# Long Lake

Oakland County (T2N, R8E, Sec. 1, 2 and T3N, R8E, Sec. 35, 36)
Huron River Watershed, Surveyed May/June 2003 and April 2007

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## Environment

Long Lake is a 156 acre kettle lake located in central Oakland County, in the northeast corner of Commerce Township. The lake is shallow, having an average depth of around 5 feet and a maximum depth of 14 feet (Figure 1). Over 90% of the lake is less than 10 feet deep with much of the 0-5 feet contour having a sandy bottom. However, in 1960 the lake averaged only 2.4 feet deep and had a maximum depth of 7 feet and the bottom consisted primarily of peat, weeds, and marl. Prior to 1965 winterkills occurred frequently, with severe winterkills taking place in 1936 and 1945. In 1960, the property owners on Long Lake contracted to have the entire lake hydraulically dredged. From 1961 to 1965, a total of 1.1 million cubic yards of bottom material were removed from Long Lake at a cost of $185,000. The lake was re-mapped in 1965. Following construction, the lake measured 156 acres, ten acres larger than before dredging, and the lake averaged 6.6 feet deep. The volume of the lake increased from 361 acre feet to 925 acre feet. After dredging, sand was the predominant lake substrate and winterkill no longer occurred.

Long Lake is located in the upper reaches of the Huron River watershed. Long Lake receives intermittent flow from Cooley Lake via a culvert under Cooley Lake Road, which discharges next to the public access site. Water leaves the lake through a wetland area at the west end, however a control structure and dyke were installed for the dredging project. A portion of the wetland was also filled with spoils from the dredging project. There appears to be little flow of water out of the marsh now. The geology of the area surrounding the lake is characterized by sand and gravel glacial outwash. These areas are well drained and allow good infiltration to the ground water. The watershed to lake ratio is 1.02 to 1, which is very small. Due to the small ratio, the lake level varies greatly during dry periods. Historically, water was pumped from Hayes Creek to supplement the lake level. More recently, the pump was abandoned and a well is now operated to maintain lake levels. There is a public boat launch located on the north side of the lake, off of Cooley Lake Road. The shoreline has been largely developed with few natural areas remaining.

## History

Long Lake was stocked in the 1930s and 1940s with largemouth bass, bluegill, and yellow perch (Table 1). It is uncommon to stock these species today, as they are self-sustaining and ubiquitous. Following the lake dredging that was completed in 1965, 50,000 muskellunge fry were stocked in 1966. Fisheries evaluations in 1968 and 1969 found no muskies.

Fisheries surveys were conducted in 1966, 1968, and 1969 and found typical species including bluegill, pumpkinseed, yellow perch, black crappie, rock bass, largemouth bass, and bullhead. In 1971, a DNR Biologist attended the Long Lake Association meeting and anglers reported that largemouth bass fishing was good, yellow perch were scarce but large, and bluegills were abundant but small with few bluegills over six inches. In an effort to reduce bluegill numbers to improve the size of

bluegills, a three year plan was approved to treat the lake with antimycin from 1971 to 1973. Antimycin is a fish toxicant that is applied in the shallows targeting bluegill during the spawn. The attempt in 1971 was unsuccessful because the antimycin concentration was too low. The concentration was increased in 1972 and the results were more effective. The DNR files do not indicate if the third treatment was applied in 1973.

Fish surveys in 1988 and 1996 found that the average size remained poor for bluegills and they were growing well below the state average. However, the remainder of the fish community supported a good fishery. Recommendations were made to stock redear sunfish to provide an opportunity to catch large panfish and to stock walleye to provide a predator in attempts to address the stunted bluegill (Table 1).

## Current Status

A general fish survey was conducted in May and June 2003 using a variety of gear. Three trap nets, two fyke nets, and a gill net were fished overnight on May 5 and May 6, 2003. Due to poor overall catches, three additional traps were fished overnight on June 2, 2003 in order to increase the sample size of fish. Additionally, four beach seines were pulled on June 3, 2003 and three night-time electrofishing transects were conducted on June 24, 2003. Later in the summer, on Agust 27, 2003 a limnological profile was completed. The goal of this survey was to conduct a general fisheries survey on Long Lake, with the added goals of evaluating the recent walleye and redear sunfish stockings.

A total of 1,614 fish were caught in the 2003 survey, representing 25 species (Table 2). Panfish such as bluegill, black crappie, green sunfish, rock bass, redear sunfish, yellow perch, and warmouth made up 61% of the total catch by number and 28% by weight. Predators including largemouth bass, smallmouth bass, northern pike, and walleye made up 4% of the total catch by number and 25% of the total catch by weight. A variety of forage species were caught, including banded killifish, bluntnose minnow, brook silverside, emerald shiner, mimic shiner, sand shiner, and spotfin shiner; all fairly common species in Southeast Michigan inland lakes. Bullhead were common, making up 6% of the total catch by number. Other species caught included white sucker and channel catfish.

Only 18 bluegills were caught in the 2003 survey during the ten net-nights (trap and fyke nets) fished in May. General surveys like this one are conducted during the bluegill spawning period. Water temperatures during the May 2003 survey (61degrees F) were within the preferred spawning temperatures of bluegills. Due to the poor catches for all species, additional netting was done in June. Water temperatures were warmer in June (66 degrees F) and the bluegill catch was much better.

Bluegills were the most abundant fish caught during the survey (all gear combined). They represented 53% of the total catch by number and 9% by weight (Table 2). The bluegills in the trap net catch averaged 5.0 inches in length and the mean growth index (mean growth index is the average deviation from the state average length at age) was -1.6, indicating poor growth rates (Table 3). The quality of the bluegill population in Long Lake was evaluated using Schneider's Index (Schneider 1990). This index provides a relative measure of the quality of the bluegill fishery in a lake based on a scale of 1 to 7, with 7 being the best (Schneider 1990). Based on the June trap net catch, the bluegill in Long Lake received an "acceptable" rating (score 3.0).

One of the factors contributing to the small average size of bluegill in the catch was that almost 90% of the bluegill catch was made up of age-1 to age-4 fish (Table 4). All age classes from age-1 to age-9 were represented in the catch, but there were relatively fewer older fish. Because the catch was weighted towards younger fish, it reduced the average size of the fish in the catch. In addition to the preponderance of young bluegills, the growth rates were slow for all age classes of bluegill (Table 3), further contributing to the small average size of bluegills in this survey.

There was variability in bluegill catch among recent surveys (Table 5). The biggest difference among surveys was the catch rate in 1988 compared to 1996 and 2003. The 1988 survey was conducted in mid-May and the 1996 survey was conducted in early June. Similar to what was observed in the current survey (2003), the May catch in 1988 was low compared to the June catch in 1996, even though water temperatures were suitable in mid-May. Thus the low catch rate in 1988 should be viewed cautiously because it may have been affected by poor timing of the survey. Although there was some variability in catch rates, the size of the bluegill caught was similar among all surveys; the average size was small, the growth index was well behind the state average, and the Schneider's Index scores were low.

Redear sunfish were the second most abundant panfish in the catch (Table 2). Redear sunfish averaged 7.3 inches and over 25% exceeded 10 inches (Table 6). All year classes from 1996 to 2000 were represented in the catch (ages 3 to 7) (Tables 3 and 4). Although the initial stocking did not take place until 1997, the 1996 year class is represented in the catch because the stockings included multiple year classes (young-of-the-year up to age-5). Redear sunfish from the 2000 year class were represented although stocking did not take place that year, indicating that natural reproduction is occurring.

The redear sunfish had a mean growth index of -1.3, but there were significant differences in growth based on age (Table 3). The age 3-5 fish were approximately 3 inches below the state average length-at-age, but the age-6 and age-7 fish were above the state average length-at-age.

Other panfish in the catch included black crappie, pumpkinseed, and yellow perch. Black crappie made up 3% of the total catch by number and had an average length of 9.5 inches, with 30% of the catch larger than 10 inches (May and June data combined) (Table 2). Although the fish were growing slower than the state average (-1.5 mean growth index), large fish were present because of the higher proportion of older fish (Table 4). Age-2 through age-10 fish were represented in the catch, but two-thirds of the catch was made up of age-7 and older black crappie. The pumpkinseed catch was similar to that of black crappie. Pumpkinseed made up 3% of the total catch by number, had below average growth rates (-1.3 mean growth index), and ranged in age from age-2 to age-10. Yellow perch ranged from 4 to 9 inches and were growing near the statewide average.

Larger gamefish caught during this survey included largemouth bass, smallmouth bass, and walleye. Largemouth bass made up 2.5% of the total catch by number and 11% by weight (Table 2). The catch ranged in length from 6 to 16 inches (Table 6) and the June trap net catch averaged 12.3 inches. Growth rates were also poor for largemouth bass (-1.5 mean growth index). Four smallmouth bass were caught, with two in the 15-inch size range. Based on the low catch, it was clear that smallmouth bass made-up a small part of the fishery on Long Lake. This is not surprising since smallmouth bass prefer deep lakes with rocky substrates, which is not consistent with the habitat found in Long Lake.

Six walleye were caught during the survey. They averaged 19.2 inches and were the only species in the survey that showed above average growth (+2.8 mean growth index).

Bullhead were abundant in Long Lake, making up 12% of the total catch by number and one-quarter of the total catch by weight. The bullheads were good sized, with 86% of the catch from 10 to 13 inches.

Seining and electrofishing were used to evaluate the minnow species. A variety of forage species were collected, including spotfin shiner, bluntnose minnow, mimic shiner, sand shiner, and emerald shiner.

A single channel catfish was caught during the survey, which is the first channel catfish reported from Long Lake. Given that this is the first reported catfish in Long Lake and the lack of suitable spawning habitat, the source of this catfish is likely an unauthorized stocking.

Limnology data is collected later in the summer after a lake has thermally stratified. On August 27, 2003, a temperature and oxygen profile was conducted, along with conductivity and pH measurements taken. The temperature ranged from 78 degree F at the surface to 76 degrees F at the bottom in 12 feet of water (Table 7). Due to the shallowness of Long Lake, the water stays relatively mixed and does not thermally stratify like deeper lakes in the area. Oxygen levels ranged from 10.8 mg/l at the surface to less than one on the bottom. The conductivity ranged from 424 microSiemens/centimeter on the surface to 555 microSiemens/centimeter on the bottom, and pH ranged from 8.7 to 7.1.

In addition to the general fisheries survey conducted in 2003, another survey was conducted from April 2 - April 25, 2007 to evaluate the walleye population. This was a mark-recapture study to generate a population estimate of adult walleye to evaluate the stocking program. Six trap nets were set on April 2 and the nets were lifted on April 3, April 4, April 5, April 6, and April 7. All walleye were marked with a partial caudal fin clip and released. Six trap nets were again set on April 23 and lifted on April 24 and April 25 to evaluate the proportion of marked versus unmarked walleye (Table 8). Catch and length data were recorded for walleye, northern pike, largemouth bass, and smallmouth bass, and dorsal spines were collected for aging both walleye and northern pike. The Chapman-Petersen method was used to calculate the population estimate of walleye (Schneider 2000).

A total of 69 walleye were caught during the population estimate (1.3 walleye/net night). These walleye averaged 19.8 inches and ranged in length from 14 to 25 inches. They exhibited above average growth rates (mean growth index of +1.7). The walleye ranged from age-3 to age-8 and all year classes corresponded to years that stocking occurred (Table 9). Stocking took place in 2006 but was not represented in the catch because these fish would have been too small to be captured by trap nets. The population of adult walleye was estimated to be 242 (plus/minus 189) or approximately 1.6 walleye per acre.

The 2007 walleye catch rate and population estimate for Long Lake were similar to other stocked walleye lakes in Southeast Michigan. Successful walleye lakes include Cass Lake (1.2-2.1 walleye/net night; 0.5-1.1 walleye/acre), Belleville Lake (0.9-1.8 walleye/net night), White Lake (6.8 walleye/net night; 1.5 walleye/acre), Union Lake (4.2 walleye/net night; 1.4 walleye/acre), and Kent Lake (1.5-6.6 walleye/net night; 3.3 walleye/acre). Although the size of the walleye population in Long Lake is comparable to other area lakes stocked with walleye, the management goal of the Long Lake stocking differs from these other lakes. These other lakes listed are stocked with the goal of developing walleye

fisheries, whereas the goal of the Long Lake walleye stocking was to provide predator control of stunted bluegills. Walleye predation studies have found that walleye densities as low as 0.5 walleye/acre are adequate to affect the bluegill population (Schneider and Lockwood 1997).

The 2007 northern pike catch rate was about 0.6 pike per net/night. These pike averaged 24.4 inches and 43% of the pike were larger than the minimum size limit of 24 inches. A variety of age classes from age-2 to age-10 were represented in the catch (Table 9). Age-2 and age-3 pike were growing better than the state average, but age-5 and older pike were growing slower than the state average.

The largemouth bass catch in April 2007 was similar to that of May/June 2003. The bass averaged 13.3 inches in the 2007 survey, with almost half of the catch exceeding the minimum size limit of 14-inches. Only ten smallmouth bass were caught in 2007 and they ranged from 9 to 19 inches. Data was not collected on other species caught, but observations were noted regarding the large size of crappies in the catch.

## Analysis and Discussion

Bluegills continue to be one of the most abundant fish in the catch. Catch rates were similar in 2003 compared to 1996, but were higher than in 1988. Overall, the average size and growth of bluegill has not changed considerably from 1988 to 2003; bluegill continue to be small in size and have poor growth rates. Walleye were stocked into Long Lake with the management goal of improving the size structure of bluegills. Walleye have been used successfully as a tool for improving the size of bluegills in a number of area lakes. Schneider and Lockwood (1997) evaluated walleye stockings as a bluegill control measure and found that the bluegill population improved considerably by the 5th year after stocking. The 2003 general survey was conducted the 4th year after walleye stocking was initiated, so it is possible that not enough time has elapsed to see the intended results.

The 2003 survey was the first conducted since redear sunfish stockings began. The goal of the redear program was to provide an opportunity to catch large panfish, especially in a lake that had a history of small bluegills. This program has been successful as 25% of the total redear catch exceeded 10 inches, which is the minimum size required to qualify for the MDNR, Master Angler Program. Although the fish reached a large size, there were differences in growth by age. The age-3 through age-5 fish were growing about 3 inches below the statewide average. However, by age-6 and age-7, the fish caught up and exceeded the statewide average length at age. It is possible there is a space (habitat) or a food limitation for small fish that they are able to overcome once they reach a certain size.

The goal of the redear sunfish program is to establish a naturally reproducing, self-sustaining population. Redear sunfish are generally stocked for 3-4 years, at which point the population becomes established and natural reproduction is sufficient to maintain the population. The presence of redears from the 2000 year-class, when stocking did not occur, confirm that successful reproduction is occurring. While this is encouraging, overall catches of this year-class were low. Future surveys should evaluate the success of redear sunfish production in Long Lake.

The walleye population estimate in spring 2007 was about 1.6 walleye per acre. This estimate compares favorably with populations in other managed lakes and exceeds the level of 0.5 walleye/acre needed to manage the bluegill population. Walleye was the only species in the survey that had above

average growth rates. Another general survey should be completed to evaluate the response of the bluegill population to the walleye program.

Largemouth bass and northern pike had good catch rates, but there were few smallmouth bass. Although all three species had below average growth rates, there were good numbers of legal-sized fish to support good fisheries.

The yellow perch catch in 2003 mirrors the reports from anglers in the 1970s; not good numbers, but the ones that were caught were good sized.

## Management Direction

The redear sunfish stocking program in Long Lake has been very successful. Redears are attaining a large size, appear to be self-sustaining, and are targeted by anglers. During the 2003 survey, we spoke with an angler who targeted Long Lake specifically because of the large redear sunfish that were available. This angler was willing to travel from a neighboring county just for the opportunity to catch large redear sunfish. The redear sunfish, along with black crappie and yellow perch provide a good panfish fishery on Long Lake.

The small, slow growing bluegills that were repored in the first fish reports in the 1960s continue to be a problem. Improvement in the bluegill population would futher complement the existing good fishery for panfish. The walleye stocking program should continue and another general survey should be completed in 2009 to evaluate the changes in the bluegill population. Based on the poor netting results observed in May of 1988 and 2003, future surveys on Long Lake should not be done before June.

Northern pike continue to do well in Long Lake. Although growth rates were below average, there were good numbers of large fish and a variety of year-classes represented. The loss of wetlands and marshes, which are required for northern pike production, continue to be a threat to pike populations. Pike are self-sustaining in this lake, providing sufficient numbers to provide a fishery, as well as provide balance to the fish community through predation of other fish. Remaining marshes and wetlands should be protected to maintain existing habitat. Furthermore, wetlands should be restored where possible to expand habitat for this important species.

## References

Schneider, J. C. (ed.) 2000. Manual of fisheries survey methods II: with periodic updates. Michigan Department of Natural Resources, Fisheries Special Report 25, Ann Arbor.

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

Schneider, J. C. and R. N Lockwood. 1997. Experimental management of stunted bluegill lakes. Michigan Department of Natural Resources, Research Report 2040, Ann Arbor.

Figure 1.-Lake map of Long Lake, Oakland County.

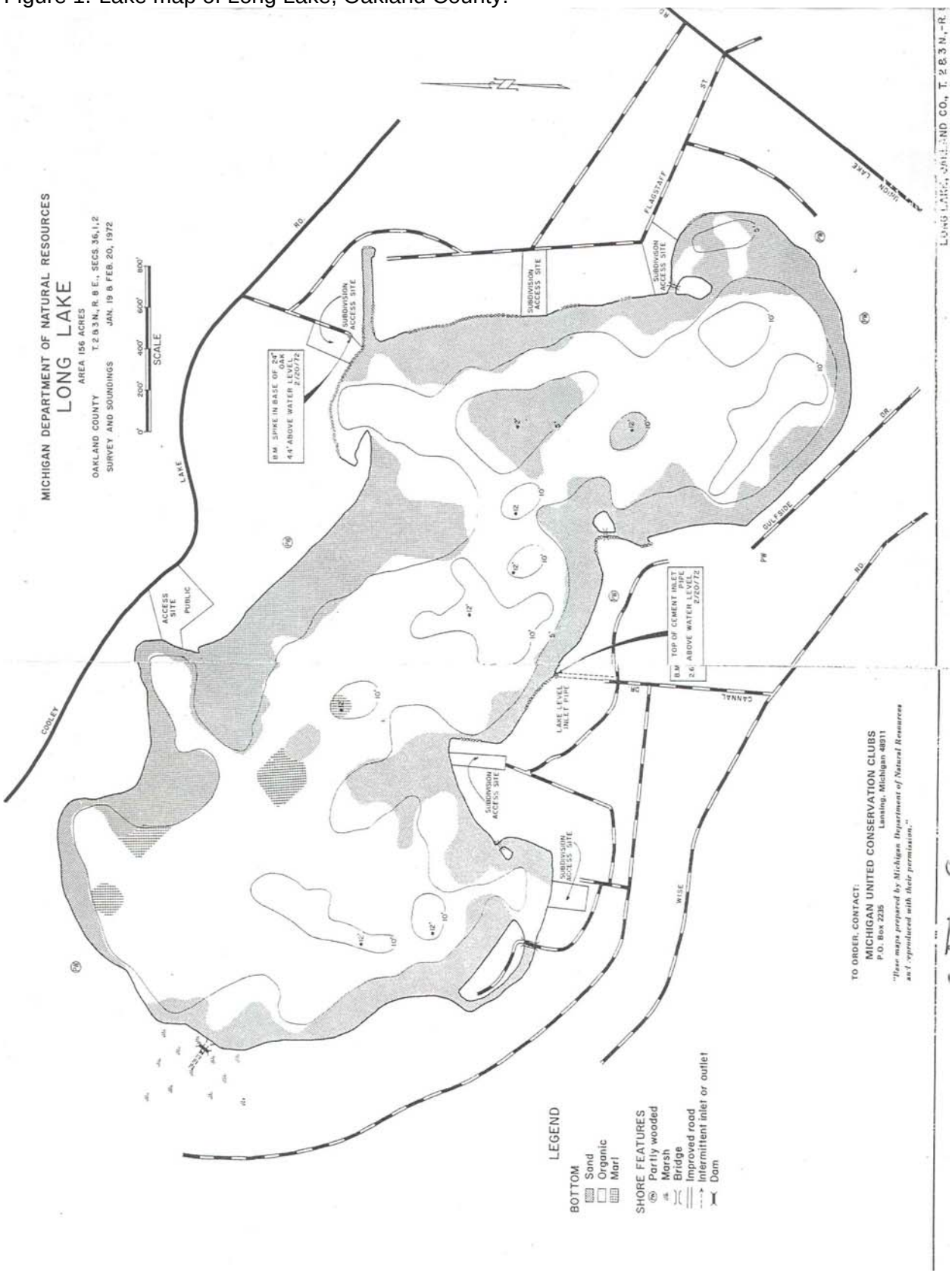

Table 1.-Summary of fish stocking into Long Lake, Oakland County.

| Stocking year | Species | Number stocked | Age at stocking/ average size |
|---|---|---|---|
| 1934 | Bluegill | 2,000 | 5 months |
| | Yellow perch | 1,400 | 7 months |
| | Yellow perch | 1,500 | Yearlings |
| 1935 | Bluegill | 3,000 | 4 months |
| | Largemouth bass | 500 | 4 months |
| | Yellow perch | 2,500 | 7 months |
| 1936 | Bluegill | 3,000 | 4 months |
| | Largemouth bass | 600 | 4 months |
| | Yellow perch | 10,000 | 8 months |
| 1937 | Bluegill | 6,500 | 4 months |
| | Largemouth bass | 450 | 3 months |
| | Yellow perch | 2,000 | 7 months |
| 1938 | Largemouth bass | 600 | 3 months |
| 1939 | Bluegill | 11,000 | 4 months |
| | Largemouth bass | 800 | 3 months |
| 1940 | Bluegill | 5,000 | 4 months |
| | Largemouth bass | 200 | 4 months |
| 1941 | Bluegill | 10,000 | 4 months |
| | Largemouth bass | 500 | 4 months |
| 1942 | Bluegill | 4,000 | 4 months |
| 1943 | Bluegill | 6,000 | 4 months |
| | Largemouth bass | 300 | 5 months |
| 1945 | Bluegill | 9,600 | 4 months |
| | Bluegill | 50 | Adults |
| | Largemouth bass | 3,960 | 4 months |
| 1967 | Muskellunge | 50,000 | Fry |
| 1997 | Redear sunfish* | 1,775 | 5.1 inches |
| 1998 | Redear sunfish* | 857 | 4.8 inches |
| 1999 | Redear sunfish* | 347 | 6.3 inches |
| | Walleye | 13,320 | 2.3 inches |
| 2000 | Walleye | 15,358 | 1.5 inches |
| 2001 | Walleye | 4,895 | 1.9 inches |
| 2002 | Walleye | 13,750 | 2.4 inches |
| 2004 | Walleye | 15,380 | 1.9 inches |
| 2006 | Walleye | 9,072 | 1.9 inches |

*- Multiple year-classes were stocked.

Table 2.-Species catch and relative abundance of fishes collected with all gear types combined during the Long Lake fish community survey 2003.

| Species | Number | Percent by number | Weight (lb) | Percent by weight | Length range (in) | Average length (in) | Percent legal size* |
|---|---|---|---|---|---|---|---|
| Bluegill | 847 | 52.5 | 25.3 | 8.7 | 1-8 | 3.1 | 3 |
| Spotfin shiner | 202 | 12.5 | 0.3 | 0.1 | 1-3 | 1.6 | -- |
| Bluntnose minnow | 100 | 6.2 | 0.2 | 0.1 | 1-2 | 1.8 | -- |
| Brown bullhead | 69 | 4.3 | 49.1 | 17.0 | 7-13 | 11.3 | 100 |
| Redear sunfish | 59 | 3.7 | 24.9 | 8.6 | 3-11 | 7.1 | 54 |
| Black crappie | 46 | 2.9 | 23.5 | 8.1 | 4-13 | 9.5 | 98 |
| Mimic shiner | 45 | 2.8 | 0.1 | <0.1 | 1 | 1.5 | -- |
| Pumpkinseed | 42 | 2.6 | 7.5 | 2.6 | 1-8 | 5.5 | 38 |
| Largemouth bass | 40 | 2.5 | 32.7 | 11.3 | 6-16 | 11.0 | 17.5 |
| Banded killifish | 40 | 2.5 | 0.1 | <0.1 | 1-2 | 1.5 | -- |
| Black bullhead | 34 | 2.1 | 25.7 | 8.9 | 9-13 | 11.7 | 100 |
| Sand shiner | 21 | 1.3 | <0.1 | <0.1 | 1-2 | 1.6 | -- |
| Yellow perch | 15 | 0.9 | 2.3 | 0.8 | 4-9 | 6.8 | 33 |
| White sucker | 10 | 0.6 | 28.3 | 10.0 | 13-22 | 18.8 | -- |
| Rock bass | 9 | 0.6 | 2.4 | 0.8 | 2-9 | 6.4 | 56 |
| Northern pike | 8 | 0.5 | 18.4 | 6.4 | 15-28 | 20.8 | 25 |
| Walleye | 6 | 0.4 | 14.4 | 5.0 | 14-21 | 19.2 | 83 |
| Green sunfish | 6 | 0.4 | 1.6 | 0.6 | 5-8 | 7.0 | 83 |
| Smallmouth bass | 4 | 0.2 | 5.5 | 1.9 | 9-15 | 13.5 | 50 |
| Hybrid sunfish | 4 | 0.2 | 0.6 | 0.2 | 1-7 | 5.0 | 50 |
| Common carp | 3 | 0.2 | 24.5 | 8.5 | 25-26 | 26.2 | -- |
| Warmouth | 1 | 0.1 | 0.1 | <0.1 | 5 | 5.5 | 0 |
| Brook silverside | 1 | 0.1 | <0.1 | <0.1 | 1 | 1.5 | -- |
| Emerald shiner | 1 | 0.1 | <0.1 | <0.1 | 1 | 1.5 | -- |
| Channel catfish | 1 | 0.1 | 1.9 | 0.7 | 18 | 18.5 | 100 |

*Legal size refers to the minimum legal size limit where applicable or minimum size acceptable to anglers.

Table 3.-Mean length-at-age (inches) for selected fish species from Long Lake 2003. Number in parenthesis represents the number of fish aged.

| Species | Age group | State average | 2003 |
|---|---|---|---|
| Black crappie | II | 6.5 | 4.6 (1) |
| | III | 7.9 | |
| | IV | 8.9 | 8.3 (2) |
| | V | 9.7 | 8.0 (3) |
| | VI | 10.4 | 8.7 (9) |
| | VII | 11.1 | 9.2 (18) |
| | VIII | 11.6 | 10.9 (5) |
| | IX | | 12.0 (2) |
| | X | | 13.5 (2) |
| | Mean Growth Index | | -1.4 |
| Bluegill | I | 2.4 | 1.9 (11) |
| | II | 4.2 | 2.6 (9) |
| | III | 5.3 | 3.9 (4) |
| | IV | 6.2 | 4.1(31) |
| | V | 6.9 | 4.8 (17) |
| | VI | 7.4 | 5.1 (10) |
| | VII | 8.0 | 6.9(8) |
| | VIII | 8.4 | 7.9 (3) |
| | IX | 8.7 | 8.8 (1) |
| | Mean Growth Index | | -1.6 |
| Largemouth bass | II | 8.7 | 8.1 (6) |
| | III | 10.6 | 8.0 (7) |
| | IV | 12.0 | 10.7 (13) |
| | V | 13.7 | 12.1 (6) |
| | VI | 15.0 | 14.1 (2) |
| | VII | 16.7 | 15.0 (3) |
| | VIII | 17.6 | 16.0(3) |
| | Mean Growth Index | | -1.5 |
| Northern Pike | II | 19.0 | 17.5 (3) |
| | III | 21.8 | 18.7 (2) |
| | IV | 24.2 | |
| | V | 26.1 | 28.2 (1) |
| | VI | 27.8 | |
| | VII | 30.0 | |
| | VIII | | |
| | IX | | 28.3 (1) |

Table 3.-Continued

| Species | Age group | State average | 2003 |
|---|---|---|---|
| Pumpkinseed | II | 4.2 | 3.1 (1) |
| | III | 5.2 | 3.6 (5) |
| | IV | 5.8 | 4.3 (10) |
| | V | 6.3 | 3.9 (3) |
| | VI | 6.8 | 5.6 (2) |
| | VII | 7.2 | 6.4 (10) |
| | VIII | | 7.3 (4) |
| | IX | | 8.4 (4) |
| | X | | 8.9 (1) |
| | Mean Growth Index | | -1.3 |
| Redear sunfish | III | 6.9 | 3.9 (1) |
| | IV | 8.0 | 4.8 (16) |
| | V | 9.0 | 6.1 (20) |
| | VI | 9.8 | 10.3 (10) |
| | VII | 10.5 | 11.1 (8) |
| | Mean Growth Index | | -1.3 |
| Yellow perch | I | 4.0 | 4.0 (1) |
| | II | 5.7 | 5.6 (6) |
| | III | 6.8 | 6.2 (1) |
| | IV | 7.8 | 6.5 (2) |
| | V | 8.7 | 8.4 (5) |
| | Mean Growth Index | | -0.2 |

Table 4.-Weighted age frequency (percent) of selected fish species in Long Lake, 2003.

| | Age | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Species | I | II | III | IV | V | VI | VII | VIII | IX | X | Number caught |
| Black crappie | | 2 | | 5 | 7 | 21 | 45 | 11 | 4 | 4 | 46 |
| Bluegill | 18 | 46 | 3 | 21 | 7 | 4 | 1 | 1 | 1 | | 847 |
| Largemouth bass | | 15 | 18 | 33 | 15 | 5 | 8 | 8 | | | 40 |
| Northern pike | | 50 | 25 | | 13 | | | | 13 | | 8 |
| Pumpkinseed | | 3 | 13 | 25 | 8 | 5 | 25 | 10 | 10 | 2 | 42 |
| Redear sunfish | | | 2 | 30 | 37 | 17 | 14 | | | | 59 |
| Yellow perch | 7 | 40 | 7 | 13 | 33 | | | | | | 15 |

Table 5.-Comparison of bluegill statistics from trap net catches among surveys.

| Survey year | Catch/net night | Average size (in) | Mean growth index | Schneider's index |
|---|---|---|---|---|
| 1988 | 4.5 | 5.0 | -1.3 | 2.0 |
| 1996 | 40.9 | 5.5 | -1.1 | 3.5 |
| 2003 | 43.3 | 5.0 | -1.6 | 3.0 |

Table 6.-Number per inch group of important game fishes collected with all gear types combined during the 2003 Long Lake fish survey.

| Length (in) | Black crappie | Bluegill | Largemouth bass | Northern pike | Pumpkinseed | Redear sunfish | Smallmouth bass | Walleye | Yellow perch |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | |
| 1 | | 108 | | | 2 | | | | |
| 2 | | 431 | | | | | | | |
| 3 | | 102 | | | 7 | 6 | | | |
| 4 | 1 | 149 | | | 11 | 8 | | | 2 |
| 5 | | 31 | | | 6 | 13 | | | 2 |
| 6 | | 16 | 2 | | 5 | 12 | | | 6 |
| 7 | 4 | 8 | 3 | | 7 | | | | |
| 8 | 15 | 2 | 7 | | 4 | 2 | | | 4 |
| 9 | 12 | | 5 | | | 3 | 1 | | 1 |
| 10 | 8 | | 6 | | | 3 | | | |
| 11 | 3 | | 4 | | | 12 | | | |
| 12 | 1 | | 3 | | | | | | |
| 13 | 2 | | 3 | | | | 1 | | |
| 14 | | | 2 | | | | | 1 | |
| 15 | | | 2 | 2 | | | 2 | | |
| 16 | | | 3 | | | | | | |
| 17 | | | | 1 | | | | | |
| 18 | | | | | | | | 1 | |
| 19 | | | | 1 | | | | 1 | |
| 20 | | | | 2 | | | | 2 | |
| 21 | | | | | | | | 1 | |
| 22 | | | | | | | | | |
| 23 | | | | | | | | | |
| 24 | | | | | | | | | |
| 25 | | | | | | | | | |
| 26 | | | | | | | | | |
| 27 | | | | | | | | | |
| 28 | | | | | | | | | |
| 29 | | | | | | | | | |
| 30 | | | | | | | | | |

Table 7.-Temperature and oxygen data from August 27, 2003 from Long Lake, Oakland County.

| Depth (feet) | Temperature ($^{o}$F) | Oxygen (mg/l) |
|---|---|---|
| 0 | 78.3 | 10.8 |
| 1 | 78.2 | 10.7 |
| 2 | 78.3 | 10.7 |
| 3 | 78.3 | 10.7 |
| 4 | 78.3 | 10.6 |
| 5 | 78.3 | 10.6 |
| 6 | 78.3 | 10.6 |
| 7 | 78.3 | 10.5 |
| 8 | 78.2 | 10.4 |
| 9 | 78.2 | 10.0 |
| 10 | 77.7 | 7.4 |
| 11 | 77.2 | 2.4 |
| 12 | 76.8 | 0.7 |
| 12.3 | 76.7 | 0.4 |

Table 8.- Catch summary of walleye from Long Lake survey 2007. The numbers indicate the number of walleye caught and marked on each date and the numbers of recaptured walleye are designated by “R”.

| | Net lift dates | | | | | | |
|---|---|---|---|---|---|---|---|
| Inch-group | April 3 | April 4 | April 5 | April 6 | April 9 | April 24 | April 25 |
| 14 | | 1 | | | | | |
| 15 | 3 | | | | | | 2 |
| 16 | 2 | | | | | 1 | 1 |
| 17 | 3 | | 2 | | 1 | 2 | |
| 18 | 3 | | | 1 | 2 | 1 | |
| 19 | 7 | 1 | 2 | | | 1R | 2 |
| 20 | 4 | 1 | 4 | | 3 | 1 | 1R |
| 21 | | | 4 | | 2 | 1, 1R | |
| 22 | 2 | | | | | | |
| 23 | 1 | 1 | | | 1 | | |
| 24 | 1 | 1, 1R | | | | | 1 |
| 25 | | 2 | | | 1 | 1 | |
| Total | 26 | 7, 1R | 12 | 1 | 10 | 7, 2R | 6, 1R |

Table 9.-Comparison of mean length at age for selected fish species from Long Lake 2007. Number in parenthesis represents the number of fish aged.

| Species | Age group | State average | 2007 |
|---|---|---|---|
| Northern pike | II | 17.7 | 19.5 (1) |
| | III | 20.8 | 21.8 (6) |
| | IV | 23.4 | |
| | V | 25.5 | 24.8 (3) |
| | VI | 27.3 | 24.9 (19) |
| | VII | 29.3 | 28.5 (2) |
| | VIII | 31.2 | 22.4 (2) |
| | IX | | |
| | X | | 32.8 (1) |
| | Mean Growth Index | | -1.3 |
| Walleye | III | 13.9 | 16.5 (15) |
| | IV | 15.8 | |
| | V | 17.6 | 20.0 (5) |
| | VI | 19.2 | 19.9 (20) |
| | VII | 20.6 | 20.7 (4) |
| | VIII | 21.6 | 21.9 (24) |
| | Mean Growth Index | | +1.7 |