

Winslow Lake
Iron County, T46N R36W S35
North Branch Paint River Watershed, 2025

Michael Glubzinski, Inland Fisheries Biologist

Environment

Winslow Lake is a 258-acre natural lake in the Ottawa National Forest approximately 21 miles northwest of Iron River in Iron County. The lake has three inlets, and outflows to Winslow Creek in the southwest bay, which subsequently empties into the North Branch of the Paint River. The lake drains a total catchment area of roughly 5,000 acres, and the land cover in this lakeshed is predominantly a mix of forest and woody wetlands (Figure 1). Seventy percent of the forest and woody wetland habitats within the lakeshed have some degree of land protection. A privately-owned 5-foot dam exists at the Winslow Creek outlet that was rebuilt in the early 1980s. Maximum depth of Winslow Lake is approximately 22 feet. The shoreline has some development on the southwestern basin, but much of the shoreline remains unaltered rock and cobble, with one-third being owned by the US Forest Service. Rock, gravel, and sand substrates are present within the lake.

Fishery Resource

History

The earliest records of fisheries management in Winslow Lake occurred in 1934 with stocking of Walleye fry, followed by additional stockings of Walleye, Largemouth Bass, and Bluegill in 1937, and Walleye again in 1938 and 1939. A fish community survey at this time described an abundant sunfish population and the presence of Yellow Perch and Northern Pike, along with abundant forage fish such as Common Shiner, Iowa Darter, Central Mudminnow, and Golden Shiner. This pattern in the fish community continued into the 1960s and 1970s, where survey catches were primarily comprised of Bluegill, Yellow Perch, Pumpkinseed, and, to a lesser extent, Largemouth Bass and Northern Pike. A few Walleye were detected in a general survey in 1962 but did not show up in subsequent surveys in 1968, 1977, and 1978. Regular Walleye stocking began in 1979 (Table 1) with the goals of producing a Walleye fishery and reducing panfish abundance to improve their growth rates. Multiple removal efforts for panfish and White Sucker, as well as a piscicide treatment of antimycin in 1979, were conducted around this time to thin the panfish and sucker populations and help Walleye establish. Follow-up surveys after the treatment in 1979 and 1980 continued to capture large numbers of Bluegill and Black Crappie but did not capture any Yellow Perch. However, in 1986, US Forest Service survey catch indicated concern with the size structure of the Yellow Perch population, as 103 fish had been captured but average size remained small at 4.8 inches. No mention was made of the chemical treatment potentially eliminating much of the population and causing it to cycle; instead, manual removal of Yellow Perch was recommended. This removal occurred in 1991, along with simultaneous removals of White Sucker and panfish to promote survival of stocked fall fingerling Walleye, which were stocked after spring fingerlings had been deemed unsuccessful. A total of 831 lbs of Yellow Perch, 539 lbs of White Sucker, and 65.5 lbs of Bluegill and other sunfish were removed. The survey, which occurred during the Walleye spawn, also captured 156 Walleye ranging from 15-27 inches.

In 1989, after attempts to stock Gogebic-strain fry and spring fingerling Walleye had been deemed unsuccessful, managers transitioned to stocking fall fingerling Bay de Noc strain Walleye. These fall fingerling stockings continued annually at a rate of 6.1 – 60.5/acre until the cessation of Walleye

stocking in Winslow Lake in 1995 after a naturally-reproducing population had successfully been established. During that time, however, concern about increased angling pressure for Walleye inhibiting the effectiveness of the management goal to improve panfish size structure led managers to impose a no-possession Walleye regulation on Winslow Lake (along with Stager Lake, Iron Co. and Six Mile Lake, Dickinson Co.) beginning in 1992. Surveys in the late 1990s and early 2000s revealed a fairly abundant Walleye population with balanced size structure, reduced population size and improved growth rates for panfish species, and an abundant, but very slow-growing, Northern Pike population, with no capture of individuals greater than the 24-inch minimum length limit. As a result, in 2004, the Northern Pike minimum size limit was removed on Winslow Lake and the bag limit was increased to 5 fish. Surveys over the next 10 years documented an increasing Walleye population size (population estimates of 4.7/acre in 2007, 5.8/acre in 2008, and 5.8/acre in 2013 (as a note, an alternate estimate of 7.1/acre in 2013 was previously reported, but this estimate had high error due to a low number of recaptures on the last night of the survey) and predator biomass (up to 83% of survey catch in 2007), improved growth rates for Northern Pike, and decreasing abundance and high growth rates for panfish. Given these data, coupled with angler frustration at the low numbers of panfish and inability to retain Walleye, managers removed the no-possession Walleye regulation on Winslow Lake in 2018, and the lake returned to the state standard Walleye regulation (15" MSL, 5 fish daily bag). Since 2019, per management recommendation following the regulation change, annual fall Walleye recruitment surveys have been conducted on Winslow Lake. Surveys in 2019 and 2020 documented strong yearling and young-of-year cohorts, respectively, but year classes from 2021-2024 were minimal (Table 2, Figure 2).

Winslow Lake is listed as a co-managed body of water shared between the Lac Vieux Desert Tribe of Lake Superior Chippewa Indians and the Keweenaw Bay Indian Community for spring subsistence harvest of Walleye. However, Winslow Lake has received little spear fishing effort over the years, with some harvest occurring from 2008-2017, but no harvest reported since the return to the state standard regulation in 2018 (Figure 3).

Current Status of the Fish Community

In 2025, a suite of survey efforts was conducted in Winslow Lake to monitor for changes to the fish community and lake habitat characteristics after reopening Walleye harvest on Winslow Lake. Surveys included a winter limnology survey, a spring adult Walleye population estimate, a summer Status & Trends fish community survey, and a fall Walleye recruitment survey.

Methods

Winter Limnology

To check for the extent of suitable conditions remaining in Winslow Lake near the end of winter, a limnology profile was taken through the ice on March 13, 2025. Water temperature, dissolved oxygen (DO) concentration, conductivity, and pH measurements were collected with a HydroLab unit at one-foot increments from the surface to the bottom of the lake. Depth in the location sampled was 24 ft.

Spring Walleye Population Estimate Survey

A mark-recapture spring Walleye population estimate was conducted on Winslow Lake beginning April 26 and ending April 30, 2025. Nighttime boat electrofishing was used for both the marking and recapture phases. The full shoreline was shocked each night, except for the night of April 27th, which was cut short due to mechanical issues. Water temperatures ranged from 43°F on April 26, to 47°F on April 30. All Walleye captured were marked with a dorsal spine clip, and this clip was retained for

ageing analysis for 10 Walleye per inch bin, if possible. To calculate the population estimate, the Chapman estimator was applied to the number of marked and recaptured individuals in each length bin (0 – 14.9”, 15 – 19.9”, ≥ 20 ”) to produce an abundance estimate within each length bin that was then summed across length bins to produce an overall population estimate for adult Walleye, with variance.

Summer Status & Trends (S&T) Survey

A summer S&T survey was conducted according to a standardized statewide survey protocol designed to provide a broadly encompassing view of a system, including presence, relative abundance, and growth information of a variety of species in the fish community along with habitat, water quality, and shoreline development information (Wehrly et al. 2015). For the fish community component, the S&T protocol requires use of multiple gear types, including large-mesh fyke nets, small-mesh fyke nets, experimental 5-panel multi-mesh (i.e., multiple mesh sizes connected in a single net) gill nets, seines, and nighttime boat electrofishing (Wehrly et al. 2023). In Winslow Lake, a total of 12 net nights of large-mesh fyke net, 6 net nights of small-mesh fyke net, 4 net nights of experimental gill net, and 4 daytime seine pulls were completed from June 9 – 12, 2025. A week later, three 10-minute nighttime boat electrofishing transects were completed on June 18, with all species collected and measured. After completing these transects, the full shoreline was electrofished and only Largemouth and Smallmouth Bass were netted in order to collect targeted information on those species, which are often poorly represented in the netting portion of an S&T survey. Shoreline habitat and development surveys, which consisted of enumerating visible and submerged wood near the shoreline and quantifying the number of dwellings on shore, along with water temperature and DO profiles, were conducted on August 18. Water samples from both lakes were also collected and submitted to a lab to determine alkalinity, nitrogen, phosphorus, and chlorophyll-a concentrations.

Fall Walleye Recruitment Survey

In conjunction with the plan of work for tribal priority lakes in the 1842 Ceded Territory and the management recommendation following the regulation change, a fall Walleye recruitment survey was completed in Winslow Lake on October 1, 2025, by a single MDNR crew following the nighttime boat electrofishing procedures for fall Walleye index assessments. The entire shoreline was surveyed. Water temperature was 63°F, which falls within the recommended range (55 – 65°F) for fall recruitment surveys following Serns Index methodology (Ziegler and Schneider 2000). The weather was clear. Only Walleye were dip-netted during the survey, and dorsal spine samples were retained from any Walleye under 12 inches for ageing in the lab.

Results

Winter Limnology

On March 13, 2025, a temperature and DO profile revealed sufficient DO concentrations for fish species (> 3.0 mg/L; Schneider et al. 2002) in the top 15 feet of the water column (Figure 4). Temperatures and DO ranged from 32°F and 11.1 mg/L at the surface to 42°F and 1.1 mg/L at the bottom, respectively. Conductivity and pH ranged from 110 μ S/cm and 6.9 at the surface to 191 μ S/cm and 6.3 at the bottom, respectively. These data indicate that, though the bottom 10 feet of the water column contained limited DO, sufficient suitable oxygen levels for fish species remained in Winslow Lake throughout the winter.

Spring Walleye Population Estimate

During the four nights of marking, a total of 343 unique Walleye were captured and given a dorsal fin clip. In the recapture run, a total of 157 Walleye were captured, 75 of which had already been marked

(48% recapture rate), producing an adult spawning population estimate of 714 Walleye (2.8/acre) with a coefficient of variation of 8.1%, indicating good precision of the estimate. The size structure of the spawning population followed a normal distribution, with a median at 16" (Figure 5). All ages 2-12 were present in the population with a peak at age four (Figure 6). The shape of the age-frequency curve, where number at each age declines successively with each age after the peak, suggests recruitment and/or survival was consistent across years for fish over four years old. Growth rates for Walleye across ages were slower than average for UP lakes (Figure 7).

Summer Status & Trends Survey

Fish community

A total of 646 fish representing 12 different species were captured across all gear types (Table 3). Bluegill were the most abundant by number, comprising 34% of the catch, followed by Largemouth Bass and Yellow Perch at 16%, though more than half of the Yellow Perch captured were 2" individuals likely from the 2024 year-class. During the targeted bass component, catch rates were 37.1 Largemouth Bass/hour and 22.0 Smallmouth Bass/hour. Largemouth Bass up to 19", and Smallmouth Bass up to 16", were captured (Figure 8). Growth rates were nearly two inches faster per age for Largemouth Bass than Smallmouth Bass for the fish that were aged, though statewide, average growth rates are similar for both species. This suggests that Largemouth Bass are currently experiencing a competitive advantage in the system, potentially due to habitat suitability. Growth rates of most panfish species were moderate and overall similar to state averages, though most of the fish were small and below a harvestable size. However, it is unknown whether this was due to cold weather during the survey moving larger panfish into deeper water, or if small size continues to define the panfish population in Winslow Lake.

Shoreline habitat & development

The full shoreline was surveyed to evaluate the extent of shoreline development and density of large woody habitat, and these metrics were compared to results from the 2013 survey as well as regional and statewide averages. Stations were 0.2 miles in length and density of dwellings ranged from 0 - 20/mile across stations, indicating a mix of both highly developed and undeveloped shorelines exist on Winslow Lake. The overall average density of dwellings was 5.2/mile, indicating no change in density of dwellings on the lake since 2013 and fewer dwellings on average compared to other lakes in the region (Table 4). Density of docks (3.0/mile) and average percent shoreline armoring (0.7%) were also very similar compared to 2013 and are low compared to regional and statewide averages. Large woody habitat density was high (403 logs/mile on average), suggesting this habitat type is very abundant across portions of the system, particularly along the eastern shoreline. Interestingly, this marks a large increase in density of large woody habitat measured since the 2013 survey (86.7 logs/mile).

Summer limnology profile

Summer water temperature and DO profiles in Winslow Lake measured on August 18, 2025 revealed sufficient DO (> 3 mg/L) to support fish was present in the top 14 ft of the water column, but not in the bottom 10 feet of the water column (Figure 9; Schneider 2002). Oxygenated water was heavily stratified from unoxygenated water. Water temperatures, while warmer than a previous limnology profile in 2013, did not exceed the preferred summer range for cool-water species like Walleye (Bozek et al. 2014, Raabe et al. 2020). The lake was stratified, with a thermocline present around 17 ft. Secchi depth – a measurement of water clarity – was measured at 8 ft compared to 5.5 ft in 2013, indicating an increase in water clarity.

Water quality

Water quality results in Winslow Lake were indicative of a system with moderate productivity and nutrient load and limited buffering capacity. Total alkalinity was measured at 58 mg/L, which is near the cutoff in place to differentiate low and moderate alkalinity systems (49.5 mg/L; Wehrly et al. 2015). Alkalinity has not changed since 2013 (also 58 mg/L; Table 4). Low alkalinity is common in the Western Upper Peninsula due to the igneous and sandstone bedrock in the region which contains limited carbonate, and therefore, produces limited buffering capacity. Chlorophyll-*a* concentration in Winslow Lake was measured at 0.09 µg/L, which is substantially lower than the 4.3 µg/L measured in 2013, suggesting a much lower overall level of phytoplankton productivity in the system. Primary production in a lake will come from either phytoplankton or aquatic vegetation. Larger amounts of aquatic vegetation were observed in Winslow Lake than in previous years, which likely reduced nutrient availability for phytoplankton, leading to a lower chlorophyll-*a* concentration. Total Kjeldahl nitrogen concentration was 1.1 mg/L, which is above average compared to other medium-sized, deep lakes in the area and other water bodies in the state (Table 4; Wehrly et al. 2015). Conversely, total phosphorus concentration was 0.004 mg/L, which is classified as low compared to lakes across Michigan and the average values for lakes in the region, indicating phosphorus is likely the nutrient limiting productivity in the system.

Fall Walleye Recruitment Survey

On October 1, 2025, one (1) Walleye was captured, measuring 10 inches. Ageing analysis of the dorsal spine sample revealed the fish to be age-1. No age-0 Walleye were captured or observed (Table 2, Figure 2). The crew noted more abundant aquatic vegetation than typically observed during fall recruitment surveys on this system.

Analysis and Discussion

Results from surveys conducted in 2025 provide useful information to evaluate the status of the fish community after removal of the no possession limit for Walleye and a return to the state standard regulation. Seven years after the regulation change took effect, the density of Walleye has decreased by 50%, from 5.6 adults/acre to 2.8 adults/acre. Additionally, average growth rates have increased across ages (3.1 inches below state average in 2013, 1.8 inches below state average in 2025; Figure 7), which is to be expected with lower population density. One of the most notable changes since reopening harvest on the system is the shift in age composition of spawning Walleye. Mean age of spawning Walleye in 2013 was 8.3, but in 2025, mean age of spawning Walleye has reduced to 5.7 (Figure 6). This indicates that, likely due to the reinstatement of harvest opportunities, Walleye are not living as long, and the spawning population is shifting from being dominated by older individuals to being driven by younger individuals. This is a pattern often referred to as age-truncation, where populations that receive fisheries harvest after previously being unfished see declines in the proportion of older fish (Barnett et al. 2017). While this is expected to an extent – and does not appear to be at a problematic level in Winslow Lake given older fish are still present in the system – it is important to recognize that severe age-truncation can cause instability in a fish population as abundance declines and early-maturing fish contribute higher proportions to future generations, limiting long-term population resiliency (Hsieh et al. 2010, Stewart 2011, Ohlberger et al. 2014, Vidal et al. 2019). Strategies to combat this in fish populations often involve changing regulations to protect the overharvested demographics and balance out the population's age structure (e.g. establishing protected slot limits for larger fish or increasing the minimum length limit). Interestingly, in Winslow Lake, the length frequency plots of the 2025 and 2013 populations were nearly identical in shape, suggesting despite

being younger in age, Walleye are reaching the same sizes, though growth continues to plateau at roughly 20". This means that a length-based regulation would protect Walleye at a range of ages. However, it should be noted that the survey methodology may have also been a contributing factor to the similarity of the length frequency given that most of the fish sampled were males, which often do not grow as large as females. Nonetheless, the Walleye population in Winslow Lake – given its unique Walleye regulatory history – could serve as a unique research opportunity to examine population responses to an alternate length-based regulation designed to protect older Walleye, provided recruitment to the population is occurring. The 2025 spawning survey showed the presence of 11 consecutive age classes, suggesting some level of natural recruitment is occurring annually despite near-zero results from fall recruitment surveys over the past four years. However, many of the Walleye from the past three year-classes have yet to reach sexual maturity; therefore, it is unknown whether adult abundance will see declines in the years ahead, or whether the fall surveys are simply not detecting the recruitment that is occurring. A follow-up Walleye population estimate survey should be conducted in the next 5-7 years to evaluate this.

Overall, limited information was able to be deduced from the S&T fish community survey due to low catches, particularly in the fyke and gill nets. This may have been due to a cold front during the netting portion of the survey, as water temps dropped from 65°F on the first day to 61°F on the second day and remained near that temperature the remainder of the survey. This likely caused fish to move out into deeper water where they were not accessible to the shoreline fyke nets. When the electrofishing survey was conducted one week later, water temperatures had warmed to 72°F and many more fish were captured, likely because more fish, particularly bass and panfish, were again occupying the shallower water. This temperature shift may also be why catch rates of Bluegill were much lower in 2025 (4/large-mesh fyke net, 3/small-mesh fyke net) compared to 2013 (25/large-mesh fyke net, 66/small-mesh fyke net). Nonetheless, some information from the fish community data can still be deduced. One item to note is growth rates of Bluegill and Pumpkinseed appear slightly lower across ages compared to 2013 (Figure 10). This pattern may be a result of reduced Walleye predation leading to higher abundances of these sunfish species and increased competition for resources. Additionally, few larger panfish were collected even during the electrofishing portion of the survey, potentially indicating size structure of Bluegill and Pumpkinseed populations continues to be small and providing limited harvest opportunities, which has been a common problem in Winslow Lake and was the driving factor behind the no-harvest regulation on Walleye. This is further supported by the decline in the large-mesh fyke net Schneider Index Score (SS) of the Bluegill catch in 2025 (SS = 2, poor) compared to 2013 (SS = 4.5, satisfactory/good), indicating smaller size structure and lower relative proportions of harvestable Bluegill encountered in the 2025 survey (Schneider 2000). Lastly, growth rates of Northern Pike plateaued well below state averages as fish aged, suggesting optimal forage may be limiting to sustain growth rates after reaching sexual maturity. This also has been a recurring theme in Winslow Lake despite management efforts and regulation changes to increase harvest for both Northern Pike (no minimum size limit) and other predatory species.

Winslow Lake has high quality shoreline and limited impacts from development compared to many other lakes both regionally and statewide. Protection of this unmodified shoreline habitat should be prioritized in this system through maintaining large woody habitat and encouraging landowners to avoid installing shoreline armoring. Winslow Lake has historically possessed good Walleye spawning habitat in the form of unaltered rock and cobble shorelines. Interestingly, however, during the 2025 fall recruitment survey, more abundant vegetation was noted compared to previous fall recruitment surveys. This is further supported by the drop in chlorophyll-*a* concentration – a proxy for algae – and the increase in Secchi depth (indicating greater water clarity) compared to 2013. Given that aquatic

vegetation and algae are the two sources of primary productivity in a lake ecosystem, if aquatic plant biomass increases and nutrient levels remain stable, algae concentrations would be anticipated to decline and water clarity increase, provided some degree of nutrient limitation exists. Prevalence and extent of vegetation should continue to be monitored in Winslow Lake as this can be one of the signs of a system shifting from a cool-water system to warm-water system. High abundance of aquatic vegetation in the littoral zone tends to be correlated with increases in bass and panfish species, lower Walleye recruitment, and correspondingly lower adult populations of Walleye (Davis et al. 2025).

For Walleye specifically, summer limnology profile data in 2025 showed a similar temperature profile to 2013, with much of the water column remaining within the energetically-optimal range for Walleye (Bozek et al. 2011; Raabe et al. 2020). However, a sharp oxycline in 2025 reduced the suitable oxygen habitat by four feet compared to 2013. This, combined with increased water clarity, increases the “summer squeeze” on Walleye, an issue documented in many lakes across the Midwest where the range of depths containing both suitable optical and oxy-thermal habitat for Walleye has shrunk over time with increases in water temperature and water clarity (Hansen et al. 2019; Raabe et al. 2020). Conversely, thermal habitats across the region have become more suitable for Largemouth Bass (Hansen et al. 2017), which is corroborated by higher growth rates for Largemouth in Winslow Lake compared to the other predatory species. These shifts in species assemblage are predicted to continue to increase over time (Hansen et al. 2017). Given some potential early signs of this occurring in the system, Winslow Lake may be a good candidate for regular summer limnology profiles to track trends in available optical and oxy-thermal habitat through time.

Management Direction

Goals

- Continue monitoring the Walleye population in Winslow Lake to track the population’s response to regulatory changes. A follow-up spring Walleye population estimate should be planned in the next 5-8 years to evaluate whether declines in catches during the fall recruitment surveys correspond to declines in the adult population, and to further monitor for age truncation through time. In addition, managers should consider Winslow Lake as a candidate for regulations to protect older Walleye to increase population resiliency.
- Establish summer limnology surveys annually or at regular intervals to track availability of suitable optical and oxy-thermal habitat for Walleye through time
- The No-Minimum-Size-Limit regulation for Northern Pike should be maintained.
- Protection of shoreline habitat should be prioritized in Winslow Lake through maintaining large woody habitat and encouraging landowners to avoid installing shoreline armoring.

Obstacles to Attainment of Goals

- Limited Fisheries Division staff and resource capacity to conduct follow-up surveys
- Resistance from the public toward potential Walleye regulation change proposals to increase protections for Walleye
- Property owners pursuing shoreline development

References

- Barnett, L. A. K., Branch, T. A., Ranasinghe, R. A., and Essington, T. E. Old growth fishes become scarce under fishing. 2017. *Current Biology* 27(18): 2843-2848. <https://doi.org/10.1016/j.cub.2017.07.069>
- Bozek, M. A., Haxton, T. J., and Raabe, J. K. Walleye and Sauger Habitat. In: "Biology, Management, and Culture of Walleye and Sauger". American Fisheries Society, June 2011. <https://doi.org/10.47886/9781934874226>
- Davis, R. P., Albright, E. A., Hein, C. L., Verhoeven, M. R., Rantala, H. M., and Feiner, Z. S. In the weeds: Aquatic macrophytes serve as important indicators of walleye recruitment in Upper Midwestern lakes. 2025. *Fisheries Research* 292:107595. <https://doi.org/10.1016/j.fishres.2025.107595>
- Hansen, G. J. A., Read, J. S., Hansen, J. F. and Winslow, L. A. Projected shifts in fish species dominance in Wisconsin lakes under climate change. 2017. *Glob Change Biol*, 23: 1463-1476. <https://doi.org/10.1111/gcb.13462>
- Hansen, G. J. A, Winslow, L. A., Read, J. S., Trembl, M, Schmalz, P. J., and Carpenter S. R. Water clarity and temperature effects on walleye safe harvest: an empirical test of the safe operating space concept. 2019. *Ecosphere* 10(5):e02737. <https://doi.org/10.1002/ecs2.2737>
- Hsieh, C., Yamauchi, A., Nakazawa, T., and Wang, W. Fishing effects on age and spatial structures undermine population instability of fishes. 2010. *Aquatic Sciences* 72: 165-178. <https://doi.org/10.1007/s00027-009-0122-2>
- Ohlberger, J., Thackeray, S. J., Winfield, I. J., Maberly, S. C., and Vøllestad, L. A. When phenology matters: age-size truncation alters population response to trophic mismatch. 2014. *Proc Bio Sci*: 281(1793), 20140938. <https://doi.org/10.1098/rspb.2014.0938>
- Raabe, J. K., VanDeHey, J. A., Zentner, D. L., Cross, T. K., Sass, G. G. Walleye inland lake habitat: considerations for successful natural recruitment and stocking in North Central North America. 2020. *Lake and Reservoir Management* 36(4): 335-359. <https://doi.org/10.1080/10402381.2019.1697771>
- Schneider, James C. (ed.) 2000. Manual of fisheries survey methods II: with periodic updates. Michigan Department of Natural Resources, Fisheries Special Report 25, Ann Arbor.
- Schneider, J. C. Fish as indicators of lake habitat quality and a proposed application. 2002. Michigan Department of Natural Resources, Fisheries Research Report 2061, Ann Arbor.
- Stewart, J. Evidence of age-class truncation in some exploited marine fish populations in New South Wales, Australia. 2011. *Fisheries Research* 108: 209-213. <https://doi.org/10.1016/j.fishres.2010.11.017>
- Vidal, T., Irwin, B. J., Madenjian, C. P., and Wenger, S. J. Age truncation of alewife in Lake Michigan. 2019. *Journal of Great Lakes Research* 45(5): 958-968. <https://doi.org/10.1016/j.jglr.2019.06.006>

Wehrly, K.E., D. B. Hayes, and T. C. Wills. Status and trends of Michigan inland lake resources, 2002–2007. 2015. Michigan Department of Natural Resources, Fisheries Report 08, Lansing.

Wehrly, K. E., G. S. Carter, and J. E. Breck. Inland Lakes Status and Trends Sampling Protocols. Draft Chapter in Schneider James C. (ed.) 2000. Manual of fisheries survey methods II: with periodic updates. 2023. Michigan Department of Natural Resources, Fisheries Special Report 25, Ann Arbor.

Ziegler, William, and J. C. Schneider. Guidelines for evaluating walleye and muskie recruitment. Chapter 23 in Schneider, James C. (ed.) 2000. Manual of fisheries survey methods II: with periodic updates. Michigan Department of Natural Resources, Fisheries Special Report 25, Ann Arbor.

Tables and Figures

Table 1. Stocking history for Winslow Lake, Iron County. Individual stocking events within a year were aggregated and average length was calculated as a weighted average of mean length from each stocking event.

Year	Species	Strain	Number	Fish/acre	Life Stage	Avg Length (cm)
1934	Walleye	NA	50,000	194	Swim-up fry	NA
1937	Largemouth Bass	NA	300	1.16	4 months	NA
1937	Walleye	NA	100,000	387.6	Swim-up fry	NA
1937	Bluegill	NA	7,000	27.1	4 months	NA
1938	Walleye	NA	250,000	969	Swim-up fry	NA
1939	Walleye	NA	300,000	1163	Swim-up fry	NA
1979	Walleye	Gogebic	250,000	980.4	Swim-up fry	0.8
1980	Walleye	NA	250,000	980.4	Swim-up fry	0.8
1982	Walleye	Gogebic	6,253	24.5	Spring fingerling	5.1
1984	Walleye	Gogebic	10,320	40.5	Spring fingerling	3.9
1986	Walleye	Manistique	12,000	47.1	Spring fingerling	3.8
1988	Walleye	Gogebic	12,000	47.1	Spring fingerling	3.7
1989	Walleye	Bay de Noc	1,552	6.1	Fall fingerling	14.8
1990	Walleye	Bay de Noc	15,418	60.5	Fall fingerling	11.7
1991	Walleye	Bay de Noc	7,219	28.3	Fall fingerling	16.3
1992	Walleye	Bay de Noc	5,098	20.0	Fall fingerling	16.5
1993	Walleye	Bay de Noc	4,894	19.2	Fall fingerling	16.5
1994	Walleye	Bay de Noc	4,578	18.0	Fall fingerling	15.8
1995	Walleye	Bay de Noc	2,520	9.9	Fall fingerling	14.2

Table 2. Winslow Lake fall Walleye recruitment survey results (1990-2025). Age data was not available for Walleye surveys in some years, therefore approximate length bins of age-0 and age-1 were used instead and were categorized based on known-age data from other years and the length-frequency relationships of Walleye captured for that particular year. No metric of distance sampled was recorded in 1990 and 1991, thus catch rate was not calculated for those years.

Year	Agency	# Age 0	Age 0/mile	Stocked Year Class?	# Age 1	Age 1/mile	Stocked Year Class?
1990	MDNR	9	-	Y	8	-	Y
1991	MDNR	19	-	Y	24	-	Y
2008	MDNR	3	0.5	N	11	2.0	N
2009	MDNR	16	4.8	N	7	2.1	N
2010	MDNR	4	1.2	N	5	1.5	N
2011	MDNR	2	0.6	N	6	1.8	N
2012	MDNR	49	14.8	N	4	1.2	N
2013	MDNR	0	0.0	N	17	5.2	N
2015	GLIFWC	13	2.4	N	2	0.4	N
2019	MDNR	1	0.3	N	99	31.5	N
2020	MDNR	42	8.4	N	6	1.2	N
2021	MDNR	7	1.4	N	10	2.0	N
2022	MDNR	1	0.2	N	2	0.4	N
2023	MDNR	0	0.0	N	1	0.2	N
2024	MDNR	0	0.0	N	0	0.0	N
2025	MDNR	0	0.0	N	1	0.2	N

Table 3. Total number and relative proportion of fish of each species caught during the Status & Trends survey on Winslow Lake in June 2025 across all gear types. Biomass was estimated using length-weight regression relationships. Note Largemouth and Smallmouth Bass catch includes a whole-lake bass-specific targeted electrofishing transect.

Species	Number Caught	% of Total Catch by Number	% of Total Catch by Biomass	Average Length
Black Crappie	8	1.2	0.9	8.5
Bluegill	222	34.4	4.2	4.4
Central Mudminnow	1	0.2	0.0	2.5
Common Shiner	1	0.2	0.0	4.5
Hybrid Sunfish	3	0.5	0.2	5.8
Johnny Darter	10	1.5	0.0	2.3
Largemouth Bass	101	15.6	37.6	10.7
Northern Pike	17	2.6	10.7	21.0
Pumpkinseed	88	13.6	6.3	6.1
Smallmouth Bass	59	9.1	17.3	8.8
Walleye	29	4.5	15.7	17.3
White Sucker	5	0.2	4.1	19.1
Yellow Perch	102	15.8	2.9	6.7

Table 4. Water quality and shoreline habitat and development survey results from Winslow Lake collected August 2025 and August 2013 compared to other medium-sized, deep lakes in the Northern Lake Michigan fisheries management unit (NLMMU, N = 71) and statewide. Statewide averages were obtained from Wehrly et al. 2015.

<i>Chemical & Physical Parameter</i>	<i>Winslow 2025</i>	<i>Winslow 2013</i>	<i>NLMMU</i>	<i>Statewide</i>
Total alkalinity (mg/L)	58	58	66	111
Chlorophyll- <i>a</i> concentration (µg/L)	0.09	4.3	3.4	4.2
Total Kjeldahl nitrogen (mg/L)	1.1	0.32	0.62	0.62
Total phosphorus (mg/L)	0.004	-	0.017	0.015
Dwellings/mi	5.2	5.3	13.1	26.9
Docks/mi	3.0	3.4	10.6	20.5
% Shoreline armoring	0.7	0	8.7	25.3
Large woody habitat/mi	403	86.7	339.1	23.4

Figure 1. Lakeshed catchment outline (black line) and land cover map (colors) of Winslow Lake, Iron County.

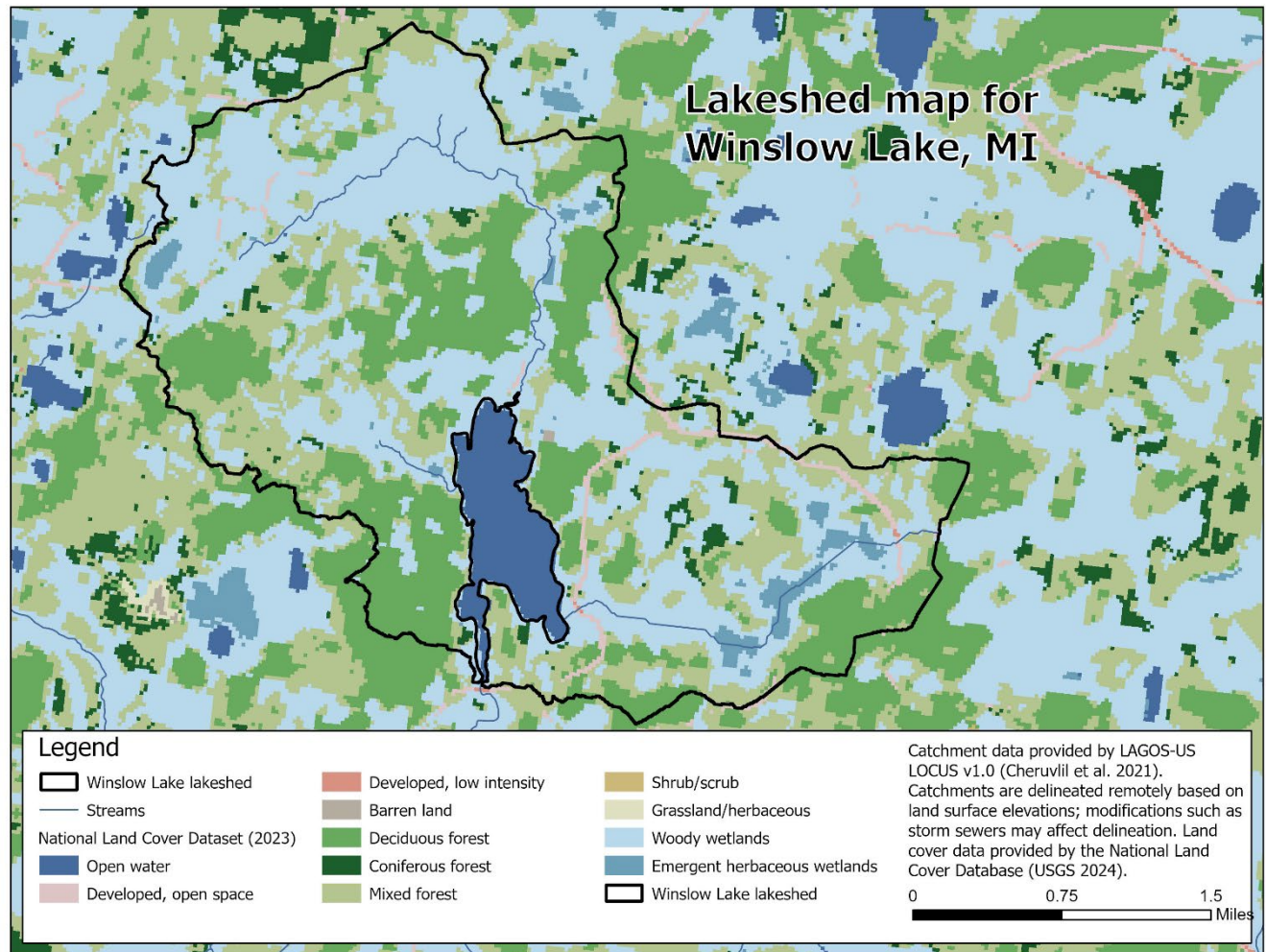


Figure 2. Catch rates (# WAE per mile of electrofishing) of young-of-year and age-1 Walleye obtained from fall recruitment surveys in Winslow Lake from 2009-2025. Recruitment surveys were also conducted in 1990 and 1991, but no metric of distance sampled was recorded, thus catch rates from those years were not available. As a note, age data was not available for surveys in 1991 and 2009-2013, thus estimated age was assigned based on length (YOY: ≤ 7.9 or $8.9''$, Age-1: $9.0-11.9''$). Surveys in 2008 and 2015 were conducted by GLIFWC.

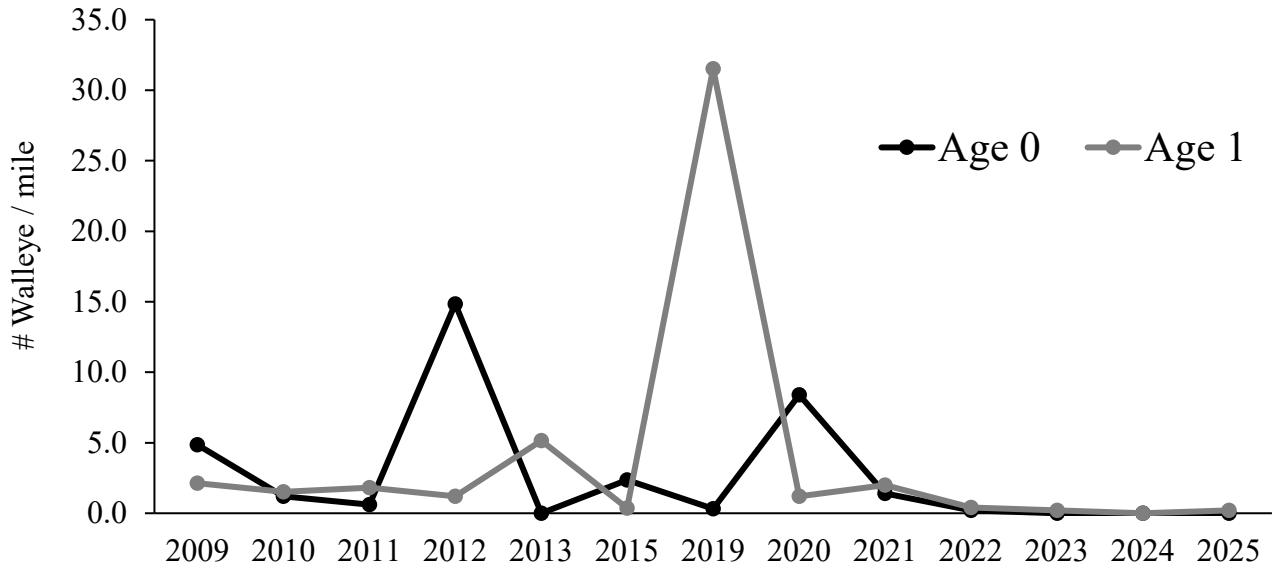


Figure 3. Number of Walleye harvested in Winslow Lake by Lac Vieux Desert tribal subsistence fishers during spring spearing season from 2000-2025. Harvest data from the state recreational fishery in Winslow Lake is unknown, thus these numbers should be interpreted as only a portion of overall Walleye harvest in the system. Tribal harvest guidelines put forth by the Great Lakes Indian Fish & Wildlife Commission are shown in gray and were determined by taking 6% (before 2013), 8% (2013-2016), or 10% (after 2016) of predicted Walleye abundance from a mixed-effects regression or recent population estimate.

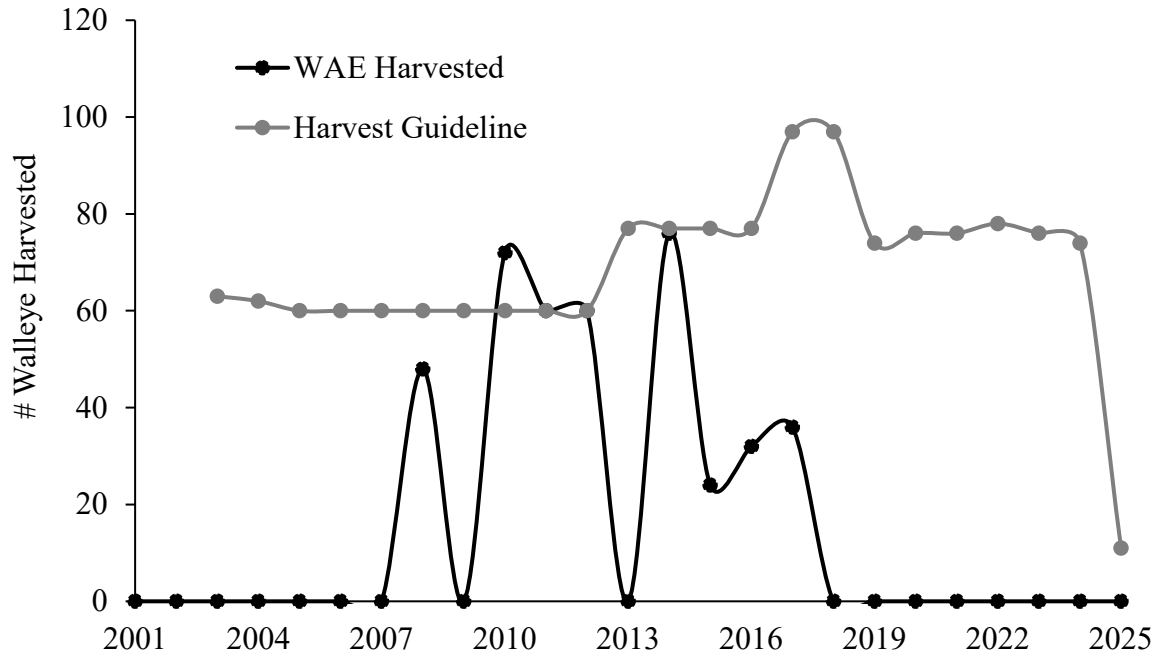


Figure 4. Water temperature (°F) and dissolved oxygen (DO) concentrations (mg/L) measured in March 2025 in Winslow Lake. White areas represent water depths with sufficient DO for cool-water fish species like Walleye, while gray areas represent unsuitable or non-preferable habitats (Schneider 2002).

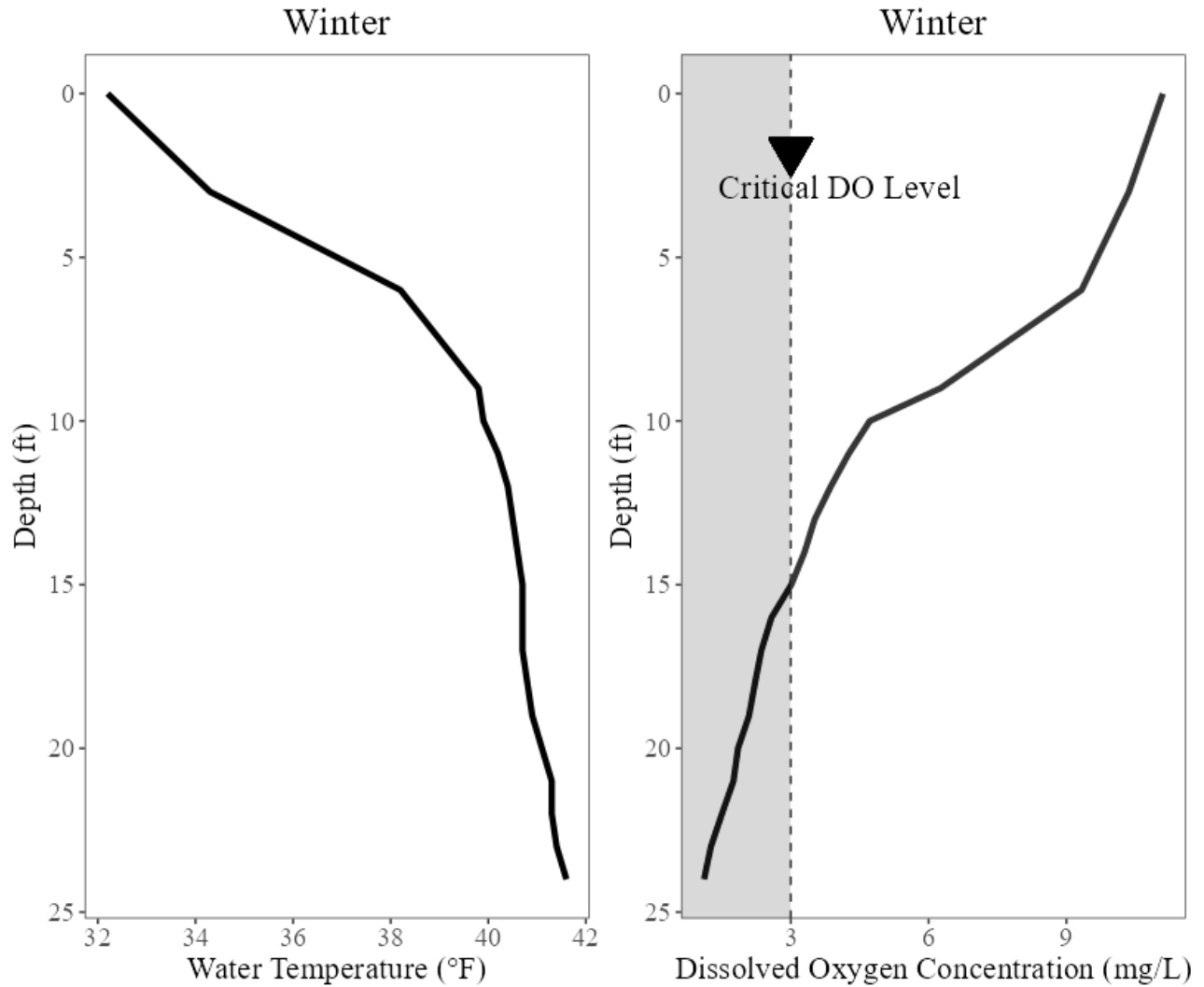


Figure 5. Length frequencies of unique Walleye captured during spring population estimate surveys in Winslow Lake in 2013 and 2025.

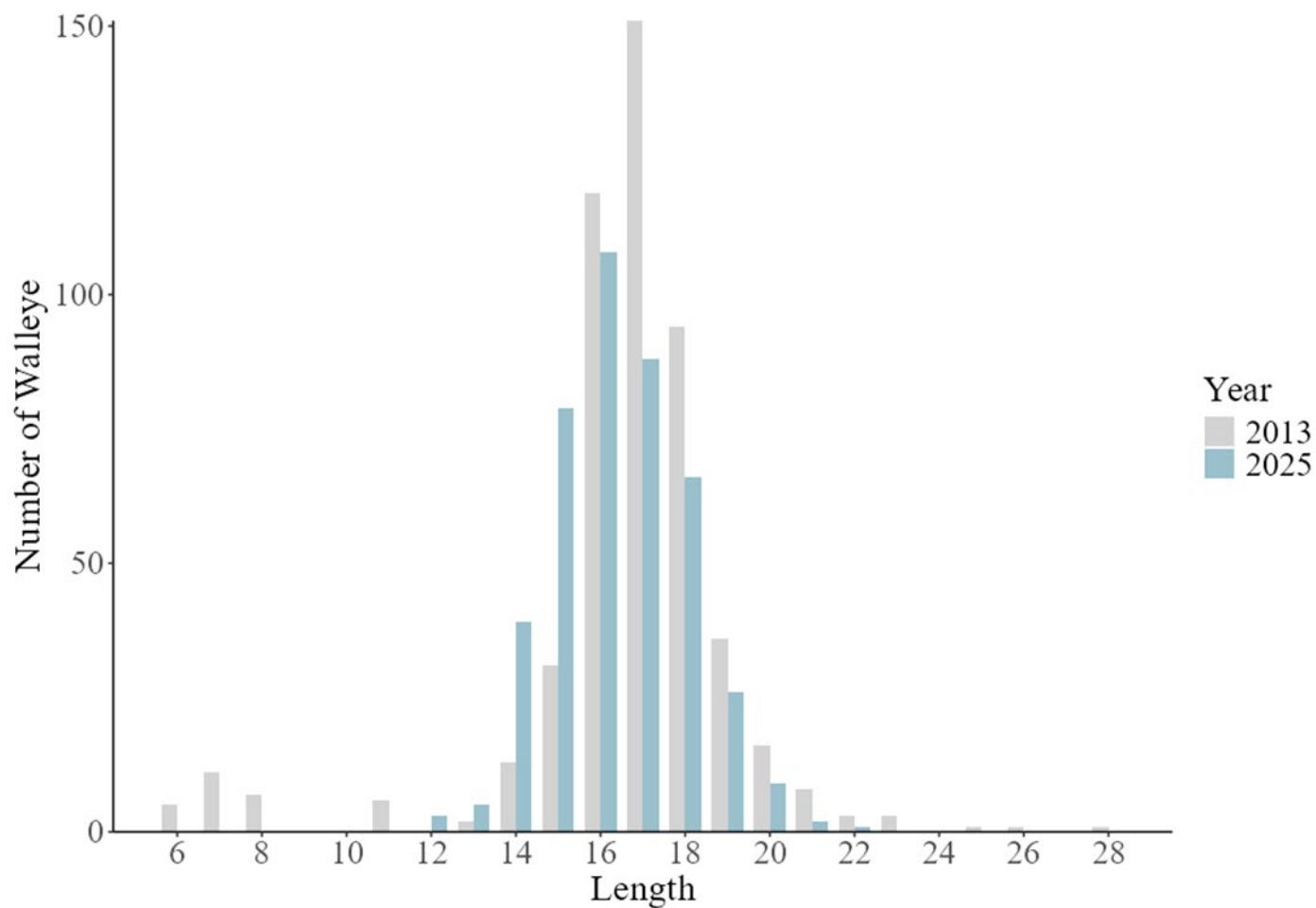


Figure 6. Estimated age frequencies of Walleye captured during the 2013 and 2025 Winslow Lake spring Walleye population estimate survey. Ages were estimated from dorsal spines for at least ten Walleye per sex per inch bin, where possible. The ages of any non-aged Walleye were simulated based on the distribution of dorsal spine ages at that length.

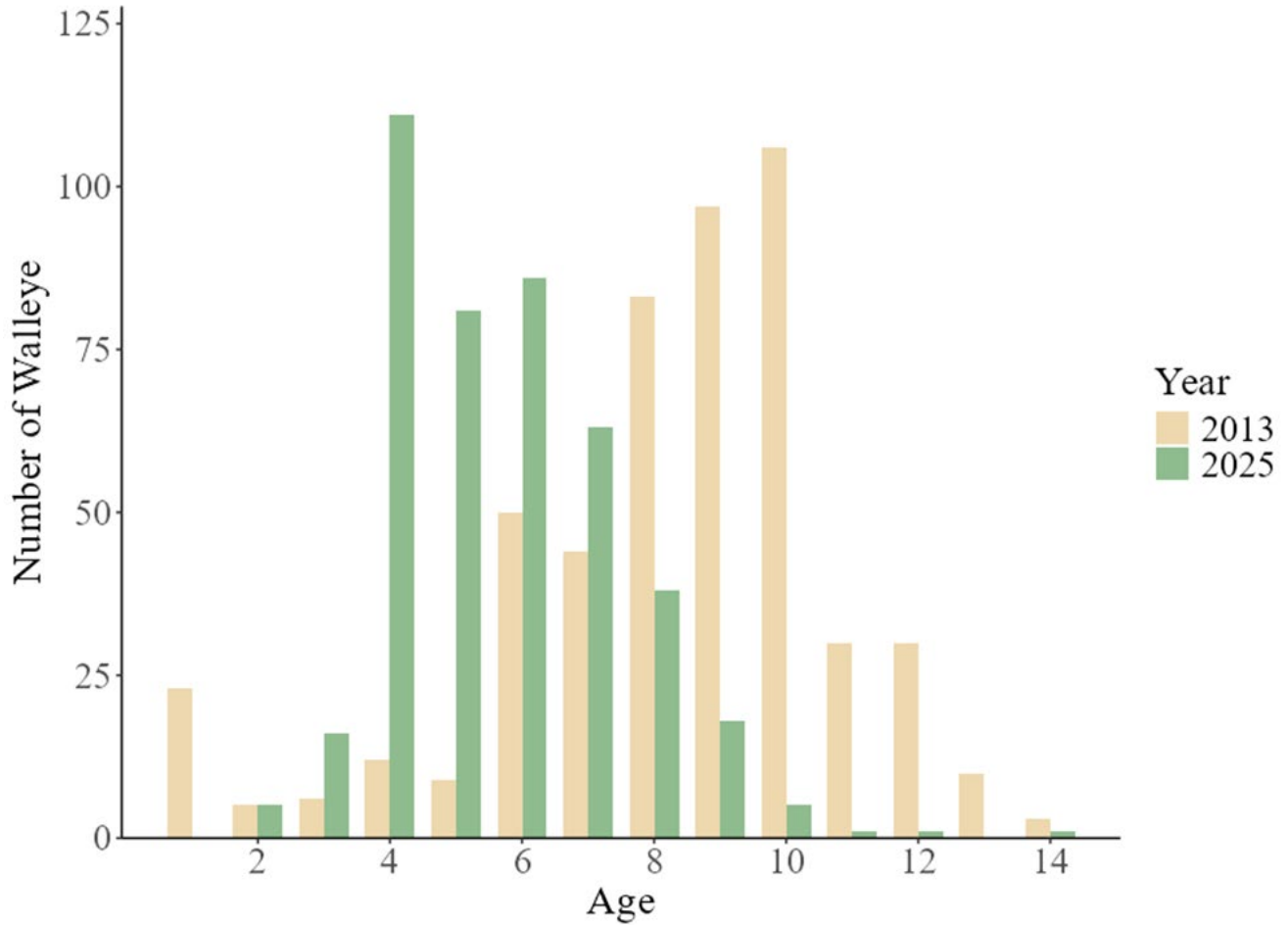


Figure 7. Mean length-at-age of Walleye captured during the 2013 and 2025 Winslow Lake spring Walleye population estimate surveys compared to the average length-at-age of Walleye in Upper Peninsula lakes. Mean length-at-age data for the Upper Peninsula was obtained from 6550 ageing structures collected during spring adult Walleye population estimate surveys across 36 Upper Peninsula lakes from 2014-2025. The shaded region around the mean line represents the 95% confidence interval.

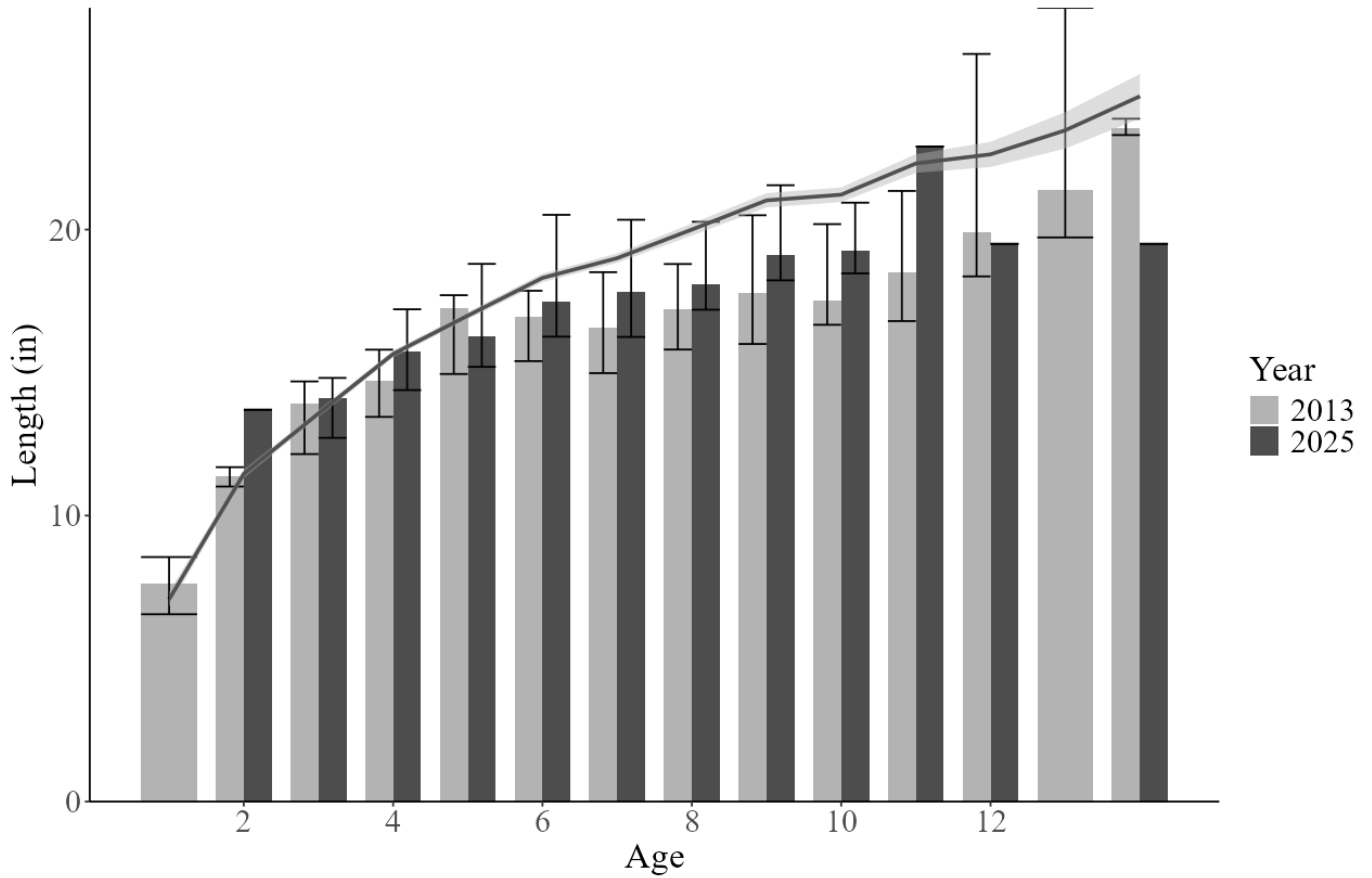


Figure 8. Length frequency of Largemouth and Smallmouth Bass captured in all efforts during the Status & Trends survey in Winslow Lake in June 2025, which included a whole-lake bass-specific targeted electrofishing transect.

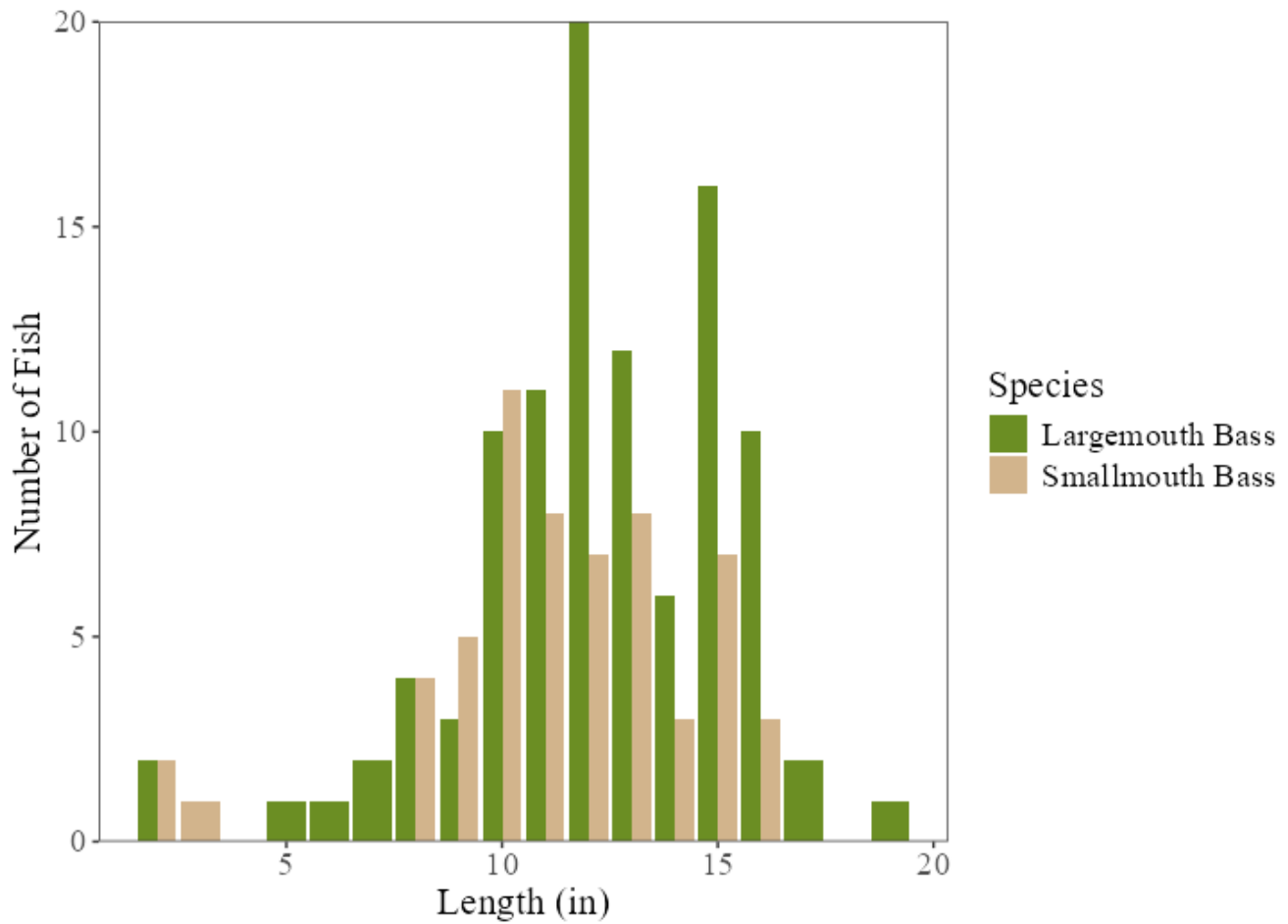


Figure 9. Water temperature (°F) and dissolved oxygen concentrations (mg/L) measured in August 2025 in Winslow Lake compared to a previous summer limnology survey in 2013. White areas represent suitable oxy-thermal habitats for cool-water species such as Walleye, while gray areas represent unsuitable or non-preferable habitats (Schneider 2002, Bozek et al., 2014).

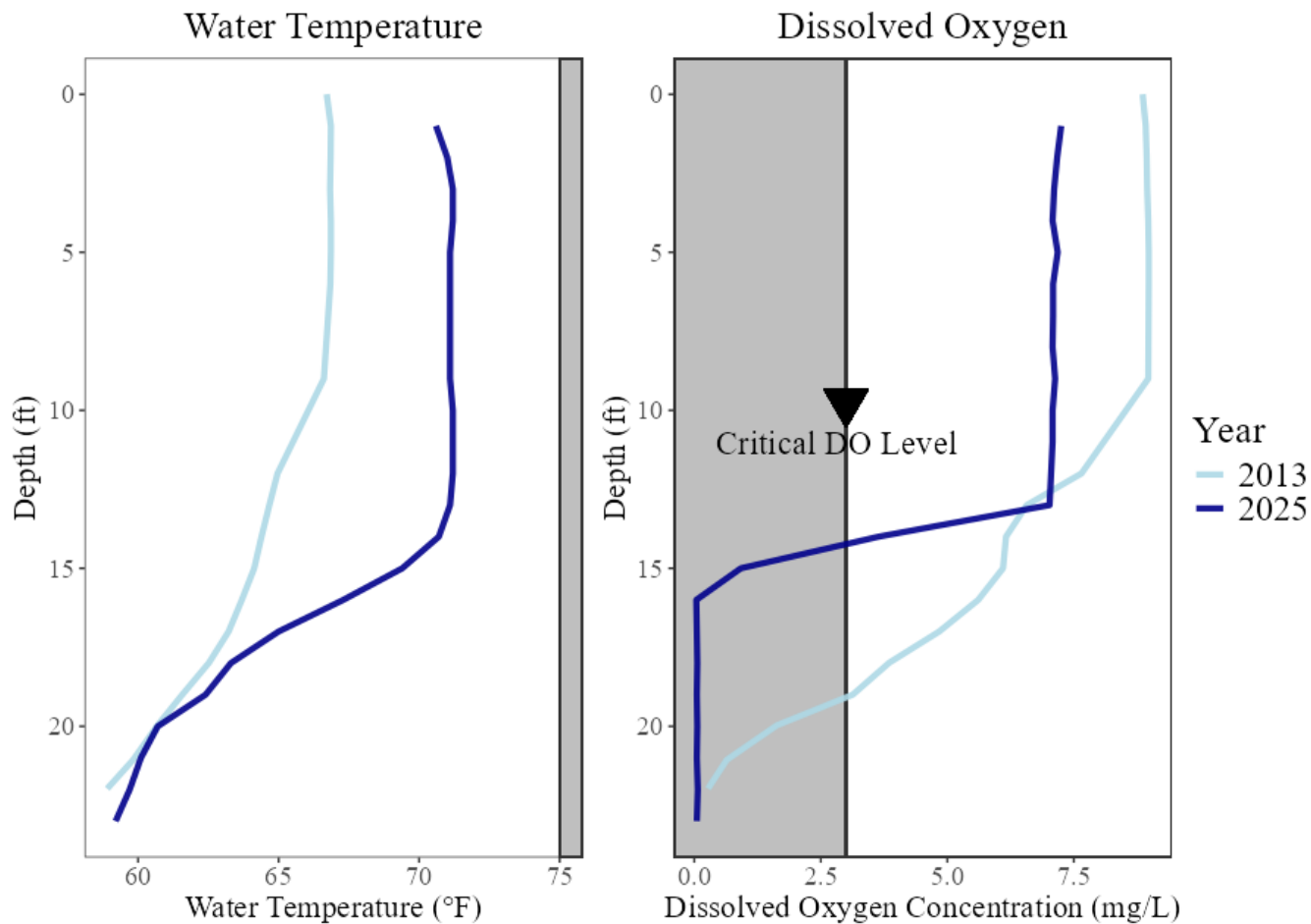
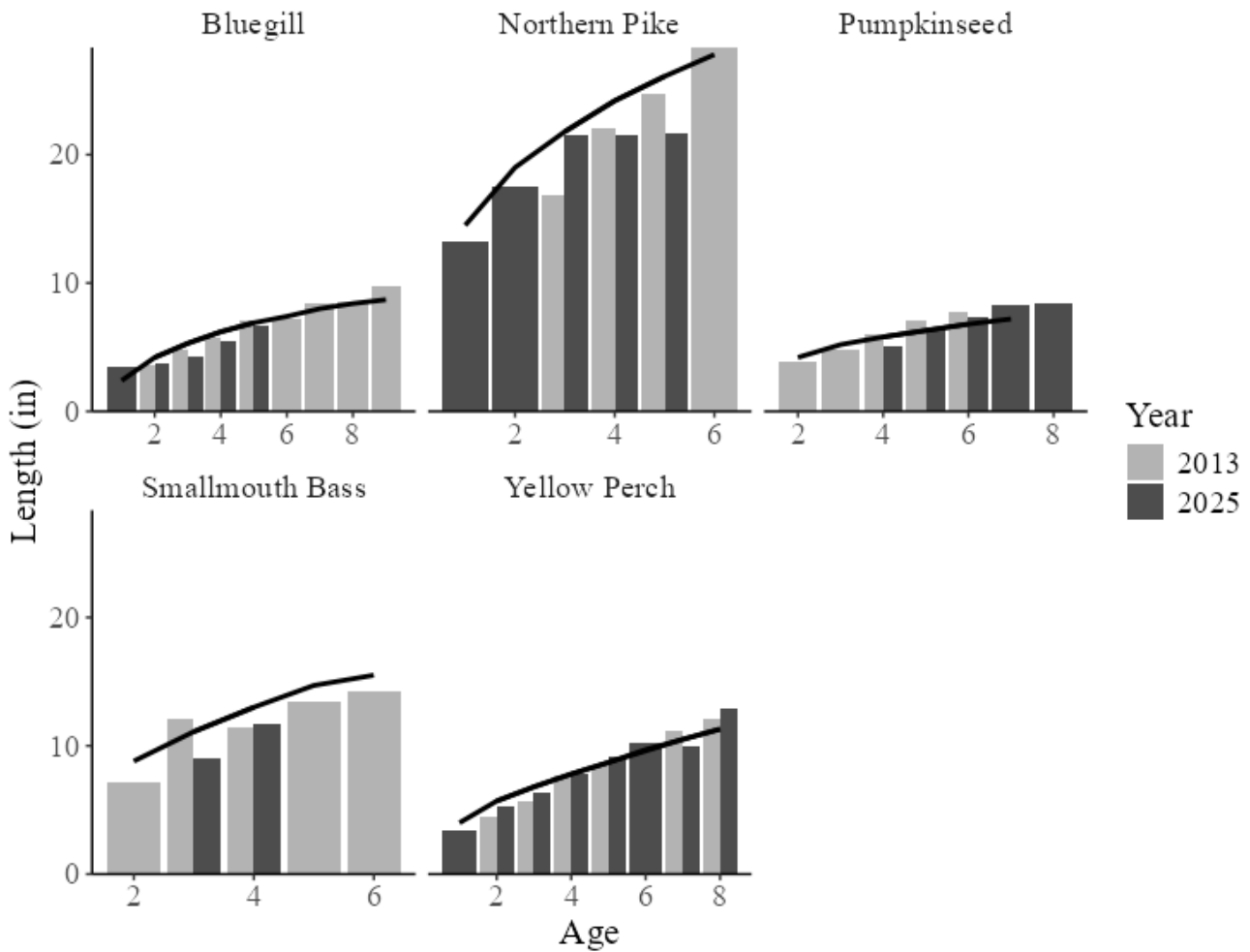


Figure 10. Mean length at age for game species captured during Status & Trends surveys in 2013 and 2025 (vertical bars) compared to state average length at age for each species (trend line).



Literature Path

Received April 7th, 2026; Approved June 15th, 2026

Stephen Lenart, Unit Review and Approval

Doug Schultz, External Reviewer

John Bauman, SFR Facilitator

John Bauman, Desktop Publisher and Approval