Long Lake

Saint Joseph County; T6S; R9W; Sec 22, 27, 33, and 34
Saint Joseph River Watershed, Last Surveyed March 11-23, 2024

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Environment

Long Lake is a 222-acre lake located in Saint Joseph County approximately 3 miles southwest of the village of Colon (Figure 1). It is an impoundment on Swan Creek. Long Lake is connected to Palmer Lake by a 1.2-mile-long channel that is typically more than 300 ft in width, and less than 5 ft deep. Water flows northward from Long Lake into Palmer Lake. The water levels in Long and Palmer lakes are controlled by Lamberson Dam. The legal lake levels are 850.7 ft in summer and 850.3 ft in winter. Three tributaries flow into Long Lake. Big Swan Creek enters at the southern end of the lake and Lepley Lake outlet and a small unnamed stream flows into the eastern side of the lake. Throughout the lake the shoreline drops off relatively quickly to 20 feet with one shallower sloping shoal on the northeast shoreline. The primary substrates are marl and sand. There are shallow areas dominated by organic substrates at the north and south ends of the lake. About 58% of the lake (by surface area) is greater than 10 feet deep and 27% is greater than 20 feet deep (Figure 2). There is a Michigan Department of Natural Resources (DNR) boating access site on the west shore of Long Lake off Frands Drive that provides public access. The access site has a hard surface ramp and a gravel lot that can accommodate parking for six vehicles with trailers.

The watershed of Long Lake is large as it is an impoundment on Swan Creek. The Long Lake watershed boundary and coverage areas were obtained from LAGOS delineation (Smith et al. 2021). The watershed drains 72,316 acres. Land use of the watershed was determined from the 2023 National Land Cover Database (USGS 2024; Figure 3). Agriculture is the predominant land use making up 67% of the watershed followed by wetlands (18%), urban (8%), forest (5%), and water (2%). Long Lake is surrounded by deposits of glacial outwash sand and gravel and postglacial alluvium. A variety of loams and sandy loams occur in the Swan Creek watershed and well-drained soils of the Coloma-Spinks-Oshtemo series are common around the lake. Residential and vacation homes surround most of the shoreline. The 2011 habitat survey revealed a total dwelling density of 32.9 dwellings/mile (20.5 dwellings/km) for Long Lake. Approximately 72% of the shoreline is armored with seawalls or riprap, which is one of the highest percentages recorded for lakes in southwest Michigan. Wetland complexes are located at the southern end of the lake and along the western shoreline, adjacent to the DNR public access site, and along the channel between Long and Palmer Lakes. Large woody structure is scarce. Since the fall of 2002, persistent algal blooms (primarily Fragilaria, Euglena, and Pseudanabaena) have reduced water clarity in Long Lake (Weed Patrol, Inc. 2008). The reduced water clarity has been accompanied by a decrease in the abundance of rooted aquatic plants.

Fishery Resource

History

The history of fish surveys on Long Lake was summarized in the last Status of the Fishery Report (Gunderman 2012). The fish community was first examined in 1887 using recreational fishing gear (e.g. "flyhooks"). Northern Pike, Bluegill, Largemouth Bass, Black Crappie, suckers, and bullheads were collected. Fish were determined to be abundant and stocking was not recommended. Despite this, early management did include periodic stocking of Bluegill, Largemouth Bass, Smallmouth Bass, and Yellow Perch from 1933 to 1945 (Table 1). The stocking of warmwater fisheries in lakes was discontinued in Michigan after research documented stocking was not required to maintain fisheries (Cooper 1948). Qualitative creel surveys conducted by Conservation Officers from 1935 through 1945 documented that Bluegill was the most abundant species caught. Yellow Perch, Black Crappie, Pumpkinseeds, and Largemouth Bass were also commonly being harvested. Long Lake depth contours were first mapped in 1953 (Figure 2).

An electrofishing survey was conducted in May 1972. Bluegill were the most abundant fish captured (n = 400, 51% of total catch) followed by Pumpkinseed (n = 175). These fish were relatively small with a mean size of 3.8 and 3.9 inches, respectively. Only 3% of Bluegill and none of the Pumpkinseeds were over 6 inches. Largemouth Bass (n = 55) were larger with an average size of 12.6 inches and 53% over 14 inches in length and ranging up to 20 inches. Two Smallmouth Bass (16 and 18 inches) were also caught. A few Yellow Perch (n = 31, mean size 4.7 inches) and Black Crappie (n = 1) were caught.

Another electrofishing survey was completed in October of 1981. There was high catch of Bluegill (n = 592) and Largemouth Bass (n = 110), but catches were dominated by small fish with 88% of Bluegill being 5 inches or smaller. Growth of Bluegill was above average and the growth index score was +0.6. Largemouth Bass up to 19 inches were captured but only seven fish 14 inches or greater were observed overall. Growth was at the low end of the average range with a growth index score of -0.9. Three Northern Pike were caught (two more were reported as missed) that ranged from 18 to 21 inches. Pumpkinseed (n = 99), Yellow Perch (n = 80), and Black Crappie (n = 18) were also captured. Yellow Perch size structure was small with only nine fish over 7 inches.

The next fisheries survey was an electrofishing, gill net, fyke net, and trap net survey conducted in September of 1992. Anglers had reported declines in the fishery during the previous 10 years and requested a survey. Bluegill were again the dominant species with 1,813 being caught making up 60% of the total catch in the survey. Bluegill ranged from 1-7 inches and 21% were over 6 inches. Growth was below average with an index score of -0.6. A total of six Northern Pike were captured ranging from 25 to 30 inches with good growth. Black Crappie, Yellow Perch, Pumpkinseed, and Largemouth Bass populations exhibited poor size structures and Largemouth Bass growth was also below average (index score = -1.2). The report noted that the new sewer system may have resulted in reduced algal growth, however water clarity was reported as poor. A limnology profile survey was conducted on September 9, 1992, and documented the oxygen dropping below 3 ppm at a depth of 13 feet. Channel Catfish were stocked in 1992 in an attempt to create a fishery.

In 1993 interest was expressed by local anglers in stocking Walleye to create a Walleye fishery in Long Lake. The Michigan Department of Natural Resources (DNR) partnered with the Colon Area Anglers Association (CAAA) to stock Walleye fry into local rearing ponds managed by CAAA. Spring fingerling Walleye (1-2 inches) were harvested from the ponds and stocked into Long Lake and other local water bodies. Spring fingerling Walleye were stocked in Long Lake six times during 1993-2006 (Table 2). Walleye stocking was evaluated through an electrofishing survey in October of 1994. Catch rates were low and only 5 young-of-year Walleye and 3 yearling Walleye were caught (0.33 young-of-year per acre and 0.16 yearlings per acre). This survey indicated poor survival of stocked Walleye (Serns 1982; Serns 1983; Ziegler and Schneider 2000). The Walleye stocking program on Long Lake was interrupted in 2007 due to the discovery of viral hemorrhagic septicemia virus in the Great Lakes. Channel Catfish also were stocked by the DNR in 1992. Redear Sunfish were stocked in Long Lake by the CAAA from 1999-2002.

There is a long history of vegetation management through chemical treatments on Long Lake. Vegetation communities were reported as problematic in the 1990s. Weeds choked much of the channel between Long and Palmer lakes and reports indicated that Long Lake was heavily vegetated. Eurasian Watermilfoil had become established in many areas. DNR assessments determined that plant density was not a significant problem and if treatments were conducted, they should focus on the channel between the lakes and target Eurasian Watermilfoil stands and select areas for recreation and navigation. There was a special assessment district formed in 1992 to fund chemical treatment of vegetation despite opposition from local angling groups. Vegetation treatments were initiated and aquatic nuisance control permits indicated large-scale proposed treatments targeting all vegetation along residential shorelines (31.6 acres), invasive treatments out to the 10-foot contour (51 acres), and more intense treatment in the south end of the lake (13 acres). Actual treatment areas were smaller and reduced with time as nuisance vegetation became less of an issue. Treatments began to focus more directly on algae and residential properties.

Removal of vegetation led to a resurgence in algal blooms. Vegetation growth had been dense due to the availability of nutrients in the system. Once vegetation was removed through treatments, nutrients became available for algae. Long Lake experienced declines in water clarity and increased algal production. Algal blooms have become a common occurrence. Treatment targets shifted to focus on algae and reducing available nutrients to curb algae production. Vegetated habitat is limited on the main lake but remains in the southern wetland area of the lake and the channel between Long and Palmer lakes. Experimental treatments to reduce algae and nutrients have included products such as copper sulfate, Phycomycin, and EutroSORB WC.

Gizzard Shad were introduced to Long, Palmer and Matteson Lakes at some point in the 1990s. These fish were either introduced in mixed bait release or may have been present in the Channel Catfish stocking in 1992. Gizzard Shad are not native to inland lakes in southwest Michigan and can exacerbate water clarity issues. They have been documented to cause water quality declines in lakes where they become overabundant (Kirk et al. 1986; Dettmers and Stein 1992; Dettmers and Stein 1996). There is concern that Gizzard Shad populations could become problematic if they expanded in Long Lake. Zebra mussels were also introduced into Long Lake Their population has varied over time and influenced water quality. The combination of invasive species, nutrient inputs, and vegetation management has resulted in difficulty managing water quality and fisheries in Long Lake.

The most recent fish survey was conducted in May 2011 (see Gunderman 2012). The survey documented similar fish communities as past surveys. Bluegill were very abundant with above average growth (growth index +1.0). Bluegill over 6 inches made up 59% of the total Bluegill catch. The size scores for the Long Lake Bluegill population were improved from past surveys at 4.2 (satisfactory) based on the trap net and large-mesh fyke net samples and 3.4 (acceptable) based on the electrofishing sample (Schneider 1990). Black Crappie were abundant and were relatively large (range = 5 to 13 inches). Almost all Black Crappie captured were 8 inches or above and 51% were 10 inches or larger. Yellow Perch, Redear Sunfish, and Pumpkinseed were reported in lower numbers comprising minor components of the fish community. Largemouth Bass were abundant but relatively small. Only 7% were over 14 inches and only one fish over 16 inches was caught. Channel Catfish were present, indicating some natural recruitment of this species. One stocked Walleye was captured (20 inches). Nineteen Northern Pike were collected that ranged from 12 to 29 inches. A total of 50 Gizzard Shad were captured and made up 4.9% of the total biomass in the survey. Gizzard Shad had not taken over the fishery but may continue to contribute to decreased water quality influencing zooplankton prey biomass. The proposed management strategy was to increase predator abundance through Walleye and Channel Catfish stocking with the goal of controlling the Gizzard Shad population.

Very low survival of stocked Walleye was documented in the 2011 fish survey. The survey results corroborated angler reports that Walleye were not being caught. Past Walleye stocking had used spring fingerlings that were relatively small (1-2 inches) and vulnerable to predation. After the 2011 survey, the management approach shifted to fall fingerling Walleye production. Fall fingerling Walleye are stocked in October at a larger size and were less vulnerable to predation. Fall fingerling were expected to survive better than past spring fingerling Walleye plants in Long Lake. Fall fingerling Walleye stocking was prescribed at a rate of 5 fish per acre with DNR providing 4 fish per acre and the Colon Township Lake Board (CTLB) purchasing 1 fish per acre. Fall fingerling Walleye stocking began in 2012 and was continued for even years (and 2013) through 2024 (Table 2).

Fall fingerling Walleyes stocked by the DNR in Long Lake in 2018 were marked with a right pelvic (RV) fin clip. Similarly, fall fingerling Walleyes stocked by the DNR in 2019 in Palmer Lake were marked with a left pelvic (LV) fin clip. The purpose of these marks was two-fold. First, to provide known-age fish for subsequent calibration of fish aging methods. Second, to evaluate movement of stocked fish between the two lakes.

Channel Catfish stocking began in 2013. Channel Catfish were first prescribed for stocking in 2013 at a rate of 15 fish per acre (3,330 fish) biennially. Stocking has since been conducted in odd years to present with some variation in density (Table 1).

The decrease in aquatic vegetation in Long Lake resulted in limited fish habitat in the lake. The lake association conducted a habitat project during 2013-2018. Fish cribs (n = 30) were constructed and placed throughout the lake in 15-20 feet of water to improve available fish cover. This effort created places where anglers could target fish and improved fishing opportunities on Long Lake.

Current Status of the Fish Community

Methods

A fish survey was conducted on Long Lake during March 11-22, 2024, following the 2018 version of the 1836 Treaty-Ceded Territory Walleye Protocol and the Northern Pike Sampling Protocol (Godby et al. 2023). The survey consisted of trap net sets checked every other day from March 12 through March 20 and an electrofishing effort on March 22. Trap net surveys began March 11 when water surface temperature was 41.6 F. Water temperatures fluctuated between 41 and 51 F during the 15-day survey period. Nets were spaced along the shoreline to cover the lake and target potential Walleye spawning habitat (i.e., shoals). Four trap nets were set and checked the initial night and then five trap nets were set and were checked daily over nine nights (49 net nights). Walleye, Northern Pike and Channel Catfish were processed in all nets while all other species were processed in one randomly selected net each day (total of 10 net nights). Fish were collected, identified to species, measured for total length, and released. Dorsal fin rays were removed from all Northern Pike and Walleye and anal fin rays (>6 inches) or scales (<6 inches) were collected from Bluegill prior to release to facilitate age and growth analyses. The dorsal fin ray removal also functioned as a mark for Walleye. The numbers of unmarked and recaptured Walleye were recorded for each net. Fish were allowed to mix for more than 24 hours after trap netting was concluded on March 21. An electrofishing survey was conducted on March 22, beginning after dark (8:45 PM). The survey was run clockwise from the boating access site and covered the entire shoreline (total effort of 2.05 hours). Walleye and Northern Pike were the only fish assessed during the electrofishing efforts.

Mark-recapture population estimates were obtained via two different methods for Walleye. The first method utilized the Schumacher-Eschmeyer method to calculate a muti-census population estimate from marked and unmarked fish collected each sampling day (Schumacher and Eschmeyer 1943; Ricker 1975). The second method utilized the Chapman-Petersen estimator where the initial electrofishing and trap net period was considered the marking run, and the final electrofishing effort was considered the recapture run (Chapman 1951). Growth indices for each age class of Walleye, Northern Pike, and Bluegill were calculated by subtracting the state average length from the mean length-at-age from the 2024 Long Lake survey (Schneider et al. 2000). Growth indices for age classes represented by a minimum of five fish were averaged to provide a mean index of fish growth. Bluegill growth was considered average if greater than -0.5 and less than +0.5. For Walleye and Northern Pike, growth index scores between +1 and -1 were considered similar to the state average while scores less than -1 and greater than +1 were considered below or above the state average, respectively. The Bluegill length-frequency distribution and mean growth index were rated as described by Schneider (1990). The relative stock density for each fish species was assessed using catch-per-unit-effort (CPUE) calculated as the number of fish caught per net night with trap nets and per minute of electrofishing. The CPUE data from this survey were compared to CPUE data from multiple lakes surveyed in the Status and Trends Program (STP) from 2001 through 2021 comparing both statewide and regional level (Southern Lake Michigan Management Unit (SLMMU)) aggregates. Walleye CPUE in Long Lake was compared to data from large lake fisheries with naturally reproducing Walleye populations surveyed in Michigan from 2001-2010 (Hanchin 2017). The Northern Pike CPUE for Long Lake was compared to CPUE data compiled by Godby et al. (2023) for early spring pike surveys.

Results

A total of 620 fish weighing 1,247 pounds were captured in the 2024 survey on Long Lake (Table 3). Seventeen species were represented in the catch. Bluegill was the most abundant species with a total of 141 collected ranging from 5 to 7 inches. Bluegill averaged 6.6 inches in length and most fish captured were over 6" (86%) and many were greater than 7 inches (20%). No Bluegill over 8 inches were caught. The mean growth index was +0.5, which is at the upper boundary for average growth. The Schneider size structure index score was 4.6 (satisfactory). Bluegill catch rates in trap nets were 14.1 fish per net night which is below the 25th percentile for SLMMU (30.8 fish per net night) and below the median for statewide surveys (21.3 fish per net night). Other sunfish were captured in lower numbers including Hybrid Sunfish (n=4), Pumpkinseed (n=2), Redear Sunfish (n=2), and Rock Bass (n=9).

Channel Catfish was the next most abundant species caught in the 2024 fish survey on Long Lake. A total of 138 Channel Catfish were captured ranging from 10 to 27 inches. The average length was 21.2 inches and fish from 19-24 inches were most common and made up 80% of the sample (Figure 4). Age structures were not sampled for Channel Catfish, so it was not possible to directly evaluate growth and stocking success by year class. However, fish of all sizes were captured, indicating good survival from multiple year classes.

Walleye were also a major component of the fish community with a total of 107 captures (92 individual fish and 15 recaptures). Walleye averaged 16.9 inches and ranged from 11 to 27 inches. There were bimodal peaks in length frequency at the 12–13-inch (39% of total catch) and 19–20-inch (32% of total catch) size classes (Figure 5). Walleye from age classes 2 through 10 (except age 7 and 9) were caught (Figure 6). Age 2 fish were the most abundant and were mostly immature. Some of the age 3 fish were mature and were primarily spawning males. All age-4 and older fish were mature and spawning. The female to male ratio was 1:1.3 with males slightly more abundant with the exception of age-4 where females made up 77% of the total catch of age-4 fish. Walleye in Long Lake were larger than the statewide average for ages 2 through 6 resulting in a growth index of +2.5 indicating above average growth (Table 4). The CPUE of Walleye in trap nets was 1.4 fish per net night. This value is below the 75th percentile for SLMMU (1.7 fish per net night), equal to the median for statewide trap net surveys (1.4 fish per net night), and below the mean of 11.8 fish per net night for large lake fisheries with natural reproducing Walleye populations surveyed in Michigan from 2001-2010. The Schumacher-Eschmeyer method yielded a population estimate of 258 fish (1.16 fish per acre) with a 95% confidence interval ranging from 156 to 460 fish. The Chapman-Petersen method resulted in a population estimate of 746 fish (2.74 fish per acre) with a 95% confidence interval of 365 to 1,657 fish. The Chapman-Peterson method likely overestimated the true population size because of low sample size for recovered marked fish. Only two marked fish were recaptured during the electrofishing run. There was movement of Walleye between Long and Palmer Lakes. Two fin-clipped Walleye from the 2019 stocking in Palmer Lake were caught in Long Lake, and two fin-clipped Walleye from the 2018 stocking in Long Lake were collected on Palmer Lake during the 2024 survey.

A total of 57 Northern Pike were captured in the 2024 survey on Long Lake (40 unique individuals, 17 recaptures). All of these fish were collected in the trap nets. Northern Pike ranged from 11 to 39 inches and 1 to 7 years old. Fish were abundant over the 24-inch size limit with 74% being 24 inches or greater (Figure 7). Growth was well above the statewide average, as evidenced by the mean growth

index of +3.9. Northern Pike of all age classes were represented, indicating consistent recruitment. The CPUE in trap nets was 1.1 fish per acre which is slightly above the median for SLMMU (1.0 fish per net night) and slightly below the median for statewide surveys (1.5 fish per net night) and considered within the average range for both geographic regions. When the CPUE from trap nets in the 2024 survey was compared to surveys using the same protocols (spring trap nets targeting pike), it was above the 25th percentile of 0.83 fish per net night for surveys conducted statewide (Godby et al. 2023). The Schumacher-Eschmeyer population estimate was 67.5 fish with a 95% confidence interval of 41.0 to 112.4. This is a density of 0.3 fish per acre which is lower than the range reported for small and medium lakes in Michigan of 1.6 to 4.7 individuals per acre for fish 14 inches and larger (Smith et al. 2016). A Chapman-Peterson estimate could not be conducted as no Northern Pike were recaptured during the electrofishing recap effort.

Black Crappie were captured in low numbers (n = 24) and ranged from 7 to 12 inches in length. Most of these fish were large with 63% being 10 inches or larger. Black Crappie CPUE in trap nets was 2.4 fish per net night. This is above the 25th percentile for SLMMU and statewide surveys (both 2.0 fish per net night). Only three Yellow Perch were present in the 2024 Long Lake fish survey. The catch rate in trap nets was 0.3 fish per net night which is below the 25th percentile for SLMMU and statewide surveys (both 1.0 fish per net night).

A total of 92 Largemouth Bass were caught in the 2024 survey on Long Lake. These fish averaged 14.1 inches and ranged from 9 to 17 inches. Half of the Largemouth Bass captured were 14 inches or greater and legal to harvest. The CPUE in trap nets was 9.2 fish per net night which is above the 75th percentiles for SLMMU (5.4 fish per net night) and statewide surveys (5.3 fish per net night). No Smallmouth Bass were captured in Long Lake.

Predators (Bowfin, Largemouth Bass, Northern Pike, and Walleye) made up 56% of the biomass collected. This percentage is above the range of 20-50% recommended by Schneider (2000a). Prey species were not efficiently surveyed due to the mesh size in the trap nets and were captured in low numbers. No minnow species were collected. Golden Redhorse (n = 14) and White Sucker (n = 9) were large-bodied prey that were captured. Three Bowfin were collected that were 20-22 inches in length. Brown Bullhead (n = 2) and Yellow Bullhead (n = 10) were also captured and contributed to the fishery of Long Lake.

Analysis and Discussion

Stocking of fall fingerling Walleye has created a strong inland fishery in Long Lake. Walleye in the 12- and 13-inch size classes were the most abundant indicating excellent survival from recent stockings. These sizes represent age-2 fish stocked in 2022. Fish that were 19 and 20 inches were also well represented in the catch. Fish from each stocked year class were captured, indicating good survival from all stocking events. The more believable Schumacher-Eschmeyer mark-recapture population estimate from the 2024 survey was below the target of 2 fish per acre outlined in the Walleye Management Plan (Herbst et al. 2021). The population estimate was also lower than Palmer Lake (1.94 fish per acre) based on estimates from a concurrent survey in 2024 (Diana 2026). Anglers consistently report high catch rates for both Long and Palmer Lakes. Anglers report that Long Lake receives more fishing pressure than Palmer Lake. Increased harvest rates could be the reason for the lower density observed in 2024 in Long Lake compared to Palmer. Because of the connection between

Long and Palmer Lakes, more fish could have moved down into Palmer Lake to spawn. There were greater numbers of older and larger fish caught in Palmer Lake that could indicate this is the case. However, there were not higher number of off year stocked fish in one lake compared to the other which would imply there was not differential movement into Palmer Lake. Walleye also often run up rivers to spawn. It is possible that some of the adult Walleye from Long Lake moved upstream to spawn in Big Swan Creek as well during the 2024 survey.

Walleye from year classes that were not stocked in Long Lake were captured (2019 and 2021). These fish could have been Walleye stocked in Palmer Lake that migrated to Long Lake. Walleye that were stocked into Long Lake in 2018 were marked with a RV fin clip and Walleye stocked in 2019 in Palmer Lake were given an LV fin clip. Two fish from the 2019 Palmer Lake stocking were recaptured in Long Lake in the 2024 survey. There were also two fish from the 2018 stocking in Long Lake that were recaptured in the 2024 Palmer Lake fish survey. These re-captures confirm that Walleye do move between the two systems. However, given the scarcity of observations, movement between lakes appears to be the exception rather than the rule. Six of the eight RV-clipped fish caught between the two 2024 lake surveys were captured in Long Lake, and 21 of the 23 LV-clipped fish were collected in Palmer Lake.

Long Lake is listed as a class 1 lake in the Walleye management plan. In general, class 1 lakes are not high priority waters for Walleye stocking. However, fisheries managers consider additional factors such as proximity to human population centers and other Walleye populations when making decisions regarding Walleye allocation. In the case of Long Lake, Walleye stocking has created a strong and successful fishery. There are several reasons for the success of the Walleye program. Long Lake has been stocked at a rate of five fish per acre which is above the standard rate utilized by SLMMU of four fish per acre. The higher rate was initiated because of the abundance of Gizzard Shad prey in hopes that Walleye could control this nuisance fish. The high stocking rate has been successful at producing a population that creates a popular fishery. The popularity is likely the main factor for the population estimate being below the target of two fish per acre. As a put-grow-take fishery, a fishable density is maintained despite the assumed high harvest rates. Growth of Walleye in Long Lake is above the statewide average indicating the stocking rate is not too high. Long Lake also has available prey for stocked Walleye. Gizzard Shad are readily consumed by Walleye as well as abundant small panfish and minnows. Adequate prey densities exist to allow for high growth rates for Walleye and Northen Pike. Largemouth Bass growth was not directly measured, but good numbers of legal fish were present indicating growth is likely not impaired. These factors combined result in good survival and growth of Walleye creating a popular fishery.

Apart from the fin-clipped fish stocked into the Long/Palmer system in 2018 and 2019, it was not possible to differentiate between stocked and wild Walleye. Six of the seven Walleye from the 2018 year class caught during the 2024 survey on Long Lake had fin clips. This could indicate low levels of natural recruitment or aging error. In 2025, the DNR began collecting genetic samples from all Walleye utilized during egg take efforts on the Muskegon River. This management change meant that in subsequent years it will be possible to take a small fin clip from individual Walleye collected during Walleye evaluation surveys, have those samples analyzed at the Michigan State University laboratory, and identify which fish were stocked by the DNR. This approach is going to greatly improve assessments of natural recruitment and Walleye stocking survival in Michigan lakes. However, the Long/Palmer situation is complicated due to supplemental Walleye stocking from a private hatchery. In order to eliminate this source of uncertainty, we would have to fin clip every fish from the private

hatchery before it is released into the lake. Although we potentially could get some assistance from local volunteers, that approach would be very labor intensive and could be stressful for the fish. It would also require additional DNR Walleye surveys to sample adult fish. Thus, this option is not recommended.

Gizzard Shad were not captured in the 2024 fish survey on Long Lake. Walleye stocking has likely suppressed the Gizzard Shad population, but they likely are still present and in higher abundance than observed in this survey. We did not observe Gizzard Shad captures in the netting effort in 2024. The large-mesh trap net utilized in this survey would not capture smaller bodied fish such as young Gizzard Shad. In addition, Gizzard Shad are generally found offshore in the spring and the trap nets utilized were focused on shoreline areas to capture spawning Walleye and Northern Pike. As a result, the Gizzard Shad abundance was not directly assessed in this survey. The 2011 fish survey on Long Lake documented moderate abundance of Gizzard Shad capturing 120 fish that made up 6.7% of the total biomass captured in the survey. Gizzard Shad have been shown to cause water quality declines in lakes where they become overabundant (Kirk et al. 1986; Dettmers and Stein 1992; Dettmers and Stein 1996). Gizzard Shad feed on zooplankton and decaying organic matter (Yako et al. 1996). As a result, overabundant Gizzard Shad populations can reduce the zooplankton that feed on algae resulting in decreased water clarity. Gizzard Shad also stir up sediment while feeding on detritus. There were some indications in previous studies that the abundance of zooplankton, especially Daphnia species, was low after Gizzard Shad introduction on Long Lake (Jude 2017; Jude 2016), however the densities of Gizzard Shad in Long Lake are much lower than those reported in studies where impacts to water quality were documented (Kirk et al. 1986; Dettmers and Stein 1992; Dettmers and Stein 1996). The Gizzard Shad population may contribute to the poor water clarity, but watershed inputs of nutrients from an agricultural landscape and reduced densities of aquatic vegetation are much larger issues that need to be addressed to improve water quality. Walleye stocking continues to be an important management strategy to keep Gizzard Shad populations under control.

Channel Catfish stocking has been very successful. There is a well-established population with an abundance of fish that are preferred size for harvest. DNR personnel encountered several anglers targeting Channel Catfish during the 2024 survey. Inland lakes with good Channel Catfish populations are uncommon in Michigan and Long Lake provides a unique experience to target these fish. Channel Catfish over 20 inches were abundant with quality fish up to 27 inches being captured in the survey. The density of Northern Pike population in Long Lake is average with extremely fast growth. There are good numbers of large fish present with most of the 2024 sample being above the 24" legal length limit. Northern Pike populations exhibit density dependent growth and low-density populations with adequate prey often result in accelerated growth (Pierce et al. 2003). Prey resources in Long Lake are ideal for Northern Pike with Gizzard Shad, White Sucker, and Golden Redhorse present. Over one-third of the pike collected were larger than 30 inches and fish up to 39 inches were caught. Long Lake provides an excellent Northern Pike fishery that does not appear to compete heavily with stocked Walleye for prey.

Predators made up over 50% of the biomass collected in the 2024 survey. This value is likely higher than the actual proportion of predators in Long Lake for several reasons. The spring timing of the survey was focused on catching Walleye and Northern Pike when they were inshore spawning. As a result, Bluegill, Gizzard Shad, and other prey species were not well represented in the catch. Large-mesh trap nets utilized in the survey were too big to capture smaller bodied fish such as minnows and younger year classes of sunfish. Growth rates of all predators were above average, indicating that prey

were available and supported good growth. These factors combined indicate that predators are not overly abundant in Long Lake.

Panfish populations have improved in Long Lake over the past 40 years. Past surveys indicated high density and poor growing Bluegill populations. The size structure is still not producing quality fish, but there were good numbers of catchable sized fish are present. Schneider index scores improved from very poor and poor in 1992, to satisfactory in 2011 and 2024. Growth index scores also increased from -1.0 in 1981, -0.5 in 1992, and +0.3 in 2011 to +0.5 in 2024. Walleye stocking may contribute to further changes in size structure as they prey on small Bluegill and keep populations from becoming over abundant (Schneider and Lockwood 2002). The catch rate was lower in 2024 than in past reported surveys which were all described as high density. Fewer Pumpkinseed and Redear Sunfish were captured in the 2024 survey compared to past surveys. This could indicate that they were not as abundant in the fishery in 2024. However, early spring trap net survey may have underestimated the abundance of Bluegill and other sunfish species as they would not fully recruit to the gear until May/June when they are inshore spawning. The large-mesh size of the gear may also result in lower capture rates of smaller size classes.

Yellow Perch had been reported as a small component of the fishery in past surveys. This continued to be the case in 2024 when only 27 fish were captured. Captured Yellow Perch were of harvestable size and ranged from 8-12 inches. Thus, the Yellow Perch population provides some potential for harvest and included larger fish than were reported in the past.

Black Crappie was the most abundant species in terms of biomass during the 2011 survey on Long Lake. Black Crappie were not well represented in the 2024 survey, but the fish that were captured were of preferred size for harvest (9 inches or larger) with fish up to 13 inches caught. The population is centered around 10 inches which is likely represented by a strong year class. 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. Catch rates were lower than in 2011 which may indicate a decline in the population. Catch rates may also have been influenced by the time of year, but spring surveys usually target Black Crappie well.

The Largemouth Bass population supports an acceptable fishery. Catch rates were above average and many legal-sized fish over 14 inches were captured. Smallmouth Bass were not captured in 2024 but were encountered in past surveys. Smallmouth Bass are likely present in low numbers and utilize the connected river system. One bass tournament was reported to the DNR Fishing Tournament Information System for Long Lake in 2025. The boating access site limits the size and number of tournaments on Long Lake. Long Lake is tied for 226th in the ranking of lakes based on the number of tournaments on Michigan inland lakes. This level of tournament activity is minimal and there is no anticipated conflict between users on Long Lake.

Management Direction

The DNR will continue to use predator stocking to control Gizzard Shad populations. This will prevent Gizzard Shad from becoming overabundant and impacting water quality. The DNR will continue to work with CTLB to maintain a quality Walleye fishery in Long Lake. The DNR will continue to stock Walleye in Long Lake at a rate of 4 fish per acre. The DNR will continue to coordinate with the CTLB to supplement the stocking with 1 fish per acre purchased from a private source. When funds are available, CTLB can stock at a rate up to 3 fish per acre. Walleye stocking will be the main tool utilized to control the Gizzard Shad population. Walleye stocking should also continue to improve Bluegill size structure by preying on small Bluegill and preventing overcrowding and stunted growth.

The DNR will continue to stock Channel Catfish in Long Lake as a predator of Gizzard Shad and to maintain a fishery. The stocking rate will remain the same (15 fish per acre biannually) as this rate has successfully created a fishery.

Continue to protect habitat and water quality in Long Lake. Habitat protection for Northern Pike will be a priority. Wetlands are limited in Long Lake and are important spawning habitat for Northern Pike. These wetlands should be protected from alteration, development, or broad-spectrum herbicide treatments to ensure this population continues to thrive. Many other fish species use these wetlands for spawning, refugia, and feeding. The DNR will continue to review Michigan Department of Environment, Great Lakes, and Energy (EGLE) permit applications and recommend best management practices to reduce impacts to the natural shoreline of Long Lake. The DNR will work with the lake association to communicate the need for aquatic vegetated habitat and strike a balance between invasive vegetation control and promoting quality fish habitat.

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Tables and Figures

Table 1. Fish stocked in Long Lake (excluding Walleye).

Year	Bluegill	Channel Catfish	Lake Trout	Lake Whitefish	Largemouth Bass	Redear Sunfish	Smallmouth Bass	Yellow Perch
1876	-	-	-	20,000	-	-	-	-
1909	-	-	20,000	-	3,000	-	-	-
1910	-	-	20,000	-	-	-	6,000	-
1935	20,000	-	-	-	-	-	-	5,000
1936	24,000	-	-	-	1,000	-	-	-
1937	50,000	-	-	-	-	-	-	-
1938	80,000	-	-	-	1,500	-	-	15,000
1939	80,000	-	-	-	2,500	-	-	10,000
1940	61,000	-	-	-	3,000	-	-	-
1941	120,000	-	-	-	500	-	-	-
1942	30,000	-	-	-	500	-	-	-
1943	3,500	-	-	-	500	-	-	-
1944	20,000	-	-	-	3,000	-	-	-
1945	15,000	-	-	-	2,000	-	-	-
1992	-	1,000	-	-	-	-	-	-
1999	-	-	-	-	-	22,638	-	-
2000	-	-	-	-	-	27,482	-	-
2001	-	-	-	-	-	18,711	-	-
2002	-	-	-	-	-	9,021	-	-
2013	-	6,736	-	-	-	-	-	-
2015	-	3,329	-	-	-	-	-	-
2017	-	3,335	-	-	-	-	-	-
2019	-	2,765	-	-	-	-	-	-
2021	-	3,336	-	-	-	-	-	-
2023	-	2,264	-	-	-	-	-	-
2025	-	3,520	-	-	-	-	-	-
Total	503,500	26,285	40,000	20,000	17,500	77,852	6,000	30,000

Table 2. Walleye stocked in Long Lake through the cooperative efforts of the DNR, Colon Area Anglers Association, and Colon Township Lake Board.

Year	Number	Stage/Length (inches)
1897	600,000	Fry
1910	80,000	Fry
1993	11,744	2.2
1994	10,800	1.8
1995	13,750	1.8
2003	20,238	1.2
2006	11,349	1.2
2012	1,000	7.0
2013	647	7.0
2014	2,200	5.1
2016	900	6.1
2018	1,171	7.8
2020	1,100	7.0
2022	1,138	6.2
2024	888	5.9
2025	675	7.0

Table 3. Fish caught across all sampling gears in the fish survey conducted on Long Lake in 2024. Data were recorded for Walleye, Northern Pike, and Channel Catfish captured in all trap net sets. Data for all other species only was recorded for one randomly selected trap net per sampling day. Only Walleye and Northern Pike data were recorded during the March 22 electrofishing effort. The Walleye and Northern Pike data includes recaptured fish.

Species	Number	Mean Length (inches)	Total Weight (pounds)	Length Range (inches)
Black Crappie	24	10.6	17.2	7 - 12
Bluegill	141	6.6	28.1	5 - 7
Bowfin	3	21.5	10.6	20 - 22
Brown Bullhead	2	12.0	1.6	11 - 17
Channel Catfish	138	21.2	446.4	10 - 27
Golden Redhorse	14	16.9	24.3	14 - 18
Hybrid Sunfish	4	8.3	1.9	7 - 10
Largemouth Bass	92	14.1	140.6	9 - 17
Northern Pike	57	28.5	345.4	11 - 39
Pumpkinseed	2	8.0	0.9	7 - 8
Redear Sunfish	2	8.5	1.0	7 - 9
Rock Bass	9	7.7	3.2	6 - 8
Spotted Sucker	3	17.5	6.3	17 - 17
Walleye	107	16.9	192.6	11 - 27
White Sucker	9	17.6	20.3	11 - 19
Yellow Bullhead	10	9.8	4.6	8 - 11
Yellow Perch	3	11.2	2.2	7 - 13
Grand Total	**620**	**15.5**	**1,247.1**	**5 - 39**

Table 4. Age, number aged, mean length-at-age, stocking year (if applicable), and mean growth index for Walleye, Northern Pike, and Bluegill captured in the 2024 fish survey on Long Lake compared to the statewide averages from Schneider et al. (2000).

Species	Age	Number Aged	Mean Length (inches)	Statewide Mean Length (inches)	Stocking Year	Growth Index
Walleye	2	44	13.0	10.4	2022	2.5
	3	7	14.9	13.9	Not stocked	
	4	22	19.1	15.8	2020	
	5	4	19.0	17.6	Not Stocked	
	6	7	22.4	19.2	2018	
	8	4	20.3	21.6	2016	
	10	4	22.7	23.1	2014	
Northern Pike	1	1	11.8	11.7		3.9
	2	7	20.2	17.7		
	3	1	21.9	20.8		
	4	6	28.5	23.4		
	5	10	29.1	25.5		
	6	12	31.7	27.3		
	7	2	34.2	29.3		
Bluegill	3	5	5.6	5.0		0.5
	4	15	6.6	5.9		
	5	10	6.9	6.7		

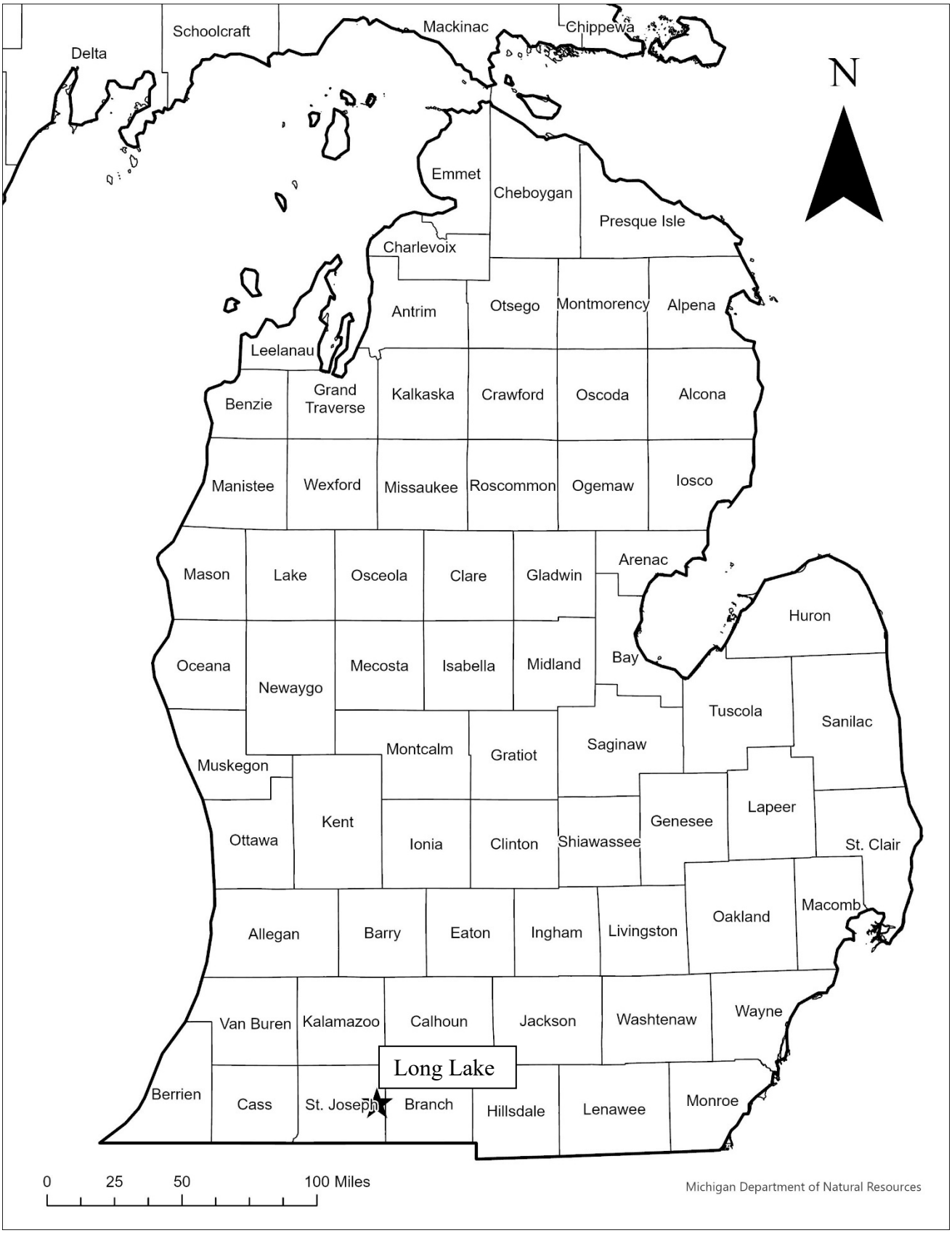

Figure 1. Map of the State of Michigan showing the location of Long Lake in Saint Joseph County.

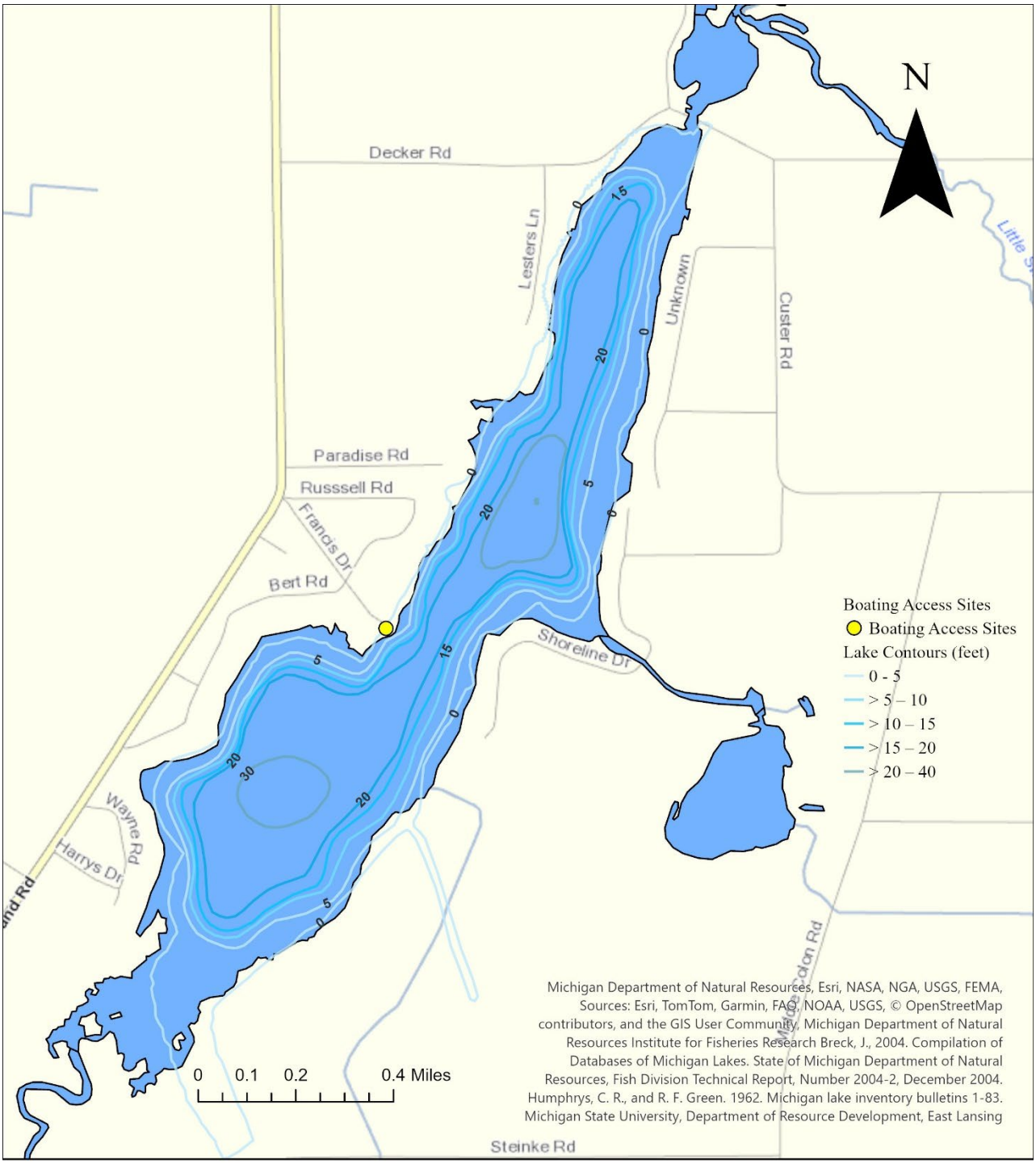

Figure 2. Depth contour map of Long Lake in Saint Joseph County.

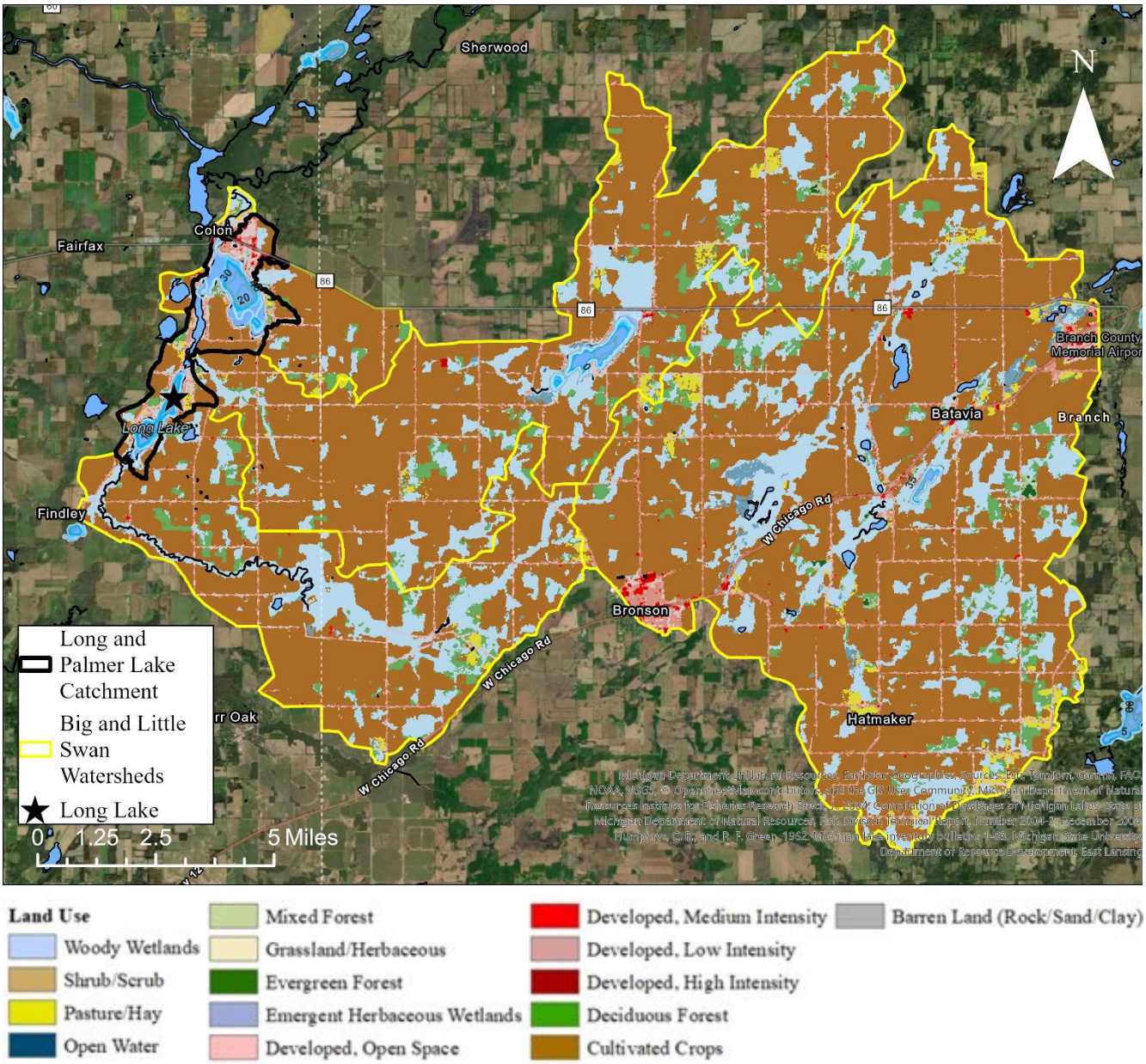

Figure 3. Land use in the Long Lake watershed. Land cover types for the Long Lake watershed were derived from the 2023 National Land Cover Database (USGS 2024). The black star indicates the location of Long Lake. The Long Lake watershed was obtained from LAGOS delineation (Smith et al. 2021). The majority of land use was cultivated crops indicated by the brown coloring.

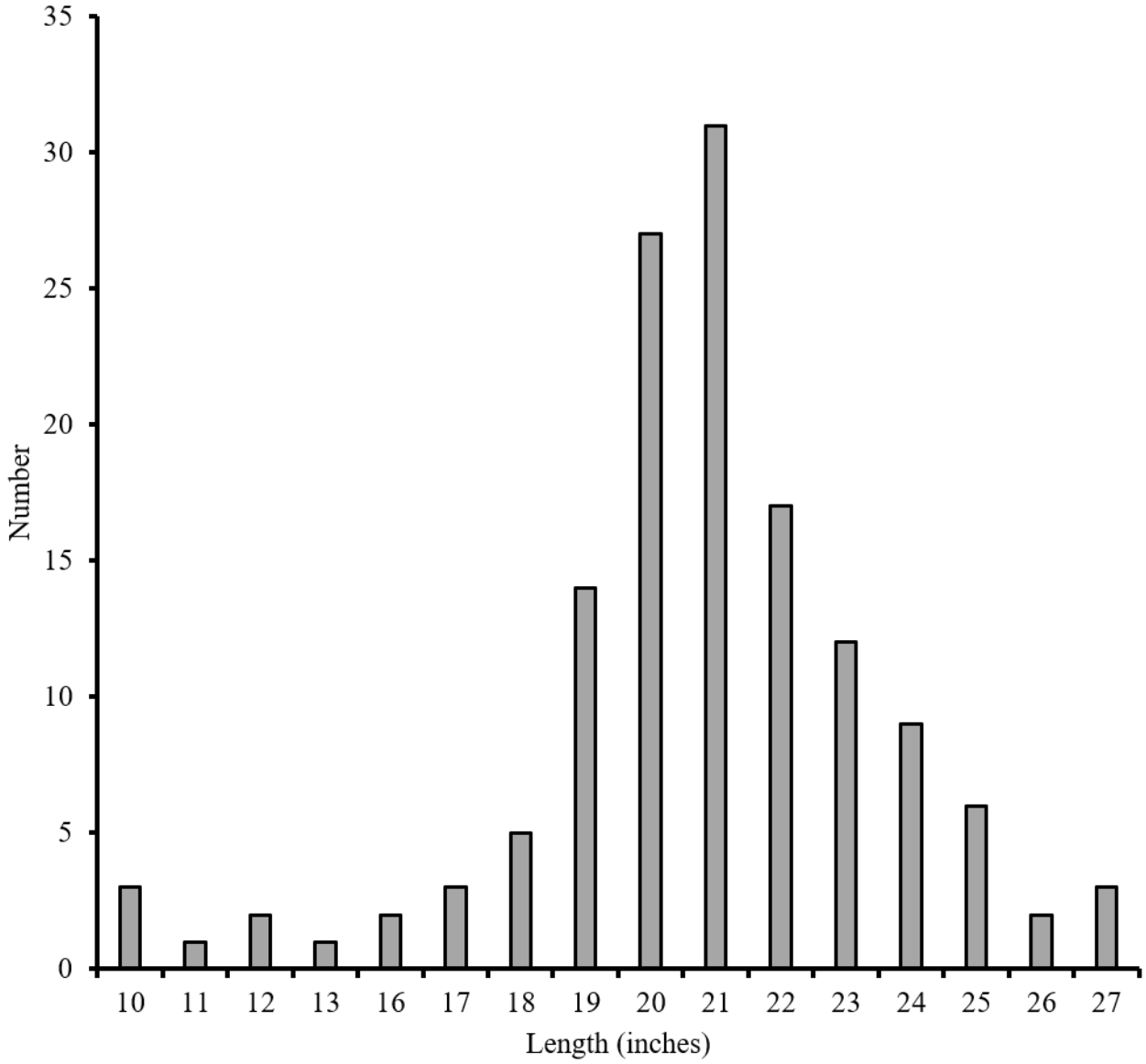

Figure 4. Length frequency distribution of Channel Catfish captured in the 2024 fish survey on Long Lake.

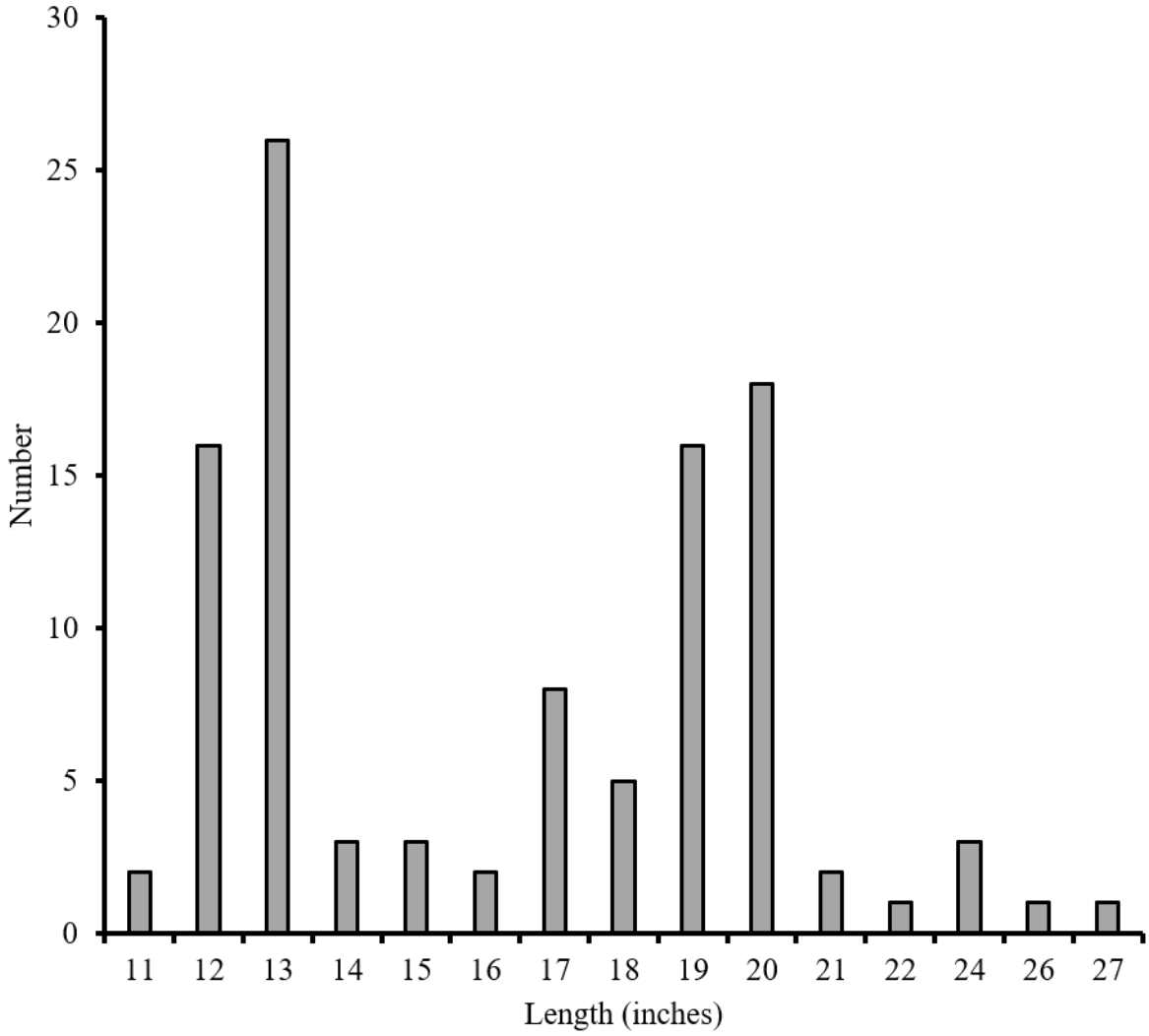

Figure 5. Length frequency distribution of Walleye captured in the 2024 fish survey on Long Lake.

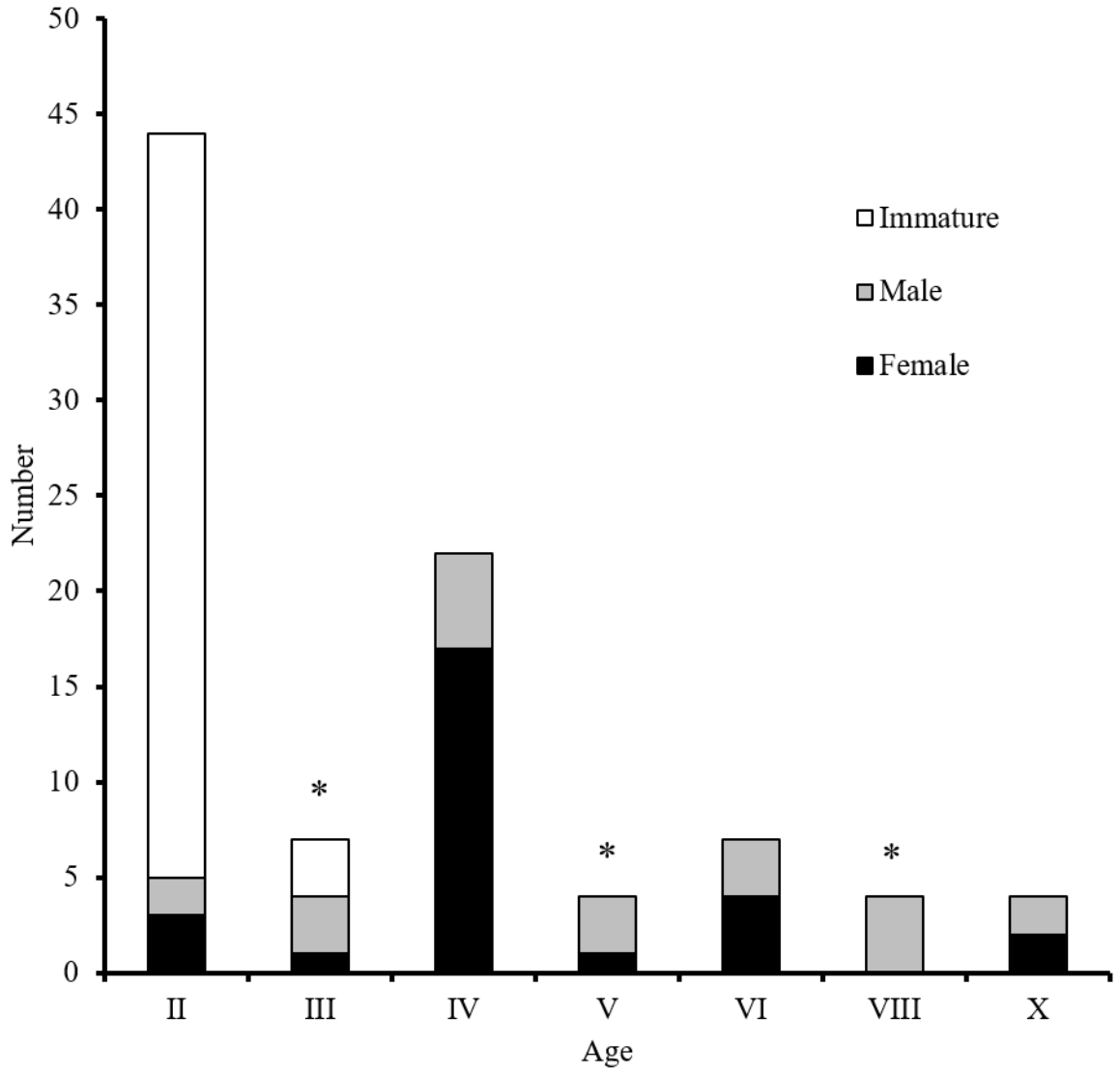

Figure 6. Number of Walleye in each age class. The asterisk indicates year classes that were not stocked in Long Lake.

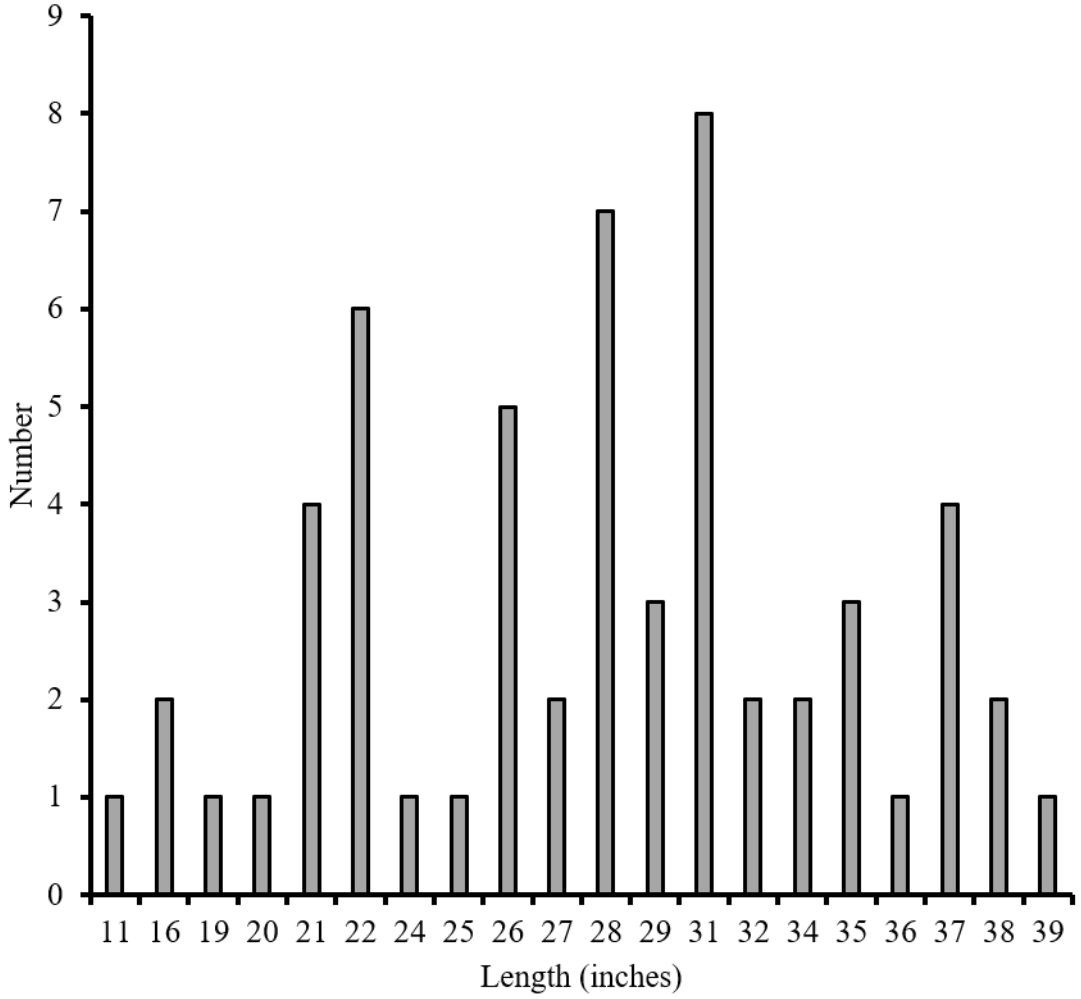

Figure 7. Length frequency distribution of Northern Pike captured in the 2024 fish survey on Long Lake.

Literature Path

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