

Green Lake
Grand Traverse County
Betsie River Watershed, Surveyed 2013

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Environment

Green Lake (Fig. 1) is 2,000 acres in size and located approximately 15 miles southwest of Traverse City, near the Village of Interlochen in western Grand Traverse County, Michigan. The maximum depth of Green Lake is about 102 feet, with the average depth being about 35 feet. Approximately one eighth of the lake is shallower than 15 feet. Substrates in Green Lake consist mostly of marl, sand, and organic matter. The surrounding area is hilly and mostly forested, although some development is present as well. There are also some large wetland complexes nearby. The shoreline of Green Lake is fairly developed with homes and cottages, although not quite as heavily developed as other nearby lakes like Long and Silver. Duck Lake, a similarly sized lake, is located directly to the east of Green Lake, with less than ¼ mile of land separating the two lakes. Duck Lake was most recently surveyed in 2008 (Tonello 2012) and hosts good fishing for panfish, largemouth bass, smallmouth bass, northern pike, and stocked lake trout. Both Duck and Green Lakes are regulated as Type B Trout Lakes. This means that they are open to year-round fishing, with minimum size limits of 10 inches for brook trout, coho salmon, and Chinook salmon, 12 inches for brown and rainbow trout, and 15 inches for lake trout. The daily possession limit is five trout or salmon, with no more than three 15 inches or greater in size.

Interlochen State Park, a very popular campground, is located on the western shore, between Duck and Green Lakes. Interlochen State Park was the first state park in Michigan, dedicated by the Michigan legislature in 1917. The Interlochen Center for the Arts, a privately-owned camp and boarding school is located just north of the State Park, and is also between the two lakes. Public access to Green Lake is available at Interlochen State Park, which hosts a boat launch. There is also another DNR boat launch on Green Lake on the west shore of the Green Lake.

Green Lake is in the headwaters area of the Betsie River watershed. It has one stream flowing into it, which enters Green Lake at its northern tip. That stream is the outlet flow from Duck Lake, and also has outlet flows from other small lakes in the area, including Round, Cedar Hedge, Tuller's, and Bridge Lakes. The Betsie River begins as it flows out of the southern tip of Green Lake (Fig. 1).

History

The first recorded fish stocking in Green Lake was in 1933 when bluegill and largemouth bass fingerlings were stocked (Table 1). Since then, Green Lake has had a long and varied stocking history. Other species stocked in the early 1900s included "Great Lakes Shiners" (likely emerald shiners), walleye, and yellow perch. Stockings of warm water species ceased in 1944, and rainbow trout were first stocked in 1949. Rainbow trout were stocked in most years through 1962, and then in 1965 lake trout and brown trout were first stocked. Through the 1970s and 1980s, brown trout were heavily

stocked, joined in some years by lake trout. Splake were also stocked several times in the late 1980s. Since 1992, only lake trout have been stocked into Green Lake.

The first fisheries survey of Green Lake was conducted in 1947 by the Michigan Department of Conservation (MDOC; the precursor to today's Department of Natural Resources (DNR)). The researchers used seines in the survey and also observed fish with an underwater light at night. Species caught or observed included yellow perch, bluegill, rock bass, largemouth bass, white sucker, lake herring (cisco), longnose gar, northern pike, bowfin, common shiner, bluntnose minnow, logperch, and Johnny darter (Table 2). A file report from MDOC Biologist Stanley Lievense discusses the lack of walleye survival, which had been stocked as fry in a number of different years prior to 1947 (Table 1). Mr. Lievense attributed the lack of survival to predation. He recommended against further walleye stocking and instead called for the stocking of rainbow trout.

In 1950, an extensive survey of Green Lake was conducted using gill nets and seines. In addition to the species captured in 1944, other species caught included rainbow trout, smallmouth bass, spottail shiner, brook silverside, and hornyhead chub. The survey file also contains a number of angler reports regarding the stocked rainbow trout from the early 1950s, with anglers routinely catching rainbow trout up to 24 inches in length.

Other fisheries surveys of Green Lake were conducted by the MDOC and DNR in 1967, 1975, 1981 (Hay 1981), 1989 (Hay 1989), 1997 (Hay 1997), and 2003 (Kalish 2003). The 1967, 1975, and 1981 surveys utilized only gill nets. The fish species composition of these surveys did not differ appreciably from the 1947 and 1950 surveys (Table 2). Species caught that had not been observed in prior surveys included brown trout, rainbow smelt, splake, yellow bullhead, and brown bullhead. Hay (1981) indicates that the splake caught in 1981 were caught near the inlet and were likely migrants from Duck Lake (since splake had not yet been stocked into Green Lake). Age and growth analysis from the 1981 survey indicated that yellow perch were growing slowly, brown trout were growing rapidly, and most other species were growing at rates near the State average.

The 1989 and 1997 surveys were the first in which fyke nets were used in addition to gill nets (Hay 1989, 1997). This allowed for better surveying of shallow waters, leading to greater numbers of panfish and bass caught. The surveys revealed good populations of bluegill, cisco, smallmouth bass, and rock bass. Lesser numbers of largemouth bass, pumpkinseed sunfish, northern pike, splake lake trout, yellow perch, bowfin, white sucker, longnose gar, black bullhead, and brown bullhead were also caught. Two lake trout were also caught in the 1989 survey, the first ever caught in a fisheries survey of Green Lake. Seven more lake trout were caught in the 1997 survey. In both of those surveys, both bluegill and yellow perch were growing slower than the State average.

The 2003 fisheries survey also utilized fyke nets and experimental gill nets, but also saw the first use of electrofishing and seining on Green Lake (Kalish, 2004). In the 2003 survey, a total of 2,076 fish weighing 759.4 lbs were caught. Bluegill, rock bass, and spottail shiner were the most numerous species caught. Other species present in good numbers included yellow perch, largemouth bass, smallmouth bass, common shiner, longnose gar, and pumpkinseed sunfish. Seventeen lake trout from 7 to 35 inches in length were caught, indicating continues success with the lake trout stocking program. One warmouth was recorded in the catch, but this fish may have been a misidentified longear sunfish.

Green Lake is substantially north of the known range of warmouth in Michigan. Bluegill, largemouth bass, and yellow perch from the 2003 survey were growing slower than the State average.

Creel census surveys were conducted on Green Lake in the summer of 2003 and the winter of 2004 (DNR Fisheries Division, unpublished data; Table 8). In the summer creel survey, it was estimated that 40,608 fish were caught, with 29,578 of those released. Bluegill was the most commonly caught species, with 4,541 kept and 15,507 released. One striking feature of the summer creel survey was the relatively small number of sport fish that were kept: only 469 smallmouth bass were kept while 3,928 were released; only 157 largemouth bass were kept while 1,943 were released. The total summer angler effort was 23,697 angler hours (7,943 angler trips).

For the winter 2004 Green Lake creel survey, the daytime and nighttime (mostly targeting rainbow smelt) were separated. For the winter daytime effort, an estimated 4,436 fish were caught, with 2,168 released. Yellow perch were the most commonly caught species, with 2,037 kept and 2,093 released. The winter daytime ice fishery on Green Lake generated a total of 18,279 angler hours (5,781 angler trips). The winter nighttime ice creel effort resulted in an estimated catch of 54,938 rainbow smelt and generated 29,766 angler hours (9,260 angler trips). In total, the 2004 Green Lake fishery generated 71,742 angler hours (22,984 angler trips). Based on a value of \$39/day for daily angler expenditures (U.S. Department of the Interior, Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau 2011) the Green Lake fishery is worth at least \$896,376 to the local economy on an annual basis.

From 1994-2013, a total of 87 exceptional fish caught from Green Lake have been entered into the DNR Fisheries Division Master Angler program (Table 3). Of those 87 fish, the vast majority were rock bass (49 entries). Smallmouth bass were also well-represented with 22 entries. Other species, each represented by five entries or less, included bluegill, bowfin, longnose gar, northern pike, lake trout, and rainbow smelt. The large number of Master Angler entries for Green Lake speaks to the popularity of fishing on Green Lake.

Current Status

The most recent comprehensive fisheries survey of Green Lake was conducted by the DNR in the summer of 2013. The netting portion of the survey took place from May 20th through May 24th. Survey gear used included two large-mesh fyke nets (7 net-nights), two trap nets (8 net-nights), one small-mesh fyke net (four net-nights), two experimental graded-mesh inland gill nets (6 net-nights), and two straight-run gill nets (7 net-nights). The seining and electrofishing portion of the survey took place on the evening of July 30th. In that effort, six seine hauls were conducted, and three ten minute transects were electrofished. The primary purpose of this survey was to assess the status of all fish populations in Green Lake, with additional focus on the lake trout population.

During the 2013 May netting survey, a total of 1,072 fish were caught, representing 14 different species (Table 4). Rock bass were the most frequently collected species, with a total of 499 caught. They represented 46.5% of the total catch by number and ranged from 3 to over 12 inches in length. Other panfish species collected included bluegill (80 from 2-10 inches), pumpkinseed sunfish (7 from 4-9 inches), and yellow perch (103 from 5-13 inches).

Game fish species caught in the 2013 May netting survey included largemouth bass, smallmouth bass, northern pike, and lake trout (Table 4). Totals of 76 largemouth and 68 smallmouth bass were caught, with both species ranging up to 20 inches. The largemouth bass averaged 14.7 inches, with 74% over 14 inches in length. The smallmouth bass averaged 15.6 inches, with 58% over 14 inches in length. The northern pike catch consisted of 49 individuals from 11 to 32 inches, averaging 23.7 inches. A total of 16 lake trout were caught, ranging from 23-32 inches.

In the July 2013 seining and electrofishing portion of the survey, a total of 536 fish were caught, representing 18 species (Table 5). Spottail shiners, mimic shiners, and bluegill were the most commonly collected species from this portion of the survey.

Most species caught in the 2013 Green Lake survey showed growth near the State of Michigan length at age average (Tables 6 and 7). The exceptions were lake trout, which were growing much faster than the State average, and smallmouth bass, which were also growing well. Young largemouth bass (ages -2 and -3) from the seining and electrofishing portion of the survey were growing slowly, but older age classes (ages -5 through -9) from the netting portion of the survey were growing at rates nearer to the State average.

Fish species that were not caught in the 2013 survey of Green Lake but had been reported in previous surveys included black bullhead, blackside darter, brown trout, hornyhead chub, cisco, logperch, rainbow smelt, rainbow trout, and splake. New species documented in the 2013 survey included Iowa darter, longear sunfish, and mimic shiner.

Analysis and Discussion

One of the reasons for conducting the 2013 survey of Green Lake was to evaluate the lake trout stocking program, which had been underway since 1982 (Table 1). The catch of 16 lake trout representing four different age classes verifies that the stocking program is successful. Also, the lake trout are exhibiting phenomenal growth rates, much higher than the State average. This is likely due to the abundant forage available in Green Lake in the form of rainbow smelt. However, the 2003/2004 creel effort showed very low catch of lake trout, both in summer and winter (Table 8).

The 2013 DNR fisheries survey showed that Green Lake has generally healthy gamefish populations. Largemouth and smallmouth bass in particular were numerous and are keystone predators. In the 2003 survey, both species were much less abundant than in 2013. The 2013 survey showed that the bass populations of Green Lake are well balanced, with good growth, multiple year classes represented in the catch, and many individuals exceeding the minimum legal-size limit of 14 inches. Green Lake has a reputation for providing excellent bass fishing opportunities, and the 2013 survey confirmed that. The northern pike catch in the 2013 survey was also much more numerous than in previous surveys, nearly half of the fish caught exceeding the minimum legal length of 24 inches.

The panfish populations in Green Lake also appear to be healthy, for the most part. Although the bluegill and pumpkinseed sunfish populations in Green Lake are not overly large, they grow well and can attain "keeper" sizes. The rock bass population in Green Lake is robust, including many individuals exceeding the minimum Master Angler length of 11 inches. The yellow perch population

of Green Lake is also healthy, averaging nearly 8 inches in length, with individuals present up to 13 inches.

Management Direction

Green Lake is an extremely popular lake for sportfishing. It is well-known for multiple fisheries, including a very popular rainbow smelt fishery, the likes of which can only be found on a handful of other inland lakes in Michigan. The large number of Master Angler entries for Green Lake speaks to the quality and popularity of Green Lake for anglers. The 2003/2004 creel survey showed that the Green Lake fishery was worth nearly \$900,000 to the local economy. Due to inflation rates in the 10+ years since the survey was conducted, it can easily be assumed that the Green Lake fishery today is worth well over \$1,000,000 to the economy of Grand Traverse County and the Interlochen area.

Green Lake is a rare natural resource in that it has deep, cold water that can harbor species like lake trout, cisco, and rainbow smelt. For the last 30+ years, Green Lake has had a reputation as a good lake for catching lake trout. The Green Lake lake trout population is likely entirely dependent on stocking. Therefore, we should continue to stock 12,000 yearling lake trout into Green Lake annually (a rate of 6 yearlings per acre). However, the extremely low catch of lake trout in the 2003/2004 creel effort is disturbing. It is questionable whether many anglers are actively targeting lake trout on Green Lake. If it is determined that lake trout stocking in Green Lake is not being adequately utilized by the angling public, then the stocking program should be cut.

Native species like bluegill, pumpkinseed sunfish, rock bass, northern pike, largemouth bass, and smallmouth bass should continue to thrive in Green Lake without direct management efforts. However, the lack of cisco in the catch of the 2013 survey of Green Lake is concerning, especially considering that cisco had been caught in virtually all previous surveys of Green Lake (Table 2). Additionally, cisco were noticeably absent in a 2008 MDNR fisheries survey of Duck Lake as well (Tonello 2012). Future fisheries surveys should make a concerted effort to sample cisco in particular on both Duck and Green Lakes. Cisco are listed as a "Threatened" species by the Michigan Department of Natural Resources.

Any remaining riparian wetlands adjacent to Green Lake should be protected as they are critical to the continued health of the aquatic community of Green Lake. Future riparian development and wetland loss may result in deterioration of the water quality and aquatic habitat. Healthy biological communities in inland lakes require suitable natural habitat. Human development within the lake watershed, along the shoreline, and in the lake proper has a tendency to change and diminish natural habitat. Appropriate watershed management is necessary to sustain healthy biological communities, including fish, invertebrates, amphibians, reptiles, birds and aquatic mammals. Generally for lakes this includes maintenance of good water quality, especially for nutrients; preservation of natural shorelines, especially shore contours and vegetation; and preservation of bottom contours, vegetation, and wood structure within a lake. Guidelines for protecting fisheries habitat in inland lakes can be found in Fisheries Division Special Report 38 (O'Neal and Soulliere 2006).

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Figure 1. Green Lake, Grand Traverse County, MI.

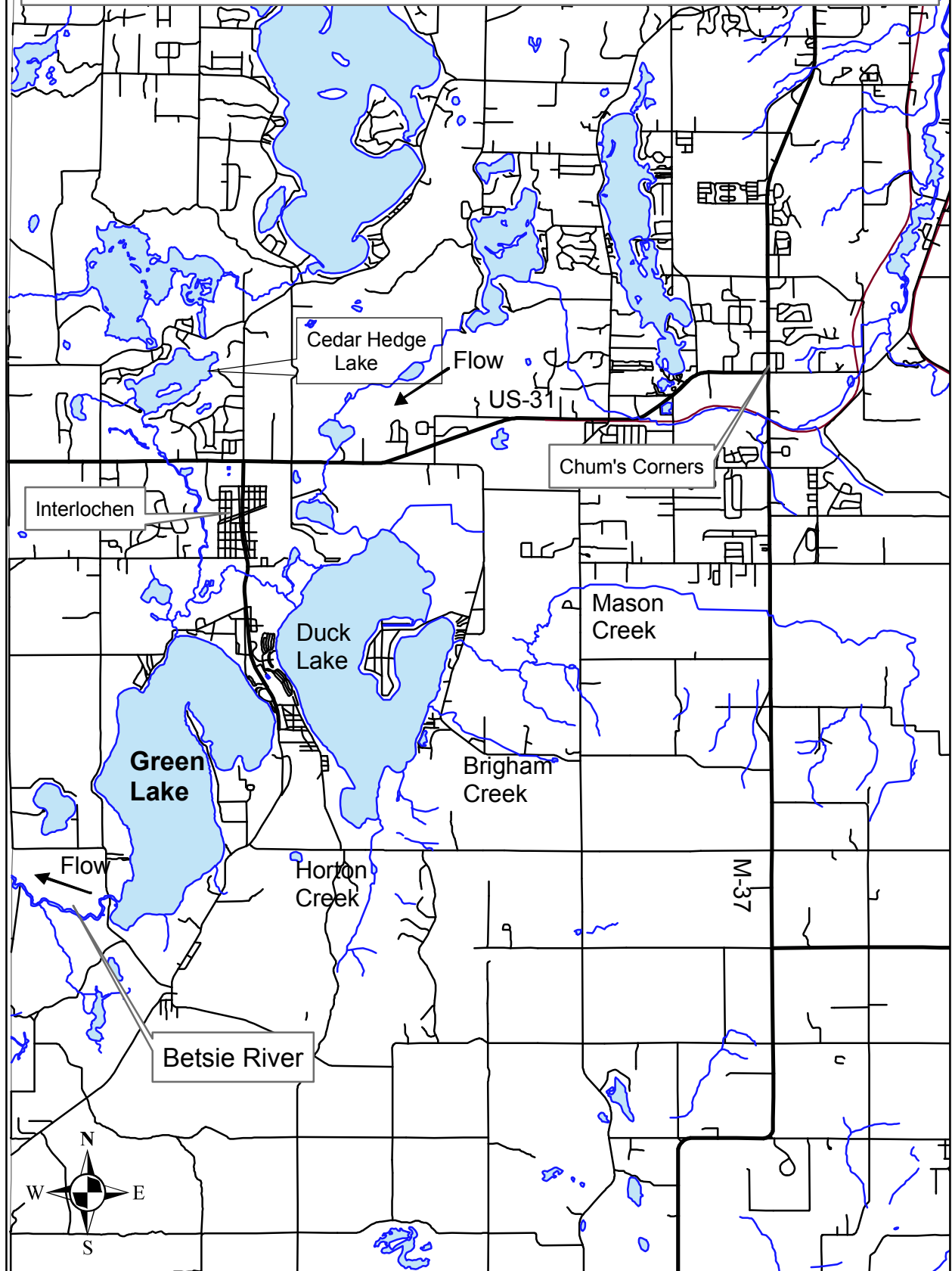


Table 1. Fish stocked in Green Lake, Grand Traverse County, 1933-2013.

Year	Species	Number	Size/age	Strain
1933	bluegill	3,000	6 mo.	
	largemouth bass	1,000	6 mo.	
1935	bluegill	6,000	4 mo.	
	shiners	250,000	fry	
	walleye	170,000	fry	
	yellow perch	25,000	7 mo.	
1936	bluegill	150	yearlings	
	largemouth bass	150	yearlings	
	largemouth bass	1,000	4 mo.	
	shiners	27,000	fry	
	walleye	300,000	fry	
	yellow perch	3,250	8 mo.	
1937	bluegill	20,000	5 mo.	
	walleye	255,000	fry	
	yellow perch	10,000	7 mo.	
1938	bluegill	20,000	4 mo.	
	largemouth bass	200	3 mo.	
	walleye	200,000	fry	
1939	bluegill	25,000	5 mo.	
	largemouth bass	1,000	5 mo.	
	walleye	200,000	fry	
	yellow perch	8,000	7 mo.	
1940	bluegill	600	yearlings	
	largemouth bass	2,400	3-7 mo.	
	walleye	180,000	fry	
1941	bluegill	10,000	4 mo.	
	largemouth bass	800	4 mo.	
1942	bluegill	20,000	4 mo.	
	largemouth bass	800	4 mo.	
	walleye	200,000	fry	
1943	bluegill	1,000	yearlings	
	largemouth bass	800	4 mo.	
1944	bluegill	1,000	yearlings	
	largemouth bass	800	3 mo.	
1949	rainbow trout	2,000	yearlings	
1950	rainbow trout	2,000	yearlings	
1951	rainbow trout	2,000	yearlings	
	rainbow trout	7,000	fall fingerlings	
1952	rainbow trout	5,000	yearlings	
1953	rainbow trout	5,000	yearlings	
1954	rainbow trout	5,000	yearlings	
1955	rainbow trout	62,000	fall fingerlings	
1957	rainbow trout	5,000	yearlings	
1958	rainbow trout	6,000	yearlings	
1961	rainbow trout	5,000	yearlings	
1962	rainbow trout	5,000	yearlings	
1965	brown trout	25,000	yearlings	
	lake trout	31,300	yearlings	

Table 1 continued. Fish stocked in Green Lake, Grand Traverse County, 1933-2013.

1968	brown trout	10,000	yearlings	
1969	rainbow trout	10,000	yearlings	
1970	brown trout	1,000	adults	
	rainbow trout	20,000	yearlings	
1971	brown trout	13,559	adults	
1972	brown trout	20,467	yearlings	
1973	brown trout	23,225	yearlings	
1974	brown trout	20,000	yearlings	
1975	brown trout	20,000	yearlings	
1976	brown trout	20,000	yearlings	
1977	brown trout	4,811	adults	
	brown trout	20,006	yearlings	
1978	brown trout	10,000	yearlings	
1979	brown trout	10,000	yearlings	
1981	brown trout	8,000	yearlings	Harrietta
1982	brown trout	5,000	yearlings	Harrietta
	lake trout	10,000	yearlings	Marquette
1983	brown trout	10,000	yearlings	Harrietta
	lake trout	10,000	yearlings	Marquette
	lake trout	11,400	fall fingerlings	Marquette
1984	brown trout	10,000	yearlings	Harrietta
1985	brown trout	10,330	yearlings	Wild Rose
	lake trout	4,000	yearlings	
	splake	18,000	yearlings	
1986	brown trout	11,400	yearlings	Wild Rose
1987	brown trout	3,100	yearlings	Plymouth Rock
	brown trout	11,900	yearlings	Soda Lake
	splake	12,000	yearlings	
1988	brown trout	15,000	yearlings	Plymouth Rock
	splake	12,000	yearlings	
1989	brown trout	15,000	yearlings	Plymouth Rock
1990	brown trout	18,593	yearlings	Soda Lake
	lake trout	11,700	yearlings	Marquette
1991	brown trout	36,000	yearlings	Plymouth Rock
1992	lake trout	15,700	yearlings	Lake Superior
1993	lake trout	15,900	yearlings	Marquette
1994	lake trout	10,600	yearlings	Marquette
1996	lake trout	16,000	yearlings	Marquette
1997	lake trout	9,130	yearlings	Marquette
1998	lake trout	11,900	yearlings	Marquette
1999	lake trout	16,000	yearlings	Marquette
2000	lake trout	6,100	yearlings	Marquette
2001	lake trout	16,000	yearlings	Marquette
2002	lake trout	16,950	yearlings	Marquette
2003	lake trout	16,000	yearlings	Marquette
2004	lake trout	16,500	yearlings	Marquette
2005	lake trout	15,000	yearlings	Marquette
	lake trout	8,896	fall fingerlings	Lake Superior
2006	lake trout	15,000	yearlings	Marquette

Table 3. Michigan DNR Master Angler awards issued for fish caught from Green Lake, Grand Traverse County, 1994-2013.

Species	Number of Master Angler awards issued
Bluegill	5
Bowfin	3
Lake trout	2
Longnose gar	4
Northern pike	1
Rainbow smelt	1
Rock bass	49
Smallmouth bass	22
Total:	87

Table 4. Number, weight, and length of fish collected from Green Lake with large mesh fyke nets, small mesh fyke nets, trap nets, and inland gillnets on May 20-24, 2013.

Species	Number	Percent by number	Weight (Pounds)	Percent by weight	Length range (inches) ¹	Average length	Percent legal size ²
bluegill	80	7.5	20.7	1.5	2-12	6.5	60 (6")
bowfin	34	3.2	120.6	9.0	11-28	20.5	
brown bullhead	48	4.5	44.3	3.3	10-14	12.5	100 (7")
lake trout	16	1.5	156.3	11.7	23-32	29.8	100 (15")
largemouth bass	76	7.1	139.5	10.4	7-20	14.7	74 (14")
longnose gar	2	0.2	6.4	0.5	23-37	30.0	
northern pike	49	4.6	155.9	11.6	11-32	23.7	49 (24")
pumpkinseed							
sunfish	7	0.7	2.8	0.2	4-9	7.4	86 (6")
rock bass	499	46.5	365.3	27.2	3-12	9.6	88 (6")
smallmouth bass	68	6.3	150.4	11.2	7-20	15.6	58 (14")
spottail shiner	42	3.9	1.5	0.1	3-5	4.3	
white sucker	47	4.4	152.9	11.4	17-22	20.2	
yellow bullhead	1	0.1	0.4	0.0	9-9	9.5	100 (7")
yellow perch	103	9.6	23.9	1.8	5-13	7.8	51 (7")
Total	1,072	100	1340.9	100			

¹Note 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.

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

Table 5. Number, weight, and length of fish collected from Green Lake with electrofishing and seining on July 30, 2013.

Species	Number	Percent by number	Weight (Pounds)	Percent by weight	Length range (inches) ¹	Average length	Percent legal size ²
banded killifish	15	2.8	0.1	0.2	2-2	2.5	
bluegill	98	18.3	6.0	10.5	1-6	4.3	2 (6")
bluntnose minnow	28	5.2	0.0	0.0	1-2	1.7	
bowfin	3	0.6	15.1	26.4	22-26	24.2	
brook silverside	3	0.6	0.0	0.0	1-3	2.5	
creek chub	1	0.2	0.0	0.0	2-2	2.5	
common shiner	1	0.2	0.0	0.0	3-3	3.5	
lowa darter	1	0.2	0.0	0.0	2-2	2.5	
largemouth bass	26	4.9	13.8	24.2	1-17	8.2	12 (14")
longnose gar	1	0.2	0.6	1.1	20-20	20.5	
longear sunfish	6	1.1	0.2	0.4	2-4	3.5	
mimic shiner	139	25.9	0.6	1.1	1-2	2.4	
northern pike	1	0.2	2.5	4.4	22-22	22.5	0 (24")
pumpkinseed sunfish	10	1.9	1.1	1.9	4-6	5.2	10 (6")
rock bass	37	6.9	11.0	19.3	2-10	6.8	70 (6")
smallmouth bass	10	1.9	5.1	8.9	1-19	6.1	10 (14")
spottail shiner	152	28.4	0.3	0.5	1-2	1.8	
yellow perch	4	0.7	0.7	1.2	5-8	7.3	75 (7")
Total	536	100	57.1	100			

¹Note 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.

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

Table 6. Average total weighted length (inches) at age, and growth relative to the state average, for fish sampled from Green Lake with trap nets, fyke nets, and inland gill nets, May 20-23, 2013. Number of fish aged is given in parenthesis. A minimum of five fish per age group is statistically necessary for calculating a Mean Growth Index, which is a comparison to the State of Michigan average.

Species	Age												Mean Growth Index	
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII		
Bluegill	3.0 (1)		4.3 (10)	5.4 (5)	6.2 (2)	6.9 (8)	8.2 (9)	9.3 (5)						0
Lake trout				25.3 (4)	30.6 (3)	31.2 (5)	31.8 (4)							+8.4
Largemouth bass		8.2 (2)	8.7 (3)	11.5 (4)	13.5 (9)	14.4 (8)	15.2 (15)	16.2 (12)	17.4 (5)	20.3 (2)	19.9 (1)			-0.6
Northern pike		12.0 (2)	16.6 (2)	22.9 (17)	24.2 (17)	26.3 (7)	28.7 (3)	26.0 (1)						-1.0
Pumpkin-seed sunfish			4.1 (1)		6.6 (3)		8.7 (2)		9.1 (1)					-
Rock bass			4.1 (5)	5.6 (3)	6.0 (15)	7.0 (8)	9.0 (14)	9.5 (12)	10.4 (7)	11.1 (9)	11.5 (7)	11.8 (6)		-0.3
Smallmouth bass		8.0 (4)	11.6 (7)	14.0 (19)	15.6 (7)	16.4 (6)	17.9 (5)	18.5 (8)	19.7 (4)	19.9 (4)				+1.2
Yellow perch		6.2 (5)	7.1 (18)	7.3 (7)	8.2 (10)	9.5 (6)	11.1 (6)	10.7 (2)	12.2 (4)					+0.4

Table 8. Results of the summer 2003 and winter 2004 MDNR creel survey, including an evening component targeting rainbow smelt anglers.

Species	Estimated harvest, summer 2003	Estimated released, summer 2003	
lake trout	9	0	
smallmouth bass	469	3,928	
yellow perch	2,920	3,231	
northern pike	291	831	Summer 2003 angler hours: 23,697
bluegill	4,541	15,507	
largemouth bass	157	1,943	
pumpkinseed	320	399	Summer 2003 angler trips: 7,943
rock bass	216	3,630	
green sunfish	12	0	
bowfin	0	95	
cisco	0	0	
rainbow smelt	0	0	
white sucker	0	14	

Species	Estimated harvest, winter 2004	Estimated released, winter 2004	
lake trout	0	37	Winter 2004 angler hours (non smelt): 18,279
smallmouth bass	0	0	
yellow perch	2,037	2,093	
northern pike	226	38	Winter 2004 angler trips (non smelt): 5,781
bluegill	0	0	
largemouth bass	0	0	
pumpkinseed	0	0	Winter 2004 smelt angler hours: 29,766
rock bass	0	0	
green sunfish	0	0	
bowfin	0	0	Winter 2004 smelt angler trips: 9,260
cisco	5	0	
rainbow smelt	54,891	46	
white sucker	0	0	

Total summer 2003/winter 2004 angler hours: 71,742
Total summer 2003/winter 2004 angler trips: 22,984
