Big Pine Island Lake
Kent County
Grand River Watershed; 2023

Addie Myers; Fisheries Management Biologist

Environment

Big Pine Island Lake is a 223-acre natural lake located approximately 6.5 miles west of Belding in eastern Kent County in Michigan's Lower Peninsula (Figure 1). Big Pine Island Lake has just over 4 miles of shoreline which is predominantly developed by residential houses. There is some natural shoreline that remains around the eastern shore, northwestern shore, and southwestern tip of the lake. The lakeshed (area that drains to the lake) around Big Pine Island Lake is dominated by agricultural lands (39%), and forested lands (21%) (Figure 2).

Big Pine Island Lake is a relatively deep inland lake for southwestern Michigan with a maximum depth of 45 feet. The lake has one outlet - an unnamed tributary on the west shore of the lake which connects Big Pine Island Lake and Muskrat Lake. Much of Big Pine Island Lake is greater than 20 feet deep and there are two areas of the lake greater than 40 feet deep. There is also an island on the western side of the lake and one "sunken" island area near the middle of the lake where water depths are only seven feet. Pulpy peat substrate dominates in most areas of the lake greater than 20 feet deep. Fibrous peat dominates in shallow areas nearshore, however, there are large pockets of sand and marl in the littoral zones that have shallower drop-offs between 5 to 20 feet of water.

There is one public boat launch, a Michigan Department of Natural Resources (DNR) boating access site, located on the western shore of Big Pine Island Lake. The boating access site has a hard-surfaced boat ramp, a vault toilet, and parking for 14 vehicles with trailers.

History

The fisheries management history on Big Pine Island Lake is sparse. Early fisheries management on Big Pine Island Lake was only documented with various fish stocking events. Fish stocking began in 1897 with Lake Trout and other species including Bluegill, Largemouth Bass, Smallmouth Bass, Yellow Perch, and Sunfishes stocked between 1897 and 1945 (Table 1). No fisheries surveys were conducted to evaluate the effects of stocking on the fish community in Big Pine Island Lake. Research completed on other lakes during the same period indicated that natural recruitment was sufficient to support bass and panfish fisheries, and stocking programs for these species were discontinued statewide after 1945 (Cooper 1948).

An Antimycin A (trade name = Fintrol) treatment was proposed on Big Pine Island Lake from 1973 through 1975. This antibiotic treatment was intended to reduce fish biomass on Big Pine Island Lake with a specific goal to increase the average size and growth rate of panfish in the lake. The three-year treatment program was deemed necessary due to the high levels of young-of-year recruitment of panfish in the lake. There is a treatment plan in the Big Pine Island Lake file, but there is no documentation that this treatment plan was ever executed. Tiger Muskellunge were stocked into the lake during 1975 through

1978. It is likely that these predators were introduced in an attempt to keep panfish from becoming overabundant and stunted.

The first fisheries survey of Big Pine Island Lake on file was on May 21, 1986. Four large mesh trap nets were set for one night. A total of 231 fish were captured with over half (n=130) being Yellow Bullhead. Bluegill was the most abundant gamefish captured with 36 individuals that ranged in length from 4.0-8.9 inches. Other gamefish captured included Black Crappie (n=11), Green Sunfish (n=23), Largemouth Bass (n=1), and Rock Bass (n=2). Field notes from the survey indicated that Northern Pike and Largemouth Bass fishing had been good and there appeared to be a healthy, well-balanced population of panfish.

Walleye were stocked from 1985 through 1988, but no follow up survey was conducted to assess survival. Starting in 2016, the Southern Lake Michigan Management Unit (SLMMU) began raising advanced growth, fall fingerling Walleye and stocking them in inland lakes in southwestern Michigan. A fish community survey was conducted in 2023 to assess if Big Pine Island Lake would be a suitable candidate for stocking fall fingerling Walleye.

Current Status

In May 2023, Big Pine Island Lake was surveyed for a general fish community assessment utilizing the DNR's Status and Trends Program (STP) protocol. The STP uses standardized protocols and a variety of sampling gear including small-mesh fyke nets, large-mesh fyke nets, experimental gill nets, seines, and nighttime electrofishing to assess fish populations in lakes across the state (Wehrly et al. DRAFT). This approach allows the DNR to develop benchmarks for fish abundance and growth that can be compared to other similar lakes within fisheries management units, Great Lakes basins, and across the state. Effort in the 2023 survey consisted of 2 net nights of small-mesh fyke nets, 11 net nights of large-mesh fyke nets, 4 net nights of experimental gill nets, 2 seine hauls, and 30 minutes of nighttime electrofishing (Table 2; Figure 3). All fish captured in Big Pine Island Lake were measured for total length, and spine or scale samples for age and growth analysis were collected from the first 10 individuals per game fish species per inch group. Weights for each fish species were estimated using the length-weight regression coefficients from Schneider et al. (2000b). Weighted age frequency distributions were estimated using the procedures described by Schneider (2000b). Mean lengths-at-age for Big Pine Island Lake game species were compared to statewide averages presented in Schneider et al. (2000a). Bluegill size structure was rated using an index based on the mean length and the proportion of fish >6 inches, >7 inches, and >8 inches collected using large-mesh fyke nets (Schneider 1990). Water quality, shoreline development, and nearshore habitat were assessed in August 2023 following STP methods (Wehrly et al. DRAFT). The timing of the STP surveys and the variety of gear used were ideal for capturing mature adult Centrarchids (e.g. Bluegill and Largemouth Bass).

A total of 2,756 fish were captured during the 2023 survey (Table 3). Fish were not individually marked, so there is the potential that individuals were captured more than once. Bluegills dominated the catch with 1,249 fish captured, representing nearly 45% of the catch by number and 20% of the catch by weight (Table 3). Bluegills ranged in length from 1.0-7.9 inches with 75% of the fish being less than 6 inches in length (Figure 4). Six age classes of Bluegill were captured during the survey (ages 1-6; Figure 5). Mean growth indices were in the average range for ages 1 through 5 (Table 4; Figure 6). The Schneider

Index for Big Pine Island Lake Bluegills collected in large-mesh fyke nets was 3.3 which is between acceptable and satisfactory.

A hundred Black Crappie were captured and ranged from 3.0-11.9 inches with 99% of the fish caught at least 7 inches in length (Figure 7). Eight age classes of Black Crappie were present in Big Pine Island Lake (age 1, 3-9; Figure 8). Hybrid sunfish (n = 383) was the second most abundant taxon captured during the 2023 survey (Table 3). Hybrid sunfish ranged in length from 1.0-8.9 inches (Figure 9). Most hybrid sunfish appeared to be a cross between Pumpkinseed and Bluegill. Three hundred thirteen Pumpkinseeds ranging from 1.0-8.9 inches in length were captured. Only 34% of the Pumpkinseeds captured were at least 6 inches. In addition to these panfish species, 28 Warmouth and 14 Yellow Perch were also collected in the 2023 survey.

Largemouth Bass (n = 89) was the dominant predator species in Big Pine Island Lake. Largemouth Bass ranged in length from 2.0-19.9 inches with 24% of the fish being at least 14 inches making them legal for harvest (Figure 10). Nine age-classes (age 1-9) of Largemouth Bass were present. Largemouth Bass in Big Pine Island Lake were growing similarly to other places across the state and had a mean growth index of -0.3 (Table 4).

Northern Pike (n = 24) ranged in length from 19.9-35.9 inches (Figure 11). Eight age classes of Northern Pike (age 3-7, 9, 10, 12) were present (Figure 12). Growth was below average, as evidenced by the mean growth index of -2.4 (Table 4). Forty-two percent of the Northern Pike captured were at least 24 inches in length, making them legal for harvest (Figure 11).

Nongame fish species captured during the 2023 survey included: Blackchin Shiner, Banded Killifish, Bowfin, Brown Bullhead, Brook Silverside, Golden Shiner, Iowa Darter, Sand Shiner, Spotfin Shiner, and Yellow Bullhead. Yellow Bullheads composed 13% of the total fish biomass with 129 individuals captured ranging in length from 4.0-13.9 inches.

On August 1, 2023 water quality and shoreline sampling were completed on Big Pine Island Lake. The dissolved oxygen and temperature profiles were taken in 45 feet of water. The epilimnion consisted of the top 16 feet of the water column. Water temperatures in the epilimnion were warm and ranged from 78.9 F to 74.0 F (Figure 13). Dissolved oxygen in the epilimnion ranged from 9.17 parts per million (ppm) and 6.61 ppm. The metalimnion (zone of thermal change) began at 16 feet and continued to the lake bottom. Water temperatures dropped from 74.0 F at 16 feet to 60.6 F at 21 feet. Dissolved oxygen concentrations declined quickly within the metalimnion, starting at 6.61 ppm at 16 feet and falling to 0.52 ppm by 20 feet. From 21 feet to the bottom, Big Pine Island Lake was hypoxic with no dissolved oxygen present. Water chemistry sampling was completed at the same location as the temperature and dissolved oxygen profile. Total alkalinity was 118 mg/L, total nitrogen was 0.677 mg/L, total phosphorus was 0.015 mg/L, and the chlorophyll a concentration was 0.0205 mg/L. The Secchi depth was 12 feet, indicating light penetration to 24 feet.

Analysis and Discussion

Compared to other lakes in SLMMU, Big Pine Island Lake appears to have a similar population density of Bluegills 4 inches or larger based upon catch-per-unit-effort (CPUE). The CPUE provides an index of relative abundance and facilitates comparisons across lakes and sampling years. Bluegill CPUE was

compared to CPUE data from other STP surveys in SLMMU and statewide from 2002 to 2021. The Bluegill CPUEs for large-mesh fyke nets and electrofishing gear in Big Pine Island Lake in 2023 were 59 Bluegills/net night and 7.5 Bluegills/minute, respectively. These values were between the 50th and 75th percentiles for Bluegills when compared to lakes in SLMMU and above the 75th percentiles when compared to lakes statewide.

Black Crappie CPUE in large-mesh fyke nets in Big Pine Island Lake in 2023 was 8.0 fish/net night which is above the 75th percentile for lakes in SLMMU and statewide. The CPUE data suggest that the population density of Black Crappie in Big Pine Island Lake was above average for lakes in the region. Nearly 100% of the Black Crappie captured were greater than 7 inches in length; however, the largest fish were only 11.9 inches. Growth was average through age 6. The sample size was limited for age 7 and older fish; however, the mean lengths for fish ages 7-9 were similar to that observed for age 6 fish. This pattern suggests that either growth slows substantially after age 6 or fast-growing fish are selectively harvested by anglers.

Largemouth Bass population density in Big Pine Island Lake appears to be above average for lakes in southwest Michigan. The electrofishing CPUE (2.4 per minute of electrofishing) was identical to the 75th percentile for lakes in SLMMU. In 2016, the DNR began requiring all bass (collectively refers to Smallmouth Bass and Largemouth Bass) tournaments to register with the DNR. Since the initiation of this program, Big Pine Island Lake has had the 97th highest number of tournaments. As part of the tournament reporting process, tournament directors must submit data on bass catches and angler participation. From 2016 through 2024, 65 bass tournaments occurred on Big Pine Island Lake with an average of 21 anglers fishing in 12.0 boats per tournament. An average of 39 Largemouth Bass were weighed at each tournament. The statewide average number of anglers fishing is 23.4 in 13.2 boats per tournament and an average of 48 bass (Smallmouth and Largemouth collectively) are weighed at each tournament statewide. The average weight of Largemouth Bass weighed at tournaments on Big Pine Island Lake was 2.09 pounds, the average heaviest Largemouth Bass weighed was 3.91 pounds, and twenty-eight Largemouth Bass weighed at least 4 pounds.

The time of year the survey was conducted was not conducive to catching large numbers of Northern Pike. However, the CPUE for Northern Pike captured in gill nets during the survey was 5.75 Northern Pike per gill net night, which is above the 75th percentile for lakes both statewide and in southwestern Michigan. Forty-two percent of all Northern Pike captured were at least 24 inches in length making them legal for harvest. In addition, nine Northern Pike captured were at least 30 inches in length. The good size structure was not the result of rapid growth. Rather, the sample was skewed towards older fish with 75% of the catch being age 5 or older.

Schneider (2000a) observed that predators typically compose 20-50% of the biomass in lakes with strong fisheries. Predators (Largemouth Bass, Northern Pike, and Bowfin) made up 35% of the biomass during the 2023 survey on Big Pine Island Lake. Growth was average for all panfish species and there was no evidence of stunting. Growth was average for bass and below average for Northern Pike. Taken together, these data indicate that stocking additional predators (e.g., Walleye) is not advisable.

The alkalinity and nutrient data for Big Pine Island Lake were consistent with a moderately hardwater system where phosphorus is the limiting nutrient (Shaw et al. 2004). The phosphorus concentration and Secchi disk depth were within the range expected for a mesotrophic lake (i.e. moderate nutrient);

however, the chlorophyll a concentration places the lake within the eutrophic (high nutrient) category (Carlson and Simpson 1996). Qualitative observations of the filamentous algae and rooted plant growth, coupled with the temperature and dissolved oxygen profile, support the conclusion that Big Pine Island Lake is a eutrophic system.

Management Direction

1. Work with the Michigan Department of Environment, Great Lakes, and Energy, riparian landowners, and other local partners to encourage use of best management practices within the lakeshed to reduce nutrient inputs to Big Pine Island Lake. Controlling nutrient inputs is necessary to minimize algal blooms and prevent unnaturally high growth of aquatic plants in the lake.
2. Do not stock additional predators such as Walleye. The lake already provides acceptable fisheries for Largemouth Bass and Northern Pike. Stocking additional predators could reduce growth rates for these popular game species.

References

Carlson, R. E., and J. Simpson. 1996. A coordinator's guide to volunteer lake monitoring methods. North American Lake Management Society, Madison, Wisconsin.

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

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

Shaw, B., C. Mechenich, and L. Klessig. 2004. Understanding lake data. University of Wisconsin-Extension, Publication G3582, Madison.

Wehrly, K. E., G. S. Carter, and J. E. Breck. DRAFT. Inland lake Status and Trends Program sampling protocols. Chapter XX in Schneider, J. C., editor. 2000. Manual of fisheries survey methods II: with periodic updates. Michigan Department of Natural Resources, Fisheries Special Report 25, Ann Arbor

Tables and Figures

Table 1. Fish stocking in Big Pine Island Lake from 1897 through 2025.

Year Stocked	Species	Number Stocked	Length (inches)	Life Stage
1897	Lake Trout	10,000	Unknown	Unknown
1905	Lake Trout	8,000	Unknown	Fry
1905	Largemouth Bass	1,000	Unknown	Fingerling
1905	Walleye	250,000	Unknown	Fry
1933	Yellow Perch	2,970	Unknown	7 month
1933	Bluegill	6,000	Unknown	5 month
1933	Largemouth Bass	7,500	Unknown	4 month
1934	Smallmouth Bass	700	Unknown	4 month
1934	Bluegill	8,100	Unknown	5 month
1934	Bluegill	1,800	Unknown	Adults
1934	Largemouth Bass	2,750	Unknown	3 month
1935	Bluegill	7,600	Unknown	4 month
1935	Largemouth Bass	700	Unknown	4 month
1935	Largemouth Bass	520	Unknown	Yearling
1935	Yellow Perch	6,525	Unknown	7 month
1936	Sunfishes	100	Unknown	Yearling
1937	Bluegill	8,500	Unknown	3 month
1937	Largemouth Bass	1,000	Unknown	4 month
1938	Bluegill	8,000	Unknown	6 month
1938	Bluegill	2,000	Unknown	Yearling
1938	Largemouth Bass	870	Unknown	4 month
1938	Yellow Perch	6,500	Unknown	7 month
1939	Largemouth Bass	1,380	Unknown	4 month
1939	Yellow Perch	3,750	Unknown	6 month
1939	Yellow Perch	9,750	Unknown	6 month
1940	Bluegill	7,000	Unknown	5 month
1940	Crayfish	2,800	Unknown	5 month
1940	Largemouth Bass	1,000	Unknown	Yearling
1941	Bluegill	500	Unknown	5 month
1941	Largemouth Bass	1,200	Unknown	3 month
1941	Yellow Perch	210,000	Unknown	Swim-up fry
1942	Bluegill	800	Unknown	5 month
1942	Largemouth Bass	1,500	Unknown	3 month
1943	Largemouth Bass	1,350	Unknown	4 month
1944	Bluegill	5,000	1.75	3 month
1944	Largemouth Bass	300	5.0	3 month
1944	Largemouth Bass	2,000	3.25	4 month

Year Stocked	Species	Number Stocked	Length (inches)	Life Stage
1945	Largemouth Bass	1,000	3.0	3 month
1972	Tiger Muskellunge	100	Unknown	Fingerling
1975	Largemouth Bass	2,500	Unknown	Fall fingerling
1975	Tiger Muskellunge	900	Unknown	Fall fingerling
1977	Tiger Muskellunge	900	Unknown	Fall fingerling
1978	Tiger Muskellunge	450	Unknown	Fall fingerling
1978	Tiger Muskellunge	450	Unknown	Fall fingerling
1985	Walleye	86	3.98	Summer fingerling
1987	Walleye	6,000	1.5	Spring fingerling
1988	Walleye	6,000	1.38	Spring fingerling
1989	Walleye	1,800	1.73	Spring fingerling
1989	Walleye	7,272	2.24	Spring fingerling
1989	Walleye	240	3.46	Summer fingerling
1989	Walleye	80	4.53	Fall fingerling

Table 2. Sampling period and total effort for each gear used during the 2023 Big Pine Island Lake fish community survey.

Sampling Period	Gear	Effort
May 22-24	Experimental Gill Net	4 net nights
May 23-24	Small-Mesh Fyke Net	2 net nights
May 22-25	Large-Mesh Fyke Net	11 net nights
May 22	Seine	2 hauls
May 25	Nighttime Electrofishing	30 minutes

Table 3. Numbers, calculated weights, total length ranges, and percentage legal or harvestable for all fish species collected on Big Pine Island Lake during May 2023.

Species	Number	Percent by Number	Weight (lb.)	Percent by Weight	Length Range (in)	Percent Legal or Harvestable Size
Black Crappie	100	3.6	44.2	7.5	3.0-11.9	99
Blackchin Shiner	8	0.3	<0.1	<0.1	1.0-2.9	N/A
Banded Killifish	15	0.5	0.1	<0.1	1.0-3.9	N/A
Bluegill	1,249	45.3	118.4	20.1	1.0-7.9	25
Bowfin	6	0.2	38.3	6.5	23.0-23.9	N/A
Brown Bullhead	20	0.7	13.4	2.3	7.0-14.9	N/A
Brook Silverside	6	0.2	<0.1	<0.1	2.0-4.9	N/A
Golden Shiner	2	0.1	0.3	0.1	7.0-8.9	N/A
Hybrid Sunfish	383	13.9	74.4	12.7	1.0-8.9	60
Iowa Darter	1	<0.1	<0.1	<0.1	1.0-1.9	N/A
Largemouth Bass	89	3.2	79.8	13.6	2.0-19.9	24
Northern Pike	24	0.9	89.4	15.2	19.0-35.9	42
Pumpkinseed	313	11.4	46.2	7.9	1.0-8.9	34
Sand Shiner	85	3.1	0.1	<0.1	1.0-1.9	N/A
Spotfin Shiner	284	10.3	0.7	0.1	1.0-3.9	N/A
Warmouth	28	1	3.6	0.6	3.0-7.9	21
Yellow Bullhead	129	4.7	77.7	13.2	4.0-13.9	N/A
Yellow Perch	14	0.5	1.6	0.3	3.0-9.9	29

* Harvestable size is 6 inches for Bluegill, Pumpkinseed, and hybrid sunfish, and 7 inches for Black Crappie and Yellow Perch.

Table 4. Lengths at age for Big Pine Island Lake game fish collected in 2023 relative to statewide averages. Statewide average lengths and growth index equations are from Schneider et al. (2000a).

Species	Age	Number Aged	Length Range (in.)	State Average Length (in.)	Weighted Mean Length (in.)	Mean Growth Index
Black Crappie	1	1	3.0	4.2	N/A	+0.3
	3	13	7.2-8.2	7.5	7.7	
	4	13	8.4-10.2	8.6	9.0	
	5	1	9.3	9.4	N/A	
	6	8	9.5-11.8	10.2	10.4	
	7	4	9.7-11.0	10.8	N/A	
	8	1	10.2	11.4	N/A	
	9	4	9.9-10.4	11.9	N/A	
Bluegill	1	22	1.3-2.6	1.8	1.8	-0.1
	2	10	3.4-3.9	3.8	3.6	
	3	11	3.8-5.7	5.0	4.7	
	4	15	4.6-6.8	5.9	5.9	
	5	12	6.0-7.8	6.7	6.7	
	6	2	7.0-7.1	7.3	N/A	
Largemouth Bass	1	5	2.3-3.4	4.2	2.7	-0.3
	2	18	5.1-8.1	7.1	6.3	
	3	22	7.6-11.4	9.4	9.6	
	4	14	9.2-13.9	11.6	12	
	5	7	12.5-15.7	13.2	13.9	
	6	10	10.2-17.1	14.7	14.7	
	7	5	14.0-16.0	16.3	15.3	
	8	3	17.3-19.2	17.4	N/A	
	9	1	17.2	18.3	N/A	
Northern Pike	3	1	19.1	20.8	N/A	-2.4
	4	5	19.3-27.0	23.4	22.2	
	5	4	19.8-21.1	25.5	N/A	
	6	6	21.4-26.8	27.3	23.7	
	7	3	22.0-30.3	29.3	N/A	
	9	3	30.3-30.8	N/A	N/A	
	10	1	35.2	N/A	N/A	
	12	1	30.0	N/A	N/A	

Species	Age	Number Aged	Length Range (in.)	State Average Length (in.)	Weighted Mean Length (in.)	Mean Growth Index
Yellow Perch	1	7	3.3-3.8	3.3	3.6	-0.2
	2	4	4.7-5.2	5.2	N/A	
	3	5	5.6-6.2	6.5	5.9	
	4	1	6.9	7.5	N/A	
	5	3	6.8-8.0	8.5	N/A	
	6	1	7.3	9.4	N/A	
	7	1	9.5	10.3	N/A	

Figure 1. Big Pine Island Lake, Kent County lakeshed boundary.

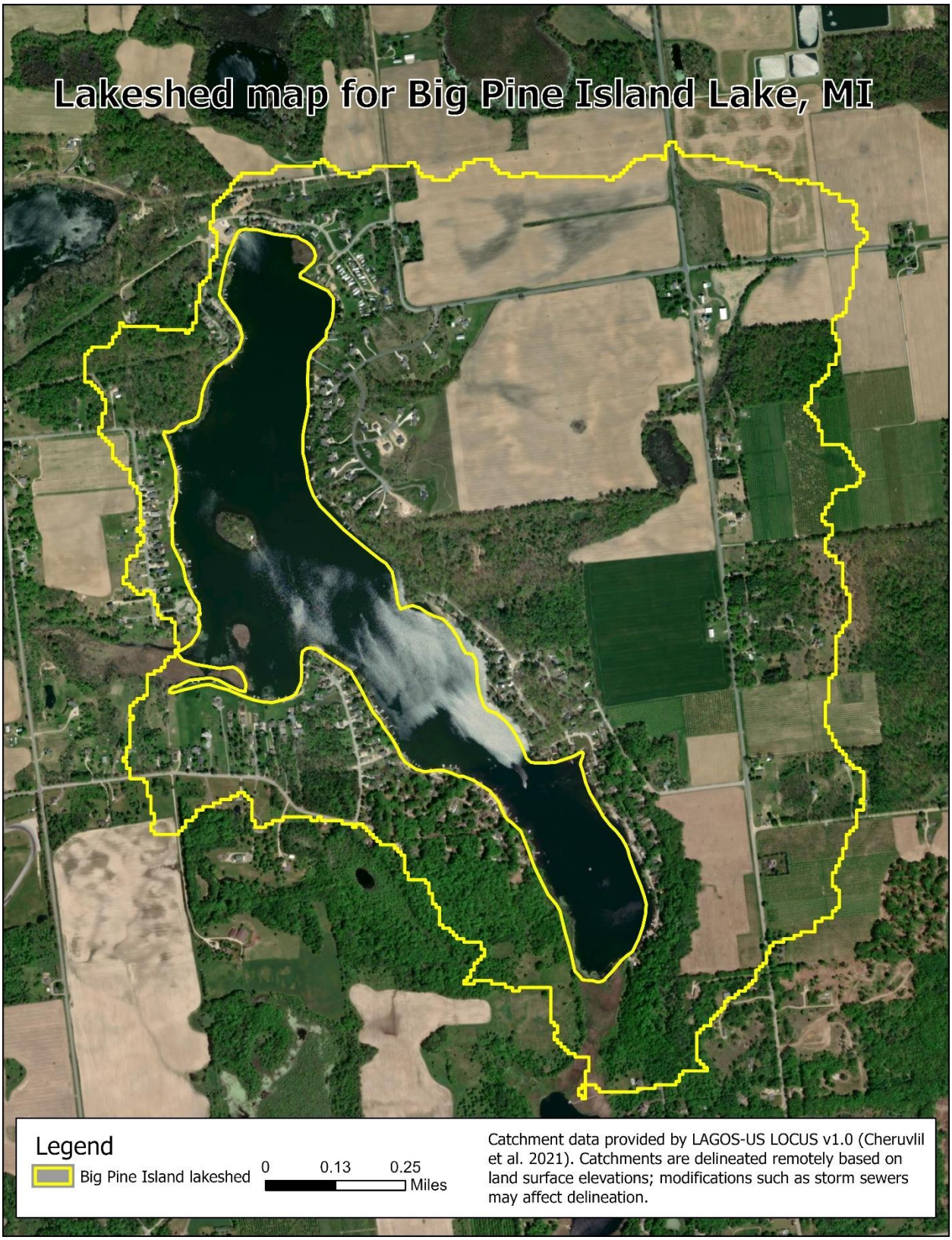


Figure 2. Land cover within the Big Pine Island Lake, Kent County lakeshed as of 2021.

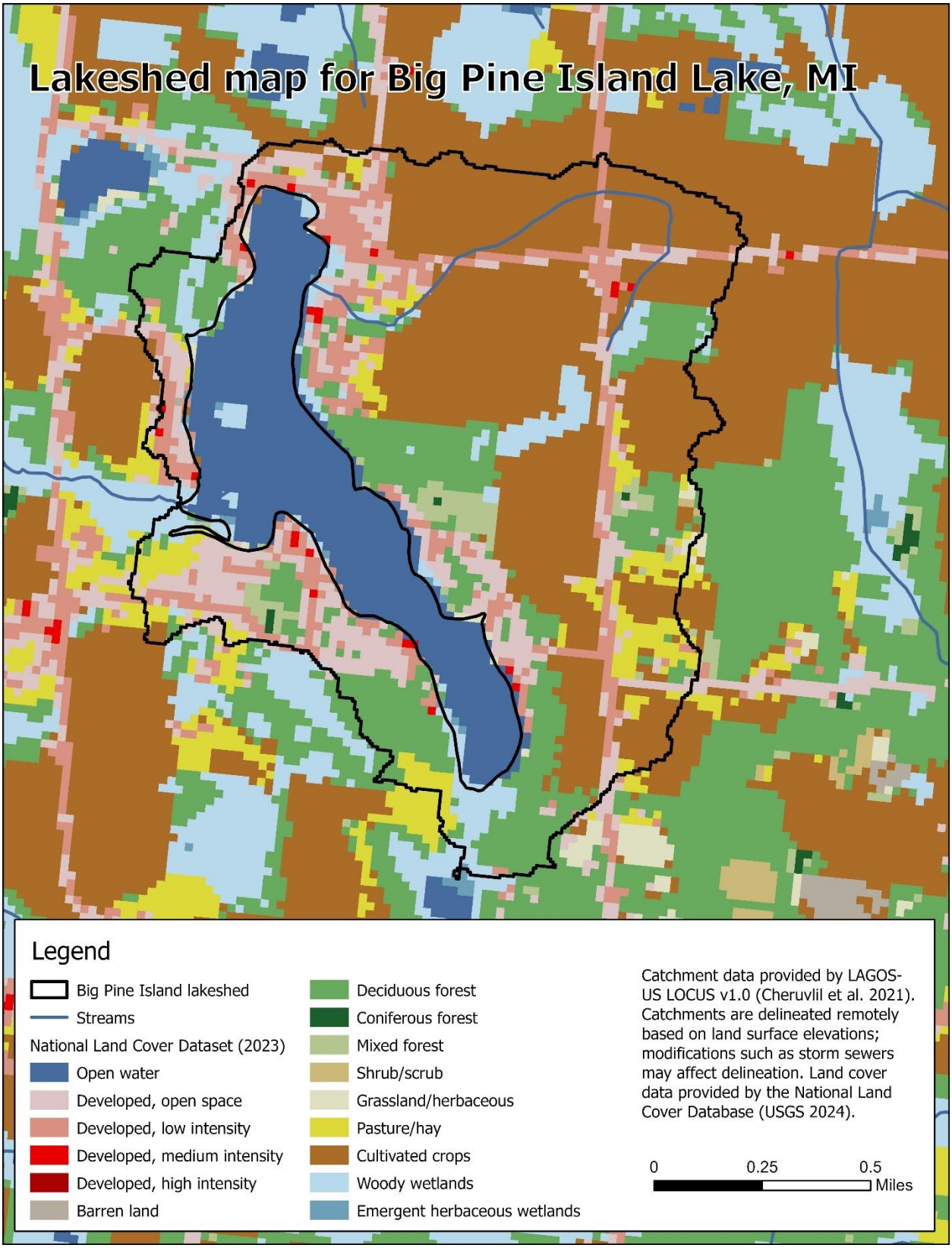


Figure 3. Map of Big Pine Island Lake with pink circles indicating locations of large-mesh fyke nets, yellow squares indicating locations of small-mesh fyke nets, green circles indicating locations of gill nets, red triangles indicating locations of seines, and red lines indicating nighttime electrofishing surveys conducted during the 2023 summer survey.

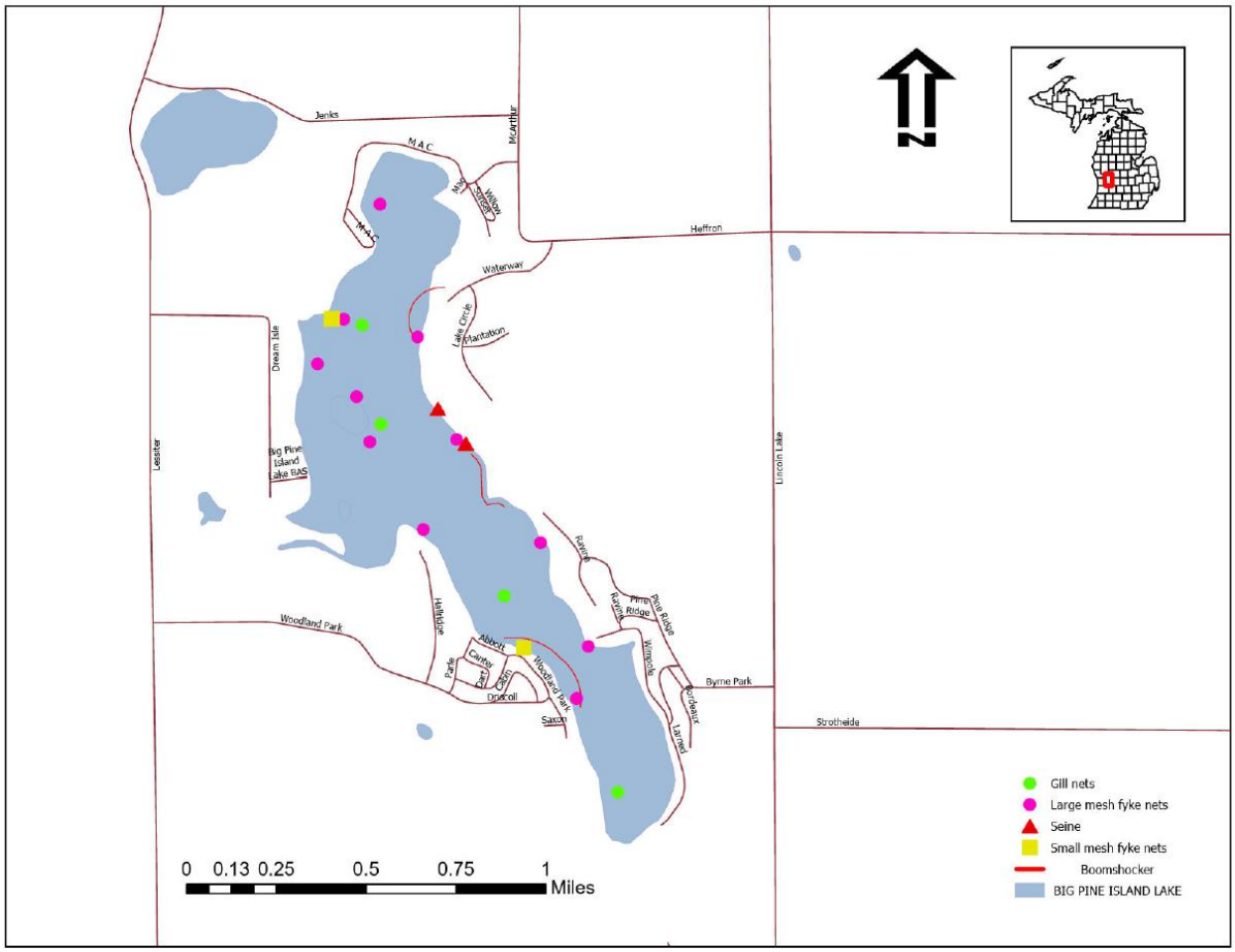


Figure 4. Length frequency distribution for Bluegills captured in Big Pine Island Lake during May 22-25, 2023.

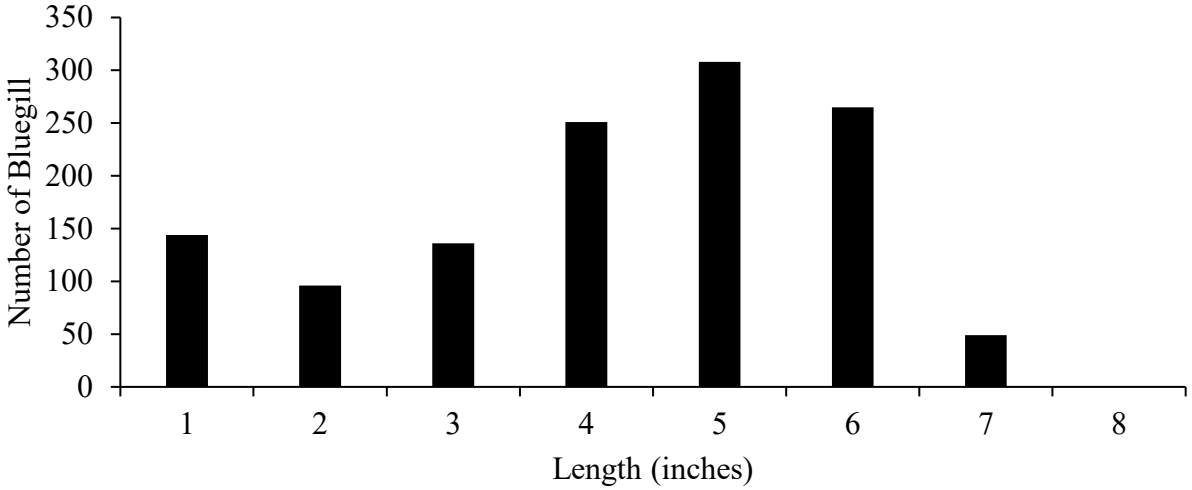


Figure 5. Age frequency distribution for Bluegills captured in Big Pine Island Lake during May 22-25, 2023.

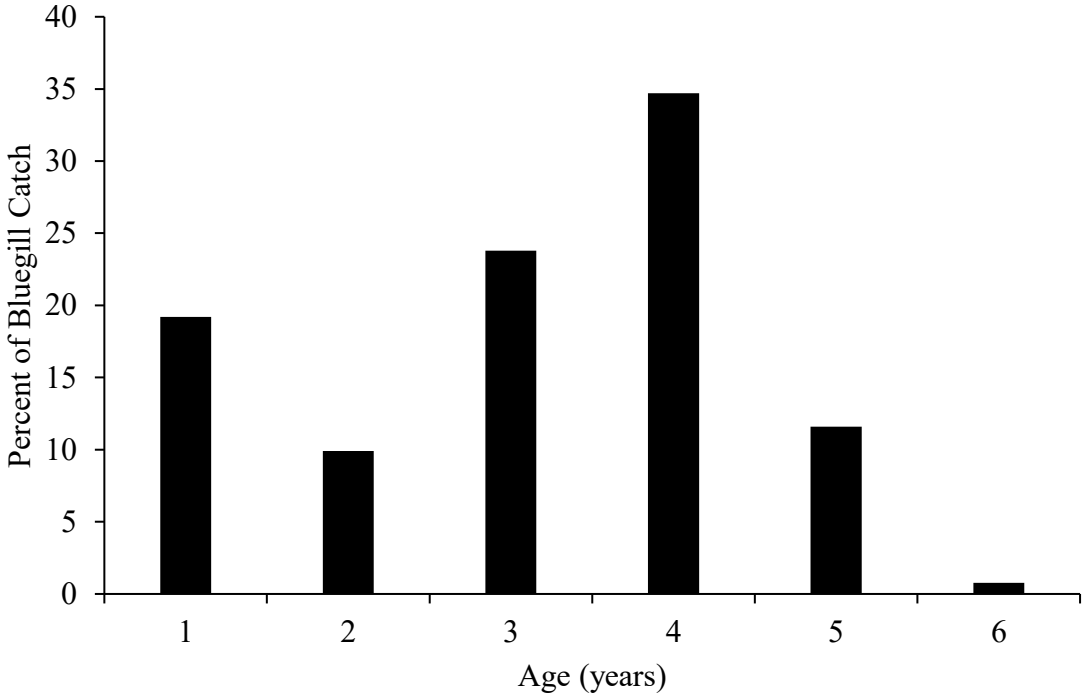


Figure 6. Mean lengths at age for Bluegill caught in Big Pine Island Lake in 2023 (gray dotted line) versus Bluegill caught statewide (black solid line).

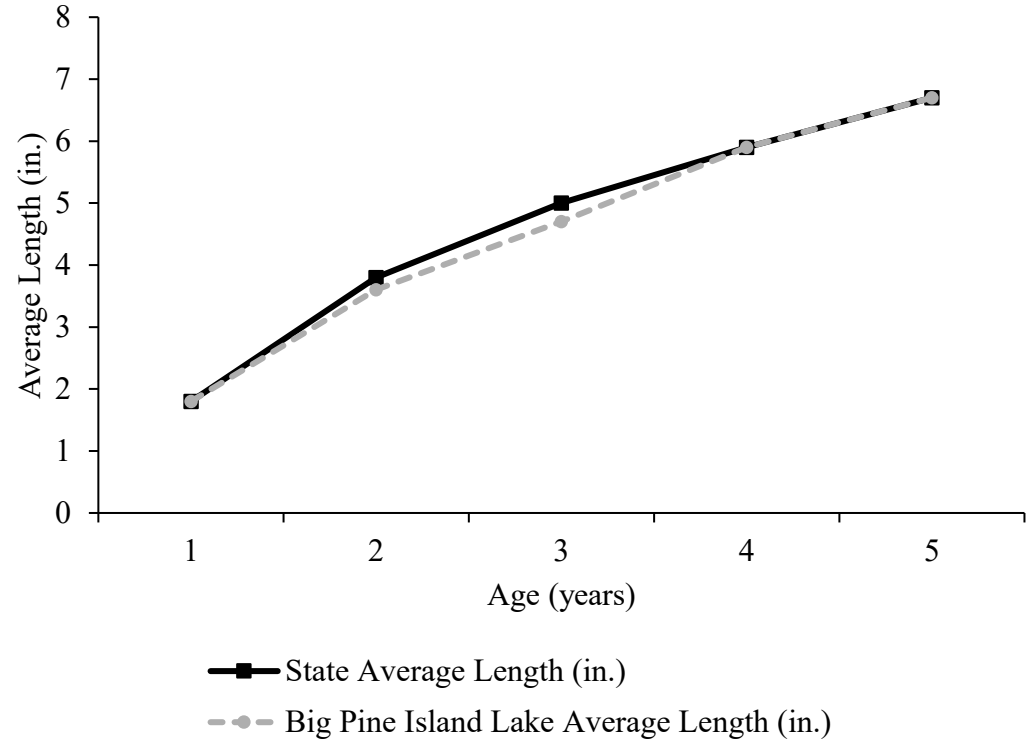


Figure 7. Length frequency distribution for Black Crappies captured in Big Pine Island Lake during May 22-25, 2023.

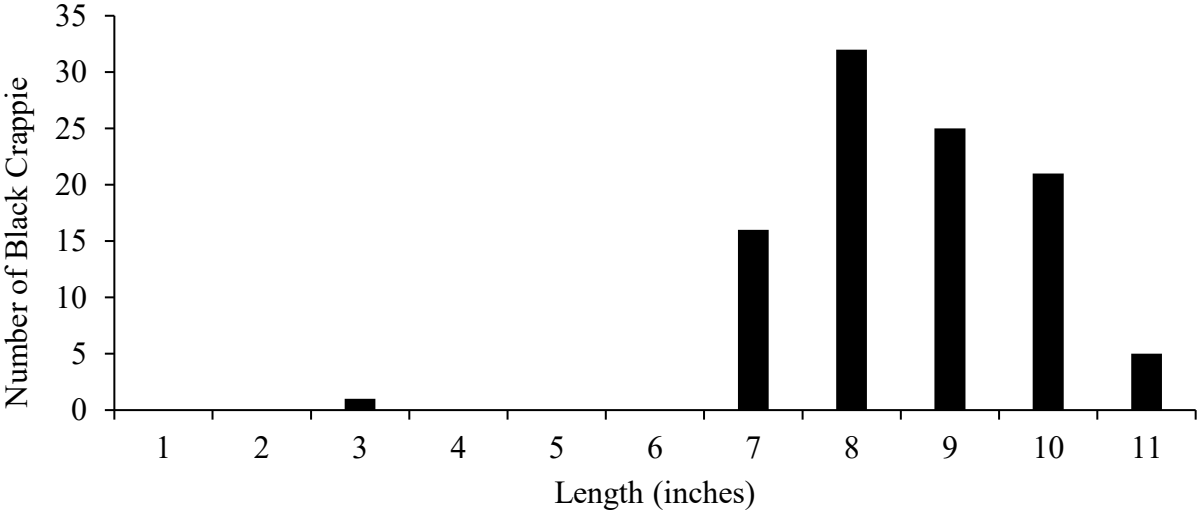


Figure 8. Age frequency distribution for Black Crappies captured in Big Pine Island Lake during May 22-25, 2023.

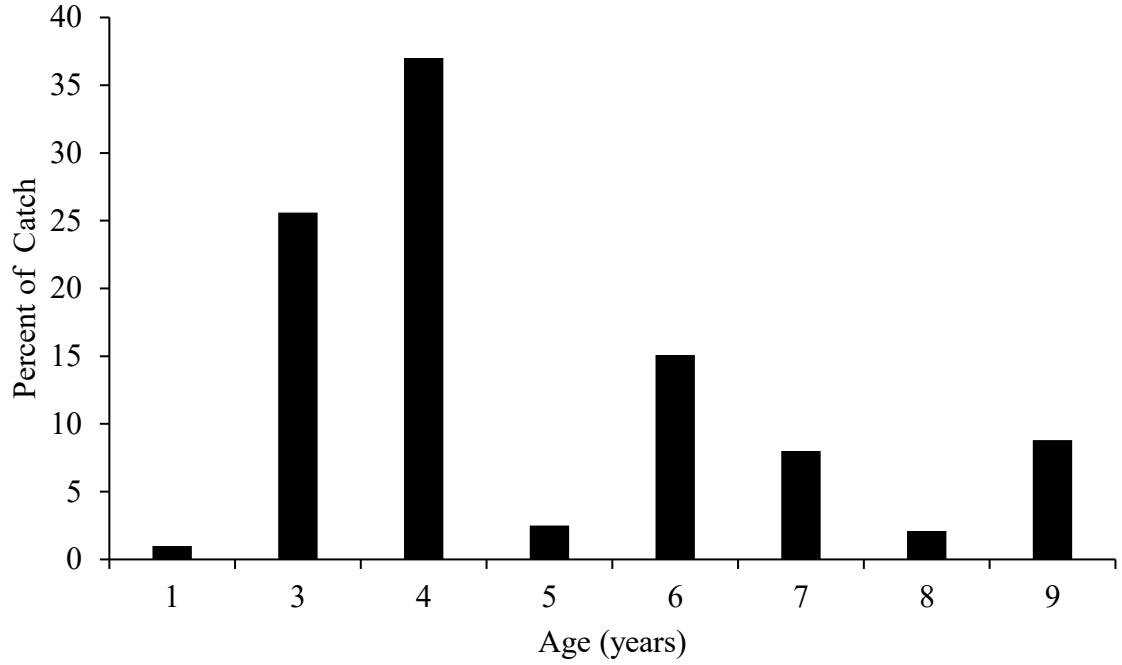


Figure 9. Length frequency distribution for hybrid sunfish captured in Big Pine Island Lake during May 22-25, 2023.

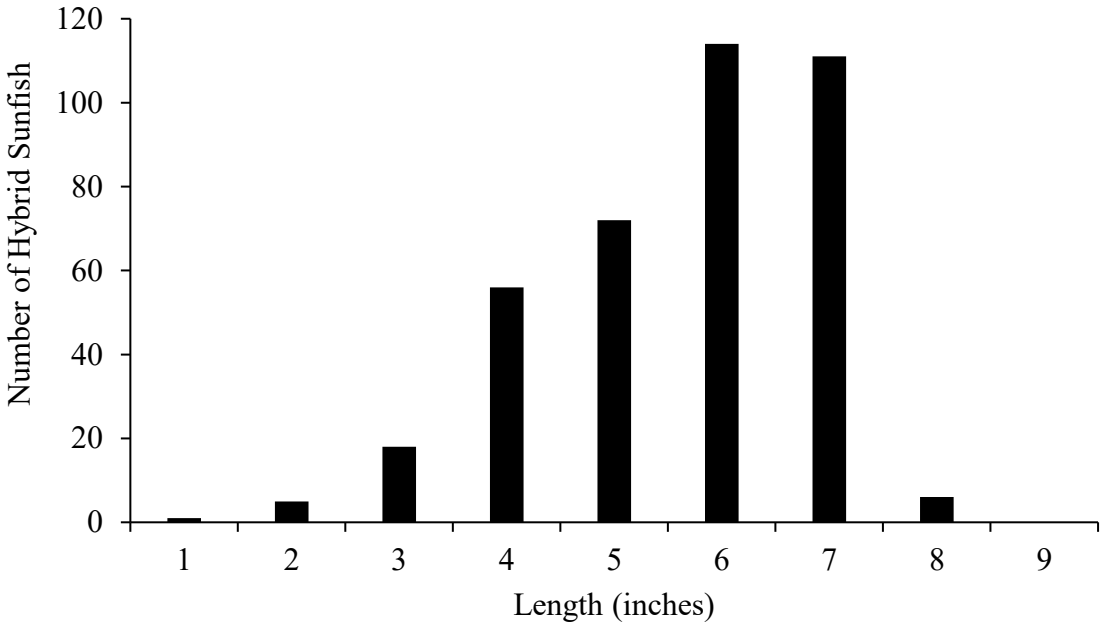


Figure 10. Length frequency distribution for Largemouth Bass captured in Big Pine Island Lake during May 22-25, 2023.

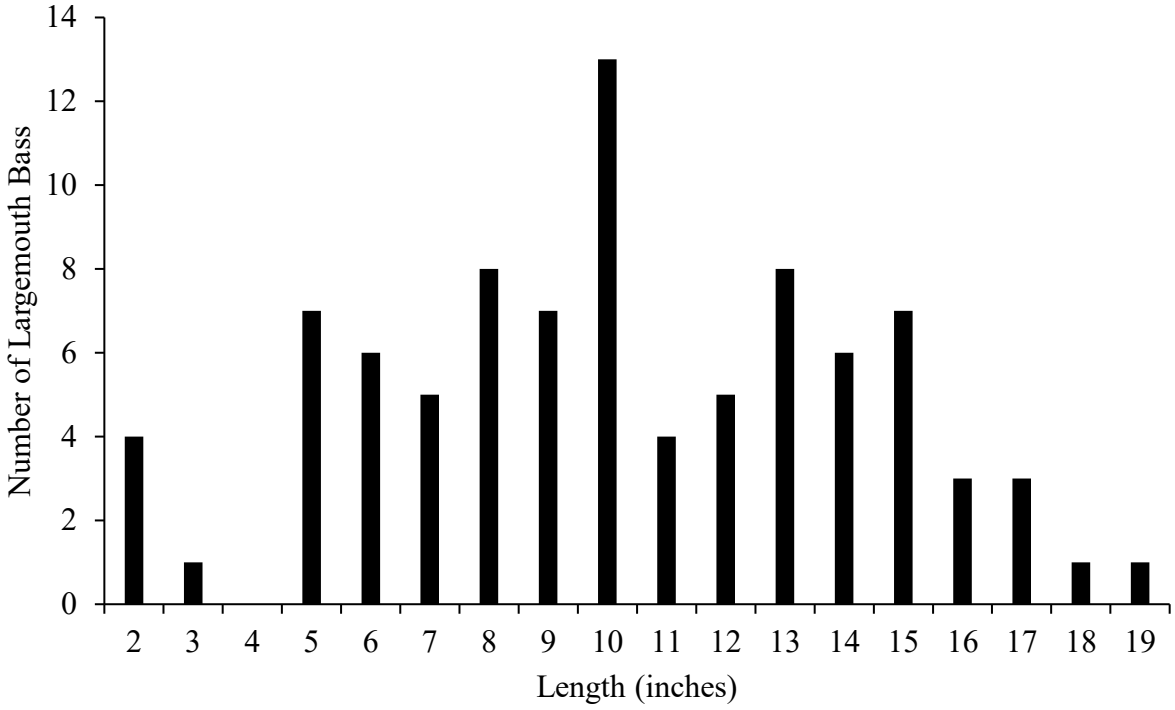


Figure 11. Age frequency distribution for Largemouth Bass captured in Big Pine Island Lake during May 22-25, 2023.

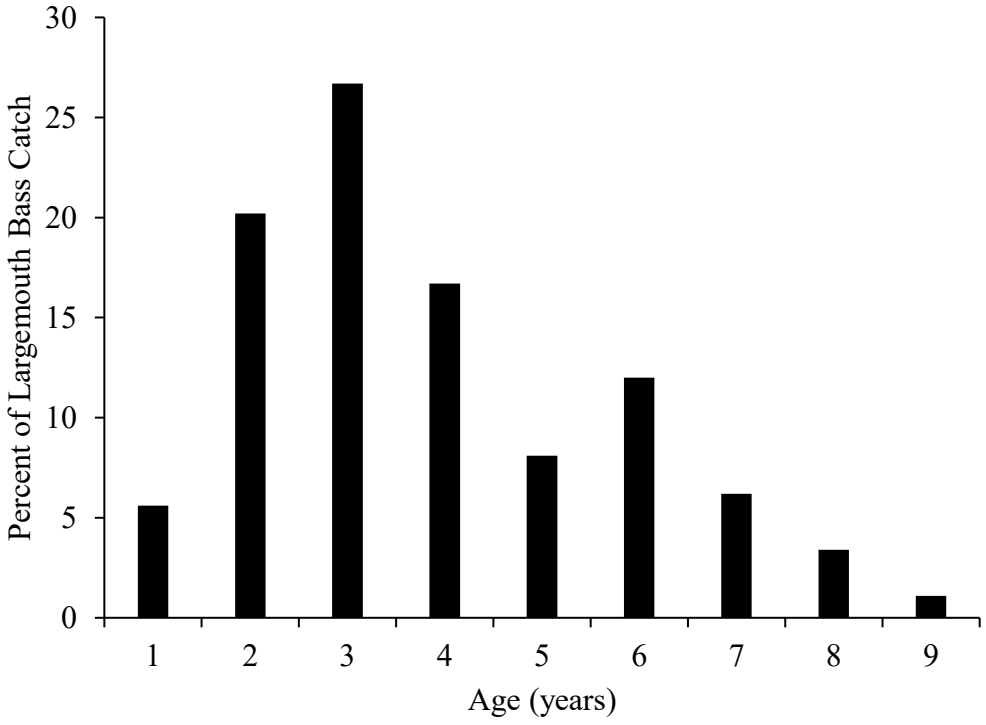


Figure 12. Length frequency distribution for Northern Pike captured in Big Pine Island Lake during May 22-25, 2023.

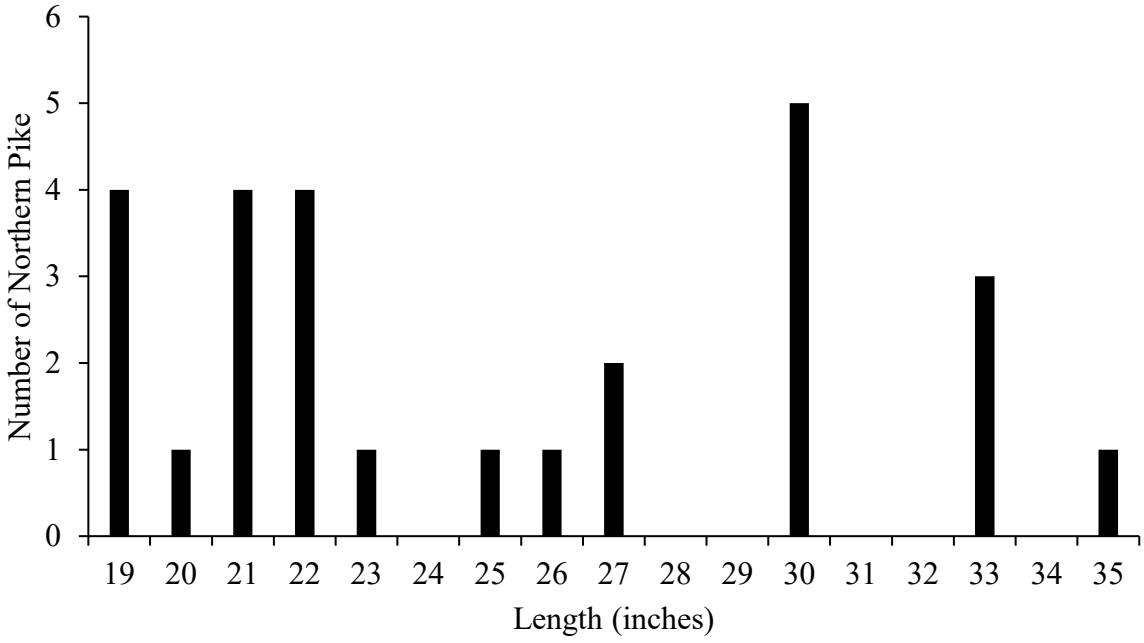
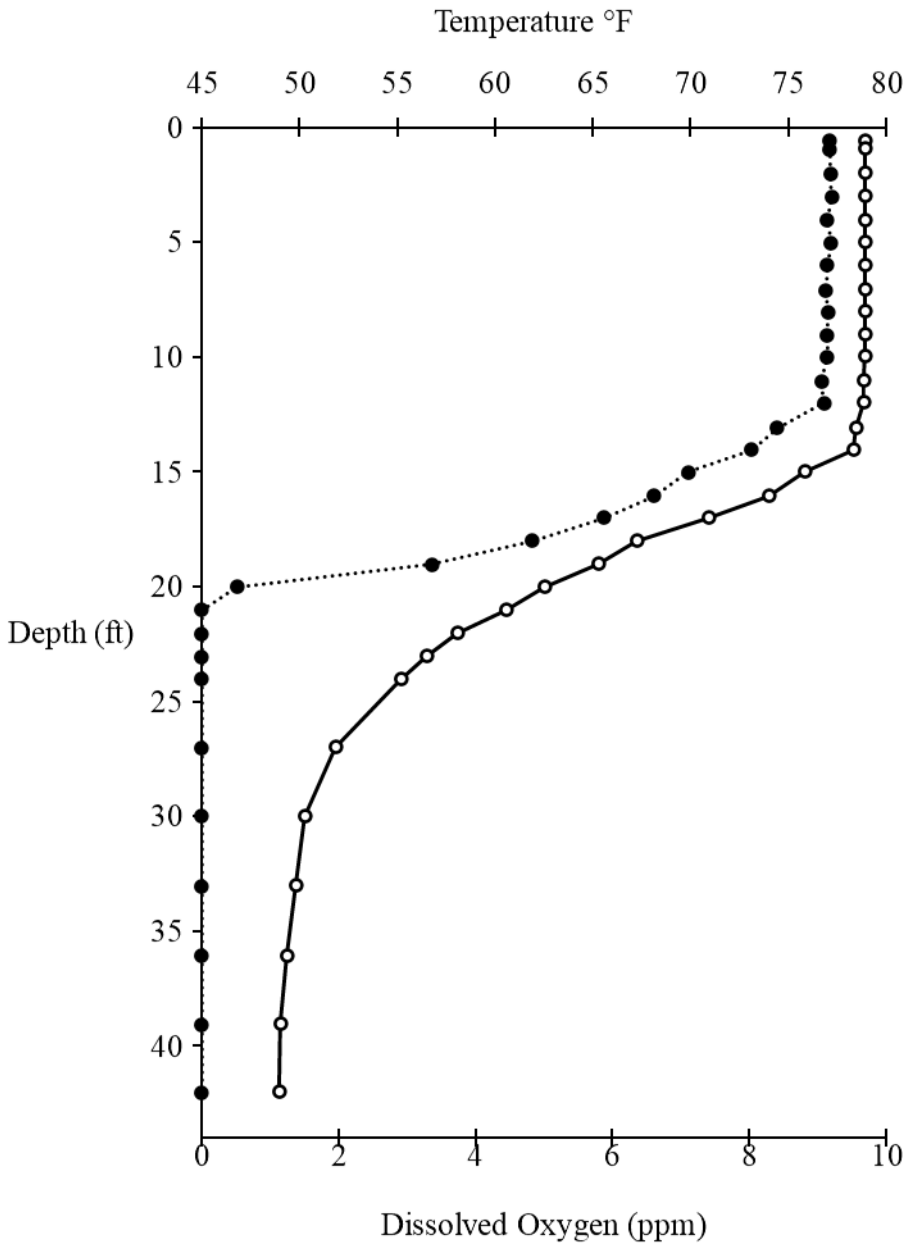


Figure 13. Water temperature and dissolved oxygen profile for the deepest basin in Big Pine Island Lake on August 1, 2023. The hollow circles with solid line represent temperature and the solid circles with dashed line represent the dissolved oxygen concentration.



Received September 16, 2025; Approved October 16, 2025
Brian Gunderman, Unit Review and Approval
Edward Baker, External Reviewer
John Bauman, SFR Facilitator
John Bauman, Desktop Publisher and Approval