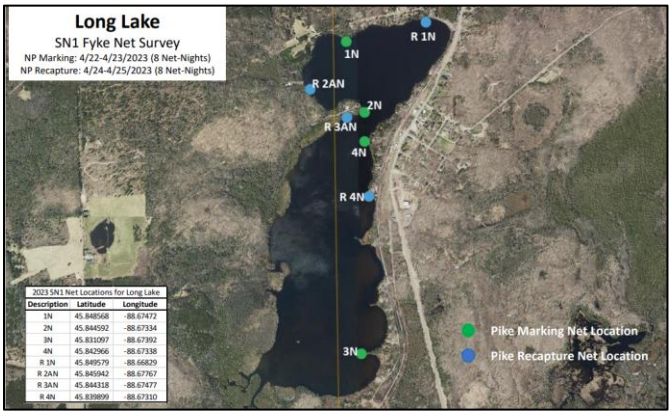
2023 LONG LAKE COMPREHENSIVE SURVEY REPORT

FLORENCE/FOREST COUNTY

INTRODUCTION AND SURVEY OBJECTIVES

The Wisconsin Department of Natural Resources (WDNR), in collaboration with the U.S. Forest Service, conducted a comprehensive survey of Long Lake, Florence/Forest County, to analyze the health of its fishery. A comprehensive survey includes surveys designed to assess all major fish populations within the lake; for species-specific survey details, see Table 1. This survey is the first comprehensive survey since a major winterkill during the 2013-2014 winter. Some surveys were conducted in 2014 and years following to assess fish survival and recruitment between the 2013 survey and this comprehensive survey, although those did not assess the entire fish community. The summary that follows will detail the current state of the fishery, as well as changes observed in the fishery since the previous assessment and winterkill. Long Lake is located in the town of Long Lake, Florence County, WI. There is a public boat launch off of HWY 139 on Long Lake Road.

Long Lake is a 340-acre lake with a maximum depth of 23 feet and 6.2 miles of shoreline. Long Lake is a drainage lake that the WDNR has classified in the "Complex-Cool-Dark" lake-class. Long Lake is within the ceded territory of Wisconsin and has no special fishing regulations, it is currently managed under the statewide fishing rules for general inland waters. Always check the fish regulation book or online for current regulations at: https://dnr.wisconsin.gov/topic/fishing/regulations.



Picture 1. A map of Long Lake with net locations from the 2023 northern pike survey.

Table 1: A summary of all effort conducted on Long Lake in 2023 during the comprehensive survey.

Survey Information				
Species	**Survey Date(s)**	**Gear Used**	**Effort**	**Water Temp. (°F)**
Northern Pike, Walleye, Yellow Perch, Black Crappie	4/21-25/2023	Fyke Net	16 Net-Nights	38-40
Largemouth Bass	5/22/2023	Boomshocker	3.08 Miles	64
Bluegill, Pumpkinseed	5/30-31/2023	Fyke Net	5 Net-Nights	74

Fish Metric Descriptions

Population estimate (PE) is estimated by marking a portion of the population, then capturing another sample of fish and using the ratio of new fish to previously marked fish to estimate the number of fish in the population.

Catch per unit effort (CPUE) is the number of fish per mile (electrofishing) or per net-night (netting) and is used to index abundance when we are unable to get a PE.

Relative stock density (RSD) is an index used to describe the size structure of fish populations. It is calculated by dividing the number of fish larger than a certain length by the number of stock size fish for a given species. Stock size is a length set for each species and is used to offset potential large year classes of juvenile fish.

Length frequency distribution (LFD) is a graphical representation of the number of fish captured by inch group. Smaller fish (or younger age classes) may not always be represented in the length frequency due to different habitat usage or sampling gear limitations.

Survey Methods

Surveys are designed to evaluate each species when they are particularly vulnerable to our gear.

Standard fyke nets and electrofishing gear is used to capture fish.

Data is collected from the target species of each survey to gather population metrics.

Fish metrics are compared to previous surveys of this water, the mean/median values for waters in this “area” (Florence and Forest Counties), and other Wisconsin lakes within the lake class.

Data collected is used to monitor the fishery, determine if stocking is necessary, evaluate fishing regulations, and determine how to improve the fishery.

Gear Used During This Survey

Fyke Nets are set in areas where we anticipate fish to congregate. Fish traveling along the shoreline will be met by a “lead,” which is similar to a fence. The lead directs the fish toward the trap end of the net. Fish travel through a series of funnels and eventually become trapped. Fish are then removed from the net and placed in holding tanks to gather data before being returned to the lake.

Picture 2. A picture of two DNR employees in a work boat with the employee on the bow securing the back of a round hooped net being lifted out of the water to the bow with ropes. The front of the net is squared and the top sticks slightly out of the water. A line of buoys from the lead can be seen running from the shoreline to the front of the net.

A boomshocker is a specially designed boat that creates an electric current in the water immediately in front of the boat. The boat is driven along the shoreline and shallow areas of the lake. When the boat encounters fish, they are momentarily stunned. Once the fish is stunned, they can be netted out of the lake and placed in a holding tank. After data is collected, the fish are returned to the lake.

Picture 3. A picture of three DNR employees in a work boat with railings on the gunnels and bow. A metal tub can be seen in front of the console at which the driver is standing. Two employees stand on the front of the boat holding long dip nets. Two orange booms extend in front of the boat with anodes dropping in to the water. Lights shine off the front of the boat pointed toward the water.

NORTHERN PIKE

A mark-recapture survey was conducted to estimate the abundance of adult northern pike in Long Lake. Fyke nets were set on 4/21/2023 and fished until 4/23/2023, capturing a total of 459 different adults which were marked with an identifiable fin clip. Nets were then moved to different locations and fished from 4/23/2023 to 4/25/2023. During this time, 288 adult northern pike were caught and of these, 23 had been previously captured during the initial two-night netting. Based on this data, we estimate the adult northern pike population in Long Lake to be 5,112 fish (15.04/acre). Adult northern pike abundance has greatly increased since it was last surveyed by the WDNR in 2013 (3.09/acre). Long Lake is considered to have an extremely high-density northern pike population and is well above the area average of 3.38 adults/acre. The 2023 northern pike population is the most abundant northern pike population surveyed across Florence and Forest counties. During the survey, northern

pike relative abundance was 47.56 fish/net-night, which is above the 100th percentile for its lake class, suggesting that the Long Lake population has the highest relative abundance of all Wisconsin lakes within its lake class.

All northern pike captured during the mark-recapture survey, 724 different fish, were measured and used for size structure analysis. After removing all fish less than 14 inches, 11.1% of the sample was ≥ 21 inches, while only 1.0% were ≥ 28 inches. Size structure has decreased since 2013 when 44.0% and 3.0% were ≥ 21 and 28 inches, respectively. A length frequency figure of northern pike caught during these two surveys can be seen below (Figure 1). The decrease in size structure is expected with the increase in abundance, however, Long Lake has extremely poor size structure, well below the area averages of 46.9%, and 9.7% being ≥ 21 and 28 inches, respectively.

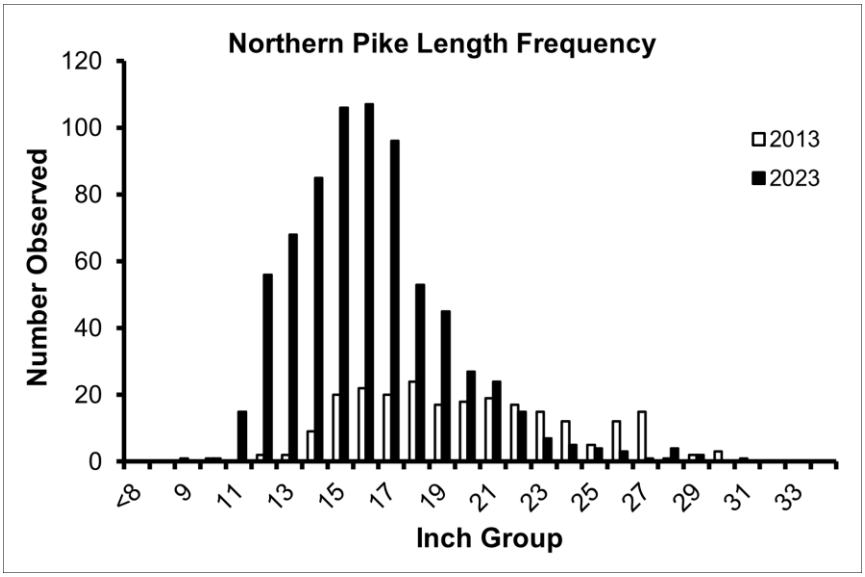


Figure 1. A length frequency plot comparing northern pike measured on Long Lake, Florence/Forest County, Wisconsin during the 2013 and 2023 spring netting surveys.

MUSKELLUNGE

Muskellunge were not specifically targeted during the 2023 comprehensive survey, however; Long Lake is currently being managed for muskellunge. During spring northern pike netting, 3 muskellunge were captured and measured. All 3 were fish which have not been surveyed by the WDNR in the past, and all 3 were given unique passive integrated transponder (PIT) tags. The fish were 34.0 (male), 36.8 (male), and 38.3 (female) inches at the time of capture (Figure 2). This survey was not designed to

properly assess muskellunge and likely does not give an adequate picture of the muskellunge population. To properly assess the muskellunge population, a mid-spring fyke netting survey would need to be conducted. Muskellunge were stocked in 2012, 2016, and 2018 by the WDNR at approximately 1 large fingerling/acre, and private stocking occurred in 2011 and 2013 at approximately 0.59 large fingerlings/acre and in 2014 at 1/acre. Muskellunge relative abundance was high during the early spring fyke netting survey (0.19 fish/net-night) in 2023 when compared to other muskellunge waters in the area (0.09 fish/net-night average) indicating that stocked muskellunge have survived well in Long Lake. Additionally, in 2025, the WDNR stocked 0.50 large fingerlings/acre.

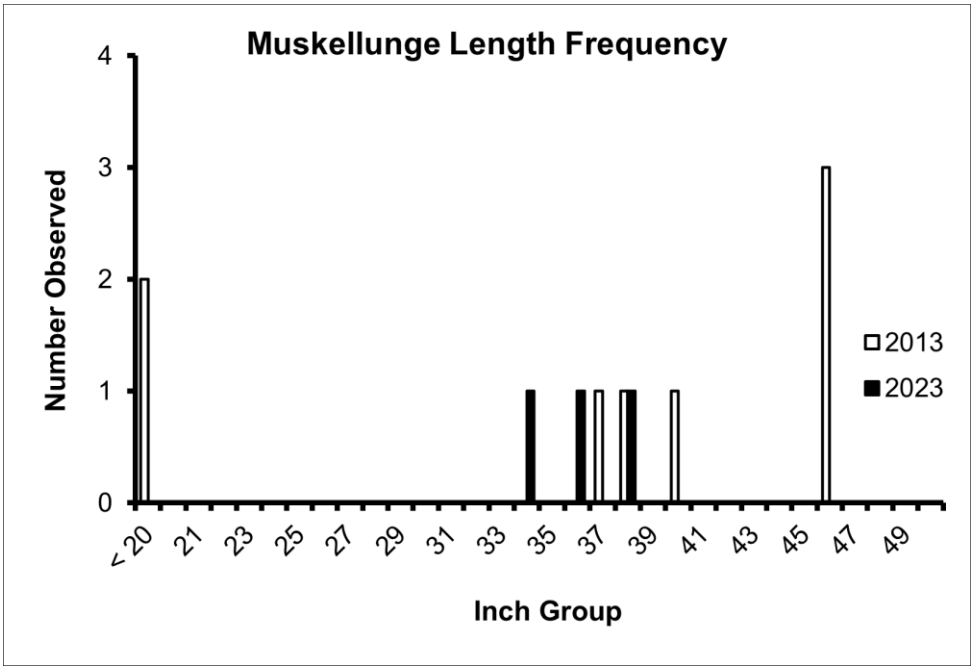


Figure 2. A length frequency plot comparing muskellunge caught in the 2013 and 2023 surveys on Long Lake, Florence/Forest County, Wisconsin.

LARGEMOUTH BASS

On the night of 5/22/2023, an electrofishing survey was conducted to assess the largemouth bass population. All largemouth bass caught were ≥ 8 inches and considered adults. Largemouth bass relative abundance was 1.30 adults/mile. Adult largemouth bass relative abundance has decreased since it was last assessed in 2013 (2.14 adults/mile). The population is well below the area average of 17.02 adults/mile,

making this a very low abundance population. Largemouth bass relative abundance is below the statewide 25th percentile for this lake type (1.70 fish/mile).

We were unable to capture enough largemouth bass to conduct comparative size structure analysis on the population. Only 4 fish were caught, and only one fish was ≥ 12 inches. Largemouth bass ranged in size from 9.3 – 13.4 inches. Size structure was greater in 2013 when 16.0% were ≥ 14 inches and 4.0% were ≥ 18 inches (Figure 3).

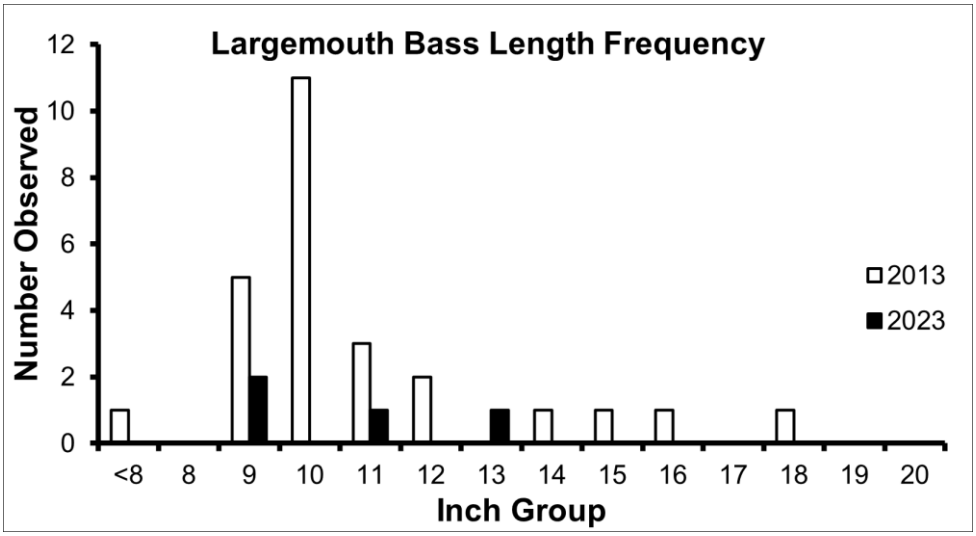


Figure 3. A length frequency plot comparing the largemouth bass measured during the 2013 and 2023 surveys on Long Lake, Florence/Forest County, Wisconsin.

YELLOW PERCH

Yellow perch were assessed during the 4/21-4/25/2023 netting survey. Yellow perch relative abundance was 0.6 fish/net-night. The yellow perch population may be more abundant than the current data suggests, as standard surveys do not always accurately assess yellow perch populations. However, the population has likely experienced a notable decline in abundance since 2013 when relative abundance was 23.6 fish/net-night. Median yellow perch relative abundance for this area of the state is 0.81 fish/net-night, making this a low abundance population. The Long Lake yellow perch population is not abundant for its lake type as its relative abundance falls below the statewide 10th percentile of 0.7 fish/net-night.

Yellow perch sample size was too small to conduct comparable size structure analysis of this population. Of the 10 yellow perch caught during the early spring fyke

netting survey, only one was ≥ 7 inches. Yellow perch size structure was also low during 2013 when 4.6% and 0.4% of yellow perch measured were ≥ 7 and 8 inches, respectively. This is well below the area average of 34.5% and 15.5% ≥ 7 and 8 inches.

BLACK CRAPPIE

Black crappie were surveyed during the same netting survey as northern pike and yellow perch. Black crappie relative abundance was 15.32 fish/net-night. This is a decrease in relative abundance since 2013 when their relative abundance was 46.8 fish/net-night. Despite the large decline, black crappie are still considered to be abundant in Long Lake, as their relative abundance is well above the area average (5.84 fish/net-night).

A total of 331 black crappie caught during the early and late spring netting surveys were measured to assess size structure. Excluding fish less than 5 inches long, 60.5% were ≥ 8 inches, 24.9% were ≥ 10 inches, and 2.4% were ≥ 12 inches (Figure 4). This is decent size structure and is near the area average of 62.4% ≥ 8 inches, 19.9% ≥ 10 inches and 4.7% ≥ 12 inches. Size structure has increased since 2013, when 25.2% were ≥ 8 inches, 7.0% were ≥ 10 inches and 2.6% were ≥ 12 inches. Black crappie are cyclic in nature, and their population can be driven by periodic strong year classes with years of poor recruitment in between, which appears to have been the case in 2013.

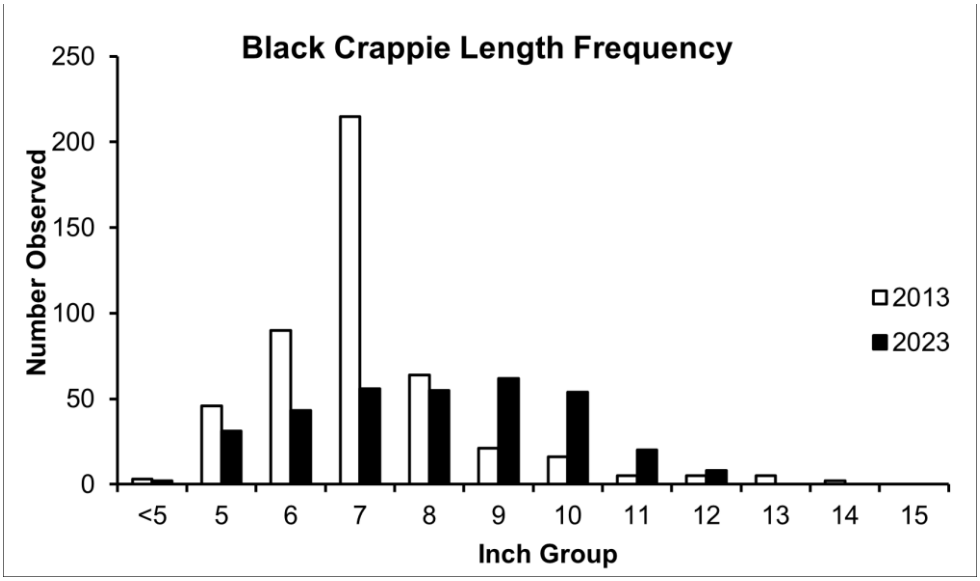


Figure 4. A length frequency plot comparing the black crappie measured during the 2013 and 2023 comprehensive surveys on Long Lake, Florence/Forest County, Wisconsin.

BLUEGILL

Bluegill were assessed during a late spring fyke netting survey targeting summer spawning panfish from 5/30 – 31/2025. Bluegill relative abundance was 321.6 fish/net-night. This is an increase since the 2013 comprehensive survey when their relative abundance was 104.3 fish/net-night. The bluegill population in Long Lake is very abundant, well above the area average of 65.57 fish/net-night.

A random sample of 727 bluegill were measured during the late spring fyke netting survey. Those ≥ 3 inches were used to assess size structure. Of these, 56.5% were ≥ 6 inches, 6.3% were ≥ 7 inches, and none were ≥ 8 inches. Size structure has increased slightly since the 2013 survey when 46.2% were ≥ 6 inches and 4.3% were ≥ 7 inches, with no fish ≥ 8 inches. The current bluegill population in Long Lake has poor size structure, well below the area average (61.6% ≥ 6 inches, 31.1% ≥ 7 inches, and 9.4% ≥ 8 inches). The bluegill length frequency can be seen below (Figure 5).

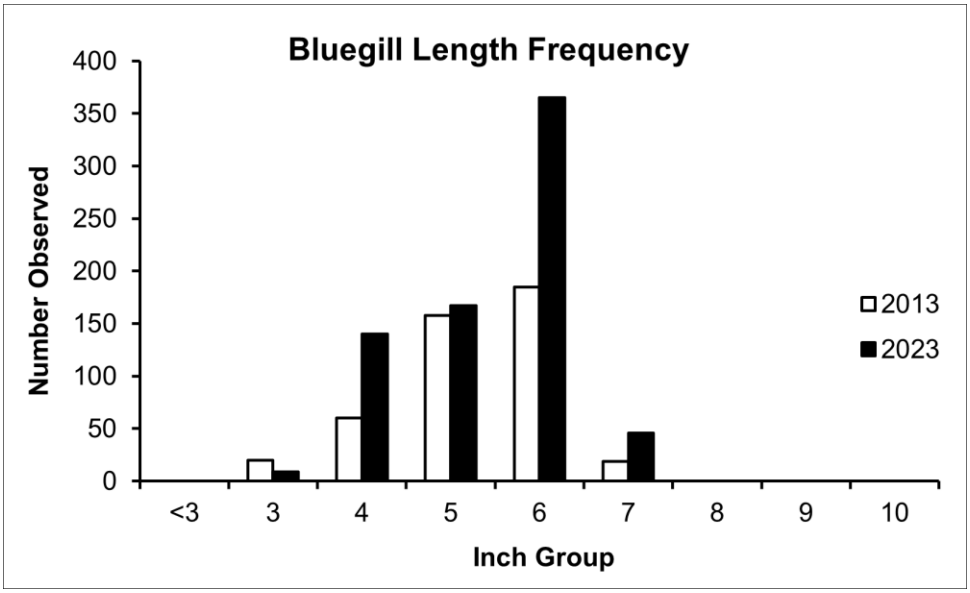


Figure 5. A length frequency plot comparing bluegill measured during the 2013 and 2023 comprehensive surveys on Long Lake, Florence/Forest County, Wisconsin.

PUMPKINSEED

Pumpkinseed were assessed during the same late spring fyke net survey as bluegill. Pumpkinseed relative abundance was 139.4 fish/net-night. This is an increase since the 2013 comprehensive survey when their relative abundance was 35.9 fish/net-night. Long Lake has a very abundant pumpkinseed population.

A random sample of 346 pumpkinseed were measured during the late spring fyke netting survey. Those ≥ 3 inches were used to assess size structure. Of these, 29.2% were ≥ 6 inches, 0.6% were ≥ 7 inches, and none were ≥ 8 inches. Size structure has decreased since 2013 (41.6% ≥ 6 inches and 1.5% ≥ 7 inches, with no fish ≥ 8 inches). A length frequency figure can be seen below comparing the two catches (Figure 6). The pumpkinseed population in Long Lake has low size structure, which is expected considering the high abundance of pumpkinseed and other panfish.

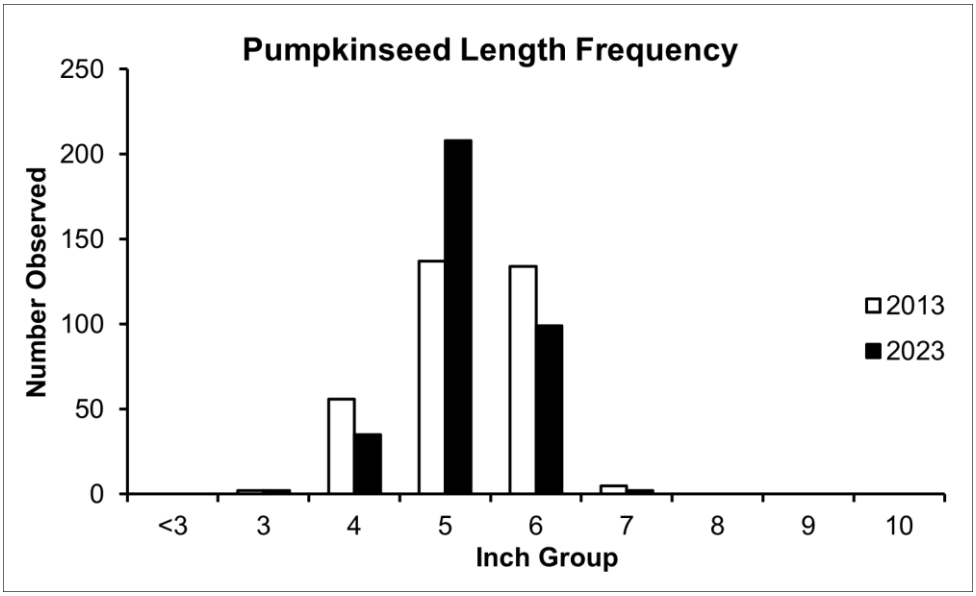


Figure 6. A length frequency plot comparing pumpkinseed measured during the 2013 and 2023 comprehensive surveys on Long Lake, Florence/Forest County, Wisconsin.

BULLHEAD

All 3 species have been present historically, however during the 2023 survey, for ease of analysis, all species were grouped. During the early spring fyke netting survey, bullhead relative abundance was 169.9 fish/net-night, which is well above the area average of 12.0 fish/net-night. Bullhead comprised 67.6% of the total catch at this time. Similarly, their relative abundance of 43.6 fish/net-night during the late spring panfish survey was well above the area average during that survey (11.0 fish/net-night). Bullhead are extremely abundant in Long Lake.

A random sample of 125 bullhead was measured during the late spring panfish survey to assess the size structure of the population (Figure 7). Bullhead less than 6 inches were removed from size structure analysis. Of the remaining sample, 45.0% were ≥ 9 inches and 2.7% were ≥ 11 inches. No bullhead measured were ≥ 12 inches long. Bullhead size structure is lower than the 2013 population, which had 52.1% and 6.5% ≥ 9 and 11 inches, respectively, but similarly had no fish ≥ 12 inches. Bullhead size structure is considered low to moderate.

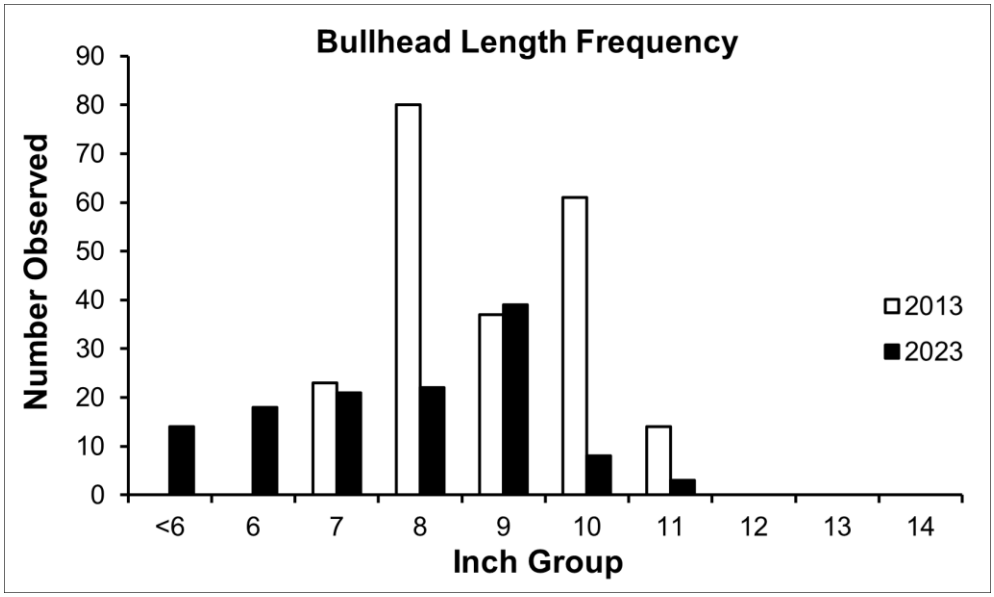


Figure 7. A length frequency plot comparing bullhead measured during the 2013 and 2023 comprehensive surveys on Long Lake, Florence/Forest County, Wisconsin.

2013-2014 WINTERKILL

The winter following the 2013 comprehensive survey, Long Lake experienced a severe winterkill event due to lower than normal operation of the aeration unit. Muskellunge, largemouth bass, black crappie, bluegill, and pumpkinseed had their populations severely reduced to undetectable levels. Northern pike and yellow perch had significant reductions to their populations, however they were afforded conditions to thrive with the depletion of competition and increased resource availability following the winterkill. Bullhead were least impacted during the winterkill as they are more tolerant of low levels of oxygen than other species and were able to take over the fish community following the winterkill.

A 2014 spring assessment was conducted to determine the extent of fish loss and numerous dead fish were observed. The survey captured mostly northern pike and bullhead, and a few yellow perch. No centrarchid species (bass, bluegill, black crappie, etc.) were observed living. This depletion of competition likely led to an explosion of recruitment for the more tolerant species and resulted in the overabundance of bullhead and northern pike that we see in the lake now. Fall electrofishing surveys were conducted, starting in 2014, to get a better understanding of what populations would recover most quickly. During 2014 juvenile yellow perch were abundant, while northern pike and bullhead comprised most of the rest of the catch. Common shiner and white sucker, which were observed in spring 2014, were again present, and few bluegill were captured. In the fall 2015 survey, one muskellunge from the 2014 stocking was captured. Other new species observed were pumpkinseed, golden shiner, and other various forage fish. No new gamefish were observed in 2016. Fortunately for Long Lake, it's connectivity to other waters has allowed for the re-introduction of some species. Long Lake seems to have stabilized, with the fishery documented in this survey since the winterkill. Help will likely be needed to guide the lake back to a desirable fishery. Stocking of muskellunge will hopefully improve the gamefish community and can provide top-down control to the system. Walleye have been stocked privately and some of these walleye were captured during the 2023 comprehensive survey, the majority of which were ≥ 20 inches. One juvenile, likely an age-1 fish was captured in the spring netting survey. It likely came from walleye stocked in connected waters.

Long Lake is an extremely volatile lake, as its shallow bathymetry and abundance of aquatic plants make it prone to frequent winterkills. The aeration system was installed in January 1990 to prevent such events, and there had not been any major winterkills until the 2013-2014 winter. The winter aeration system is a pivotal

component for maintaining desirable fish populations. Bullhead and northern pike are capable of strong compensatory recruitment and can have large year classes following winterkills. Without aeration, the fish community would be a winterkill style community dominated by bullhead, yellow perch, and northern pike. The WDNR will continue to monitor the lake's recovery.

OTHER SPECIES

During the 2025 comprehensive survey, 6 other fish species were captured which were not detailed in this summary. None of these species were caught in high abundance. The table below shows the relative abundance of these species across netting (catch/net-night) and electrofishing (catch/mile) surveys conducted in 2023. Species included in the table are walleye (WE), white sucker (WS), golden shiner (GSH), common shiner (CSH), bluntnose minnow (BNM), and bluegill x pumpkinseed hybrids (BxP). No other species were captured.

Table 2. A table detailing relative abundance (catch/net-night for netting surveys; catch/mile for electrofishing surveys) of species captured during the 2023 comprehensive survey on Long Lake, Florence/Forest County, Wisconsin, which were not detailed in this summary.

RELATIVE ABUNDANCE OF OTHER SPECIES						
Survey	**WE**	**WS**	**GSH**	**CSH**	**BNM**	**BxP**
Spring Netting #1 (4/24—4/29/2023)	1.6	0.3	0	0	0	0
Spring Electrofishing #2 (5/22/23)	0.97	2.0	6.0	8.0	2.0	10.0
Spring Netting #3 (5/30—6/1/2023)	0	0	0	0	0	11.4

SUMMARY

Long Lake is a moderately developed lake on the border of Florence and Forest counties. The lake has good access through the public boat launch. This lake provides good recreational opportunity even though there aren't many quality sized fish. This comprehensive survey details all major fish species within the system and provides an adequate picture to the shape and status of the fishery in its current state.

Long Lake has an extremely abundant northern pike population with poor size structure. This population is the densest northern pike population in the area and has the highest relative abundance in the state for this lake type. The current state of the northern pike population may be relatively undesirable to some anglers but would provide plenty of action with some harvest opportunity. The current statewide regulation allows for the daily harvest of 5 northern pike of any size. Harvest is encouraged. The current regulation is appropriate.

The muskellunge population in Long Lake is relatively new in the sense that the oldest fish currently present were stocked in 2014, post-winterkill. The current population has not been properly assessed as it needs more time to develop; however, it likely provides a moderate density muskellunge fishing opportunity. The current regulation is appropriate. A more thorough muskellunge assessment is recommended during the next comprehensive survey.

The largemouth bass population of Long Lake was significantly depleted with the 2013-2014 winterkill. No effort has been made to improve the largemouth bass population since the winterkill, as previous largemouth bass rehabilitation efforts have been unsuccessful in Long Lake. The observation of largemouth bass during spring electrofishing surveys indicate that some have made their way into Long Lake from connected waters. Before the winterkill walleye were present, but they were not a dominant gamefish, and the population was likely entirely from private stocking. Since spring 2014, large fingerling walleye have been stocked privately on 3 occasions (0.74/acre in 2015, 0.95/acre in 2016 and 2017). The WDNR does not currently manage Long Lake for walleye. At this time, there are likely not "fishable" populations of largemouth bass or walleye, but they may be an occasional "surprise" catch for anglers. Current regulations of these species are appropriate.

The panfish populations in Long Lake are extremely abundant. Bluegill and pumpkinseed have rebounded strongly since the winterkill and have become very abundant. Black crappie were stocked privately in 2015 and 2017, and they are

abundant again. Yellow perch were abundant, but the population seems to have decreased in recent years, likely due to predation or competition with other panfish species. Current panfish regulations are appropriate.

Bullhead remain extremely abundant in Long Lake. They were likely the fish species that benefitted most from to the 2013-2014 winterkill, and their numbers remain incredibly high. Bullhead fishing is open year-round and there is no bag limit. This may be a quality angling opportunity for anglers looking to harvest fish. Bullhead are native to the system and are a resilient species which can provide angling opportunity in winterkill style lakes, as was the case with Long Lake. However, due to the extreme abundance and objective to promote a more desirable fishery, removal efforts may be considered to create space and resource availability for desirable species.

The aeration system in Long Lake is a very important factor in managing this fishery. Should the lake not be aerated during the winter, this lake is at risk of another severe winterkill event. We thank the Long Lake Association for their efforts in maintaining and operating the aeration unit.

Long Lake is on an 8-year sampling rotation and is scheduled for its next comprehensive survey in 2031.

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