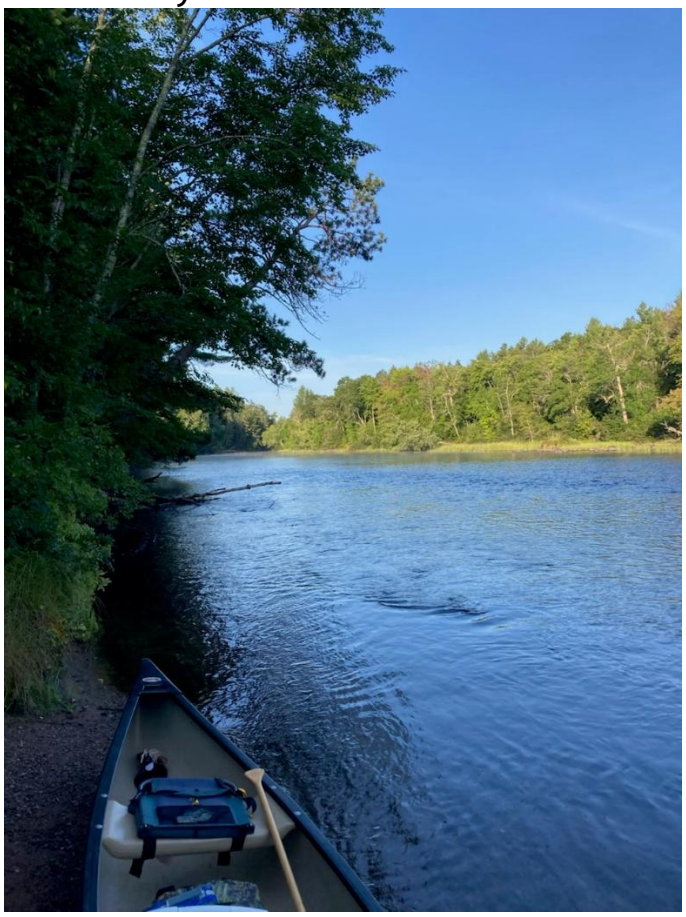
WISCONSIN DEPARTMENT OF NATURAL RESOURCES

2025 Namekagon River Smallmouth Bass Survey

Waterbody Identification Code 2689500



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Executive Summary

The smallmouth bass populations in the upper and lower portions of the Namekagon River were assessed with hook and line surveys in 2025. DNR staff from Hayward and Spooner surveyed the Upper Namekagon River (Hayward Dam to Trego Lake) and Lower Namekagon River (County Highway K landing to St Croix River Confluence) from August 5-28, 2025. This survey followed the same protocol as the 2020 survey and assessed the abundance, size structure and population demographics of smallmouth bass in each stretch of the Namekagon River.

A total of 343 smallmouth bass were collected from the Upper Namekagon River and 173 smallmouth bass were collected from the Lower Namekagon River. Average length of smallmouth bass was 11.9 inches (range: 2.5 – 20.0 inches) in the Upper Namekagon River and 11.2 inches (range: 5.7 – 18.8 inches) in the Lower Namekagon River. Average length of smallmouth bass in the Upper Namekagon River decreased, while average length in the Lower Namekagon increased since 2020.

Approximately 30% of smallmouth bass were over 14 inches in the Upper Namekagon, while 16% were over 14 inches in the Lower Namekagon. Both decreased from 2020. Approximately 4% of the fish sampled were over 18 inches in the Upper Namekagon, and 1% were over 18 inches in the Lower Namekagon River, which was similar to 2020.

The Namekagon River continues to hold healthy smallmouth bass populations in both sections. Management recommendations are to: 1) Retain the 14-inch minimum length limit and five-fish bag limit given the low mortality rates, the high number of year classes, high abundance of young fish and average growth rates; 2) Conduct a smallmouth bass assessment on the Namekagon River every five years to monitor trends; and 3) Explore the possibility of conducting an angler survey to estimate angler effort and harvest.

Introduction

Hook and line surveys were conducted in 2025 to assess the status of the smallmouth bass populations, in the upper and lower portions of the Namekagon River. This survey followed the methods of the 2020 survey. Other than public outreach, there have not been any significant management changes for the smallmouth bass fishery on the Namekagon River.

RIVER CHARACTERISTICS

The Namekagon River is a moderate-sized river that flows through Bayfield, Sawyer, Washburn and Burnett counties in northwest Wisconsin. The river is approximately 100 miles in length, and flows from the headwaters at the outlet of Lake Namekagon in Bayfield County to the confluence with the St. Croix River in Burnett County. Most of the shoreline along the Namekagon River is owned by the National Park Service, the State of Wisconsin or the local County Forest.

There are a few impoundments on the river and include: Lake Namakagon, Pacawawong Lake, Phipps Flowage, Lake Hayward and Trego Lake. The river from Lake Namakagon to Lake Hayward is a classified trout stream. Below the Hayward Dam, the river is considered a warm-water fishery with a gamefish community that consists of smallmouth bass, walleye, muskellunge, northern pike and largemouth bass.

FISHING REGULATIONS

Smallmouth bass in the Namekagon River are currently managed with the statewide bass regulation which is a 14-inch minimum length limit and 5 fish daily bag limit. Namekagon River smallmouth bass regulations have generally followed the statewide or regional base regulations for bass.

Methods

DNR staff from Hayward and Spooner used hook and line sampling from August 5-28, 2025, to assess the smallmouth bass population in the Namekagon River. Mini-boom electrofishing was not used based on its ineffectiveness in past surveys. Sampling was split between the Upper Namekagon River (Hayward Dam to Trego Lake; 30 river miles) and Lower Namekagon River (County Highway K landing to St. Croix River Confluence; 31 river miles). Sampling occurred during daylight hours with two to four anglers for each sampling trip. Anglers used artificial lures, nightcrawlers or minnows. All smallmouth bass were measured and had aging structures taken. Lengths were

also recorded for other gamefish and redhorse species collected while targeting smallmouth bass.

Smallmouth bass were aged with scales and dorsal spines. Scales were used to age smallmouth bass under 12 inches, while scales and spines were used for bass greater than 12 inches. Scales were either aged whole-view or pressed and aged using a microfiche viewer. All spines were cross-sectioned and aged under a microscope multiplied by 100.

Size structure of smallmouth bass was determined using proportional size distribution (PSD) indices (Neumann et al. 2013). The PSD and PSD-14 values for smallmouth bass are the number of fish ≥11 inches and 14 inches divided by the number ≥7 inches. The mean length at age was used to assess smallmouth bass growth using the von Bertalanffy equation (Quist et al. 2013). The $L\infty$ from the von Bertalanffy equation was used to predict the average ultimate length in each population. Average length and mean length-at-age were compared to the Complex-Riverine lake classification in Rypel et al. (2019) in lieu of a statewide river average for Wisconsin. Population comparisons were also made with the nearby Couderay River (Sawyer County) and the Menominee River (Marinette County). Annual mortality (A) and conditional natural mortality (cm) were calculated using catch curve analysis and mortality models in FAMS (Slipke and Maceina 2014).

Angler hours were determined from the amount of time on the river each day and multiplied by the number of anglers. The smallmouth bass catch rate was calculated by dividing the number of smallmouth bass caught by angler hours for each date sampled. This metric was used to calculate relative abundance and make comparisons to the 2020 survey.

Results

There were 343 smallmouth bass collected from the Upper Namekagon River and 173 smallmouth bass collected from the Lower Namekagon River. Smallmouth bass from the Upper Namekagon River had an average length of 11.9 inches (range: 2.5 – 20.0 inches), while smallmouth bass from the Lower Namekagon River had an average length of 11.2 inches (range: 5.7 – 18.8 inches; Figure 1). Average length for both sections was above the 75th percentile (10.1 inches) for Complex-Riverine lakes in Wisconsin. The average length of smallmouth bass decreased in the Upper Namekagon River since 2020, while average length of smallmouth bass in the Lower Namekagon increased (Roberts 2021). Year classes appeared more stable for the

Upper Namekagon than the Lower Namekagon based on age frequency comparisons (Appendix Figures 1 & 2).

The PSD and PSD-14 were 60 and 32 for the Upper Namekagon, and both decreased from 2020 (Table 1). PSD and PSD-14 were 52 and 17 for the Lower Namekagon, which resulted in an increase for PSD and a decrease for PSD-14 from 2020 (Table 1).

Table 1. Proportional size distributions (PSD) values of smallmouth bass from the Upper and Lower Namekagon River in 2020 and 2025.

River Segment	PSD	PSD-14
Upper Namekagon 2020	68	48
Upper Namekagon 2025	60	32
Lower Namekagon 2020	39	28
Lower Namekagon 2025	52	17

Approximately 30% of smallmouth bass were over 14 inches in the Upper Namekagon, while 16% of smallmouth bass were over 14 inches in the Lower Namekagon. The percentage of fish over 14 inches in both sections decreased compared to 2020 (Roberts 2021). Approximately 4% of the fish sampled were over 18 inches in the Upper Namekagon, and 1% were over 18 inches in the Lower Namekagon River, which were similar to 2020.

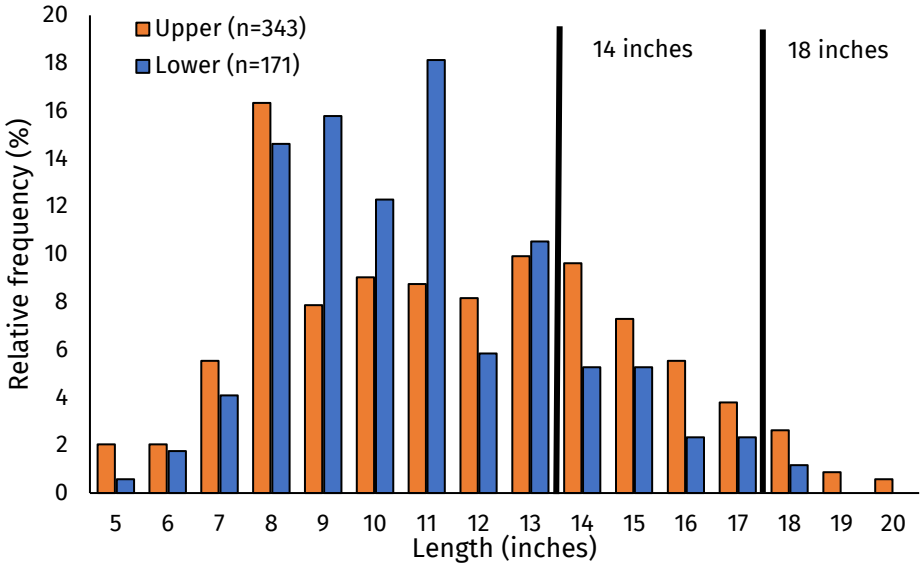

Figure 1. The relative frequency (%) of smallmouth bass sampled per inch group in the Upper and Lower Namekagon River in 2025.

Growth was below average to average for most age classes in both sections compared to the Complex-Riverine lake class (Figure 2). Growth remained similar to 2020 (Figure 2) and to the nearby Couderay River.

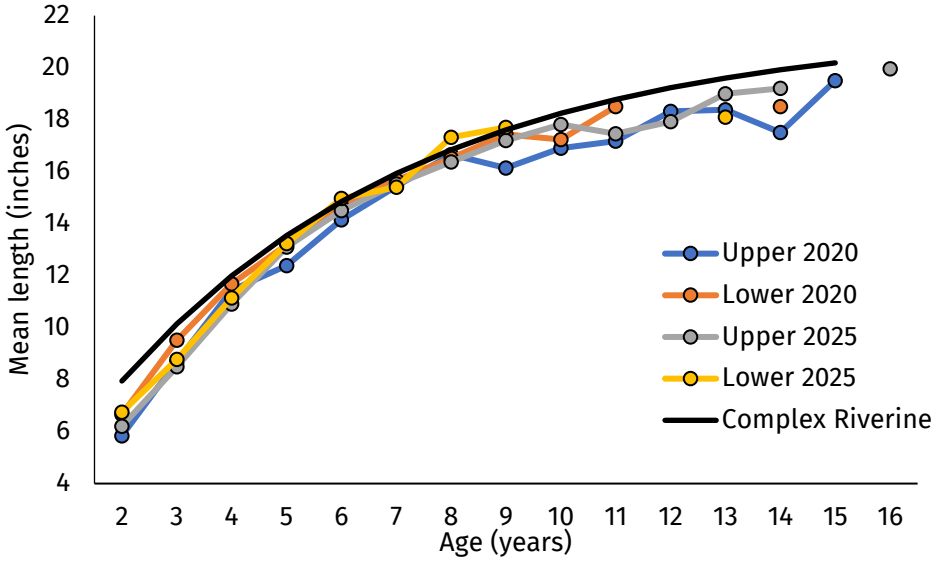

Figure 2. Mean length-at-age for smallmouth bass in the Upper and Lower Namekagon River for the 2020 and 2025 surveys compared to the Complex-Riverine lake classification.

The L∞ (i.e., growth potential) for each section was similar between river sections (Table 2). The estimated time to reach 14 inches was 6 years and the estimated time to reach 18 inches was 11 years in both river sections. Both were very similar to estimates from 2020 (Table 2). The estimated time for Namekagon River smallmouth bass to reach 14 inches and 18 inches was also similar to the Couderay River and the Menominee River (Table 2).

Table 2. Total number of smallmouth bass sampled (n), asymptotic length (L_∞), estimated time in years to reach 14inches (t_{14}) and 18 inches (t_{18}) are reported for each river segment.

River Segment	Sampling Year	N	L_∞	t_{14}	t_{18}
Upper Namekagon	2025	343	20.1	6	11
Lower Namekagon	2025	173	19.5	6	11
Upper Namekagon	2020	192	19.1	6	11
Lower Namekagon	2020	150	19.4	6	10
Menominee (3)	2016 -2018	57 – 460	20.5 – 21.8	4	8 – 10
Couderay	2020	170	21.7	6	9

Annual mortality rates were low for the Namekagon River. Annual mortality (A) was estimated to be lower for the Upper Namekagon River (27%), while the Lower Namekagon River (36%) was comparable to the Menominee River (Table 3). Estimated conditional mortality (cm) was within 5% of annual mortality (A) in both river sections, which suggested low fishing mortality in both sections (Table 3).

Table 2. Total annual mortality rates (A) estimated from catch curves for smallmouth bass and age ranges used in catch curves for the Namekagon River in the 2020 and 2025 surveys. The Menominee River (Isermann et al. 2018) and Couderay River are provided for comparison. Conditional natural mortality rates (cm) represent mean values obtained using the eight estimators provided in Fishery Analysis and Modeling Simulator (FAMS) version 1.64.2 (Slipke and Maceina 2014).

River Segment	Year of Sampling	Ages	A (%)	cm (%)
Upper Namekagon	2025	2-16	27	28
Lower Namekagon	2025	2-13	36	31
Upper Namekagon	2020	3-15	24	29
Lower Namekagon	2020	3-14	24	29
Menominee River (3)	2016-2018	4-15	34-36	24-27
Couderay River	2020	3-10	29	29

The smallmouth bass catch rate was higher in the Upper Namekagon (2.1 fish/angler hour) than the Lower Namekagon (1.6 fish/angler hour; Figure 3). However, overlap did occur between confidence intervals (C.I.) for the Upper Namekagon (95% C.I. 1.5 – 2.8 fish/angler hour) and the Lower Namekagon (95% C.I. 1.3 – 1.8 fish/angler hour) relative abundance. Relative abundance of smallmouth bass increased in both the Upper Namekagon and Lower Namekagon since 2020 (Figure 3).

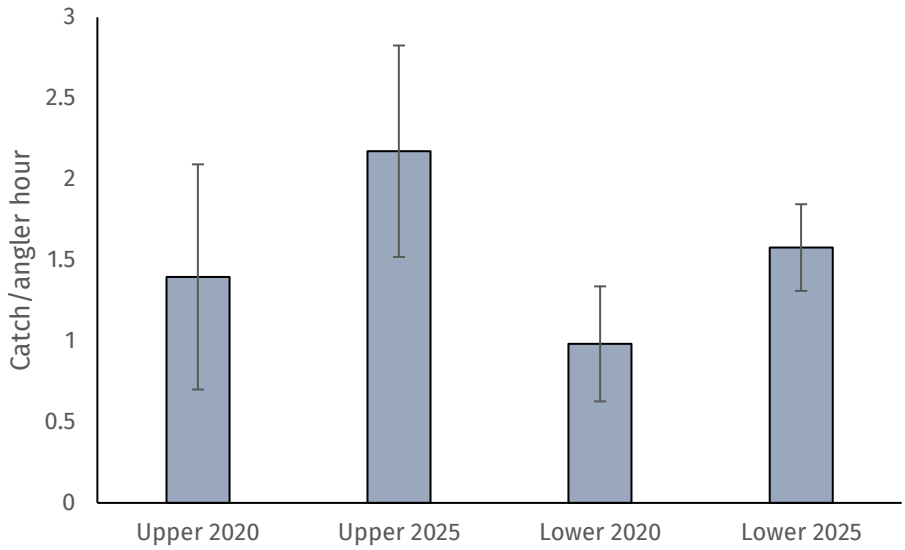

Figure 3. Catch rate (catch/angler hour) of smallmouth bass sampled during the 2020 and 2025 Namekagon River smallmouth bass surveys.

During this survey multiple other species were incidentally sampled. For the Upper Namekagon, these species included: northern pike, walleye, largemouth bass, golden redhorse, shorthead redhorse and silver redhorse. For the Lower Namekagon, these species included: walleye, northern pike, muskellunge, golden redhorse and silver redhorse.

Discussion

Based on the 2025 survey, the Namekagon River continues to hold healthy smallmouth bass populations in both sections. The smallmouth bass population in the Lower Namekagon River increased slightly in average size and increased in relative abundance since 2020. The Upper Namekagon River smallmouth bass population decreased in average size and increased in relative abundance since 2020. A reasonable amount of variation in both size and abundance is expected in riverine smallmouth bass populations that are exposed to rapidly changing conditions.

Size structure of smallmouth bass in both river sections was good and PSD stayed similar or increased in both sections since 2020 and also remained within the recommended range for a relatively balanced smallmouth bass fishery (suggested range is 30 to 70; Andersen and Weithman 1978; Beamsderfer and North 1995). The PSD-14 from both sections declined since the 2020 survey (33% in the Upper Namekagon, 39% in the Lower Namekagon). This change may be related to the increased abundances of smaller fish, which can skew these estimates.

Our aging data documented many year classes present in both sections of the river. Growth was near or below average when compared to Complex-Riverine lakes in

Wisconsin (the most comparable data in lieu of river averages). Growth potential increased for both sections, which suggested that both have the potential to produce 19 to 20-inch fish. The estimated time to reach 14 inches and 18 inches did not change significantly compared to the last survey for either section. The Namekagon River still has slower growth than the nearby Couderay River or the Menominee River.

Annual mortality increased for the Lower Namekagon in 2025 compared to 2020 whereas annual mortality was similar for the Upper Namekagon River between 2020 and 2025. In addition, the annual mortality rates ranged from 27% to 36%. These are relatively low rates and still below the mean (43%) for many other smallmouth bass river fisheries around the country (Beamsderfer and North 1995). In addition, the mortality rates estimated in this survey were likely overestimated to some degree as dorsal spines can underage fish, especially bass over age 8 (Isermann et al. 2018).

The relative abundance of smallmouth bass increased in both sections. This was likely due to strong age-3, 4, and 5 year classes in both sections (which comprised 84% of Lower Namekagon and 65% of the Upper Namekagon aging sample; Appendix Figures 1 & 2). It is possible these strong year classes were a result of low stable water conditions during recent drought years. Lukas and Orth (1995) reported better recruitment of smallmouth bass during low flows periods.

Despite the increase in relative abundance, the number of smallmouth bass over 14 inches decreased in both sections. The weak age 4 and 5 year classes noted in the 2020 survey may have impacted size structure in the Lower Namekagon, as those age classes would have been over 14 inches during this survey (Appendix Figures 1 & 2). Low water may have also played a role in lower numbers of large fish sampled in both reaches. The lower Namekagon in 2025 averaged 65% less flow than during the 2020 survey for the month of August (Xcel Energy unpublished data). Unfortunately, similar data were not available for the Hayward Dam. One major difference between the upper and lower portions of the Namekagon River is larger bass can migrate out of the Lower Namekagon River to the larger and more complex St. Croix River when water levels get low, compared to the Upper Namekagon where they cannot leave the system due to dams, but they may occupy the Trego Flowage more heavily during low water. We observed many preferred habitats (logs, rocks, etc.) that were dry or very shallow compared to the 2020 survey in the Lower Namekagon River. Dietzel et al. (2016) found water depth to be an important indicator for smallmouth bass and bass preferred depths of 2.0 – 12.0 ft. This favorable depth range may have been limited for larger smallmouth bass in 2025 due to low water levels.

The statewide standard regulation (14-inch minimum, five-fish bag limit) appears to adequately protect the smallmouth bass populations in both the Upper and Lower Namekagon River. As discussed in Roberts (2021), there are still basically two other regulation options that can be considered for the smallmouth bass fishery in the

Namekagon River. These are: 1) the protected slot (no minimum length limit, 14 – 18 inches protected slot, one fish over 18 inches, five-fish bag limit) and 2) the trophy regulation (18-inch minimum, one fish bag limit). Based on this survey, the protected slot exposes a large portion of the younger fish to harvest (70% of our sample in the Upper Namekagon and 84% in the Lower Namekagon are below 14 inches). However, this regulation would provide protection to 15% of the Lower Namekagon and 26% of the Upper Namekagon population in the protected slot. This regulation has some appeal for the Namekagon River, given the higher relative abundance of smaller bass and the angler interest in protecting larger bass from harvest. Conversely, river systems undergo variable recruitment as seen in the Lower Namekagon. So allowing harvest of juvenile bass is somewhat risky without knowing current and future patterns of smallmouth bass recruitment in the Namekagon River. The trophy regulation received good reviews from the public, and a proposed regulation for the Namekagon River was passed at the local and state levels in spring 2020 (Question 36 – Wisconsin Conservation Congress 2020). However, our analyses do not suggest the smallmouth bass population would benefit, given the lower mortality and below average to average growth and slight increases in growth potential. An 18-inch minimum is more appropriate for a lower density population, otherwise this regulation could actually encourage stunting. This trend is already being realized on some Wisconsin lakes (Sass et al. 2026 – in review). The current 14-inch minimum, five fish bag limit regulation is the intermediate of these two regulations. It protects recruitment while allowing some harvest of larger fish.

Current research in Wisconsin suggests that smallmouth bass harvest rates have declined to very low levels (Sass et al. 2026 – in review). Our conditional mortality rates (cm) and total annual mortality rates (A) were very similar, which also suggests that the Namekagon river has low smallmouth bass harvest. As stated in the last report, an estimate of smallmouth bass harvest would be useful data for management, though a tagging study likely is not the best method to gather this data. Consideration should be given to a social survey to achieve this estimate. The National Park Service would be an important partner if such a survey was pursued.

Recommendations

1. Given the low mortality rates, the high number of year classes, high abundance of young fish and average growth rates, the 14-inch minimum length limit and five fish bag limit should stay in place. If abundance continues to increase and/or size declines to unacceptable levels then consideration should be given to the 14-18-inch protected slot.
2. A hook and line smallmouth bass assessment should continue to take place every five years on the Namekagon River. This assessment will help track trends and population characteristics.

3. An estimate of angler effort and angler harvest is needed for the Namekagon River. An angler survey of some type should be explored to assess this data need. This survey should be conducted in conjunction with the National Park Service.

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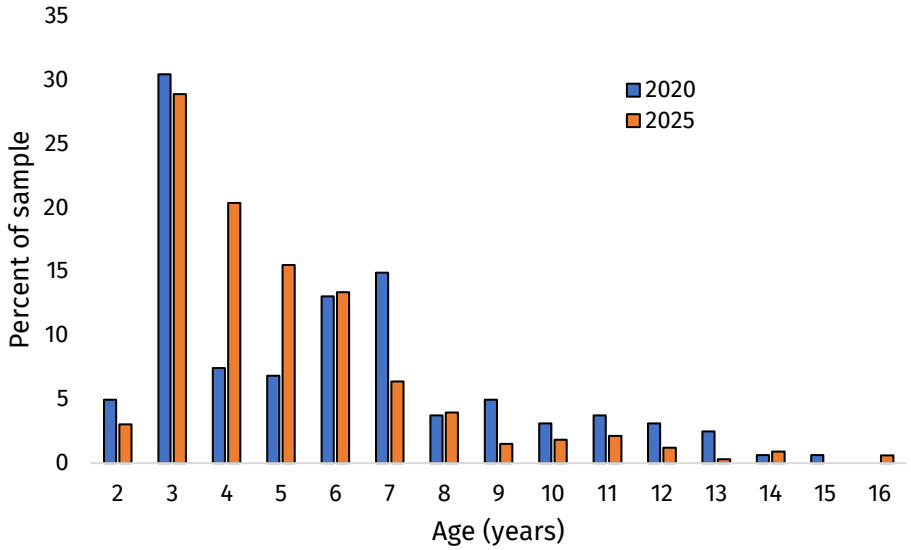
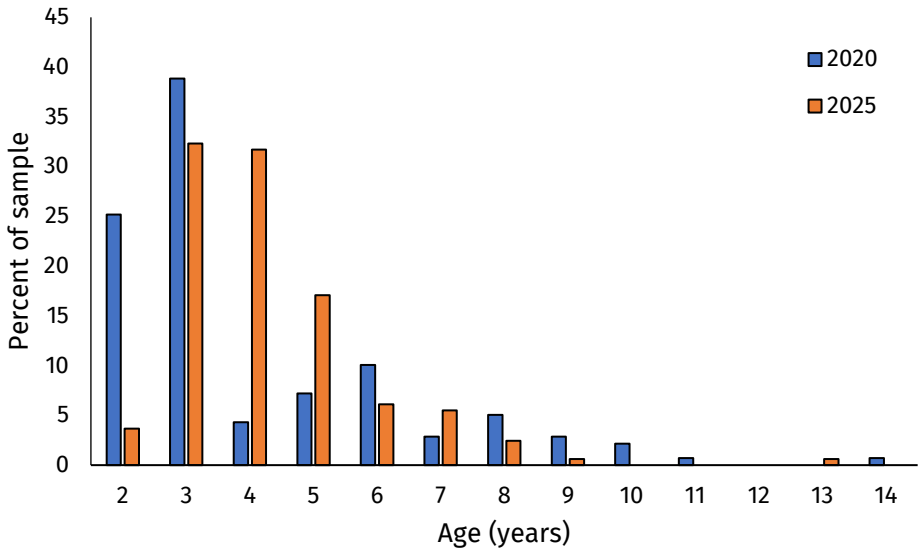
Appendix



Appendix Figure 1. The relative frequency (%) of ages for smallmouth bass sampled in the Upper Namekagon River in 2020 and 2025.



Appendix Figure 2. The relative frequency (%) of ages for smallmouth bass sampled in the Lower Namekagon River in 2020 and 2025.