### WHEELER LAKE Oconto County 2022 Fish Management Report

Christopher C. Long – Senior Fisheries Biologist





Wisconsin Department of Natural Resources 101 N. Ogden Rd. Suite A Peshtigo, Wisconsin 54157





### SUMMARY

<u>Lake and location:</u> Wheeler Lake, Oconto County, T33N R16E Sec 27

#### Physical / chemical attributes (Wisconsin DNR, 1975): Surface acres: 293 Maximum depth (ft): 35 Average depth (ft): 15 Shoreline length (mi): 4.0 Lake type: Seepage (80% over 20 ft) Basic water chemistry: Neutral, clear water of high transparency, Secchi = 13 ft. Littoral substrate: 40% gravel, 30% rubble, 20% sand and 10% muck. Aquatic vegetation: Sparse; Eurasian water milfoil is present. Other features: This lake is highly developed with over 150 homes along the shoreline. It is located within the Ceded Territory.

<u>Purpose of survey:</u> Determine the status of fishery.

Survey Seq No	Survey Begin Date	Survey End Date	Primary Survey Purpose
515096970	26-Apr-22	1-May-22	FISHERIES ASSESSMENTS LAKES EARLY SPRING WAE MUE
515097041	31-May-22	31-May-22	FISHERIES ASSESSMENTS LAKES LATE SPRING BASS PAN
515097041	7-Jun-22	9-Jun-22	FISHERIES ASSESSMENTS LAKES SUMMER PANFISH
515097391	1-Aug-22	2-Aug-22	FALL RECRUITMENT SURVEY
515098000	5-0ct-22	5-0ct-22	FISHERIES ASSESSMENTS LAKES FALL IUVENILE

#### <u>Surveys:</u>

#### <u>Fishery:</u>

The Wheeler Lake fishery is comprised of panfish species (Bluegill, Yellow Perch, Black Crappie, Pumpkinseed and Rock Bass) and gamefish species (Walleye, Largemouth Bass, Smallmouth Bass and Northern Pike).

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## INTRODUCTION

Wheeler Lake is in northern Oconto County east of Lakewood. At 293 acres, it is one of the larger lakes in the immediate area and offers a variety of recreational opportunities in addition to fishing. There is one access point/boat landing on the lake which is maintained by the Town of Lakewood on Wheeler Lake Lane. The U.S. Forest Service owns and operates a public beach on the west side of the lake.

A creel survey conducted during the 2008/2009 fishing season (open water and ice fishing) revealed that 21% of fishing effort was targeted at Walleye. The total catch of Walleye during the creel survey period was 193 fish with a harvest of 154 walleye. Anglers fished a total of 28.6 hours to catch a Walleye and 36.0 hours to harvest a Walleye. Fishing pressure (hours/acre) on Wheeler Lake was 43.0 hours/acre which was lower than the Oconto County average (70.6) but more than the statewide average (33.6).

The Department of Natural Resources (DNR) stocked small fingerling walleye from 1964 to 1970. For decades the Walleye fishery was sustained through natural reproduction. The last fisheries survey of Wheeler Lake was conducted in 2014 (Long, 2015). That survey indicated that Walleye density was only 0.9 adults per acre. As a result, small fingerling stocking occurred in 2014 and large fingerling stockings began in 2015 at the rate of 5 fish/acre (Table 1). Walleye fishing regulations were also changed in 2015. The previous regulation consisted of a 15inch minimum length limit (MLL) and the daily bag limit fluctuated based on tribal harvest declarations. The new MLL is 18 inches, and the daily bag limit is 3.

In 2014, Largemouth Bass and Northern Pike populations exhibited good numbers and size structure while panfish (Bluegill and Black Crappie) appeared to be under-represented in the survey. Therefore, special regulations for panfish (10 fish daily limit) and Largemouth Bass (no minimum length limit and 5 fish daily bag) were established in 2016 and 2019, respectively.

The goal of the 2022 comprehensive fisheries survey was to assess the status of the fishery by characterizing 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). Comparisons to previous surveys were made where applicable.

Year	Species	Number Stocked	Average Length (inches)	Source	
2014	WALLEYE	9844	2.6	DNR HATCHERY	
2015	WALLEYE	1465	8.2	PRIVATE HATCHERY	
2016	WALLEYE	1464	7.4	TRIBAL HATCHERY	
2017	WALLEYE	1464	7.9	DNR HATCHERY	
2017	WALLEYE	1407	3.2	DNR HATCHERY	
2017	BLUEGILL	1700	6.0	PRIVATE HATCHERY	
2018	YELLOW PERCH	1500	5.5	PRIVATE HATCHERY	
2019	WALLEYE	1407	7.0	DNR HATCHERY	
2021	WALLEYE	1403	7.3	DNR HATCHERY	
2022	YELLOW PERCH	1400	7.0	PRIVATE HATCHERY	

Table 1. Wheeler Lake stocking history; Oconto County, WI.

### **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 DNR 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 DNR 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. Proportional stock density (PSD) and relative stock density for preferred length fish (RSD<sup>P</sup>) 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 & DISCUSSION**

Overall, 1,024 fish representing 12 species and were collected during the 2022 sampling season (Table 2). The five most abundant species collected by number were Walleye Sander vitreus (29%), Largemouth Bass Micropterus salmoides (17%), Rock Bass Ambloplites rupestrism (16%), Northern Pike Esox lucius (10%) and Bluegill Lepomis macrochirus (8%).

2022									
SPECIES COMPOSITION OF FISHES COLLECTED									
*COMMON NAME	TOTAL NUMBER COLLECTED	PERCENT	NUMBER COLLECTED (FN)	NUMBER COLLECTED (SE1 - EF)	NUMBER COLLECTED (PANFISH FN)	NUMBER COLLECTED (SE2 - EF)	NUMBER COLLECTED (Fall - EF)	AVERAGE LENGTH (inches)	LENGTH RANGE (inches)
Walleye**	298	29%	227	41	5	15	10	17.6	11.5 - 25.4
Largemouth Bass	176	17%	5		3	168		12.0	2.0 - 17.4
Rock Bass	165	16%	14		118	33		7.5	2.5 - 10.4
Northern Pike**	100	10%	77		14	9		19.5	13.0 - 23.9
Bluegill	77	8%	3		14	60		4.7	2.5 - 7.9
Smallmouth Bass	68	7%	2		7	59		11.2	5.5 - 16.2
Yellow Bullhead	68	7%	2		61	5		10.7	9.0 - 12.6
Yellow Perch	40	4%	38			2		7.6	4.5 - 10.9
Pumpkinseed	16	2%			9	7		6.0	3.0 - 7.9
Black Crappie	13	1%	8		5			9.7	7.0 - 13.3
Green Sunfish	2	<1%			2			5.0	5.0 - 5.4
Brown Bullhead	1	<1%			1			14.0	14.0 - 14.4
TOTAL	1,024		376	41	239	358	10		•
* Common names o	of fishes reco	gnized by t	the American	Fisheries So	ciety.				

Table 2. Species composition of fishes collected during the 2022 comprehensive survey of Wheeler Lake, Oconto County, WI.

\*\* Recapures not included.

Walleye made up 29% of the total catch with 298 fish collected (Table 2). This total includes Walleve collected during spring (SN1) and summer (SN3) fyke netting. spring (SE1), summer (SE2) and fall (FE) electrofishing. Walleye ranged in length from 6.4 to 25.4 inches and averaged 17.6 inches across all samples (Figure 1). Electrofishing CPUE (SE1) was 14.4 Walleye/mile and improved from the 1.0/mile observed in 2014. SN1 CPUE also improved from 2.0 Walleye/net night (NN) in 2014 to 7.8/NN in 2022. The fall electrofishing survey produced 1.8 young-of-the year (YOY) Walleye / mile which is evidence that natural reproduction is occurring and has improved since 2014 when no YOY Walleye were collected.



Figure 1. Length frequency of Walleye collected during 2014 and 2022 surveys in Wheeler Lake, Oconto County, WI.

A subsample of 21 Walleye was aged. Fish ranged in age from 5 to 7 years old (Figure 2). On average, Walleye in Wheeler Lake are reaching legal size (18 inches) by age 7. This is considered normal growth for Walleye in northern Wisconsin (Figure 2).



Figure 2. Mean length at age of Walleye collected during 2014 and 2022 surveys in Wheeler Lake, Oconto County, WI.

Largemouth Bass were the second most abundant species collected during the 2022 survey (Table 2). Overall, 176 largemouth were collected that ranged in length from 2.0 to 17.4 inches and averaged 12.0 inches (Figure 3). Electrofishing CPUE increased substantially between 2014 and 2022 from 28.5/mile to 42.0/mile. PSD more than doubled from 21 to 58 between 2014 and 2022. RSD<sup>P</sup> also improved significantly from 0 to 16 between surveys. The increase in RSD<sup>P</sup> can be attributed to the number of Bass collected <u>></u> 12 inches in 2022 (Figure 3).



Figure 3. Length frequency of Largemouth Bass collected during 2014 and 2022 surveys in Wheeler Lake, Oconto County, WI.

A subsample of 29 Largemouth Bass was aged using scales (<12") and dorsal spines (>12"). Ages ranged from 3 to 15 years old which is surprising since only fish from the 8, 12 and 15-inch length groups were aged (Figure 4). Even though bass growth was average until age 6, growth was below average at older ages (Figure 4).



Figure 4. Mean length at age of Largemouth Bass collected during 2014 and 2022 surveys in Wheeler Lake, Oconto County, WI.

In 2014, Rock Bass *Ambloplites rupestris* were the most abundant species sampled and accounted for 32% of all fish collected. In 2022, Rock Bass only made up 16% of the fish collected (Table 2). Rock Bass ranged in length from 2.5 to 10.4 inches and averaged 7.5 inches (Table 2). SN3 CPUE was 9.8 Rock Bass/NN in 2022 and increased from 7.2/NN in 2016.

Northern Pike accounted for 10% of the fish collected (100 total). Pike ranged in length from 13.0 to 23.9 inches and averaged 19.5 inches (Figure 5). In 2022, fyke netting CPUE was 2.3 pike/NN and almost doubled from 2014 when Northern Pike CPUE was 1.2/NN.



Figure 5. Length frequency of Northern Pike collected during 2014 and 2022 surveys in Wheeler Lake, Oconto County, WI.

A total of 77 Bluegill was collected which accounted for 8% of the fish collected. Bluegill from the entire survey ranged in length from 2.5 to 7.9 inches and averaged 7.4 inches (Figure 6). Twenty percent of all Bluegill collected during SE2 electrofishing were 6 in or greater and considered harvestable. Electrofishing (EF) CPUE increased from 34.0 to 60.0 Bluegill/mile (mi) 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.



Figure 6. Length frequency of Bluegill from Wheeler Lake, Oconto County, WI.

A subsample of 20 Bluegill was aged that ranged from 4 to 6 years old. Bluegill were stocked in 2017 (Table 1) and the age-5 year class corresponds to this stocking event. However, we cannot decern if these are stocked fish or naturally reproduced fish. In 2022, growth was average at all ages compared to the mean length at age of Bluegill in northern Wisconsin (Figure 7).



Figure 7. Mean length at age of Bluegill collected during 2014, 2016 and 2022 surveys in Wheeler Lake, Oconto County, WI.

Smallmouth Bass *Micropterus dolomieu* contribute to the diversity of gamefish in Wheeler Lake (Table 2). Overall, 68 Smallmouth Bass were collected that ranged in length from 5.5 to 16.2 inches and averaged 11.2 inches (Figure 8). Electrofishing CPUE was 7.3 smallmouth/mile in 2014 and 14.8/mile in 2022. PSD increased from 38 to 68 between 2014 and 2022. RSD<sup>P</sup> also increased from 6 to 11 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 8).



Figure 8. Length frequency of Smallmouth Bass collected during 2014 and 2022 surveys in Wheeler Lake, Oconto County, WI.

A subsample of 14 Smallmouth Bass was aged using scales (<12") and dorsal spines (>12"). Ages ranged from 3 to 11 years old (Figure 9). Smallmouth Bass growth was average at age 3 but below average at older ages (Figure 9). Smallmouth Bass reproduction and recruitment were consistent with what has been observed in previous surveys.



Figure 9. Mean length at age of Smallmouth Bass during 2014 and 2022 surveys in Wheeler Lake, Oconto County, WI.

Yellow Perch *Perca flavescens* and Black Crappie abundance were lower during our spring fyke netting in 2022 than 2014 (Table 2). A total of 40 Yellow Perch were collected. Perch ranged in length from 4.5 to 10.9 inches (Figure 10). The largest perch (10.9 inches) was collected 3 consecutive days in a row and identified as the same fish because the anal spine was removed for aging.



Figure 10. Length frequency of Yellow Perch collected during 2014 and 2022 surveys in Wheeler Lake, Oconto County, WI.

The goal of our spring fyke netting is to generate a Walleye population estimate. In 2022, nets were set in areas where Walleye are known to congregate during spawning activity. These net locations were different than in 2014 and resulted in the collection of fewer panfish than the previous survey. Therefore, summer netting was conducted in early June to target spawning panfish (Table 2 and Figure 11). As a result, more Bluegill, Pumpkinseed and Black Crappie were collected during summer panfish netting. However, fewer Rock Bass were collected in 2022 (Figure 11).



Figure 11. Number of panfish collected in 2016 and 2022 during summer netting surveys in Wheeler Lake, Oconto County, WI.

Table 3. Species composition of fishes collected during August mini fyke net surveys in 2016 and 2022 in Wheeler Lake, Oconto County, WI.

Species	2016	2022
Bluntnose Minnow	94	99
Bluegill	47	64
Largemouth Bass	8	62
Green Sunfish	19	12
Rock Bass	36	9
Smallmouth Bass	14	6
Yellow Perch		2
Yellow Bullhead	1	1
Pumpkinseed		1
Johnny Darter	1	
Iowa Darter	1	
Blacknose Shiner	6	
Emerald Shiner	2	

Additionally, Green Sunfish *Lepomis cyanellus* and Bullheads *Ameiurus spp*. (black and brown) were collected and accounted for just over 10% of the total number of fish collected during the 2022 fish survey in Wheeler Lake (Table 2).

## **CONCLUSIONS & RECOMMENDATIONS**

Wheeler Lake boasts quality fishing opportunities for a variety of species. The Walleye fishery had been maintained by natural reproduction for the last several decades, but due to declining abundance and the lack of recruitment, 9,844 smallfingerling Walleye marked with oxytetracycline (OTC) were stocked in 2014. To determine the level of natural reproduction and the contribution of this stocking event, young-of-the-year (YOY) Walleye were collected and otoliths were examined for marks. The subsequent proportion of marked to unmarked YOY Walleye can verify natural reproduction. Unfortunately, no YOY Walleye were collected in 2014 after 2 nights of electrofishing that encompassed the entire shoreline each night.

In 2015, large fingerling Walleye stocking began at the rate of 5 Walleye/acre (Table 1) and new Walleye fishing regulations were established (18-inch minimum length limit / 3-fish daily bag limit). In 2014, the population estimate for adult Walleye was 260 or 0.9 adults/acre but increased to 562 or 1.9 adults/acre in 2022. The increase in adult density has likely contributed to improved natural reproduction. Fall electrofishing surveys documented natural reproduction in 2015, 2020, 2021 and 2022. Because natural reproduction is not adequate to produce a quality Walleye fishing opportunity, Walleye stocking should continue. Increasing the stocking rate of large fingerling Walleye to 10/acre in alternate years would likely improve adult density.

Largemouth Bass electrofishing CPUE increased 50% between 2014 and 2022 from 28.5/mile to 42.0/mile despite the implementation of a more liberal harvest regulation in 2020 (no minimum length limit / 5 fish daily bag limit). A biomanipulation (manual removal via electrofishing) project should considered to reduce Largemouth Bass abundance. A CPUE of 42.0 equates roughly to 13.0 adults/acre. Our objective would be to reduce Largemouth Bass CPUE to 5.5/mile or 1.5 adults/acre over the next two years. Removing Largemouth Bass would create a "void" which would hopefully be filled by more desirable species such as Walleye.

Between 2012 and 2021 the Wheeler Lake Association has constructed 80 fish cribs that were placed throughout the lake (Figure 12). The construction and placement of additional fish cribs is planned for the next several years. In 2019, the U.S. Forest Service placed approximately 45 trees were around the east island and 15 trees around the west island to enhance fish habitat (Figure 13). The Wheeler Lake Association has also expressed interest in partnering with WDNR to enhance Walleye spawning habitat within the next few years.



Figure 12. Fish crib construction on Wheeler Lake, Oconto County, WI.



Figure 13. USFS fish-stick installation on Wheeler Lake islands, Oconto County, WI.

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 Wheeler Lake is scheduled for 2030 and will focus on the age, growth, abundance, and recruitment of the dominant gamefish. Our primary objective will be to assess Walleye density. Other survey objectives will be to evaluate Largemouth Bass and panfish abundance, size structure and recruitment. Alternate year fall surveys will continue to monitor Walleye reproduction and recruitment of stocked fish.

Access to Wheeler Lake is adequate. One boat landing is located on the south side of the lake. Boaters are reminded to remove all vegetation from their boat and trailer before leaving to limit the spread of this and other invasive species. A map of Wheeler Lake can be found at the following internet address; <u>https://dnr.wi.gov/lakes/maps/DNR/0439800a.pdf</u>

## REFERENCES

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