# WISCONSIN DEPARTMENT OF NATURAL RESOURCES Maiden Lake - 2022 Fish Management Report

WBIC 487500



Photo Credit: WDNR



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## Introduction

Maiden Lake is in northern Oconto County just southwest of Lakewood. At 278 acres it is one of the larger lakes in the immediate area and offers a variety of recreational opportunities in addition to fishing. There are two access points/boat landings on the lake; a public launch is maintained by the Town of Riverview on Maiden Landing and the other is a private landing at the Maiden Lake Resort.

The Department of Natural Resources (DNR) stocked small fingerling Walleye in 2001 and large fingerling Walleye, beginning in 2014 under the Wisconsin Walleye Initiative (Table 1). The Maiden Lake Association was responsible for all other recent Walleye stockings (1995, 1998 and 2013) (Table 1). No Walleye had been stocked between 1947 and 1995 and the fishery had been sustained by natural reproduction.

Year	Species	Number Stocked	Average Length (inches)	Source
1995	WALLEYE	2100	6.0	PRIVATE HATCHERY
1998	WALLEYE	2150		PRIVATE HATCHERY
2001	WALLEYE	12000	1.6	DNR HATCHERY
2013	WALLEYE	1496	7.0	PRIVATE HATCHERY
2014	WALLEYE	2779	6.6	DNR HATCHERY
2016	WALLEYE	2796	7.9	DNR HATCHERY
2018	WALLEYE	2782	7.5	DNR HATCHERY
2020	WALLEYE	2827	8.1	DNR HATCHERY
2022	WALLEYE	2782	7.6	TRIBAL HATCHERY

Table 1. Maiden Lake stocking history, Oconto County, WI.

The last fisheries survey of Maiden Lake was conducted in 2014/2015. The primary objective of the 2022 comprehensive fisheries survey was to generate a Walleye population estimate while also assessing the status of the fishery by characterizing other gamefish populations based on relative abundance, proportional stock density (PSD), relative stock density (RSD), catch per unit effort (CPUE) and mean length at capture (age and growth).

### **SURVEY EFFORT**

Table 2. Sampling effort for 2022 Maiden	Lake fisheries	survey, Oconto	County, WI.
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Survey Seq No	Survey Begin Date	Survey End Date	Primary Survey Purpose				
515096969	4/26/2022	5/1/2022	FISHERIES ASSESSMENTS LAKES EARLY SPRING WAE MUE (SN1 & SE1)				
515097040	6/1/2022	6/1/2022	FISHERIES ASSESSMENTS LAKES LATE SPRING BASS PAN (SE2)				
515097080	6/13/2022	6/16/2022	FISHERIES ASSESSMENTS LAKES SUMMER PANFISH (SN3)				
515097394	8/2/2022	8/3/2022	FALL RECRUITMENT SURVEY (mini fyke nettting)				
515097908	9/21/2022	9/21/2022	FISHERIES ASSESSMENTS LAKES FALL JUVENILE (fall electrofishing)				

## **Methods**

### **DATA COLLECTION**

Standard fyke nets (spring & summer; 3-foot hoop, 3/4-bar, 1.5-inch stretch), minifyke nets (1/4-inch stretch with turtle exclusion) and a standard WDNR electrofishing boat (spring/SE1, summer/SE2, fall) were used to collect fish. All fish collected were measured to the nearest 0.1-inch (in) total length (TL). A sub-sample of scales, dorsal spines, or anal fin rays was collected for age and growth analysis from all gamefish. Aging structures were collected from 5 fish per half inch group in the stock, quality and preferred length groups. Ages were assigned to each fish using standard WDNR procedures.

#### **DATA ANALYSIS**

Catch per unit effort (CPUE) was calculated as catch by gear divided by sampling effort for each species collected. Length frequency distributions were tabulated from fish measured during the electrofishing and fyke net samples; not all panfish were measured. Proportional stock density (PSD) and relative stock density for preferred length fish (RSDP) were calculated for dominant gamefish (Anderson and Neumann 1996). Preferred lengths of various gamefish have a minimum length between 45 and 55% of the world record length for that species (Anderson and Neumann 1996). Stock, quality, and preferred lengths were used as proposed by Gabelhouse (1984). Mean length at capture data was calculated for dominant gamefish and compared to the average of mean length at age for northern Wisconsin.

## **Results**

Overall, 1,392 fish representing 12 species and hybrid sunfish were collected during the 2022 sampling season (Table 3). The five most abundant species collected by number were Walleye Sander vitreus (32%), Bluegill Lepomis macrochirus (29%), Rock Bass Ambloplites rupestris (17%), Smallmouth Bass Micropterus dolomieu (12%) and Largemouth Bass Micropterus salmoides (5%).

2022									
SPECIES COMPOSITION OF FISHES COLLECTED									
*COMMON NAME	TOTAL NUMBER COLLECTED	PERCENT	NUMBER COLLECTED (FN)	NUMBER COLLECTED (SE1 - EF)	NUMBER COLLECTED (SE2 - EF)	NUMBER COLLECTED (FN PANFISH)	NUMBER COLLECTED (Fall - EF)	AVERAGE LENGTH (inches)	LENGTH RANGE (inches)
Walleye**	443	32%	256	162	7	8	10	16.9	6.0 - 25.4
Bluegill	399	29%	13		51	335		6.8	2.5 - 10.5
Rock Bass	241	17%	13		55	173		7.6	4.0 - 11.9
Smallmouth Bass	168	12%	1		139	28		11.6	4.0 - 17.9
Largemouth Bass	70	5%	2		64	4		13.0	3.0 - 17.4
Sunfish Hybrids <sup>^</sup>	18	1%	1			17		6.7	5.6 - 8.9
Pumpkinseed	16	1%			16			5.7	2.5 - 7.4
Yellow Bullhead	13	1%			1	12		10.8	7.2 - 13.0
Northern Pike**	13	1%	4			9		20.7	13.8 - 30.9
Yellow Perch	6	0.4%	6						
Green Sunfish	3	0.2%			2	1		4.6	4.0 - 5.4
White Sucker	1	0.1%			1				
Black Crappie	1	0.1%				1		11.0	11.0 - 11.4
τοται ς	1 202		206	162	226	E00	10		
* Common namos o	Compon pages of fishes recognized by the American Eichories Society								

Table 3. Species composition of fishes collected during the 2022 comprehensive survey of Maiden Lake. Oconto County. WI.

\*\* Recapures not included

<sup>^</sup>Hybrids may include: Bluegill X Unknown, Green Sunfish X Bluegill, Green Sunfish X Unknown, & Pumpkinseed X Bluegill.

#### WALLEYE

Walleye made up 32% of the total catch with 443 fish collected (Table 3). This total includes Walleye collected during spring and summer fyke netting, spring (SE1), summer (SE2) and fall electrofishing. Walleye ranged in length from 6.0 to 25.4 inches and averaged 16.9 inches across all samples (Figure 1). Electrofishing CPUE (SE1) was 32.5/mile and similar to 2015 (35.0/mile). Spring fyke netting CPUE almost doubled from 8.5/net night (NN) in 2015 to 16.2/NN in 2022. The fall electrofishing survey, which was conducted before stocking, produced 8 young-of-the-year (YOY) Walleye which suggests natural reproduction is occurring and has improved slightly since 2014.

The 2022 population estimate for adult Walleye was 448 or 1.7 adults/acre. This was less that what was observed in 2015 when the population estimate was 559 or 2.1 adults/acre.



Figure 1. Length frequency of Walleye collected during 2015 and 2022 surveys in Maiden Lake, Oconto County, WI.

A subsample of 12 Walleye was aged. Fish ranged in age from 4 to 8 years old (Figure 2). Walleye were reaching legal size (18 inches) at age 6. Compared to the average length at age for northern Wisconsin, Walleye growth was average.



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Figure 2. Mean length at age of Walleye collected during 2015 and 2022 surveys in Maiden Lake, Oconto County, WI.

### BLUEGILL

A total of 399 Bluegill was collected which accounted for 29% of the fish collected (Table 3). Bluegill ranged in length from 2.5 to 10.5 inches and averaged 6.8 inches (Figure 3). Twenty percent of all Bluegill collected during SE2 electrofishing were 6 in or greater and considered harvestable. Electrofishing CPUE decreased from 94.0 to 51.0 Bluegill/mile between 2014 and 2022. Bluegill PSD (21) and RSD<sup>P</sup> (0) from the SE2 electrofishing sample was the same in both 2014 and 2022.

The decrease in electrofishing CPUE prompted summer panfish netting. Summer panfish netting in 2022 resulted in a CPUE of 18.6/NN which was greater than the 17.9/NN observed in 2016. The amount of sampling effort (NN) was different between years; 21 NN in 2016 vs. 18 NN in 2022.



Figure 3. Length frequency of Bluegill from Maiden Lake, Oconto County, WI.

A subsample of 25 Bluegill was aged from 3 to 8 years old. In 2022, growth was slightly above average at ages 4 through 8 compared to the mean length at age of Bluegill in northern Wisconsin (Figure 4).



Figure 4. Mean length at age of Bluegill from Maiden Lake, Oconto County, WI.

### **ROCK BASS**

Rock Bass were the 2<sup>nd</sup> most abundant panfish species collected, accounting for 17% of all fish collected in 2022 (Table 3). Rock bass ranged in length from 4.0 to 11.9 inches and averaged 6.6 inches (Figure 5). Summer panfish netting CPUE (9.6/NN) was nearly identical between 2016 and 2022. Overall, Rock Bass contribute significantly to the panfish fishery in Maiden Lake.



Figure 5. Length frequency of Rock Bass from Maiden Lake, Oconto County, WI.

#### **SMALLMOUTH BASS**

Smallmouth Bass are the second most abundant gamefish species in Maiden Lake (Table 3). Overall, 168 Smallmouth Bass were collected that ranged in length from 4.0 to 17.9 inches and averaged 11.6 inches (Figure 5). Electrofishing CPUE was 31.3/mile in 2014 and 34.8/mile in 2022. PSD increased from 36 to 68 between 2014 and 2022. RSD<sup>P</sup> also increased from 12 to 33 between surveys. This increase in PSD and RSD<sup>P</sup> can be attributed to the increased catch of smallmouth  $\geq$  12 inches in 2022 (Figure 5).



Figure 5. Length frequency of Smallmouth Bass from Maiden Lake, Oconto County, WI.

A subsample of 31 Smallmouth Bass was aged using scales (<12") and dorsal spines (>12"). Ages ranged from 3 to 11 years old (Figure 6). Smallmouth Bass growth was average until age 9 but below average at older ages compared to the mean length at age of Smallmouth Bass in northern Wisconsin (Figure 6). Smallmouth were reaching 14 inches by age 7.



Figure 6. Mean length at age of Smallmouth Bass in Maiden Lake, Oconto County, WI.

### **LARGEMOUTH BASS**

Largemouth Bass only accounted for 5% of the fish collected during the 2022 survey (Table 3). Overall, 70 Largemouth ranged in length from 3.0 to 17.4 inches and averaged 13.0 inches (Figure 7). Electrofishing CPUE decreased between 2014 and 2022 from 20.8/mile to 16.0/mile. PSD increased significantly from 50 to 92 between 2014 and 2022 because fewer Bass were collected between 8 and 12 inches. RSD<sup>P</sup> improved from 8 to 21 between surveys. The increase in RSD<sup>P</sup> can be attributed to the number of Bass collected over 15 inches in 2022 (Figure 7).



Figure 7. Length frequency of Largemouth Bass from Maiden Lake, Oconto County, WI.

A subsample of 15 Largemouth Bass was aged using scales (<12") and dorsal spines (>12"). Ages ranged from 6 to 10 years old (Figure 8). In 2022 Largemouth Bass growth was below average compared to the mean length at age of Largemouth in northern Wisconsin (Figure 8). Largemouth were reaching 14 inches between age 8 and 9.



Figure 8. Mean length at age of Largemouth Bass in Maiden Lake, Oconto County, WI.

# **Discussion**

Maiden Lake supports a quality and diverse fishery. Walleye density appears to have declined only slightly between 2015 and 2022. Even so, Walleye fyke netting CPUE doubled while utilizing only ½ the sampling effort (26 NN in 2022 comparted to 56 NN in 2015) because net locations were adjusted between years to better target spawning walleye. The average length of Walleye collected in 2022 was 16.9 inches and similar to the 2014/2015 survey when the average length of Walleye was 16.7 inches. Forty-one percent of the Walleye collected during the 2022 spring netting were greater than 18 inches and above the minimum harvest length limit.

Walleye natural reproduction, which is assessed through electrofishing in the fall, has improved slightly since the last survey (Table 4). The 2022 YOY Walleye assessment occurred before stocking and resulted in the collection of 8 YOY or 1.4 YOY Walleye/mile. In 2014, 5 YOY (1.3 YOY Walleye /mile) were collected but in 2015, no YOY were collected. As the number of adults per acre increases, natural reproduction should also improve.

Table 4. Fall electrofishing results for young-of-the-year (YOY) Walleye on Ma	iden
Lake, Oconto County, WI.	

Year	Survey Date	Number of Miles	YOY collected	YOY / Mile
1999	10/14/1999	5.5	3	0.5
2014	9/10/2014	4.0	5	1.3
2015	9/15/2015	4.2	0	0.0
2022	9/21/2022	5.6	8	1.4

Maiden Lake is one of the few lakes, if not the only lake in northern Oconto County, where Smallmouth Bass are more abundant than Largemouth Bass (Table 3). The habitat in Maiden Lake should continue to favor Smallmouth Bass over Largemouth Bass. Reproduction for both species is adequate to maintain healthy populations.

Bluegill numbers remain solid as confirmed by summer panfish netting. Typically, panfish populations (abundance and size structure) are evaluated using only summer electrofishing (SE2) because smaller fish are not vulnerable to capture via netting. However, these results emphasize the importance of utilizing summer panfish netting to fully assess panfish populations when necessary.

Northern Pike have never been a dominant predator in Maiden Lake. The amount of shallow, weedy habitat that Pike favor is limited. Therefore, the lack of Pike observed during the survey should not be alarming.

## **Recommendations**

The current fishing regulations are adequate to provide quality fishing opportunities for a variety of species. The next comprehensive fisheries survey (spring fyke netting, electrofishing {spring, summer, fall}) of Maiden Lake is scheduled for 2030 and will focus on the age, growth, abundance, and recruitment of the dominant gamefish. Our specific goals will be to assess adult Walleye density, Walleye reproduction and Walleye recruitment. Alternate year fall surveys will continue to monitor Walleye reproduction and recruitment of stocked fish. Increasing the stocking rate of large fingerling Walleye from 5 to 10/acre should be considered if adult density and natural reproduction do not improve.

### References

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