WISCONSIN DEPARTMENT OF NATURAL RESOURCES

Otter Lake Fisheries Survey Report
Chippewa County, Wisconsin 2023

Waterbody Code: 2157000

Photo Credit: Wisconsin DNR

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Executive Summary

A fisheries survey was conducted on Otter Lake, a 661-acre drainage lake in east-central Chippewa County, located approximately 5 miles north of Stanley, Wisconsin. The adult walleye population size was estimated at 2.3 fish per acre. There has been no documentation of walleye natural reproduction, and aging data show that almost all of the population is a result from stocking large fingerlings on an alternate year basis for the last decade. Northern pike size structure showed an improvement with RSD-28 improving from 9 to 31 relative to the 2018 survey. Largemouth bass were the most abundant game fish caught during spring electrofishing surveys (37 fish per mile) and size structure has improved in recent years. Bluegill catch rates were high (166 per mile), down from previous surveys, but size structure has shown an improvement with mean bluegill length increasing by 0.4 inches. Black crappie catch rates were much lower than the previous survey, but the mean size was the highest since the past two decades.

Introduction

Otter Lake is a 661-acre drainage lake in east-central Chippewa County located approximately 5 miles north of Stanley, Wisconsin. The lake has a maximum water depth of 43 feet and 15.5 miles of shoreline. Otter Creek flows into the eastside of Otter Lake and exits over the dam on the north shore and ultimately flows into the Yellow River. The lake is able to avoid winterkill and support a desirable fishery due to two aeration systems operated during the ice on period by Chippewa County Facilities and Parks Department. There are four public boat landings present on the lake. The fishery in Otter Lake is comprised of walleye (Sander vitreus), largemouth bass (Micropterus salmoides), bluegill (Lepomis macrochirus), northern pike (Esox Lucius), black crappie (Pomoxis nigromaculatus), pumpkinseed (Lepomis gibbosus), yellow perch (Perca flavescens), and bullheads (Amerius spp.).

The purpose of this survey was to sample Otter Lake under the Wisconsin DNR's tier 1 lake sampling protocol for public access lakes in Wisconsin. Data from this survey was compared to historical data to 1.) Estimate total walleye abundance and assess the size structure and 2.) Evaluate relative abundance and size structure of other important fishes, such as largemouth bass, northern pike and panfish.

Methods

Otter Lake was sampled in the spring 2023 as soon as the ice receded from the main body of the lake. Sampling procedure included spring fyke netting and electrofishing primarily to estimate total walleye abundance, length at age, and size structure. Survey data were also collected to establish catch rates, length at age and size structure on other important fish species such as largemouth bass, northern pike, bluegill, black crappie and yellow perch.

FYKE NETTING:

A total of eight fyke nets, following SNI protocol, were set on Otter Lake. Four nets were set on April 14th in ice-free locations, and the remaining four were set on April 15th after the remaining ice went out. Fyke nets were checked on the 15th and 16th and collapsed on the 16th due to inclement weather forecasted. Eighteen inches of snow fell the following day and portions of the lake iced back up. Nets were reopened on April 19th, checked on the 20th-27th, and pulled on the 27th. Walleye were measured, weighed and marked with a right ventral fin clip to aid in the population estimate. For aging purposes, scales and a dorsal spine were taken from five fish of each sex per inch group from walleye.

Northern pike and largemouth bass were measured for length and weighed. Scales and a dorsal spine were taken from five per inch class for largemouth bass. The first three anal fin rays for five from each inch class per sex were taken from northern pike for aging. Five of each half inch class of bluegill, black crappie and yellow perch were measured for length and scales were taken for aging purposes. Twenty-five fish of each species were measured for length per net and the remaining fish were counted. All other fish were identified and counted.

ELECTROFISHING:

Electrofishing surveys were conducted on the nights of April 27th and May 15th. On April 27th, the entire shoreline was sampled with the goal of capturing walleye to obtain the data needed for a population estimate (i.e. the marked to unmarked ratio). All walleye were collected, measured, and inspected for a right ventral fin clip. The purpose of the sampling conducted on May 15th was to capture centrarchids (bass, bluegill, crappie); this survey was broken into eight runs. Four 0.5-mile panfish runs during which all panfish and bass were collected, and four 1.5-mile bass runs, where only largemouth bass were collected. For largemouth bass, aging structures were collected from five fish per inch group; scales were collected from fish less than 12 inches and dorsal spines were collected from fish greater than 12 inches. Scales were collected from panfish greater than 3 inches up to five per half inch group. 100 of each fish species were measured for length and the rest were counted.

DATA ANALYSIS:

Spring fyke netting and electrofishing data for 2023 were compared to similar data from spring fyke net and electrofishing surveys from 2005, 2014 and 2018. Walleye population estimates for 2005, which was estimated by the Schnabel method, was compared to 2014, 2018 and 2023, population estimates, which were all estimated with the Chapman modification to the Lincoln-Peterson method. Catch per unit effort and size structure data were compared to past surveys. Length-at-age was determined and compared to the statewide average to determine relative growth rates. Stocking records for Otter Lake are provided in Table 1.

Results

WALLEYE

The total adult walleye population in 2023 was estimated at 1,523 (95% C.I.=1,175-2,062) fish or 2.3 per acre, which is similar to the 2010 abundance estimate which was estimated at 1,692 or 2.6 fish per acre (95% CI=503-2,881). These estimates are lower than the 2018 adult walleye abundance was estimated at 4,841 or 7.3 fish per acre (95% C.I. =2,654-9,705), but higher than the 2005 survey, where the walleye population was estimated at 441 or 0.7 fish per acre (95% C.I.=335-589). In the 2023 survey, the walleye size structure was fairly 'top heavy' with the majority of the fish between 16.5 inches and 23 inches (Figure 1) and the mean length of walleye was 19.7 inches (Range: 9.7-27.7 inches). The size structure metrics indicate the same excellent size structure with the PSD at 88 and RSD-20 at 55. This is better than what was observed in 2018 survey when the PSD was 98 and RSD-20 was 36, which is similar to what was observed in the 2014 survey, when the walleye PSD and RSD-20 values were 98 and 32, respectively. These numbers are slightly lower than what was found in the 2005 survey when the PSD was 95 and RSD-20 was 77.

Five strong age classes were present in this survey ranging from 2-10 years of age (Figure 2). Almost all of the walleye aged were from year classes where extended growth fingerlings were stocked. It was estimated that 99.4% of walleye caught were assigned back to a stocked year class. Walleye length at age was well above that statewide average (Figure 3).

Figure 1: Walleye length frequency, Otter Lake, Chippewa County, Wisconsin, 2023.

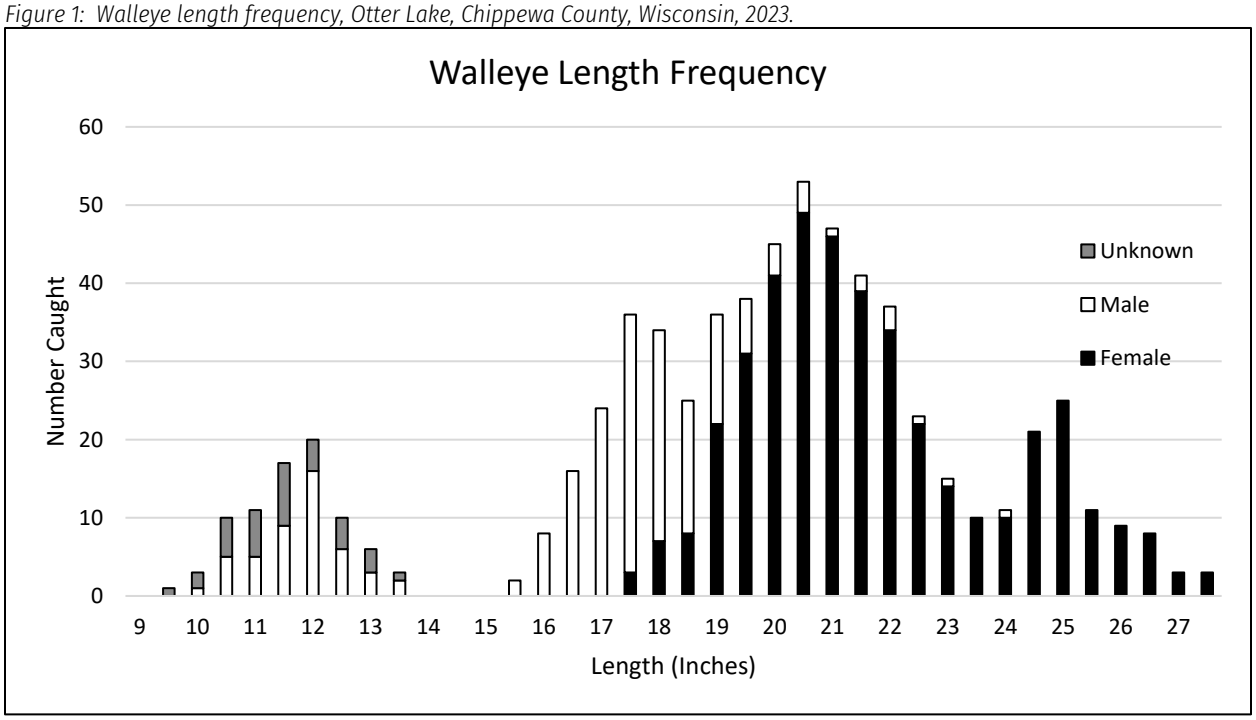


Figure 2: Age frequency of walleye, Otter Lake, Chippewa County, Wisconsin, 2023.

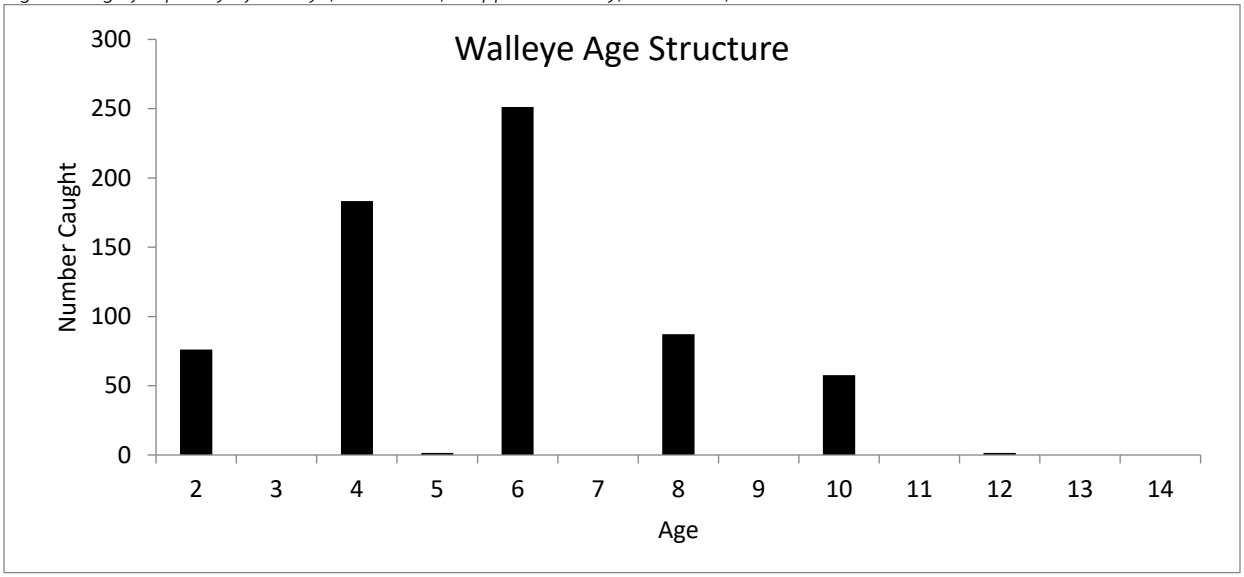
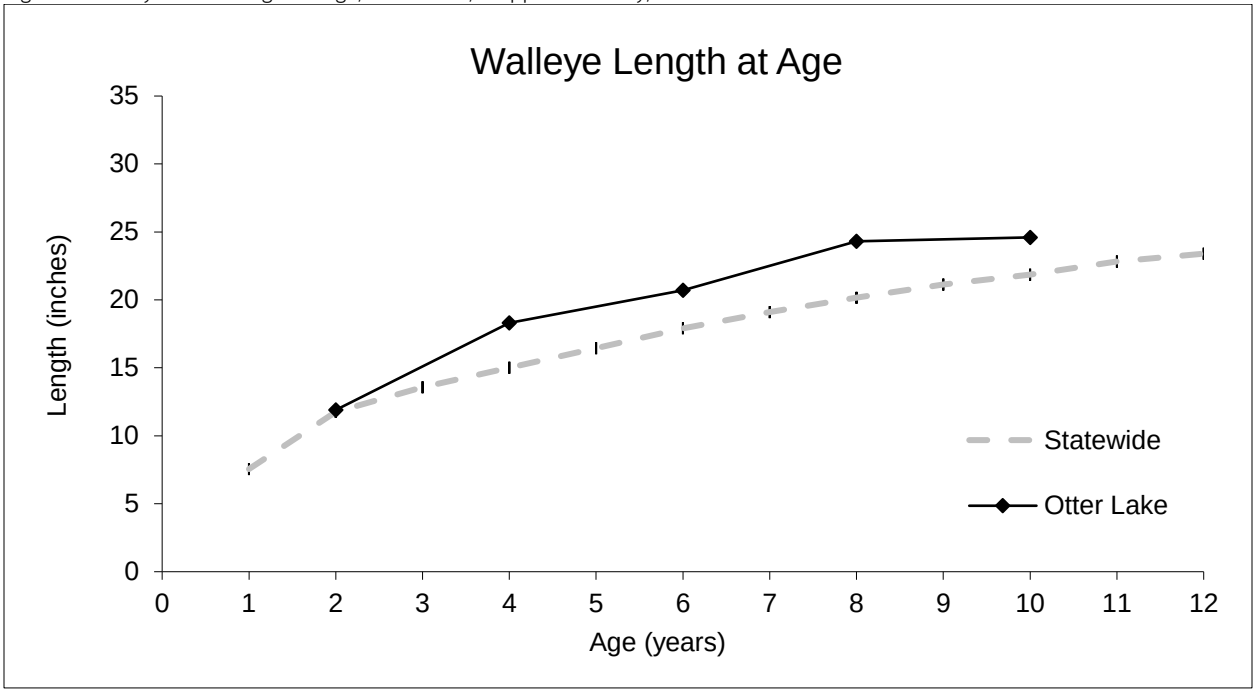


Figure 3: Walleye mean length at age, Otter Lake, Chippewa County, Wisconsin 2023.



LARGEMOUTH BASS

The relative abundance of largemouth bass in the 2023 was 37 fish per mile, which is slightly lower than what was observed in previous survey, but size structure remained fairly stable. Electrofishing CPUE in 2018 was 48 fish per mile, compared to 47 fish per mile in 2005, and 49 fish per mile in 2005. The mean length of largemouth bass in the 2023 survey was 13.7" (Range: 5.2-21 inches) (Figure 4), which is only one tenth

difference than what was observed in the 2018 survey at 13.6 inches (Range: 6-20.4 inches). These mean sizes are slightly better than what was observed in 2014, 12.9 inches (Range: 3-22 inches) and in 2005, 12.3 (Range: 2-19.4 inches). The percent of largemouth bass larger than 16 inches continues to improve. Data from the 2023 survey, show that the RSD-16 was 16 and the PSD was 67. These indices are not far off from the 2018 size structure metrics where the PSD was 80 and RSD-16 was 14. The previous two surveys show slightly poorer size structure. In the 2014 survey, the PSD, RSD-16 values were 73, 12 respectively and in 2005 the PSD was 55 and RSD-16 was 8. Length-at-age of largemouth bass was slightly faster for ages under six and on par with the statewide average for older fish (Figure 5).

Figure 4: Largemouth bass length frequency from spring electrofishing survey, Otter Lake, Chippewa County, Wisconsin, 2023.

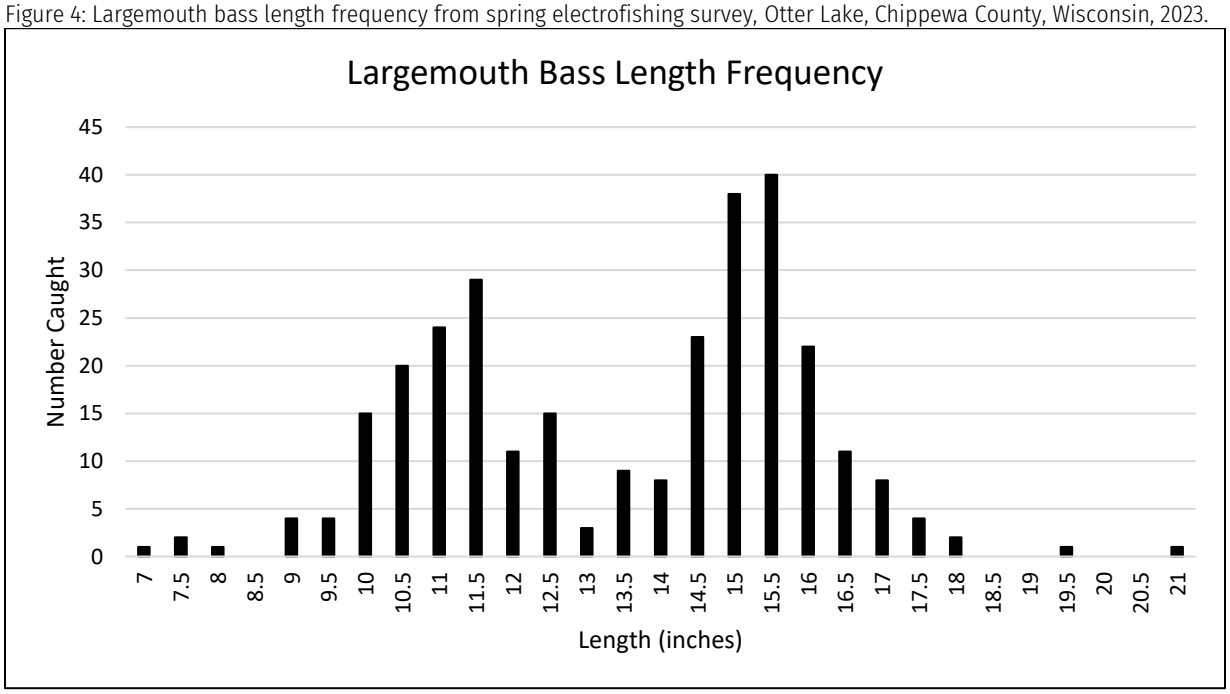
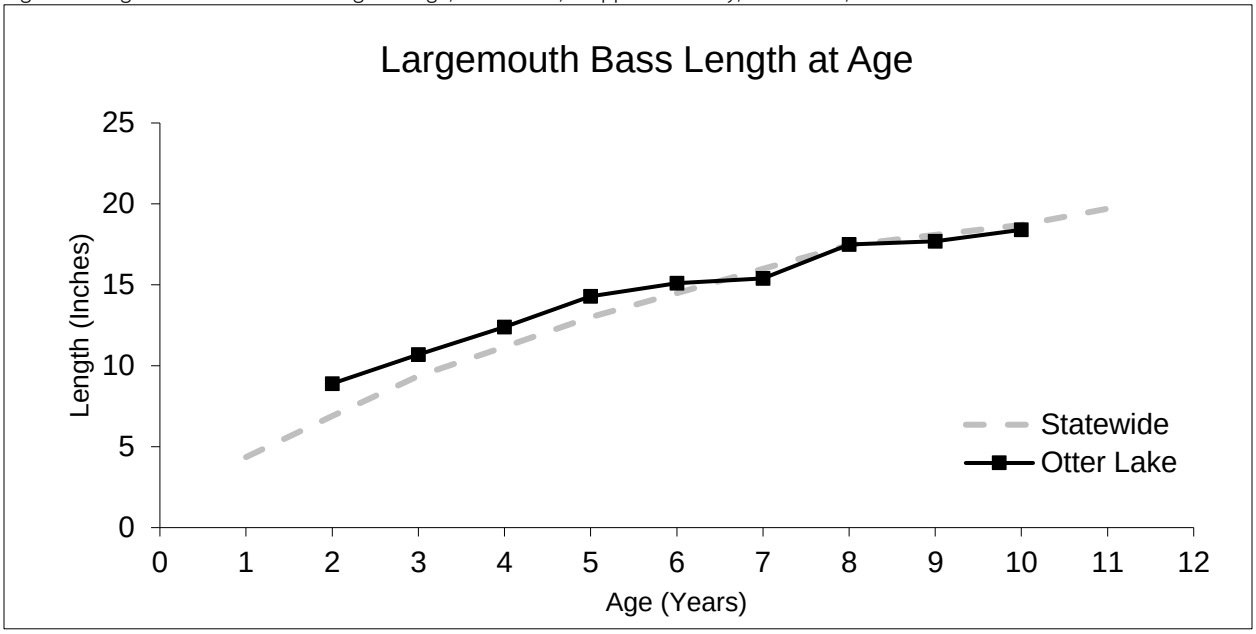


Figure 5: Largemouth bass mean length at age, Otter Lake, Chippewa County, Wisconsin, 2023.



NORTHERN PIKE

The spring fyke netting survey in 2023 yielded a relative abundance of 1.3 fish per net, which is lower than past surveys, but the size structure increased. The 2018 survey had the highest relative abundance with 3.2 fish per net, considering catches of 1.9 fish per net in 2014 and 2.6 fish per net in 2005. The mean length of northern pike was 24.7 inches (Range: 10.8-42.8 inches) in 2023 (Figure 6), up about an inch from 2018 where the mean length of northern pike was 23.1 inches (Range: 19-39 inches). This is almost identical to the mean length in 2014 of 23.0 inches (Range: 16-39 inches), but the mean length of northern pike was considerably higher in 2005 at 27.9 inches (Range: 11-40 inches). The size structure indices in 2023 are higher than what they were in 2018 and 2014 but lower than what they were in 2005. In 2023, the PSD was 83 and RSD-28 was 31 compared to 2018, where the PSD was 79 and RSD-28 was 9, which is similar to 2014 where the PSD was 70 and RSD-28 was 13 but lower than in 2005 where the PSD was 92 and RSD-28 was 62. When compared to the statewide average, mean length-at-age was variable, but was generally higher than the statewide average (Figure 7).

Figure 6: Northern pike length frequency, Otter Lake, Chippewa County, Wisconsin, 2023.

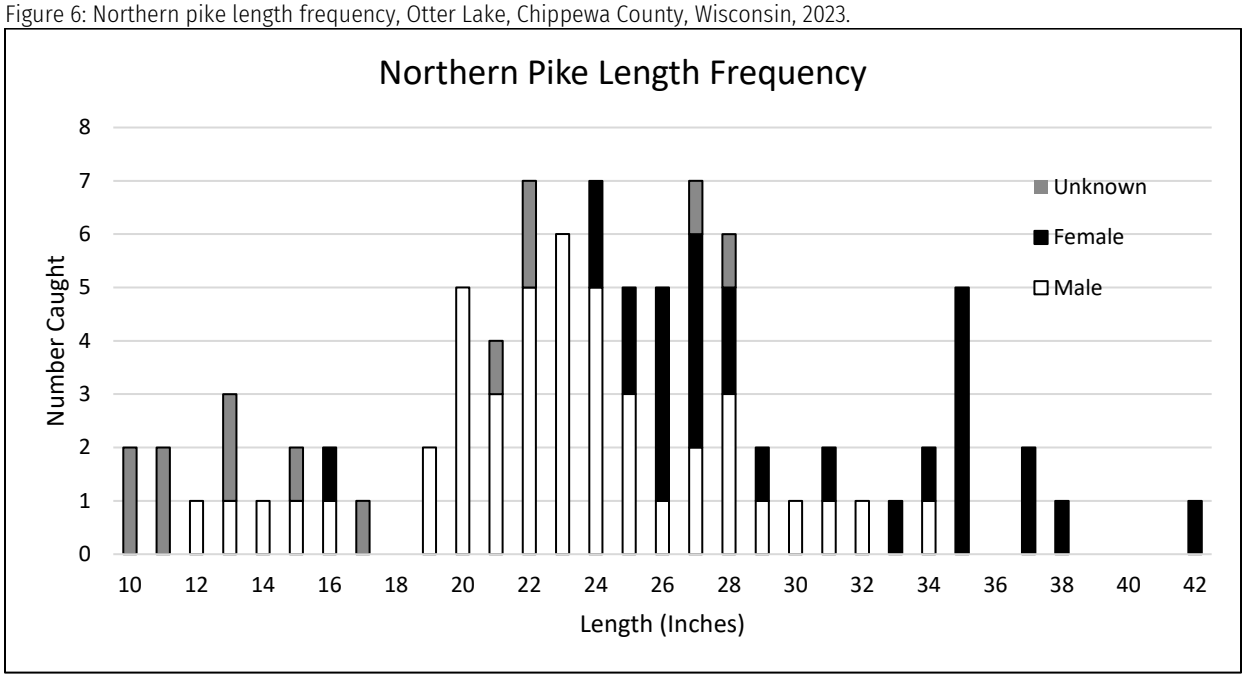
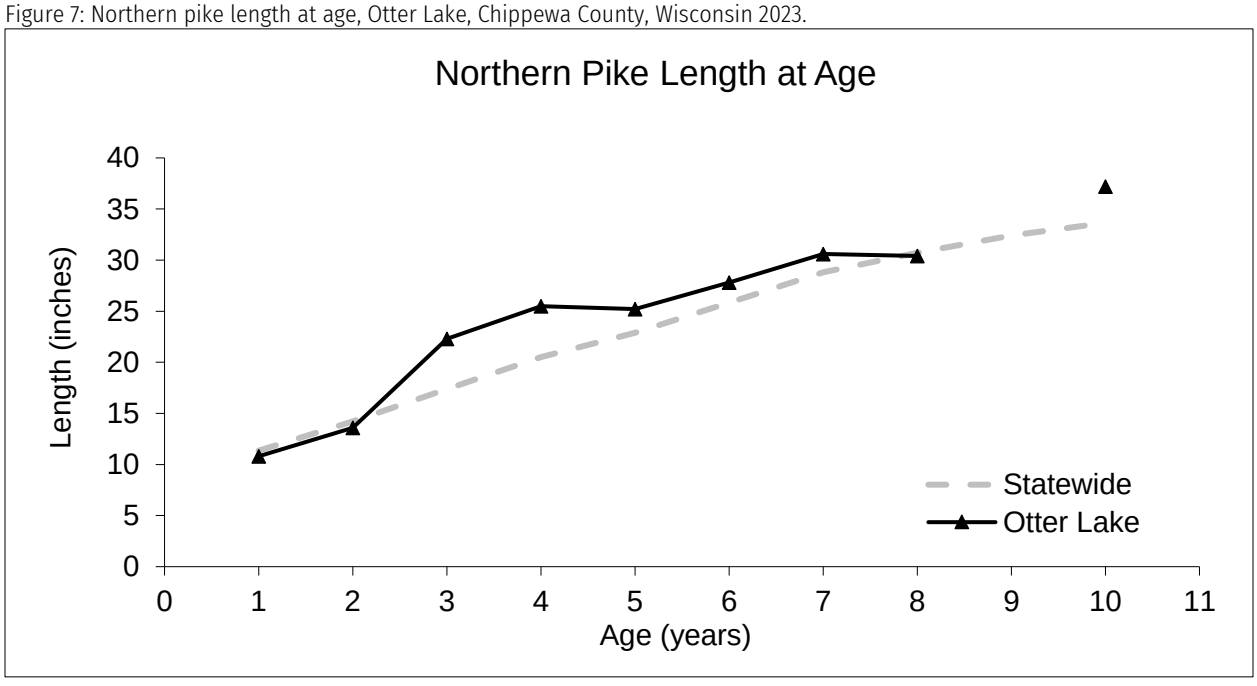


Figure 7: Northern pike length at age, Otter Lake, Chippewa County, Wisconsin 2023.



BLUEGILL

Bluegill electrofishing CPUE remains high although not as high as previous surveys: 166 fish per mile in 2023; 226 fish per mile in 2018; 179 fish per mile in 2014; and 173 fish per mile in 2005. Mean length of bluegill collected in fyke nets and electrofishing in 2023 was 6.6 inches (Range: 2.8-10.2 inches) (Figure 8) the PSD was 72 and the RSD-7

was 32 which is an improvement from the previous survey. In 2018, mean length was 6.2 inches (Range: 2-9.6 inches) and the PSD was 54 and RSD-7 was 29. The 2014 size structure data was very good relatively speaking when the mean length was 6.8 inches (Range: 2.4-9.8 inches) and the PSD was 79 and the RSD-7 was 59. Comparatively, in 2005, the mean length was 6.3 inches (Range: 3-9.4 inches) and the PSD was 70 and RSD-7 was 19. Bluegill growth rate was faster when compared to the statewide average (Figure 9).

Figure 8: Bluegill length frequency from fyke netting and electrofishing, Otter Lake, Chippewa County, WI, 2023.

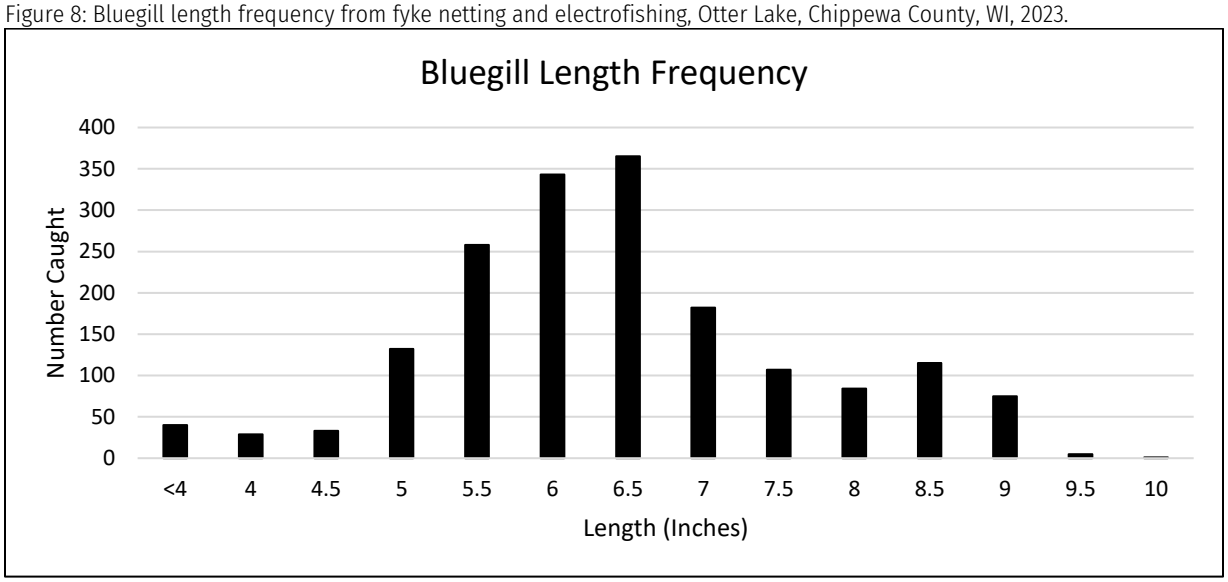
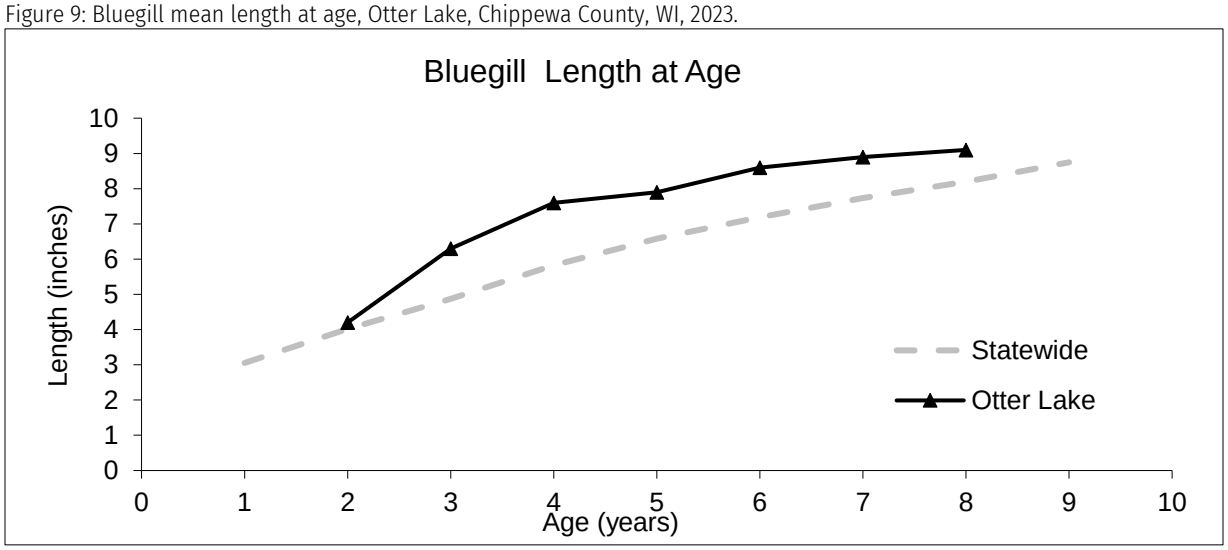


Figure 9: Bluegill mean length at age, Otter Lake, Chippewa County, WI, 2023.



BLACK CRAPPIE

Black crappie electrofishing CPUE was much lower in 2023 at 13 per mile when compared to previous surveys: 86 fish per mile in 2018; 45 fish per mile in 2014; and 24 fish per mile in 2005. Mean length of black crappie in 2023 was the highest since

2004 at 7.0 inches (Range: 2.6-12.1 inches) (Figure 10). In 2018, mean length was 5.6 inches (Range: 2.9-12 inches), smaller than in 2014 where the mean length was 6.6 inches (Range: 4-10 inches). In 2004, the mean length was the same as in 2023 at 7.0 inches (Range: 1.6-9.7 inches). In 2023, the PSD was 35 and RSD-10 was 10, which is an improvement from the previous survey in 2018 when the PSD was 11 and RSD-10 was 7. In 2014, the PSD was 32 and the RSD-10 was 1 and it 2004 the PSD was 17 and RSD-10 was 0. Additionally, black crappie growth rate was above the statewide average for ages 2-6 and on par with the statewide average for younger or older fish (Figure 11).

Figure 10: Black crappie length frequency, Otter Lake, Chippewa County, WI, 2023.

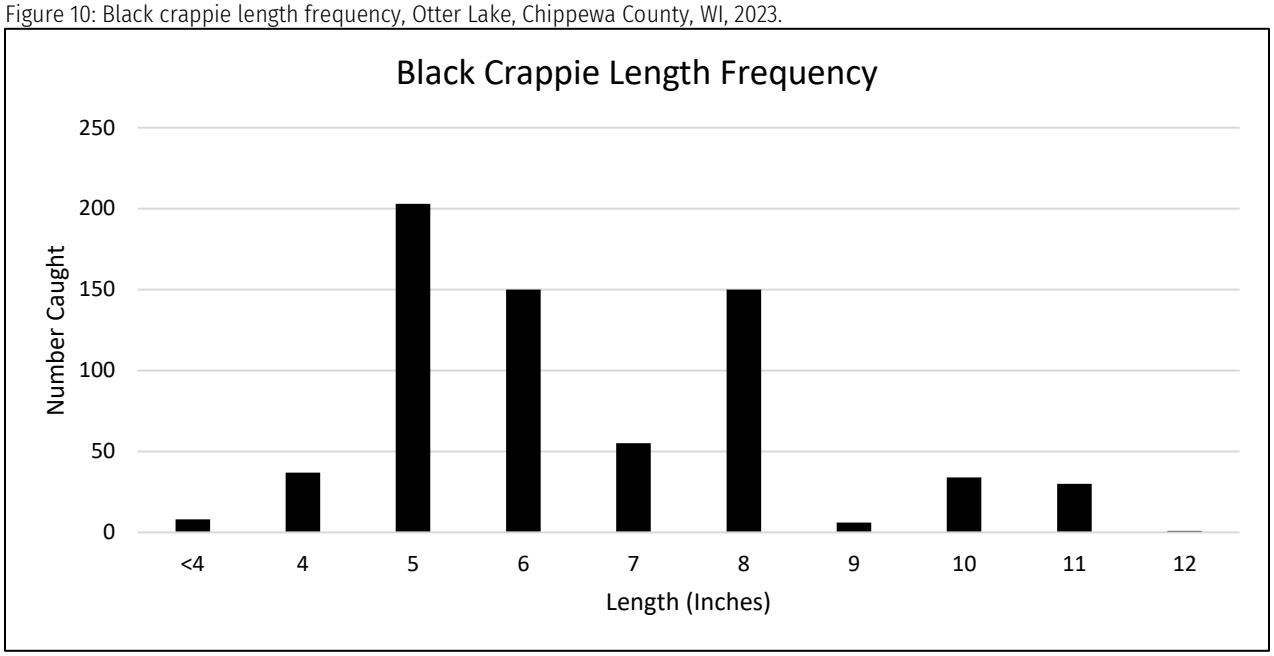
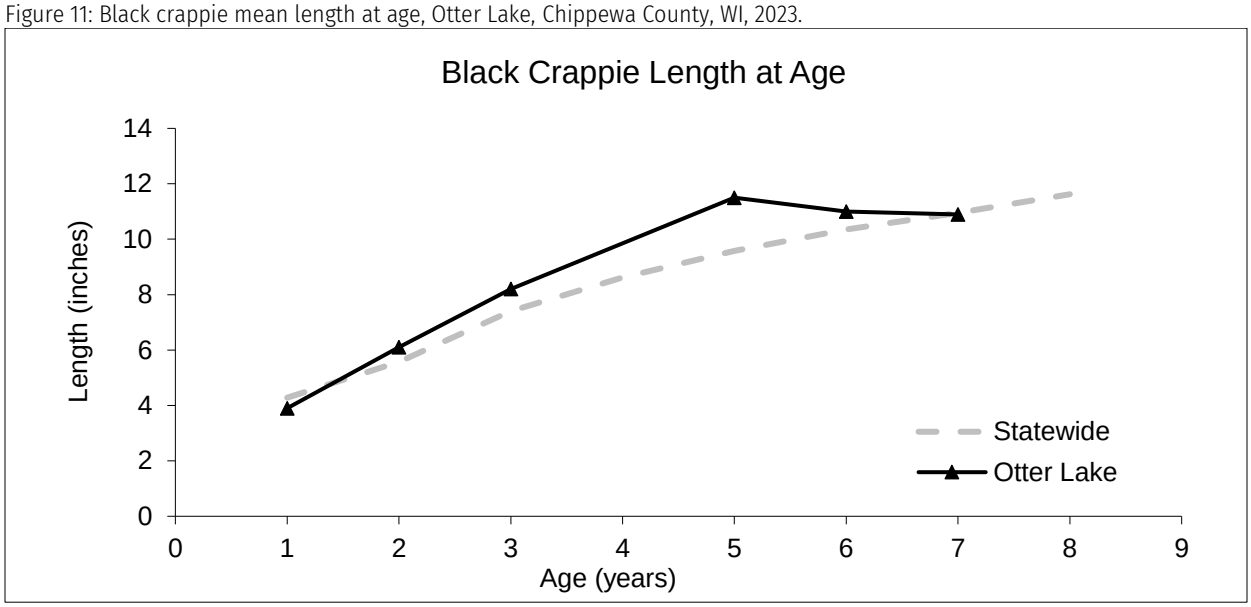


Figure 11: Black crappie mean length at age, Otter Lake, Chippewa County, WI, 2023.



YELLOW PERCH

The yellow perch catch rate was much lower than in the previous survey, but not far off of the mark from the 2014 and 2005 surveys. In 2023, the catch rate was 6.7 per net, compared to 91 fish per net in 2018. The relative abundance in the 2023 survey was similar to that observed in 2014 at 14 fish per net and 4.2 fish per net in 2005. Size structure increased slightly but remains poor as has been documented in the past. In 2023, the mean size was 6.7 inches (Range 3.6-10.5 inches), the PSD was 13 and the RSD-10 was 1. In 2018, the mean length was 5.5 inches (Range: 3.5-11.9 inches) (Figure 12) and PSD was 8 and RSD-10 was 1. This is similar to the results from the 2014 survey where the mean length was 6 inches (Range: 3.3-11.3 inches) and PSD was 14 and RSD-10 was 1. In 2004, the mean length was 6.3 inches (Range: 2.8-10.8 inches), the PSD was 6 and RSD-10 was 0.4 . Yellow perch length at age was higher than the statewide average (Figure 13).

Figure 12: Yellow perch length frequency, Otter Lake, Chippewa County, WI, 2023.

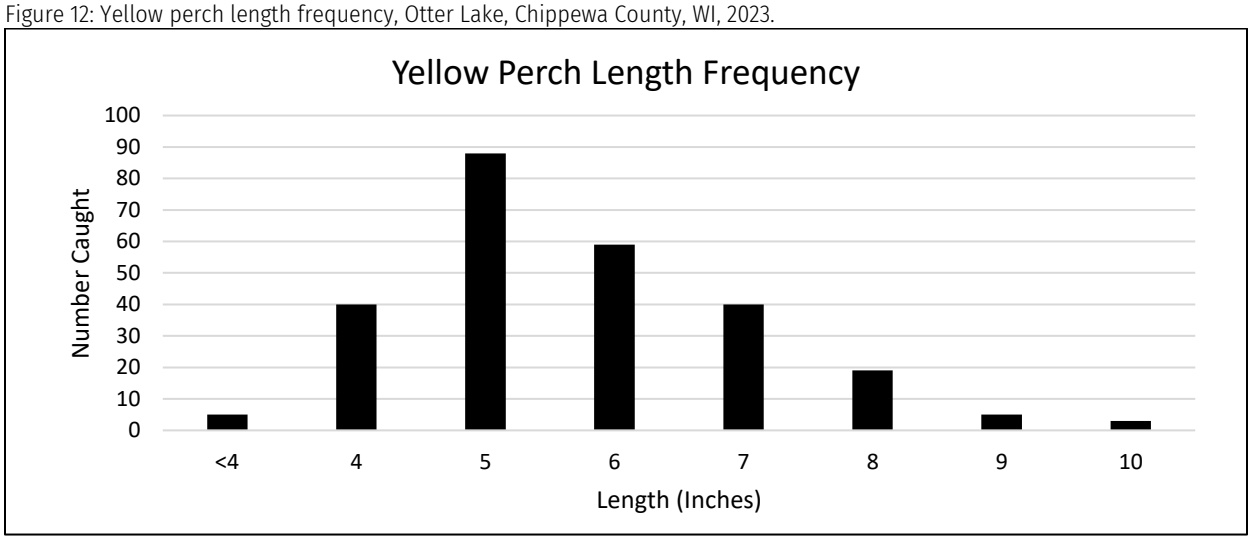
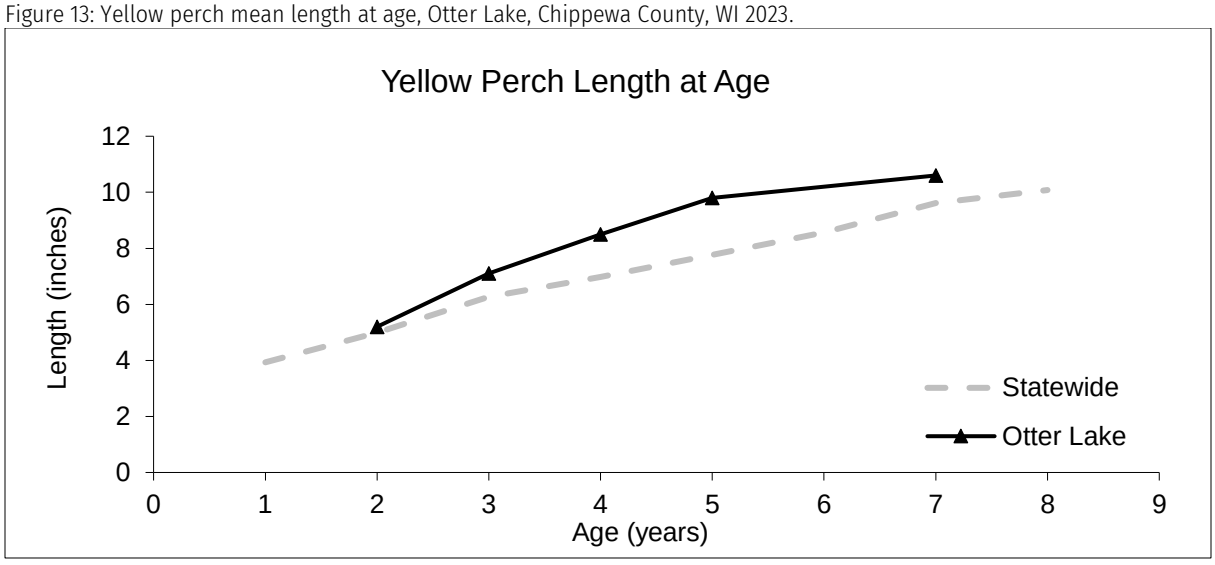


Figure 13: Yellow perch mean length at age, Otter Lake, Chippewa County, WI 2023.



OTHER SPECIES

Black bullhead, brown bullhead, yellow bullhead, pumpkinseed and white sucker were also collected during this survey. In addition, forage fish such as central mudminnow, golden shiner and tadpole madtom were also present (Table 2).

Table 1: Stocking History in Otter Lake, Chippewa County, WI, 2001-Present

Year	Species	Age Class	Number of Fish Stocked	Avg Fish Length In.	Stock Source
2001	WALLEYE	SMALL FINGERLING	33050	1.6	DNR
2003	WALLEYE	SMALL FINGERLING	33000	1.8	DNR
2005	WALLEYE	SMALL FINGERLING	34086	2.2	DNR
2005	WALLEYE	SMALL FINGERLING	33379	1.6	DNR
2005	WALLEYE	FRY	100000	-	NON-DNR
2009	WALLEYE	SMALL FINGERLING	23176	1.7	DNR
2010	WALLEYE	LARGE FINGERLING	1500	6	NON-DNR
2011	WALLEYE	SMALL FINGERLING	23129	1.6	DNR
2012	WALLEYE	LARGE FINGERLING	1500	6	NON-DNR
2013	WALLEYE	LARGE FINGERLING	6610	6.8	DNR
2015	WALLEYE	LARGE FINGERLING	6015	7.2	DNR
2017	WALLEYE	LARGE FINGERLING	6015	6.8	DNR
2019	WALLEYE	LARGE FINGERLING	6009	7.1	DNR
2021	WALLEYE	LARGE FINGERLING	6044	7.8	DNR
2023	WALLEYE	LARGE FINGERLING	6003	7.1	DNR

Table 2: Summary of all fish captured during spring electrofishing and fyke netting survey, Otter Lake, Chippewa County, Wisconsin, 2023.

Species	Fyke Netting	E-fishing	Total
Black crappie	1890	25	**1915**
Bluegill	8910	331	**9241**
Bullheads (Black, Brown, Yellow)	3	0	**3**
Central mudminnow	1	0	**1**
Creek chub	3	0	**3**
Golden shiner	10	0	**10**
Largemouth bass	80	383	**463**
Northern pike	86	0	**86**
Pumpkinseed	36	1	**37**
Tadpole madtom	2	0	**2**
Walleye	497	155	**652**
White sucker	44	0	**44**
Yellow perch	348	5	**353**

Discussion

WALLEYE

The walleye population in Otter Lake is doing well despite drop in total abundance compared to the previous survey in 2018. With consistent stocking of large fingerlings due to the Wisconsin Walleye Initiative, the walleye population has grown in recent years and was estimated at 2.3 adults per acre in 2023. This is less than the estimate of 7.3 adults per acre in 2018, but still considered very good for a stocked fishery. Stocking of large fingerlings (6-8 inches) at a rate of 10 per acre started in 2013 and has continued on an alternate year basis. From 2013 to 2023, annual fall surveys have been conducted in an attempt to document natural reproduction of walleye, but none has been found making stocked walleye likely the sole contributor to the population. Aging evidence corroborates that the walleye population is a result of stocking because almost all of the walleye age estimates were assigned back to one of the stocked year classes (Figure 2).

Size structure improved from the previous survey, and Otter Lake currently has the best walleye size structure of any lake recently surveyed in Chippewa County. There are a few reasons that can be attributed to the increase in the number of large walleye. Walleye in Otter Lake grow relatively fast compared to other walleye waters in the state (Figure 3). Because walleye have a fast growth rate, it takes less time to reach a larger size, which translates into good survival (69% annual survival rate). Another reason why size structure improved is because stocking has occurred on a consistent basis since 2013, so there are more older fish in the lake. Twenty-two percent of the fish captured were either eight or ten years of age which are generally greater than 24 inches in length. Female walleye grow to a larger size than male walleye and the population is predominately composed of females due to skewed sex ratios of stocked walleye (Figure 1). Eighty-two percent of the fully mature (ages 6-10) walleye age classes captured in the survey were female. The reason for the skewed sex ratio is unknown and is a topic currently being researched by DNR staff. Regardless of the reason, this is not bad news for Otter Lake walleye anglers because female walleye grow faster and bigger than males leading to many memorable size fish in the population. Additionally, the current walleye regulation (15” minimum size limit with a 20-24 inch protected slot and a three fish bag limit with one over 24 inches) protects larger fish, which limits harvest and likely contributes to the quality size structure.

The drop in estimated adult walleye abundance my seem concerning to anglers, but the populations size is still adequate to maintain a quality fishery. Typically with a stocked fishery, the goal is to maintain adult density above 1.5-2 fish per acre and that goal is being achieved in Otter Lake. The drop in population size may be due to increased angling effort for walleye. In 2018, the population increased fairly rapidly, and many anglers were likely unaware of the robust population that had developed. According to anecdotal angling reports since, anglers have taken advantage of this

quality fishing opportunity, so harvest may be one factor in the reduction in population size. Additionally, there is error in the population size estimates that are generated from the survey data. The 2018 population estimate may have been biased high where the 2023 estimate may be lower than the actual abundance. The drastic cool down and large snowstorm that occurred during the survey may have delayed a portion of the population from spawning, and thus they were unavailable to sampling leading to a lower estimated population size. To further corroborate this, the rate at which adult walleye were observed during the bass/panfish electrofishing survey was relatively high indicating that there may be more walleye present than estimated in 2023.

Walleye may also be contributing to the increase in bluegill size structure as have been observed in other areas (Schneider and Breck 1997). Walleye are known to consume juvenile panfish especially bluegill. It has been observed in other waterbodies that an increase in the population size of walleye has led to an increase in bluegill size structure. The mechanism that leads to this outcome is that walleye consume small bluegill, which in turn increases bluegill growth rates and ultimately results in larger bluegill as has been observed in Otter Lake.

LARGEMOUTH BASS

Largemouth bass are the dominant game fish in Otter Lake. There is a strong bluegill population to provide a forage base, and ample habitat is present in Otter Lake in the form of logs, stumps, aquatic vegetation, and a high amount of shoreline per surface acre, which may contribute to a slightly faster than average growth rate. Largemouth bass relative abundance dropped slightly from the previous survey, but it was still at a healthy level and well within the natural variation of the population. Size structure appears to be improving, with the mean length and RSD-16 both slightly higher compared to previous surveys and memorable sized fish are also present with fish as large as 21.4 inches and 6.3 pounds sampled in the survey. Additionally, annual year classes were observed in the survey indicating annual recruitment from natural reproduction contributing to the adult population.

NORTHERN PIKE

Eighty-six northern pike were captured during this survey, even though this may seem like a lot of fish, catch rates were lower relative to the previous survey. The catch rate fell from 3.6 fish per net in 2018 to 1.3 fish per net in 2023, which may be relative to a true decline in total abundance, or it could be a product of the spring weather prolonging the survey making for a less intense migration of spawning fish into shallow water. The survey in 2018 was short and intense (3 days) due to a rapid spring warm up. Conversely, the 2023 survey lasted 13 days due to fluctuating spring temperatures which led to more net nights with a modest pulse of fish moving into shallow water. Regardless, size structure was much better in 2023 than in 2018 with mean size increasing 1.6 inches and RSD-28 increasing from 9 to 31, with near trophy size fish present in the population up to 42.8 inches. Northern pike provide another

gamefish opportunity in addition to walleye and largemouth bass with quality size fish available for anglers.

BLUEGILL

Bluegill are likely the primary target for most anglers that fish Otter Lake. Bluegill catch rates (166 fish per mile) were lower than observed in the 2018 survey, but similar to the two surveys prior and still considered very high. Size structure has increased from 2018 with 0.4 inch increase in mean size, an increase the PSD from 54 to 72, and an increase in the RSD-7 from 29 to 32. Panfish data from Otter Lake can be compared to other nearby lakes which are known to have desirable pan fisheries to determine how it measures up. The catch rate in Marsh-Miller Lake (220 bluegill per mile) in 2019 was higher than Otter Lake and size structure was very similar (PSD-69, RSD-7 – 31). Otter Lake's bluegill population far surpassed that of Miller Dam's 2018 survey results in regard to relative abundance and size structure (69 bluegill per mile, PSD-33, RSD-7 – 14). Growth rates are well above the statewide average in Otter Lake likely due to the highly productive water and strong largemouth bass population which helps to reduce number of small bluegill and increase growth rates (Rasmussen and Michaelson 1974; Guy and Willis 1990). The bluegill fishery should continue to thrive on Otter Lake fueled by ample habitat and fast growth rates.

BLACK CRAPPIE

In previous surveys, the black crappie population has had poor size structure, but the 2023 survey showed modest uptick despite a decline in relative abundance. Not a bad trade off – less fish but more quality sized fish. The mean size, PSD and RSD-10 were all the highest recorded for Otter Lake. Black crappie are known to have highly variable recruitment making for inconsistent year class strength, which can cause variability in fishing success due to natural fluctuations in the population. There was an older less abundant year class in the fishery in 2023, which will likely dwindle in a few years and be replaced by a new year class of highly abundant smaller fish.

YELLOW PERCH

Yellow perch make up a relatively small proportion of the panfish population. Catch rates were much lower than what was observed in the previous survey. Size structure was poor with most fish from 5-6 inches making most of them likely two years old, however they should provide a good forage base for the northern pike and walleye populations. For comparison, Lake Altoona's catch rate was 248 per net in 2017 and size structure was better too with many fish in the 10-13 inch range. Growth rates in Otter Lake were consistent with the statewide average indicating that stunting is not an issue. Previous surveys show that Otter Lake has a history of poor yellow perch size structure, likely due natural mortality factors such as predation.

References

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