Three Lakes (Middle Lake)

Kalamazoo County; T01S, R10W, Sections 25 and 26
Kalamazoo River Watershed, last surveyed May 8-15 and August 2, 2023

Matthew Diana, Fisheries Biologist

Environment

Three Lakes is a set of three lakes located in Kalamazoo County near Richland, MI (Figure 1). The lakes are connected to each other and are collectively referred to as Three Lakes and individually as West, Middle, and East Three Lakes (Figure 2). West Three Lakes is a deep groundwater fed lake that drains towards Middle Three Lakes through a small navigable channel. A road (35th Street) separates Middle and East Three Lakes which are connected by a culvert under the road. East Three Lakes is connected to Gull Creek a few miles south of where the creek flows out of Gull Lake over the Gull Lake Dam. East Three Lakes has a wetland complex associated with the connection to Gull Creek and Gull Creek exits at the southeast end of the lake. Gull Creek is a tributary to the Kalamazoo River that joins the main river upstream of Morrow Pond. The Three Lakes watershed is 3,876 acres and the land use is made up of a mix of agriculture (30%), forest (29%), urban (20%), and wetland (19%) with the remaining being water (2%; Figure 3). The surficial geology is glacial outwash sand and gravel and postglacial alluvium of coarse texture.

The Michigan Department of Natural Resources (DNR) has not produced bathymetric maps for the Three Lakes. The maximum depth located in Middle Three Lakes during the 2023 DNR survey was 34 feet. The substrates contain a mix of organic substrates and marl. Middle Three Lakes drops off quickly on the south and western shore while an extensive shoal exists along the northern shoreline. The shoreline of all three lakes is surrounded by wetland. The fishery consists of warmwater fish including Largemouth Bass, Black Crappie, Bluegill, Pumpkinseed, and Northern Pike.

There is unmaintained public access to Three Lakes through roadside gravel parking areas and makeshift gravel launch sites adjacent to 35th Street into both Middle Three Lakes and East Three Lakes. The roadside public access is deeded through the private property lease and is available for public use in perpetuity. The sites were proposed to be gifted to DNR in 1978 for development of a maintained access site, but because of the small size, use restrictions, and the fact that the site already provided public access, it was never transferred or developed. Public access remains available and no DNR passport stamp is required for use. Three Lakes is a very popular public fishing spot during the open water season. It also is one of the earliest lakes to freeze in the winter. As a result, fishing pressure is often high during the ice fishing season.

Fishery Resource

History

Three Lakes historically was stocked periodically with warmwater fish species. Smallmouth Bass were stocked once in 1898. Largemouth Bass were stocked in 1909 with 2,000 fish released in each lake. Stocking resumed in 1933. Bluegill were stocked annually from 1933 to 1945 with a mean number of 17,717 spring fingerlings (4-5 month old, ~1-2 inches) except in 1943 when 1,000 yearling Bluegill were stocked. Largemouth Bass were stocked with an average of 555 fish in 1933 through 1936 and 1940 through 1945. Yellow Perch were stocked in 1935, 1938, and 1939 with 5,000 5-7 month old fingerlings each year. The stocking of warmwater fisheries in lakes was discontinued in Michigan after research documented stocking was not required to maintain fisheries (Cooper 1948). Three Lakes management shifted to coldwater species in 1975 when Rainbow Trout stocking was initiated. Rainbow Trout were stocked in Middle and West Three Lakes from 1975 through 1998 (Table 1).

A limnology profile was conducted on all three of the Three Lakes on August 30, 1974. The water was oxygenated (above 3 ppm) down to 16 feet of depth on West and 24 feet of depth on Middle Three Lakes. The water temperature on West Three Lakes was 74 degrees F at the surface and dropped below 68 degrees F between 10 and 12 feet of depth with a maximum depth of 26 feet. The water temperature on Middle Three Lakes was 76 degrees F at the surface and dropped below 68 degrees F between 15 and 18 feet of depth with a maximum depth of 33 feet. This indicated preferred trout habitat existed between 12 and 16 feet on West Lake and 18 and 24 feet on Middle Three Lakes. East Three Lakes was much shallower with a maximum depth of 13 feet. East Three Lakes was not stratified and was 70 degrees to the bottom of the lake with no trout habitat present. Rainbow Trout were stocked in 1975 for the first time. The first fisheries survey on record was conducted on West and Middle Three Lakes on October 24, 1975. The survey included the use of gill nets (8 net nights) and fyke nets (2 net nights) intended to assess survival of the newly stocked Rainbow Trout. Only two Rainbow Trout were collected but they were 12 inches indicating good growth. Bluegill was the most abundant species captured. The average size for Bluegill was 5.9 inches, with good numbers of 6- to 10-inch Bluegill captured and one fish over 10 inches. Bluegill growth rates were above average (mean growth index = +1.1). Largemouth Bass were present in the catch in low numbers (n = 12) and were small ranging from 6-12 inches with average growth rates. Other fish collected were Yellow Perch (n = 7), Bullhead spp. (n = 44), Pumpkinseed (n = 6), Black Crappie (n = 5), Northern Pike (n = 2), Grass Pickerel (n = 8), Longnose Gar (n = 1), Warmouth (n = 33), Lake Chubsucker (n = 10), and Golden Shiner (n= 20). The management recommendation following the survey was to continue annual Rainbow Trout stocking.

Another fish survey was conducted in mid-October 1981. The entire shoreline of Middle Three Lakes was surveyed using nighttime electrofishing, and five fyke nets and six experimental gill nets were utilized over a four-night survey (total effort not specified). A total of 595 Bluegill were captured ranging from 1 to 8 inches. Bluegill growth was average with a mean growth index of -0.2. Largemouth Bass were more abundant than in the 1974 survey with 129 being caught. Largemouth Bass remained small, ranging from 2 to 14 inches with average growth (growth index -0.1). Few Yellow Perch (n = 20), Black Crappie (n = 13), and Northern Pike (n =

3) were caught. The species composition was similar to the 1974 survey. No Rainbow Trout were captured, but biologists noted that Conservation Officers reported trout being harvested from Three Lakes. The management recommendation was to conduct a lake mapping effort; however, the lake mapping was never completed.

A gill net survey was conducted on West and Middle Three Lakes on September 15, 1986. Six nets were set overnight (three on each lake). Only 25 fish were caught including Yellow Perch (n = 16), Bluegill (n = 4), Bullhead spp. (n = 3), Warmouth (n = 1), and Longnose Gar (n = 1). No Rainbow Trout were captured. Biologists noted that anglers reported good catches of Bluegill and Black Crappie in West and Middle Three Lakes, and that Rainbow Trout were caught in May and June.

Hook and line surveys were conducted in 1993 (six anglers, two nights) and 1998 (four anglers, six hours). Three Rainbow Trout were captured in 1993 (10 - 12 inches) and none were caught in 1998. Limnology surveys were conducted on August 25, 1993, August 26,1996, and July 1, 1998. The water temperature in Middle Three Lakes in 1993 dropped below 68 degrees F at 16 feet of depth and dissolved oxygen in 1993 dropped below 3 ppm at 22 feet indicating a 6 foot layer of cold oxygenated water available for trout. In Middle Three Lakes in 1996, the temperature dropped below 68 degrees F at 19 feet and oxygen remained above 3 ppm until a depth of 30 feet. Middle Three Lakes in 1998 had oxygenated water to 27 feet and temperature dropped below 68 degrees F at 18 feet. A limnology survey was also conducted on West Three Lakes in 1998. The temperature dropped to 68 F at 14 feet of depth and oxygen stayed above 3 ppm down to 19 feet. These limnology surveys indicated that habitat was available for Rainbow Trout to survive. However, angler reports and angling surveys indicated that the fishery had declined. Stocking fish in West Three Lakes required a biologist to meet the stocking truck with a boat and transport fish to the stocking site. Angling access to West Three Lakes was also challenging at times. Management recommendations were to discontinue trout stocking, and the last fish were stocked in 1998. Despite the history of trout stocking and fisheries surveys targeting trout, no full fish community surveys were conducted on Three Lakes prior to 2023.

Current Status of the Fish Community

Methods

A fish community survey was conducted on Three Lakes during May 8-15, 2023. The Middle Three Lakes was selected as a random survey in the DNR Status and Trends program (Wehrly et al. In Revision) and was the only lake included in the survey (referred to as Three Lakes hereafter). The random lake selection aligned with Southern Lake Michigan Management Unit (SLMMU) priorities as Three Lakes had not been surveyed in some time despite it being a popular fishing destination. The objectives of the fisheries survey were to evaluate the fish populations present, evaluate relative abundance and growth rates of the fish present, and to develop a management plan for the fishery in Three Lakes. A total of two graded-mesh gill nets were set for two nights each (4 total net nights), three large-mesh fyke nets were set for three nights each (9 total net nights), and two small-mesh fyke nets were set for two nights each (4 total net nights). Three seine hauls (25 feet by 6 feet) were conducted in littoral areas. Three electrofishing transects that were 10 minutes in effort each (0.5 hours total) were conducted at

night. All fish were identified to species, counted, and measured for total length. Aging structures (scales or spines) were also collected from 10 fish in each one-inch length class for Bluegill, Black Crappie, Yellow Perch, Largemouth Bass, and Northern Pike, which comprised the major sportfish species. Weights for all fish species were calculated using length-weight regression equations compiled by Schneider et al. (2000b), which were developed from statewide survey data. Limnological sampling was conducted on August 2, 2023, during the warmest part of the year when the lake was fully stratified and dissolved oxygen concentrations at depth typically are limiting. Limnological sampling included temperature and dissolved oxygen concentrations recorded at one-foot depth intervals at the deepest location on the lake (depth = 34 feet).

The relative abundance for each fish species was assessed using catch per unit effort (CPUE) calculated as the number of fish caught per net night (gill and fyke nets), per seine haul, or per minute of electrofishing. The CPUE data from this survey were compared to summary CPUE data from lakes surveyed in the Status and Trends program during 2001-2021 on both a statewide level and a regional level for the Southern Lake Michigan Management Unit (SLMMU). Weighted age compositions were calculated for each sportfish species using species-specific length-age keys and methods described by Schneider (2000). A growth index was calculated for each species and age class by subtracting the statewide average mean length-at-age from that of the 2023 Three Lakes survey. Growth indices for age classes represented by a minimum of five fish were then averaged to provide a mean index of growth for each species (Schneider et al. 2000a). Mean growth index scores ranging from 1.0 to -1.0 are considered similar to the statewide average (except for Bluegill, where -0.5 to 0.5 is considered average), whereas scores less than -1.0 and greater than 1.0 (less than -0.5 and greater than 0.5 for Bluegill) are considered below and above the statewide average, respectively. Bluegill size structure was also rated using a combined index based on mean length, proportions of fish greater than 6.0 inches, 7.0 inches, and 8.0 inches collected using specific gear types, and mean growth index score (Schneider 2000a; Schneider 1990).

Limnological sampling was conducted on August 2, 2023, and included a temperature and oxygen profile and a shoreline development and woody cover survey. Temperature and dissolved oxygen concentrations were recorded at 1-foot increments at the deepest spot in the lake. Shoreline surveys were conducted along four 1,000-foot transects on Three Lakes for a total of 4,320 feet (transect 4 was 1,320 feet). The number of docks (large = over 2 boat slips and small = 1-2 boat slips), dwellings, submerged trees, and the percentage of the shoreline that was armored (riprap or seawalls) were recorded for each transect. Hourly water temperatures were recorded from March 7 through November 20, 2023, using an Onset Hobor Water Temp Pro v2 temperature logger that was deployed at a depth of 2.5 feet.

Results

A total of 3,025 fish were captured in the 2023 survey of Three Lakes (Table 2). These fish represented 24 species. Bluegill was the most abundant species with 1,376 fish captured across all gears making up 45% of the total catch by numbers. Bluegill ranged from 1.2 to 8.4 inches, and age ranged from age-1 to age-7 (Figure 4). Age-1 fish made up 63% of Bluegill collected

across all gear types. All other age classes were equally represented making up 3.7 to 7.4% of the total Bluegill catch. Bluegill CPUE was 29.6 fish per net night in large-mesh fyke nets which is just below the median for SLMMU lakes (35.2 fish per net night) but above the median for statewide surveys (13.4 fish per net night) and considered average. Bluegill CPUE in small-mesh fyke nets was 127.8 fish per net night which is well above the 75th percentile for SLMMU and statewide surveys (72.0 fish per net night and 46.0 fish per net night, respectively). The Bluegill mean growth index was +0.1 indicating average growth. Schneider index scores were 5.8 (good) in fyke nets, 4.8 (satisfactory) in electrofishing, and 4 (satisfactory) for growth. Other sunfish species supplement the Bluegill and Black Crappie populations but were not as common. A total of 204 Pumpkinseeds were captured that averaged 6.8 inches with fish up to 8 inches present. A total of 115 Hybrid Sunfish ranging from 2 to 8 inches were collected as well as 95 Warmouth (2 to 7 inches). One 7-inch Rock Bass was also caught.

Black Crappie was the second most abundant species caught in the 2023 survey. A total of 347 Black Crappie were captured that averaged 9.6 inches and ranged from 5 to 13 inches. Black Crappie CPUE in large-mesh fyke nets was 38.1 fish per net night. This catch rate is extremely high and above the 75th percentiles for SLMMU and statewide surveys of 6.9 and 4.8 fish per net night respectively. Nine- and 10-inch fish made up a majority of the crappie catch at 58% and 24% (Figure 5). These fish were mostly represented by one year class. Age-4 fish averaged 9.7 inches and made up 73% of all crappies collected. Age-5 fish were also well represented, averaging 10.2 inches and making up 12% of the catch. The size and age distribution were both bell curves centered around fish that were 9 inches and age 4. Black Crappie up to age 7 were caught in good numbers as well as one age-10 fish that was 13.1 inches. Black Crappie in Three Lakes were larger than the statewide average for all age classes collected, and the mean growth index was +0.9 (Figure 6).

Yellow Perch averaged 7 inches in length and ranged from 2 to 11 inches. A total of 50 fish were caught that were age 1 through age 10. Growth was average with a growth index score of +0.1. Twenty percent of the fish caught were 10 inches or larger. Brown Bullhead (n = 8) and Yellow Bullhead (n = 113) were also captured. These fish were mostly small (6 to 14 inches). Minnows and small fish were abundant in Three Lakes. Blackchin Shiner (n = 270) and Blacknose Shiner (n = 99) were the most common minnows. Banded Killifish and Blackstripe Topminnow were abundant with 81 and 47 being caught respectively. Lake Chubsucker, Brook Stickleback, Brook Silverside, Central Mudminnow, and Iowa Darter were also captured in low numbers.

Largemouth Bass and Northern Pike were the primary predators in Three Lakes. A total of 173 Largemouth Bass were collected ranging from 2 to 21 inches and averaging 9.7 inches. The CPUE of Largemouth Bass in electrofishing was 228 fish per hour which is above the 75th percentiles for SLMMU (147 fish per hour) and statewide lakes (103 fish per hour). The majority of Largemouth Bass (70%) were 8 to 12 inches in length (Figure 7). A total of 11 fish were above the 14-inch minimum size limit for harvest, making up 6% of the total catch. Largemouth Bass growth was average with a growth index score of -0.6 and similar length at age as the statewide average for each year class. Largemouth Bass up to age-12 were captured and age classes 1 through 10 were represented. Largemouth Bass ages 1 through 4 were most common, making up 86% of the total catch. These fish had not yet recruited to the legal fishery.

Age-5 fish averaged 13.2 inches and ranged from 12.0 to 15.8 inches with the faster growing fish subject to harvest.

A total of nine Northern Pike were caught in the 2023 survey. These fish averaged 19.5 inches and ranged from 12 to 26 inches. The pike were age-1 through 7. Not enough Northern Pike were captured in each age class to evaluate growth, but the fish that were captured were generally smaller than the statewide average length for each age class. The gill net CPUE for Northern Pike was 2 fish per net night. This catch rate is just below the median for SLMMU and statewide surveys (both 2.5 fish per net night). Bowfin (n = 3) and Longnose Gar (n = 2) were additional native predators that were captured in low numbers. Predators made up 24.45% of the total biomass caught in the 2023 survey. This is near the low end of the range of 20-50% recommended by Schneider (2000a).

A limnology profile was conducted on August 2, 2023, at the deepest location identified where the depth reached 34 feet. Secchi depth was 9.5 feet which indicates there was light penetration to 19.0 feet of depth. Water temperature was 79.0 degrees F at the surface and was relatively consistent to the thermocline at a depth of 13 feet (Figure 8). Temperature dropped below 68 degrees F at 17 feet and dissolved oxygen dropped below 3 ppm at a depth of 33 feet. This resulted in a band of 16 feet that would provide habitat for coldwater fish.

The shoreline of Three Lakes was mostly natural with a few transects with houses or docks. Only one small dock was located on Three Lakes (0.2 docks per 1,000 feet of shoreline) which is below the 25th percentiles for SLMMU and statewide surveys which were 1.4 and 0.5 docks per 1,000 feet respectively. There were only two houses along the shoreline (0.5 houses per 1,000 feet of shoreline) which is also below the 25th percentiles for SLMMU (3.2 houses per 1,000 feet) and statewide surveys (0.8 houses per 1,000 feet). Armoring was absent with no seawalls or rip rap along the shoreline which is well below the 25th percentile for SLMMU (2.2%) and statewide surveys (0.4%). There were only three submerged trees along the shore (0.7 trees per 1,000 feet of shoreline) mostly due to the wetland complex surrounding the lake resulting in a lack of recruitment of larger wood.

Several species of turtles were caught in the 2023 survey on Three Lakes. Painted Turtles were the most common with 36 individuals being caught. Snapping Turtles (n = 9), Musk Turtles (n = 9), Map Turtles (n = 8), and Blanding's Turtles (n = 1) were also caught.

Analysis and Discussion

Bluegill catch rates were average in large-mesh fyke nets but were very high in small-mesh fyke nets. Thus, the CPUE data suggest that the population density of adult Bluegills was average, whereas the population density for juvenile Bluegills was above average. Age-1 Bluegill were extremely abundant, indicating a strong year class. Despite the abundance of young Bluegill, growth rates were average. Growth of Bluegill was consistent up to age 4 but decreased at age 5. This pattern indicates that age of maturity is likely age 4 as Bluegill growth decreases after maturation (Drake et al. 1997; Jenning et al. 1997; Hoxmeier et al. 2009). This life history strategy leaves adequate time prior to maturation for fish to reach harvestable size. Stunting is not evident in Three Lakes, and age-4 fish were 6.7 inches in length. Good numbers of 7- and 8-inch fish also are available to anglers.

The Black Crappie fishery is excellent in Three Lakes. There is a high abundance of fish and growth rates are above average. The population of 9- and 10-inch fish was very abundant. These are good sized fish for anglers to target and harvest as fish over 9 inches are preferred by anglers (Gabelhouse 1984). The population was dominated by the 2019 year class (age 4). Abundance of older fish was reduced after age-4. The drop in numbers could be due to variable recruitment but could also be related to harvest. Age-4 fish were fully recruited to the fishery and harvest is likely focused on fish 9 inches and above. Acceptable numbers of fish age-2 through age-7 are still present, but at a lower abundance compared to ages 4 and 5. The presence of fish up to age-10 creates the potential for anglers to catch memorable sized fish up to 13 inches in Three Lakes. A 16-inch Black Crappie was reported to the DNR's Master Angler program in 2019.

Black Crappie populations are often cyclical based on variable recruitment success (Swingle and Swingle 1967; Guy and Willis 1995; Sammons et al. 2002). A Black Crappie fishery generally is driven by a few strong year classes and as a result fishing success varies as the year class grows and is harvested. The Black Crappie population may fluctuate in Three Lakes but at the time of the survey there were abundant fish of preferred sizes present. These fish will grow producing larger fish in subsequent years; however the abundance will drop as the 2019 year class succumbs to harvest and natural mortality. Another strong year class will likely replace these fish, but it will take time for them to grow to the preferred size class.

The Yellow Perch population provides an average fishery in Three Lakes. Nine- and 10-inch fish were common and are preferred by anglers. Growth rates were average, and several year classes of fish were available that will continue to grow and support a fishery into the future. Yellow Bullheads were abundant in Three Lakes in 2023. Past surveys also documented high levels of abundance for this species. The Yellow Bullhead population contributes to the sport fishery in Three Lakes by providing additional harvest opportunities. Angler reports indicate this fishery was popular in the past, and Three Lakes is expected to continue providing a high-density population of Yellow Bullhead suitable for harvest.

The Largemouth Bass population is characterized by a high population density with average to slightly depressed growth rates. Fish up to age-4 are abundant with lower numbers of older fish. Abundance declines once fish reach 14 inches indicating harvest may be high on Three Lakes. Despite high harvest, larger fish are present creating the potential for memorable-sized fish over 19.2 inches (Gabelhouse 1984). Largemouth Bass up to 21.0 inches were caught in the 2023 survey. Three Master Angler Largemouth Bass have been reported for Three Lakes (one in 2016 and two in 2018) confirming anglers are catching memorable-sized fish.

Northern Pike catch rates were average in Three Lakes. Only one fish was over the 24-inch legal length limit. Although growth could not be directly evaluated, Northern Pike in Three Lakes were smaller in each age class than the statewide average, suggesting suppressed growth. Alternative regulations could be considered for Northern Pike, but the population is small, and the size structure is not likely significantly influenced by harvest rates. The population density is average and would not fall into a high-density category that would justify liberalized harvest limits (e.g. 5 fish bag, no size limit) or shifting harvest to a smaller size classes (24-34 inch protected slot limit). As a result, no alternative regulations are recommended for Three Lakes.

A few larger Northern Pike were present with a 26.4-inch fish caught in the 2023 survey and a 36-inch Northern Pike reported to the Master Angler program in 2023.

Habitat for coldwater fish is still present in Three Lakes. The temperature and dissolved oxygen profile showed cold oxygenated water is present at depth during late summer stratification. The shoreline is primarily natural and much of the lake has a wetland fringe. The water quality in Three Lakes is expected to remain high if the shoreline remains undeveloped. Challenges to water quality would be changing land use and agriculture runoff. Some runoff enters the lake from the adjacent road, but the remaining watershed is small which limits the potential for non-point source pollution. There is no history of weed treatments on Three Lakes, and the vegetation community is relatively intact providing good spawning and nursery habitat for important gamefish species. The wetland and vegetation also provide good habitat for turtles which were observed in good numbers throughout the survey.

Trout stocking was considered because appropriate oxythermal habitat for trout was present during the limnological sampling in August 2023. However, previous stocking efforts in the 1990s did not produce a strong trout fishery. Furthermore, it is likely that the Northern Pike population would prey heavily on stocked trout. Thus, trout stocking is not recommended.

Management Direction

Three Lakes will continue to be managed as a warmwater fishery. The lake maintains an acceptable fish community which has been maintained by natural reproduction despite potentially high harvest. Fish stocking or regulation changes are not warranted at this time and would be unlikely to improve the sport fishery.

The DNR will continue to protect fish habitat through review of Michigan Department of Environment, Great Lakes, and Energy (EGLE) permit applications for proposed projects both on and surrounding the lake. The wetland shoreline should be protected from modification to continue to provide fish habitat and filter runoff. Conservation easements are one potential strategy for long-term wetland protection.

References

Cooper, G. P. 1948. Fish stocking policies in Michigan. Michigan Department of Natural Resources, Fisheries Research Report 1167, Ann Arbor.

Drake, M.T., Claussen, J.E., Philipp, D.P. and Pereira, D.L., 1997. A comparison of bluegill reproductive strategies and growth among lakes with different fishing intensities. North American Journal of Fisheries Management, 17(2), pp.496-507.

Gabelhouse Jr., D.W. 1984. A length-categorization system to assess fish stocks. North American Journal of Fisheries Management 4:273-285.

Guy, C. S., and D. W. Willis. 1995. Population characteristics of Black Crappies in South Dakota waters: a case for ecosystem management. North American Journal of Fisheries Management 15:754-765.

Hoxmeier, R.J.H., Aday, D.D. and Wahl, D.H., 2009. Examining interpopulation variation in bluegill growth rates and size structure: effects of harvest, maturation, and environmental variables. Transactions of the American Fisheries Society, 138: 423-432.

Jennings, M. J., J. E. Claussen, and D. P. Philipp. 1997. Effect of population size structure on reproductive investment of male bluegill. North American Journal of Fisheries Management 17:516-524.

Sammons, S.M., P.W. Bettoli, D.A. Isermann, and T.N. Churchill, T.N. 2002. Recruitment variation of crappies in response to hydrology of Tennessee reservoirs. North American Journal of Fisheries Management 22: 1393-1398.

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

Schneider, J.C. 2000a. Interpreting fish population and community indices. Chapter 21 in Schneider, James 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. 2000b. Weighted average length and weighted age composition. Chapter 15 in Schneider, James 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., P. W. Laarman, and H. Gowing. 2000a. Age and growth methods and state averages. Chapter 9 in Schneider, James 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., P. W. Laarman, and H. Gowing. 2000b. Length-weight relationships. Chapter 17 in Schneider, James C. (ed) 2000. Manual of fisheries survey methods II: with periodic updates. Michigan Department of Natural Resources, Fisheries Special Report 25, Ann Arbor.

Smith, N.J., K.E. Webster, L.K. Rodriguez, K.S. Cheruvelil, and P.A. Soranno. 2021. LAGOS-US LOCUS v1.0: Data module of location, identifiers, and physical characteristics of lakes and their watersheds in the conterminous U.S. ver 1. Environmental Data Initiative. https://doi.org/10.6073/pasta/e5c2fb8d77467d3f03de4667ac2173ca (Accessed 2023-11-8).

Swingle, H. S., and W. E. Swingle. 1967. Problems in dynamics of fish populations in reservoirs. Pages 229-243 in Reservoir Committee, editors. Reservoir fishery resources symposium. American Fisheries Society, Southern Division, Reservoir Committee, Bethesda, Maryland.

U.S. Geological Survey (USGS). 2024. Annual NLCD Collection 1 Science Products: U.S. Geological Survey data release, https://doi.org/10.5066/P94UXNTS

Wehrly, K.E., G.S. Carter, and J.E. Breck. In revision. Chapter XX: Inland lake Status and Trends Program sampling protocols. Michigan Department of Natural Resources, Fisheries Special Report, Ann Arbor.

Tables and Figures

Table 1. Rainbow Trout stocking history for Three Lakes, Kalamazoo County. All trout were stocked as yearlings.

Year	Strain	# Stocked West Lake	# Stocked Middle Lake	Average Length (Inches)
1975	-	1,600	600	-
1976	-	600	1,600	-
1977	-	1,600	600	-
1978	-	600	1,600	-
1979	-	600	1,600	6.3
1980	-	600	1,600	8.07
1981	Harrietta	2,200	-	-
1982	-	1,200	550	7.09
1983	Harrietta	1,600	600	6.38
1984	Harrietta	1,200	490	6.06
1986	Shasta	1,760	680	6.81
1987	Shasta	2,000	800	6.77
1988	Shasta	2,200	1,000	6.06
1989	Shasta	2,120	920	6.77
1990	Shasta	2,200	999	6.73
1991	Arlee	1,750	740	6.97
1992	Shasta	2,200	999	6.54
1993	Shasta	1,588	699	6.3
1994	Shasta	-	978	6.89
1995	Arlee	-	910	6.93
1996	Eagle Lake	-	840	6.46
1997	Shasta	-	866	6.57
1998	Shasta	-	770	6.1

Table 2. Numbers, calculated weights, and lengths for fish species captured in the 2023 Status and Trends survey of Three Lakes.

Species	Number	Total Weight (lbs)	Average Length (inches)	Length Range (inches)
Banded Killifish	81	0.1	1.6	1 - 2
Black Crappie	347	178.2	9.6	5 - 13
Blackchin Shiner	270	0.6	1.8	1 - 2
Blacknose Shiner	99	0.3	2.1	1 - 2
Blackstripe Topminnow	47	0.1	1.6	1 - 2
Bluegill	1,376	103.3	3.4	1 - 8
Bowfin	3	16.2	24.8	23 - 25
Brook Silverside	2	-	3.5	3 - 3
Brook Stickleback	4	-	1.5	1 - 1
Brown Bullhead	8	9.1	13.5	12 - 14
Central Mudminnow	1	0.0	2.5	2 - 2
Grass Pickerel	1	0.2	9.5	9 - 9
Hybrid Sunfish	115	34.5	7.2	2 - 8
Iowa Darter	10	0.0	1.7	1 - 2
Lake Chubsucker	13	3.7	7.7	3 - 9
Largemouth Bass	173	112.4	9.7	2 - 21
Longnose Gar	2	8.0	34.5	32 - 36
Northern Pike	9	16.4	19.5	12 - 26
Pumpkinseed	204	57.9	6.8	2 - 8
Rock Bass	1	0.3	7.5	7 - 7
Tadpole Madtom	1	0.0	2.5	2 - 2
Warmouth	95	11.8	5.3	2 - 7
Yellow Bullhead	113	61.6	10.3	6 - 13
Yellow Perch	50	10.6	7.0	2 - 11
Total	**3,025**	**625.2**	**5.1**	**1 - 36**

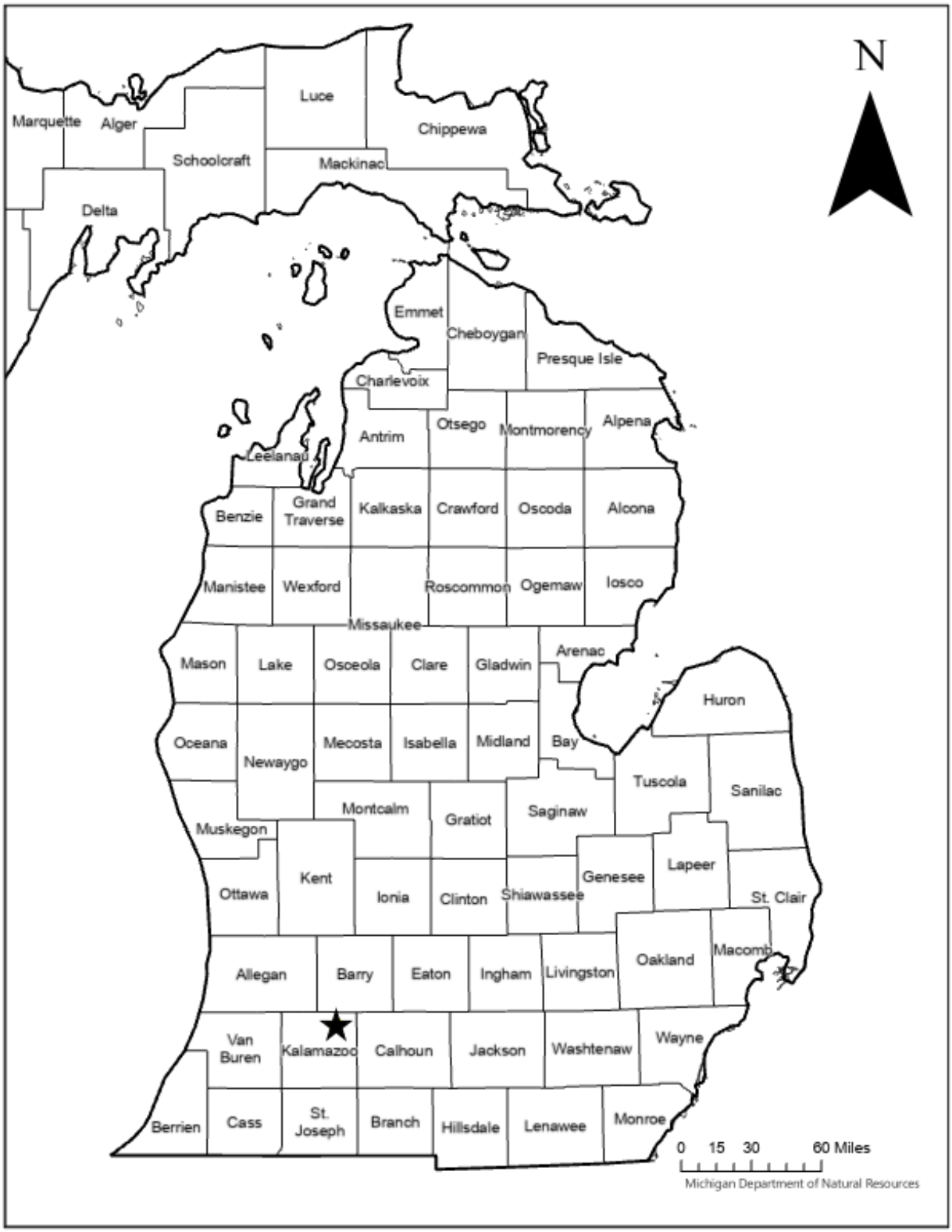

Figure 1. General location of Three Lakes in Kalamazoo County, Michigan. The black star indicates the location of Three Lakes.

Figure 2. Lake map for Three Lakes in Kalamazoo County.

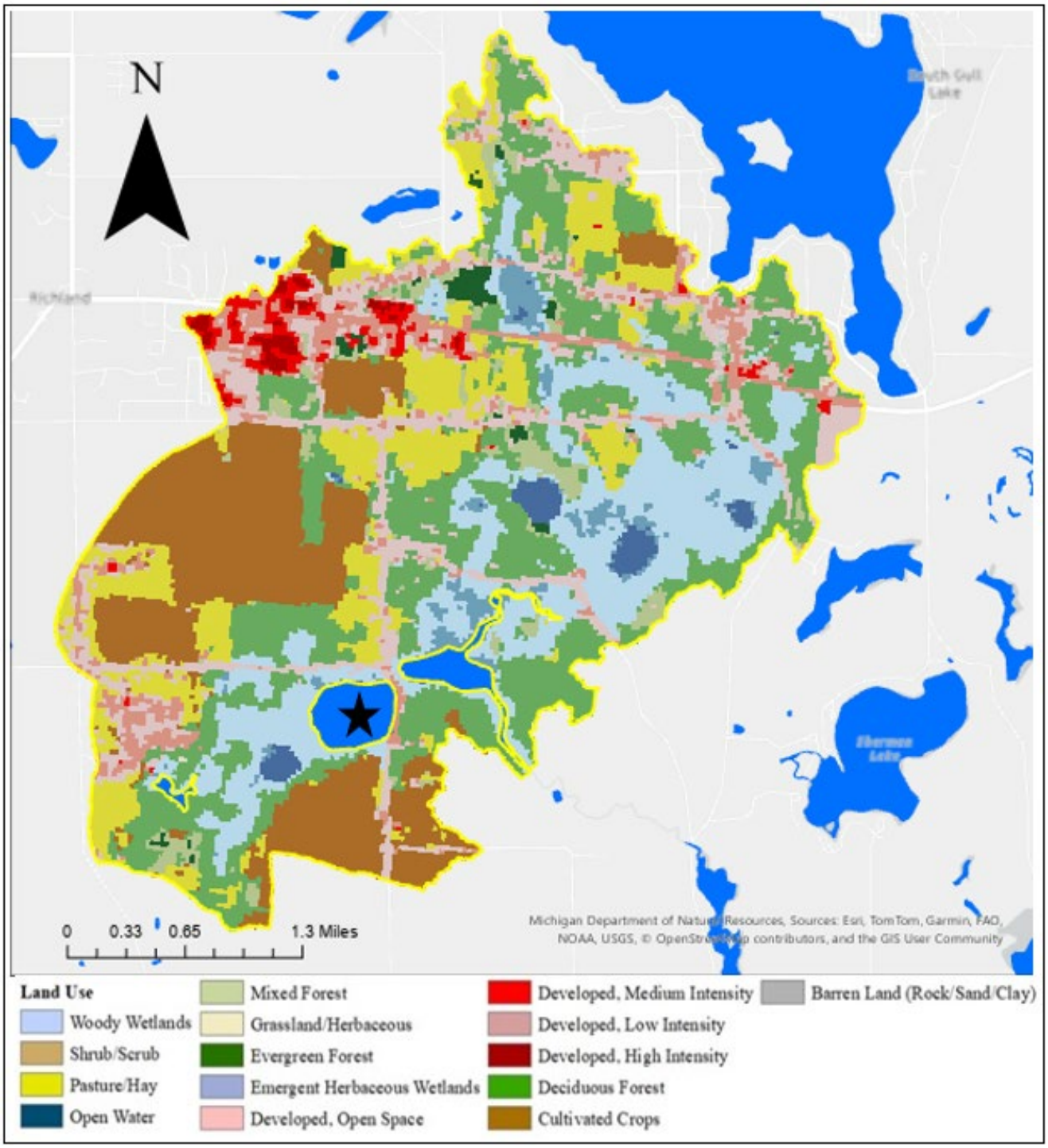

Figure 3. Land use in the Three Lakes watershed. Land cover type for the Three Lakes watershed is derived from the 2023 National Land Cover Database (USGS 2024). The black star indicates location of Three Lakes. The Three Lakes watershed was obtained from LAGOS delineation (Smith et al. 2021).

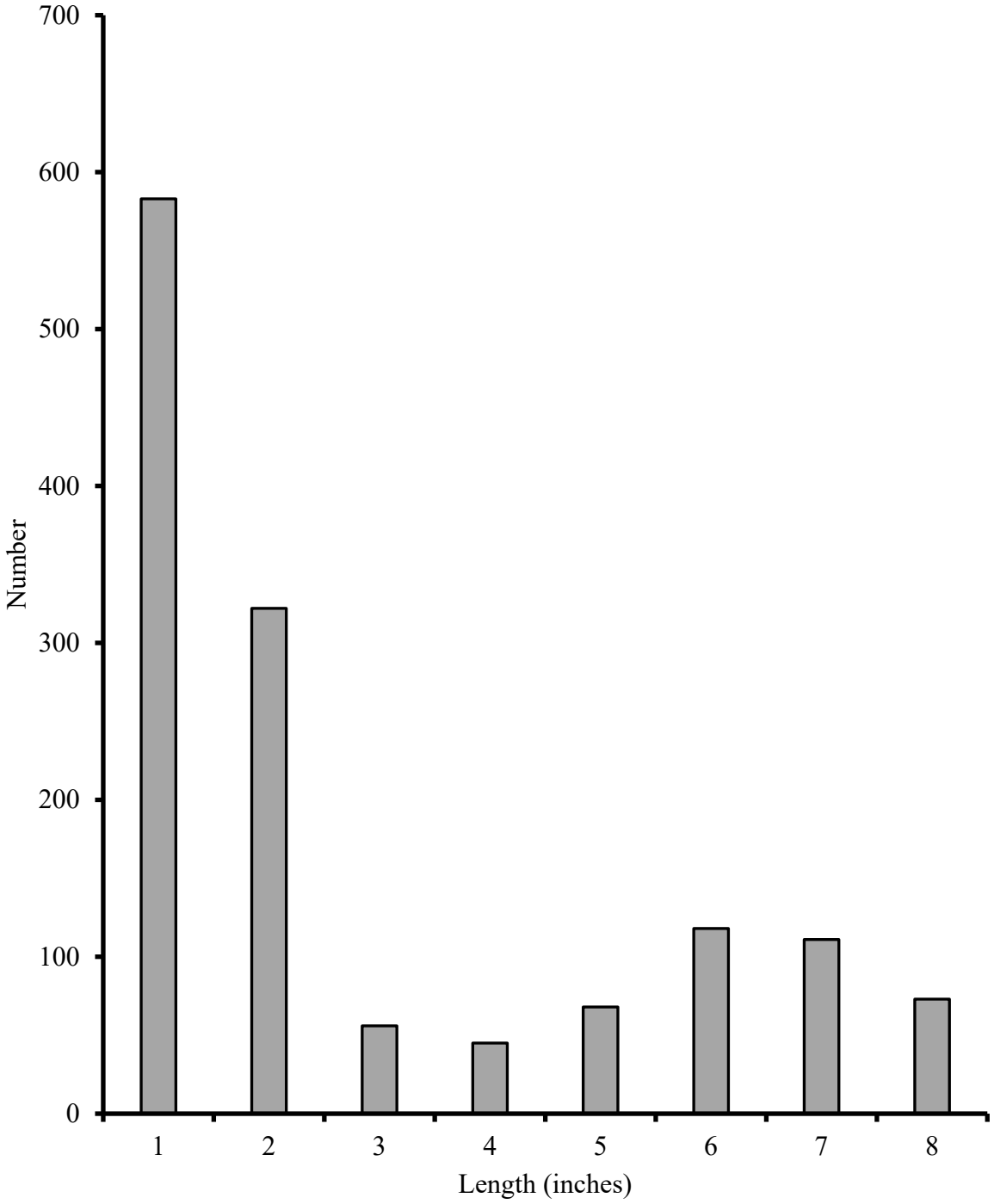

Figure 4. Length frequency distribution of Bluegill caught during the 2023 fish survey on Three Lakes, Kalamazoo County.

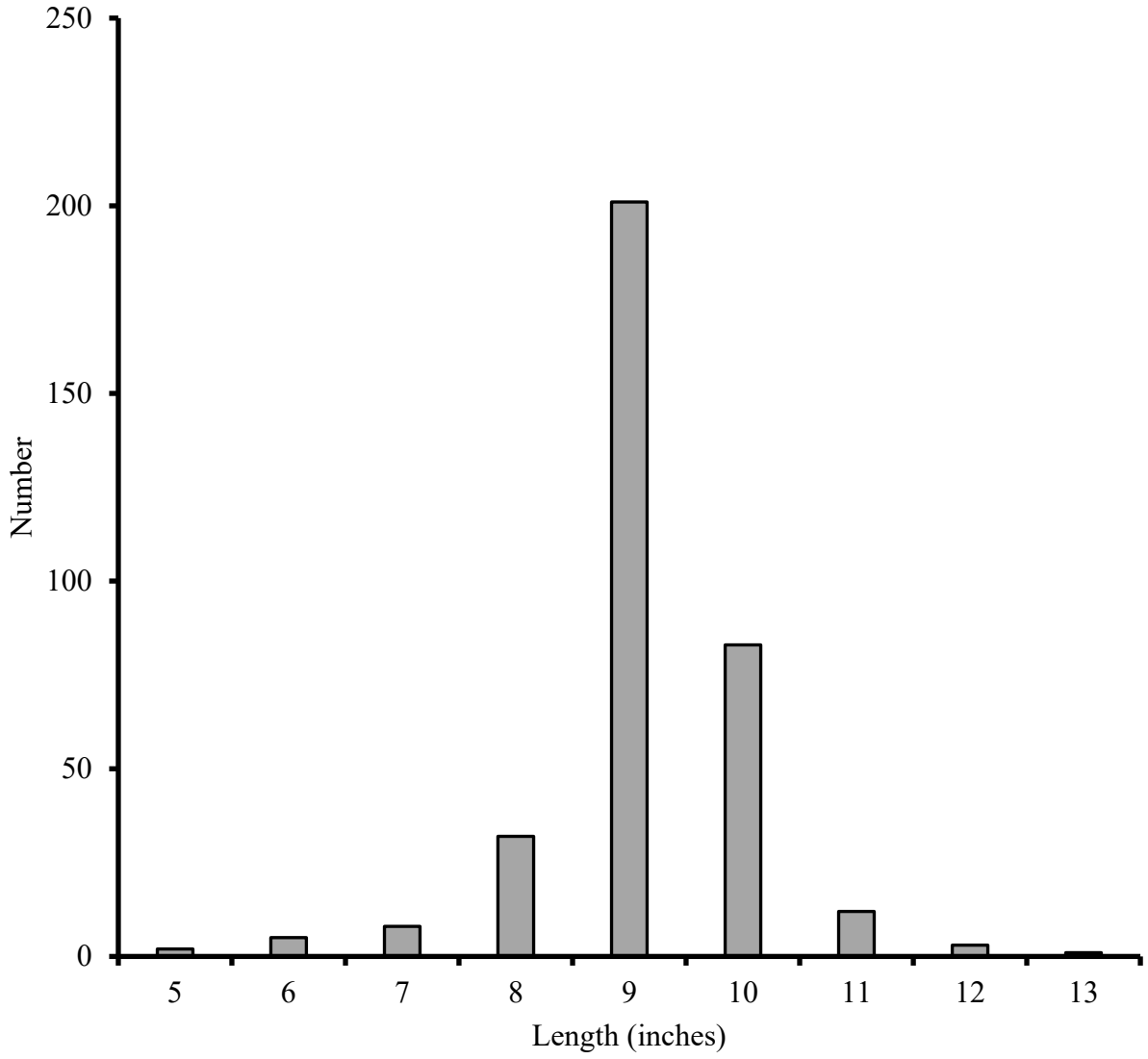

Figure 5. Length frequency distribution of Black Crappie caught in the 2023 fish survey on Three Lakes in Kalamazoo County.

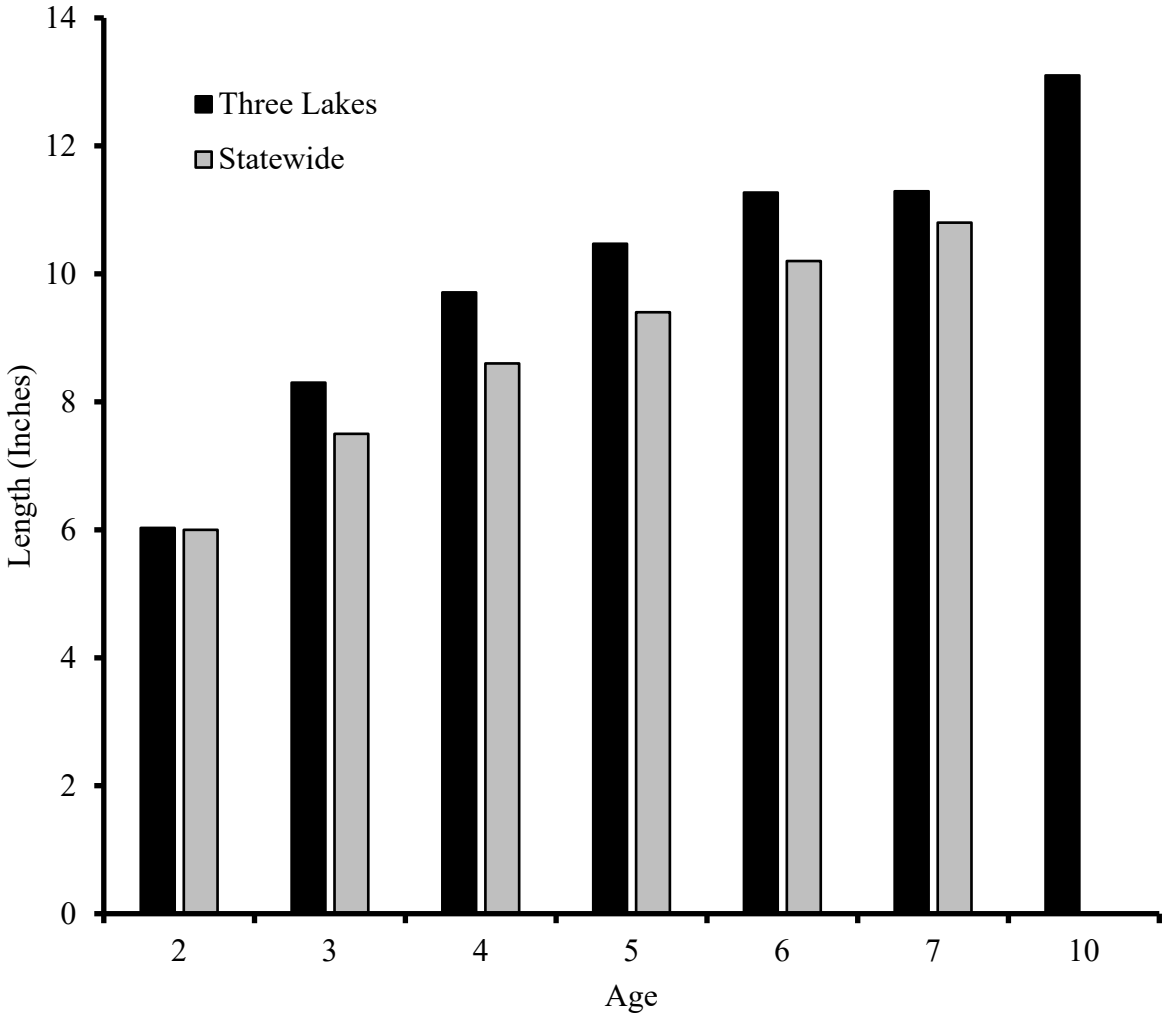

Figure 6. Mean lengths at age for Black Crappie caught in the 2023 fish survey on Three Lakes compared to statewide averages from Schneider et al. (2000a).

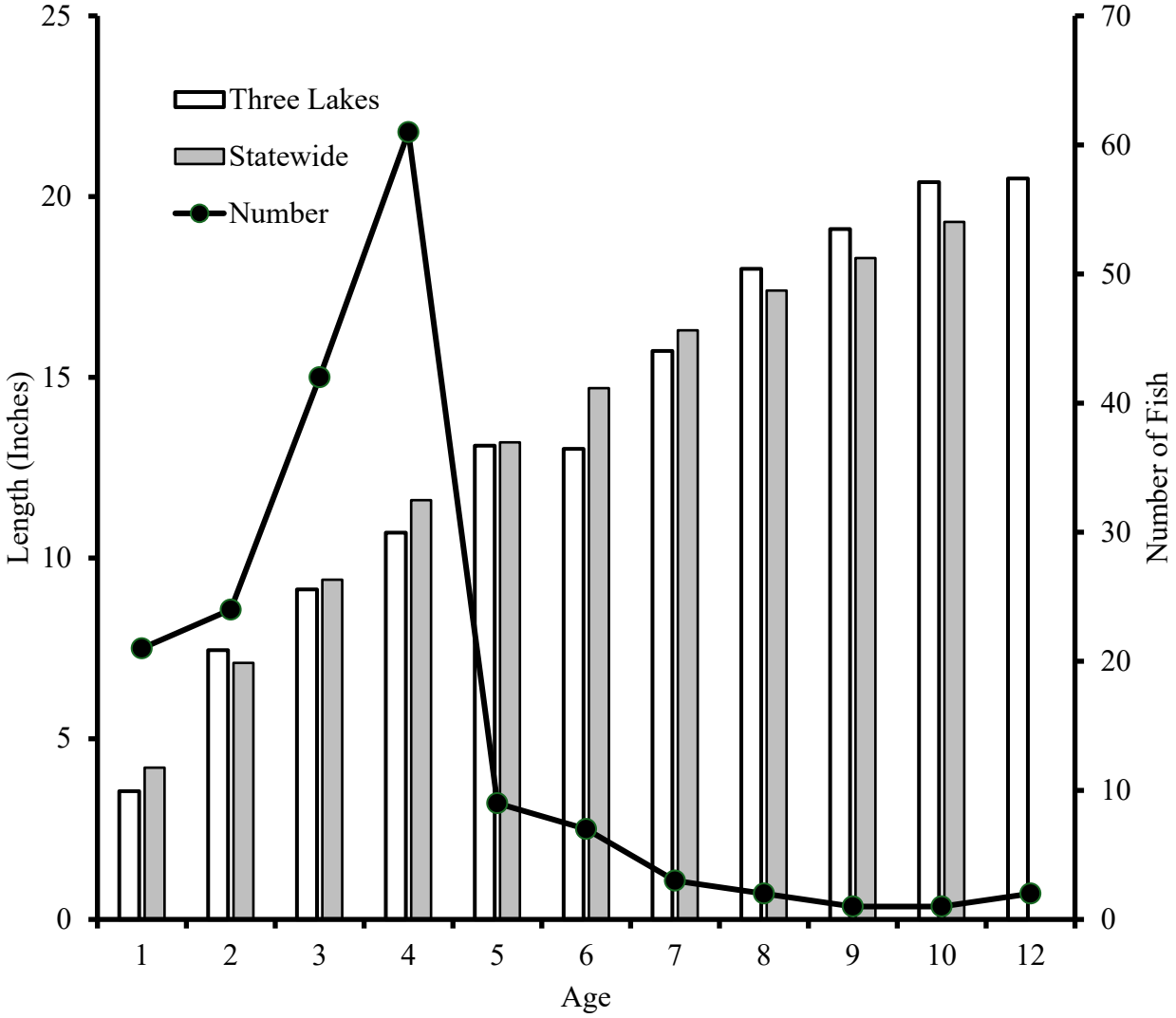

Figure 7. Mean length and number of Largemouth Bass caught in each age class in the 2023 fish survey on Three Lakes.

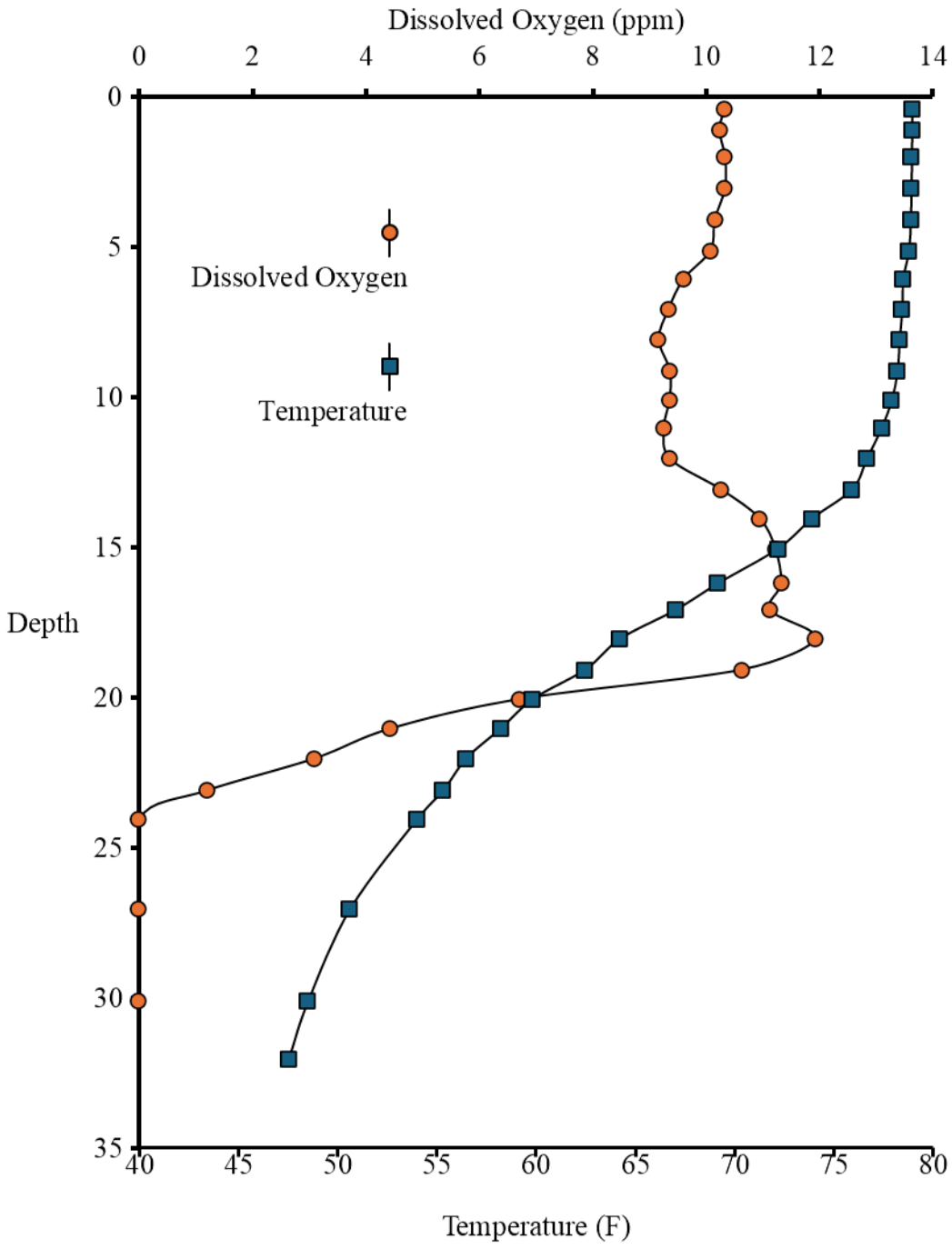

Figure 8. Results of the most recent water temperature and dissolved oxygen profile for Three Lakes. Profile was completed at the deepest basin on August 2, 2023.

Literature Path

Received January 12, 2026, Approved January 27, 2026
Brian Gunderman, Unit Review and Approval
Jeffery Jolley, External Reviewer
John Bauman, SFR Facilitator
John Bauman, Desktop Publisher and Approval