

WISCONSIN DEPARTMENT OF NATURAL RESOURCES

Fishery Survey Report for Durphee Lake

Sawyer County, Wisconsin, 2021

WATERBODY IDENTIFICATION CODE: 2396800



MAX WOLTER
DNR Fisheries Biologist
Sawyer County
December 2021

Introduction

Durphee Lake was surveyed in 2021 to assess the status of the fishery. Durphee Lake is 198 acres and has 2 miles of shoreline. Schoolhouse Lake (54 acres) has a semi-navigable connection to Durphee Lake, depending on water level, but was not included in this survey. We conducted a population estimate for adult walleye and indexed the catch rates of Largemouth Bass, Smallmouth Bass, Northern Pike and panfish species in Durphee Lake. We assessed general population characteristics, size structure (when possible) of all species and growth of several species of interest. Recent management activities on Durphee Lake have focused on Walleye stocking and implementing new fishing regulations for Walleye, bass and panfish.

LAKE CHARACTERISTICS

Durphee Lake is a “Complex-Cool-Clear” lake based on the Wisconsin Department of Natural Resources (DNR) Fisheries lake classification system (Rypel et al. 2019). “Clear” and “Cool” relate to water color and relative thermal status, while “Complex” indicates a fishery that includes Walleye. Durphee Lake is relatively shallow and has moderate productivity (Tables 1 & 2). The watershed is small, and only 5% of the surface area is developed (source: [Midwest Glacial Lakes Conservation Planner](#)). However, the shoreline of Durphee Lake is heavily developed, with recreational dwellings on most of the shoreline and an adjacent cranberry operation to the west. More information on water quality and invasive species can be found at the DNR lake page for [Durphee Lake](#).

Table 1. Lake and watershed characteristics for Durphee Lake, Sawyer County, Wisconsin

Characteristic	Value
Size (acres)	198
Max Depth (feet)	16
Mean Depth (feet)	10
Watershed Area (acres)	273
Lake Class	Complex-Cool-Clear

Table 2. July-August (2015) mean Trophic State Index (TSI) values for Durphee Lake, Sawyer County, Wisconsin

Trophic State Index	Value
Secchi Disk Visibility	55
Total Phosphorus	51
Chlorophyll A	51

There is one public boat landing on Durphee Lake. The landing is on the south side of the lake off County KK and is maintained by the Town of Bass Lake. There is no landing on Schoolhouse Lake, and the public can only access through Durphee. Durphee Lake receives considerable fishing interest for a lake of its size, due to proximity to many recreational dwellings and a reputation for good fishing.

STOCKING HISTORY

Walleye have been the only species stocked into Durphee Lake (Appendix Table 1) in the last few decades. Large fingerling Walleye have been stocked by the DNR at a rate of 20 fish/acre during even-numbered years since the beginning of the Wisconsin Walleye Initiative in 2013. Some tribal stocking has also occurred.

FISHING REGULATIONS

Durphee Lake has several special fishing regulations. Walleye are currently managed with an 18-inch minimum length limit and a three fish daily bag limit, which is intended to help rehabilitate the population.

Largemouth Bass were found to be abundant and with poor size structure in previous surveys, leading to more liberalized regulations in 2016. Both Largemouth and Smallmouth Bass are currently managed with no minimum length limit (i.e. bass of any size can be kept) and a five fish daily combined bag limit.

Durphee Lake was included in a project to evaluate the effectiveness of reduced bag limits for panfish as a means to increase panfish size. Durphee Lake currently has an experimental “five per species, 15 fish total bag limit” regulation for panfish. Anglers may keep no more than five of any one panfish species and up to 15 total (example: five crappie, five Bluegill, five perch). Evaluations of the effectiveness of this regulation are underway, and data from this survey will contribute to that analysis.

Until recently, Schoolhouse Lake was managed with separate regulations from Durphee Lake. This created some degree of confusion and created concerns among conservation wardens about anglers going back and forth between the two lakes. In 2020, the regulations for Durphee Lake were applied to Schoolhouse Lake and the two are now effectively managed as a chain.

Methods

Durphee Lake was sampled during 2021, following the DNR’s comprehensive treaty assessment protocol (Cichosz 2019) to estimate adult Walleye abundance and index (relative catch rate,) Northern Pike, Black Crappie and Yellow Perch. Size structure data were also collected from all gamefish and panfish species. Descriptions of standard DNR survey type, gear used, target water temperatures and target species are listed in Appendix Table 2.

A late spring electrofishing survey (SE2) was done to assess the bass and Bluegill populations. This survey consisted of 2 miles of electrofishing, where all gamefish and panfish were captured to provide an index of abundance and description of size structure.

In addition, a fall electrofishing survey was done to assess the abundance of age-0 and age-1 Walleye in September 2021. Similar fall electrofishing surveys have occurred periodically since 1999.

Lake class standards catch per unit effort (CPUE) was calculated by comparing Durphee Lake CPUEs of each species to the CPUEs of the other Complex-Cool-Clear lakes in Wisconsin (Rypel et al. 2019). When possible, CPUE was also compared to past surveys of Durphee Lake (most recently 2013).

Walleye were aged with dorsal spines. Bluegill and Black Crappie were aged with otoliths. All spines and otoliths were cut and aged under a microscope. Mean length-at-age was compared to the median length at age for Complex-Cool-Clear lakes. Size structure was assessed using the proportional size distribution (PSD) indices (Neumann et al. 2013). The PSD value for a species is the number of fish of a specified length and longer divided by the number of fish of stock length or longer, the result multiplied by 100 (Appendix Table 3).

To assess Walleye stocking survival, an age-length key was used to estimate the abundance of Walleye in each year class, assuming minimal natural reproduction and most fish originating from stocking events. Survival was estimated by dividing the population estimate for each age class by the total number of fish stocked for that year and multiplying it by 100. Cost of each stocking event was calculated by multiplying the number of large fingerlings stocked in that year by the average cost per large fingerling (\$1.06). Cost per recruit to age-3 and age-5 was estimated by dividing the cost of each stocking event by the estimated abundance of that year class.

Results and Discussion

WALLEYE

The adult Walleye population estimate was 196 total adult Walleye, or 1.0 adult Walleye/acre (CV = 0.15) for Durphee Lake in 2021 (Figure 1). This estimate is lower than both 2012, when an estimated 249 adult Walleye (1.3/acre) were present in the lake, and 2000, when the estimate was 682 (3.4/acre).

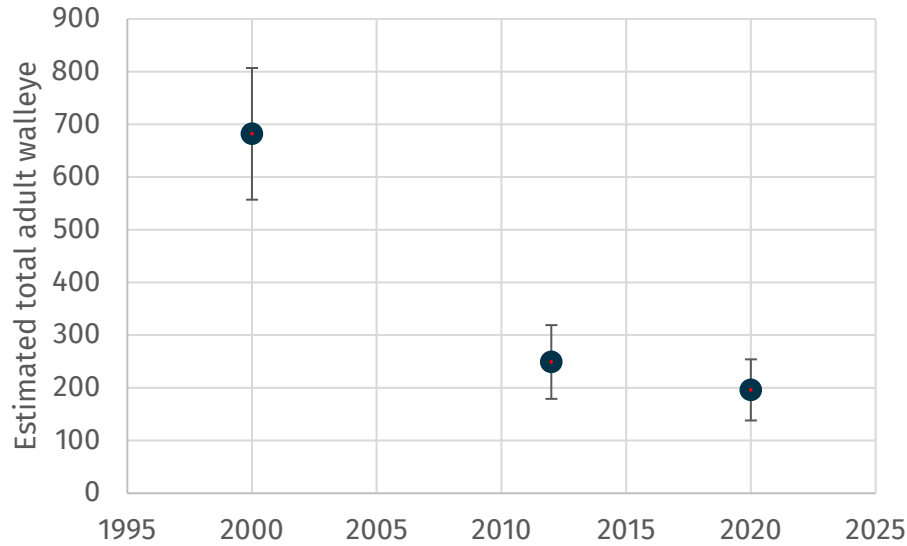


Figure 1. Estimates of total adult Walleye in Durphee Lake over time. The 2012 and 2000 estimates were generated by the Great Lakes Indian Fish and Wildlife Commission.

Walleye natural recruitment declined in the early 2000s and has not rebounded (Figure 2). We now rely on Walleye stocking in Durphee Lake in place of natural reproduction. Natural reproduction generally creates more abundant Walleye fisheries, and the drop in adult density in Durphee Lake is a result of the loss of natural reproduction. The current density of adult Walleye in Durphee Lake is in line with what we expect from stocked Walleye fisheries, which average around 1.4 adults per acre (Cichosz 2019).

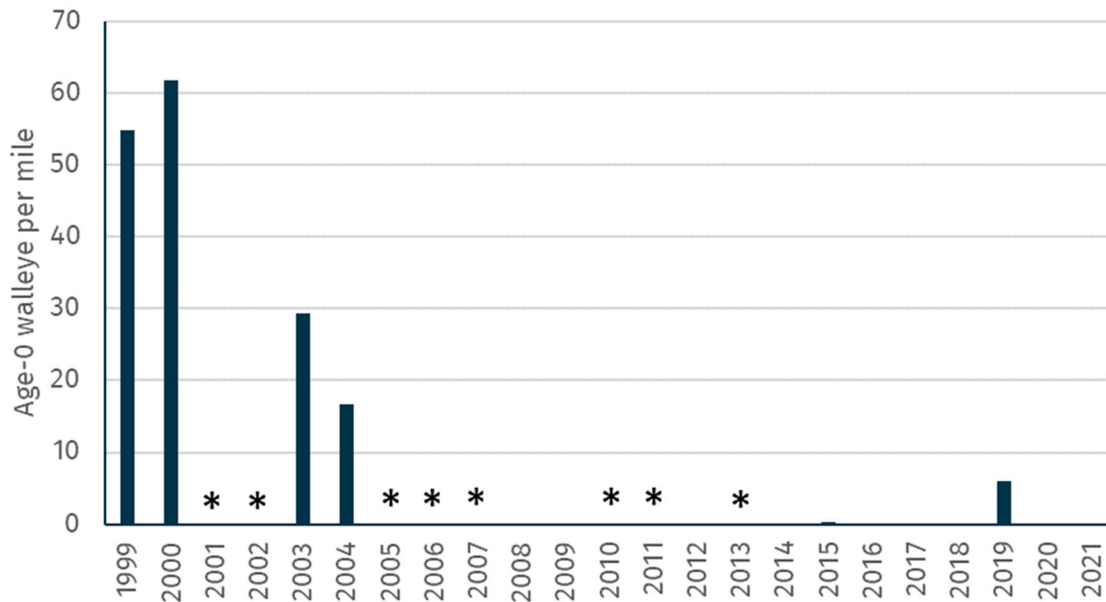


Figure 2. Capture history of natural born "young of year" or age-0 Walleye in Durphee Lake during fall electrofishing surveys. No fall survey was conducted in years with an asterisk.

Adult Walleye captured in 2021 ranged in length from 12.0 to 26.9 inches (Figure 3). The mean lengths of male and female Walleye were 16.7 inches and 21.0 inches, respectively. The male : female ratio was estimated to be 2.1 : 1. Walleye PSD from fyke netting was 69 and PSD-20 was 26. Walleye PSD in 2013 was similar (75) but PSD-20 was 70, likely due to an older population at that time, which may have been mostly remnant survivors of the last natural born year classes from the early 2000s. The PSD-20 value from 2021 represents a somewhat more balanced population that is less dominated by very old Walleye.

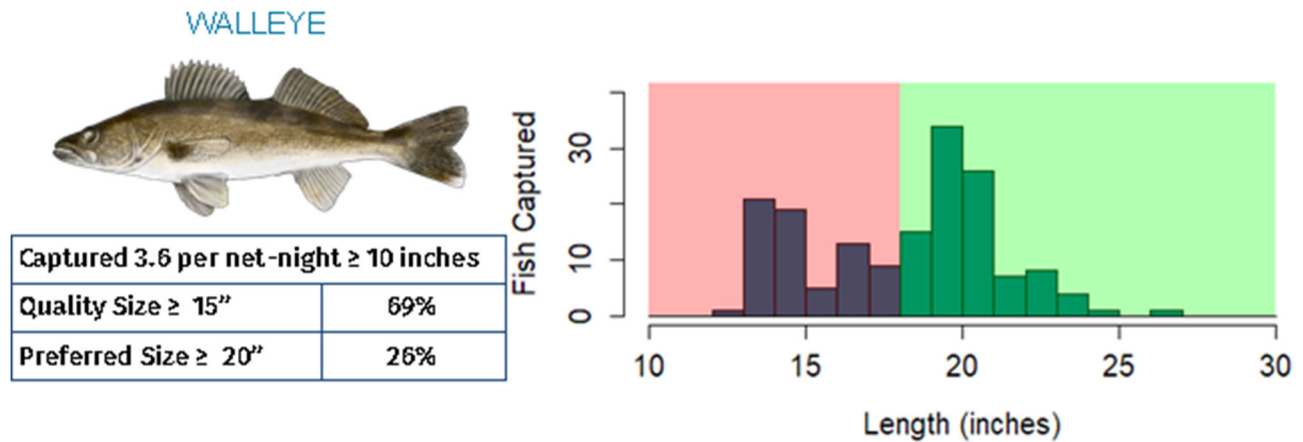


Figure 3. Capture rate, size structure metrics and length frequency of Walleye captured in a 2021 survey of Durphee Lake in Sawyer County. Only fish captured in the fyke netting portion of the survey are shown. Colors correspond to the current angling length limits (18" minimum), where green are legal-sized fish.

Walleye in Durphee Lake had growth that exceeded the median for Complex-Cool-Clear lakes across ages 3-7 but were similar to the median for ages 8 and 9 (Figure 4). Growth differences between sexes were apparent. Males reach 18 inches in between 7-8 years, while females reach that mark in 5 years or less (very few females less than 18 inches were observed).

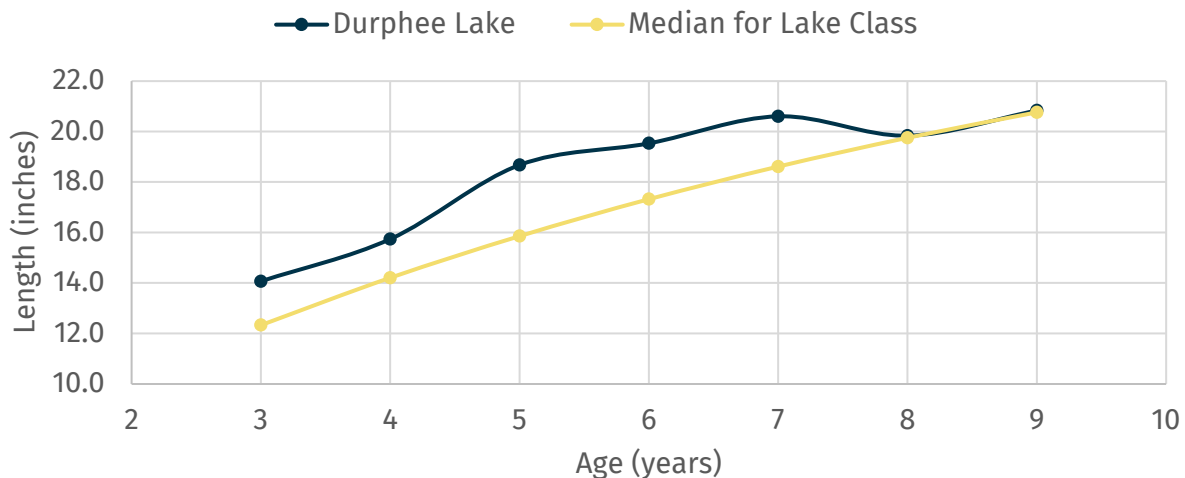


Figure 4. Mean length at age for Walleye captured in Durphee Lake, 2021. Only ages with a sample size of 5 or greater are shown. The median for the lake class (Complex-Cool-Clear) is shown for comparison.

A portion of the Walleye fishery in Durphee Lake was comprised of the 2018 (age-3) and 2016 (age-5) year classes, allowing us to generate some estimates of stocking success and cost-per-survivor. Age-3 Walleye comprised 21% of the estimated total population and age-5 Walleye comprised 13% of the population. The survival to age-3 was 1% and cost per age-3 Walleye was estimated at \$102. The survival to age-5 was 0.6% and the cost per age-5 Walleye was estimated at \$152.

NORTHERN PIKE

Northern Pike catch rate (11 per net night, Figure 5) in Durphee Lake was high (>90th percentile) when compared to other similar lakes, yet was lower than the previous survey in 2013, when 16 were captured per net night. Pike size offered a lot of quality for anglers despite the higher abundance. The average length of pike in this survey was 22.1 inches, and 68% were over 21 inches.

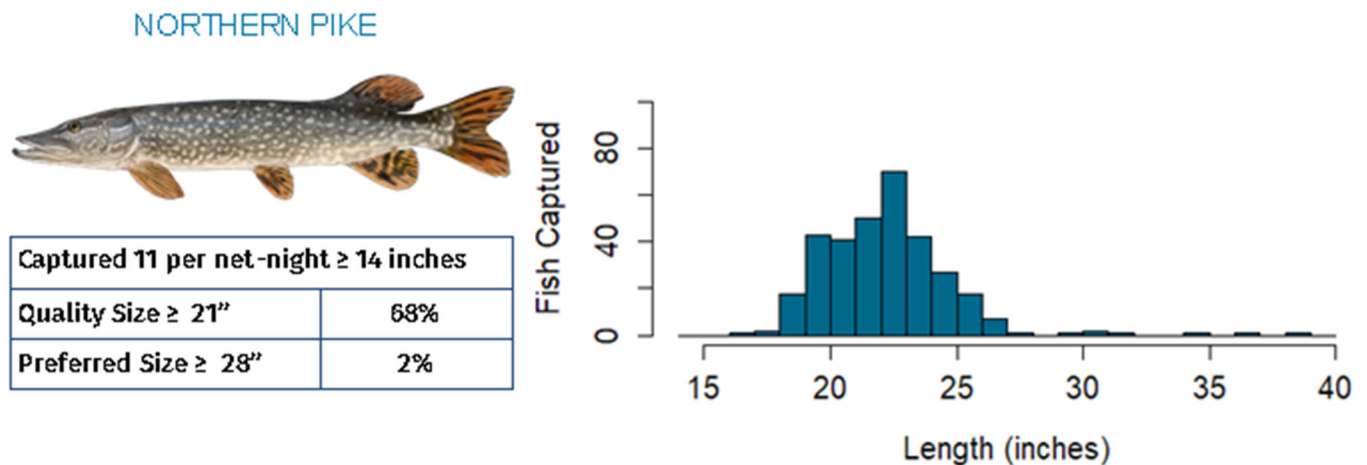


Figure 5. Capture rate, size structure metrics and length frequency of Northern Pike captured in a 2021 survey of Durphee Lake in Sawyer County.

Durphee Lake does not present itself as classic pike habitat. Aquatic plants are somewhat limited and most of the substrate is sand. Spawning habitat for pike may also be limiting, which may prevent pike from becoming overabundant. The pike population likely benefits from a strong forage base of suckers and a lack of competition from other apex predators (there are no muskellunge in Durphee Lake). Quality size of pike should be expected to continue, provided the forage base remains strong and abundance of pike does not become excessive. The current regulations for pike appear to be appropriate.

LARGEMOUTH AND SMALLMOUTH BASS

Largemouth Bass catch rate (24/mile, Figure 6) was moderately high (>75th percentile) compared to other similar lakes. Most largemouth captured (47 total) were between 8-11 inches in length. Overall size structure was poor as a result, with only 2% of largemouth in this survey over 15 inches.

LARGEMOUTH BASS



Captured 24 per mile \geq 8 inches	
Quality Size \geq 12"	19%
Preferred Size \geq 15"	2%

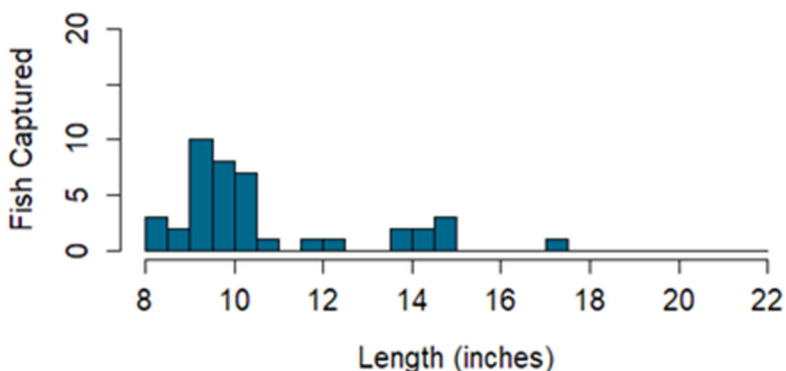


Figure 6. Capture rate, size structure metrics and length frequency of Largemouth Bass captured in a 2021 survey of Durphee Lake in Sawyer County.

The poor size structure of largemouth in Durphee Lake was provided as justification for removal of the minimum length limit in 2016. Harvest of the abundant smaller largemouth is now allowed. It does not appear this regulation has improved size structure of bass on Durphee Lake based on this survey, but the regulation continues to provide opportunities to harvest small bass for anglers who are interested.

Smallmouth Bass are present in Durphee Lake, but only six were captured as a part of this survey, limiting our ability to describe the population.

BLUEGILL

There were 158 Bluegill collected from Durphee Lake during the SE2 survey, and their lengths ranged from 2.6 to 9.1 inches (Figure 7). The mean length was 6.0 inches. Bluegill CPUE was 79 fish/mile, which was much lower than the catch rate in 2013 (286 fish/mile). However, the lower 2021 catch rate is much more desirable from the standpoint of offering better Bluegill size. At a lower density, Bluegill are often able to achieve better size. That pattern is true when comparing size of Bluegill between 2021, when 11% of Bluegill were over 8 inches, and 2013 when zero Bluegill over 8 inches were captured.

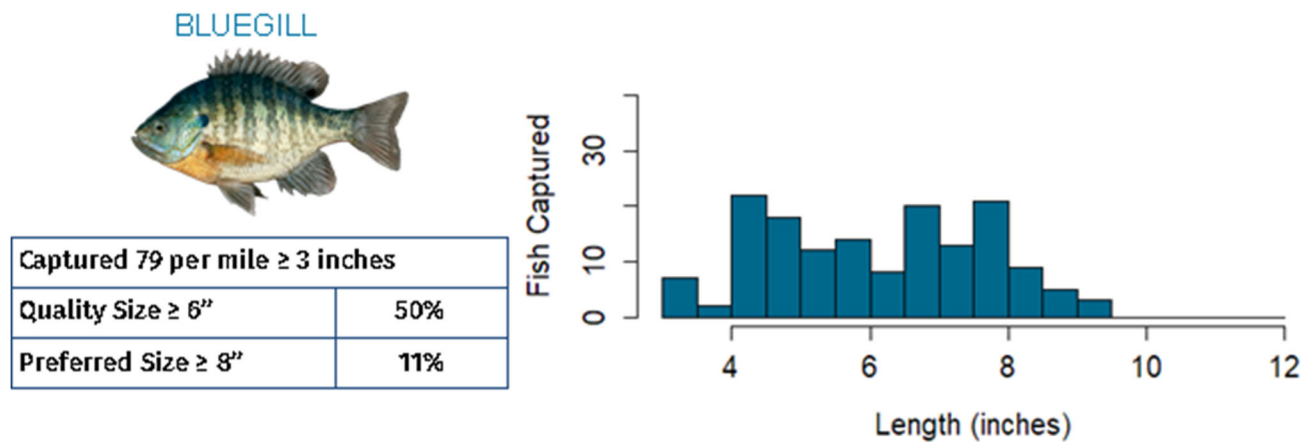


Figure 7. Capture rate, size structure metrics and length frequency of Bluegill captured in a 2021 survey of Durphee Lake in Sawyer County.

Bluegill in Durphee Lake have fast growth rates in comparison to other lakes, reaching 7 inches in 5 years, on average, and almost 8 inches by their 6th year of life. For comparison, that's around 0.5-1.0 inches faster than the average for other lakes of this type.

The other potential factor contributing to improved Bluegill size is the experimental reduced bag limit that has been in place since 2016. Studies such as Rypel (2015) have shown consistent panfish size improvements with lower bag limits. Durphee Lake is a part of a larger evaluation of reduced bag limits to benefit panfish in Wisconsin lakes.

BLACK CRAPPIE

There were 122 Black Crappie collected from Durphee Lake during the netting survey and their lengths ranged from 3.9 to 12.4 inches (Figure 10). The mean length was 7.8 inches, influenced by high catch of 3- to 5-inch crappie from a recent year class (too small to appear in Figure 8). Black Crappie CPUE was four fish/net night, which was lower than the catch rate in the 2013 survey (7.5 fish/net night) but still higher than the median for lakes of this class. Black Crappie size structure was excellent. Of all crappie over 5 inches, 86% were over 8 inches and an impressive 63% were over 10 inches. Like Bluegill, Black Crappie size in Durphee Lake likely benefits from lower abundance and reduced panfish bag limits.

BLACK CRAPPIE



Captured 4 per net-night \geq 5 inches	
Quality Size \geq 8"	86%
Preferred Size \geq 10"	63%

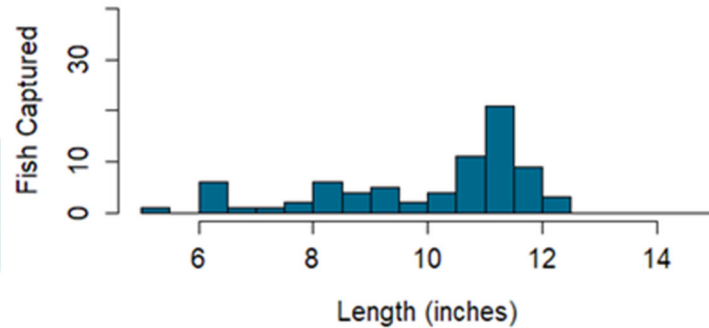


Figure 8. Capture rate, size structure metrics and length frequency of Black Crappie captured in a 2021 survey of Durphee Lake in Sawyer County.

Only a small number of crappie were sacrificed for age and growth analyses, limiting our ability to fully characterize growth. However, this limited sample revealed the sporadic nature of crappie recruitment in Durphee Lake, a common phenomenon for Black Crappie (Bunnell et al. 2006). Crappie ranging from 8 to 11 inches spanned an age range of 4 to 15 years. 15-year-old crappie appear to be fairly common, and that year class (born in 2006) makes up a sizable portion of the preferred size (10-inch-plus) crappie anglers might encounter.

YELLOW PERCH

Yellow Perch were collected in low numbers throughout our survey efforts on Durphee Lake. Just four total Yellow Perch were captured via fyke netting and 23 via electrofishing. Most of the catch during electrofishing was small juvenile perch (average length 3.3 inches), limiting our ability to describe the adult population. The combined low catch rates from two separate gear methods point to a low-density perch population. This is in contrast to the perch population from several decades ago. In the 1960s, perch were considered so abundant in Durphee Lake that netting removals were done. The change in the perch population is of interest and may be linked to other changes in the fishery. For example, perch are an important prey item for Walleye, and decreased perch abundance may be a contributing factor in the observed decline in Walleye natural reproduction and continued average/low stocking success.

There is no indication that angler harvest has led to the decline in perch abundance. Long-term changes in habitat, including changes in water clarity and reduced shoreline wood, are a more likely explanation.

Summary and Management Recommendations

- 1.) Stocking is now necessary to maintain a Walleye fishery after several decades of almost nonexistent natural Walleye reproduction. Stockings should continue, but expectations for a high-density Walleye fishery should be tempered by the results of this survey. An adult Walleye density of 1-2 adults/acre seems most realistic. Continued use of protective regulations is appropriate and Walleye appear to grow to desirable sizes.
- 2.) Bluegill and crappie populations are in much better shape than when Durphee was surveyed in 2013. Abundance for each species has declined, but the abundance of large Bluegill and crappie has increased considerably. Reduced bag limits appear to be a powerful tool to improve and maintain the size of panfish in this lake and should be continued. Regulation consistency with Schoolhouse Lake will help with regulation enforcement.
- 3.) Northern Pike offer a nice angling opportunity in Durphee Lake, and the quality population is the result of mostly passive management (no stocking, no special regulations). Pike should continue to be monitored, but no other changes appear necessary at this time.
- 4.) The Largemouth Bass population continues to demonstrate less-than-desirable size, with many bass around 10 inches. The current high abundance of Largemouth Bass is relatively recent, and it may take time for the population to settle into equilibrium. Harvest of Largemouth Bass <14 inches can be allowed (and may be beneficial to bass size structure). Angling regulations should continue to provide that opportunity to anglers. Smallmouth Bass harvest does not appear to be beneficial, but their lower abundance does not justify a separate regulation.
- 5.) The next comprehensive survey (SN1, SE1, SE2 and FE) is planned for 2029. The success of the large fingerling stocking should be further evaluated during that survey by assessing the abundance, age structure, population demographics and stocking survival of the Walleye population. Due to the importance of the panfish fishery, the size structure and relative abundance of panfish populations should continue to be closely monitored as well.
- 6.) Efforts to increase habitat complexity in Durphee Lake should be encouraged where applicable. Inputs of coarse woody debris, protection/promotion of aquatic vegetation, and maintenance/restoration of shoreline vegetative buffers are needed habitat work for Durphee Lake, particularly given the well-developed shoreline. This website healthylakeswi.com is a great resource to learn about this recommendation.
- 7.) Invasive species education and other efforts should continue. Efforts to keep aquatic invasive species out of a waterbody are much more effective than controlling invasive species once they are established.

Acknowledgments

Special thanks to Scott Braden, Evan Sniadajewski and Kallie Thompson for assisting with field collection, aging and data entry.

References

- Bunnell, D.B., R.S. Hale, M.J. Vanni, and R.A. Stein. 2006. Predicting crappie recruitment in Ohio reservoirs with spawning stock size, larval density, and chlorophyll concentrations. *North American Journal of Fisheries Management* 26:1.
- Cichosz, T.A. 2019. Wisconsin Department of Natural Resources 2017-2018 Ceded Territory Fishery Assessment Report. Wisconsin Department of Natural Resources. Administrative Report #91, Madison, Wisconsin.
- Neumann, R.M., C.S. Guy, and D.W. Willis. 2013. Length, weight, and associated indices. Pages 637-676 in A.V. Zale, D.L. Parrish, and T.M. Sutton, editors. *Fisheries techniques*, 3rd edition. American Fisheries Society, Bethesda, Maryland.
- Rypel, A.L. 2015. Effects of a reduced daily bag limit on bluegill size structure in Wisconsin lakes. *North American Journal of Fisheries Management* 35:2.
- Rypel, A.L., T.D. Simonson, D.L. Oele, J.D. Griffin, T.P. Parks, D. Seibel, C.M. Roberts, S. Toshner, L. Tate, and J. Lyons. 2019. Flexible classification of Wisconsin lakes for improved fisheries conversation and management. Fisheries. DOI: 10.002/fsh.10228.

Appendices

Appendix Table 1. Fish stocking records for Durphee Lake from 1972-present.

Year	Species	Age Class	Number Fish Stocked	Avg Fish Length (inches)	Source Type
2020	WALLEYE	LARGE FINGERLING	3953	7	DNR HATCHERY
2018	WALLEYE	LARGE FINGERLING	3953	6.4	DNR HATCHERY
2016	WALLEYE	LARGE FINGERLING	3953	7.2	DNR HATCHERY
2014	WALLEYE	LARGE FINGERLING	3953	6.3	DNR HATCHERY
2011	WALLEYE	LARGE FINGERLING	482	7.8	TRIBAL HATCHERY
2005	WALLEYE	FRY	200000	<1	TRIBAL HATCHERY
2001	WALLEYE	SMALL FINGERLING	10000	1.7	DNR HATCHERY
1997	WALLEYE	SMALL FINGERLING	9650	1.6	DNR HATCHERY
1995	WALLEYE	FINGERLING	9773	2.4	DNR COOP PONDS
1992	WALLEYE	FINGERLING	7600	2	DNR COOP PONDS
1990	WALLEYE	FINGERLING	6800	3	DNR COOP PONDS
1988	WALLEYE	FINGERLING	6858	3	DNR COOP PONDS
1976	WALLEYE	FINGERLING	10016	3	DNR COOP PONDS

Appendix Table 2. Fish survey protocols used by DNR to sample lakes.

Survey Type	Gear Used	Target Water Temperature (°F)	Target Species
Spring Netting 1 (SN1)	Fyke Net	~45	Walleye, Northern Pike
Spring Electrofishing 1 (SE1)	Boat Electrofishing	45-50	Walleye
Spring Netting 2 (SN2)	Fyke Net	50-55	Muskellunge, Black Crappie, Yellow Perch
Spring Electrofishing 2 (SE2)	Boat Electrofishing	55-70	Largemouth Bass, Smallmouth Bass, Bluegill and other panfish, non-game species
Spring Netting 3 (SN3)	Fyke Net	65-80	Bluegill, Black Crappie
Fall Electrofishing (FE)	Boat Electrofishing	50-60	Juvenile Walleye and Muskellunge



A DNR Technician lifting a fyke net



A DNR electrofishing boat

Appendix Table 3. Proportional and relative stock density values.

Species	Stock Size (in)	Quality Size (in)	Preferred Size (in)
Black Crappie	5	8	10
Bluegill	3	6	8
Large mouth Bass	8	12	15
Northern Pike	14	21	28
Pumpkinseed	3	6	8
Rock Bass	4	7	9
Small mouth Bass	7	11	14
Walleye	10	15	20
Yellow Perch	5	8	10