**Lake Minnewanna**
Lapeer County, T6N/R9E/S 12, 13
Farmers Creek Watershed, Last Surveyed 2013

**Joseph M. Leonardi, Fisheries Biologist**

## Environment

Lake Minnewanna is located in the Metamora Hadley State Recreational Area in southern Lapeer County approximately 7 miles south of Lapeer (Figure 1). It is a small glacial lake that has been enlarged by Minnewanna Dam on the South Branch Farmers Creek. South Branch Farmers Creek is a sub-watershed of the South Branch Flint River. The South Branch Flint River flows to the Flint River, which flows to the Shiawassee River, which flows to the Saginaw River, which discharges to Saginaw Bay of Lake Huron.

The South Branch Farmers Creek watershed lies within the Huron district of the Southern Lower Michigan Regional Landscape Ecosystem and is described by features identified in the Lum Interlobate sub-district (Albert 1995). The Lum Interlobate sub-district description includes medium and coarse textured end moraines with kettle lakes and wetlands dispersed among pitted outwash deposits. Topography is described as gently sloped and undulating hills. Soil textures range from sand to clay with a common occurrence of sandy loam on the elevated moraines, sand on the outwash, and organic peat in the depressions. Soils are of Miami-Celina-Morley association and are moderately well drained.

The primary water control structure on Lake Minnewanna is Minnewanna Dam. Records indicate Minnewanna Dam was constructed in 1963. It is a combination of earthen dike with a concrete box to maintain water level. The earthen dike portion of the dam is estimated to be 620 feet in length and serves as the road to Lake Minnewanna beach. The concrete box has a bottom draw screw valve and upper boards for maintaining surface elevation. Dam head is estimated to be 30 feet. Typical dam operations keep Lake Minnewanna at a fixed crest during spring, summer, and fall seasons. Water level during full pool months is maintained by surface discharge using upper board control. A 3 foot drawdown is conducted in the winter to protect the shoreline and docks.

Lake Minnewanna has an irregular shape with a number of small to medium size coves and one small island (Figure 2). The lake has an estimated 4.1 miles of shoreline. Development is restricted to park uses and accounts for approximately 30% of the entire shoreline. Groomed grass areas for the beach and picnic grounds are maintained on the south portion of the lake. Camping areas are set back on the elevated banks and do not directly affect the immediate shoreline. With the exception of the beach and dam areas, the shoreline is kept in a semi-natural state. A fishing pier is located near the beach and a small boat launch is located on the south shore. No-wake boating restrictions are enforced.

Lake Minnewanna is estimated to be 60 surface acres. Bottom contours are gradual and the lake reaches a maximum depth of 23 feet directly in front of the dam control structure. Eighty-two percent of Lake Minnewanna is estimated to be less than 10 feet in water depth.

In general, Lake Minnewanna is classified as a warmwater, small size, and shallow lake of mesotrophic limnological characteristics. The United States Geological Services evaluated the chemical water characteristics of Lake Minnewanna in August 2008. Measured parameters were consistent with historical values and typical of this region of the State. August measurements of secchi disk (11.5 ft.), total phosphorus (24 ug/l), and chlorophyll-a (7 ug/l) yielded a Trophic Status Index (TSI) of 47 on a scale of 0-150. A TSI of 47 is consistent with mesotrophic lake classification. Mesotrophic lakes generally have intermediate nutrient levels, moderate water clarity, relatively abundant aquatic vegetation, and support diverse biological communities.

Temperature, oxygen, and pH profiles were conducted by Fisheries Division in August 2013 (Table 1). These profiles were consistent with historical measurements and show summer thermocline development between 13-16 feet. In addition, during summer months and thermocline development, dissolved oxygen concentrations appear fish limiting (<3 mg/l) at depths greater than 15 feet. Thermal characteristics of the epilimnion and littoral zone are consistent with warmwater classification where summer temperatures approach the mid to upper 70's (F) for an extended period of time. pH values ranged from 7.1 in the lower water column to 7.5 at the surface and are within an acceptable range to support aquatic life.

The dominant type of fish habitat in Lake Minnewanna is aquatic vegetation which is dense in the littoral zone during summer and fall months. Milfoils (Eurasian and native) and pondweeds (curlyleaf and thinleaf) occur in abundance. Coontail, chara, and water lily are also common.

## History

Lake Minnewanna has an extensive history of fisheries management. Fish community surveys date back to 1953 with more recent evaluations occurring in 1985, 1990, and 2002. Historically (dating back to 1953), the panfish community exhibited poor size structure due to over-abundance and slow growth. Efforts to reduce panfish populations and promote a better size structure met with little success. Similarly, efforts to reduce excessive vegetation met with little success. Over-abundant and slow growing panfish populations were still evident in 2002 as were conditions of nuisance vegetation. In the 1960s, and again in the 1980s, attempts were made to isolate a small northern cove of the lake and utilize it as a northern pike rearing marsh. Rearing marsh production was minimal and the barrier isolating the cove was removed. Since 1953, a total of 21 species of fish have been documented in Lake Minnewanna (Table 2). Sportfish important to anglers included significant populations of bluegill, pumpkinseed, black crappie, and largemouth bass. There have not been any recent fish stockings in Lake Minnewanna.

## Current Status

In June 2013, Fisheries Division conducted a fisheries survey on Lake Minnewanna using trap net, gill net, seine, and electrofishing gear. The use of multiple gear types helps to present a generalized picture of the fish community. Large mesh trap nets are used to capture larger (>3 inches) fish species that inhabit the littoral zone or that move inshore at night. Gill nets sample fishes that occupy offshore waters and are particularly effective at capturing perch and northern pike. Seining captures representative samples of small-bodied nongame species and smaller sizes (<3 inches) of sport fishes

that inhabit the littoral zone. Daytime electrofishing was conducted to specifically target largemouth bass.

A total of 480 fish representing 13 species were collected in the 2013 fisheries survey (Table 3). Trap nets accounted for 69% of the total catch. For the remaining catch, seining accounted for 15%, electrofishing 14% and gill nets 1%, respectively. Bluegill were the most abundant species collected comprising 45% of the total catch followed by pumpkinseed (18%), largemouth bass (18%), and black crappie (14%). Other species captured in low abundance included carp, white sucker, golden shiner, grass pickerel, green sunfish, sand shiner, warmouth, yellow perch, and yellow bullhead.

A total of 216 bluegill averaging 5.6 inches were collected in the 2013 fisheries survey (Table 3). Seventy-seven percent of the bluegill captured were collected with trap net gear compared to 22% with the seine. Average size of the bluegill trap net catch was 5.6 inches compared to 3.5 inches collected with the seine. Fifty-four percent of the trap net catch met or exceeded the acceptable harvest size of 6 inches. Bluegill size structure was dominated by fish in the 5-6 inch size range. Age and growth analysis indicated bluegill were growing below state average having a mean growth index of -1.3 (Table 4). Weighted age frequency indicated 92% of the total catch was < 6 years and 99% of the total catch was < 7 years (Table 4). Bluegill longevity appears to peak at 6 years.

A total of 90 pumpkinseeds averaging 6.2 inches were collected in the 2013 fisheries survey (Table 3). Eighty-three percent of the pumpkinseeds captured were collected with trap net gear compared to 17% with seine. Average size of the pumpkinseed trap net catch was 6.8 inches compared to 3.6 inches with the seine. Eighty-seven percent of the trap net catch met or exceeded the acceptable harvest size of 6 inches. Pumpkinseed size structure was dominated by fish in the 6-7 inch size range. Age and growth analysis indicated pumpkinseeds were growing slightly below state average having a mean growth index of -0.4 (Table 4). Weighted age frequency indicated 99% of the total catch was < 7 years (Table 4). Pumpkinseed longevity appears to peak at 7 years.

A total of 88 largemouth bass averaging 11.7 inches were collected in the 2013 fisheries survey (Table 3). Seventy-four percent of the largemouth bass captured were collected with electrofishing while specifically targeting for the species. Twenty-six percent of the largemouth bass were collected with trap nets. Average size of largemouth bass collected electrofishing was 11.5 inches compared to 12.2 inches for the trap net catch. Sixteen percent of the total catch met or exceeded the minimum harvest size of 14 inches. Largemouth bass size structure was dominated by fish in the 11-13 inch size range. Age and growth analysis indicated largemouth bass were growing below state average having a mean growth index of -1.8 (Table 4). Weighted age frequency indicated 92% of the total catch was < 8 years. Largemouth bass longevity appears to peak at 8 years with some fish living as many as 13 years.

A total of 65 black crappie averaging 7.3 inches were collected in the 2013 fisheries survey (Table 3). Ninety-five percent of the black crappie captured were collected with trap nets and 5% were collected with gill nets. Average size of black crappie collected with trap nets was 7.3 inches compared to 6.2 inches with gill nets. Fifty-one percent of the total catch met or exceeded the acceptable harvest size of 7 inches. Black crappie size structure was dominated by fish in the 6-7 inch size range. Age and growth analysis indicated black crappie were growing below state average having a mean growth index

of -1.9 (Table 4). Weighted age frequency indicated 97% of the total catch was < 7 years with 47% being 3 years of age. Black crappie longevity appears to peak at 7 or 8 years.

Other species collected in the 2013 fisheries survey in low abundance included common carp, golden shiner, grass pickerel, green sunfish, sand shiner, warmouth, yellow perch, and yellow bullhead (Table 3).

## Analysis and Discussion

The Lake Minnewanna fish community remains similar in species composition and size structure to that which was found in the 2002 survey. Bluegill are the most abundant species. Pumpkinseeds, largemouth bass, and black crappie occur in lesser abundance but provide additional angling opportunities.

In southern Michigan warmwater lakes, bluegill are typically the most abundant fish species present and play a key role in community structure and overall sport fishing quality (Schneider 1981). Schneider (1990) suggests indices of bluegill characteristics which can be used to classify the status of populations. The "Schneider Index" uses size scores of length frequency and growth data and relates them to a subjective ranking system ranging from "very poor" to "superior". Using the Schneider Index for classifying bluegill populations, Lake Minnewanna scored 3.5 for an acceptable/satisfactory ranking (Table 5). This rank is a slight improvement from past surveys but still indicates a low abundance of bluegill > 7 inches.

Bluegill population dynamics have been studied extensively in southern Michigan lakes (Schneider 1981, 1990, 1993, Schneider and Lockwood 1997, Breck 1997). In general, shallow and weedy lakes like Lake Minnewanna, exhibit high bluegill recruitment, have low proportions of large (> 8 inch) bluegill, and have relatively low abundance of predators. Even when the abundance of predators is increased in such systems, excessive vegetation often reduces their effectiveness to control bluegill recruitment. High recruitment of young bluegill results in over population and increases competition for food. Bluegill longevity has shown to be a key factor in size structure particularly in shallow wamwater lakes. As with other lakes in this region of Michigan, few bluegill seem to live beyond 5 or 6 years and, therefore, are unable to achieve larger size. Although angler harvest may account for some mortality of larger fish, natural mortality seems to be a more likely cause. Despite exhibiting symptoms of a "stunted" population and below state average growth, the Lake Minnewanna bluegill size structure is acceptable and provides ample opportunities for anglers.

Although pumpkinseeds occur in lesser abundance in Lake Minnewanna, they exhibit similar growth and life expectancy trends as bluegill. Below state average growth and a 7 year life expectancy do not allow for larger size fish. Presently, the Lake Minnewanna pumpkinseed fishery appears stable and provides for an acceptable sport fishery for fish in the 6-7 inch size range.

Largemouth bass are one of the most widely sought after sportfish in Michigan (Bremigan et al. 2008). Recent collections of largemouth bass from lakes in southern Michigan compare daytime electrofishing efforts (Figure 3, Table 6). Catch per unit effort (CPUE) is measured as the number of fish/hour to demonstrate relative abundance but can be heavily influenced by strong year classes. CPUE measured as biomass (lbs./hour) is a better measure of relative abundance as it is less

susceptible to variation due to strong year classes. CPUE for largemouth bass in Lake Minnewanna is above the mean for both numbers/hour and biomass/hour. Largemouth bass > 14 inches is slightly below the mean but mainly due to a high abundance of large bass in Big Seven Lake. In comparison to these other southern Michigan lakes, the relative abundance and size structure of largemouth bass in Lake Minnewanna is considered very good to excellent. Largemouth bass are fairly long lived (13 years) and despite below state average growth, a substantial proportion of them achieve lengths greater than 13 inches.

Black crappie occur as an additional sportfish in Lake Minnewanna. Consistent with previous fisheries surveys, their relative abundance is low and they offer only a limited sport fishery. Black crappie size structure in Lake Minnewanna is acceptable and has remained consistent with past fisheries surveys (Table 7). Growth is slow and well below state average, suggesting less than ideal habitat and forage conditions.

## Management Direction

Management direction for the Lake Minnewanna fisheries should continue to focus on warmwater species. The limiting factors of slow growth and a relatively short life span make improvements to bluegill and pumpkinseed populations difficult. However, even with these constraints, the bluegill, pumpkinseed, and black crappie populations are stable and offer an acceptable recreational fishery. As well, the largemouth bass population is stable and offers an excellent recreational fishery.

Northern pike have been noticeably scarce in recent fisheries surveys of Lake Minnewanna. Northern pike were not collected in 2013 and only a few were collected in 1990 and 1985. A review of fisheries records from the 1960s and 1970s indicates a stronger presence of northern pike coinciding with a period when attempts were made to rear them in the connecting cove and suggests supplemental stocking has potential to improve the population. When collected in the past, individual growth rates were near state average suggesting suitable forage was present. Although Lake Minnewanna is relatively small in size, suitable coolwater thermal habitat is available to potentially support a small northern pike population. A recommendation to stock northern pike is proposed. Recommendations are to stock 600-900 spring fingerling northern pike (10-15/acre) on an alternate year schedule. Monitoring of the stocking effort should occur in subsequent years.

## References

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**Figure 1.** Location of Lake Minnewanna, Lapeer County.

**Figure 2.** Hydrographic map of Lake Minnewanna, Lapeer County.

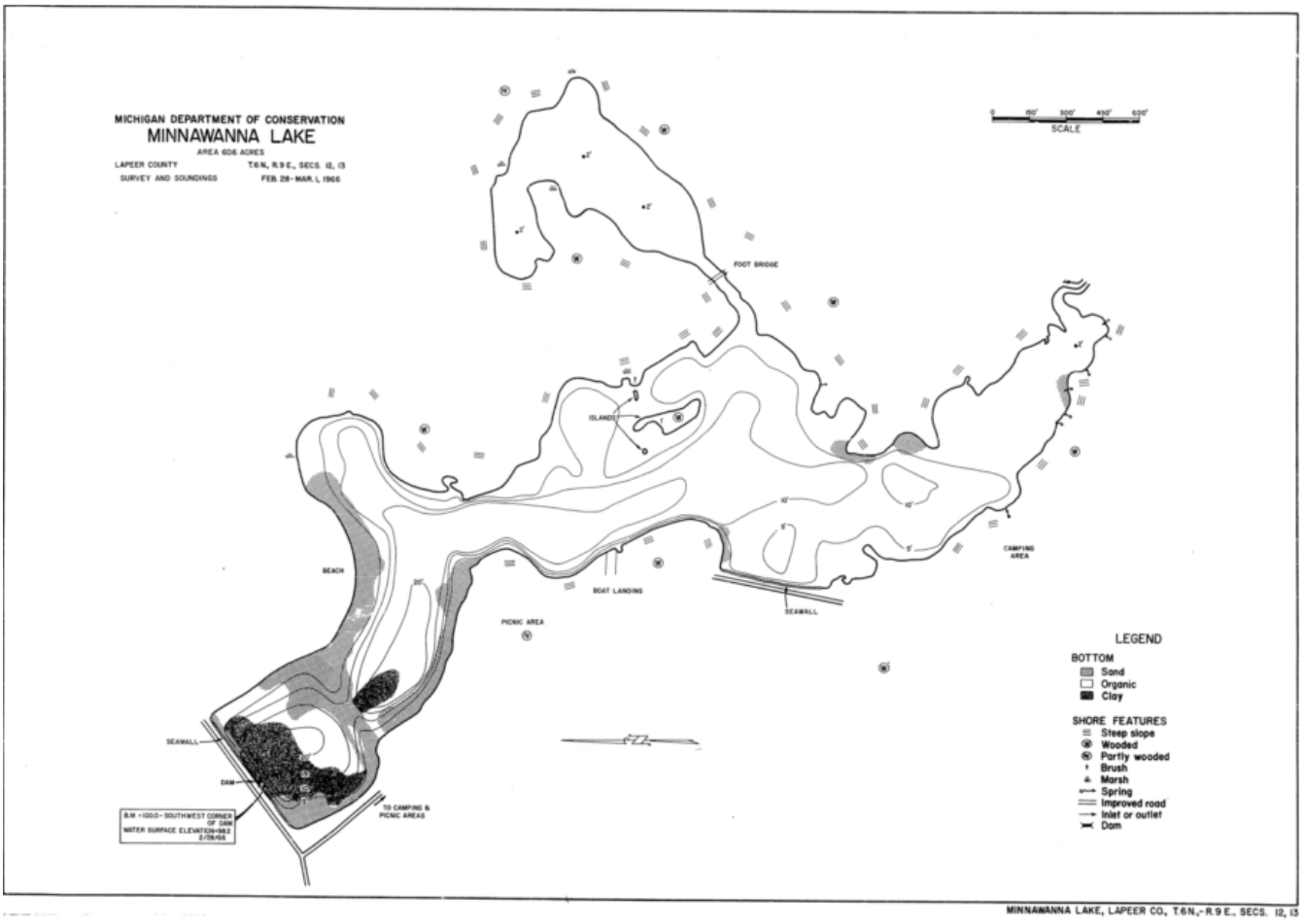

**Figure 3.** Lake comparison of daytime electrofishing for largemouth bass (LMB) in select southern Michigan lakes.

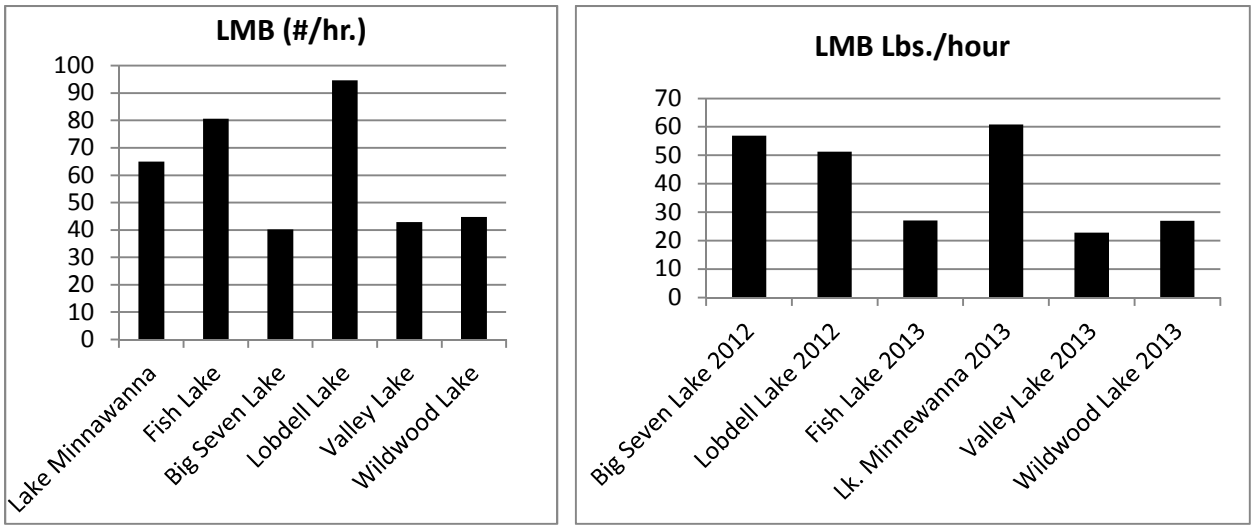

**Table 1.** Temperature, oxygen, and pH measurements for Lake Minnewanna, Lapeer County. Measurements taken August 5, 2013. Shaded area indicates thermocline.

| Depth (ft.) | Temperature (F) | Oxygen (ppm) | pH |
|---|---|---|---|
| 0 | 71 | 9.0 | 7.5 |
| 1 | 71 | 9.0 | 7.7 |
| 2 | 71 | 9.0 | 7.8 |
| 3 | 71 | 9.0 | 7.8 |
| 4 | 71 | 9.0 | 7.9 |
| 5 | 71 | 9.0 | 7.9 |
| 6 | 71 | 8.9 | 7.9 |
| 7 | 71 | 8.8 | 7.9 |
| 8 | 71 | 8.8 | 7.9 |
| 9 | 70 | 8.2 | 7.8 |
| 10 | 70 | 7.4 | 7.8 |
| 11 | 70 | 6.6 | 7.7 |
| 12 | 70 | 6.2 | 7.6 |
| 13 | 69 | 5.0 | 7.6 |
| 14 | 68 | 3.3 | 7.5 |
| 15 | 67 | 1.7 | 7.5 |
| 16 | 62 | 0.4 | 7.4 |
| 17 | 62 | 0.4 | 7.4 |
| 18 | 62 | 0.3 | 7.3 |
| 19 | 60 | 0.2 | 7.3 |
| 20 | 59 | 0.2 | 7.2 |
| 21 | 58 | 0.1 | 7.2 |
| 22 | 58 | 0.1 | 7.1 |
| 23 | 58 | 0.1 | 7.1 |

**Table 2.** List of fishes in Lake Minnewanna, Lapeer County. Origin: N= native, C= colonized, I= introduced. Status: O= extirpated, P= recent observations.

| Common name | Scientific name | Origin | Status |
|---|---|---|---|
| Carps and minnows | | | |
| Blacknose shiner | *Notropis heterolepis* | N | P |
| Common carp | *Cyprinus carpio* | C | P |
| Golden shiner | *Notemigonus crysoleucas* | N | P |
| Fathead minnow | | | |
| Sand shiner | *Notropis stramineus* | N | P |
| Mudminnows | | | |
| Central mudminnow | *Umbra limi* | N | P |
| Suckers | | | |
| Lake chubsucker | *Erimyzon sucetta* | N | P |
| White sucker | *Catostomus commersoni* | N | P |
| Bullhead catfishes | | | |
| Black bullhead | *Ameiurus melas* | N | P |
| Brown bullhead | *Ameiurus nebulosus* | N | P |
| Yellow bullhead | *Ameiurus natalis* | N | P |
| Pikes | | | |
| Grass pickerel | *Esox americanus* | N | P |
| Northern pike | *Esox lucius* | N | P |
| Sunfishes | | | |
| Black crappie | *Pomoxis nigromaculatus* | N | P |
| Bluegill | *Lepomis macrochirus* | N | P |
| Green sunfish | *Lepomis cyanellus* | N | P |
| Largemouth bass | *Micropterus salmoides* | N | P |
| Pumpkinseed | *Lepomis gibbosus* | N | P |
| Warmouth | *Lepomis gulosus* | N | P |
| Perches | | | |
| Yellow perch | *Perca flavescens* | N | P |
| Iowa darter | *Etheostoma exile* | N | P |

**Table 3.** Total catch (all gear) from Lake Minnewanna, Lapeer County. Data collected June 2013.

| Common name | Number | Percent by number | Weight (lbs.) | Percent by weight | Length range (in.)* | Average length (in.) | Percent legal size** |
|---|---|---|---|---|---|---|---|
| Black crappie | 65 | 13.5 | 14.5 | 8.2 | 5-11 | 7.3 | 51 |
| Bluegill | 216 | 45.0 | 30.6 | 17.3 | 2-7 | 5.6 | 54 |
| Common carp | 2 | 0.4 | 18.9 | 10.7 | 26-28 | 27.5 | 100 |
| White sucker | 1 | 0.2 | 2.9 | 1.6 | 19-19 | 19.5 | 100 |
| Golden shiner | 2 | 0.4 | 0.3 | 0.1 | 7-7 | 7.5 | 100 |
| Grass pickerel | 1 | 0.2 | 0.2 | 0.1 | 10-10 | 10.5 | 100 |
| Green sunfish | 1 | 0.2 | 0.1 | 0.0 | 4-4 | 4.5 | 0 |
| Largemouth bass | 88 | 18.3 | 87.3 | 49.3 | 5-19 | 11.7 | 16 |
| Pumpkinseed | 90 | 18.8 | 30.6 | 11.7 | 2-8 | 6.2 | 73 |
| Sand shiner | 10 | 2.1 | 0.1 | 0.0 | 2-2 | 2.5 | 100 |
| Warmouth | 1 | 0.2 | 0.3 | 0.2 | 7-7 | 7.5 | 100 |
| Yellow perch | 1 | 0.2 | 0.1 | 0.1 | 6-6 | 6.5 | 0 |
| Yellow bullhead | 2 | 0.4 | 1.1 | 0.6 | 9-11 | 10.5 | 100 |
| All species total | 480 | | 177.0 | | | | |

* Note some fish may be measured to 0.1 inch, others to inch group.

** Percent legal or acceptable size for angling.

**Table 4.** Age and growth data from selected sportfish, Lake Minnewanna, Lapeer County. Data collected June 2013.

| Species/Age | No. aged | Length range (in.) | State avg. length (in.) | Weighted mean length (in.) | Weighted age frequency (%) | Mean growth index* |
|---|---|---|---|---|---|---|
| Black crappie | | | | | | -1.9 |
| Age III | 17 | 5.8-7.6 | 7.9 | 6.53 | 47.38 | |
| Age IV | 10 | 6.6-10.0 | 8.9 | 7.41 | 23.53 | |
| Age V | 2 | 7.4-9.2 | 9.7 | 8.00 | 4.62 | |
| Age VI | 5 | 7.7-10.2 | 10.4 | 8.25 | 10.70 | |
| Age VII | 5 | 7.6-11.6 | 11.1 | 8.55 | 10.99 | |
| Age VIII | 2 | 8.3-10.2 | 11.6 | 9.00 | 2.78 | |
| Bluegill | | | | | | -1.3 |
| Age I | 1 | 2.3-2.3 | 2.4 | 2.30 | 0.67 | |
| Age II | 12 | 2.0-3.0 | 4.2 | 2.56 | 8.86 | |
| Age III | 10 | 3.0-4.5 | 5.3 | 3.39 | 9.91 | |
| Age IV | 3 | 4.4-4.7 | 6.2 | 4.53 | 2.08 | |
| Age V | 16 | 4.5-6.8 | 6.9 | 5.92 | 40.37 | |
| Age VI | 16 | 4.9-7.4 | 7.4 | 6.43 | 30.36 | |
| Age VII | 5 | 6.8-7.1 | 8.0 | 6.89 | 7.10 | |
| Age VIII | 1 | 7.2-7.2 | 8.4 | 7.20 | 0.64 | |
| Largemouth bass | | | | | | -1.8 |
| Age I | 3 | 5.2-6.0 | 5.4 | 5.70 | 3.41 | |
| Age II | 9 | 6.6-10.9 | 8.7 | 7.97 | 10.61 | |
| Age III | 20 | 7.5-11.7 | 10.6 | 9.56 | 22.04 | |
| Age IV | 13 | 9.9-12.6 | 12.0 | 11.34 | 14.36 | |
| Age V | 7 | 9.6-13.6 | 13.7 | 12.02 | 8.51 | |
| Age VI | 10 | 9.2-14.5 | 15.0 | 12.52 | 11.91 | |
| Age VII | 5 | 11.4-13.8 | 16.7 | 13.34 | 7.20 | |
| Age VIII | 11 | 12.2-17.8 | 17.6 | 14.70 | 13.64 | |
| Age IX | 1 | 13.7-13.7 | 18.6 | 13.70 | 1.53 | |
| Age X | 2 | 17.6-19.9 | 19.3 | 18.75 | 2.27 | |
| Age XII | 2 | 14.7-18.9 | | 17.50 | 3.41 | |
| Age XIII | 1 | 17.8-17.8 | | 17.80 | 1.14 | |
| Pumpkinseed | | | | | | -0.4 |
| Age II | 2 | 2.4-2.4 | 4.2 | 2.40 | 2.22 | |
| Age III | 5 | 2.8-4.5 | 5.2 | 3.65 | 14.44 | |
| Age IV | 3 | 5.4-6.3 | 5.8 | 6.01 | 5.89 | |
| Age V | 17 | 5.1-7.5 | 6.3 | 6.35 | 34.33 | |
| Age VI | 13 | 5.5-8.5 | 6.8 | 7.00 | 24.81 | |
| Age VII | 8 | 6.4-7.9 | 7.2 | 7.27 | 17.56 | |
| Age VIII | 1 | 8.9-8.9 | | 8.90 | 0.74 | |

*****Mean growth index is the average deviation from the state average length at age.

**Table 5.** Lake Minnewanna bluegill classification using the Schneider Index (Schneider 1990). Size score is given in parenthesis.

| Sample date | 9/18/85 | 7/17/90 | 5/21/02 | 6/3/13 |
|---|---|---|---|---|
| Sample size | 394 | 546 | 696 | 167 |
| Average length (inches) | 5.7 (3) | 5.3 (2) | 5.9 (3) | 6.2 (4) |
| % ≥ 6 inches | 40 (3) | 18 (2) | 46 (3) | 68 (4) |
| % ≥ 7 inches | 2 (2) | 0 (2) | 2 (2) | 11 (4) |
| % ≥ 8 inches | 0 (2) | 0 (2) | 0 (2) | 0 (2) |
| Schneider Index | 2.50 | 1.75 | 2.50 | 3.5 |
| Rank[1] | Poor/Accpt. | Poor/V.Poor | Poor/Accpt. | Accpt./Sat. |

[1]Rank: 1 = Very poor, 2 = Poor, 3 = Acceptable, 4 = Satisfactory, 5 = Good, 6 = Excellent, 7 = Superior

**Table 6.** Lake comparison of largemouth bass size structure and catch effort using day time electrofishing in Southern Lake Huron Management Unit.

| Lake | Survey Year | Sample size | Avg. size (in.) | % ≤ 7" | % 8-9" | % 10-11" | % 12-13" | % ≥ 14" | CPUE (#/hr.) | CPUE (lbs./hr.) |
|---|---|---|---|---|---|---|---|---|---|---|
| Lake Minnewanna | 2013 | 65 | 11.5 | 13.8 | 16.9 | 24.6 | 32.3 | 12.3 | 65.0 | 60.8 |
| Fish Lake | 2013 | 54 | 8.0 | 44.4 | 33.3 | 18.5 | 1.8 | 1.8 | 80.6 | 27.1 |
| Big Seven Lake | 2012 | 37 | 12.9 | 16.2 | 10.8 | 8.1 | 10.8 | 54.1 | 40.2 | 56.9 |
| Lobdell Lake | 2012 | 142 | 8.9 | 43.7 | 23.2 | 8.5 | 12.7 | 12.0 | 94.7 | 51.3 |
| Valley Lake | 2013 | 33 | 9.3 | 36.4 | 24.2 | 24.2 | 12.1 | 3.0 | 42.9 | 22.8 |
| Wildwood Lake | 2013 | 55 | 10.3 | 16.4 | 29.1 | 34.5 | 18.2 | 1.8 | 44.7 | 27.0 |
| **Mean** | | **64.3** | **10.2** | **28.5** | **22.9** | **19.7** | **14.7** | **14.2** | **61.4** | **41.0** |

**Table 7.** Black crappie size structure using trap or fyke net gear from Lake Minnewanna, Lapeer County. Data collected June 2013.

| Sample date | 9/18/85 | 7/17/90 | 5/21/02 | 6/3/13 |
|---|---|---|---|---|
| Sample size | 59 | 54 | 65 | 62 |
| Average length (inches) | 5.9 | 7.8 | 7.9 | 7.3 |
| % $\geq$ 7 inches | 30.5 | 87.0 | 98.5 | 53.2 |
| % $\geq$ 8 inches | 8.5 | 25.9 | 21.5 | 21.0 |
| % $\geq$ 9 inches | 1.7 | 14.8 | 10.8 | 8.1 |
| Mean Growth Index | -0.6 | -1.1 | -0.8 | -1.9 |