# WISCONSIN DEPARTMENT OF NATURAL RESOURCES Lake Wissota Fisheries Survey Report Chippewa County, Wisconsin 2024

Waterbody Code: 2152800



Photo Credit: Wisconsin DNR



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### **Executive Summary**

Lake Wissota is the largest waterbody in Chippewa County by surface area and it receives a high amount of angling activity. Walleye are the primary target for anglers on Lake Wissota and the population is in a healthy state in terms of abundance, size structure and recruitment. The adult walleve density was estimated at 2.1 adults per acre which was the highest it has been since the 2006 survey. Forty-three percent of the walleye sampled were over 15 inches, which may be attributed to a large 2018 year class in that size range. A large segment of the population, 47%, was in the new harvest slot of 13 inches to 16 inches, which should provide harvest opportunities of desirable sized fish for anglers. Walleye natural reproduction remains strong which will continue to provide recruitment of young walleye into the adult population. Muskellunge population size structure was guite good for a Class A1 fishery. The proportion of muskellunge over 30 inches and the proportion over 42 inches were all above the medians for Class A1 fisheries which are already known for good size structure. Northern pike were not targeted in this survey, but based on the fish that were caught, the size structures was in a healthy range, so they should provide a quality supplemental angling opportunity. Smallmouth bass catch rates remained high relative to previous surveys, but size structure was lower with 15% of the catch greater than 14 inches; however, near trophy size fish were present in the population as smallmouth bass as large as 19.5 inches were sampled. Bluegill catch rates and size structure were lower relative to the previous survey, but these metrics were in the range of prior surveys. Black crappie size structure was the highest documented in a recent survey as 43% were over 10 inches, but catch rates were lower, which may indicate there is an older year class present in the population at low numbers. DNR fisheries crews will be back on Lake Wissota in 2028 for another round of spring fisheries surveys.

### GLOSSARY

**PSD:** Proportional Stock Density – numerical description of population size structure. The percent of fish over a species-specific length standard when small fish, generally age-1, are disregarded. The higher the number, the greater proportion of large fish are present. Example for walleye: (# of fish  $\geq$  15 inches) / (# of fish  $\geq$  10 inches) X 100

**RSD:** Relative Stock Density – similar to a PSD, but a specific length is supplied. Example for walleye: RSD-20 = (# of fish  $\ge$  20 inches) / (# of fish  $\ge$  10 inches) X 100

**C.I.:** 95% confidence interval. There is a 95% certainty that the population estimate is between the upper and lower bounds given.

**CPUE:** Catch Per Unit Effort – generally given in catch per mile of electrofishing or catch per net lift.

## Introduction

Lake Wissota is a 6,300-acre impoundment of the Chippewa River located in southcentral Chippewa County near Chippewa Falls. It was created in 1917 when the hydroelectric dam was constructed which is now owned and operated by Xcel Energy. It is the fourth of six impoundments over a heavily dammed, 50 mile stretch of the Chippewa River. Lake Wissota is comprised a 4,100-acre 'main basin'; a 450-acre southern section named 'Little Lake Wissota'; a 350-acre north-eastern lobe known as the 'Yellow River/Moon Bay Area'; and an 8 mile stretch of river upstream of the County Highway S bridge to the Jim Falls hydroelectric dam. Lake Wissota has a maximum depth of 64 feet and over 70% of Lake Wissota is over 20 feet in depth. It is a eutrophic waterbody with an average Secchi depth of 4.5 feet in 2024. The lack to transparency in the water column is due to naturally stained water from the Chippewa River and algal blooms in the summer months.

The sport and panfishery in Lake Wissota is primarily comprised of walleye (Sander vitreus), smallmouth bass (Micropterus dolomieu), largemouth bass (Micropterus salmoides), northern pike (Esox lucius), muskellunge (Esox masquinongy), channel catfish (Ictalurus punctatus), flathead catfish (Pylodictis olivarisbluegill), lake sturgeon (Acipenser fulvescens), bluegill (Lepomis macrochirus), black crappie (Pomoxis nigromaculatus), and yellow perch (Perca flavescens).

Over the past several decades numerous fish habitat improvement projects have taken place on Lake Wissota. Hundreds of fish cribs have been installed, and more recently dozens of rock reefs were added to the lakebed by a local conservation group, The Chippewa Rod and Gun Club. The shoreline of Lake Wissota is heavily developed with residential housing, so over the past decade efforts have been made to improve nearshore habitat which is generally lost on highly developed waterbodies. The DNR has led numerous tree drop and fish stick projects to improve nearshore woody habitat for a variety of fish species. This past winter, a large-scale fish stick project took place on Little Lake Wissota where 80 large, hardwood trees were placed long the shoreline of Mermaid Bay. This project will provide spawning habitat for panfish and bass, refuge and feeding locations for juvenile fish, and foraging opportunities for gamefish. This project was made possible by partnership between the First Wisconsin Chapter of Muskies Inc., Lake Wissota Improvement and Protection Association, the DNR, the Town of Lafayette and the Chippewa County Highway Department.

Public infrastructure on Lake Wissota consists of seven boat landings around the lake and Lake Wissota State Park on the north end.

### **SURVEY EFFORT**

The purpose of this survey was to sample Lake Wissota under the DNR's tier 1 lake sampling protocol for public access lakes in Wisconsin. The primary goal was to

complete a population estimate for walleye and relative abundances for other important species such as northern pike, muskellunge, smallmouth bass, bluegill and black crappie. Lake Wissota is also surveyed each fall to evaluate walleye natural reproduction. Data from these surveys were compared to historical data to evaluate trends over time and determine if future management actions are necessary. Lake Wissota is on a four-year survey rotation, and it is scheduled to be surveyed again in 2028.

### Methods

**Fyke netting:** Six fyke nets were set on April 4<sup>th</sup> and six more fyke nets were added on April 5<sup>th</sup>. Fyke nets were collapsed on April 6<sup>th</sup> due to low catches and inclement weather. They were reopened on the 8<sup>th</sup> and checked daily until April 13<sup>th</sup>. Four nets were removed on April 12<sup>th</sup> and the remaining eight nets were removed on April 13<sup>th</sup> for a total of 74 net lifts.

Walleye captured with fyke nets, were measured for length and marked with a left ventral fin clip to facilitate a population estimate. Once approximately 10% of the population was believed to be marked, the fyke nets were removed. In order to get the information needed to estimate total abundance, a 'recap run' was conducted where the entire shoreline was electrofished and all adult walleye observed were captured. The ratio of marked (fin clipped) to unmarked walleye yields the information needed to calculate a total abundance estimate. For aging purposes, a subset of adult fish were sacrificed for otolith collection. Otoliths have shown to provide more accurate age estimates on older fish. A dorsal spine was taken from five fish of each sex per half inch group from walleye for age estimation as well.

Muskellunge were measured for length and given a Passive Integrated Transponder (PIT) tag to mark fish for identification in future surveys. Anal fin rays were taken for age estimation.

All northern pike were measured for length. All other fish were identified and counted.

**Electrofishing**: Electrofishing surveys were conducted on April 10<sup>th</sup>-14<sup>th</sup> and on May 14<sup>th</sup>. On April 10<sup>th</sup>-13<sup>th</sup>, daytime electrofishing surveys were completed on the Chippewa River near Jim Falls with a pulsed DC mini-boom shocker and all mature walleye captured were given a left ventral fin clip. On the night of April 14<sup>th</sup>, the entire 54-mile shoreline of Lake Wissota was sampled to obtain the recapture data needed for the population estimate. This task was completed with two pulsed DC mini-boom shockers and four pulsed DC maxi-boom shockers, each sampling a different section of shoreline. All walleye were collected during the recapture run were measured and inspected for a left ventral fin clip. The purpose of the sampling conducted the 14<sup>th</sup> of May was to capture centrarchids (bass, bluegill, crappie); this survey was broken into five stations. Each station contained a 0.5-mile 'bass/panfish run' in which all

bass and panfish were collected and a 1.5-mile 'bass run', where only bass were collected. For 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. One hundred of each fish species were measured for length and the rest were counted.

**Data Analysis:** Spring fyke netting, electrofishing, and abundance estimate data from 2024 were compared to previous survey data. An age frequency histogram was developed for the walleye population. Catch per unit effort and size structure data were compared to past surveys. Length at age for various species was calculated from the data collected in 2024 and compared to standard growth estimates to determine relative growth rates. Stocking records for Lake Wissota from the past decade are provided in Table 1.

# Results

### WALLEYE

During the initial marking portion of the population estimate, 1,573 mature walleye were marked with a left ventral fin clip. Most of the walleye, 73%, were captured electrofishing in the Chippewa River near Jim Falls and the remaining 27% were captured via fyke nets on the main lake. One thousand and twenty were captured during the recapture electrofishing run of which 121 were marked yielding an estimate of an adult walleye population size of 13,315 (95% C.I. =10,850-15,780) or 2.1 adults per acre. In comparison, during the 2015 survey the population size of adult walleye was estimated at 8,389 (95% CI=6,340-10,438) or 1.3 adults per acre; during the 2011 survey the abundance estimate was 6,437 (95% C.I.=5,366-7,509) or 1.0 adults per acre; during the 2006 survey the abundance estimate was 13,017 (95% C.I.=11,106-14,928) or 2.1 adults per acre; and during the 1996 survey the walleye population estimate was 10,484 (95% CI=9,658-11,310) or 1.7 adults per acre (Figure 1).

Size structure has improved relative to the previous four surveys. The mean length of walleye in the 2024 survey was 14.8 inches. The mean length of males was 14.3 inches and ranged from 10.7 inches to 21.2 inches. The mean length of females was 18.2 inches and ranged from 13.2 inches to 26.7 inches (Figure 2). The PSD was 42 and is an increase from prior surveys (Figure 3). The female RSD-20 was 21 and is on par with previous surveys (Figure 4). Out of the 2,950 walleye captured in this survey, 1,825 were male, 490 were female and 590 fish were of unknown sex for a male:female sex ratio of 3.7 (Figure 2).

Thirteen age classes were present in this survey ranging from 2-14 years of age (Figure 5). Total annual mortality for the walleye population was estimated at 34% (Figure 6). Growth rates were slow as walleye length at age for both sexes were

shorter than the statewide means (Figures 7 & 8). There is little variability over time of the mean length of the most common age classes for each sex (Figure 9).

Fall electrofishing catch rates of age-0 walleye are used to measure reproductive success. From 1995-2024, catch rates averaged 77 age-0 walleye per mile of shoreline sampled (Figure 10).



Figure 1: Adult walleye abundance estimates over time Lake Wissota, Chippewa County.

Figure 2: Walleye length frequency Lake Wissota, Chippewa County, 2024.





Figure 3: Walleye proportional stock density Lake Wissota, Chippewa County, 2024.



Figure 4: Female walleye relative stock density 20 inch over time Lake Wissota, Chippewa County, 2024.





Figure 6: Catch Curve for walleye on Lake Wissota, Chippewa County, 2024. Total annual mortality was 34%.





Figure 7: Length at age for male walleye on Lake Wissota, Chippewa County, 2024, compared to the statewide average for male walleye.

Figure 8: Length at age for female walleye on Lake Wissota, Chippewa County, 2024, compared to the statewide average for female walleye.





Figure 9: A comparison of the mean length of the most abundant age classes of each sex of walleye over time on Lake Wissota, Chippewa County.

Figure 10: Walleye age-0 catch rate (fish caught per mile of shoreline electrofished) Lake Wissota, Chippewa County, 1995-2024. Years without data (1996, 1999, 2007, 2008, 2010) no surveys were conducted.



#### **MUSKELLUNGE**

From 2019-2024, 137 muskellunge greater than 20 inches have been captured through DNR surveys and 176 muskellunge greater than 20 inches have been captured by Muskies Inc. anglers for a total of 313 fish sampled. Combining data collected by the DNR and Muskies Inc. over this timeframe, the PSD was 63 and RSD-42 was 15 (Figure

11). The maximum length of muskellunge measured was captured by an angler at 49 inches.

Muskellunge from 12 age classes were captured from 2019-2024 ranging from 1-14 years of age. Muskellunge length at age was above the mean for other musky populations in the state (Figure 12).

Muskellunge stocking records are presented in Table 1.



Figure 11: Muskellunge length frequency Lake Wissota, Chippewa County, 2019-2024 for volunteer angler and DNR captured fish.

Figure 12: Muskellunge length at age (males and females combined) on Lake Wissota, Chippewa County, 2019-2024 compared to the statewide mean for muskellunge length-at-age.



#### **NORTHERN PIKE**

Northern pike catches were low as they were not targeted in the 2024 survey. Thirtyfour northern pike were captured ranging in length from 16.1 inches to 31.3 inches with a mean length of 23.6 inches (Figure 13) with a PSD of 76.



Figure 13: Northern pike length frequency Lake Wissota, Chippewa County, 2024.

#### **SMALLMOUTH BASS**

Electrofishing CPUE was 14 fish per mile in 2024 and 2019, compared to 9 fish per mile in 2015, and 12 fish per mile in 2011 (Figure 14). In 2024, the mean length of smallmouth bass caught was 11.8 inches (Range: 5.0-19.5 inches) (Figure 15). Size structure in 2024 appears to have declined slightly relative to the previous survey, but on par with the 2015 survey and lower than the 2011 survey. In 2024 and 2015, the RSD-14 was 15, which is lower than what was observed in 2019 and 2011 when the RSD-14 was 26 and 36 respectively (Figure 16). Length-at-age of smallmouth bass was near the statewide average for most age groups (Figure 17).



Figure 14: Smallmouth bass relative abundance, Lake Wissota, Chippewa County 2011-2024.









Figure 17: Length at age for male and female smallmouth bass combined on Lake Wissota, Chippewa County, 2024 compared to the statewide average length at age for male and female smallmouth bass combined.



### **BLUEGILL**

Electrofishing CPUE was considerably lower in 2024 than the previous survey in 2019, but not far off the 2015 and 2011 survey. In 2024, the CPUE was 13 fish per mile, compared to 41 fish per mile in 2019, 17 fish per mile in 2015 and 24 fish per mile in 2011 (Figure 17). Size structure of the fish caught in 2024 was lower relative to the previous two surveys but higher than the 2011 survey. In 2024, the RSD-7 was 21,

which is lower than what was observed in 2019 and 2015 when the RSD-7 was 32 and 49 respectively but higher than an RSD-7 of 7 in the 2011 survey (Figure 18). Lengthat-age of bluegill for 2024 survey was combined with the length at-age from the 2019 survey so a broader age range could be portrayed. The length at age was higher than the statewide mean for most ages of bluegill (Figure 19).



Figure 17: Bluegill relative abundance, Lake Wissota, Chippewa County, 2011-2014.

Figure 18: RSD-7 for bluegill Lake Wissota, Chippewa County, 2011-2024.





Figure 19: Length at age for bluegill on Lake Wissota, Chippewa County, 2019-2024, compared to the statewide average for bluegill length at age.

#### **BLACK CRAPPIE**

Black crappie catch was lower, but size structure was noticeably higher than the previous surveys. CPUE in 2024 was 5 fish per mile compared to 19 per mile in 2019, and 14 per mile in both 2015 and 2011 (Figure 20). The RSD-10 of the fish caught in 2024 was 46, which is considerably higher than an RSD-10 of 10 in 2019 and an RSD of 3 in 2015 and somewhat higher than an RSD-10 of 29 in 2011 (Figure 21). Length at age of black crappie for the 2024 survey was combined with the length at age from the 2019 survey so a broader age range could be portrayed. The length at age was higher than the statewide mean for most ages of black crappie (Figure 22).



Figure 20: Black crappie relative abundance Lake Wissota, Chippewa County, 2011- 2024.



Figure 21: Black crappie size structure Lake Wissota, Chippewa County, 2011-2024.

Figure 22: Length at age for black crappie on Lake Wissota, Chippewa County, 2019-2024, compared to the statewide average for black crappie length at age.



Table 1: Stocking history Lake Wissota, Chippewa County, 2015-2024.

YEAR	SPECIES	STRAIN	AGE CLASS	NUMBER	<b>AVG LENGTH</b>	SOURCE TYPE
				STOCKED	(IN)	
2015	MUSKELLUNGE	UPPER	LARGE	2494	12.4	GOV THOMPSON
		CHIPPEWA	FINGERLING			SFH AND PONDS
		RIVER				
2015	MUSKELLUNGE	LEECH LAKE	LARGE	667	11	NON-DNR
			FINGERLING			
2016	MUSKELLUNGE	UPPER	LARGE	1500	11.7	GOV THOMPSON
		CHIPPEWA	FINGERLING			SFH AND PONDS
		RIVER				
2017	MUSKELLUNGE	UPPER	LARGE	825	11.4	GOV THOMPSON
		CHIPPEWA	FINGERLING			SFH AND PONDS
		RIVER				
2018	MUSKELLUNGE	UPPER	LARGE	3381	12.2	GOV THOMPSON
		CHIPPEWA	FINGERLING			SFH AND PONDS
		RIVER				
2019	MUSKELLUNGE	UPPER	LARGE	200	12.1	GOV THOMPSON
		CHIPPEWA	FINGERLING			SFH AND PONDS
		RIVER				
2021	MUSKELLUNGE	UPPER	LARGE	1146	14.1	GOV THOMPSON
		CHIPPEWA	FINGERLING			SFH AND PONDS
		RIVER				
2022	MUSKELLUNGE	UPPER	LARGE	272	11	NON-DNR
		CHIPPEWA	FINGERLING			
		RIVER				
2022	MUSKELLUNGE	UPPER	LARGE	2500	12	GOV THOMPSON
		CHIPPEWA	FINGERLING			SFH AND PONDS
		RIVER				
2023	MUSKELLUNGE	UPPER	LARGE	825	11	NON-DNR
		CHIPPEWA	FINGERLING			
		RIVER				
2024	MUSKELLUNGE	UPPER	LARGE	2467	13	GOV THOMPSON
		CHIPPEWA	FINGERLING			SFH AND PONDS
		RIVER				

### Discussion

#### WALLEYE

Data collected from the 2024 fisheries survey indicates that the walleye population was strong relatively to previous surveys conducted. The adult density was estimated at 2.1 adults per acre, which is the highest it has been since 2006 and a 62% increase since the last population estimate in 2015. A survey was attempted in 2019 but due to high flows in the Chippewa River sampling was unsuccessful there. Considering most of the walleye migrate upriver to spawn, a reliable population estimate could not be obtained. The density of walleve populations supported by natural reproduction in Wisconsin are typically between three and four adults per acre, so 2.1 adults per acre may not seem very good. Considering much of the main basin of Lake Wissota is deep, relatively unproductive habitat that lacks significant structure for walleye life history needs, a density estimate based on the entire surface area of Lake Wissota may not be a fair comparison to other, more productive waterbodies. A reasonable assessment of the current status of the adult walleve population size is to compare it to previous abundance estimates from Lake Wissota as all waterbodies have their own strong points and limitations. When evaluating the population size in that context, the adult density is in great shape.

Not only has adult density improved but size structure has as well. When only taking into consideration walleye over 10 inches, 43% of those fish were also over 15 inches in the 2024 survey, which is referred to as Proportional Stock Density or PSD. This is higher than documented in previous surveys and up from the mark of 25% in the 2015 survey. The female RSD-20, or percent of female walleye over 10 inches that are also over 20 inches, did not show an increase but it was on par with other surveys at 21%. Another way to state this information is that there was an increase in the number of walleye that are between 15 and 20 inches relative to previous surveys, but the proportion of walleye over 20 inches has been steady. This is likely due to the 2018 year class, which was relatively large and were in that 15 to 20 inch size range. An increase in quality sized walleye from 15 to 20 inches was good to see as poor size structure has been a common complaint from anglers.

A total of 2,950 walleye were sampled as part of this survey which represents a good portion of the population in which to draw conclusions. Of those walleye, 1,825 were male, 490 were female and 590 fish were of unknown sex for a male:female sex ratio of 3.7. This is a decrease from a male:female sex ratio of 5.3 in 2015, which indicates a larger proportion of female walleye were captured in 2024. The sex ratio is not likely the true proportion of males to females that are present in Lake Wissota as walleye spawning behavior differs by sex where males occupy the spawning grounds for a longer period of time than females, so males are sampled at a disproportionally higher rate than females. Male walleye started to mature at age-3 or 11 inches, and most male walleye were mature at age-4 or 12-14 inches. Female walleye started to

mature around age-4 or 14.5 inches, and most were mature by age-5 or 15-16 inches. Considering most male walleye were mature by 12 inches, the majority of unknown sex fish sampled between 12 and 15 inches were likely immature females and not included in the adult population estimate.

Male walleye grow slower and do not get as large as female walleye. Male walleye ranged in size from 10.7 inches to 21.2 inches with the 77 % of the population between 12 and 16 inches. Only two percent of male walleye were 18 inches or longer. Both male and female walleve were on average 1.6 inches shorter than the statewide mean length for a walleye of the same age. An annual mortality rate of 34% eventually reduces the adult male abundance over time and combining that with a slower growth rate, few male walleve reach past the 18 inch mark. Female walleve have the potential to grow larger and faster than male walleye, so they can carry eggs for the next generation. Female walleye ranged from 13.2 inches to 26.7 inches. Female walleye were spread over a larger size range than males with the majority of their population, 73 % were between 15 inches and 20 inches. In contrast to males, 48% of females were greater than 18 inches. The slower growth rates for walleve in Lake Wissota can likely be attributed to the large walleye year classes and lack of productive habitat present to fuel a faster growth rate. The 4,100 acre main basin is relatively unproductive habitat, and the majority of it is deeper than 25 feet with little aquatic vegetation or other habitat needed to support a robust forage fish community. The Chippewa River has soft water, and soft water systems are known to be less productive than more alkaline waterbodies, so that likely factors into the slower growth rates as well.

A new walleye regulation on Lake Wissota, and surrounding impoundments on the Chippewa River, when into effect in the spring of 2024. The new regulation allows walleye of at least 13 inches to be kept, except walleye from 16 to 24 inches must be released and only one may be over 24 inches. Based on input through the Spring Hearing process, and though the Statewide Walleye Management Plan update, anglers stated their dissatisfaction with the 14 to 18 inch protected slot. The old regulation was not performing as desired by increasing growth rates as growth rates have remained relatively stable, and many of the male walleye were succumbing to natural mortality while in the closed slot. The goals of the new regulation are to allow anglers to keep a more desirable size of fish, maintain density, focus harvest on slower growing male walleye and increase size structure by protecting walleye from 16 to 24 inches. It will be interesting to watch how this regulation shapes the population moving forward.

Walleye natural reproduction remains strong in Lake Wissota, which will sustain the population into the future. Each fall an electrofishing survey is conducted on Lake Wissota to assess walleye year class strength and the mean CPUE is 77 age-0 walleye per mile of shoreline sampled. This is considered excellent as a year class between 10 and 20 per mile is generally considered successful in northern Wisconsin lakes. There was a relatively large year class in 2018, which were age-6 at the time of this

survey, and they made up a large percentage of the catch. The 2023 year class was the strongest since the 2018 year class and the 2023 year class will be entering the harvest slot in 2026-2027 depending on sex. Walleye recruitment is known to be variable and often success is driven by environmental factors that are out of our control. Poor year classes happen occasionally such as in 2024, but poor walleye year classes were observed on most waterbodies throughout the state in the fall of 2024. Recruitment is expected to rebound in the coming year or two as Lake Wissota has a history of strong natural reproduction.

#### **MUSKELLUNGE**

Lake Wissota is a classified as a Class A1 muskellunge fishery based on its angling quality. These waters are best known as "trophy waters" for their ability to consistently produce a number of large muskellunge but overall abundance of muskellunge may be relatively low. Angling action can be inconsistent in these waters, but the fish that are caught have a larger average size. At certain times when conditions are right these waters can also provide good action. Class A1 waters represent 19% of all muskellunge waters in Wisconsin. The reproductive category for Lake Wissota is a Category 2, which means that there is some natural recruitment, but stocking is necessary to sustain a fishable population.

Muskellunge are difficult to capture in fisheries surveys in large reservoir systems and Lake Wissota is no exception. Typically, a muskellunge population estimate would be conducted to collect the data needed for management, but population estimates have been tried in the past on Lake Wissota with limited success. Most recently, a population estimate was attempted in 2015/2016. During these surveys, nets were set on likely muskellunge spawning habitat and checked daily through the water temperature spawning range (50-60 degrees), but catches were low, and a population estimate was not attainable with the data collected. It is suspected that adult muskellunge migrate up tributaries or to dams to spawn leaving the area where they are susceptible to capture in Lake Wissota. Muskellunge have been documented running up tributaries and to dams to spawn in other riverine systems (Warren 2013; Zelman et al. 2023). Therefore, in order to make management decisions about the population, data is collected from muskellunge captured opportunistically during fisheries surveys for other species and from data provided by angling cooperators.

Members of the First Wisconsin Chapter of Muskies Inc. (FWCMI) have partnered to help collect data on the muskellunge population in Lake Wissota. The FWCMI, with oversite by the DNR, implemented a volunteer angler tagging program in 2017. This program allows trained volunteers to tag muskellunge caught angling with a PIT (Passive Integrated Transponder) tag. The PIT tag information, along with biological data from each fish caught, is given to the DNR at the end of the angling season. The value of this program has been demonstrated over the past several years as it has added to the data set for muskellunge management, which is especially important in Lake Wissota given the difficulty of catching muskellunge in large reservoir systems.

From 2019 through 2024, data was collected on 313 muskellunge from Lake Wissota. Volunteer anglers from the FWCMI volunteer tagging program provided data on 176 muskellunge and data from 137 muskellunge came from DNR surveys. Considering the FWCMI anglers provided data on more muskellunge than captured during DNR fisheries surveys over the same timeframe, it is clear that this program helps provide supplemental data on the population to be more confident in management decisions.

The Lake Wissota muskellunge population has relatively good size structure even for a Class A1 fishery which are known to have above average size structure. The PSD is the proportion of muskellunge larger than 20 inches that are also larger than 30 inches. When considering all muskellunge captured from 2019 through 2024, the PSD was 63. The third quartile for PSDs for other Class A1 fishery around the state is 54, so Lake Wissota has a higher PSD than 75% of the other Class A1 fisheries. An RSD-42 is the proportion of muskellunge that are larger than 20 inches that are also larger than 42 inches. The RSD-42 was 15 on Lake Wissota when incorporating data from all 313 muskellunge, and that metric ranks above the statewide median for Class A1 fisheries which is 13. The longest muskellunge captured from 2019-2024 was 49 inches caught by a volunteer angler. Lake Wissota has the ability to produce trophy sized fish as muskellunge as long as 52 inches has been captured in previous fish surveys. Due to the historic good size structure metrics and potential to produce trophy class muskellunge, a 50 inch minimum length limit was implemented in 2018.

The growth rate for muskellunge was above the statewide mean when pooling data from 92 male and female muskellunge collected from 2019 to 2024 (Figure 10). Most of the muskellunge were collected outside the spawning timeframe making differentiating between sexes difficult, which is why aging data from males and females were analyzed collectively. Female muskellunge are known to grow faster and to a larger size, so if more female muskellunge were captured than males, the growth rates could be artificially inflated. Faster than average growth rates may be attributed to a high biomass of sucker species in Lake Wissota mainly shorthead redhorse, golden redhorse, silver redhorse and white suckers. Additionally, a faster growth rate may indicate that the population is not restricted by density dependance, and stocking rates are not too high for the attributes of this waterbody.

Stocking is necessary to maintain a desirable muskellunge population in Lake Wissota. The upper Chippewa River strain is the native genetic strain to Lake Wissota, and it is well adapted to the physical and environmental conditions present in the watershed. Upper Chippewa River strain musky are reared at Tommy Thompson State Fish Hatchery in Spooner, Wisconsin, and fall fingerlings average 12 inches in length when stocked in mid to late September. The current guidance for a Class A1 fishery is to stock at a rate of one fish per acre on an alternate year basis and the number of fish is capped at 2,500 per waterbody regardless of size. Given the size of Lake Wissota, stocking is capped at 2,500 fish which equates to approximately 0.4 fish per acre. In the past, due to the size of Lake Wissota, open nature of the Chippewa River system and adequate hatchery production, it was stocked annually at 2,500 fall fingerlings. However, under current policy, future stocking will conform with the current guidance at 2,500 fish on an alternate year basis. FWCMI has helped supplement DNR stockings in recent years by working with private aquaculture to purchase fry from the DNR which were reared in a private setting and stocked as fall fingerlings. Private stocking has helped offset a lack of state hatchery production in recent years and may help mitigate stocking reductions from the new stocking policy. Stocking history from the past decade for Lake Wissota is available in Table 1.

#### **SMALLMOUTH BASS**

Given that Lake Wissota is an impoundment of the Chippewa River, and smallmouth bass evolved in riverine environment, they are the dominate bass species in Lake Wissota. Largemouth bass are present in Lake Wissota at low numbers, but none were captured in this survey. Relative abundance of smallmouth bass, measured by number caught per length of shoreline electrofished, was 14, which is the same as it was in 2019 and somewhat higher than it was in 2015 and 2011. Overall the relative abundance of smallmouth bass is considered stable. Trophy sized fish are still present in the population as smallmouth bass just shy of 20 inches were captured; however, the RSD-14 was lower in the 2024 survey relative to the previous surveys. The RSD-14 for smallmouth bass is the proportion of fish greater than 7 inch that are also longer than 14 inches and this metric was 15, which is lower than it was in 2019 but within the range seen in previous surveys. The PSD which is the proportion of bass greater than 7 inches that are also greater than 11 inches was 52, which is considered on the high end of the recommended range (Anderson and Weithman 1978). Despite the proportion of fish greater than 14 inches being lower than the previous survey, the size structure it is still in a healthy range.

Smallmouth bass growth was on par with the statewide average with a mean length of an age-5 largemouth bass was 14 inches. Consistent age classes were present from two through seven indicating consistent recruitment over this timeframe. Numerous tree drop and fish stick project have occurred over the years, which may help recruitment and provide consistent year classes in the future.

#### **NORTHERN PIKE**

Northern pike were not a target species in this survey, but biological data was collected from northern pike that were incidentally captured in fyke nets while targeting spawning walleye. If attempting to capture northern pike, fyke nets would have been set near northern pike spawning habitat such as isolated bays, remnant emergent vegetation or tributary mouths and a better sample of the population would have likely been obtained. Unfortunately, resources are not available to collect sizable amounts of data on all species. The PSD for northern pike is the proportion of fish longer than 14 inches that are also longer than 21 inches. Using data from the 34 northern pike caught, the PSD was 76 which is considered high (Anderson and Weithman 1978) indicating good size structure. The mean length was 23.6 inches which is a nice sized fish for harvest. The northern pike population provides a bonus fishery to supplement other fishing opportunities on Lake Wissota.

#### PANFISH

#### **BLUEGILL:**

Bluegill relative abundance in 2024 was much lower than the previous survey but not far off the 2015 or 2011 surveys. Size structure was lower in 2024 as well with 21% of bluegill captured greater than 7 inches but it is higher than observed in the 2011 survey. The PSD which is the percent of bluegill greater than 3 inches which are also greater than 6 inches was 64, which is in the recommended range for quality bluegill fishing (Novinger and Legler 1978). Despite lower catch rates and size structure compared to other surveys, quality bluegills still exist in the populations. Typical productive bluegill habitat such as vast vegetation flats are lacking in Lake Wissota, which helps explain the relatively lower catch rates compared to waterbodies with more productive bluegill habitat. Lake Wissota has stained water, sandy substrate, and a large open main basis that has a lot of wind and wave energy. All of these physical characteristics of the lake are not conducive for vegetation growth and bluegill habitat. Recent additions of nearshore woody habitat in the form of tree drops and fish sticks may help the bluegill population grow in the coming years. Growth rates were above the statewide average so slow growth or 'stunting' is not a concern.

#### **BLACK CRAPPIE:**

Black crappie relative abundance was low in the 2024 survey, but size structure was high as 43% of the crappie caught were greater than 10 inches. Crappie are known for highly variable recruitment and are often referred to as having 'boom or bust' populations (Guy and Willis 1995; McDonough et. al 1991). Considering the relatively low catch rate and good size structure, the population may be in the later stages of a large year class that is dwindling in numbers, but the fish are of good sized. Another strong year class may be entering the population in the coming years, so relative abundance may increase but size structure may decline. Nearshore woody habitat additions may help improve natural reproduction and recruitment as well.

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