Bills Lake
Newaygo County: 12N, 12W, 27-29,33
Grand River Watershed, Last Surveyed: 2023

Addie Myers: Fisheries Management Biologist

Environment

Bills Lake is a 204-acre lake located approximately 9 miles southeast of the village of Newaygo in Newaygo County (Figure 1). The lake has a small inlet on the southeastern shore and one outlet, Ransom Creek on the southwest shore, which flows south into the headwaters of the Rogue River. Bills Lake is a deep lake for central Michigan with a maximum depth of 80 feet. The lake has some wide littoral shoals around the shore; however, the majority of the lake is at least 30 feet deep. Marl is the dominant substrate in Bills Lake, but there are also extensive areas of sand and some pockets of cobble, gravel, and detritus. A Michigan Department of Natural Resources (DNR) boating access site is located on the northwestern shore of the lake. The boating access site is moderate sized with a gravel parking lot for 20 vehicles with trailers.

The Bills Lake watershed landcover is dominated by forested lands (42%) and water (23%; Figures 2 and 3). Smaller landcover types within in the watershed include urban (14%), agricultural (10%), wetland (5%), and grassland (4%). The shoreline of Bills Lake is developed with residential development covering 33% of the shoreline. Approximately 35% of the shoreline of the lake is forested and 13% is wetland habitat. The surficial geology around Bills Lake consists of coarse-textured glacial moraines, and Darcy maps show strong potential for groundwater inputs to the lake.

History

Fisheries management of Bills Lake began in the 1890s by the Michigan Fish Commission (MFC). A wide variety of fish species were initially stocked into Bills Lake, including Lake Trout, Smallmouth Bass, and Walleye (Table 1). The first fisheries survey was conducted in July 1892 by the MFC. Gill nets were set in Bills Lake, presumably for only one night. Fish species captured during the 1892 survey included: Brook Trout, Smallmouth Bass, Yellow Perch, Bluegill, Largemouth Bass, and "Sunfish" which were most likely Pumpkinseed. It was noted that "food was plentiful" and that one Brook Trout weighed 2.5 pounds (Sargeant 1892). The bathymetry, substrate, and residential development of Bills Lake were mapped in 1940 by the United States Forest Service.

The first large-scale fisheries survey was conducted in July 1952 by the Michigan Department of Conservation, the precursor to the present day DNR. Twenty-four gill net sets and 12 seine hauls were completed during the July 1952 survey. Bluegill was the most abundant fish species captured in the gill nets, but eight other species were also collected (Table 2). The species diversity was high in the seine hauls with 12 fish species caught. Bluntnose Minnow was the most abundant fish species captured with the seines. The next survey was another gill net survey completed in May 1961. The fish community was similar to previous surveys with the exception of Rainbow Trout, White Sucker, Black Crappie, and Northern Pike being caught for the first time (Table 2).

Following stocking of Splake in 1965 and 1966, there were gill netting surveys in 1967 and 1968 to assess the Splake fishery in Bills Lake. Splake were captured in both years, but the numbers and sizes of fish were not sufficient to justify continuation of the stocking program. Splake stocking was cut and stocking reverted back to Rainbow Trout in 1968 (Table 1). The next survey was completed in June 1975 to assess the Rainbow Trout stockings that were occurring. Gill nets and traps nets were set for two nights around Bills Lake, but no Rainbow Trout were captured. The fish community was similar to previous surveys but lacked any salmonids (Table 2). Additional surveys to evaluate the Rainbow Trout stockings were completed in September 1983 and May 1984. In both surveys gill nets and trap nets were deployed in an effort to effectively sample the different habitats of Bills Lake. No trout were captured in 1983, but in 1984 two sublegal Rainbow Trout were collected. Survey analyses indicated that the fish community of Bills Lake was dominated by an "excellent warmwater fish population" and survival of Rainbow Trout was "questionable because of the Northern Pike population" as Rainbow Trout were documented in Northern Pike stomachs. Rainbow Trout stocking was discontinued following the 1984 survey and Walleye stocking commenced (Table 1).

The first survey to assess Walleye survival was completed in October 1987. Trap nets and gill nets were deployed around the lake. Five Walleye were captured as well as other coolwater and warmwater species including Northern Pike, Yellow Perch, Largemouth Bass, and numerous panfish species. Another gill netting survey was completed in June 1989 assessing the Walleye fishery. Two Walleye were captured, and notes from the survey report document numerous angler calls appreciating the Walleye stocking and fishery that was produced.

In October 1991, a Serns Walleye recruitment survey was completed on Bills Lake. This survey protocol utilizes nighttime boat electrofishing in shallow water specifically aimed at young-of-year (YOY) and age-1 Walleye. During the 1991 effort and all subsequent Serns surveys, electrofishing was completed along the entire shoreline of the lake. Twenty-eight Walleye were captured during the survey and were all age-0, age-1, or age-3. Survival of stocked fish appeared to be low. Another Serns survey was completed in September 1994. Similar to the 1991 survey, the catch of yearling Walleye from previous stocking efforts was poor, but there was some natural recruitment occurring as evidenced by the collection of several YOYs.

In April 1995, an early spring Walleye population survey was completed on Bills Lake. Walleye were sampled with trap nets in April and released with a mark. (The type of mark was not listed in the survey report. It most likely was a fin clip.) The recapture phase occurred in May and used trap nets, gill nets, and nighttime boat electrofishing to assess the Walleye population and entire fish community. Based on the mark-recapture data, the total Walleye population was estimated at 1.7 Walleye per acre and the legal Walleye population was estimated at 1.1 Walleye per acre. There was some evidence of natural reproduction of Walleye observed, but most fish were from year classes that corresponded to stocking efforts. Bluegill (n = 278) was the most abundant species in the catch. Given the large number of Bluegill captured, a Schneider Index score was calculated (Schneider 1990). The Schneider Index provides a score for the Bluegill fishery in a lake that ranges from 1 (very poor) to 7 (superior). The Schneider Index score for Bluegill in Bills Lake during the 1995 survey was 5 which is good. The Schneider Index was also calculated from Bluegill captured during the 1984 survey and it was 4 or satisfactory.

In 2000, another Serns Walleye recruitment survey was conducted on Bills Lake. No YOY or yearling Walleye were captured. The only Walleye caught were two age 3 fish (1997 year class) and two age 5 fish (1995 year class).

Spring fingerling Walleye stocking in Bills Lake was discontinued in 2005. The management prescription written to cancel the spring fingerling plants noted that Walleye management could be resumed if fall fingerlings became available for stocking. The Southern Lake Michigan Management Unit started rearing fall fingerling Walleye in 2013 as a pilot project and gradually increased annual production to around 10,000-15,000 fish per year. A dissolved oxygen and temperature profile conducted in July 2016 indicated that water temperature and dissolved oxygen conditions in Bills Lake were suitable for Walleye survival. Fall fingerling Walleye stocking at a density of 4 fish/acre began in 2016. Walleye were stocked annually during 2016-2018 (Table 1). The intent was to stock biennially after 2018; however, covid 19 shutdowns precluded Walleye rearing in 2020. Fall fingerling stocked resumed in 2021.

Southern Lake Michigan Management Unit staff received reports from the Bills Lake Association of an overabundance of small Northern Pike in the lake in the spring of 2021. After receiving training from the DNR fisheries biologist, a group of volunteer anglers collected dorsal fin ray samples and total length data on 136 individual pike during July-October 2021. Only one fish was larger than the statewide default minimum size limit of 24 inches. The mean growth index was -5.8, which is considered very poor growth. On April 1, 2023, the Northern Pike regulations on Bills Lake were changed to a daily possession limit of five fish of any size except only one fish can be 24 inches or larger.

Current Status

A trap netting survey was conducted immediately following ice off in the spring of 2023. The netting survey objectives were 1. To estimate Walleye and Northern Pike abundance, and 2. To assess the differences in size structure and growth indices for angler caught Northern Pike from the 2021 sampling effort relative to pike collected in fisheries survey gear. Six trap nets and one large mesh fyke net were set on March 22, and were checked at least every two days before being removed from the lake on April 6 (Figure 1). On April 7 a single-pass nighttime electrofishing survey was conducted around the entire shoreline of Bills Lake. During the netting portion of the survey, all Northern Pike and Walleye were measured to obtain total length, and dorsal fin ray (pike) or spine (Walleye) samples were collected from each fish for age and growth analyses. This partial dorsal fin clip also doubled as a mark, and all fish were inspected for dorsal fin clips after the initial day of netting. Sex of Northern Pike and Walleye was determined by examining expressed fluids (milt for males and eggs for females). Weighted age frequencies for Walleye and Northern Pike were calculated using the methods described by Schneider (2000). In addition to the data collected on Northern Pike and Walleye, other fish species captured during the trap net sampling were identified and measured to inch bin. The electrofishing survey specifically targeted Northern Pike and Walleye; therefore, those were the only species netted. All Northern Pike and Walleye were measured, sexed, and assessed for a mark during the electrofishing survey, and dorsal fin ray/spine samples were collected from new fish.

A total of 84 individual Walleyes were captured during the 2023 spring trap netting survey and electrofishing recapture survey. Most of the Walleye were initially captured during the netting portion of the survey, but nine Walleye were first handled during the electrofishing recapture phase. The

Schumacher/Eschmeyer population estimator utilizes multiple marking events and recapture events (netting and electrofishing survey pooled). By contrast, the Lincoln Petersen, with the Chapman modification, lumps all netting events into a single marking event with the electrofishing effort as the recapture event. Given the low number of fish handled during the electrofishing sampling, the Schumacher/Eschmeyer model was used in this instance.

A total of 84 unique individual Walleye were captured and 20 Walleye were recaptured over the seven netting recapture days and one night electrofishing survey. The Schumacher/Eschmeyer Walleye population estimate was 197 Walleye with a 95% confidence interval of 150 to 288 Walleye. The density estimates equal an entire Walleye population of 1.0 Walleye per acre (95% confidence interval = 0.7-1.4 fish/acre). Walleye population estimates were not separated by sex due to the low number of Walleye captured across the surveys.

Total lengths for Walleyes ranged from 12 inches to 25 inches (Figure 4). Age-5,6, and 7 Walleye were most abundant in the catch which correspond to the 2018, 2017, and 2016 fall fingerling stocking events (Figure 5). Nearly 47% of the Walleye were from the 2016-year class. Not surprisingly, all but three individual Walleye were from a stocked year class. Across all year classes Walleye in Bills Lake were nearly two inches larger than statewide averages (Figure 6; Table 3).

A total of 133 unique individual Northern Pike were captured and 10 were recaptured during the 2023 spring survey on Bills Lake. Ninety-six percent of Northern Pike captured were under 24 inches in length (Figure 7). Females tended to be larger than males, and all of the pike 23 inches or larger were females. A Schumacher-Eschmeyer population estimate was calculated with an estimated Northern Pike population of 836 fish with 95% confidence intervals from 448 fish to 6,186 fish. Given the low number of recaptures, the population estimate is of little utility due to the wide confidence intervals. There were enough Northern Pike captured to assess age and growth across year classes. The Northern Pike population was dominated by age-3, age-4, and age-5 fish (Figure 8). Mean lengths at age for Bills Lake Northern Pike across all year classes were more than 3 inches smaller than statewide averages, and the mean growth index was -4.5 (Table 3; Figure 9).

Black Crappie were not a target species during the 2023 spring netting survey; however, they were the third most abundant fish species caught (Table 4). Seventy-six Black Crappie were netted, and all were at least 8 inches in length (Figure 10). Most of the Black Crappie were between 10.0 and 11.9 inches in length, but fish up to 14.9 inches in length were captured. In addition to the Black Crappie, 52 Bluegill were also netted. Bluegill size structure was also impressive. Forty percent of all Bluegill handled were at least 8 inches in length (Figure 11). Also of note, two individuals were in the 10-inch bin. Bluegills over 10 inches are rare in southwestern Michigan and would meet the minimum length requirement for entry in the DNR's Master Angler Program.

Fifty-one Largemouth Bass were also caught in the 2023 netting survey. Twenty-seven percent of the Largemouth Bass were of legal size for harvest (i.e., 14 inches or larger). The largest Largemouth Bass sampled was in the 17-inch bin.

Other game fish species captured during the 2023 netting survey included: Hybrid Sunfish (n=6), Pumpkinseed (n=1), Rock Bass (n=66), Smallmouth Bass (n=1), and Yellow Perch (n=11). The low number of individuals captured of these species does not mean the population densities are low in Bills

Lake because the survey timing and gear used were not ideal for targeting these species. Nongame species captured included Bowfin, Brown Bullhead, Common Carp, White Sucker, and Yellow Bullhead. Most of these species were captured in very low abundance (Table 4).

On July 31, 2023, a dissolved oxygen and water temperature profile was recorded at the deepest basin of Bills Lake. Bills Lake was stratified when the profile was recorded with a surface water temperature of 78.9F and bottom water temperature around 45F (Figure 12). Dissolved oxygen concentrations remained above 5 ppm to a depth of 37 feet. From 60 feet to the bottom of Bills Lake, there was no dissolved oxygen present in the water column. The Secchi depth of Bills Lake was 13.5 feet, indicating that the water was quite clear.

Analysis and Discussion

Wehrly et al. (2012) classified inland lakes in Michigan based on a variety of variables including lake size, thermal regime, and fish assemblage patterns. The lake classification includes six classes of lakes (1-6). Bills Lake is similar to many lakes in southwestern Michigan and is classified as a class 1 lake. Class 1 lakes have high degree-days, high mean water temperatures, small surface areas, and have intermediate depths. Class 1 lakes are not a top priority for Walleye management statewide, but some key class 1 lakes near population centers have highly utilized Walleye fisheries because of stocking efforts (Herbst et al. 2022). Bills Lake appears to be classified correctly as a class 1 lake based on the lake characteristics and the Walleye population.

The Bills Lake Walleye population estimate of 1.0 Walleye per acre is low. The target density of adult Walleye in inland lakes is 2.0 adult Walleye per acre (Michigan Department of Natural Resources 2004). Many of the males and nearly all of the female Walleye from the 2021 year class were not sexually mature at the time of the 2023 survey and would not be expected to be nearshore and vulnerable to our sampling gear. Thus, the catch was primarily composed of fish from only three stocked year classes (2016-2018). Given the above average growth rates, most stocked Walleye are reaching legal size for harvest in Bills Lake by age-3 indicating that all three of these stocked year classes were available for harvest for a few years prior to the 2023 survey. The low stocking rate of 4 Walleye per acre coupled with the large gap between stocking and surveying could explain the low estimate of Walleye in Bills Lake. The Walleye handled were in good condition, growing well, and providing an opportunistic fishery.

Comparisons of cost/benefit ratios for past spring fingerling versus recent fall fingerling stocking are complicated by differences in survey methods, variable stocking rates, and timing of surveys in relation to previous stocking events. The cost per fall fingerling Walleye produced in SLMMU ponds during 2021-2023 was $2.81. Using this value, the total cost for the stocking program from 2016-2021 was $9,192. From 1984-1993, a total of 121,012 spring fingerlings were stocked in Bills Lake. The DNR has been using a cost estimate of $0.0654 per spring fingerling Walleye. With that value, the total stocking cost from 1984-1993 would have been $7,914. However, it is important to recognize that the spring fingerling cost/fish estimates were generated many years ago and probably considerably underestimate current cost. In addition, when the 1995 survey was conducted there were six stocked year classes from age 3 to age 10 in the lake. As previously noted, only three stocked year classes in that age range were present during the 2023 survey.

The Management Plan for Walleye in Michigan's Inland Waters states that Class 1 lakes generally are low priority sites for stocking unless they are located in an area with few Walleye fishing opportunities or are near large population centers (Herbst et al. 2022). Bills Lake is only about a 45-minute drive from Grand Rapids or Muskegon. Nearly all the lakes in southwest Michigan are Class 1 waters, so some stocking of Class 1 waters is necessary for the DNR to create and maintain Walleye fishing opportunities in this heavily populated portion of the state. Bills Lake has better environmental conditions for Walleye than many Class 1 lakes. Optimal water temperatures for Walleye are between 64F and 72F (Christie and Regier 1988; Hasnain et al. 2010). Both the 2016 and the 2023 water quality sampling indicated that Bills Lake has a well-oxygenated (i.e., dissolved oxygen concentration above 5 ppm) band of water within this temperature range throughout the summer.

Due to the low recapture rate, a reliable quantitative estimate of Northern Pike abundance in Bills Lake is not available. Catch-per-unit-effort (CPUE), recapture percentage, and growth rates provide qualitative indicators of pike abundance. The trap net catch-per-unit effort (CPUE) for Northern Pike was 1.3 fish per net night. Compared to other lakes in SLMMU, this CPUE is much lower than the mean CPUE for Northern Pike captured in spring trap net surveys (3.5 Northern Pike/net night). When compared statewide, the CPUE is lower than the mean CPUE of 4.4 Northern Pike per net night for targeted trap netting surveys (Godby et al. 2023). However, CPUE data alone do not provide a robust index of abundance. In the case of Bills Lake, the capture of Northern Pike was most likely low compared to actual abundance because only 10 individuals were recaptured during the 15 days of netting and one night of electrofishing. Additionally, many of the female Northern Pike captured during the first few days of surveying were spent, indicating they had already spawned. It is possible that a substantial percentage of the Northern Pike had already finished spawning when the survey began and had moved offshore.

The mean growth index of Northern Pike sampled during the 2023 survey was -4.5, which was slightly better than the mean growth index of angler caught Northern Pike in 2021 of -5.8 but still very poor. Of the 138 Northern Pike anglers caught in the summer of 2021, only one fish was 24 inches or greater. Of the 133 Northern Pike captured in the 2023 survey, only five Northern Pike were 24 inches or greater in length. The mean growth index and overall size structure of Northern Pike captured in 2023 provide additional support for the regulation change that was implemented on April 1, 2023. The poor growth also suggests that the Northern Pike population density in Bills Lake is higher than the CPUE data would indicate.

Although not the target of the spring netting survey, the panfish community in Bills Lake appears to be dominated by Black Crappie and Bluegill. Both species had relatively low abundance of individuals captured due to the cold water temperatures, but the size structure was impressive. Future fisheries surveys should continue to monitor the panfish community.

Management Direction

1. Continue to actively manage the Walleye fishery in Bills Lake by biennial stocking of fall fingerling Walleye (target = 4 fish/acre).

2. Continue to encourage harvest of Northern Pike with the liberalized regulation which has no minimum size limit and a daily bag limit of 5 fish, but only one fish 24 inches or greater in length.

3. Encourage riparian landowners to maintain and restore natural shorelines and improved connection between the littoral zones and riparian upland habitats.

References

Christie, G. C., and H. A. Regier. 1988. Measures of optimal thermal habitat and their relationship to yields for four commercial fish species. Canadian Journal of Fisheries and Aquatic Sciences. 45:301-314.

Godby, N.A., C.K. Kovacs, M. J. Diana, and J. T. Francis. 2023. Northern Pike sampling protocol. Chapter 29 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.

Hasnain, S., C. Minns, and B. Shuter. 2010. Key ecological temperature metrics for Canadian freshwater fishes. Climate Change Research Report. 17:1-51.

Herbst, S., D. Hayes, K. Wehrly, C. LeSage, D. Clapp, J. Johnson, P. Hanchin, E. Martin, F. Lupi, and T. Cwalinski. 2022. Management plan for Walleye in Michigan's inland waters. Michigan Department of Natural Resources.

Michigan Department of Natural Resources. 2004. Stocking guidelines for various species of fish. Chapter 5 in Dexter, J. L., Jr., and R. P. O'Neal, editors. Michigan fish stocking guidelines II: with periodic updates. Michigan Department of Natural Resources, Fisheries Special Report 32, Ann Arbor.

Sargeant, N.D., P. Marke, D. Lydell, N.J. Sargeant, L. Miller, and J. McKevlir. 1892. Michigan Fish Commission. Examination of Interior Lakes.

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

Schneider, James C. 2000a. 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.

Wehrly, K.E., J.E. Beck, L. Wang, and L. Szabo-Kraft. 2012. Landscape-based classification of fish assemblages in sampled and unsampled lakes. Transactions of the American Fisheries Society 141:414-425.

Tables and Figures

Table 1. Fish stocked from 1894 to 2023 into Bills Lake, Newaygo County.

Year	Species	Number Stocked	Average Length (inches)	Life Stage
1894	Lake Trout	10,000	Unknown	Unknown
1896	Lake Trout	25,000	Unknown	Unknown
1897	Lake Trout	25,000	Unknown	Unknown
1905	Walleye	150,000	Unknown	Fry
1909	Smallmouth Bass	2,000	Unknown	Fingerling
1909	Walleye	50,000	Unknown	Fry
1910	Smallmouth Bass	6,000	Unknown	Fry
1933	Bluegill	5,000	Unknown	5 month
1933	Largemouth Bass	800	Unknown	5 month
1934	Walleye	486	Unknown	Adults
1936	Bluegill	11,875	Unknown	5 month
1936	Largemouth Bass	12,600	Unknown	1 month
1936	Yellow Perch	20,000	Unknown	8 month
1937	Bluegill	9,600	Unknown	5 month
1937	Crayfish	14,550	Unknown	Unknown
1938	Bluegill	10,000	Unknown	6 month
1938	Largemouth Bass	500	Unknown	5 month
1938	Smallmouth Bass	580	Unknown	5 month
1939	Bluegill	5,000	Unknown	4 month
1939	Smallmouth Bass	1,080	Unknown	3 month
1940	Smallmouth Bass	1,000	Unknown	4 month
1941	Smallmouth Bass	3,000	Unknown	1 month
1942	Smallmouth Bass	800	Unknown	5 month
1942	Walleye	200,000	Unknown	Swim-up fry
1943	Smallmouth Bass	3,000	Unknown	3 month
1944	Largemouth Bass	500	3.5	4 month
1944	Largemouth Bass	500	3.5	4 month
1950	Brook Trout	384	8.6	Yearling
1950	Brook Trout	385	8.6	Yearling
1950	Brook Trout	384	8.6	Yearling
1950	Brook Trout	385	8.6	Yearling
1950	Rainbow Trout	15,000	2.5	Spring fingerling
1952	Brook Trout	375	8.1	Yearling
1952	Brook Trout	375	8.1	Yearling
1952	Brook Trout	375	8.1	Yearling
1952	Brook Trout	375	8.1	Yearling
1953	Brook Trout	1,500	8.7	Yearling

1954	Brook Trout	5,000	8.75	Yearling
1955	Brook Trout	5,000	Unknown	Legal
1956	Brook Trout	5,000	Unknown	Legal
1957	Rainbow Trout	10,000	Unknown	Legal
1958	Rainbow Trout	5,000	Unknown	Legal
1960	Rainbow Trout	10,000	Unknown	Legal
1961	Rainbow Trout	5,000	Unknown	Legal
1962	Rainbow Trout	5,000	Unknown	Legal
1963	Rainbow Trout	5,000	Unknown	Legal
1964	Rainbow Trout	5,000	Unknown	Legal
1965	Splake	20,000	Unknown	Sublegal
1966	Splake	10,000	Unknown	Spring fingerling
1968	Rainbow Trout	9,000	Unknown	Yearling
1969	Rainbow Trout	6,000	Unknown	Yearling
1970	Rainbow Trout	1,000	Unknown	Adults
1970	Rainbow Trout	5,000	Unknown	Yearling
1971	Rainbow Trout	6,000	Unknown	Yearling
1972	Rainbow Trout	6,000	Unknown	Yearling
1973	Rainbow Trout	6,000	Unknown	Yearling
1974	Rainbow Trout	6,000	Unknown	Yearling
1975	Rainbow Trout	6,060	Unknown	Yearling
1981	Rainbow Trout	5,000	6.1	Yearling
1982	Rainbow Trout	5,500	6.5	Yearling
1983	Rainbow Trout	6,000	6.2	Yearling
1984	Rainbow Trout	4,800	5.6	Yearling
1984	Walleye	3,757	1.8	Spring fingerling
1986	Walleye	8,000	2.1	Spring fingerling
1987	Walleye	8,000	1.8	Spring fingerling
1988	Walleye	699	3.5	Fall fingerling
1990	Walleye	12,717	1.3	Spring fingerling
1991	Walleye	6,000	1.7	Spring fingerling
1992	Walleye	26,438	1.2	Spring fingerling
1993	Walleye	56,100	1	Spring fingerling
1995	Walleye	43,338	1.3	Spring fingerling
1997	Walleye	11,852	1.1	Spring fingerling
1998	Walleye	28,702	1.4	Spring fingerling
2000	Walleye	20,400	1.1	Spring fingerling
2003	Walleye	20,529	1	Spring fingerling
2005	Walleye	5,878	1.1	Spring fingerling
2016	Walleye	797	5.8	Fall fingerling
2017	Walleye	874	5.7	Fall fingerling
2018	Walleye	800	7.4	Fall fingerling
2021	Walleye	800	5.8	Fall fingerling

2021	Yellow Perch*	1,400	6	Yearling
2022	Yellow Perch*	915	6	Yearling
2023	Yellow Perch*	1,000	6	Yearling
2023	Walleye	802	6.5	Fall fingerling

* Private fish stocking under permit from the DNR

Table 2. Presence, absence of fish species in historical fisheries surveys of Bills Lake, Newaygo County, Michigan.

Species	1892	1952	1961	1967	1968	1975	1983	1984	1987	1989	1995	2023
Banded Killifish		x										
Black Crappie			x		x	x	x	x	x		x	x
Blackchin Shiner		x										
Blacknose Shiner		x										
Bluegill	x	x	x		x	x	x	x	x	x	x	x
Bluntnose Minnow		x										
Brook Silverside		x										
Brook Trout	x		x									
Brown Bullhead					x	x	x					x
Central Mudminnow		x										
Common Carp						x						x
Golden Shiner								x				
Green Sunfish		x	x									
Hybrid Sunfish												x
Largemouth Bass	x	x	x		x	x	x	x	x	x	x	x
Least Darter		x										
Longear Sunfish		x										
Northern Pike			x		x	x	x	x	x	x	x	x
Pumpkinseed	x	x	x			x	x	x	x		x	x
Rainbow Trout			x	x				x				
Redhorse Spp.							x					
Rock Bass		x	x		x	x	x	x	x	x	x	x

Smallmouth Bass	x	x	x			x		x	x		x	x
Splake				x	x							
Walleye								x	x	x	x	x
Warmouth												x
White Sucker			x		x							x
Yellow Bullhead		x				x	x		x	x	x	x
Yellow Perch	x	x	x	x	x	x	x	x	x	x	x	x

Table 3. Age and growth data for Northern Pike (top) and Walleye (bottom) captured in Bills Lake, Newaygo County during the 2023 spring survey. Mean growth indices were calculated as described by Schneider et al. (2000a).

Species	Age	Number Aged	Length Range (in)	Weighted Mean Length (in)	State Average Length (in)	Mean Growth Index
Northern Pike	1	4	8.1-9.1	8.5	11.7	-4.5
	2	7	12.0-15.5	13.9	17.7	
	3	48	14.5-19.9	16.5	20.8	
	4	48	15.0-21.2	17.7	23.4	
	5	17	16.0-30.2	21.3	25.5	
	6	3	18.0-28.9	24.2	27.3	
	8	1	20.9	N/A	31.2	
	9	1	15.9	N/A	N/A	

Species	Age	Number Aged	Length Range (in)	Weighted Mean Length (in)	State Average Length (in)	Mean Growth Index
Walleye	2	7	12.1-13.3	12.7	10.4	+2.0
	3	1	16.7	N/A	13.9	
	4	1	18.2	N/A	15.8	
	5	39	17.7-22.2	20.2	17.6	
	6	21	18.4-24.2	20.9	19.2	
	7	14	18.9-24.5	22.0	20.6	
	11	1	25.7	N/A	N/A	

Table 4. Numbers, weights, and lengths for fish species collected during the 2023 spring survey on Bills Lake, Newaygo County. Fish were captured using trap nets, large mesh fyke nets, and nighttime boat electrofishing. Because not all fish species were marked, this table includes all captures (i.e., recaptured Walleye and Northern Pike were not excluded).

Species	Number	Percent by Number	Weight (lb.)	Percent by Weight	Length Range (in)	Percent Harvestable Size[1]
Black Crappie	76	14.2	58.7	8.5	8.0-14.9	100
Bluegill	52	9.7	17.9	2.6	3.0-10.9	79
Brown Bullhead	6	1.1	5.3	0.8	10.0-13.9	N/A
Common Carp	1	0.2	15.1	2.2	32.0-32.9	N/A
White Sucker	6	1.1	10.5	1.5	10.0-19.9	N/A
Hybrid Sunfish	6	1.1	2.0	0.3	6.0-8.9	100
Largemouth Bass	51	9.6	60.0	8.7	8.0-17.9	27
Northern Pike	143	25.8	181.5	26.3	8.1-30.2	4
Pumpkinseed	1	0.2	0.4	0.1	7.0-7.9	100
Rock Bass	67	12.4	29.0	4.2	4.0-10.9	85
Smallmouth Bass	1	0.2	0.6	0.1	10.0-10.9	0
Walleye	104	19.5	297.4	43.1	12.1-25.7	93
Warmouth	1	0.2	0.2	<0.1	6.0-6.9	100
Yellow Perch	11	2.1	1.3	0.2	5.0-7.9	18
Yellow Bullhead	14	2.6	11.1	1.6	10.0-13.9	100

[1] Harvestable size is defined as 6 inches for Bluegill, Hybrid Sunfish, Pumpkinseed, and Warmouth and 7 inches for Black Crappie and Yellow Perch.

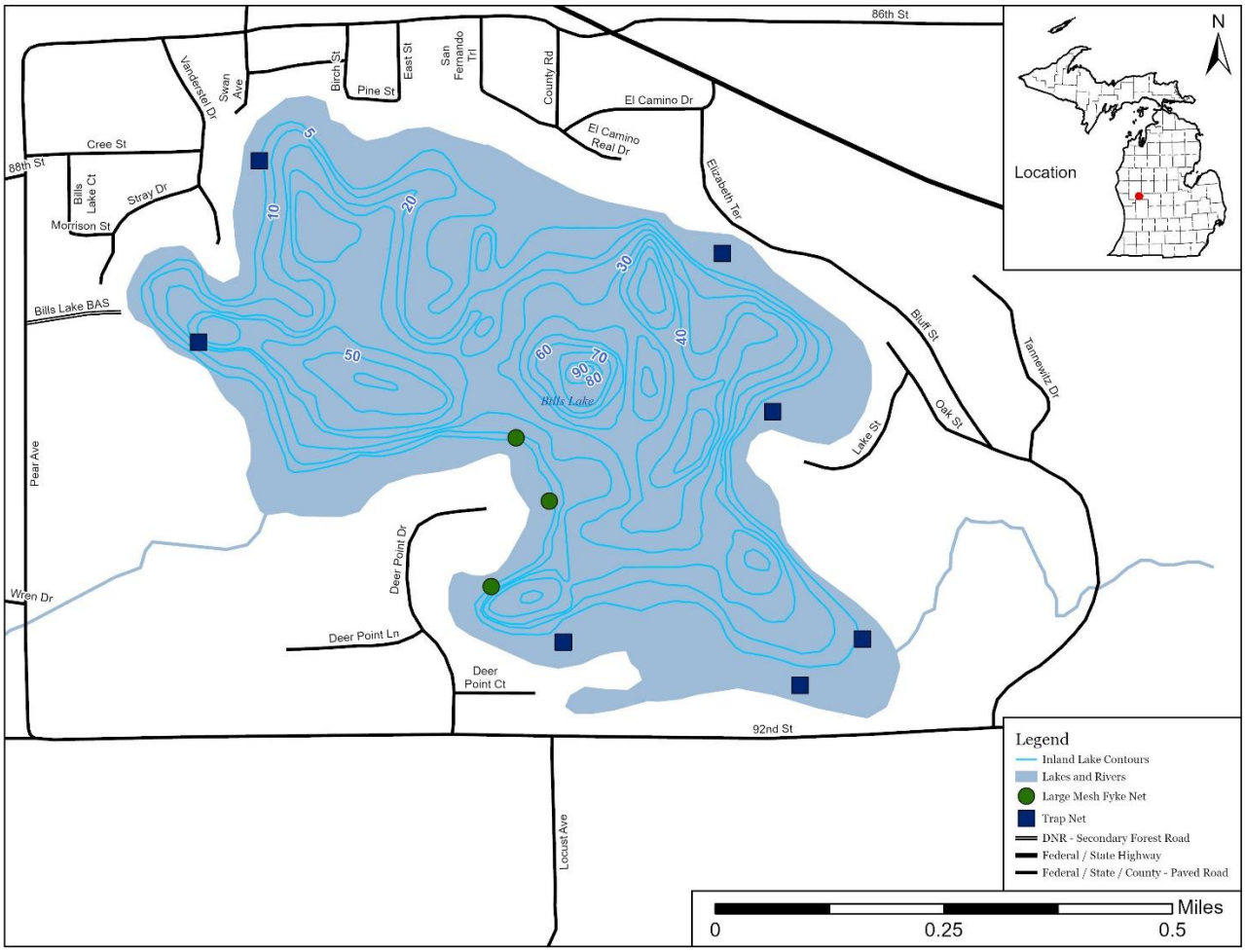

Figure 1. Map of Bills Lake with squares indicating locations of trap nets and circles indicating locations of large mesh fyke nets set during the 2021 spring netting survey

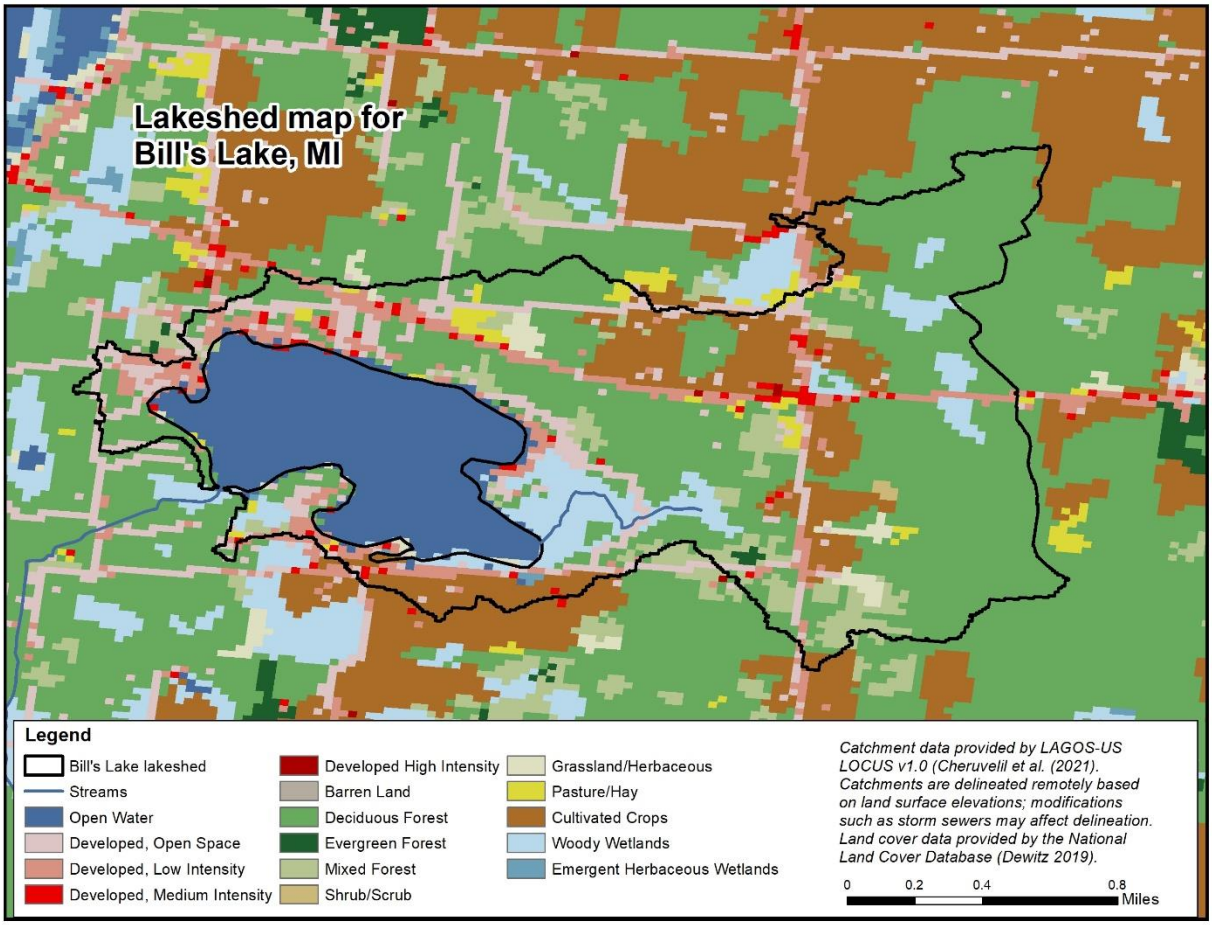

Figure 2. Land cover within the Bills Lake, Newaygo County catchment as of 2021.

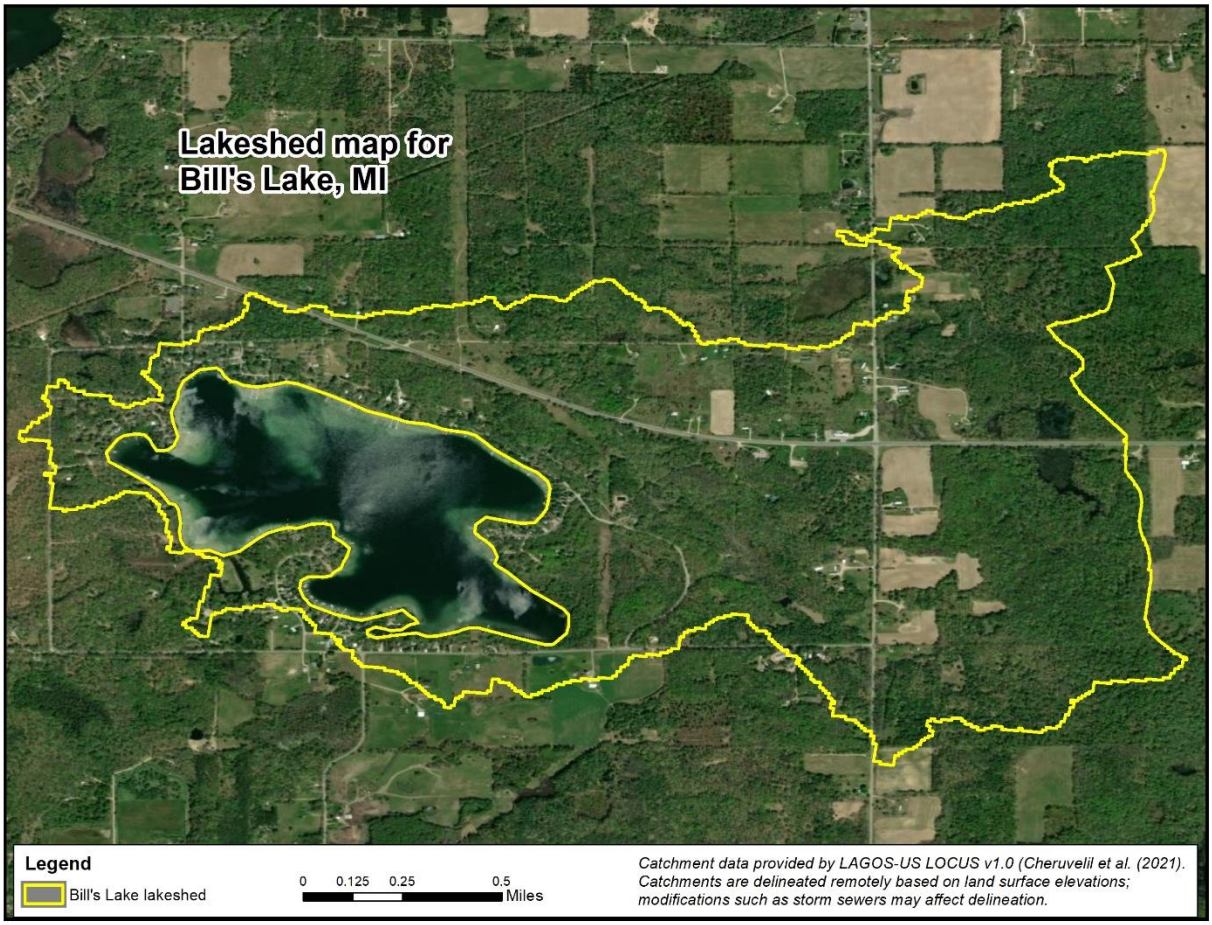

Figure 3. Bills Lake, Newaygo County watershed boundary.

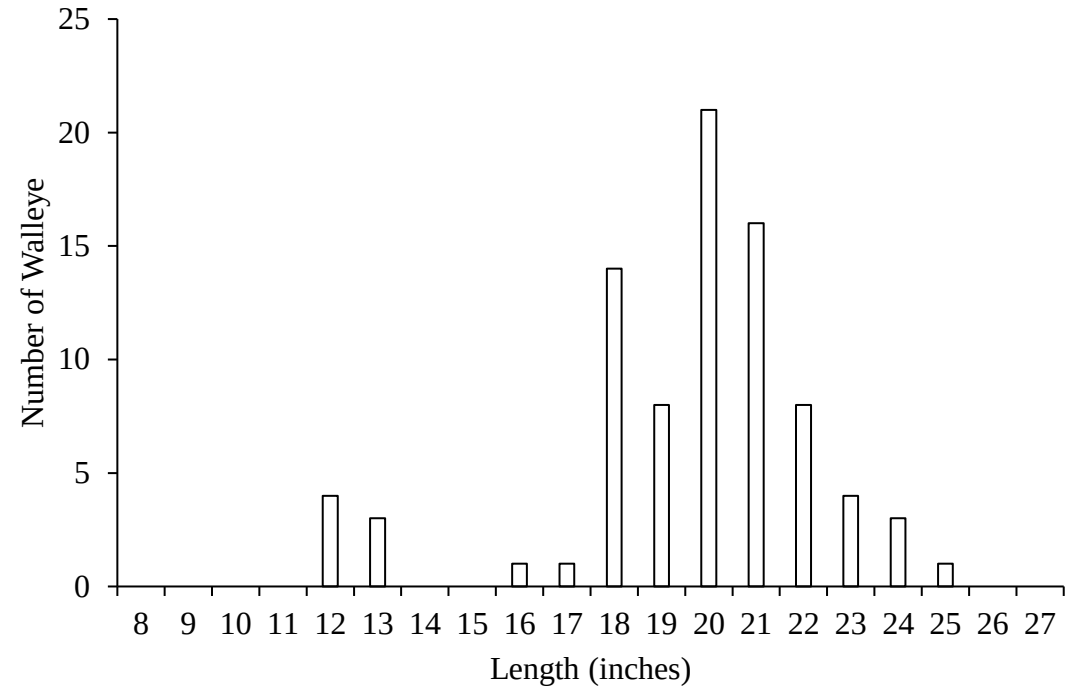

Figure 4. Length frequency distribution of Walleyes captured during the 2023 spring survey on Bills Lake.

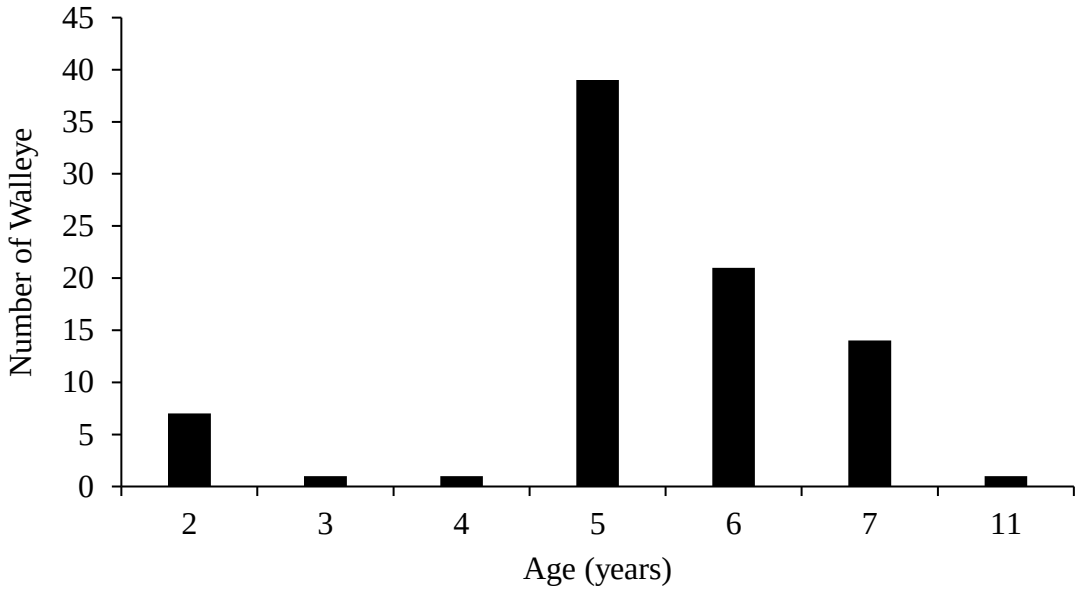

Figure 5. Age frequency distribution of Walleye captured during the 2023 spring survey of Bills Lake, Newaygo County.

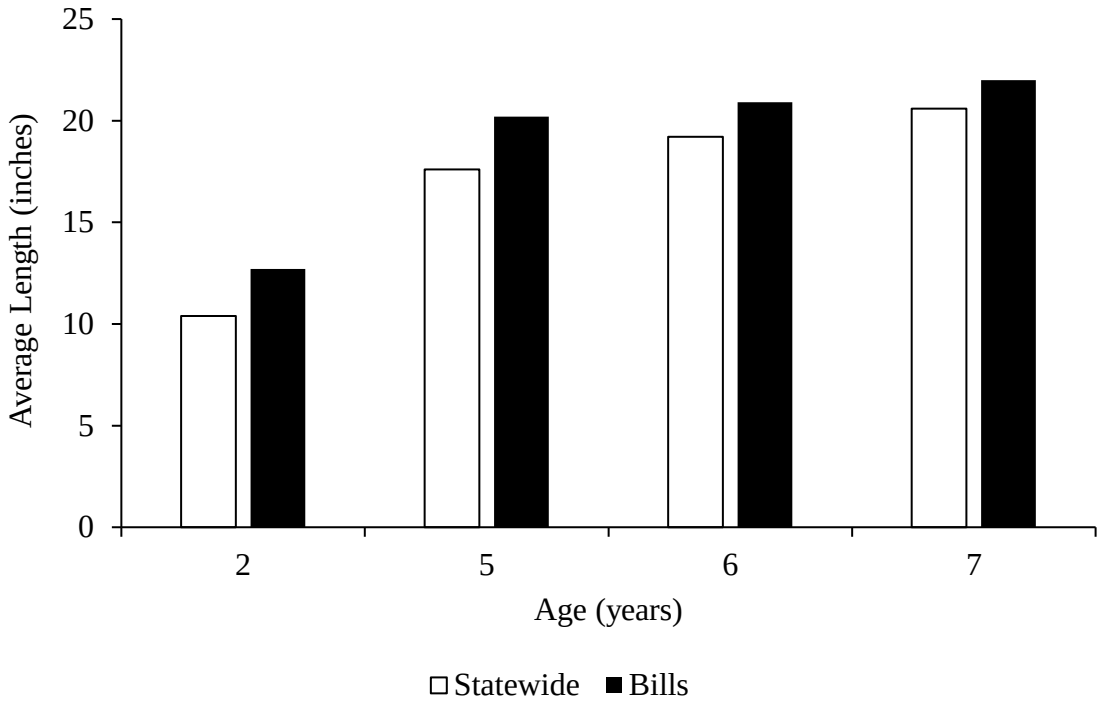

Figure 6. Average lengths at age for Walleye in Bills Lake (black bars) compared to statewide averages (white bars) determined through analysis of spine samples collected during the 2023 spring survey. State average lengths are from Schneider et al. (2000b).

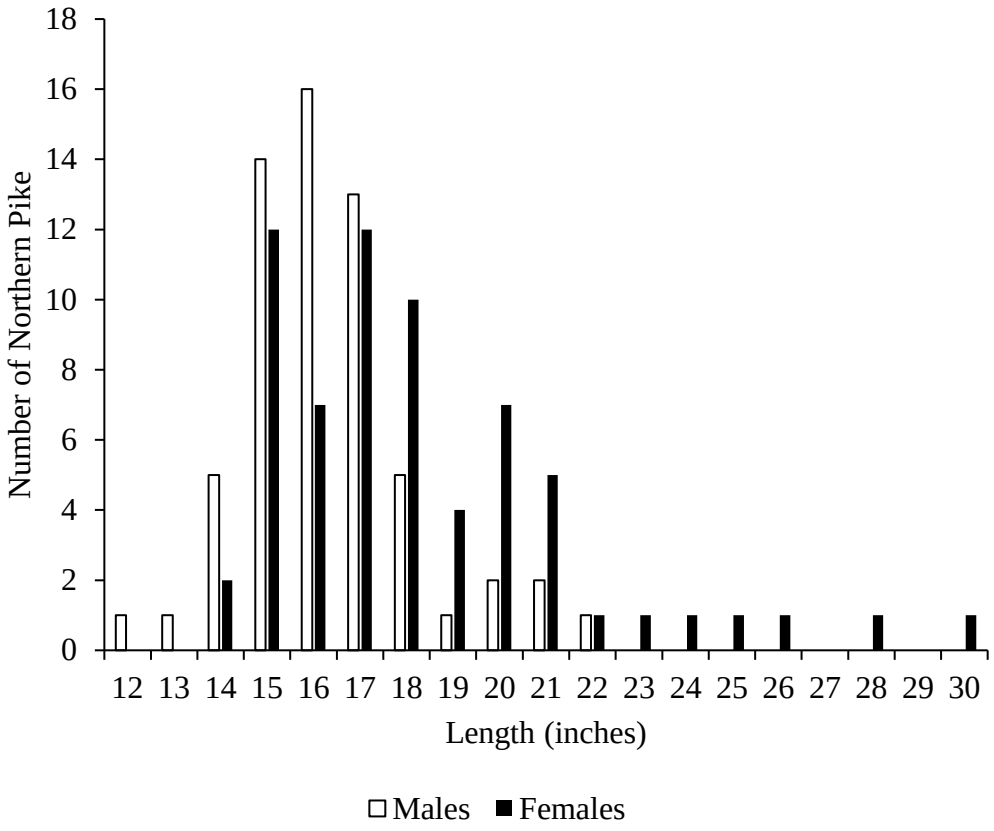

Figure 7. Length frequency distribution of Northern Pike captured during the 2023 spring survey on Bills Lake. Males are represented by the open bars and females are represented by the solid black bars. Seven fish of unknown sex (total length range = 8-20 inches) were also collected but are not displayed in the figure.

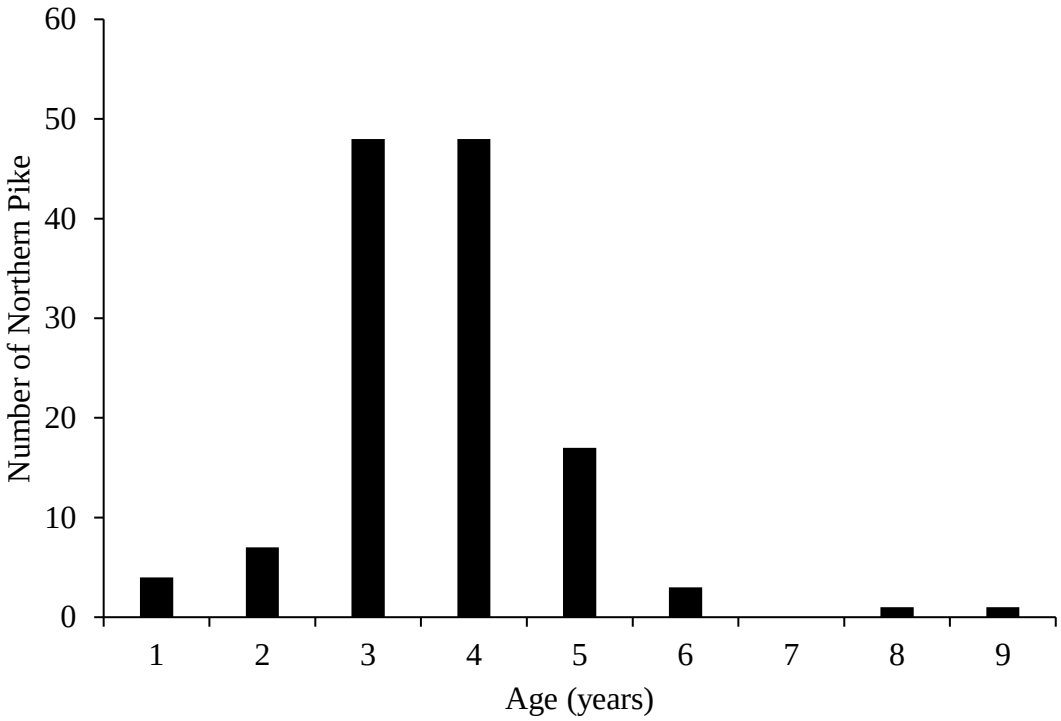

Figure 8. Age frequency distribution of Northern Pike captured during the 2023 spring survey of Bills Lake, Newaygo County.

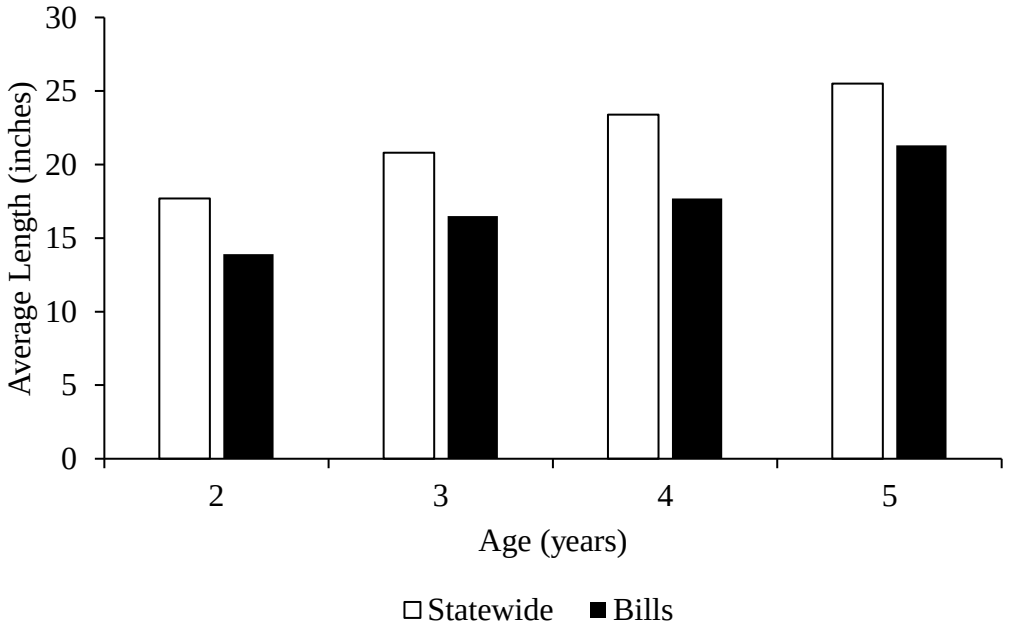

Figure 9. Average lengths at age for Northern Pike in Bills Lake (black bars) compared to statewide averages (white bars) determined through analysis of spine samples collected during the 2023 spring survey. State average lengths are from Schneider et al. (2000b).

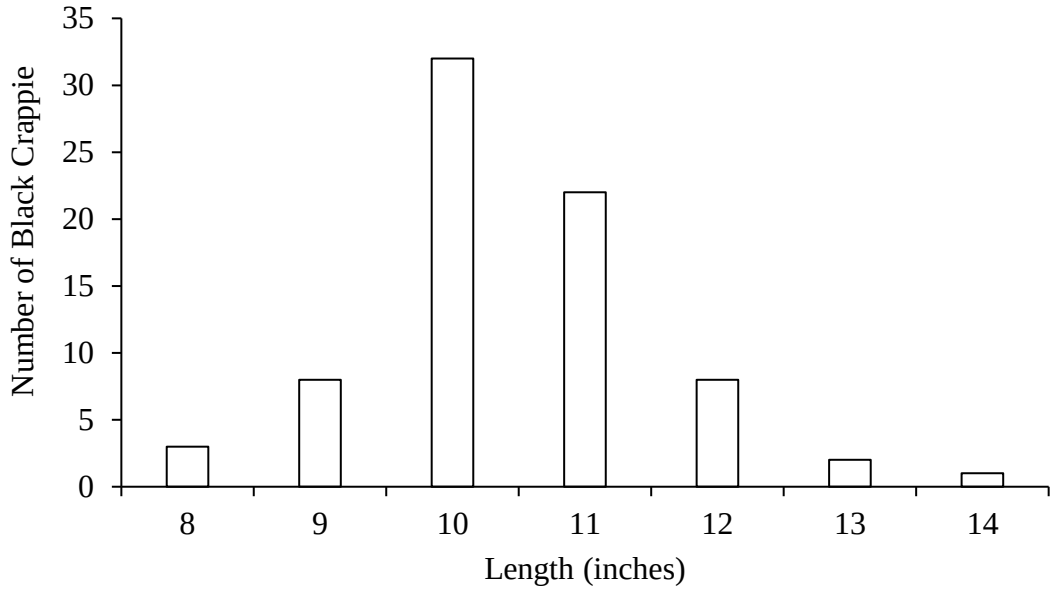

Figure 10. Length frequency distribution of Black Crappie captured during the 2023 spring survey on Bills Lake.

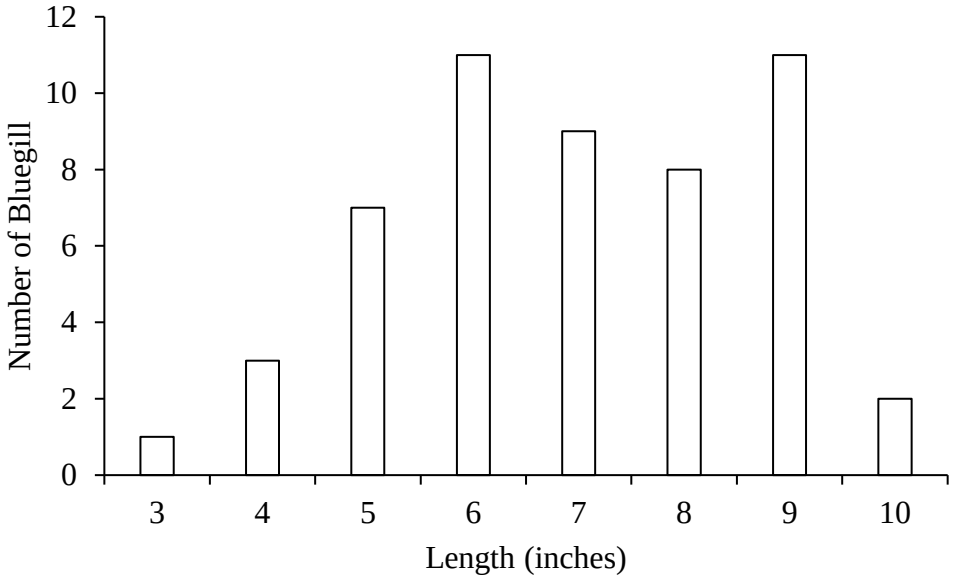

Figure 11. Length frequency distribution of Bluegill captured during the 2023 spring survey on Bills Lake.

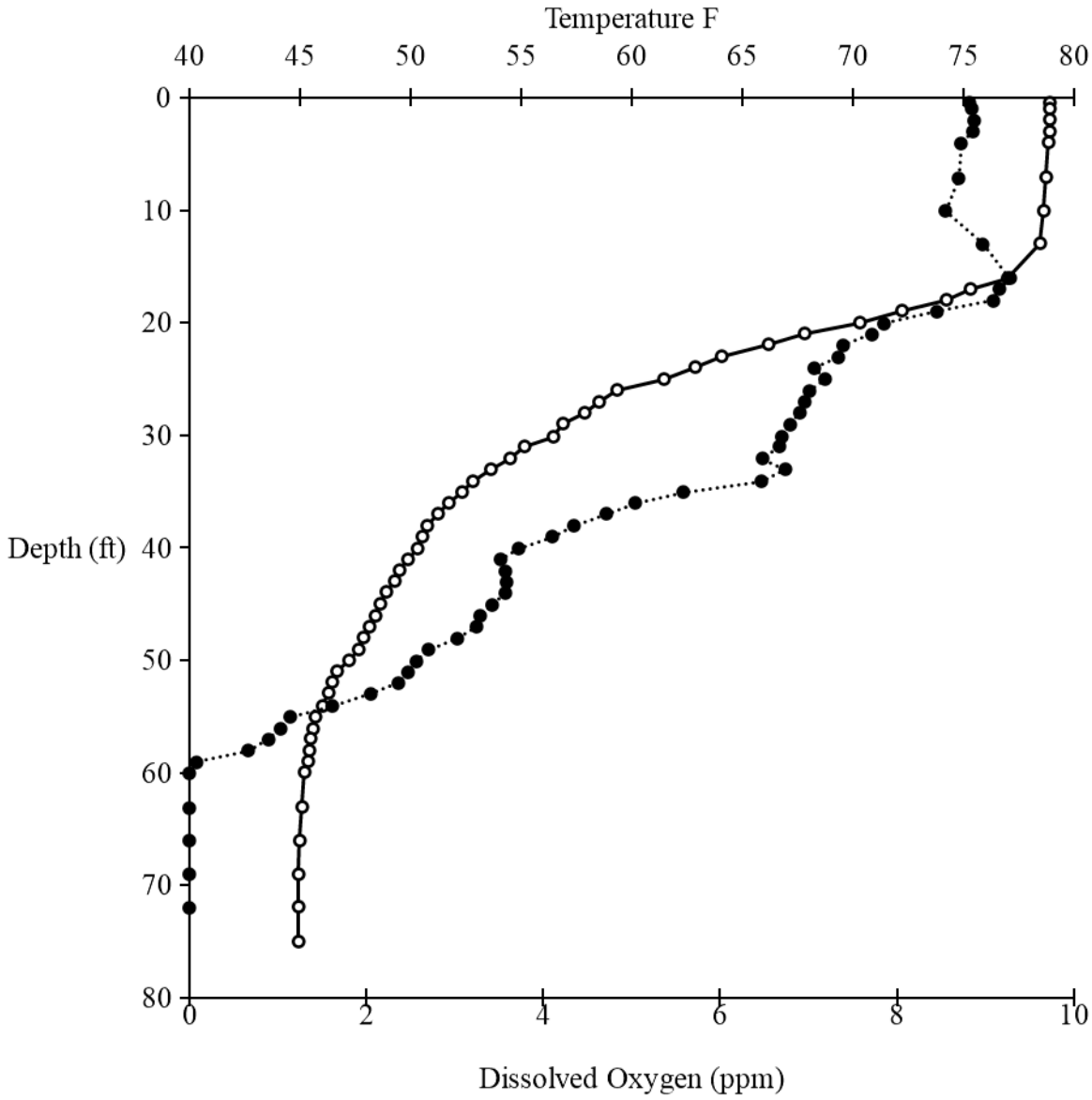

Figure 12. Temperature and dissolved oxygen profile of Bills Lake on July 31, 2023. The dashed line with solid circles is dissolved oxygen (ppm) and the solid line with open circles is temperature (F).

Received June 4, 2024; Approved July 12, 2024
Brian Gunderman, Unit Review and Approval
Edward Baker, External Reviewer
John Bauman, SFR Facilitator
John Bauman, Desktop Publisher and Approval