Palmer Lake

Saint Joseph County; T6S. R9W, Sec 13, 14, 23, and 24
Saint Joseph River Watershed, Last Surveyed March 7-23, 2024

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Environment

Palmer Lake, an impoundment of Swan Creek, is a 448-acre lake located in Saint Joseph County on the south side of the village of Colon (Figure 1). The original sawmill dam was built in 1832 which flooded two smaller lakes that now make up the two deepest holes of the lake (Figure 2). Palmer Lake is connected to Long 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 to Palmer Lake. Little Swan Creek flows into the channel between the lakes. Two smaller tributaries empty into Palmer Lake from the east. Swan Creek flows out of the northwest end of Palmer Lake and intersects with the Saint Joseph River 1.3 miles downstream. 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. Drop-offs generally are gradual and 63% of the lake (by surface area) is less than 10 ft deep. Organic substrates predominate near the channel and at the southeastern end of the lake. Sand and marl substrates are common along the remainder of the shoreline. There is a Michigan Department of Natural Resources (DNR) boating access site on the southeast end of Palmer Lake off Karlston Road that provides public access. The access site has a hard surface ramp and a gravel lot that can accommodate parking for five vehicles with trailers.

The watershed of Palmer Lake is large as it is an impoundment on Swan Creek. The Palmer Lake watershed was mapped 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%). Palmer 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. Many wetlands within the watershed have been drained, but some wetland complexes remain along the channel between Palmer and Long lakes. Residential and vacation homes surround nearly the entire shoreline of Palmer Lake. The 2011 habitat survey revealed a total dwelling density of 53.6 dwellings/mile (33.3 dwellings/km). Approximately 81% of the shoreline is armored with seawalls or riprap, which is one of the highest percentages recorded for lakes in southwest Michigan. Large woody structure is scarce. Since the fall of 2002, persistent algal blooms (primarily of the genera Fragilaria and Euglena) have reduced water clarity in Palmer and Long lakes (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 Palmer Lake was summarized in the last Status of the Fishery Resource Report (Gunderman 2012). Early management included periodic stocking of Bluegill, Largemouth Bass, Smallmouth Bass, and Yellow Perch from 1933 to 1945 (Table 1). The stocking of warmwater fish in lakes was discontinued in Michigan after research documented that stocking was not required to maintain fisheries (Cooper 1948).

The first comprehensive fish survey was an electrofishing survey conducted in October of 1981. There was high catch of Bluegill (n = 845) but it was dominated by small fish with 89% of Bluegill being 5 inches or smaller. Growth of Bluegill was below average with a growth index score of -1.0. Bluegill growth was considered average if the index was greater than -0.5 and less than +0.5. For Walleye and Northern Pike, growth index scores between +1 and -1 are considered similar to the state average while scores less than -1 and greater than +1 are considered below or above the state average, respectively. Largemouth Bass up to 19 inches were caught but only six fish 14 inches or greater were captured. Growth was slightly below average but still acceptable with a growth index score of -0.5. A single Northern Pike was caught that was 17 inches. Pumpkinseed, Yellow Perch, and Black Crappie were also captured in low numbers.

The next fisheries survey was an electrofishing, gill net, and trap net survey conducted in September of 1992. Bluegill was again the dominant species with 1,014 being caught making up 52% of the total catch in the survey. Bluegill ranged from 1-7 inches and 22% were over 6 inches. Growth was below average but acceptable with an index score of -0.5. A total of 20 Northern Pike were captured ranging from 21 to 33 inches with good growth (index score = +3.5). Black Crappie, Yellow Perch, Pumpkinseed, and Largemouth Bass populations exhibited poor size structures. The report notes excessive vegetation growth in Palmer Lake potentially impacting the fishery.

Local anglers expressed strong interest in establishing a Walleye fishery in Palmer Lake. Beginning in 1993, the DNR partnered with the Colon Area Anglers Association (CAAA) to rear Walleye. The DNR stocked Walleye fry into rearing ponds and CAAA managed these ponds and harvested spring fingerling Walleye for stocking in Palmer Lake and other local water bodies. Spring fingerling Walleye were stocked in Palmer Lake several times during 1993-2006 (Table 1). The DNR's statewide Walleye stocking program was interrupted in 2007 due to the discovery of viral hemorrhagic septicemia virus in the Great Lakes. This situation interrupted Walleye pond operation and Walleye stocking in Palmer Lake. In addition to Walleye, Channel Catfish were stocked by the DNR in 1992. Redear Sunfish were also stocked in Long Lake by the CAAA from 1999 through 2002 and some Channel Catfish migrated downstream into Palmer Lake.

There is a long history of vegetation management through chemical treatments on Palmer Lake. Vegetation communities were reported as problematic in the 1990s. Weeds choked much of the channel between Long and Palmer Lakes and reports indicate the lake was heavily vegetated. Eurasian Watermilfoil had become established in many areas. DNR assessments determined that weed 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 indicate large-scale proposed treatments targeting all vegetation along residential shorelines (122 acres), invasive treatments out to the 10-foot contour (234 acres), and lily pad treatments in the channel (2.3 acres). Actual treatment areas were smaller than the permitted treatment areas and reduced with time as nuisance vegetation became less of an issue. Treatments began to focus more directly on the channel and problem milfoil areas and select private property riparian areas.

During the late 1990s to early 2000s, Palmer Lake experienced a shift in stable states from a vegetation dominated lake to an algal dominated system. Vegetation density had increased due to the availability of nutrients in the system. Once vegetation was removed through treatments, the nutrients that the plants had been sequestering became available for algae. Palmer Lake experienced declines in water clarity and increased algal production. Algal blooms have become a common occurrence, and some copper-based herbicides were applied to temporarily reduce algal abundance. The current vegetation management program for Palmer Lake is focused on controlling invasive species (i.e., Eurasian Watermilfoil, Curlyleaf Pondweed, and Starry Stonewort), reducing phosphorus inputs to the lake through best management practices within the watershed, and application of lanthanum-based products to minimize internal phosphorus loading. Vegetated habitat is limited on the main lake but remains abundant in the channel between Long and Palmer lakes. Localized herbicide treatments are conducted in late summer to clear navigation paths through the lily pads on the west side of the channel. The decrease in aquatic vegetation in Palmer Lake resulted in limited fish habitat in the lake. Zebra mussels were also introduced to Palmer Lake around 2004. They became well established to nuisance levels resulting in a temporary increase in water clarity. A drawdown was conducted in the winter of 2010/2011 for infrastructure repair which reportedly decreased zebra mussel abundance and water quality following drawdown. The lake association conducted a habitat project on Palmer Lake in 2013. Fish cribs were constructed and placed throughout the lake in 10 feet of water above the thermocline to improve available fish cover at depth. This effort created places where anglers could target fish and improved fishing opportunities on Palmer Lake.

Gizzard Shad became established in Palmer and Long lakes at some point in the 1990s. It is possible they were introduced during the Channel Catfish stocking in 1992. Gizzard Shad are not native to inland lakes in southwest Michigan and can exacerbate water clarity issues. Gizzard Shad 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 Palmer Lake.

A fish survey of Palmer Lake conducted in May 2011 (Gunderman 2012) documented a similar fish community as past surveys. Bluegill were very abundant with average growth (mean growth index = +0.3). Bluegill experienced high mortality after age 5 resulting in few older fish present. As a result, 6- and 7-inch Bluegill were the most abundant, with very few 8-inch fish in the sample. Creel data were not available; however, the high mortality was suspected to be due to fishing harvest. The size scores for the Palmer Lake Bluegill population were improved from past surveys at 4.8 (satisfactory-good) based on the trap net and large-mesh fyke net samples and 3.4 (acceptable-satisfactory) based on the electrofishing sample (Schneider 1990). Redear Sunfish and Pumpkinseed were abundant and large, supplementing the Bluegill fishery. Black Crappie and Yellow Perch were reported in lower numbers, comprising minor components of the fish community. Twelve Channel Catfish were collected, indicating a low level of natural recruitment. No stocked Walleye were captured. Only three Northern Pike were caught that ranged from 23 to 33 inches. A total of 120 Gizzard Shad were captured, which made of 6.7% of the total biomass in the survey. Gizzard Shad had not taken over the

fish community but may have contributed to decreased water quality. State endangered Pugnose Shiners were also collected in the survey. The proposed management strategy was to increase predator load through Walleye and Channel Catfish stocking with the goal of controlling Gizzard Shad populations.

No survival of stocked Walleye was documented in the 2011 fish survey, corroborating angler reports that Walleye were not being caught. Past Walleye stocking had used spring fingerlings that are relatively small (1-2 inches) and vulnerable to a wide range of predators. After the 2011 survey, the management shifted to fall fingerling Walleye production. Fall fingerling Walleye are stocked in October-November at a larger size and are less vulnerable to predation. Fall fingerlings were expected to survive better than past spring fingerling Walleye plants in Palmer 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 (CLTB) purchasing 1 fish per acre. Fall fingerling Walleye stocking began in 2014 and continued in odd years through the present (Table 2). Channel Catfish stocking began in 2013. Channel Catfish were prescribed at a rate of 15 fish per acre (6,720 fish) biennially. Stocking has been conducted in odd years until present with some variation in density (Table 1).

Fall fingerling Walleye stocked by the DNR in Long Lake in 2018 were marked with a right pelvic (ventral) fin clip. Similarly, fall fingerling Walleye stocked by the DNR in Palmer Lake in 2019 were marked with a left pelvic fin clip. The purpose of these marks was two-fold. First, it provided known-age fish for subsequent calibration of fish aging methods. Second, it facilitated an evaluation of movement of stocked fish between the two lakes.

Current Status of the Fish Community

Methods

A fish survey was conducted on Palmer Lake during March 7-23, 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 12-20 and electrofishing efforts on March 7 and 23. The initial electrofishing effort was conducted on March 7, approximately two days after complete ice out when the water surface temperature was 48.5 degrees F. Only Walleye were collected. The entire lake shoreline was electrofished including much of the channel between Palmer and Long Lake for a total of 2.8 hours. Water temperatures cooled immediately after this effort, and trap net surveys began March 11, 2024, when the 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). Eight trap nets were set and checked daily over nine nights, and five nets were set over a tenth night (total effort = 77 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. Sex, maturity (mature/immature), and reproductive status (green, ripe, or spent) also were recorded for each Walleye (on first capture). Fish were allowed to mix for two days after trap netting was concluded on March 21, 2024. An electrofishing effort was conducted on March 23, 2024, beginning after dark (11:48 PM).

Electrofishing was conducted from the boating access site in a clockwise direction until the entire shoreline was sampled (total effort of 2.53 hours). Only Walleye and Northern Pike were collected during the electrofishing efforts.

Mark-recapture population estimates for Walleye were obtained via two different methods. The number of marked and unmarked fish collected each sampling day were used to calculate a multiple-census population estimate with the Schumacher-Eschmeyer method (Schumacher and Eschmeyer 1943; Ricker 1975). Another population estimate was conducted using the Chapman-Petersen method 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 Palmer 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 the index was greater than -0.5 and less than +0.5. For Walleye and Northern Pike, growth index scores between +1 and -1 are considered similar to the state average while scores less than -1 and greater than +1 are 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 a summary of CPUE data from lakes surveyed in the Status and Trends Program (STP) from 2001 through 2021 on a statewide and regional level for the Southern Lake Michigan Management Unit (SLMMU). The Northern Pike CPUE for Palmer Lake also was compared to CPUE data compiled by Godby et al. (2023) for early spring pike surveys.

Results

A total of 1,233 fish weighing 1,853 pounds were captured in the 2024 survey on Palmer Lake (Table 3). Twenty species were represented in the catch. Walleye was the most abundant species with a total of 383 captures (317 individual fish, 66 recaptures). Walleye averaged 16.1 inches and ranged from 4 to 26 inches. Fish 15 to 20 inches were the most abundant, making up 70% of the total catch (Figure 4). Walleye from age classes 1 through 10 (except age 8) were caught (Figure 5). Age 1 fish were immature. A mix of age-2 and 3 fish were mature with age-3 fish being primarily spawning males. All fish over age-4 were mature. The female to male ratio was 1:2 with males being more abundant especially at age 3 where 74% of ripe fish were male. Older age classes were more evenly split (66% male). Walleye in Palmer Lake were larger than the statewide average for ages 2 through 6 resulting in a growth index of +1.4 indicating above average growth (Table 4). Female Walleye average length was larger than males in each age class., Two fish had right pelvic fin clips identifying them as survivors of the 2018 DNR stocking event in Long Lake. The CPUE of Walleye in trap nets was 3.2 fish per net night. This catch rate is well above the 75th percentile for SLMMU (1.7 fish per net night) and statewide trap net surveys (2.1 fish per net night) but is below the mean of 11.8 fish per net night for large lake fisheries with naturally reproducing Walleye populations surveyed in Michigan from 2001-2010 (Hanchin 2017). The Schumacher-Eschmeyer method yielded a Walleye population estimate of 868.3 fish (1.94 fish per acre) with a 95% confidence interval ranging from 689 to 1,117 fish. Population estimates using the Chapman-Petersen method resulted in a higher density of 2.74 fish per acre. The estimated population was 1,227 fish with a 95% confidence interval of 916 to 1,697 fish.

A total of 53 Northern Pike were captured in the 2024 survey on Palmer Lake. Northern Pike ranged from 19 to 37 inches and 2 to 8 years old. Sixty percent of the pike met or exceeded the 24-inch minimum size limit (Figure 6). The mean growth index was +4.2, indicating growth was well above the statewide average. This estimate was based on age 5 and 6 Northern Pike as too few were captured in other age classes to be included in the growth index calculation. The presence of several Northern Pike age classes suggests consistent natural recruitment. The CPUE in trap nets was 0.7 fish per acre which is below the median and 25th percentile for SLMMU (both 1.0 fish per net night) and below the 25th percentile for statewide surveys (1.0 fish per net night). 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 just below the 25th percentile of 0.83 fish per net night for surveys conducted statewide (Godby et al. 2023). Although all Northern Pike were "marked" with a dorsal fin clip, the number of recaptures was insufficient to generate mark-recapture population estimates for this species.

Channel Catfish were abundant in Palmer Lake. A total of 265 Channel Catfish were captured ranging from 9 to 29 inches (Figure 7). The average length was 18.7 inches and fish from 18-21 inches were most common and made up 49% of the sample. Age structures were not collected from Channel Catfish, so it was not possible to directly evaluate growth and stocking success by year class. However, fish of all sizes were captured, suggesting good survival from multiple year classes.

A total of 267 Bluegill were collected ranging from 4 to 8 inches. Bluegill averaged 6.6 inches in length and most fish captured were over 6" (87%) and many were greater than 7 inches (25%). Only three Bluegill over 8 inches were caught. The mean growth index was +0.5 which is the upper boundary of the average range. The Schneider size structure index score was 5 (good). Bluegill catch rates in trap nets were 26.7 fish per net night which is below the 25th percentile for SLMMU (30.8 fish per net night) and just above the median for statewide surveys (21.3 fish per net night). Other sunfish were captured in lower numbers including Hybrid Sunfish (n=2), Pumpkinseed (n=16), Redear Sunfish (n=5), and Rock Bass (n=1).

Black Crappie were captured in good numbers (n = 102) and ranged from 6 to 15 inches in length. The length frequency was normally distributed around the peak at 10 inches (Figure 8). Black Crappie CPUE in trap nets was 10.2 fish per net night. This catch rate is above the median for SLMMU (8.0 fish per net night) and above the 75th percentile for statewide surveys (9.9 fish per net night).

Yellow Perch were present in the 2024 Palmer Lake fish survey, but not in high numbers (n = 27 fish). The fish captured were in the preferred harvest size ranging from 8 to 12 inches. Catch rates were 1.4 fish per net night which is near the median for SLMMU (1.0 fish per net night) and statewide surveys (1.0 fish per net night).

A total of 59 Largemouth Bass were caught in the 2024 survey on Palmer Lake. These fish averaged 14.4 inches and ranged from 10 to 18 inches. A majority (59%) of the Largemouth Bass captured were 14 inches or greater and legal to harvest. Catch rate in trap nets was 5.9 fish per net night which is above the 75th percentile for SLMMU (5.4 fish per net night) and statewide surveys (5.3 fish per net night). Two Smallmouth Bass were also captured that were both 15 inches in length.

Predators (Bowfin, Largemouth Bass, Northern Pike, Smallmouth Bass, and Walleye) made up 35% of the biomass collected (adjusted by CPUE). This percentage is within the range of 20-50% recommended by Schneider (2000a). Prey species were not efficiently surveyed and were captured in low numbers including Gizzard Shad (n=3), Golden Redhorse (n=4), Golden Shiner (n=2), and White Sucker (n=16). One Bowfin was collected that was 23 inches in length. Common Carp were caught in low numbers (n=8) but were large (21-33 inches). Brown Bullhead (n=3) and Yellow Bullhead (n=14) were also captured and contributed to the fishery of Palmer Lake.

Analysis and Discussion

Predators made up 35% of the biomass collected in the 2024 survey. This value is likely higher than the actual proportion of predators in Palmer Lake for several reasons. The spring timing of the survey was utilized to target Walleye and Northern Pike while they were inshore spawning and many other fish were still predominantly occupying offshore areas. As a result, Bluegill, Gizzard Shad, and other prey species were not well represented in the catch. Large-mesh trap nets were used in the survey which do not catch smaller-bodied fish such as minnows and younger year classes of sunfish. Growth rates of all predators were above average, indicating that prey are available and support good growth. These factors combined indicate that predators are not overly abundant in Palmer Lake.

Stocking of fall fingerling Walleye has created an excellent inland fishery in Palmer Lake. The mark-recapture population estimates from the 2024 survey were similar to the target of 2 fish per acre outlined in the Walleye Management Plan (Herbst et. al 2021). Palmer Lake anglers consistently report some of the highest catch rates for inland lakes in southwest Michigan. Walleye in the 15- to 20-inch size classes were the most abundant in Palmer Lake and represent size classes preferred for harvest by anglers. Fish from each stocked year class were captured, indicating good survival from all stocking events. Walleye from year classes that were not stocked in Palmer Lake (2022, 2020, and 2018) were also represented in the catch. These fish were likely Walleye stocked in Long Lake that migrated to Palmer Lake, as evidenced by the capture of two fin-clipped fish from the 2018 Long Lake stocking event. There were also two fin-clipped fish from the 2019 Palmer Lake stocking that were recaptured during a concurrent fish survey in Long Lake in 2024. These captures confirm that Walleye move between the two systems. However, less than 15% of the fish caught in each lake were from years in which no stocking occurred in that lake, so it appears that the populations do not fully mix and movement between lakes is more of the exception rather than the rule.

There are several reasons for the success of the Walleye stocking program. Palmer Lake is classified as a class-2 lake in the DNR Walleye management plan which indicates that it is among the few lakes in Southern Michigan most suitable for Walleye stocking. This classification is primarily due to the size of Palmer Lake which supports enough fish to sustain high levels of angling pressure. Palmer Lake has also been stocked at a rate of five fish per acre which is above the standard rate of four fish per acre utilized by the SLMMU. The higher rate was initiated because of the presence of Gizzard Shad and the objective of controlling this nuisance species through increased predation. The high stocking rate has been successful at producing a population near the target of two adult Walleye per acre. This population density has been maintained despite high harvest rates reported by local anglers. As previously noted, growth of Walleye in Palmer Lake is above the statewide average indicating the stocking program has not raised the predator-prey ratio to a level that is not sustainable.

Gizzard Shad were not abundant in the 2024 fish survey on Palmer Lake, with only three large adult Gizzard Shad captured. Walleye stocking has likely suppressed the Gizzard Shad population, but they are present in higher abundance than observed in this survey. The large-mesh trap net gear utilized in this survey would not capture smaller-bodied fish such as younger Gizzard Shad. In addition, Gizzard Shad are generally found offshore in the spring and the trap nets 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 Palmer 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 Daphnia species was low after Gizzard Shad introduction on Palmer Lake (Jude 2017; Jude 2016); however the densities of Gizzard Shad in Palmer 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 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 from becoming overabundant.

Channel Catfish stocking has been very successful. There is a well-established population with an abundance of fish that are preferred size for harvest. The DNR field staff encountered several anglers targeting Channel Catfish during the 2024 survey. Inland lakes with good Channel Catfish populations are uncommon in Michigan, and Palmer Lake is providing a unique experience to target these fish. Channel Catfish over 20 inches were abundant with fish up to 29 inches being captured in the survey.

The Northern Pike population of Palmer Lake is low density but extremely fast-growing. As a result there are acceptable numbers of large fish present with most of the population being above the 24-inch 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 Palmer Lake are ideal for Northern Pike with Gizzard Shad, Yellow Perch, White Sucker, and Golden Redhorse present.

Panfish populations have improved in Palmer Lake over the past 30 years. Past surveys indicated high density and poor growing Bluegill populations. The 2024 survey documented an increase in the proportion of 7-inch fish in the population. The size structure is still not producing quality fish, but good numbers of catchable-sized fish are present and the size structure has improved. Schneider index scores for trap net and large-mesh fyke net samples improved from very poor and poor in 1992, to satisfactory in 2011 to good in 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 changes in size structure as they prey on small Bluegill and keep populations from becoming overabundant (Schneider and Lockwood 2002). The Bluegill catch rate was lower in 2024 than in past reported surveys which were all described as high density including the 2011 survey that was reported as the third highest large-mesh fyke net catch rate of Status and Trend lakes surveyed from 2002-2007 (CPUE of 181.3 fish per net night). Fewer Pumpkinseed and Redear Sunfish were captured in the 2024 survey than in past surveys. The data could indicate that they are not contributing as significantly to the fishery in 2024. However, early seasons trap netting may also underestimate the abundances of Bluegill and other sunfish species as they do not fully recruit to the gear until May/June when they are inshore spawning.

Black Crappie and Yellow Perch had been reported as small components of the fish community in past surveys. This continues to be the case for Yellow Perch in 2024 with only 27 captured. The Yellow Perch that were captured were of harvestable size and ranged from 8-12 inches. Thus, the population provides some potential for harvest and includes larger fish that were not reported in the past. Black Crappie were well represented in the 2024 survey with larger fish present up to 15 inches. The Black Crappie fishery appears better than reported in past surveys. The population is centered around 10 inches which is likely the result of 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. The Black Crappie population may

fluctuate in Palmer Lake but at the time of the survey there were abundant fish of preferred sizes present. The timing of this survey may have targeted Black Crappie better than past surveys as crappie tend to move offshore as water temperatures rise in late spring and become less vulnerable to trap nets and fyke nets. The Black Crappie fishery should provide an additional opportunity that was not reported in past surveys.

Largemouth Bass populations typically are assessed in late spring using electrofishing gear. Thus, the timing and methods utilized during the 2024 survey were not ideal for evaluating the status of the bass fishery in Palmer Lake. However, the trap net CPUE and length-frequency distribution of the sample suggest the lake supports a strong Largemouth Bass population. Smallmouth Bass are also present in Palmer Lake and contribute to the fishery. Eight bass tournaments were reported to the DNR Fishing Tournament Information System for Palmer Lake in 2024. The boating access site limits the size and number of tournaments on the lake. Palmer Lake is tied for 100th in the ranking of lakes based on the number of tournaments on Michigan inland lakes. This level of tournament activity is low and unlikely to generate significant conflict between users on Palmer Lake.

Pugnose Shiners were not collected in the 2024 survey. The capture of this species was not expected based on the gear types utilized. Pugnose Shiners likely are still present in Palmer Lake and were observed in the 2011 survey. The Pugnose Shiner is listed as an endangered species in Michigan and relies on thick vegetation for spawning and foraging habitat. This type of habitat has declined in Palmer Lake over the past 30 years, but there are still locations with suitable habitat, especially in the shallow channel between Long and Palmer Lakes. Because Pugnose Shiners are present, there are several protections in place on Palmer Lake. Vegetation treatment is prohibited within 6 feet of the shoreline during June and July (i.e., Pugnose Shiner spawning season). Offshore treatment or treatment along undeveloped shorelines is restricted in refuge habitat for the Pugnose Shiner consisting of dense stands of native vegetation. The use of Hydrothol for plant control is prohibited year-round, and copper-based herbicides cannot be used during June-July. Annual vegetation surveys are required to monitor the status of the plant community and to verify that vegetation management activities are not adversely affecting Pugnose Shiner habitat. Weed harvesting or cutting generally does not require a permit. However, this activity can directly cause mortality of Pugnose Shiners and can only be conducted in lakes where this species is present if authorized by a Threatened and Endangered Species Permit from the DNR. No such permit has been issued for Palmer 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 Palmer Lake. The DNR will continue to stock Walleye in Palmer Lake at a rate of 4 fish per acre. The DNR also 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 2 fish per acre. Public Water Stocking Permits will be required for the supplemental stocking. Walleye stocking will be one of the main tools utilized to control the Gizzard Shad population. Walleye stocking should also continue to improve Bluegill size structure through predation on small Bluegill, preventing overcrowding and stunted growth.

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

Habitat and water quality protection must continue in Palmer Lake, with habitat protection for Pugnose Shiner being a priority. These fish require dense stands of vegetation to persist and are intolerant of turbidity. Wetlands are also limited in Palmer 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 persists. 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 in Palmer Lake. The DNR will work with the lake association to understand the need for aquatic vegetated habitat and strike a balance between invasive vegetation control and promoting quality fish habitat.

References

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Tables and Figures

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

Year	Bluegill	Channel Catfish	Lake Trout	Lake Whitefish	Largemouth Bass	Smallmouth Bass	Yellow Perch
1877	-	-	-	25,000	-	-	-
1909	-	-	20,000	-	3,000	-	-
1910	-	-	20,000	-	-	-	-
1933	10,000	-	-	-	1,500	-	-
1934	15,000	-	-	-	1,000	-	-
1935	20,000	-	-	-	1,000	-	10,000
1936	23,000	-	-	-	500	-	-
1937	50,000	-	-	-	1,000	-	-
1938	80,000	-	-	-	1,500	-	15,000
1939	80,000	-	-	-	2,500	2,000	10,000
1940	61,000	-	-	-	3,000	2,000	-
1941	120,000	-	-	-	500	-	-
1942	20,000	-	-	-	500	-	-
1943	4,000	-	-	-	1,000	-	-
1944	20,000	-	-	-	3,000	-	-
1945	15,000	-	-	-	2,000	-	-
1992	-	2,000	-	-	-	-	-
2013	-	13,519	-	-	-	-	-
2015	-	6,840	-	-	-	-	-
2017	-	6,734	-	-	-	-	-
2019	-	5,558	-	-	-	-	-
2021	-	6,811	-	-	-	-	-
2023	-	4,767	-	-	-	-	-
2025	-	6,901	-	-	-	-	-
Total	518,000	53,130	40,000	25,000	22,000	4,000	35,000

Table 2. Walleye stocked in Palmer Lake by the DNR or through private stocking (*) under permit from the DNR.

Year	Number	Stage/Length (inches)
1897	600,000	Fry
1909	200,000	Fry
1910	250,000	Fry
1993	22,401	2.17
1994	3,900	1.77
1994	1,200	1.69
1994	2,400	3.82
1996	800	1.69
1996	9,860	2.44
1996	3,002	2.44
1996	7,272	2.01
1998	27,728	0.47
1999	22,378	1.54
2003	18,407	1.29
2003	7,960	1.29
2003	9,220	1.07
2003	9,220	1.07
2006	4,365	1.17
2006	18,158	1.17
2014	156	4.65
2015	1,932	5.47
2015	190	6.97
2017	1,980	5.62
2017	500*	7
2019	1,995	5.52
2019	520*	7
2021	1,232	5.57
2021	1,100*	7
2023	1,792	6.48
2023	450*	7
2025	2,955	5.28
2025	450*	7

Table 3. Fish caught across all sampling gears in the fish survey conducted on Palmer Lake in 2024. Only Walleye were collected during the March 7th electrofishing effort. 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 23 electrofishing effort. The Walleye and Northern Pike data includes recaptured fish.

Species	Number	Mean Length (inches)	Total Weight (lbs)	Range (inches)
Black Crappie	102	10.6	72.8	6 - 15
Bluegill	267	6.6	55.3	4 - 8
Bowfin	1	23.5	4.6	23 - 23
Brown Bullhead	3	12.5	2.7	11 - 13
Channel Catfish	265	18.7	594.7	9 - 29
Common Carp	8	25.5	64.2	21 - 33
Gizzard Shad	3	16.9	4.8	15 - 17
Golden Redhorse	4	18.0	8.2	15 - 18
Golden Shiner	2	7.0	0.2	6 - 7
Hybrid Sunfish	2	7.0	0.5	6 - 7
Largemouth Bass	59	14.4	95.0	10 - 18
Northern Pike	53	25.9	243.4	18 - 37
Pumpkinseed	16	6.7	4.1	5 - 7
Redear Sunfish	5	9.5	1.6	6 - 8
Rock Bass	1	7.5	0.7	9 - 9
Smallmouth Bass	2	15.5	3.8	15 - 15
Walleye	383	16.1	640.8	4 - 26
White Sucker	16	16.9	32.1	8 - 20
Yellow Bullhead	14	10.7	7.4	6 - 14
Yellow Perch	27	10.3	16.2	8 - 12
Grand Total	1,233	14.4	1,853.0	4 - 37

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

Species	Age	Number Aged	Mean Length (inches)	Statewide Mean Length (inches)	Stocking Year	Growth Index
Walleye	1	58	6.8	7.1	2023	1.4
Walleye	2	13	13.8	10.4	Not Stocked	-
Walleye	3	110	15.9	13.9	2021	-
Walleye	4	29	18.0	15.8	Not Stocked	-
Walleye	5	67	19.1	17.6	2019	-
Walleye	6	3	19.9	19.2	Not Stocked	-
Walleye	7	27	20.6	20.6	2017	-
Walleye	9	10	22.2	22.4	2015	-
Walleye	10	1	20.5	23.1	2014	-
Northern Pike	2	3	19.1	17.7	-	4.2
Northern Pike	3	2	22.7	20.8	-	-
Northern Pike	4	1	31.2	23.4	-	-
Northern Pike	5	6	25.7	25.5	-	-
Northern Pike	6	7	35.5	27.3	-	-
Northern Pike	7	2	27.4	29.3	-	-
Northern Pike	8	1	25.4	31.2	-	-
Bluegill	3	10	5.8	5	-	0.5
Bluegill	4	9	6.4	5.9	-	-
Bluegill	5	15	6.8	6.7	-	-
Bluegill	6	2	7.5	7.3	-	-

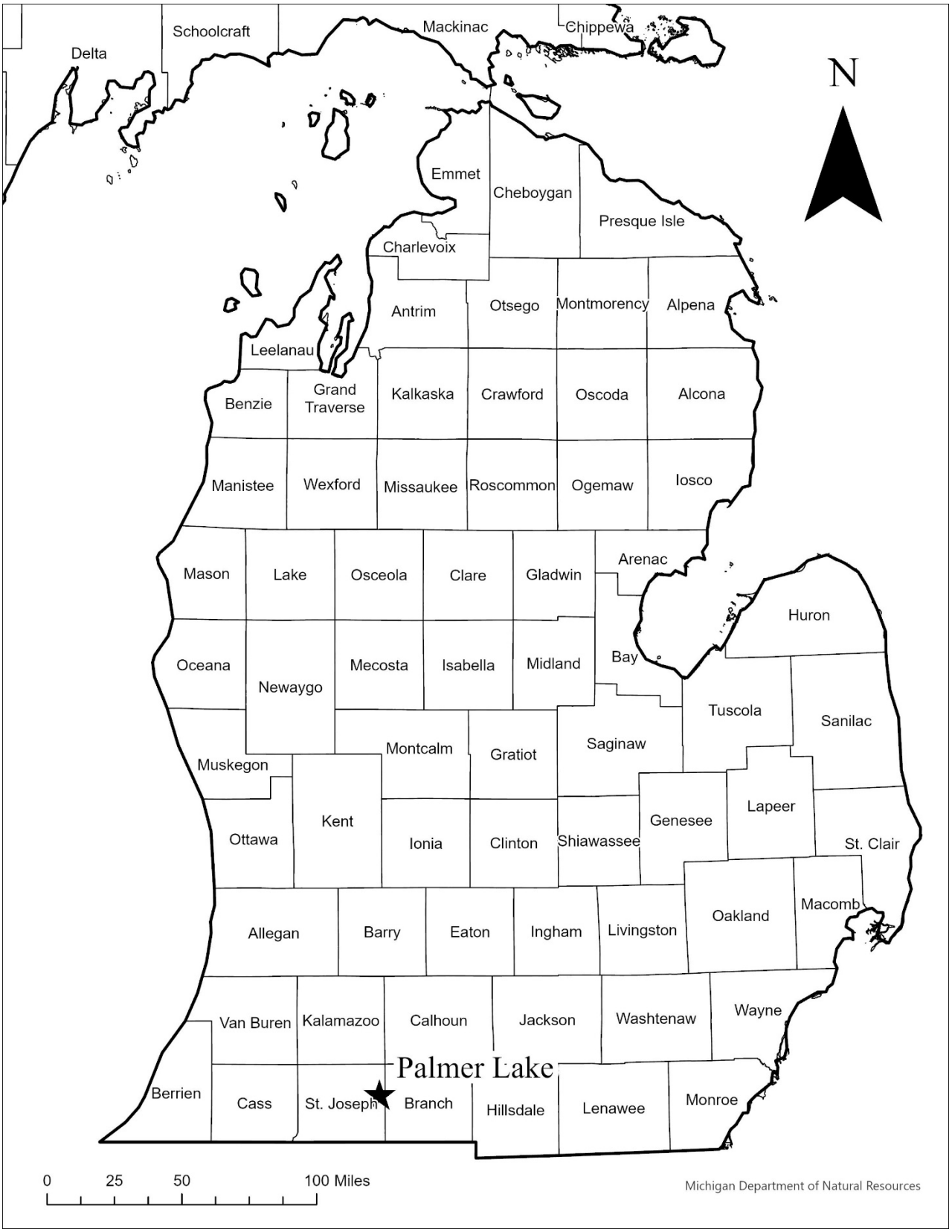

Figure 1. Map of the State of Michigan showing the location of Palmer Lake in Saint Joseph County.

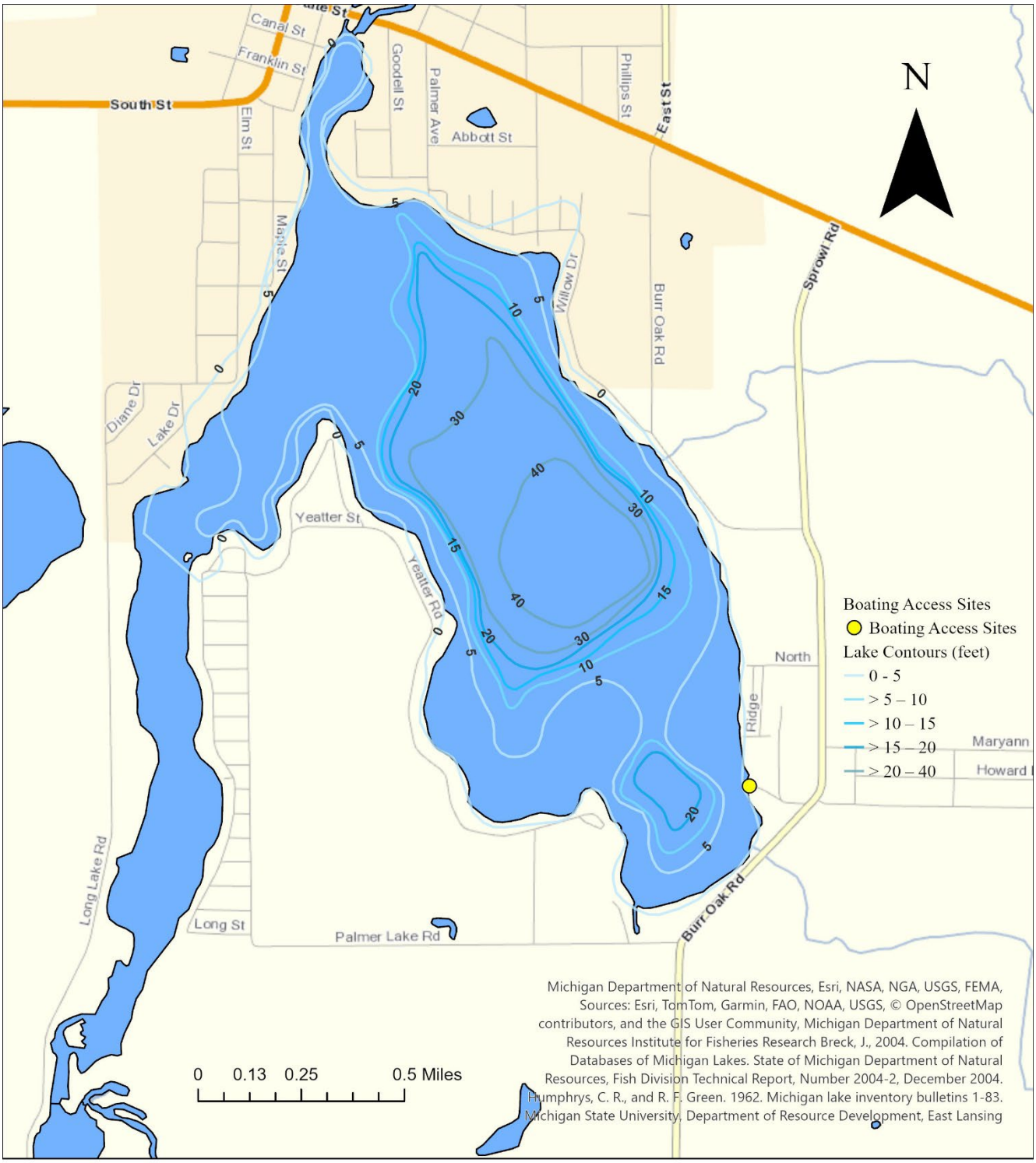

Figure 2. Depth contour map of Palmer Lake in Saint Joseph County.

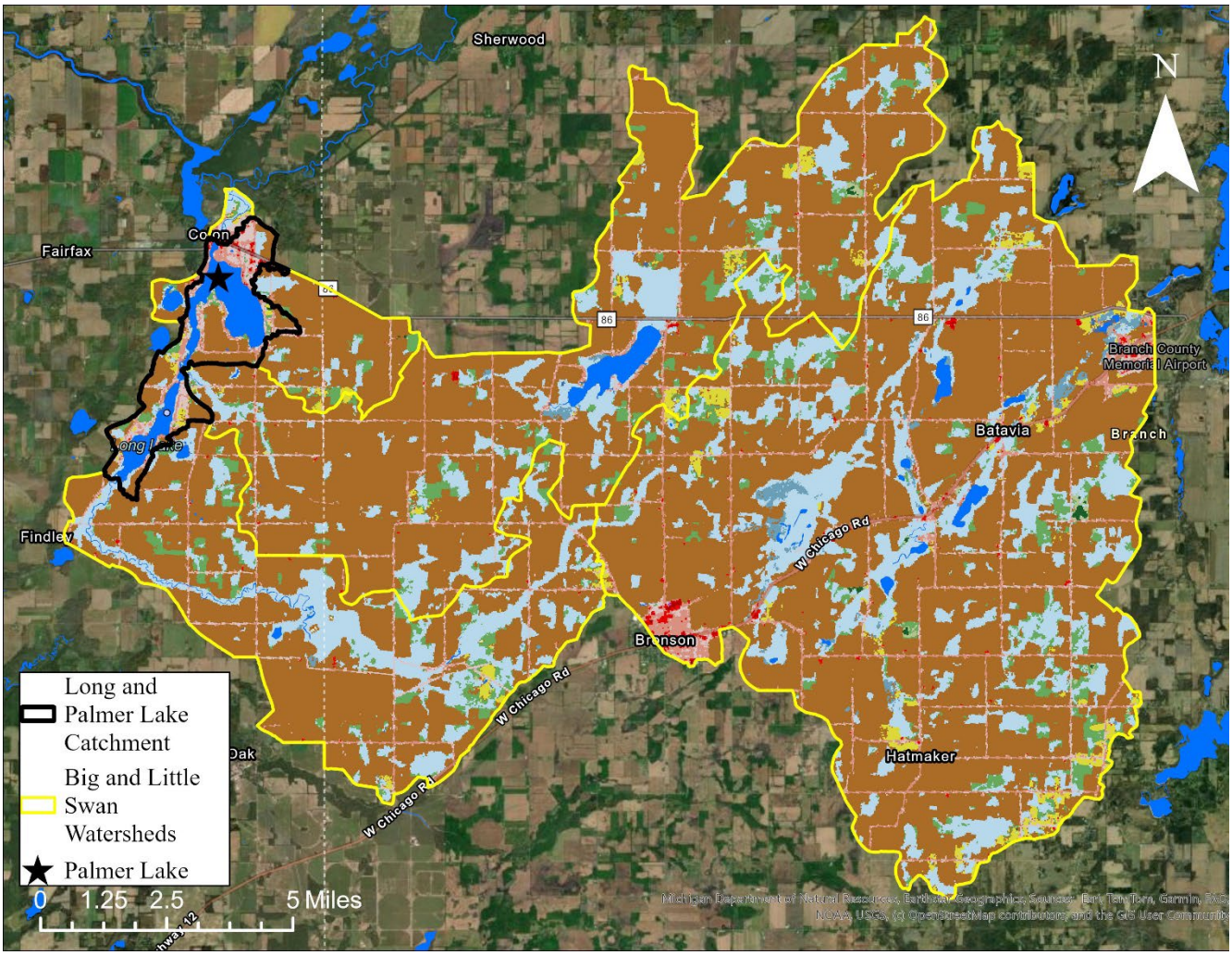

Figure 3. Land use in the Palmer Lake watershed. Land cover type for the Palmer Lake watershed was derived from the 2023 National Land Cover Database (USGS 2024). The black star indicates location of Palmer Lake. The Palmer Lake watershed was obtained from LAGOS delineation (Smith et al. 2021).

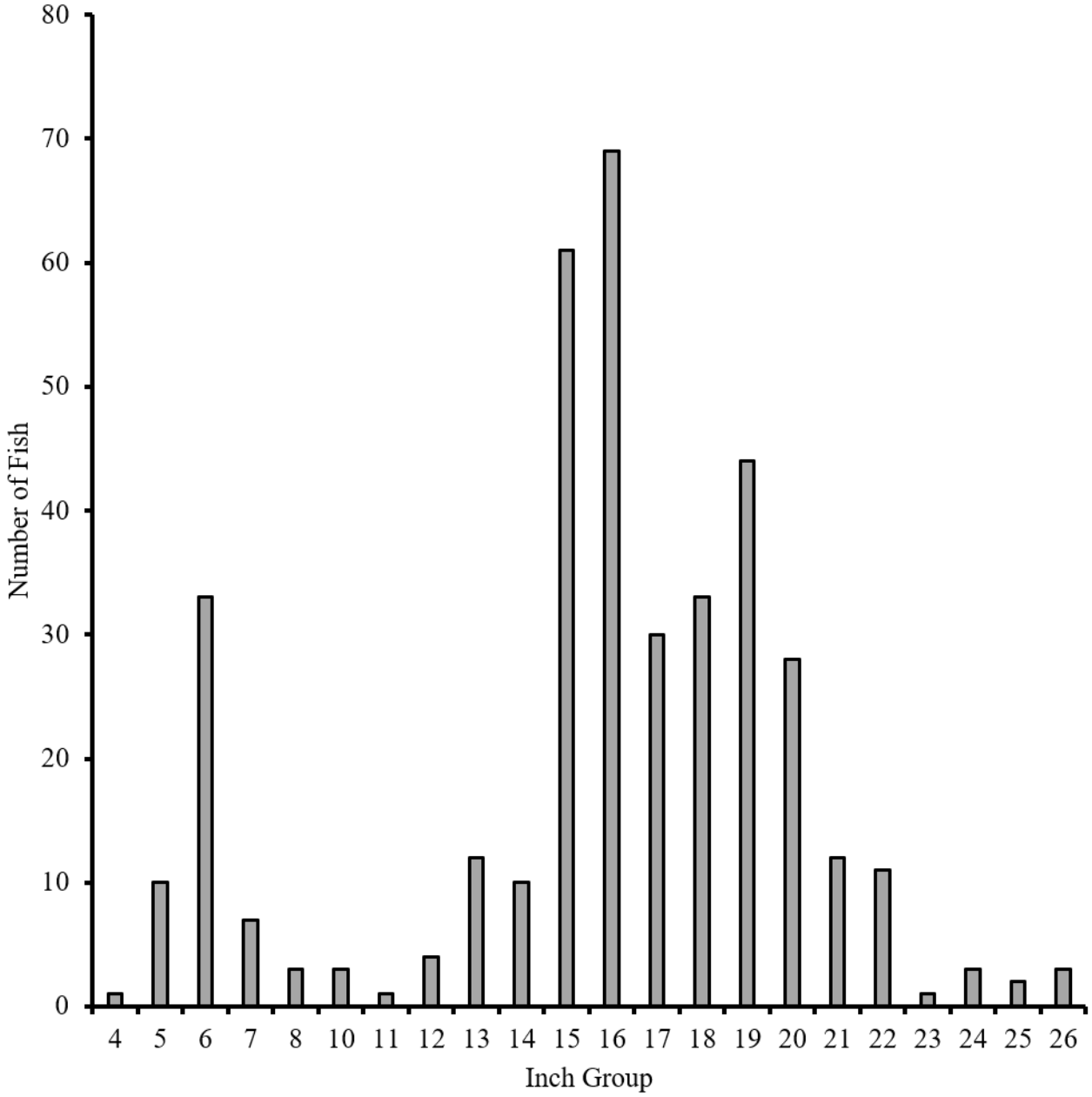

Figure 4. Length frequency distribution of Walleye captured in the 2024 fish survey on Palmer Lake.

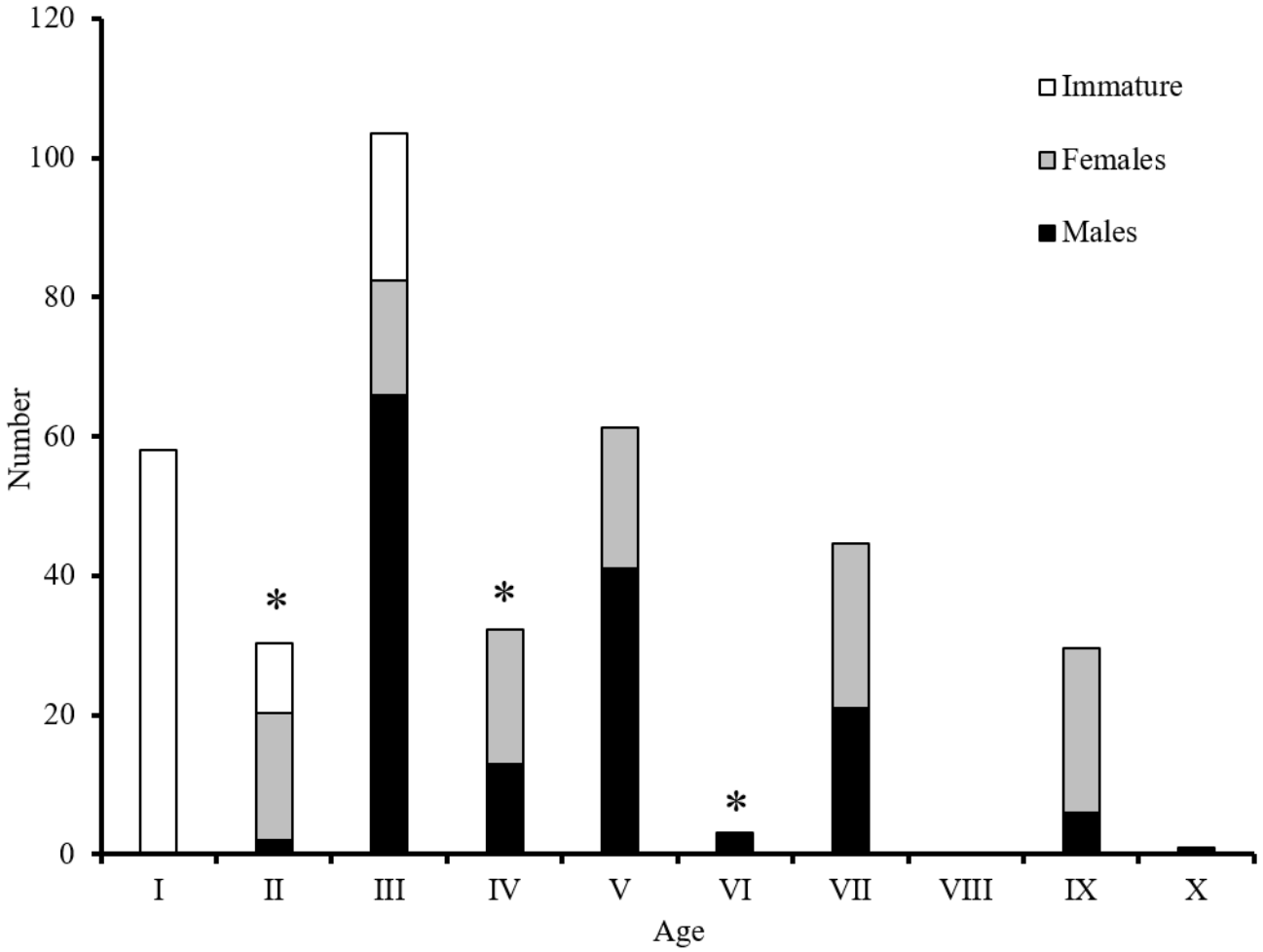

Figure 5. Number of Walleye in each age class. The asterisk indicates year classes that were not stocked in Palmer Lake.

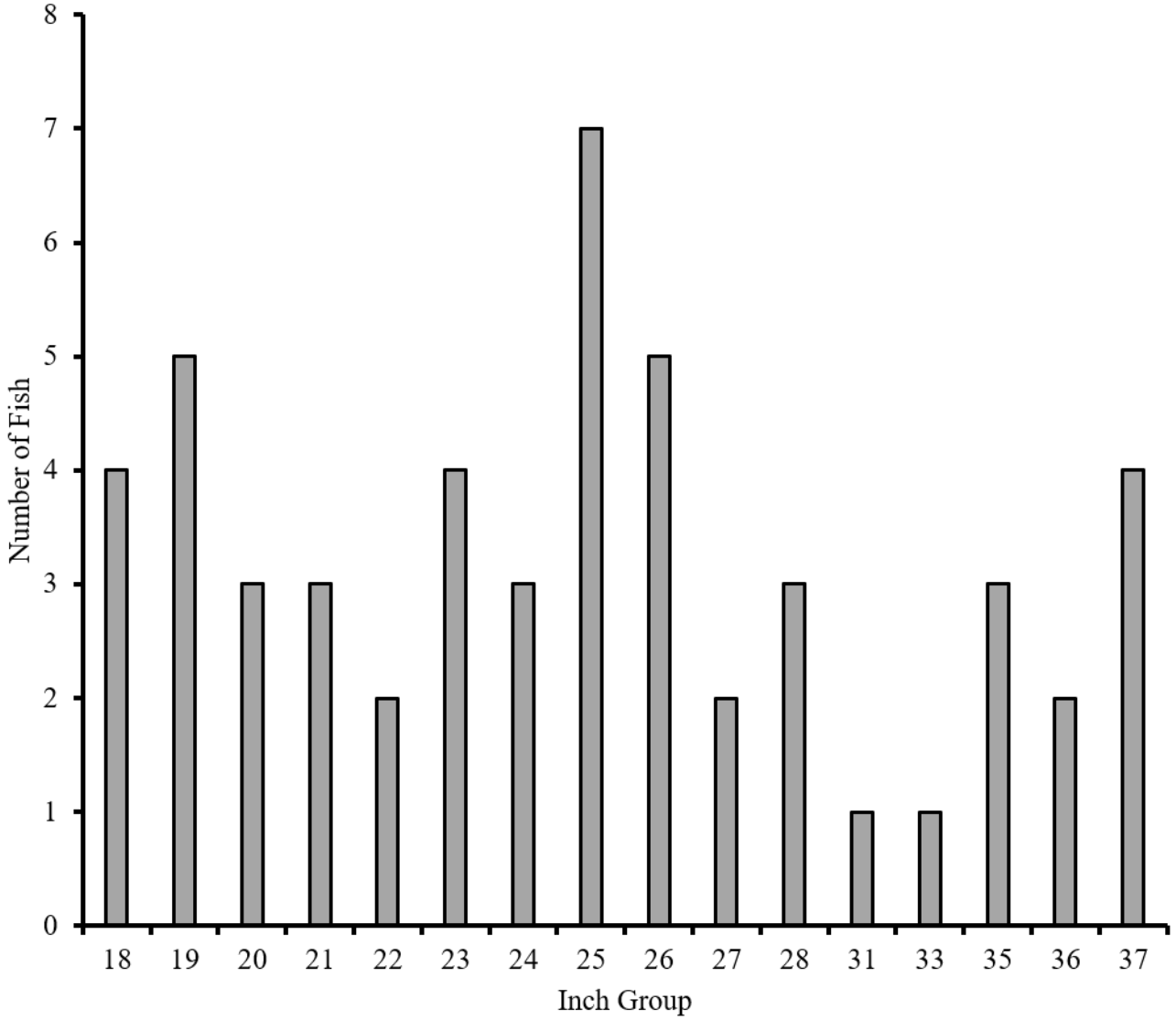

Figure 6. Length frequency distribution of Northern Pike captured in the 2024 fish survey on Palmer Lake.

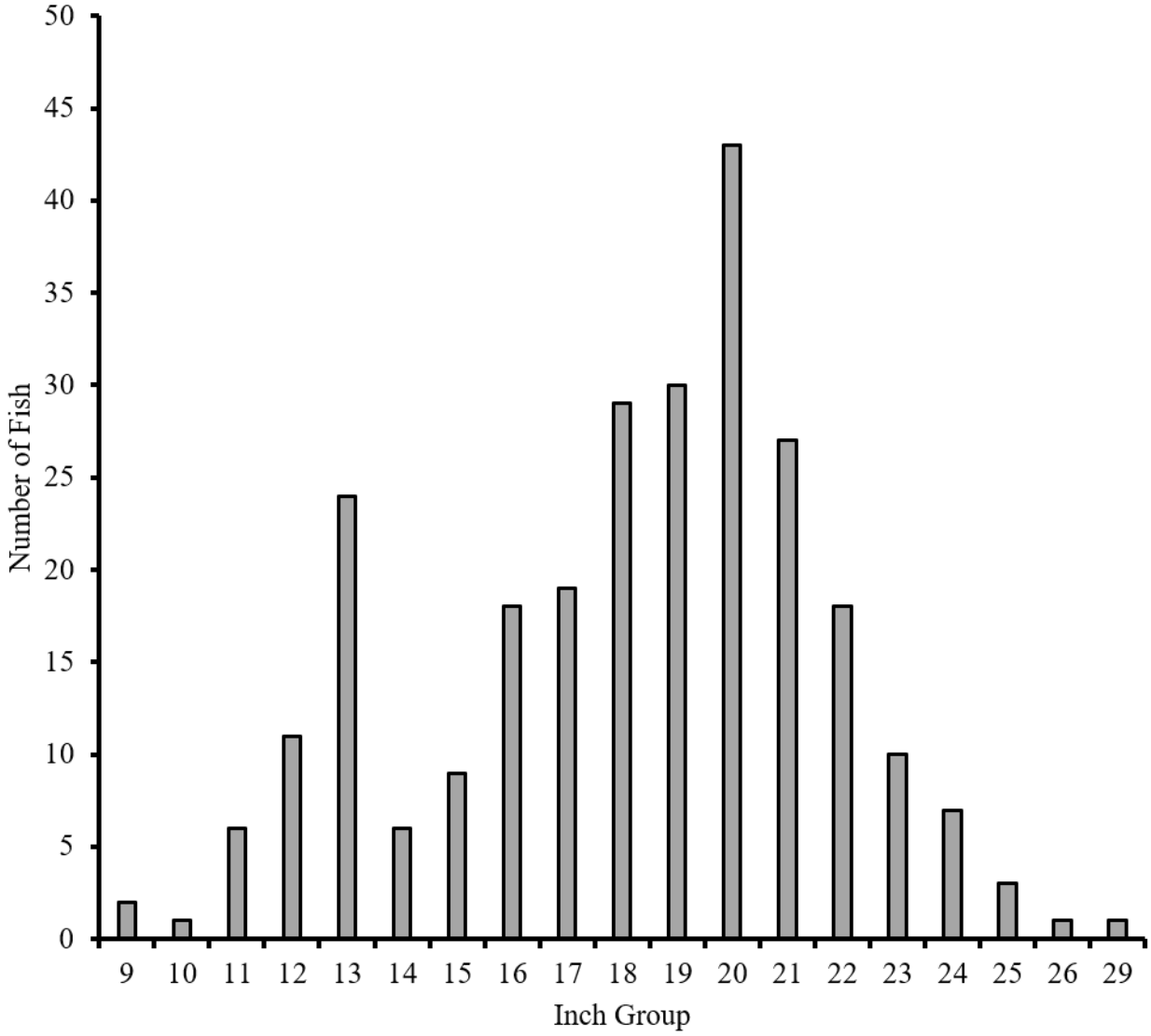

Figure 7. Length frequency distribution of Channel Catfish captured in the 2024 fish survey on Palmer Lake.

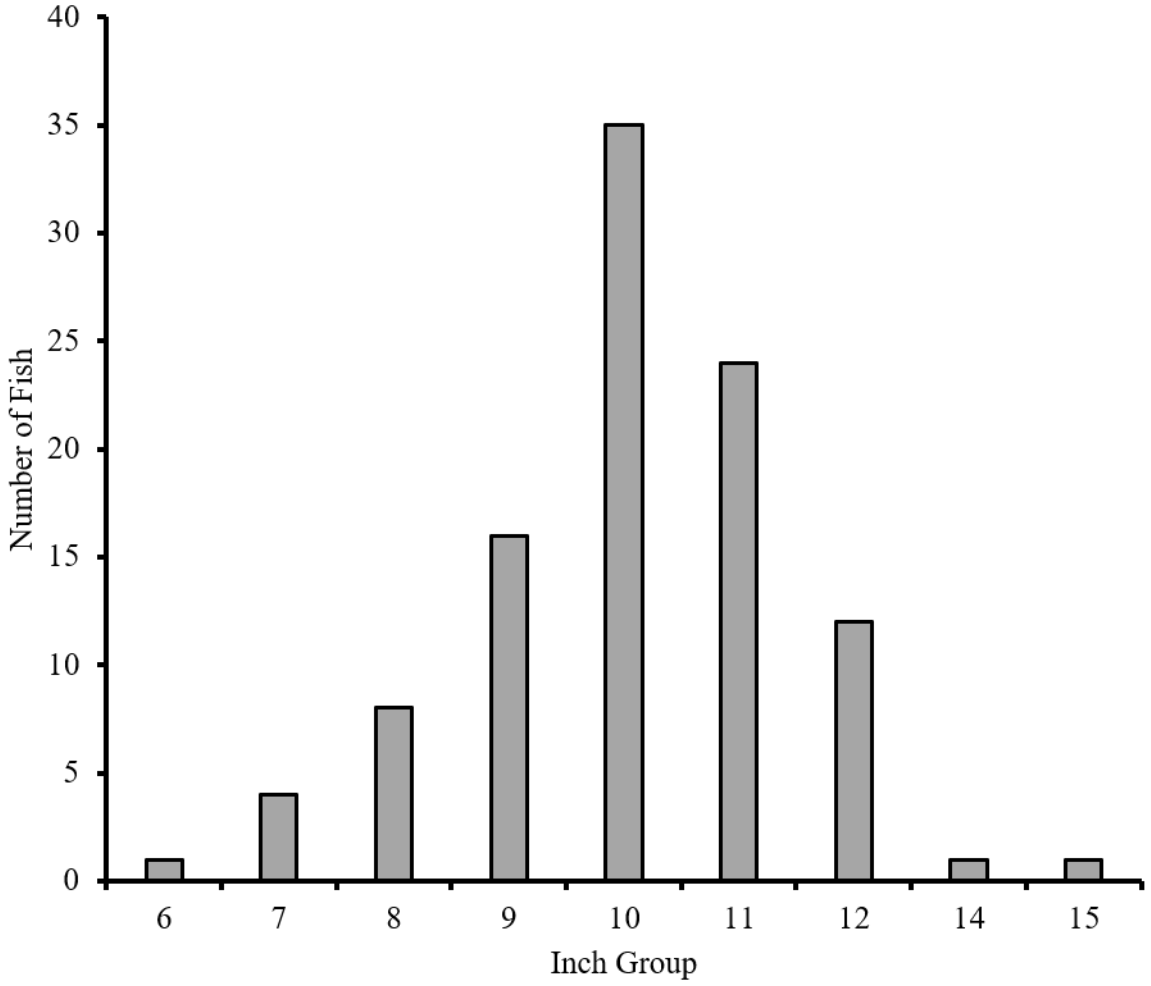

Figure 8. Length frequency distribution of Black Crappie captured in the 2024 fish survey on Palmer Lake.

Literature Path

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