WISCONSIN DEPARTMENT OF NATURAL RESOURCES

2025 Spider Fisheries Survey Report

Waterbody Code: 1586600

Photo Credit: Lakeland Aerial

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WISCONSIN
DEPT. OF NATURAL RESOURCES

June 2026

Table Of Contents

Introduction

Spider Lake is a 118-acre, soft-water drainage lake located within the Sugar Camp Watershed. Water conditions support aquatic life, wildlife, recreation, public health and welfare. No invasive species are noted as being established in Spider Lake as of 2025. The lake is accessible to the public, tribal members, and the 3 riparian owners via a boat ramp on the southeast shore, located off Spider Lake Road (Figure 1). Additional information on Spider Lake can be found at the Wisconsin Department of Natural Resources' (DNR) Lake Page.

Spider Lake is classified as a complex-cool-clear system with a shared fishery (Rypel et al. 2019). The fish community is diverse, comprising 17 species and two hybrids that span various tolerance levels including intolerant species like the mottled sculpin to tolerant species such as the white sucker. Multiple thermal guilds are also represented in Spider Lake including coolwater (walleye, yellow perch) and warmwater (bluegill, largemouth bass) groups that represent a broad spectrum of angler interests, from highly desirable walleye to species often viewed as nuisances, such as rock bass. Supplemental stocking took place in the 1940s, 1950s, and 1970s, but the fishery has remained self-sustaining since that time (Table 1).

Angling pressure on Spider Lake has been concentrated primarily during the open-water season, with anglers targeting bluegill, largemouth bass, muskellunge, and walleye at intensities below the average for other Oneida County lakes (Halverson and Blonski 2013). No reported angling tournaments on Spider Lake (2008- present unpublished data; N. Lederman Wisconsin Department of Natural Resources) and tribal members have not utilized Spider Lake for spring harvest (unpublished data; T. Cichosz Wisconsin Department of Natural Resources). Consequently, overall harvest pressure on Spider Lake is likely limited.

The Wisconsin DNR manages Spider Lake in consultation with the Great Lakes Indian Fish and Wildlife Commission (GLIFWC). Historical fisheries assessments have been sporadic, with survey efforts primarily targeting species of high recreational value (Table 2). Additionally, water quality data remains limited with infrequent monitoring through the Citizen Lake Monitoring Network Citizen Monitoring Program since 1990 (Water Explorer 2026).

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

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

Table 1. Fish stockings from 1938-2025 in Spider Lake, Oneida County, Wisconsin.

YEAR	SPECIES	AGE CLASS	NUMBER OF FISH	SOURCE
1938	walleye	fry	266,390	DNR
1939	walleye	fry	250,000	DNR
1939	muskellunge	fry	10,000	DNR
1940	walleye	fry	250,000	DNR
1940	muskellunge	fry	10,000	DNR
1941	walleye	fry	250,000	DNR
1941	muskellunge	fry	7,500	DNR
1944	largemouth	fingerling	450	DNR
1955	walleye	fingerling	1830	DNR
1975	muskellunge	large	100	DNR

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

YEAR	TYPE	GEAR	TARGET SPECIES	SURVEY PURPOSE
1961	FE	boom	all species	relative abundance
1997	FE	boom	gamefish	relative abundance
2005	FE	boom	all species	juvenile recruitment
2005	SN 3	mini fyke	all species	relative abundance
2013	SN 1	fyke net	all species	mark-recapture
2013	SE 1	boom	walleye	mark-recapture
2013	SN 2	fyke net	muskellunge	mark-recapture
2013	FE	boom	gamefish	juvenile recruitment
2015	SN 1	fyke net	all species	mark-recapture
2015	SE 1	boom	walleye	mark-recapture
2015	FE	boom	gamefish	juvenile recruitment
2017	FE	boom	walleye	juvenile recruitment
2018	FE	boom	gamefish	juvenile recruitment
2020	FE	boom	walleye	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 Spider Lake following the treaty assessment protocol (Cichosz 2025) during 2025. Early spring netting (SN 1) and early spring electrofishing (SE 1) for walleye and northern pike followed by a late spring electrofishing (SE 2) for bass and panfish occurred. Fall electrofishing (FE) targeting juvenile gamefish also occurred. Effort provides a description of the status of the fishery, size structure of select fish species and abundance.

SURVEY EFFORT

Spring fyke netting was conducted using 4-foot framed fyke nets. Six nets were set on April 21 and fished until April 24, 2025, totaling 18 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 Spider Lake on April 25, 2025. Late spring electrofishing was conducted around Spider Lake on May 12, 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 three droppers), and two dippers with nets having 0.375-inch bar mesh netting.

Captured gamefish and panfish during all sampling were measured to the nearest 0.1 inch. Largemouth bass, northern pike and walleye were marked with a left 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 Spider Lake is. The walleye population was 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 Spider Lake, Oneida County, WI.

SPECIES	STOCK SIZE (IN)	QUALITY SIZE	PREFERRED SIZE (IN)
black crappie	5	8	10
bluegill	3	6	8
largemouth bass	8	12	15
muskellunge	20	30	38
northern pike	14	21	28
pumpkinseed	3	6	8
rock bass	4	7	9
smallmouth bass	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 and year.

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

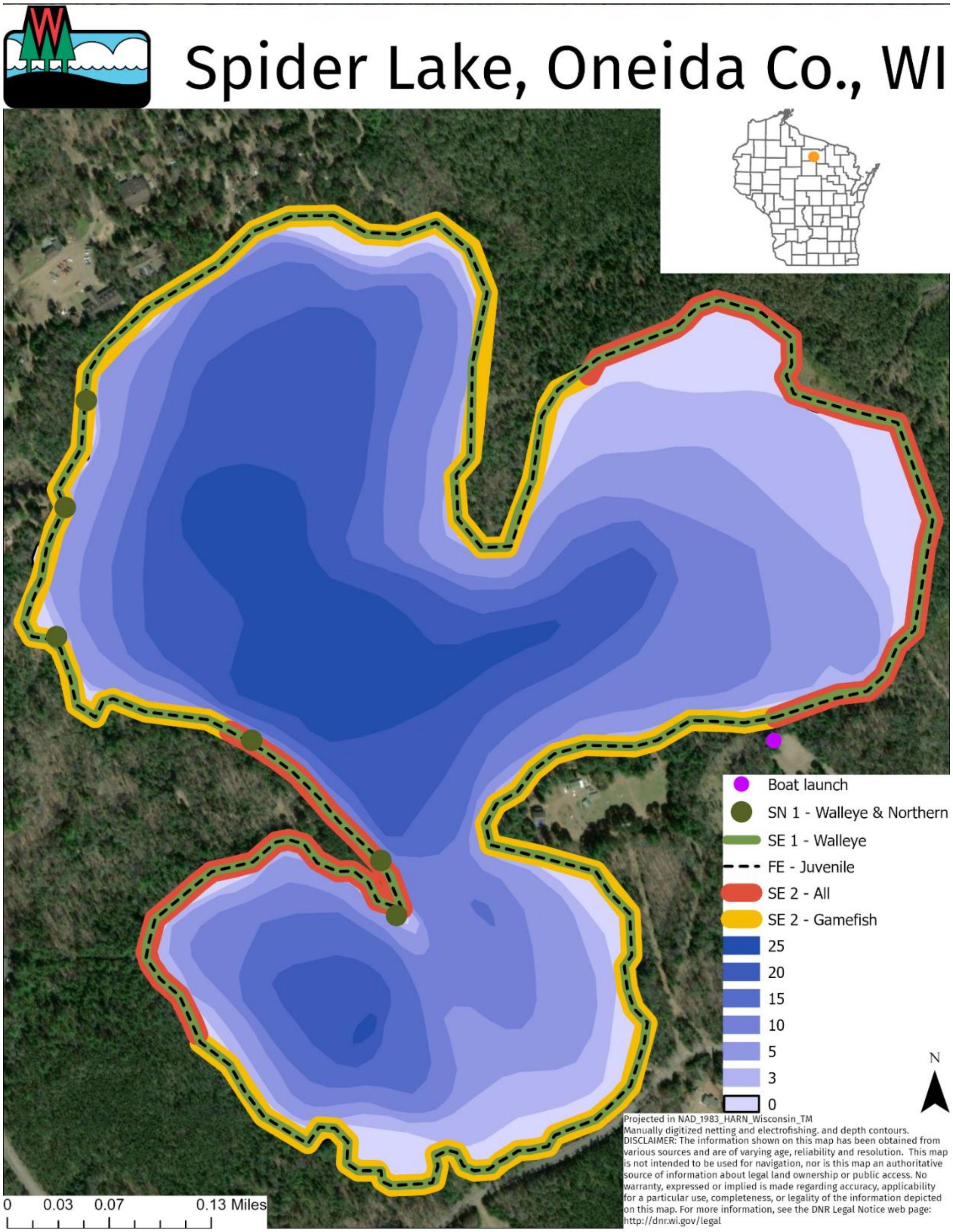

Figure 1. Sampling locations of the various capture gears used during the 2025 Spider Lake survey in Oneida County, Wisconsin. Green dots indicate fyke nets targeting walleye. Green line indicates electrofishing survey route targeting walleye. Red and yellow lines indicate transects targeting bass (red) 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 eastern side of the lake, accessible from Spider Lake Road.

Results

BLACK CRAPPIE

A total of 27 black crappies were captured during the Spider Lake survey (17 via electrofishing and 10 via netting). The netting catch rate of 0.56 fish per net-night ranks in the 25th percentile for complex-cool-clear lakes, while spring electrofishing found 15.0 black crappies per mile. Fall catch rates remained consistent between 2005 and 2025, but a lack of historical spring data prevents a direct year-over-year comparison for that season (Figure 2).

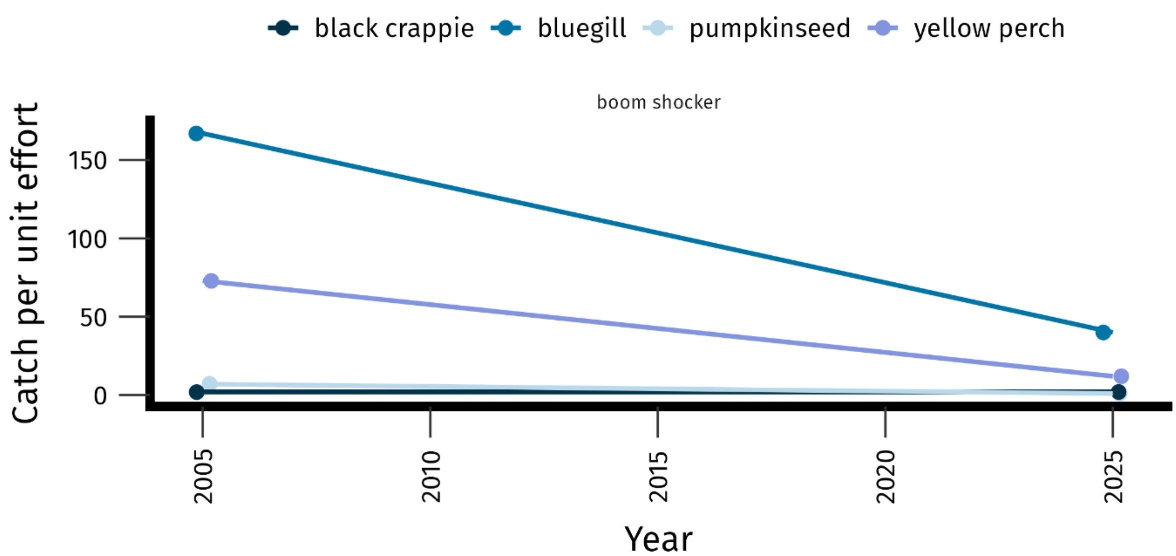

Figure 2. Catch rate of black crappies, bluegill, pumpkinseed and yellow perch across surveys within Spider during fall electrofishing. Each species is a unique color. Points within the same year among lakes were jittered to remove overlap.

Measured black crappie lengths ranged from 1.5 inches to 11.8 inches, with a mean length of 8.1 inches (Figure 3). Mean length of black crappies is in the 90th percentile for complex-cool-clear systems. The PSD was near the regional average, exhibiting a healthy mix of individuals across a broad size range (Figure 4). Further size structure comparisons should be avoided due to limited sample size (< 75 individuals; Miranda 2007).

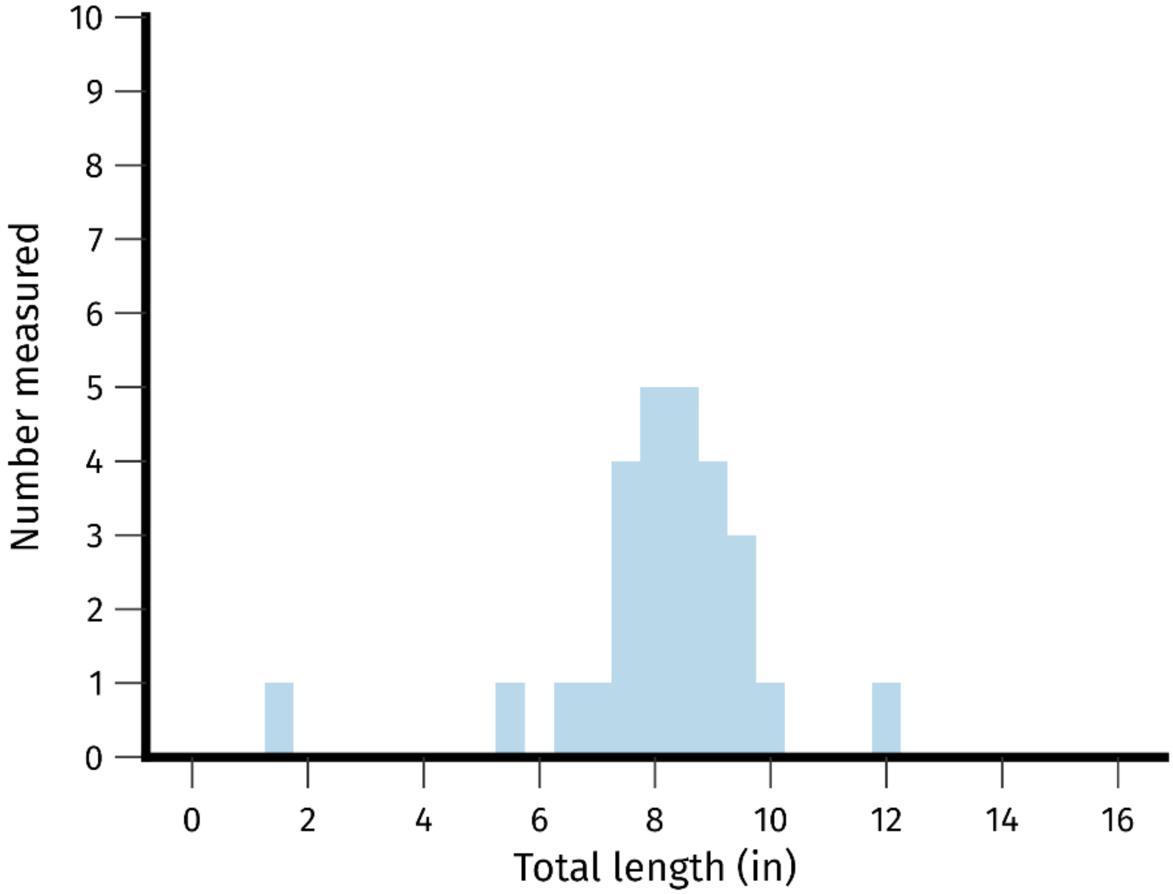

Figure 3. Length frequency of measured black crappie in Spider Lake Oneida County, WI during the 2025 survey. Length bins are every 0.5 inch.

BLUEGILL

A total of 416 bluegills were captured during the Spider Lake survey (347 via electrofishing and 69 via netting). The spring electrofishing catch rate of 307.0 bluegills per mile places the population in the 95th percentile for complex-cool-clear lakes, while the netting catch rate was 3.8 bluegills per net-night. Fall electrofishing catch rates showed a decline from 167.0 bluegills per mile in 2005 to 40.0 bluegills per mile in 2025 (Figure 2). Because bluegills had not been targeted in previous spring surveys, a direct historical comparison for that season is not possible.

Measured bluegill lengths varied between 1.0 inches to 6.9 inches, with a mean length of 4.3 inches (Figure 4). Bluegill mean length ranks in the 90th percentile for complex-cool-clear systems but the PSD remains skewed toward smaller individuals. The majority of the population consists of fish under 5 inches, falling short of the 6-inch "quality" threshold— a size structure similar to that observed in 2005 (Figure 5).

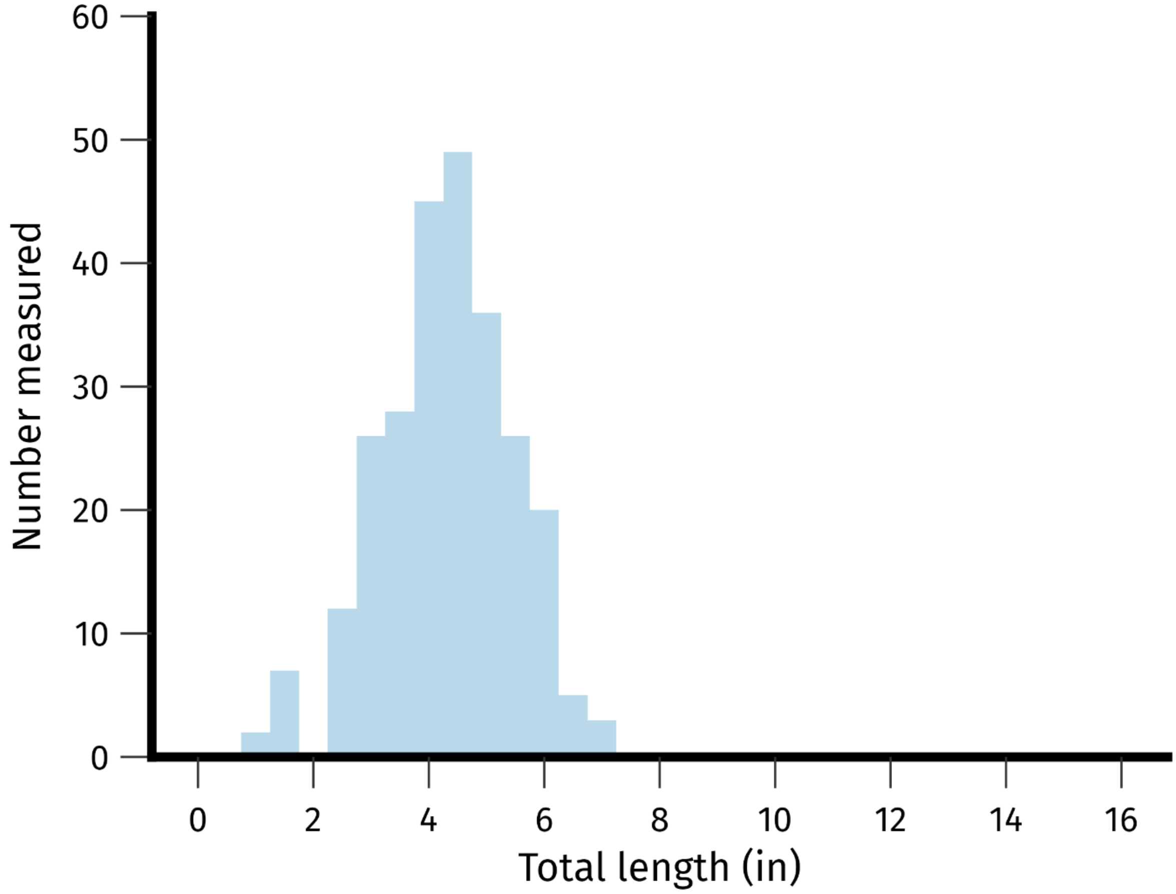

Figure 4. Length frequency of measured bluegills in Spider Lake Oneida County, WI during the 2025 survey. Length bins are every 0.5 inch.

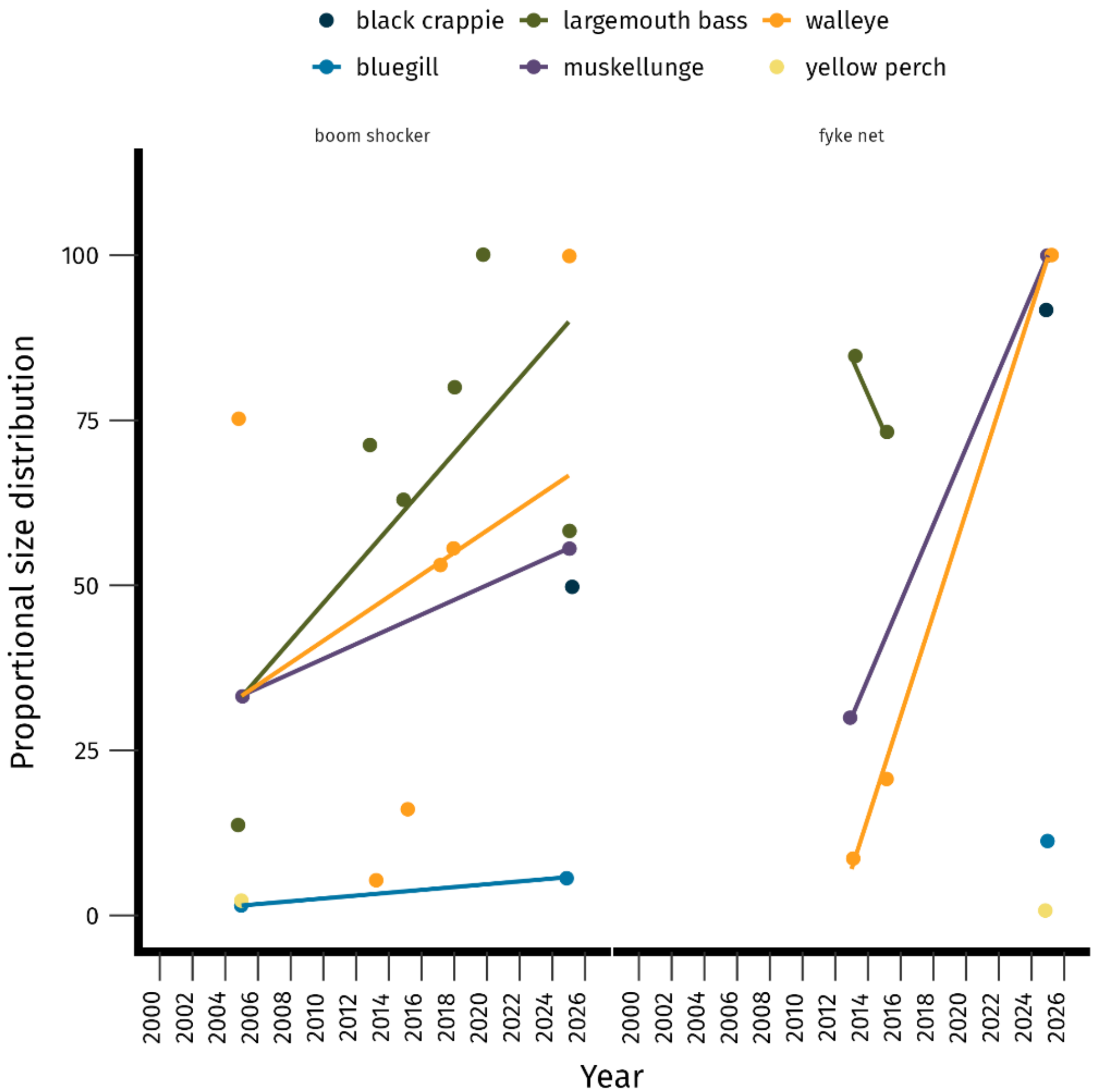

Figure 5. Proportional size distribution of quality length fish from select species captured across surveys during electrofishing (left) and netting (right) within Spider Lake Oneida County, WI.

LARGEMOUTH BASS

A total of 32 largemouth bass were captured during the Spider Lake survey (30 via electrofishing and two via netting). The late-spring electrofishing catch rate of 2.6 fish per mile ranks in the 25th percentile for complex-cool-clear lakes. Spring catch rates remained comparable to the 2.9 fish per mile recorded in 2013 while fall electrofishing surveys show a gradual increase from 1.9 fish per mile in 1997 to 5.5 per mile in 2025. Measured lengths ranged from 1.7 to 16.7 inches, with a mean length of 7.8 inches (Figure 6). Mean length of largemouth bass is in the 25th percentile for complex-cool-clear systems. Further size structure comparisons should be avoided due to limited sample size (< 75 individuals; Miranda 2007).

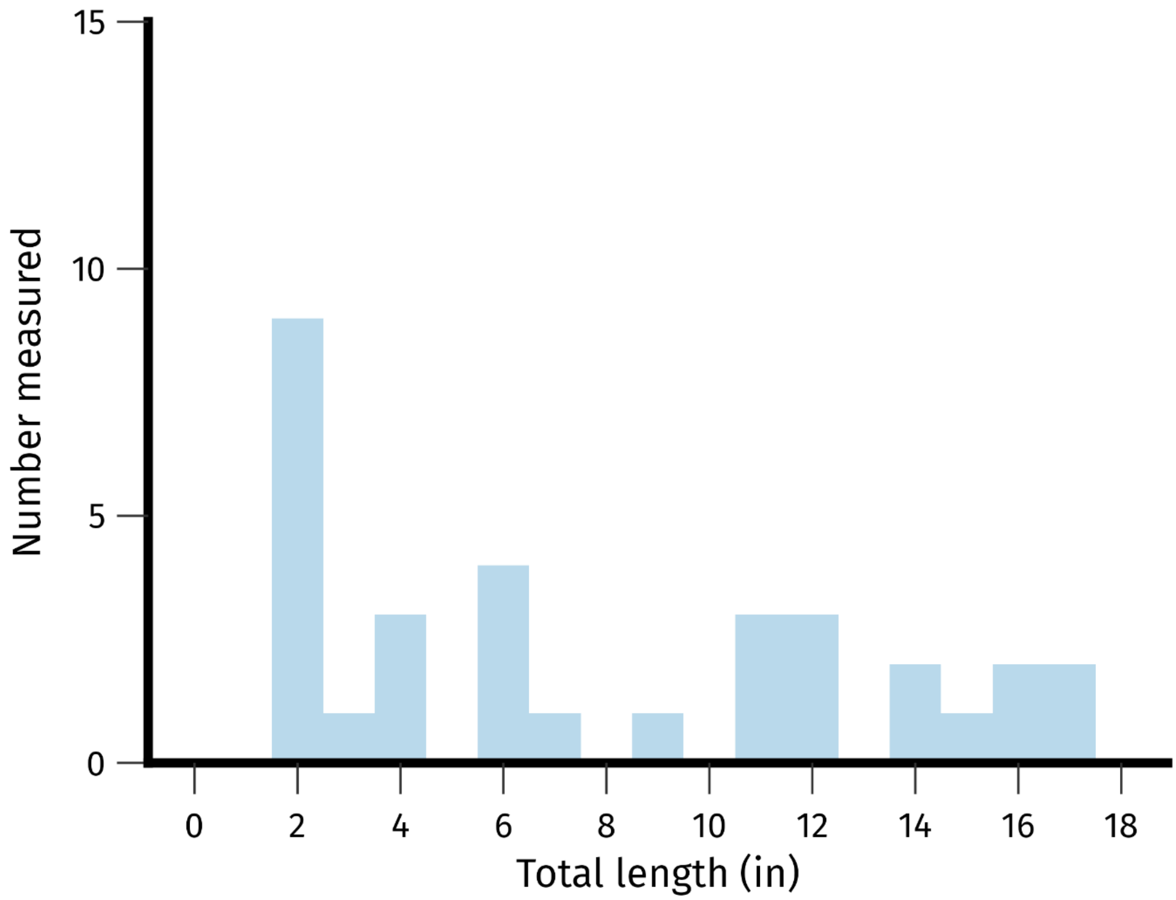

Figure 6. Length frequency of measured largemouth bass in Spider Lake Oneida County, WI during the 2025 survey. Length bins are every 1.0 inch.

MUSKELLUNGE

A total of 20 muskellunge were captured during the Spider Lake survey (14 via electrofishing and six via netting). The netting catch rate of 0.3 muskellunge per net-night ranks in the 95th percentile for complex-cool-clear lakes, while spring and fall electrofishing found 2.1 and 0.8 muskellunge per mile, respectively. Measured lengths of muskellunge varied between 7.7 to 40.5 inches, with a mean length of 30.4 inches (Figure 7). This mean muskellunge length places the population in the 90th percentile for similar systems.

The muskellunge population was represented by eight age classes in 2025, ranging from age 1 to age 13. This is identical to the eight age classes observed in 2013, which spanned ages 2 through 11. Mean length-at-age has remained consistent with historical data and is comparable to other complex-cool-clear systems through age 6. However, growth rates appear to slow beyond that point (Figure 8).

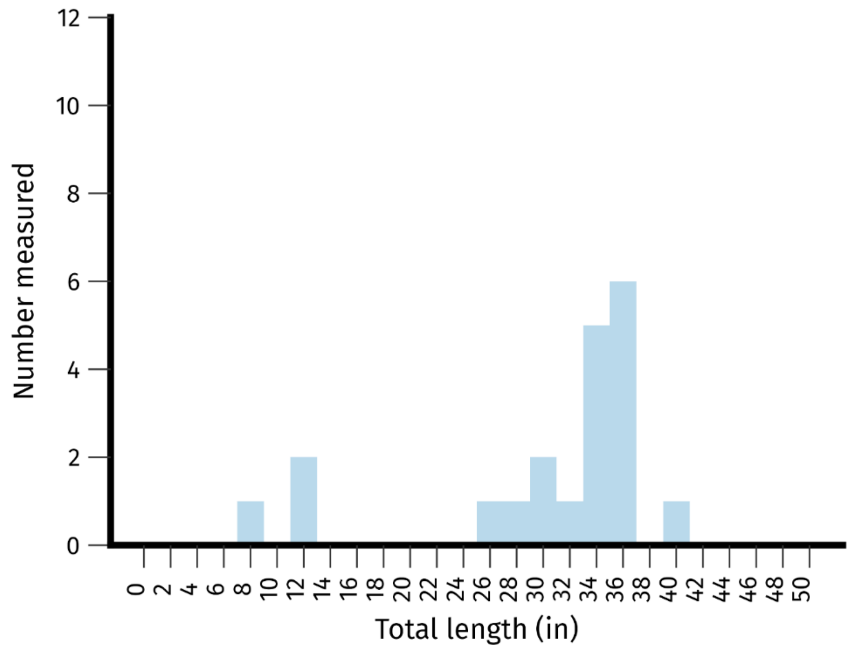

Figure 7. Length frequency of measured muskellunge in Spider Lake Oneida County, WI during the 2025 survey. Length bins are every 2.0 inch.

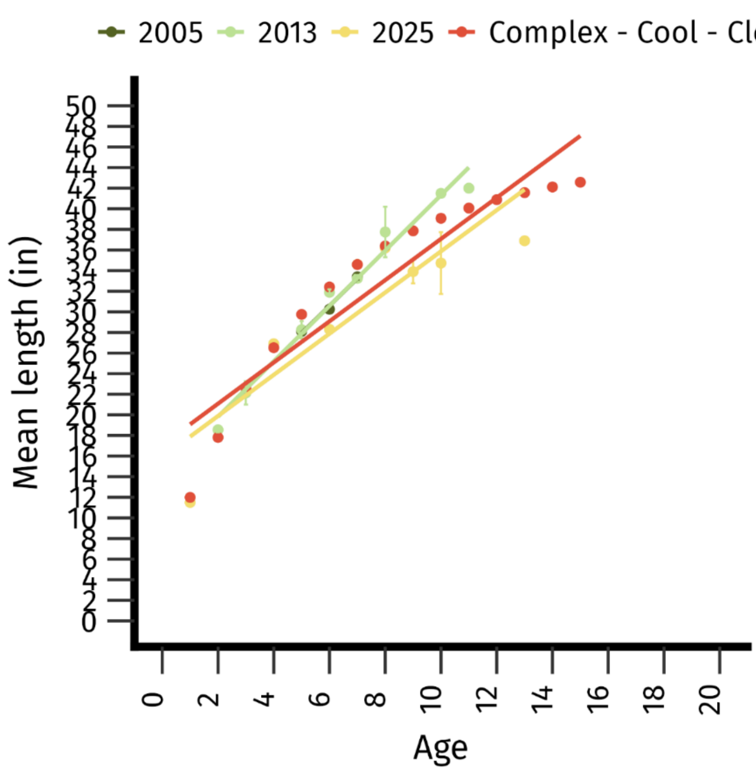

Figure 8. Mean total length (±1 standard error) at estimated age of muskellunge within Spider Lake. Muskellunge ages were assigned using anal fin rays in 2025 and scales in 2013. Mean length at age for each year and median length at age for complex-cool-clear lake class are represented by unique colors.

PUMPKINSEED

A total of 44 pumpkinseed were captured during the Spider Lake survey (32 via electrofishing and 12 via netting). The spring electrofishing catch rate of 31.0 pumpkinseed per mile falls in the 90th percentile for complex-cool-clear lakes, while the netting catch rate was 0.7 pumpkinseed per net-night. Fall electrofishing catch rates were higher in 2005 (7.0 per mile) than in 2025 (1.0 per mile). Because pumpkinseed were not specifically targeted during the spring in previous surveys, a historical comparison for that season is not possible (Figure 2).

Measured pumpkinseed lengths ranged from 2.7 inches to 6.8 inches, with a mean length of 4.3 inches (Figure 9). Pumpkinseed mean length ranks in the 75th percentile for complex-cool-clear systems. The PSD was skewed toward smaller size classes, with most of the population measuring under 5 inches lacking a significant number of quality sized individuals, typically defined as 6 inches or greater (Figure 4). Further size structure comparisons should be avoided due to limited sample size (< 75 individuals; Miranda 2007).

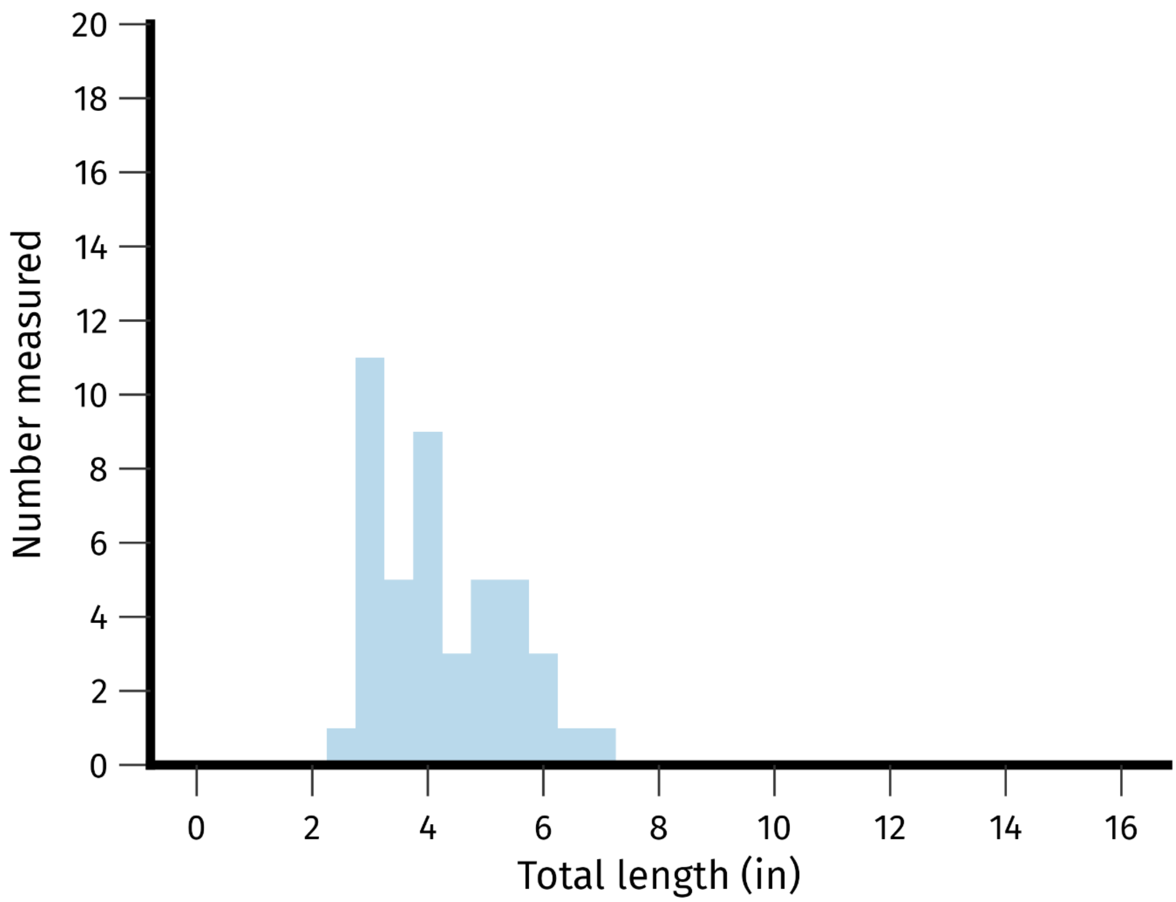

Figure 9. Length frequency of measured pumpkinseed in Spider Lake Oneida County, WI during the 2025 survey. Length bins are every 0.5 inch.

WALLEYE

A total of 106 walleye were handled during the 2025 Spider Lake survey (37 via electrofishing and 69 via netting), with a male-to-female ratio of 1.12. Of the individuals captured during population estimate sampling, 58 were unique and 20 were recaptures. Notably, four individuals (three females, one male) retained marks from the 2015 survey. The adult walleye population was estimated to be 77 ± 20 fish (0.6 per acre; CV = 0.14), representing a decline from 2013 and 2015 levels (Figure 10). An additional 27 walleyes were handled outside the population estimate sampling. Netting catch rates (3.8 walleye per net-night) aligned with the 50th percentile for complex-cool-clear lakes. Natural recruitment remains low but present, with no age-0 and 0.38 age-1 walleye per mile captured during fall surveys consistent with historical trends (Figure 11).

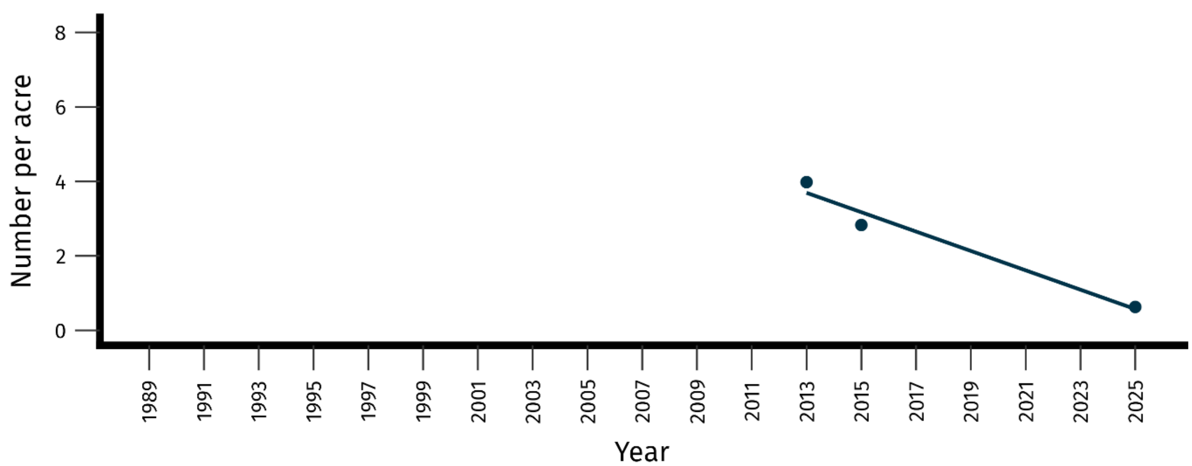

Figure 10. Adult walleye population estimate through time in Spider Lake, Oneida County, WI.

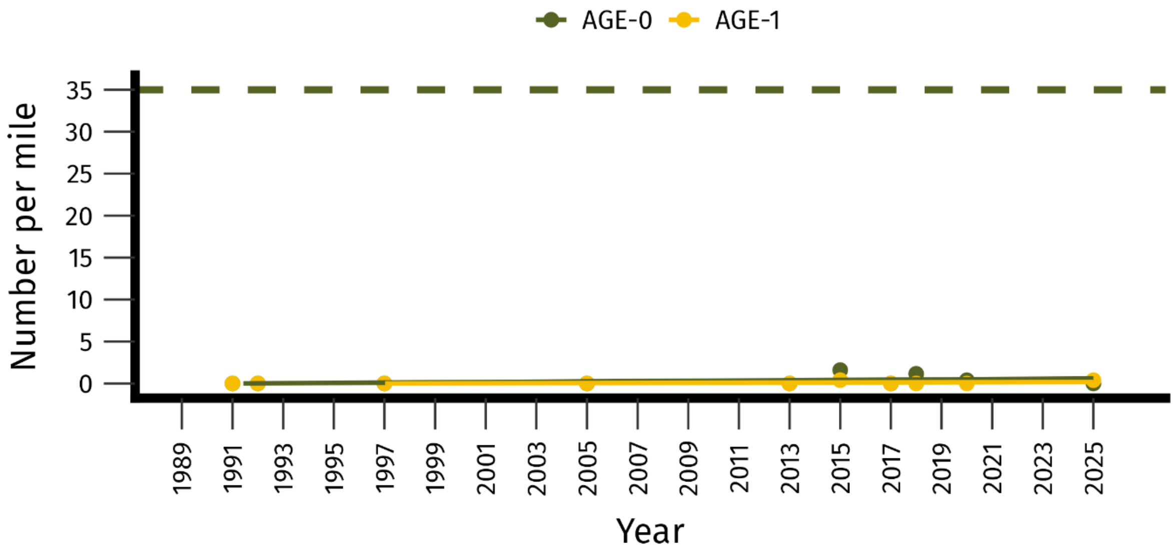

Figure 11. Number of age-0 and age-1 walleye per mile captured during fall boom shocking within Spider Lake Oneida County, WI through time. Fish ages were assigned by scales. Dashed green line is the average age-0 catch per mile in self-sustaining lakes.

Captured walleye ranged from 6.6 inches to 26.5 inches, with a mean length of 20.1 inches in Spider Lake. This mean length is in the 95th percentile for complex-cool-clear systems (Figure 11). Sexual dimorphism in length was evident, as females were consistently larger than males (Figure 12). Size structure has shifted since the 2015 survey with PSD-15 increasing from 20 to 100, and PSD-20 rising from 1 to 31. This suggests an unbalanced population now dominated by mature, large-sized individuals with low representation of younger age classes Pedersen 2020; Anderson and Weithman 1978).

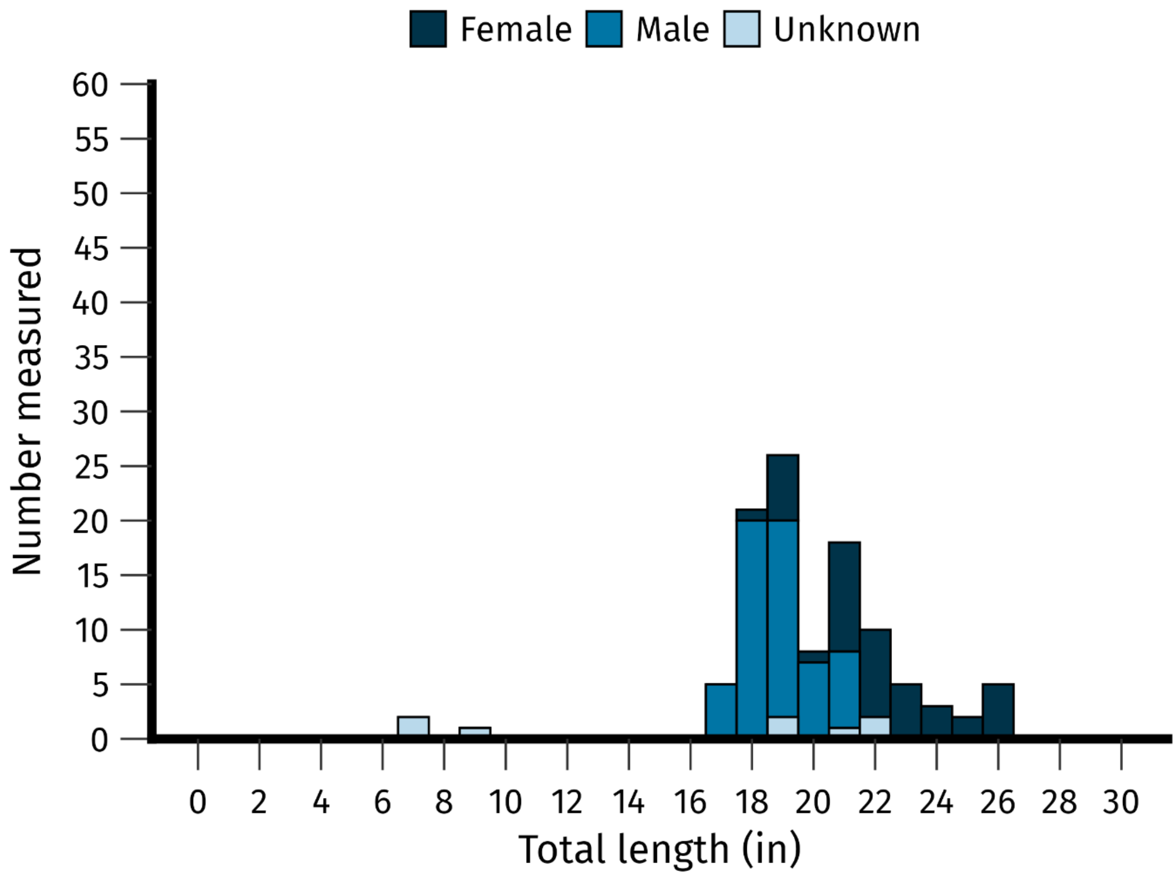

Figure 12. Length frequency of measured walleye in Spider Lake Oneida County, WI during the 2025 survey. Length bins are every 1.0 inch.

The walleye population was represented by 13 age classes in 2025, ranging from age 1 to age 17 within Spider Lake. This indicates an increase in age diversity and longevity compared to the 2013 survey, which identified 11 age classes (ages 3–13). Mean length at age remained consistent with historical data and regional lake class averages through age 10, after which growth became stagnant (Figure 13). Due to an inadequate sample size of both juvenile and larger individuals, the Von Bertalanffy growth model could not be reliably parameterized using the 2025 dataset. Realistic total annual mortality estimates were only calculable for males during the 2013 survey, with an estimated rate of 51% (Table 4).

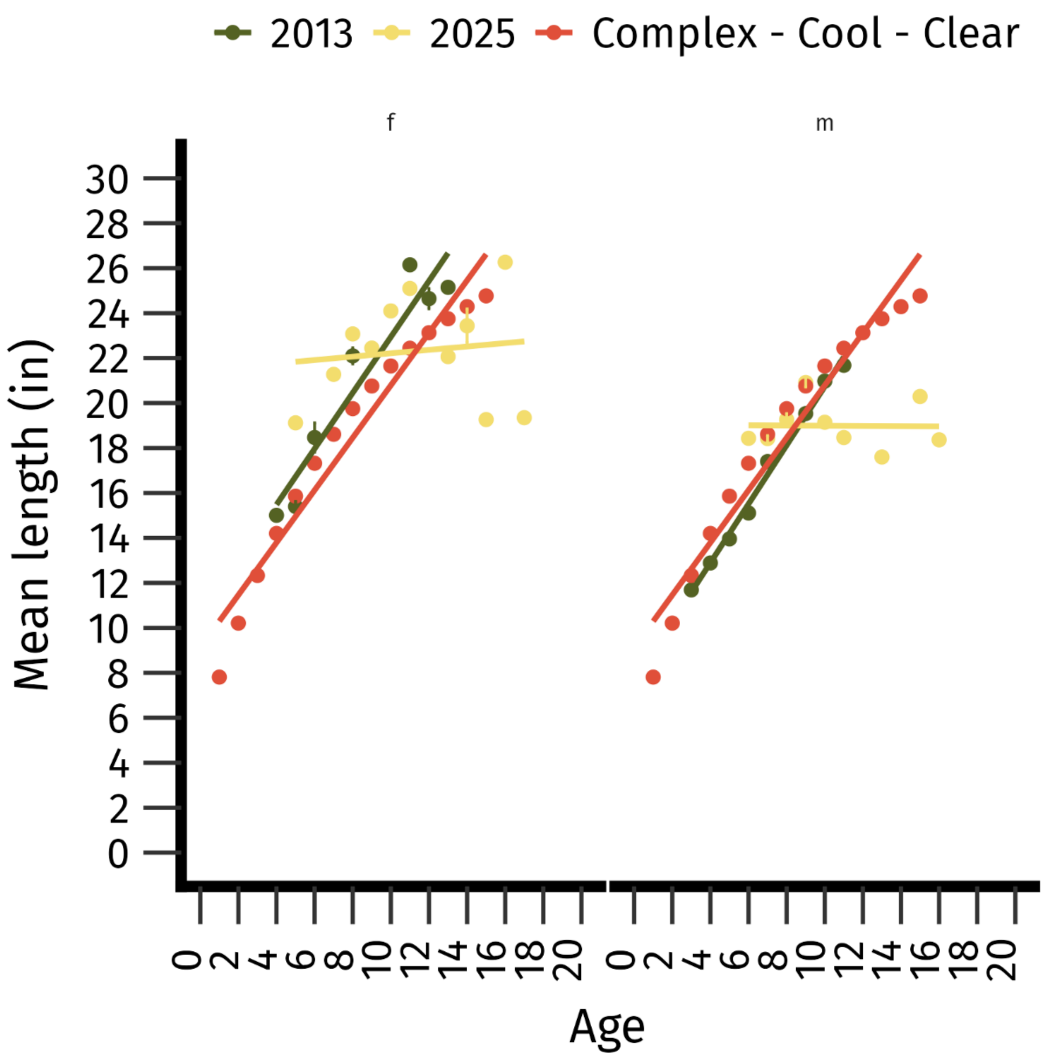

Figure 13. Mean total length (±1 standard error) at estimated age of walleye within Spider Lake for female (left) and male (right). Walleye ages were assigned using dorsal fin rays in 2025 and 2013. Length of individuals with an unknown age were assigned an age with a sex specific age-length key. Mean length at age for each year and median length at age for complex-cool-clear lake class are represented by unique colors.

Table 4. Catch curve mortality estimates from walleye within Spider Lake, Oneida county, WI. Ages were assigned from dorsal spines in 2025 and 2013. Z is total instantons mortality and A is the annual mortality rate. Confidence intervals (CI) of each metric in paratheses next to the estimate.

SEX	YEAR	Z (CI)	A (CI)
Female	2013	0.14 (-0.23-0.52)	13.5 (-25.3 – 40.4)
Male	2013	0.72 (0.2-1.2)	51.2 (18.2 – 70.9)
Female	2025	0.0 (-0.3-0.3)	1.01 (-28.3 – 23.6)
Male	2025	0.2 (-0.1-0.5)	16.2 (-10.1- 36.3)

YELLOW PERCH

A total of 421 yellow perch were captured during the 2025 Spider Lake survey (269 via electrofishing and 152 via netting). The spring electrofishing catch rate of 257.0 yellow perch per mile and netting rate of 8.44 yellow perch per net-night were in the 50th percentile for complex-cool-clear lakes. Fall electrofishing catch rates show a decline from 73.0 yellow perch per mile in 2005 to 12.0 yellow perch per mile in 2025 (Figure 2). Measured lengths of yellow perch varied between 2.3 inches to 8.6 inches, with a mean length of 4.9 inches (Figure 15). While this yellow perch mean length ranks in the 75th percentile for complex-cool-clear lakes, the population is dominated by individuals under 8 inches, with few fish reaching quality size (Figure 4).

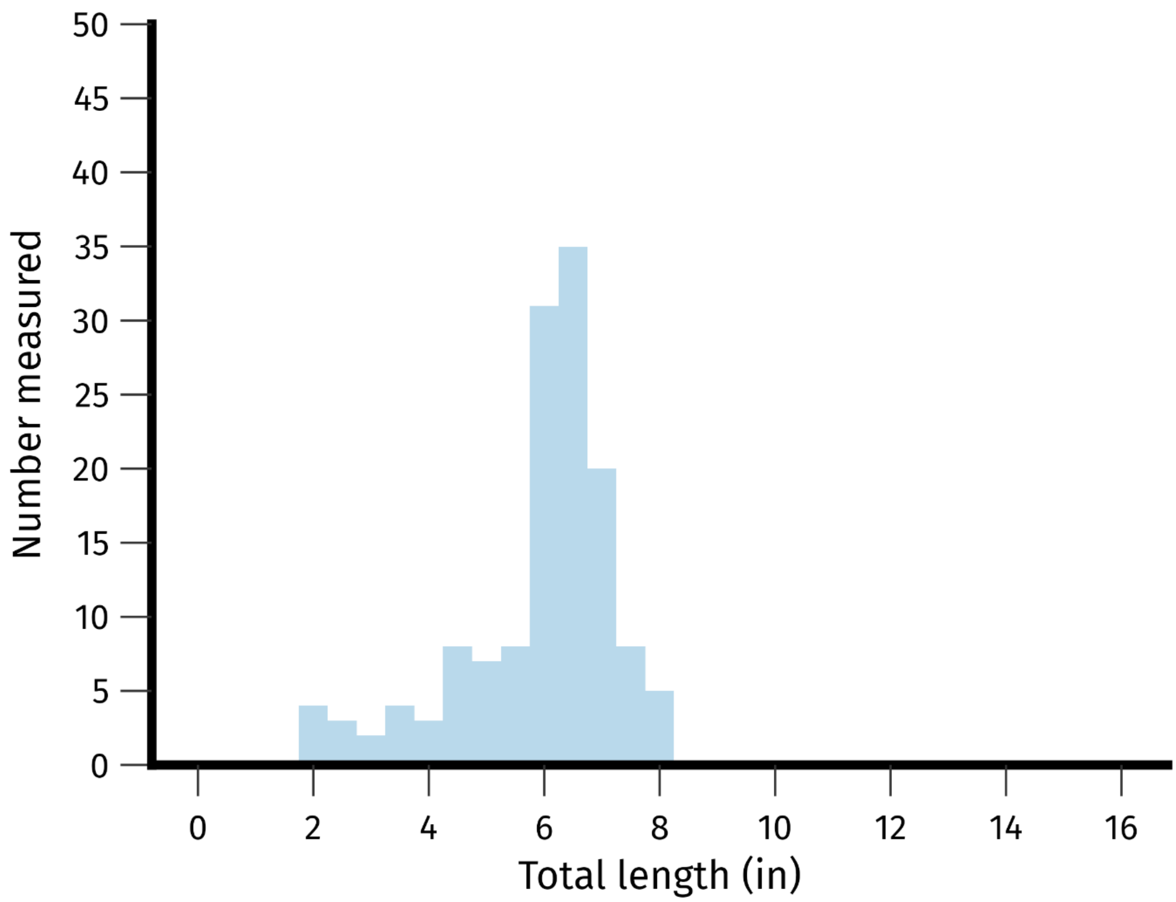

Figure 15. Length frequency of measured yellow perch in Spider Lake Oneida County, WI during the 2025 survey. Length bins are every 0.5 inch.

Other species

Other species captured during the Spider Lake survey included bluntnose minnow (2), fathead minnow (2), golden shiner (18), mottled sculpin (2), northern pike (9; 11.7-28.2 inches), rock bass (2), white sucker (32) and yellow bullhead (2).

Discussion

Spider Lake is a low-productivity, soft-water system (alkalinity 16 mg/L). Historically, Spider Lake supported a self-sustaining, predator-dominated fishery where muskellunge and walleye maintained a balance with associated panfish species (Morehouse 1961). Recent surveys suggest shifts with muskellunge populations remaining stable, declines in walleye and panfish abundances and increasing largemouth bass numbers. Managing the shifting balance will be critical to the future balance and functioning of Spider Lake. Utilizing Resist-Accept-Direct (RAD) framework can aid managers when deciding which management action to take (Lynch et al. 2021)

The lake's low buffering capacity and limited nutrient availability constrain the production of phytoplankton and zooplankton, restricting the total fish biomass capable of being supported. While this allows for efficient transfer of energy to top predators, the food web is susceptible to stress from overpopulation or interspecific competition. For example, the increasing size structure of top predators may be exerting excessive pressure on the panfish and soft-rayed forage, leading to a decline in prey size structure. Sustaining high densities of large-bodied predators in such a resource-limited environment likely creates recruitment bottlenecks for the predators and stunts the size structures for other species.

The walleye population within Spider Lake is exhibiting stagnant growth rates and low recruitment resulting in a reduced adult abundance. Declining walleye populations have been occurring across the ceded territory of Wisconsin over the last 20 years (Mrnak et al. 2024, Rypel et al. 2018). A variety of factors have been identified as contributing to this walleye decline including environmental changes (Barta et al. 2024), habitat change (Lester et al. 2004), fish community change (Broda et al. 2022; Hansen et al. 2015) and production-overharvest (Embke et al. 2019). Stocking is commonly used as a first response to declining abundance but the effectiveness has been reducing (Embke et al. 2025). The Resist-Accept-Direct (RAD) framework could help prioritize which management action is taken and when (Feiner et al. 2022). Resisting change within Spider Lake with a couple cycles of small fingerling stocking when natural year-classes go undetected could prevent the system from reaching a tipping point sliding it back to the history muskellunge-walleye dominated fishery before reaching a point where recovery is unlikely (Nes et al. 2016). If the first few stocking attempts do not result in improved natural recruitment, accepting the change and the fishery it is becoming should be considered given the limited walleye exploitation and angler use of the system (Halverson and Blonski 2013).

Survey interpretations may be confounded by some potential sampling biases. For example, largemouth bass were captured in low abundances across a wide range of lengths. This could suggest consistent but low recruitment but also deviates from the standard fisheries assumption that abundance decreases as length increases (Bayley and Austen 2002; Kerr and Dickie 2001). This discrepancy could point to sampling efficacy issues, as electrofishing efficiency typically diminishes in areas with increased water depth and dense vegetation (Bayley and Austen 2002) which are common in Spider Lake. Additionally, inconsistent timing between spring and fall electrofishing with limited directed effort makes it difficult to distinguish population shifts from variations in catchability (DuFour et al. 2019). Implementing routine spring electrofishing is necessary to accurately represent the relative abundance and size structure trends in largemouth bass and panfish populations.

Recommendations

1. **Consider walleye stocking:** Stock small fingerling walleye if surplus stocking product becomes available could be considered when weak spawning years are detected the year prior. This could establish a strong year class, bolster existing fishery, and prevent the system from reaching the ecological tipping point.
2. **Increase fall survey frequency:** Reduce the number of years between fall surveys to better track recruitment dynamics and distinguish between sporadic natural recruitment and total year-class failure, evaluate the success of stocking efforts, and more accurately determine muskellunge reproduction.
3. **Standardize bass and panfish sampling:** bass and panfish sampling should occur during every scheduled rotation using the standardized late-spring electrofishing protocol. If spring sampling is not feasible, effort should include fall survey collection to maintain the integrity of that existing data series.

Acknowledgments

Thank you to the DNR staff that collected data over the years used in this report. Charlie Leanna and Herny Rogge assisted during field work. Lawrence Eslinger calculated the walleye population estimate.

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