Selkirk Lake
Allegan County; T03N, R11W, Sec 28, 29, 32, 33
Rabbit River Watershed, Surveyed March 19 through 29, 2022 and October 4, 2022

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Environment

Selkirk Lake is a 94-acre lake in Allegan County. The lake has no natural outlets, but a drain was installed in the 2010s that releases excess water north through a manmade drain to Indian Lake which drains to the Rabbit River. The Selkirk Lake watershed is relatively small, draining 533 acres (Figure 1; Smith et al. 2023). The land cover based on 2021 mapping was primarily agriculture (41%) with smaller amounts of urban (18%), water (18%), forest (15%), and wetland (7%; Figure 2; Dewitz 2023). The geology is primarily glacial outwash sand and gravel and post glacial alluvium and is located just east of an end moraine feature of coarse-textured till. There is a Michigan Department of Natural Resources (DNR) boating access site on the southern shoreline of Selkirk Lake accessed off 125th Avenue. Selkirk Lake was depth mapped by the Michigan Department of Conservation (predecessor of the DNR) in 1959.

History

The first recorded fisheries assessment for Selkirk Lake was conducted by the Michigan Fish Commission in 1891. Gill nets were utilized for the survey and Yellow Perch, Largemouth Bass, bullheads, and Bluegill were caught. Yellow Perch were reported as "very large" and Largemouth Bass were reported as "plentiful". The DNR stocked several species from 1894 through 1945 including Bluegill, Largemouth Bass, Yellow Perch, and Smallmouth Bass (Table 1). The DNR has since discontinued the practice of stocking most warmwater fish species in Michigan as they reproduce readily, and stocking is not required to maintain populations.

Selkirk Lake was surveyed again in spring of 1961 using a 1,600-foot seine. Small panfish were extremely abundant and were growing slowly. A total of 4,941 fish were captured and Bluegill made up 90% of the catch. A vast majority of Bluegill (84%) were below 6 inches in length. Largemouth Bass were also abundant with two fish over 20 inches caught. Pumpkinseed, Black Crappie, Yellow Perch, Golden Shiner, White Sucker, and Grass Pickerel were also present.
Selkirk Lake was treated with a piscicide called toxaphene in 1963 with the goal of reducing Bluegill density and promoting better growth. The lake was surveyed in 1964 using a 1,400-foot seine which demonstrated the treatment was successful. As expected, the panfish catch rate was much lower than in the previous survey. Bluegill remained the most abundant species, but only 705 fish were captured, a reduction of over 75% from the 1961 survey effort. Pumpkinseed, Largemouth Bass, Bullhead, and Green Sunfish were also captured in low numbers.

Walleye fry were stocked in 1964. An electrofishing survey was conducted in August 1965 to evaluate Walleye stocking success in Selkirk Lake. A total of 766 fish were collected, most of which were 4- to 6-inch Largemouth Bass (84%). Bluegill were not abundant with 56 fish caught and 68% of those fish were 4-6 inches. Only one Walleye (16 inches) was collected. The stocking effort was considered a failure, and the stocking program was discontinued. Additional electrofishing efforts were conducted in

September 1966 and July 1967. Bluegill were more abundant in 1966 making up 54% of the 574 fish caught. Bluegill 6-8 inches were more common (70%) indicating improved growth following the 1963 treatment. No Walleye were collected. Only 166 fish were captured in the 1967 electrofishing survey. The evaluation stated that a good population of Largemouth Bass was present with multiple age classes represented. However, catch rates were low and only six fish of the 27 captured were over 14 inches. Catch rates were likely influenced by time of year as Largemouth Bass are generally in deeper water during summer. Bluegill and Black Crappie growth was slow and reproduction was limited.

An electrofishing survey was conducted on Selkirk Lake in November 1970 to evaluate the status of the fishery along with a supplemental gill net survey (four nets, to evaluate the Yellow Perch population. Bluegill and Black Crappie were abundant, making up 67% and 25% of the 325 fish captured, respectively. All of these fish were small with lengths less than 8 inches (except one 8-inch Bluegill). Common Carp were also observed for the first time. The DNR did not stock or authorize stocking of Common Carp and it was assumed they were illegally introduced in an attempt to control vegetation. Only one 8-inch Yellow Perch was captured during electrofishing, and none were caught in the gill netting effort. A lake reclamation was recommended by DNR due to the stunted Bluegill and Black Crappie populations, scarcity of Yellow Perch, poor Largemouth Bass recruitment, and the presence of undesired Common Carp. Lake treatments were not conducted due to lack of public support. Selkirk Lake riparian landowners were reluctant to have the DNR conduct additional toxaphene treatments because the chemical remains in the environment and can impact invertebrates.

Public opinion had shifted by 1975 and the lake association met and approved additional chemical treatments. The DNR conducted an electrofishing survey in October 1975. The survey continued to document overabundant panfish and poor Largemouth Bass recruitment. All but three Bluegill collected (806 total) were between 4 and 8 inches. The mean growth index for Bluegill was -0.7 and age-5 fish averaged 6.1 inches compared to the statewide average of 7.3 inches. The Black Crappie growth index was worse at -1.7 with age-4 fish averaging 6.6 inches compared to the statewide average of 9.4 inches. Five large Common Carp were also collected. Chemical reclamation was again recommended.

Selkirk Lake was treated with Rotenonec (a naturally occurring compound produced by tropical plants that is biodegradable) in 1976 in an effort to reclaim the lake from stunted Bluegill. It was restocked with 10,000 Largemouth Bass and 3,000 Bluegill fingerlings, and 22,000 steelhead averaging 2.7 inches were also stocked to provide forage. Adult Yellow Perch (n = 165) were stocked in the spring of 1977 and were expected to spawn in 1978. Electrofishing surveys were conducted annually in the fall of 1977, 1978, 1979, and 1980 to monitor the fish community response to treatment and to inform fish stocking needs. Largemouth Bass were doing well in the fall of 1977, but few Bluegill survived (only a single 8-inch fish caught). It was stocked again in 1978 with 20,000 Bluegill and an additional 4,000 Largemouth Bass. The 1978 survey documented survival of these fish and evidence of Yellow Perch spawning with small fish ranging from 2 to 6 inches present (n = 21). Largemouth Bass of age-1 and 2 were captured indicating survival of stocked fish. These fish were fast-growing, averaging 8.3 and 11.8 inches respectively compared to the state averages of 6.1 for age-1 and 8.6 for age-2 Largemouth Bass. Fish surveys in 1979 began to document an increasing abundance of small Bluegill. Largemouth Bass and Bluegill catch rates increased from past surveys, but there was concern that too many small Bluegill were present which could lead to stunting. Yellow Perch were present, but still small ranging from 4 to 8 inches. By the 1980 survey, Bluegill began to dominate the catch again with a high density of small Bluegill inshore. Mean lengths were average for age-3 and 4 fish but were below average for the

abundant age-1 and 2 fish. The Largemouth Bass growth index was +1.1; however, only four of the fish collected were 14 inches or greater.

A trap and fyke net survey was conducted on Selkirk Lake on September 9-10, 1986. Catch rates were very low potentially due to warm water temperatures. A follow up fyke and trap net effort was conducted October 2-3, 1986, which captured significantly more fish. The catch from the two surveys (September and October) were combined for analysis. A total of 695 fish were captured in the two surveys. Bluegill were the most abundant fish with 317 being caught, and Pumpkinseed (n = 113) and Bullhead (n = 209) also were abundant. Bluegill ranged from 3 to 6 inches and averaged 5.4 inches. Yellow Perch averaged 7.7 inches and ranged from 5 to 10 inches. Growth was considered average for both Bluegill (growth index = 0) and Yellow Perch (growth index = +0.2). Only 19 Black Crappie were caught ranging from 6 to 10 inches and two Largemouth Bass were caught. No specific management changes were recommended at the time.

Selkirk Lake was part of a Bluegill stunting study conducted during the 1990s (Schneider and Lockwood 1997; Schneider and Lockwood 2002). This study compared several methods of improving size structure of stunted Bluegill populations. The techniques focused on improving Bluegill size structure by reducing Bluegill population densities through application of a piscicide (Antimycin), introducing Walleye, protecting large Bluegill by implementing catch and release only angling regulations, or a combination of these treatments. Lakes were separated into five treatment groups, Antimycin, Walleye stocked, Antimycin and Walleye stocking, Antimycin and catch and release angling, and control (no manipulation). Selkirk Lake was included as a Walleye stocking lake and 1,410 fall fingerling Walleye (5.4 inches) were stocked in 1990. Fish surveys were conducted annually from 1986 to 2000 (except 1994, 1997, and 1999) to observe changes in Bluegill size structure and document Walleye stocking success. The surveys in 1987 through 1990 provided pre-treatment data, whereas the sampling efforts from 1991 through 1995 were considered post-treatment surveys. Fish were collected using electrofishing and trap net efforts in May and June.

Pre-treatment surveys (1987-1990) consistently documented high abundance and poor growth rates for Bluegill (growth index range from -1.3 to -1.8). Stocked Walleye survived well in Selkirk Lake and the population estimate in 1993 was 2 fish per acre. Walleye growth was relatively slow with age-3 fish only reaching 12.1 inches compared to the statewide average of 13.9 inches. Growth was likely low due to the high density of Walleye stocked.

Bluegill growth rates and size structure improved significantly a few years following Walleye stocking. Mean length-at-age was significantly larger by 1995 especially for older age classes (Table 2). Growth rates increased to become similar to the statewide average (range from -0.3 to +0.3). Bluegill size structure improved 5 years following stocking with the proportion of 6-, 7-, and 8-inch Bluegill significantly increasing (Table 3). Schneider size structure scores were very poor or poor in 1988 - 1993 but increased to good in 1995 and excellent in 1996 and 1998. Catch per unit effort (CPUE) of age-1 Bluegill in electrofishing samples increased during the experiment. Average age-1 Bluegill CPUE was 25 fish per hour pre-treatment and 120 fish per hour post-treatment. There was one particularly strong year class in 1991 immediately after Walleye stocking. Walleye stocking successfully improved the Bluegill fishery for the first time after decades of attempts to improve the size structure through other means.

Because of the survival of the 1990 stocked year class of Walleye and the subsequent improvement to the Bluegill fishery, the DNR stocked 5,046 spring fingerlings and 1,474 yearling Walleye in the lake in 1998 (Table 1). Electrofishing was conducted along the entire shoreline of Selkirk Lake in September 1998, and the population estimates for young-of-year (YOY) Walleye were calculated as described by Serns (1982). The Serns YOY estimate after the 1998 stocking was 2.2 YOY per acre which was comparable to other regional lakes. No yearling Walleyes were captured.

Spring fingerling stocking was continued in 1999 and 2000 based on the results from the 1998 sampling effort. Serns surveys conducted in 1999 showed similar survival of stocked Walleye with a score of 0.19 YOY per acre and survival of 1998 stocked fish to age-1 was observed. The 2000 Serns survey only recaptured one Walleye documenting variable stocking success. Bluegill size structure also declined somewhat in 2000 likely due to a decrease in adult Walleye abundance as the 1990 year class began to die off along with moderate to poor survival of the 1998-2000 Walleye year classes. However, the Bluegill size structure remained much improved compared to the years prior to Walleye stocking.

Spring fingerling Walleye stocking continued periodically until 2016. Changes to SLMMU rearing pond operations increased availability of fall fingerling Walleye, and fall fingerlings were stocked in Selkirk Lake in 2015, 2016, 2018, and 2022. A fish survey was conducted in 2022 to evaluate the success of the fall fingerling Walleye stocking in creating a fishery as well as maintaining Bluegill size structure. The purpose of this report is to document findings from that survey effort.

Current Status

Methods

A fish survey was conducted on Selkirk Lake during March 19 - 29, 2022, following the 2018 version of the 1836 Treaty-Ceded Territory Walleye Protocol and the Northern Pike Sampling Protocol (Godby et al. Draft). The survey consisted of trap net sets checked every other day from March 19-29 and an electrofishing effort on April 7, 2022. Nets were spaced along the shoreline to cover the lake and target potential Walleye spawning habitat (i.e., cobble shoals). Trap nets were set approximately two days after complete ice out with water temperatures ranging from 40-43 degrees. During the 11-day survey period the water temperatures generally remained around 42 degrees. Northern Pike catch rates were low and trap nets primarily targeted Walleye. Four nets were set for two-night sets and lifted six times for a total trap net effort of 48 net nights. All 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 one week after trap netting was concluded. An electrofishing effort was conducted on April 7, 2022, beginning after last light (8:56 PM). Electrofishing was conducted from the boating access site in a clockwise direction until the entire shoreline was sampled. Only Walleye were collected during the electrofishing effort.

Mark recapture population estimates 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. Another population estimate was conducted using

the Chapman-Petersen method where the trap net period was considered the marking run, and the electrofishing effort was considered the recapture run. 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 2022 Selkirk 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 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 Selkirk Lake also was compared to CPUE data compiled by Godby et al. (2023) for early spring pike surveys.

Results

A total of 2,912 fish were captured during the 2022 fish survey on Selkirk Lake (Table 4). Bluegill was the most abundant species making up 54% of the total fish caught by number. The CPUE for Bluegill in trap nets was 32.6 fish per net night. This catch rate was above the 25th percentile for SLMMU lakes (30.8 fish per net night) and near the median for statewide lakes (21.3 fish per net night) and considered average. Bluegill were large averaging 7.7 inches and ranging from 4-9 inches. A total of 35.9% of fish captured were 8 inches or greater (Figure 4). Mean lengths-at-age were much improved compared to 1988-1996 and were similar to 1998 for most age classes (Table 2). The Bluegill growth index score was +0.7 which indicates above average growth in Selkirk Lake. The Schneider index scored the Bluegill size structure as excellent. In 2022, the average length and the Schneider score were higher than in all previous survey years (Table 3). Other sunfish species did not contribute much to the fishery. Only 21 Pumpkinseed, one Green Sunfish, and six Hybrid Sunfish were captured.

Yellow Perch were the second most abundant fish species caught (n = 650). These fish were large averaging 9.5 inches and ranging from 6-12 inches. Fish over 10 inches made up 27% of the total catch, and 9-inch fish made up 45% of the total catch. The CPUE was 13.5 fish per net night. This value is far above the 75th percentiles for SLMMU and statewide lakes (1.5 and 2.0 fish per net night respectively).

A total of 243 Black Crappie were caught in trap nets. Crappie averaged 8.9 inches and ranged from 5-13 inches. Fish over 10 inches made up 40% of the total catch. Black Crappie CPUE in trap nets was 5.1 fish per net night which is between the 25th and 75th percentiles for SLMMU and statewide lakes.

Largemouth Bass ranged from 7-20 inches with a total of 170 caught during the trap net survey. These fish averaged 11.8 inches, and 84% of Largemouth Bass captured were 10-12 inches. Twelve Largemouth Bass over 14 inches were caught making up 7% of Largemouth Bass captured. The CPUE of Largemouth Bass in trap nets was 3.5 fish per net night which is close to the median for SLMMU and statewide lakes (3.5 and 3.2 fish per net night respectively). No Largemouth Bass tournaments have

been registered in the Michigan Tournament Information System which has required all bass tournaments to be registered since 2016.

Eighteen Northern Pike were captured during the survey ranging from 18-39 inches (Figure 6). Age-3 fish comprised 73% of the fish captured and were the only age class collected in large enough numbers to estimate growth rate. These fish were 4.4 inches larger than the state average for age-3 fish. The remaining fish were older, and they were 3.0-8.9 inches larger than the statewide average. The CPUE for Northern Pike was only 0.4 fish per net night. This value is below the 25th percentile for SLMMU and statewide lakes (1 fish per net night for both). There are limited pike captures in Status and Trend surveys conducted in May and June. Spring trap net data from Northern Pike targeted surveys are summarized in the Northern Pike Sampling Protocol (Godby et al. 2023). The CPUE of Northern Pike in Selkirk Lake was below the 25th percentile of statewide spring Northern Pike targeted surveys (0.71 fish per net night).

A total of 92 unique individual Walleye were captured during the Selkirk Lake survey. Trap nets captured 76 unique individuals and 16 were recaptured again. Sixteen Walleye were captured during the night electrofishing effort, seven were marked fish that were recaptured. Walleye ranged from 15 to 25 inches and averaged 19.4 inches (Figure 7). Four age classes were observed (age 4, 6, 7, and 9) that corresponded to the four stocked year classes prior to the 2022 survey (2013, 2015, 2016, 2018; Table 5). No Walleye were observed from year classes that were not stocked. The growth index for Walleye was +0.7 which is above the mean but still within the average range. The Chapman-Petersen population estimate for Walleye was 140 fish (95% confidence interval = 78 to 203 fish) which equates to a density of 1.5 fish per acre. Schumacher and Eschmeyer population estimates using mark and recapture data by date yielded a similar population estimate of 173 fish (95% confidence interval = 117 to 332 fish) or 1.8 fish per acre. These densities are slightly lower than the 2 fish per acre target identified in the Management Plan for Walleye in Michigan's Inland Waters (hereafter referred to as the Walleye Management Plan; Herbst et al. 2021). Insufficient numbers of fish were captured to generate estimates by sex or age class.

Analysis and Discussion

Status and Trends survey CPUE data were used for comparison in this analysis, largely because CPUE data for early spring netting surveys were not readily available for species other than Northern Pike. However, these CPUE comparisons must be interpreted with caution. Status and Trends surveys are conducted in May-early June. Due to seasonal differences in fish behavior, vulnerability to trap nets may not be the same in March as during the STP survey window.

Bluegill management goals have been achieved in Selkirk Lake. Populations had been stunted throughout the history of fisheries management. Size structure was consistently poor with few harvestable Bluegill available for anglers to catch resulting in several attempts by the DNR to kill the fish population to thin Bluegill numbers and improve growth. The size structure of the Bluegill population in Selkirk Lake has markedly improved since the early 1990s. During the 2022 survey, Bluegill catch rates were average relative to STP surveys, but growth rates were above average. This situation is ideal for Bluegill populations as low to moderate density populations tend to exhibit more rapid growth than high density populations.

Walleye predation is likely the mechanism that has resulted in improved size structure. Selkirk Lake as well as other lakes included in Walleye stocking treatments showed a significant shift towards larger fish for several years following stocking (Schneider and Lockwood 1997; Schneider and Lockwood 2002). These improvements were delayed by a couple years but were long lasting. Continued Walleye stocking in Selkirk Lake not only improved Bluegill size structure but created a fishable Walleye population. The estimated density of Walleye in Selkirk is close to statewide population goals. Anglers consistently report catching good-sized Walleye both in open water and through the ice. Selkirk Lake Walleye stocking shifted from spring fingerling Walleye to fall fingerling Walleye in 2015. Fall fingerling Walleye are stocked later in October at a much larger size (6.1 inch average 2015-2022). Fall fingerling survival is much higher and as a result stocking density is reduced (4 fish per acre). The current prescription to stock fall fingerling Walleye every other year at 4 fish per acre has been successful at creating a fishery and should be continued. The absence of fish from non-stocked year classes indicates that there is little or no natural recruitment of Walleye in this system.

The Largemouth Bass population was dominated by 10-12-inch fish. It is unclear if this is a result of abundant year classes, or if some individuals are experiencing poor growth and truncating at 10-12 inches. Despite the high abundance of 10-12-inch fish, several larger fish were present. Largemouth Bass as large as 20 inches were caught. At least some fish are experiencing growth rates sufficient to reach quality size.

Northern Pike growth rates are density dependent, and low-density populations often experience rapid growth (Pierce at al. 2003). Based on the 2022 trap net CPUE, the Northern Pike population density in Selkirk Lake appears to be low. However, the trap net effort took place after the peak spawning timing for Northern Pike when they are most vulnerable to trap net gear. As a result, the observed catch rates may underrepresent the true abundance. What is clear is that growth rates were well above the statewide average, as corroborated by the capture of three fish in the 38-39-inch bins. The low-density population with above average growth maintains a quality fishery in Selkirk Lake with the potential to catch trophy fish.

Prey fish species were not adequately collected in the survey due to the large mesh size of the trap nets. Predator growth rates for the fish where growth was assessed (Walleye and Northern Pike) were average or above average. Fish of large size were captured for all popular sport fish in this survey. There is no indication that the predator prey ratio is unbalanced.

Yellow Perch and Black Crappie were abundant with good size structure in 2022. The spring survey was timed well for capturing these fish which can be difficult to sample adequately. As a result, catch rates for Yellow Perch were much higher than those reported in STP surveys. Yellow Perch up to 12 inches were caught and many fish were greater than the preferred size of 10 inches listed by Gablehouse (1984). Black Crappie catch rates were average. Good numbers of large fish were caught with over 40% being above the preferred size of 10 inches (Gablehouse 1984). Crappie populations are often represented by a few strong year classes (Swingle and Swingle 1967; Guy and Willis 1995; Sammons 2002). The Selkirk Lake length frequency distribution shows peaks in abundance for fish 6-7 inches and at 10 inches, which suggests that several strong year classes of younger fish are present to replace older ones as they experience mortality. The availability of large fish may fluctuate as they are replaced by younger year classes but should continue to support a quality fishery for Black Crappie in Selkirk Lake.

Management Direction

Continue to stock fall fingerling Walleye at a rate of 4 fish per acre in alternate years. Walleye stocking has created a popular fishery and has improved the historically stunted Bluegill population in Selkirk Lake. Stocking rates may vary depending on availability of fish.

Continue to protect habitat and water quality in Selkirk Lake. Wetlands are limited in Selkirk 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 Selkirk 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.

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Table 1: Fish stocking record for Selkirk Lake in Allegan County. Walleye were stocked as spring fingerlings (SF) unless noted with an FF (fall fingerlings) or FRY (fry). Walleye stocked in 2018 were marked with a right pelvic fin clip to provide known age fish for aging verification.

Year	Walleye	Bluegill	Largemouth Bass	Yellow Perch	Smallmouth Bass	Steelhead	Fathead Minnow
1894	-	-	-	-	1,000	-	-
1933	-	15,000	1,000	-	-	-	-
1934	-	25,000	1,000	-	-	-	-
1935	-	30,000	1,000	10,000	-	-	-
1936	-	20,000	1,500	-	-	-	-
1937	-	20,000	-	-	-	-	-
1938	-	70,000	1,000	15,000	-	-	-
1939	-	150,000	500	5,000	-	-	-
1940	-	50,000	1,000	-	-	-	-
1941	-	105,000	500	-	-	-	-
1942	-	20,000	1,000	-	-	-	-
1943	-	2,000	500	-	-	-	-
1944	-	20,000	1,000	-	-	-	-
1945	-	10,000	2,000	-	-	-	-
1964	13,270 FRY	-	-	-	-	-	-
1970	-	-	-	-	-	-	19,200
1976	-	3,000	10,000	-	-	22,080	-
1977	-	20,000	4,000	165	-	-	-
1978	-	-	3,400	-	-	-	-
1990	1,410 FF	-	-	-	-	-	-
1998	5,046 SF/1,474 FF	-	-	-	-	-	-
1999	9,431	-	-	-	-	-	-
2000	10,442	-	-	-	-	-	-
2002	6,058	-	-	-	-	-	-
2004	4,728	-	-	-	-	-	-
2011	4,522	-	-	-	-	-	-
2013	4,764	-	-	-	-	-	-
2015	470 FF	-	-	-	-	-	-
2016	4,814 SF/156 FF	-	-	-	-	-	-
2018	377 FF	-	-	-	-	-	-
2022	351 FF	-	-	-	-	-	-

Table 2. Mean lengths at age of Bluegill captured in fish surveys from 1988 through 2022 compared to the statewide averages from Schneider et al. (2000).

Year	1	2	3	4	5	6	7	8	9	10	11	12
1988	1.9	2.7	3.3	3.8	4.6	5.3	5.8	6.7	-	-	-	-
1989	2.3	3.1	3.8	4.3	4.8	5.3	5.8	5.8	-	7.9	-	-
1990	1.7	3.2	3.8	4.5	4.6	5.2	5.6	6.2	6.8	7.3	-	-
1991	1.7	3.1	4.3	4.6	4.9	5.2	5.7	6.0	6.0	0.1	-	-
1992	1.8	2.6	4.3	5.0	5.2	5.6	5.9	6.1	6.4	7.1	-	-
1993	1.6	2.8	4.0	5.1	5.8	5.9	6.1	6.5	6.3	0.0	-	-
1995	1.6	2.6	3.3	5.4	5.8	7.0	6.9	6.8	6.9	6.9	-	-
1996	1.6	2.6	3.7	4.0	7.1	7.1	7.3	7.9	7.6	7.6	-	-
1998	1.7	2.9	5.8	7.0	7.7	7.7	8.3	8.0	8.5	8.6	8.6	8.8
2000	1.6	2.5	4.3	6.5	6.9	8.3	8.4	-	-	-	-	-
2022	-	-	5.3	6.9	7.7	8.0	8.0	8.6	9.4	9.1	-	-
Statewide	1.8	3.8	5.0	5.9	6.7	7.3	7.8	8.2	8.6	8.9	-	-

Table 3. Schneider size structure score for Bluegill captured in trap net surveys on Selkirk Lake from 1988 to 2022.

Year	Schnieder Score	Score	Average Length	% over 6"	% over 7"	% over 8"	Growth Score
1988	very poor	1	-	5.0	0	0	-1.8
1989	very poor	1.2	5	2.0	0	0	-1.4
1990	poor	1.8	5.2	10.2	2.3	0.75	-1.6
1991	very poor	1.2	5.2	3.0	0.3	0	-1.4
1992	poor	1.6	5.6	20.1	0.4	0.41	-1.3
1993	poor	2.2	6	52.4	0.4	0	-1.3
1995	good	5	6.8	94.0	38.1	0.47	-
1996	excellent	6.3	7.4	95.5	87.6	11.9	-
1998	excellent	5.6	7.4	89.6	67.2	27.7	+0.3
2000	satisfactory	4.2	6.7	82.4	35.4	0.02	-0.3
2022	excellent	6.4	7.7	97.2	85.7	35.9	+0.7

Table 4: Numbers, mean lengths, and length ranges for all fish species captured during trap net and electrofishing surveys conducted on Selkirk Lake in 2022. Only Walleye were collected during the electrofishing efforts.

Species	Number	Mean Length (inches)	Length Range (inches)
Black Crappie	243	8.9	5 - 13
Bluegill	1,565	7.7	4 - 9
Bowfin	7	24.2	17 - 28
Golden Shiner	8	9.3	7 - 11
Green Sunfish	1	5.5	5 - 5
Hybrid Sunfish	6	6.8	4 - 7
Largemouth Bass	170	11.8	7 - 20
Northern Pike	18	27.8	18 - 39
Pumpkinseed	21	7.3	5 - 8
Walleye	92	19.4	15 - 25
White Sucker	1	8.5	8 - 8
Yellow Bullhead	130	11.4	7 - 14
Yellow Perch	650	9.5	6 - 12
Total	2,912	9.1	4 - 39

Table 5. Number and mean size of Walleye captured in the 2022 survey separated by age class and compared to the statewide average.

Stocking Year	Age	Number	Mean Length (inches)	Statewide Mean Length (inches)
2018	4	31	12.3	15.8
2016	6	39	20.3	19.2
2015	7	21	20.3	20.6
2013	9	1	17.5	22.4

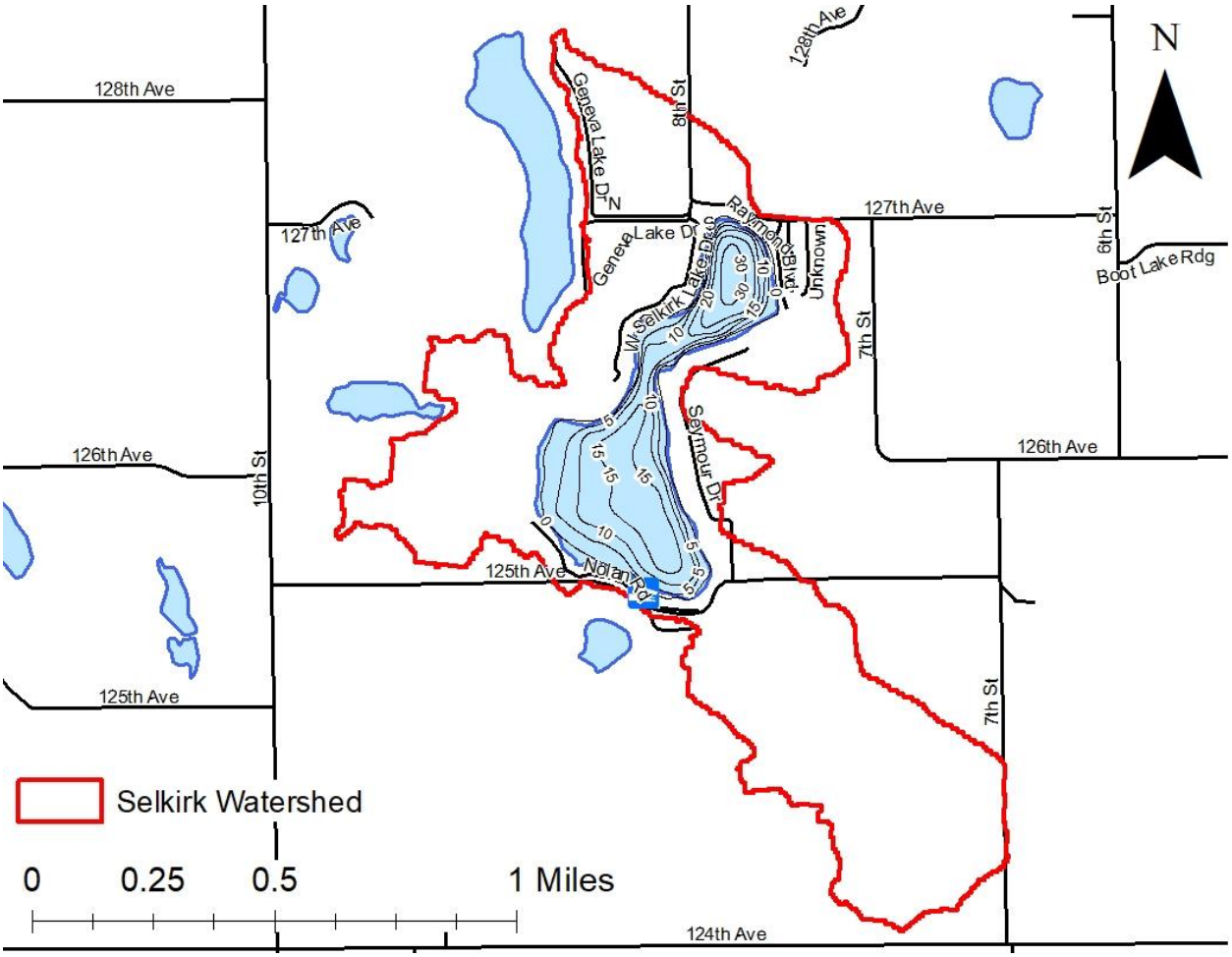

Figure 1: Map of Selkirk Lake and the Selkirk Lake watershed including depth contours (feet).

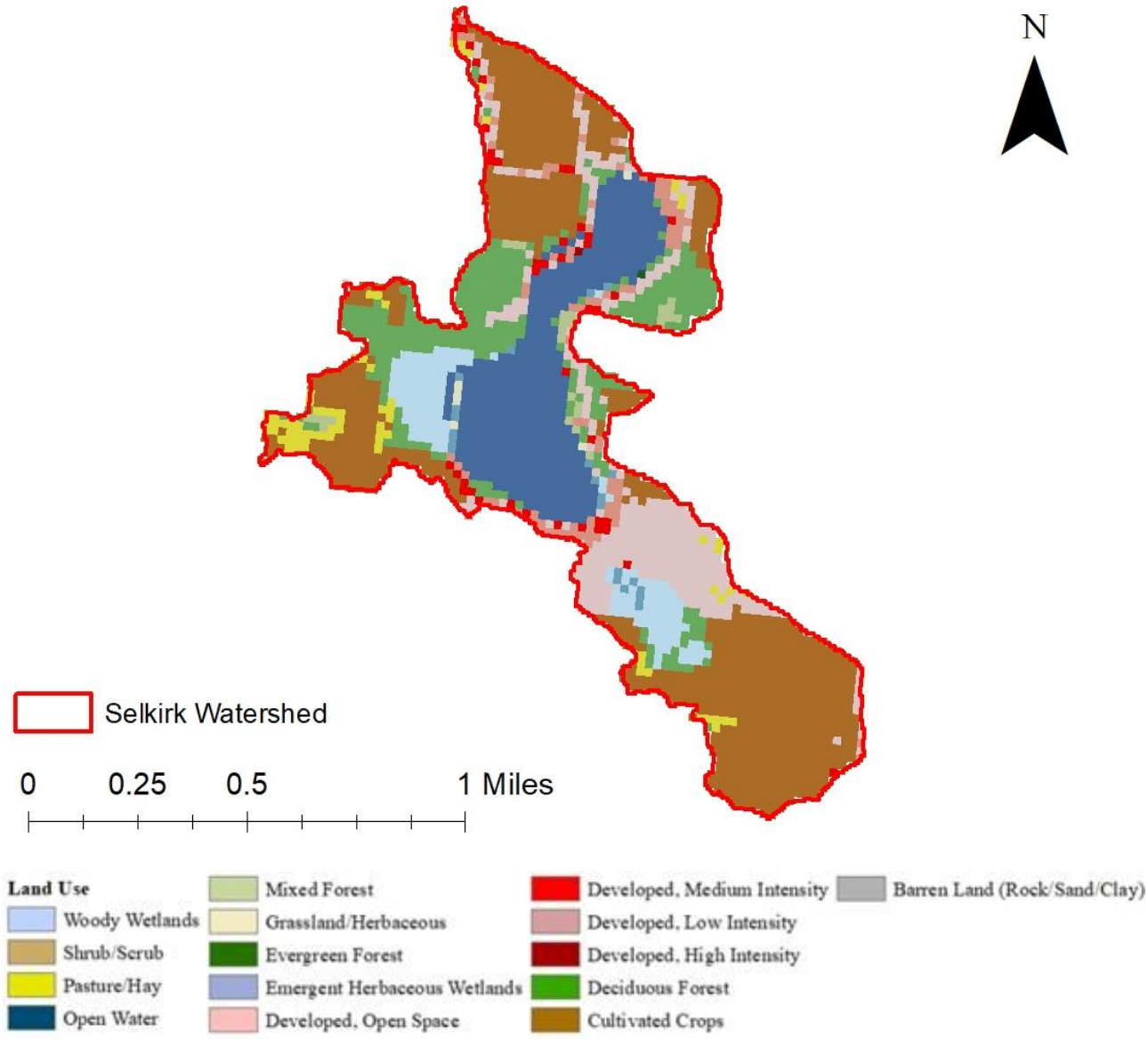

Figure 2. Land use map of the Selkirk Lake watershed based on the 2021 National Land Cover Database (Dewitz 2023). The Selkirk Lake watershed was obtained from LAGOS delineation (Smith et al. 2021).

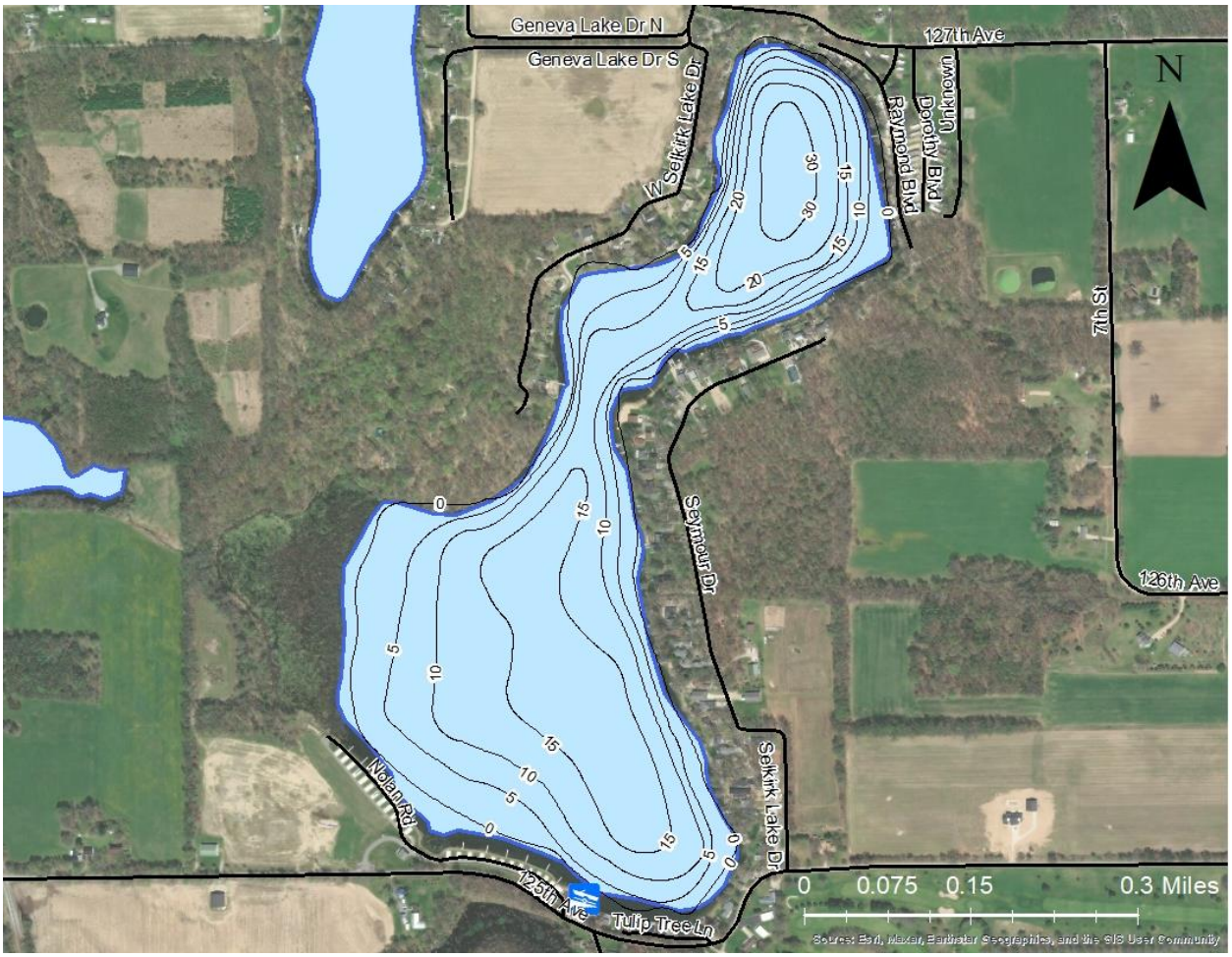

Figure 3: Map of Selkirk Lake including depth contours (feet).

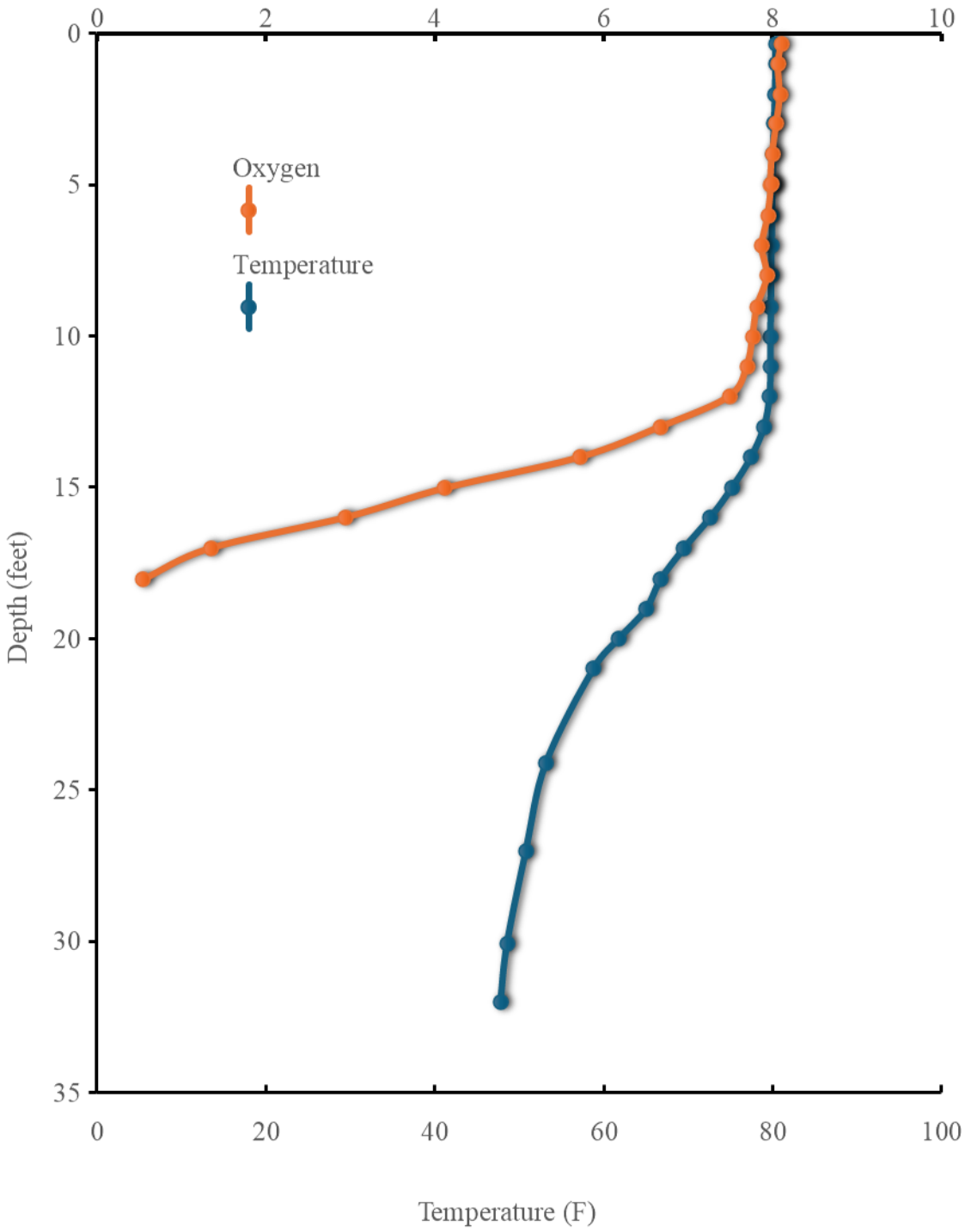

Figure 3. Temperature and dissolved oxygen profile for Selkirk Lake on October 4, 2022.

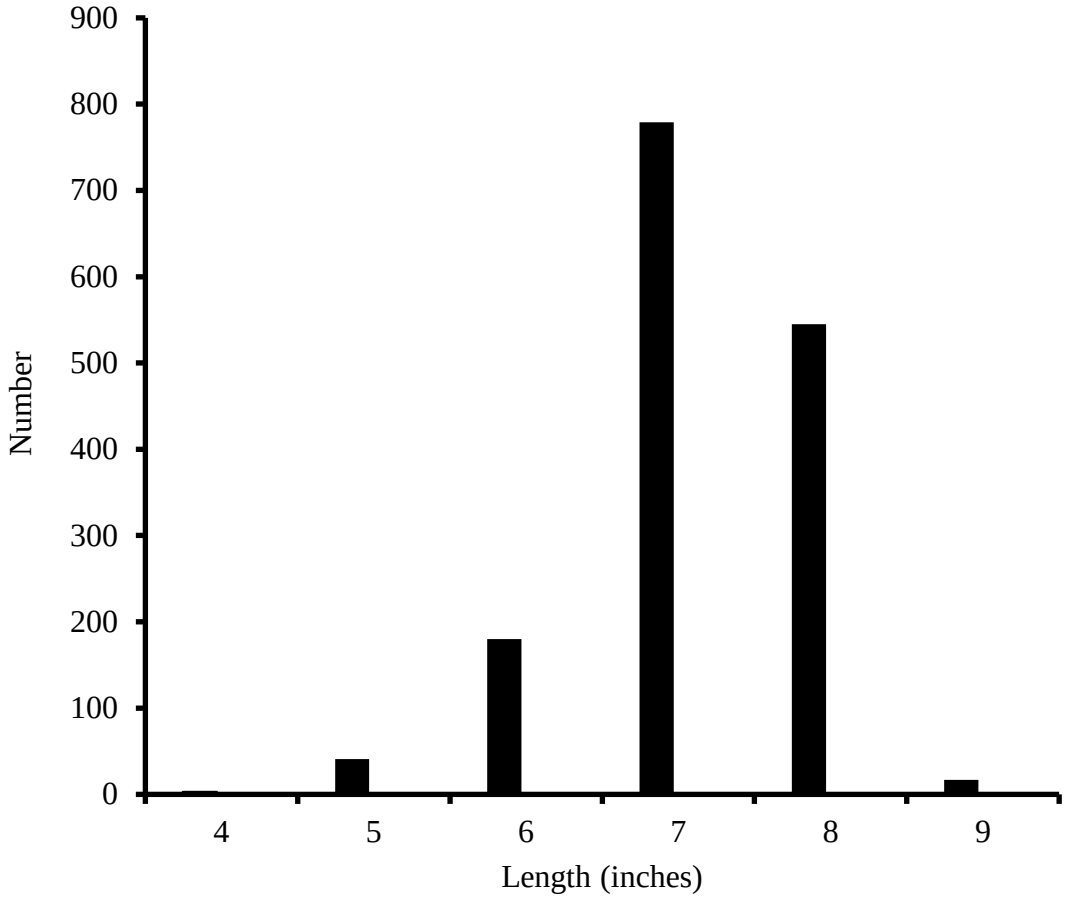

Figure 4. Length frequency distribution for Bluegill captured in the 2022 fish survey on Selkirk Lake.

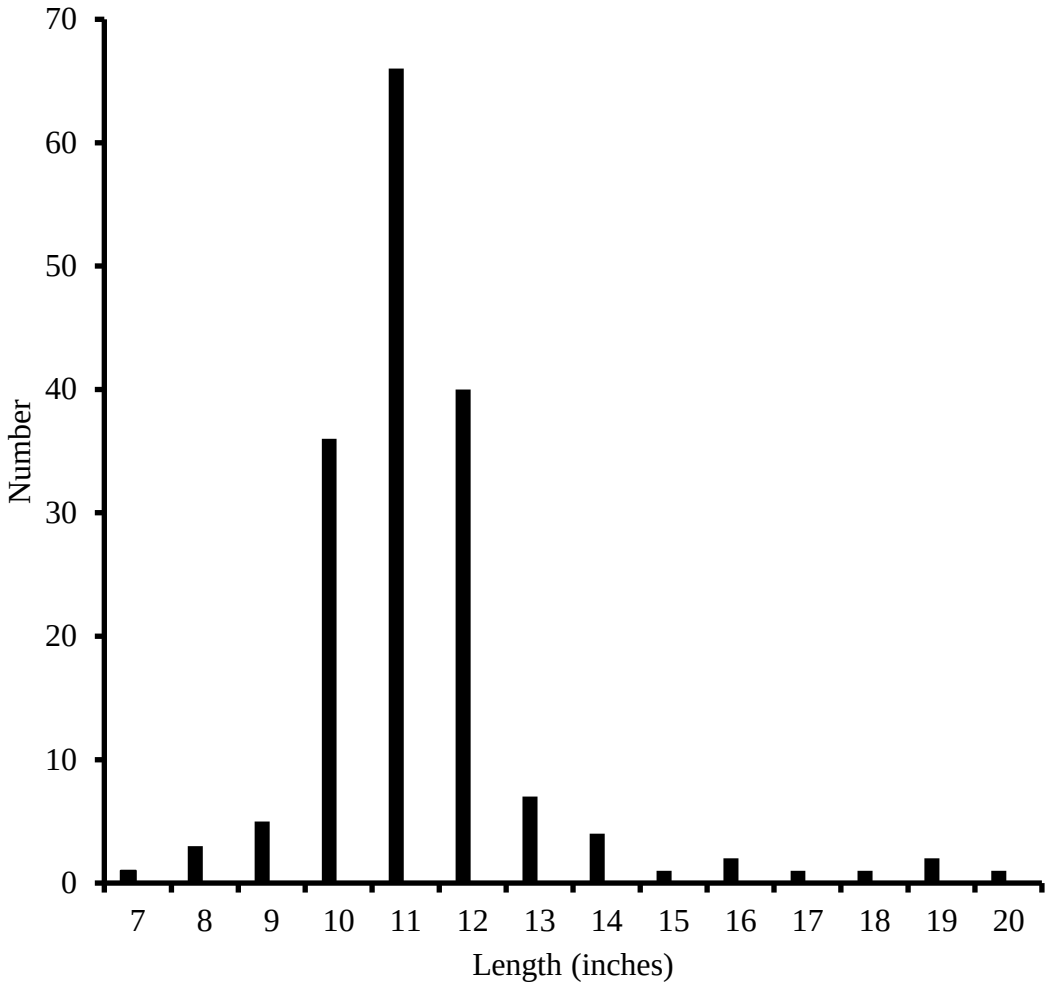

Figure 4. Length frequency distribution for Largemouth Bass captured in the 2022 fish survey on Selkirk Lake.

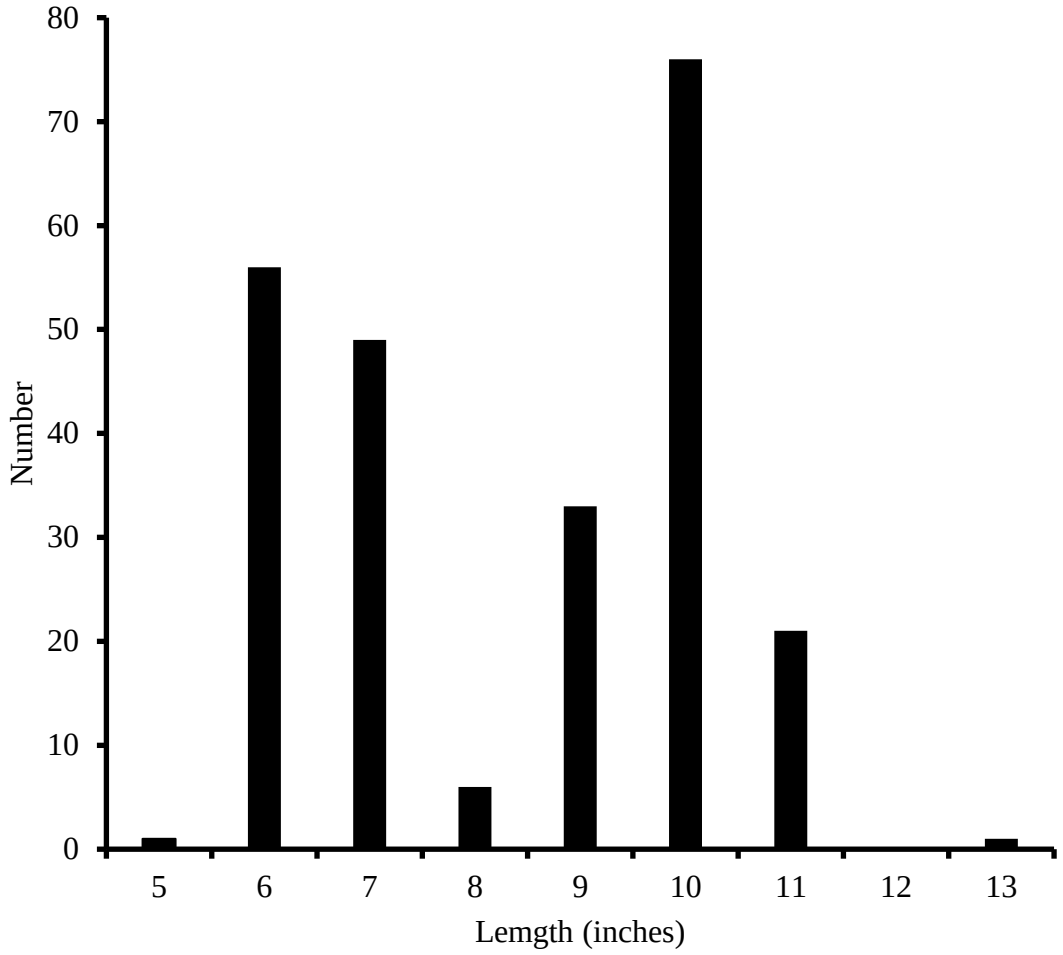

Figure 5. Length frequency distribution for Black Crappie captured in the 2022 fish survey on Selkirk Lake.

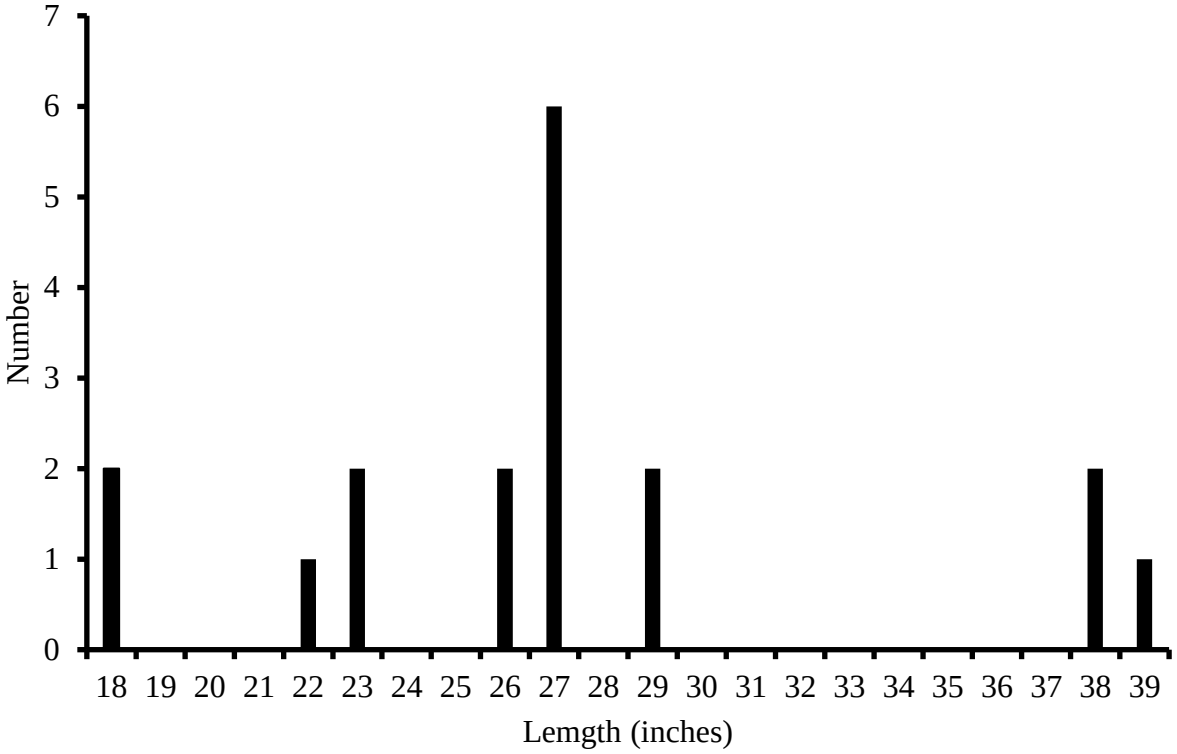

Figure 6. Length frequency distribution for Northern Pike captured in the 2022 fish survey on Selkirk Lake.

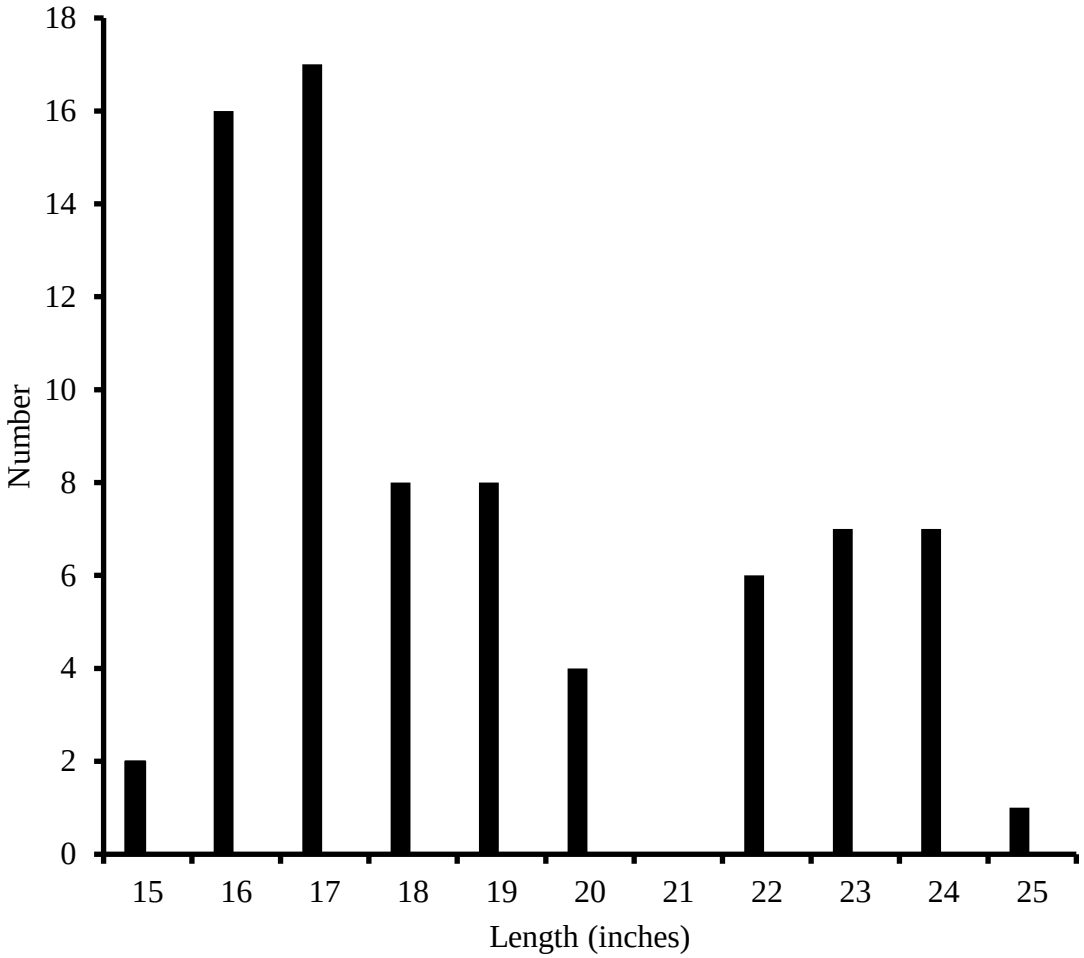

Figure 7. Length frequency distribution for unique Walleye captured (excluding recaptures) in the 2022 fish survey on Selkirk Lake.

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