WISCONSIN DEPARTMENT OF NATURAL RESOURCES

2025 Bolger Fisheries Survey Report

Waterbody Code: 973000

Photo Credit: Lakeland Aerial

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June 2026

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Introduction

Bolger Lake is a 119-acre soft water seepage lake within the Upper Tomahawk River Watershed (Tyler 1975). Water conditions support aquatic life, wildlife, recreation, public health and welfare within Bolger Lake. Chinese mystery snail (2012) is the only invasive species noted as being established in Bolger Lake as of 2025. The lake is accessible to the public and the 48 local property owners via a public ramp situated on the northeast shore off Bolger Lake Road (Figure 1). Additional information on Bolger Lake can be found at the Wisconsin Department of Natural Resources' (DNR) Lake Page.

Bolger Lake is classified as a complex-cool-clear lake with a shared fishery utilized by both the public and tribal members (Rypel et al. 2019). The fish community is represented by 19 species of diverse thermal guilds, including coolwater (walleye, yellow perch) and warmwater (bluegill, largemouth bass). These species exhibit varying environmental tolerances, ranging from intolerant (mottled sculpin) to tolerant (white sucker). Records indicate that largemouth bass, muskellunge and walleye were introduced via stocking efforts in the 1950s and 1970s (Kubisiak 2004; Table 1). While some natural reproduction occurs, oxytetracycline (OTC) marks suggest that the walleye population is supported mostly by stocking (M. Luehring, GLIFWC, unpublished data). Angling pressure is typical of other Oneida County lakes, primarily occurring during the open-water season (Halverson and Blonski 2016). No angling tournaments have been recorded since 2008 (unpublished data; N. Lederman Wisconsin Department of Natural Resources) and tribal spring harvests have averaged 17 ± 6.8 walleye annually since 2019 (unpublished data; T. Cichosz Wisconsin Department of Natural Resources).

The DNR manages Bolger Lake in consultation with GLIFWC, focusing fisheries assessments on recreationally significant species (Table 2). Water quality monitoring has been a consistent priority, with data collected through the Citizen Monitoring Program since 1993.

The objectives of the 2025 fishery survey on Bolger Lake were to

1. assess the status of the fish community
2. evaluate walleye and muskellunge stocking effectiveness
3. update fisheries management recommendations

Table 1. Fish stockings from 1959-2024 in Bolger Lake, Oneida County, Wisconsin.

YEAR	SPECIES	AGE CLASS	NUMBER OF FISH	SOURCE
1959	largemouth	fingerling	2000	DNR
1960	largemouth	fingerling	5000	DNR
1962	muskellunge	fingerling	1087	DNR
1968	muskellunge	fingerling	282	DNR
1970	muskellunge	fingerling	311	DNR
1972	muskellunge	large	200	DNR
1975	walleye	small	11900	DNR
1976	walleye	small	5000	DNR
1977	walleye	small	5000	DNR
1978	walleye	small	4800	DNR
1982	muskellunge	large	200	DNR
1986	muskellunge	large	200	DNR
1995	walleye	small	3003	DNR
1998	walleye	fry	200000	DNR
1998	walleye	small	11000	DNR
2000	walleye	small	11900	DNR
2002	walleye	small	11900	DNR
2004	walleye	small	2380	DNR
2005	muskellunge	large	60	DNR
2006	walleye	small	4165	DNR
2007	muskellunge	large	40	DNR
2008	walleye	small	4165	DNR
2009	muskellunge	large	58	DNR
2010	walleye	small	4156	DNR
2011	muskellunge	large	60	DNR
2012	walleye	small	4165	DNR
2013	muskellunge	large	51	DNR
2014	walleye	large	1718	DNR
2015	muskellunge	large	65	DNR
2016	walleye	large	4004	Tribal
2017	muskellunge	large	60	DNR
2018	muskellunge	large	58	DNR
2018	walleye	small	4165	DNR
2019	muskellunge	large	52	DNR
2020	walleye	small	4462	DNR
2021	muskellunge	large	29	DNR
2022	walleye	small	4014	DNR
2023	muskellunge	large	29	DNR
2024	walleye	small	4429	DNR

Table 2. Fish surveys from 1961-2025 in Bolger Lake, Oneida County, Wisconsin.

YEAR	TYPE	GEAR	TARGET SPECIES	SURVEY PURPOSE
1961	SN 3	fyke net	all species	relative abundance
1974	SN 3	fyke net	all species	relative abundance
1997	FE	boom	walleye	juvenile recruitment
2002	FE	boom	walleye	juvenile recruitment
2003	FE	boom	all species	juvenile recruitment
2003	SN 3	mini fyke	all species	relative abundance
2003	SN 1	fyke net	walleye	mark-recapture
2003	SE 1	boom	walleye	mark-recapture
2003	SE 2	boom	all	relative abundance
2005	SE 1	boom	walleye	mark-recapture
2008	FE	boom	gamefish	juvenile recruitment
2010	FE	boom	gamefish	juvenile recruitment
2015	SN 1	fyke net	walleye	mark-recapture
2015	SE 1	boom	gamefish	mark-recapture
2015	FE	boom	gamefish	juvenile recruitment
2020	FE	boom	gamefish	juvenile recruitment
2023	FE	boom	gamefish	juvenile recruitment
2025	SN 1	fyke net	walleye	mark-recapture
2025	SE 1	boom	walleye	mark-recapture
2025	SE 2	boom	all species	relative abundance
2025	FE	boom	all species	juvenile recruitment

Methods

A comprehensive fishery survey was conducted on Bolger Lake following the treaty assessment protocol (Cichosz 2025) during 2025. Early spring netting (SN 1) and early spring electrofishing (SE 1) targeted walleye and northern pike. Late spring electrofishing (SE 2) targeted bass and panfish. Fall electrofishing (FE) targeted juvenile gamefish. Effort provides a description of the status of the fishery, size structure of select fish species and abundance.

SURVEY EFFORT

Early spring fyke netting was conducted using 4-foot framed fyke nets. Six nets were set on April 23 and fished until April 27, 2025, totaling 24 net nights. Nets were set in varying habitats (i.e., substrate and vegetation) and water depths targeting spawning adult fish (Figure 1). Nets were checked once every 24 hours.

Early spring electrofishing targeting gamefish was conducted around Bolger Lake on April 27, 2025. Late spring electrofishing was conducted throughout Bolger Lake on May 27, 2025 (Figure 1). Two half-mile transects targeting all species were randomly selected while the remaining shoreline was sampled for gamefish of all sizes. Fall electrofishing targeting gamefish of all sizes was completed on September 11, 2025.

Boats sampling during electrofishing runs used AC power, two probes (each with 3 droppers), and two dippers with nets having 0.375-inch bar mesh netting.

Late spring angling targeting bass in Bolger Lake was completed by three anglers on May 21, 2025. Anglers used a spinning rod and reel of choice with whatever lure they desired. Angling targeted bass on their beds to increase the number of marked individuals at large within Bolger Lake to improve precision of the population estimate.

Captured gamefish and panfish during all sampling were measured to the nearest 0.1 inch. Largemouth bass, northern pike, smallmouth bass and walleye were marked with a right ventral fin clip. Muskellunge were checked for a PIT (passive integrated transponder) tag and if one was not found, a PIT tag was placed internally adjacent to the dorsal fin and released. Newly captured adult muskellunge had their first anal fin ray removed for age estimation. Dorsal fin rays were collected from five walleye within every half-inch increment of each sex for age estimation. Counts were recorded for all other species.

DATA ANALYSIS

Abundance was indexed with a population estimate and quantified to a density estimate (number per acre) by dividing the population estimate number by how acres Bolger Lake is. Largemouth bass, smallmouth bass and walleye populations were estimated using the Chapman's version of the Petersen method (Chapman 1951) as follows

$$N = \frac{(M+1) * (C+1)}{(R+1)}$$

Relative abundance was used as an index of population size for fish where a population estimate was not generated. Bluegill, pumpkinseed and rock bass relative abundance was indexed as the number of individuals per shoreline mile during SE 2 runs collecting all fish. Black crappie, muskellunge, northern pike and yellow perch relative abundance were indexed as the number of individuals per net night during SN 1 surveys.

Size structure of fishes were described using length frequencies, descriptive statistics and proportional size distribution (PSD; Gabelhouse 1984a). Quality-sized fish are 36% of the world-record length and preferred-sized fish are 45% of the world-record length representing fish lengths anglers likely enjoy catching (Table 3). The PSD value for a species was calculated as the number of fish of a quality length and longer divided by the number of stock length fish or longer and multiplied by 100. The mean, minimum and maximum length of each fish species was calculated during each sampling year and compared through time.

Table 3. Proportional size distribution lengths of select fish species Bolger Lake, Oneida County, WI.

SPECIES	STOCK SIZE	QUALITY SIZE	PREFERRED SIZE
Black crappie	5	8	10
Bluegill	3	6	8
Largemouth	8	12	15
Muskellunge	20	30	38
Northern pike	14	21	28
Pumpkinseed	3	6	8
Rock bass	4	7	9
Smallmouth	7	11	14
Walleye	10	15	20
Yellow perch	5	8	10

Growth was quantified by assigning ages to muskellunge anal rays and walleye dorsal spines. Age was assigned to each unaged fish that was measured using an age-length key. Age-length keys were created from the proportion of each age within each inch length group within each species (Isermann and Knight 2005). Mean length at age was then calculated using the entire sample from assigned ages. Predicated mean maximum length was calculated using Von Bertalanffy's growth equation of:

$$l_t = L_\infty(1 - e^{-K(t-t_0)})$$

Mortality was estimated from a catch curve for each species aging structures were collected. A weighted regression using the natural log of catch at age was determined (Miranda and Bettoli 2007) for each species. The point where descending ages occurred was adjusted for each species.

Stocked walleye survival was calculated by adjusting the population estimate for an assumed 30% natural reproduction rate (M. Luehring, GLIFWC, unpublished data). The resulting value was divided by the total number of fish stocked for that year to calculate a survival percentage. Recruitment costs were estimated by dividing the total cost—calculated at $1.83 per large fingerling and $0.42 per small fingerling (G. Muench, WDNR, unpublished data)—by the age-specific stocked population estimate. These cost estimates are conservative and exclude expenditures for infrastructure, maintenance, and labor.

Relative abundance indices, mean length and growth were compared to other complex-cool-clear lakes within the Wisconsin lake systems (Rypel et al. 2019), other Oneida county lakes, and prior surveys completed within Bolger Lake when appropriate.

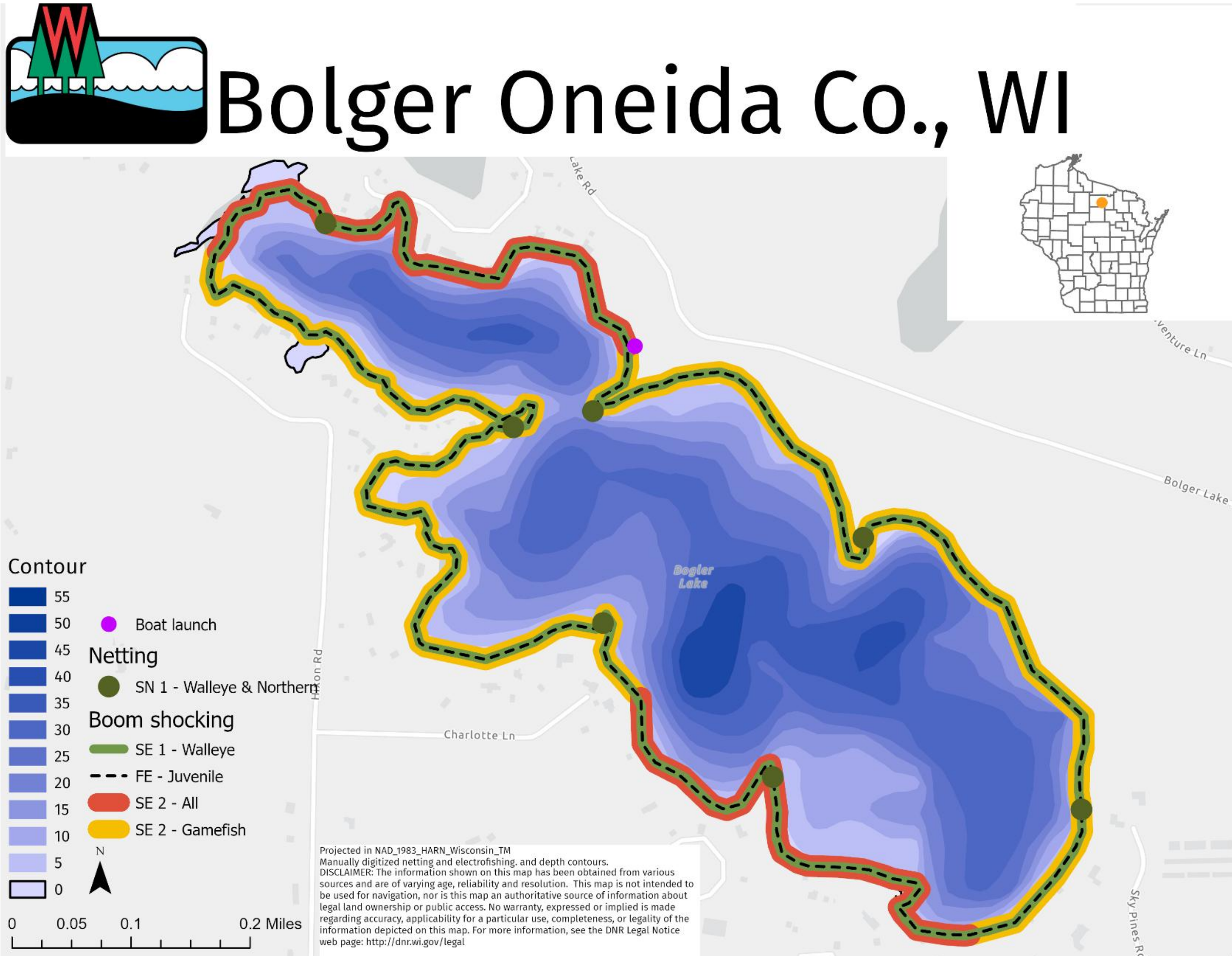

Figure 1. Sampling locations with the various capture gears used during the 2025 Bolger Lake survey in Oneida County, Wisconsin. Green dots indicate fyke nets targeting walleye. Green line indicates electrofishing survey route targeting walleye. Red and yellow lines indicate transects targeting bass (red) and panfish (yellow) during the second electrofishing survey. Dashed black line indicates the route during the fall electrofishing survey targeting juvenile gamefish. Depth contours are blue colors with darker blue indicating deeper water and lighter blue indicating shallower water. Purple circle indicates where the boat launch which is located on the northeastern side of the lake, accessible from Bolger Lake Road.

Results

BLUEGILL

A total of 201 bluegill (193 electrofishing, eight netting) were captured while surveying Bolger Lake. Bluegill catch rate was 0.33 per net-night during netting and 141.0 per-mile during spring electrofishing. Bluegill catch per-mile was above the 50th percentile per mile for complex-cool-clear lakes. Bluegill catch rate during fall surveys was relatively similar between 2003 and 2025, but had not been targeted in the spring previously (Figure 2).

Lengths of measured bluegill varied between 1.1 inches to 8.6 inches with a mean length of 3.2 inches (Figure 3). Bluegill mean length was at the 50th percentile for complex-cool-clear systems. Proportional size distribution of bluegill was on the small end with most individuals in the population smaller than 5 inches which is less than a quality sized individual (6 inches, Figure 4).

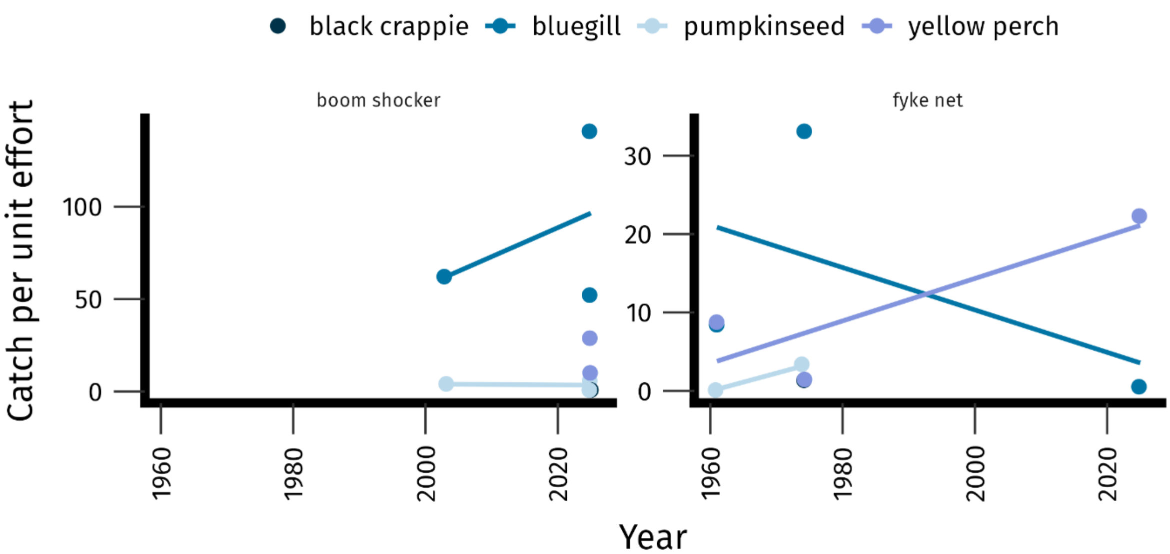

Figure 2. Catch rate of black crappie, bluegill, pumpkinseed and yellow perch across surveys within Bolger Lake during electrofishing (left; catch per mile) and netting (right; catch per net night). Each species is a unique color.

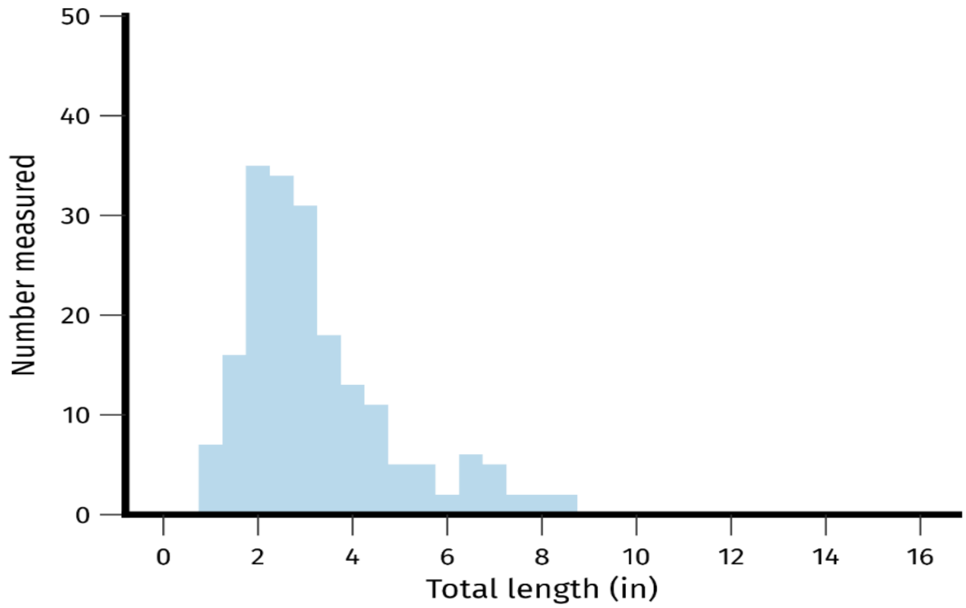

Figure 3. Length frequency of measured bluegills in Bolger Lake Oneida County, WI during the 2025 survey. Length bins are every 0.5 inch.

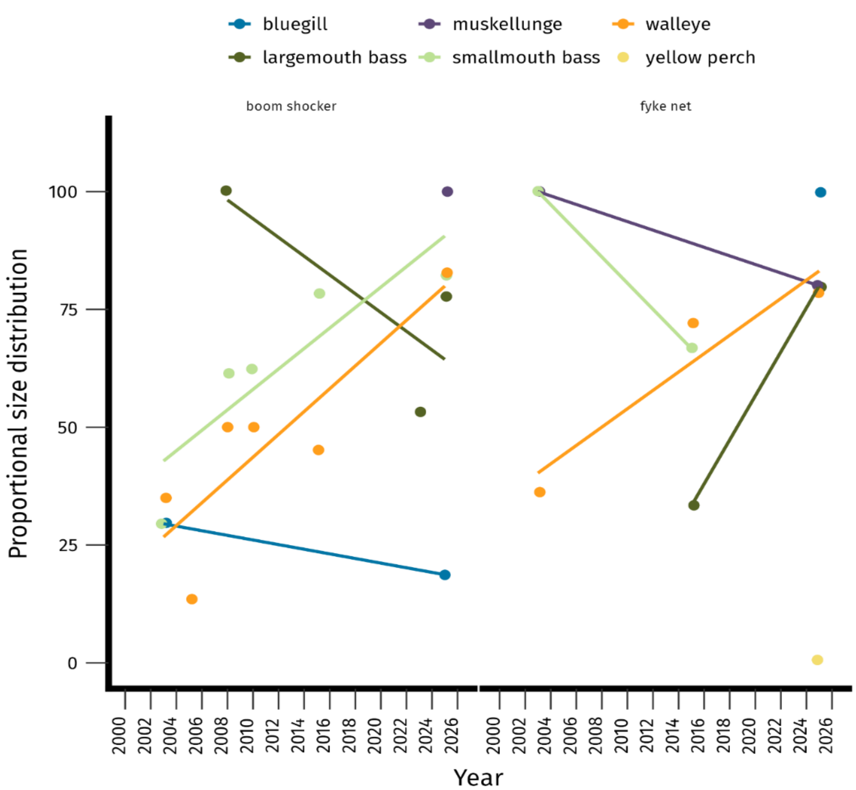

Figure 4. Proportional size distribution of quality length fish from select species captured across surveys during electrofishing (left) and netting (right) within the Bolger Lake Oneida County, WI. Black crappie, northern pike and pumpkinseed were excluded due to lack of sample size across years.

LARGEMOUTH BASS

A total of 142 largemouth bass (120 electrofishing, five netting, 17 angling) were captured while surveying Bolger Lake. During population estimate sampling, 119 unique individuals and 11 recaptures were recorded. The largemouth bass population was estimated to be 292 ± 73 fish (2.5 per acre; CV = 0.25) increasing from too few being captured in 2003 to calculate a population estimate. Despite this increase, the 2025 density remains below the Oneida County average (5.1 ± 0.8 per acre; N = 31) and the ceded territory average (6.0 ± 0.5 per acre; N = 165 unpublished data; T. Cichosz Wisconsin DNR). An additional seven largemouth bass were handled outside the population estimate sampling or were less than 8 inches. Late spring electrofishing yielded a catch rate of 32.1 largemouth bass per mile, placing Bolger Lake in the 90th percentile for complex-cool-clear systems (Figure 5). Measured lengths of largemouth ranged from 4.6 to 18.5 inches with a mean length of 12.6 inches—ranking in the 95th percentile for complex-cool-clear systems (Figure 6).

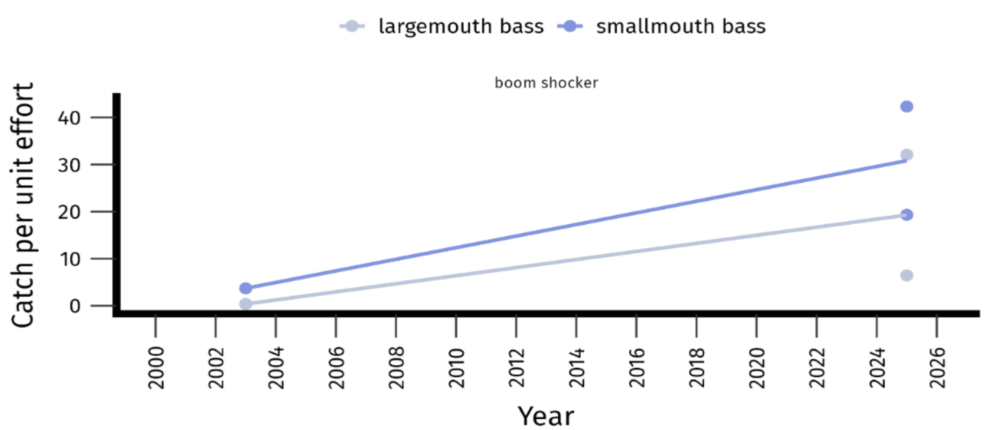

Figure 5. Catch per-mile of largemouth bass and smallmouth bass with boom shocking among spring surveys within Bolger Lake during electrofishing. Each species is a unique color.

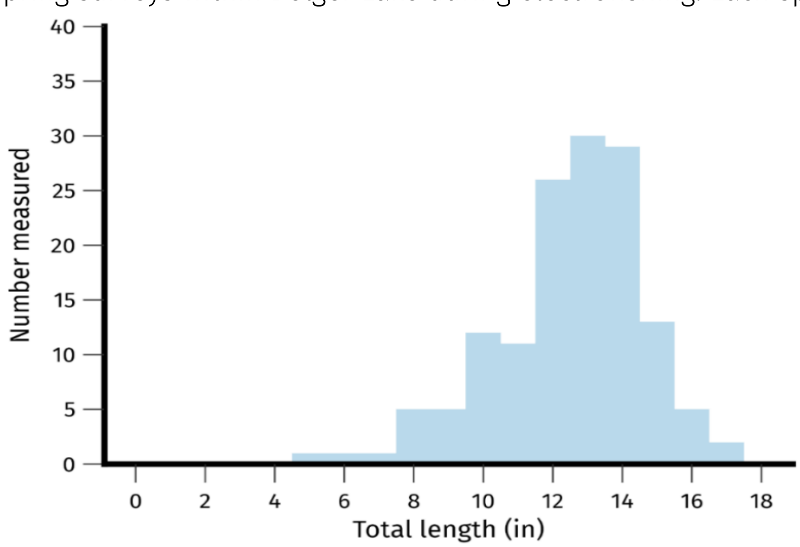

Figure 6. Length frequency of measured largemouth bass in Bolger Lake Oneida County, WI during the 2025 survey. Length bins are every 1.0 inch.

MUSKELLUNGE

A total of 20 muskellunge were handled in 2025, with a spring electrofishing catch rate of 1.5 per-mile, fall electrofishing catch of 0.7 per-mile and a netting rate of 0.4 per net-night (50th percentile for complex-cool-clear lakes). Lengths of measured muskellunge varied between 16.9 to 40.0 inches with a mean length of 26.2 inches (Figure 7) and ranking in the 75th percentile for complex-cool-clear systems. Proportional size distribution of muskellunge has been variable through time but lower in 2025 compared to the 2003 and 2015 surveys (Figure 4).

The 2025 muskellunge population comprised four age classes, ranging from age 2 to age 8. This represents an increase in age diversity compared to 2015, when only a single age class (age 8) was identified. All muskellunge captured corresponded to specific years in which stocking occurred (Figure 8). Survival, expressed as the percentage of the original stocking cohort handled during the survey, varied from 27% for the 2023 year-class to 3% for the 2017 year-class. Mean length-at-age was consistent with other complex-cool-clear systems, as indicated by overlapping error bars (Figure 9). Due to the limited sample size in 2015 (N = 2), a statistical comparison between survey years was not feasible.

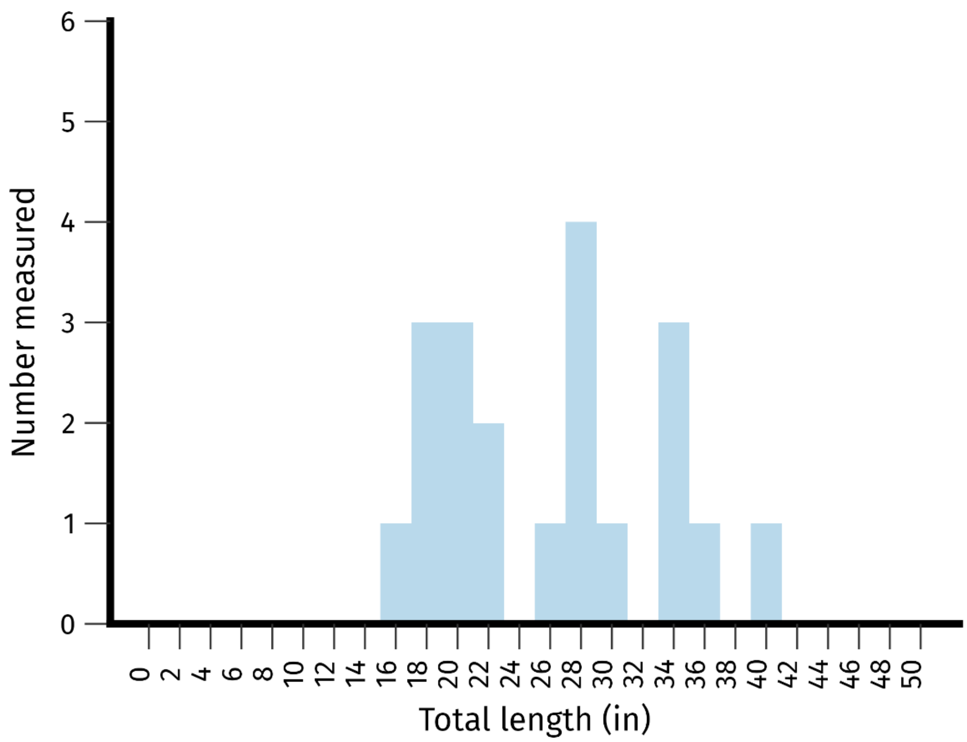

Figure 7. Length frequency of measured muskellunge in Bolger Lake Oneida County, WI during the 2025 survey. Length bins are every 2.0 inch.

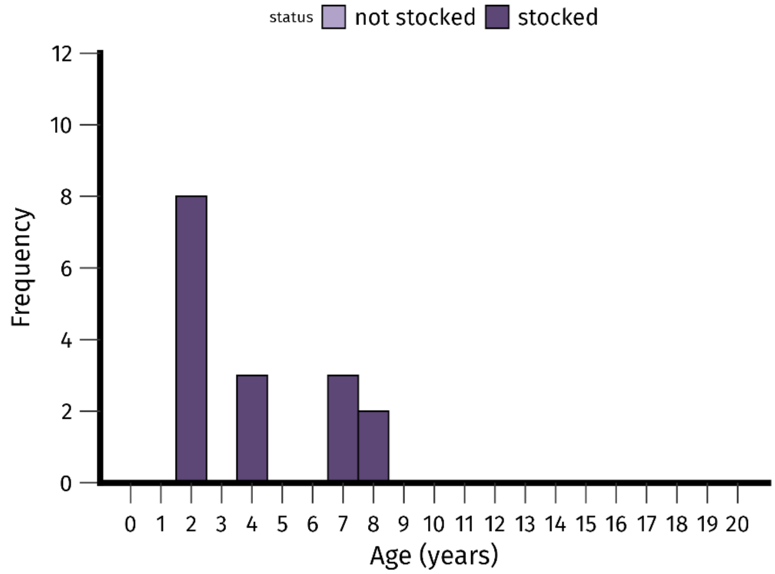

Figure 8. Histogram of estimated muskellunge age distribution of individuals captured during the 2025 survey of Bolger Lake Oneida County. Light purple bars indicate age assignments that do not align with stocking years, and dark purple bars aligns with stocked years.

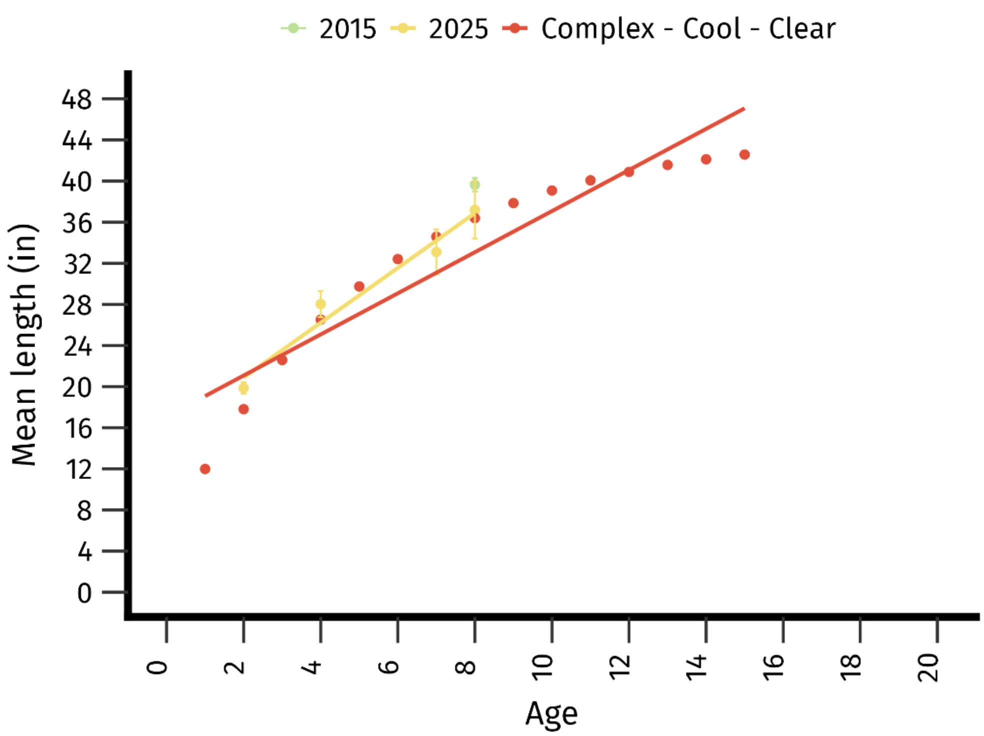

Figure 9. Mean total length (±1 standard error) at estimated age of muskellunge within Bolger Lake. Muskellunge ages were assigned using anal fin rays in 2025 and 2015. Mean length at age for each year and median length at age for complex-cool-clear lake class are represented by unique colors.

SMALLMOUTH BASS

A total of 236 smallmouth bass were captured during the Bolger Lake survey (206 via electrofishing, 16 via netting, and 14 via angling). During population estimate sampling, 160 unique individuals and 30 recaptures were recorded. The smallmouth bass population was estimated at 262 ± 40 fish (2.2 per acre; CV = 0.15) increasing from 2003, when captures were insufficient for an estimate. Smallmouth bass density in Bolger Lake algins with the Oneida County average (2.2 ± 0.4 per-acre; N = 27) and slightly above the ceded territory average (1.8 ± 0.3 per acre; N = 126; unpublished data; T. Cichosz Wisconsin DNR). An additional 46 smallmouth bass were handled outside the population estimate sampling or were less than 8 inches. Late spring electrofishing yielded 42.3 smallmouth bass per mile, placing the lake in the 75th percentile for complex-cool-clear systems.

Smallmouth bass lengths varied from 2.1 to 20.8 inches, with a mean length of 12.6 inches (Figure 10). This average sits in the 75th percentile for similar complex-cool-clear systems. Smallmouth bass size structure has shifted toward larger, with a greater proportion of the population now measuring over 11 inches (Figure 4).

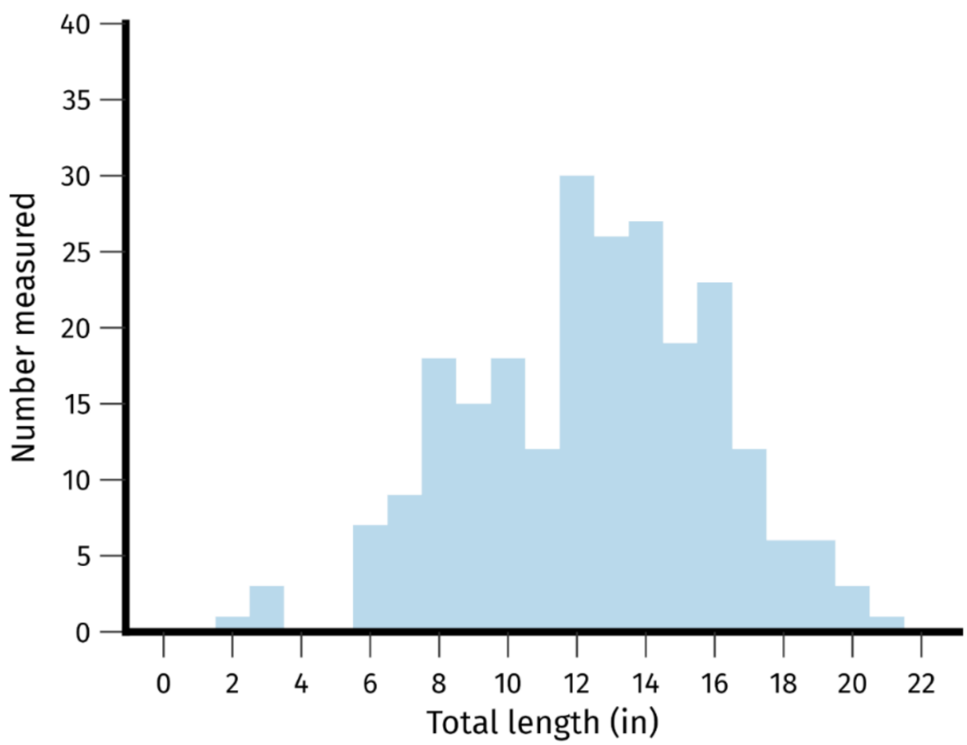

Figure 10. Length frequency of measured smallmouth bass in Bolger Lake Oneida County, WI during the 2025 survey. Length bins are every 1.0 inch.

WALLEYE

A total of 313 walleye were captured during the 2025 survey (120 via electrofishing and 193 via netting). Population estimate sampling included 197 unique individuals and 40 recaptures, resulting in an estimated population of 301 ± 35 (2.5 per acre; CV = 0.12). This is a decrease from the 2015 estimate of 547 ± 170 fish (4.6 per acre; CV = 0.31). An additional 76 walleyes were handled outside the population estimate sampling. During targeted efforts, walleye catch rate was 8.0 per net night during netting and 28.8 per mile during electrofishing, placing Bolger Lake around the 75th percentile for complex-cool-clear lakes. Fall surveys indicate low recent recruitment, with no age-0 and 0.36 age-1 walleye captured per mile.

Lengths of captured walleye varied between 7.5 inches and 26.0 inches with a mean length of 16.4 inches, which is around the 75th percentile for complex-cool-clear lakes (Figure 11). Female walleyes tended to be larger than male walleyes (Figure 12). Walleye PSD-15 was 80, and PSD-20 was 1 in 2025, increasing from the PSD-15 of 71 and PSD-20 of 0 observed during the 2015 survey. Walleye PSD-20 of 1 is below the suggested value for a balanced population (PSD-20 = 10-20; Pedersen 2020), while PSD-15 of 80 is higher (30-60 Anderson and Weithman 1978).

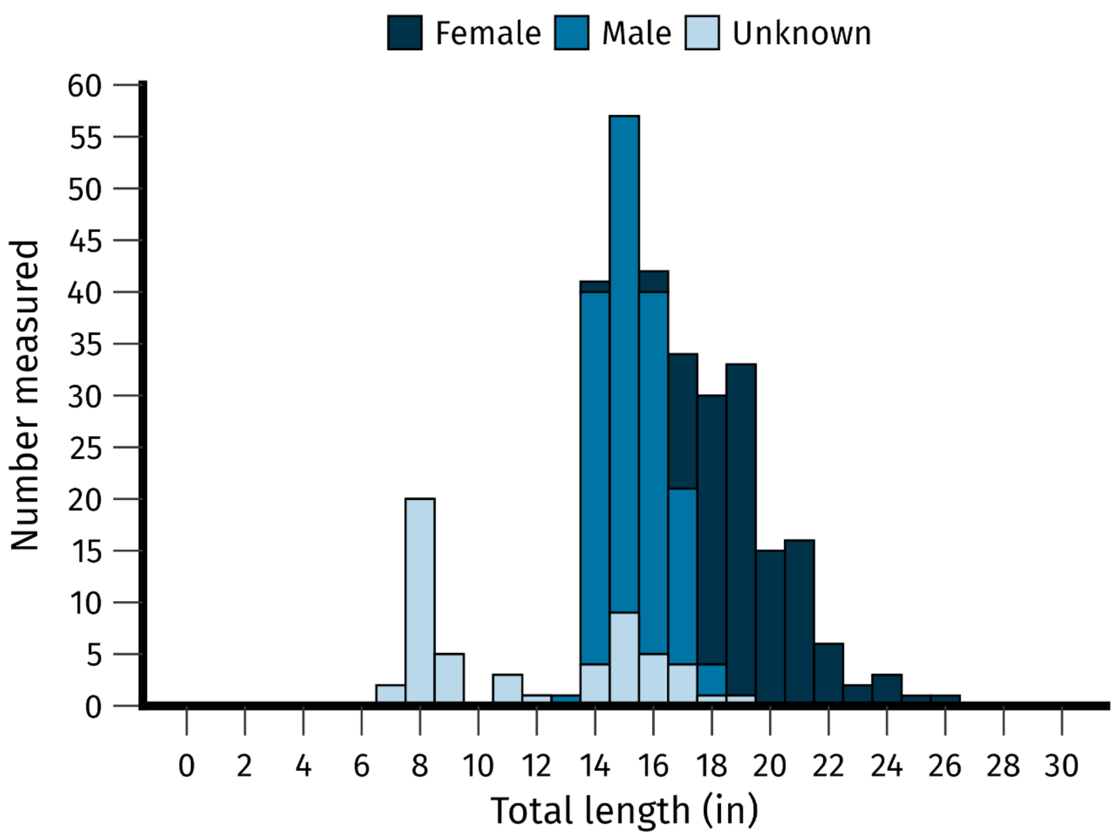

Figure 11. Length frequency of measured walleye in Bolger Lake Oneida County, WI during the 2025 survey. Length bins are every 1.0 inch.

The 2025 walleye population consists of 10 age classes (ages 2–17), a slight decrease in diversity from the 12 classes identified in 2015. Data indicates that natural recruitment is minimal as fish from non-stocked years (ages 4, 8, and 10) comprise 3.4% of the adult population (Figure 12).

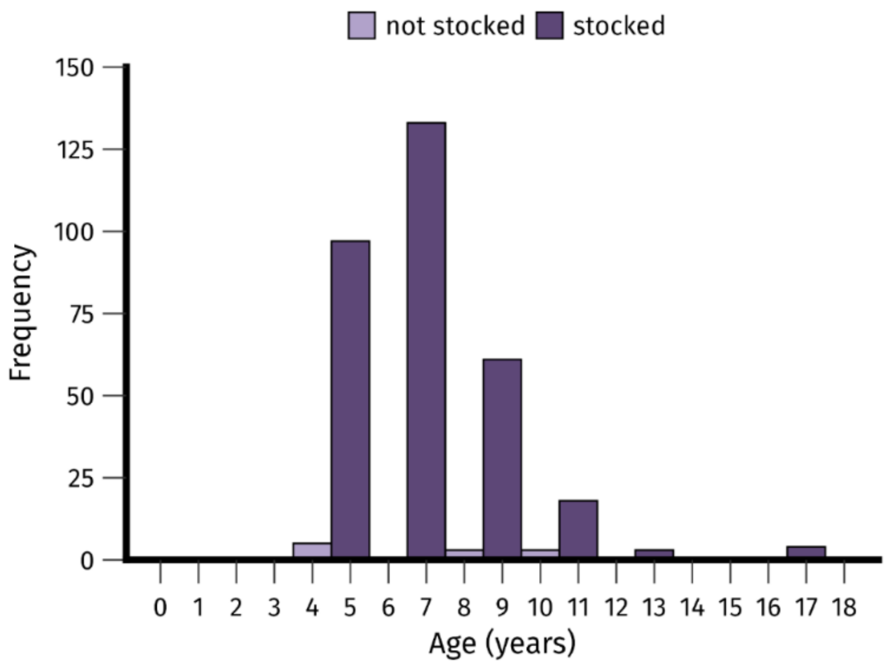

Figure 12. Walleye age distribution histogram of assigned ages from the 2025 walleye population estimate in Bolger Lake Oneida County. Light purple bars indicate age assignments that do not align with stocking years, and dark purple bars aligns with stocked years.

Walleye growth rates in Bolger Lake remained consistent with previous surveys. Growth patterns diverged by sex when compared to regional benchmarks for complex-cool-clear lakes with males growing more slowly than expected, while females exhibited accelerated growth (Figure 13). The von Bertalanffy growth model failed to converge for females; for males, the predicted theoretical mean maximum length (L_∞) was 19.1 inches (95% CI: 18.6–19.6 inches). Additionally, total annual mortality of adult walleyes could not be estimated via catch-curve analysis due to the inconsistent recruitment history (Figure 14).

Survival of stocked walleye to the adult fishery has been highly variable across year-classes. The 2010 cohort (age 15) showed 0.0% survival into 2025, whereas the 2018 cohort (age 7) exhibited a 1.7% survival rate (Table 4). These varying rates impact economic efficiency, with the cost per fish recruiting to the adult fishery ranging from $24.30 for age-7 individuals to $874.65 for age-13 individuals (Table 4). Notably, small fingerlings demonstrated higher survival percentages and a lower cost per recruited individual compared to large fingerlings in Bolger Lake (Table 4).

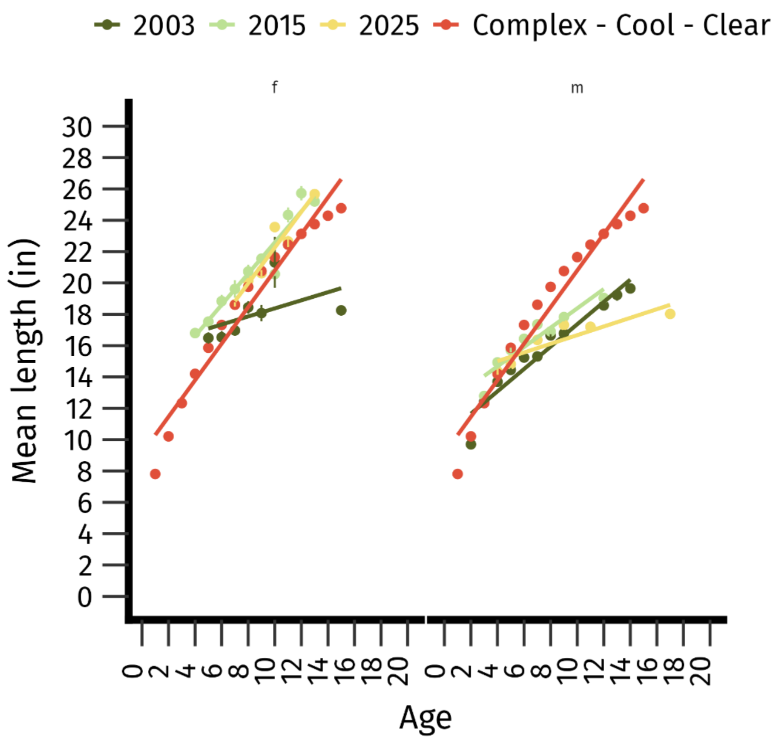

Figure 13. Mean total length (±1 standard error) at estimated age of walleye within Mildred Lake for female (left) and male (right). Walleye ages were assigned using dorsal fin rays in 2025 and 2015 and scales in 2005. Length of individuals with an unknown age were assigned an age with a sex specific age-length key. Mean length at age for each year and median length at age for complex-cool-clear lake class are represented by unique colors.

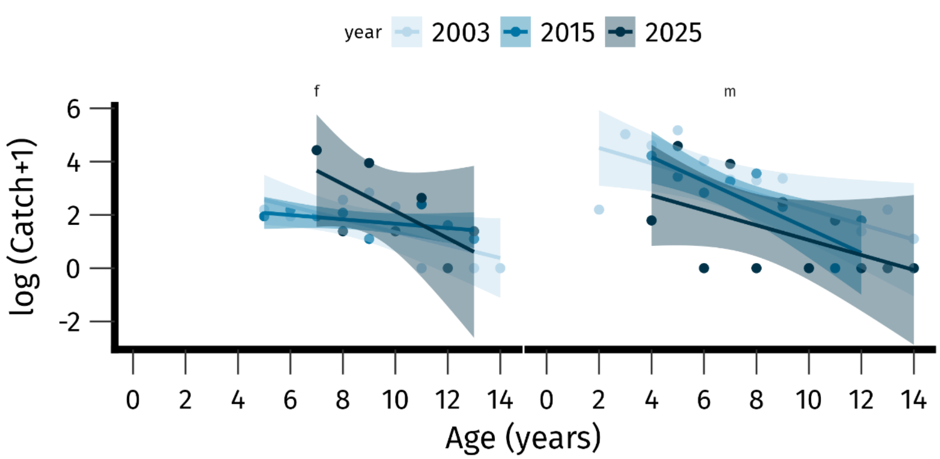

Figure 14. Catch curve of walleye within Bolger Lake, Oneida county, WI. Ages were assigned from dorsal spines in 2025 and 2015 and scales in 2003. Each year is represented by a unique color. Best fit line fit assigned based of linear model to fully vulnerable ages for each year and sex combination where the catch curve started descending with the associated 95% confidence interval of the estimate.

Table 4. Percent survival and cost (US Dollar) to contribution to the adult walleye fishery of stocking events within Bolger Lake, Oneida County, WI.

STOCKING YEAR	SIZE CLASS STOCKED (IN)	NUMBER STOCKE	PERCENT SURVIVAL	COST PER RECRUIT
2008	small	4,165	0.05%	$874.65
2010	small	4,165	0.00%	NA
2012	small	4,165	0.05%	$874.65
2014	large fingerling	1,718	0.5%	$349.23
2016	large fingerling	4,004	0.8%	$215.51
2018	small	4,165	1.7%	$24.30
2020	small	4,462	0.8%	$46.85

YELLOW PERCH

A total of 575 yellow perch were captured during the 2025 survey (536 via netting and 39 via electrofishing). The netting catch rate of 22.3 individuals per net-night ranks in the 75th percentile for complex-cool-clear lakes. Spring catch rates in 2025 exceeded fall rates—a reversal of the trend observed during the 2003 survey (Figure 2). Measured lengths ranged from 1.9 inches to 8.2 inches, with a mean length of 5.9 inches (Figure 15). This yellow perch mean length places Bolger Lake in the 90th percentile for similar systems. However, the population remains dominated by smaller fish, with few individuals reaching the "quality" threshold of 8 inches (Figure 4).

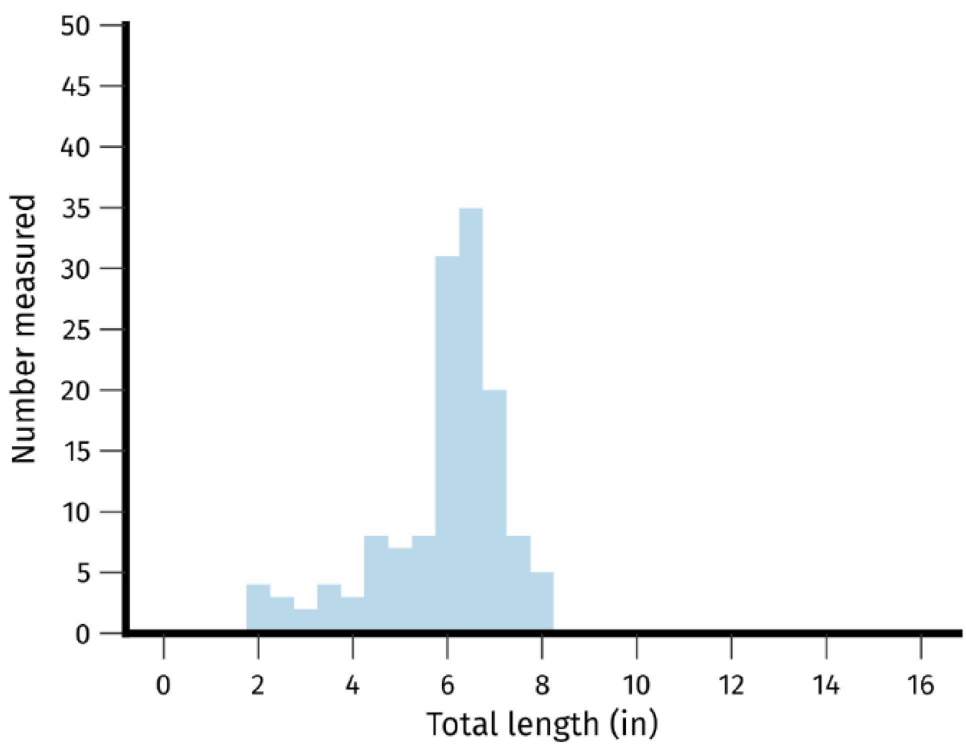

Figure 15. Length frequency of measured yellow perch in Bolger Lake Oneida County, WI during the 2025 survey. Length bins are every 0.5 inch.

Other species

Other species captured during the Bolger Lake survey included black crappie (1), bluntnose minnow (17), central mudminnow (4), mimic shiner (5), mottled sculpin (1), northern pike (8; 13.5-27.5 inches), pumpkinseed (7), rock bass (137), white sucker (5) and yellow bullhead (2).

Discussion

Bolger Lake is a low-alkalinity system (6 mg/L), which likely limits primary productivity and the carrying capacity of the mixed fishery. Largemouth and smallmouth bass have exhibited increases in abundance and size structure since 2003 and panfish remain abundant but continue to lack a "quality" size structure. The muskellunge and walleye populations are maintained through supplemental stocking, though success rates vary significantly across years. Given the system's low productivity, maintaining a balance between predator and prey densities is critical. An overabundance of any species could slow growth rates, resulting in a stunted fishery with even fewer harvestable individuals.

The introduced walleye population in Bolger Lake appears to be maintained primarily through stocking, as very few individuals corresponded to non-stocked years. This supplemental stocking has produced an adult density exceeding the Ceded Territory average for stocked lakes (1.4/acre; T. Cichosz, WDNR, unpublished data) and the established benchmark for a fishable population (1.5/acre; Donofrio et al. 2022). While survival and cost-per-recruit were highly variable regardless of stocking size, survival was generally low (<2.0%) and costs high (mean of $159 per individual under age 11). The high cost and low survival of older individuals (+10 years old) is expected, as they are reaching their life expectancies in exploited systems (7 to 10 years; Tsehaye et al. 2016). Limiting cost assessment to individuals less than 10 years old, drops the mean cost $35.58. This indicates that small fingerlings are more cost-effective with higher survival than large fingerling and their use should be prioritized. Additionally, because survival and cost estimates assumed a 30% contribution from natural reproduction, a parentage assessment should be considered. If stocking is the sole driver of walleye fishery, higher survival rates and lower costs per recruit than was demonstrated during this survey would be revealed.

The muskellunge population in Bolger Lake appears to be sustained primarily through supplemental stocking, as all individuals handled during the survey corresponded to documented stocking years. This supports previous findings that stocking is essential to maintain this fishery (Kubisiak 2004). Survival of stocked cohorts is highly variable, with 3% to 27% of individuals per stocking group having been handled. Growth rates remain typical for complex-cool-clear systems and suggest that current stocking densities have not triggered density-dependent issues. To better understand these dynamics, a recapture survey for muskellunge during 2026 should be considered to provide more reliable abundance, survival and cost-per-recruit data. Additionally, genetic testing should be considered to determine if any natural reproduction is occurring or if the fishery is exclusively stocking-dependent.

Bluegill and yellow perch populations in Bolger Lake consist primarily of individuals below "quality" size. Research suggests that panfish size structure is often driven more by internal population dynamics than environmental factors (Tomcko and Pierce 2005) and can be influenced by angling pressure (Beard and Essington 2000). The poor size structure may result from populations dominated by short-lived individuals rather than long-lived stunted fish (Michaletz 2020), overabundance relative to system carrying capacity (Tomcko and Pierce 2005), or excessive angler harvest (Beard and Essington 2000). Without recent age-structure or creel data, the cause of the poor panfish size structure remains unclear. An understanding of age structure, mortality rates, and harvest pressure will be necessary to determine if more restrictive regulations could improve the size structure in Bolger Lake.

Recommendations

- **Validate stocking contribution via parentage analysis:** Parentage assessment would quantify return on investment for walleye and muskellunge stocking and confirm whether these fisheries are exclusively stocking-dependent or if natural reproduction contribution estimates are correct.
- **Conduct a comprehensive muskellunge population estimate:** This assessment will facilitate a robust analysis of survival rates and cost-per-recruit, allowing managers to determine if current stocking densities are appropriate for the lake's low-productivity environment.
- **Assess panfish age and growth:** Determining whether the current size structure is caused by overharvest, high natural mortality, or density-dependent stunting requires age information informing whether a more restrictive daily bag limits would be viable to improve size structure.

Acknowledgments

Thank you to the DNR staff that collected data over the years used in this report. Bob Consolo, Mark Love, Sam Eagan, Travis Strasburg, Taylor Flannery and Herny Rogge assisted during field work. Lawrence Eslinger calculated the walleye and bass population estimates.

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