WISCONSIN DEPARTMENT OF NATURAL RESOURCES

Fishery Survey Report for Amnicon Lake, Douglas County, Wisconsin 2024-2025


Photo Credit: DNR Staff

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Executive Summary

A comprehensive fisheries survey with an angler creel survey was conducted on Amnicon Lake from April 2024 to May 2025 to assess the status of the fishery. The goal of this survey was to estimate angler catch and harvest, abundance and size structure of muskellunge, northern pike, walleye, largemouth bass, black crappie and bluegill.

Anglers fished Amnicon Lake less in 2024 than previous surveys, but more than the Douglas and Bayfield County average. Anglers targeted northern pike most often, but many also targeted black crappie, muskellunge and largemouth bass.

Northern pike were first documented in Amnicon Lake in 2006. Northern pike abundance was not effectively assessed with the early spring fyke net survey, but angler catch and harvest rates were high and size structure was low. Anglers are encouraged to harvest northern pike in Amnicon Lake to help decrease their abundance and minimize impacts on other species.

The muskellunge population has shifted from a high abundance, smaller size, action fishery to a lower abundance, larger size, quality or trophy fishery. A muskellunge population with lower density and higher size structure can be expected moving forward, but higher northern pike harvest may increase muskellunge abundance. Muskellunge stocking should continue, and protection of shoreline habitat is critical to encourage natural reproduction. Our management objective is to maintain muskellunge density between 0.15 to 0.30 per acre with a PSD-42 of at least 15.

The walleye population can be classified as having low abundance with high size structure. Angler harvest has remained low, and the 18-inch minimum length limit remains effective in protecting walleyes until they spawn at least once. As a result of the low adult density and low angler use, walleye stocking has been deferred. To support natural reproduction, protection of shoreline habitat is critical. Our management objective is to maintain a lower density, higher size structure walleye population supported by natural reproduction.

Largemouth bass had average abundance and size structure compared to similar lakes. Our management objective is to maintain a catch rate of 5 to 15 largemouth bass per mile with a PSD-12 of at least 60. Moving forward, a late spring electrofishing survey should be completed every six years to monitor bass and bluegill populations.

Black crappie and bluegill each had moderate abundance with low size structure and slow growth. Slow growth and low size structure indicates overabundance, so anglers are encouraged to harvest these smaller black crappies and bluegill. Increased harvest will increase food availability for the remaining fish and improve growth rates. Yellow perch were rare, small and primarily serve as an additional prey fish for walleye, muskellunge, northern pike and largemouth bass in Amnicon Lake.

Introduction

Amnicon Lake is a 390-acre drainage lake located in central Douglas County with an average depth of 10 feet and a maximum depth of 31 feet. The lake has an inlet from an unnamed creek to the east that flows from Dowling Lake, and an outlet to the Amnicon River on the southwest end of the lake that flows through Lyman Lake and eventually drains into Lake Superior. The primary public access site is a boat launch on the northwest side of the lake owned by the Town of Summit.

Amnicon Lake is a high productivity system (eutrophic) with water clarity around 5 feet (Secchi depth) and is classified as a complex-cool-dark lake based on fish species, water temperature and clarity (Rypel et al. 2019). The watershed (2,770 acres) is primarily forest (42%) with wetlands (26%), surface waters (20%), urban development (6%) and minimal agriculture (2%; Midwest Glacial Lakes Conservation Planner). The DNR Lake Page provides additional information on lake characteristics such as substrate types and bathymetry. DNR fisheries management staff surveyed Amnicon Lake in 2024 and 2025 to assess the status of the fisheries.

FISHING REGULATIONS

Walleye are currently managed with an 18-inch minimum length, which has been in place since 2015. All other species are managed with statewide limits including muskellunge (40-inch minimum length) and largemouth (14-inch minimum length). See Appendix Table A1 for more detailed regulations.

STOCKING

Large fingerling walleyes were stocked at approximately 5 fish per acre in alternate years from 2014 to 2022 (Appendix Table A2). Walleye have not been stocked since 2022 due to low survival and angler use. Large fingerling muskellunge are stocked at approximately 0.5 fish per acre in even-numbered years. Beginning in 2024, Great Lakes strain muskellunge have been stocked into Amnicon Lake to conform to our genetics management plan.

Methods

FISH SURVEY

Survey methods followed standard DNR Treaty comprehensive assessment protocols (Cichosz 2025; Appendix Table A3). Sampling consisted of two spring fyke net surveys, two spring electrofishing surveys and a fall electrofishing survey. All fish captured during these surveys were identified to species, counted and measured to the nearest 0.1 inch.

Walleye and muskellunge populations were estimated using a mark-recapture framework. Walleye were marked with fin clips during the early spring netting survey (SN1) where fyke nets were set after ice-out (59 net-nights). This was followed by an

early spring electrofishing survey (SE1) of the entire shoreline (6.0 miles, including islands) targeting walleye, some of which had been marked with a fin clip during the SN1 survey. Muskellunge were marked with fin clips during the SN1 survey and during a late spring fyke net survey (SN2) that immediately followed the SE1 survey in 2024 (34 net-nights). Another SN2 survey was conducted in 2025 (30 net-nights) to recapture marked muskellunge. For these walleye and muskellunge surveys, the number of fish captured were used to calculate a population estimate of adult walleye (sex identified via eggs or milt present or ≥ 15 inches) and muskellunge (sex identified via eggs or milt present or ≥ 30 inches) using the Lincoln-Peterson estimator with Chapman modification (Ricker 1975):

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

where N = population estimate, M = number of fish marked, C = total number of fish captured during the recapture survey and R = number of marked fish captured during the recapture survey.

Shortly after the 2024 SN2 survey, gamefish and panfish were targeted during the late spring electrofishing survey (SE2). Gamefish were collected along the entire shoreline (4.5 miles) and all species were collected in two 0.5-mi stations.

To evaluate walleye recruitment, a fall electrofishing survey (FE1) was conducted by shocking the entire shoreline (6.0 miles, including islands). The number of age-0 (fish born that spring) and age-1 walleye captured per mile were calculated to index the relative abundance of each year class.

Catch rates (fish/mile or fish/net-night) were used to index relative abundance of all species other than walleye and muskellunge in the most effective survey for each species. Northern pike and yellow perch were best sampled in the SN1 survey, black crappie were best sampled in the SN2 survey, and largemouth bass and bluegill were best sampled in the SE2 survey.

Size structure for each species was visualized using length frequency histograms and quantified using the proportional size distribution (PSD) metric:

$$PSD = \frac{\#\ of\ fish \geq given\ length\ category}{\#\ of\ fish \geq stock\ length} * 100$$

PSD can generally be interpreted as the percent of fish greater than stock size (Gabelhouse 1984; Appendix Table A4). PSD results were only included when ≥ 30 individuals were sampled.

To estimate age and model growth, anal fin rays were collected from all muskellunge and dorsal spines were collected from five walleyes of each sex per 0.5-inch length bin. To characterize panfish growth, otoliths were collected from approximately twenty 6 to 7-inch bluegills and 8 to 9-inch black crappies.

To evaluate trends through time, results were compared to previous surveys conducted on Amnicon Lake from 1993 to 2020, when possible. To determine the status of Amnicon relative to similar lakes, walleye PSD was compared to other complex-cool-dark lakes with a combination of stocking and natural walleye recruitment. Similarly, catch rate and PSD of other species were compared to other complex-cool-dark lakes.

CREEL SURVEY

An angler creel survey was conducted during the 2024-2025 fishing season (May 2024-March 2025, excluding November) following standard DNR treaty comprehensive assessment protocols (Cichosz 2025). Angler metrics of species-specific fishing effort, catch rates and harvest per acre were estimated. Angler exploitation (% of population harvested by anglers) of walleye was calculated by dividing the estimated number of angler-harvested marked walleye by the total number of walleye marked during the spring surveys in 2024. Exploitation of walleye by tribal spearing was calculated by dividing the total number of spear-harvested walleye by the walleye population estimate. These results were compared to results from previous creel surveys conducted on Amnicon Lake in 1999 and 2006 to evaluate trends through time. To determine the status of Amnicon Lake relative to similar lakes, these results were compared to other creel surveys in the Ceded Territory during the same timeframe.

Results

CREEL SURVEY

Anglers spent an estimated 9,344 hours (23.9 hours/acre) fishing Amnicon Lake in 2024, which was lower than in 2006 (11,054 hours) and 1999 (12,057 hours) but above the Douglas and Bayfield County average of 21.3 hours/acre since 2010. Anglers directed the most effort at northern pike, with an estimated 4,785 hours or 36% of the total directed (species specific) effort, but many also targeted black crappie (2,559 hours, 19% of total directed effort), muskellunge (2,161 hours, 16% of total directed effort) and largemouth bass (1,678 hours, 13% of total directed effort; Figure 1). Over time, Amnicon Lake anglers have spent more time targeting northern pike, but less time targeting muskellunge, black crappie and walleye (Figure 1).

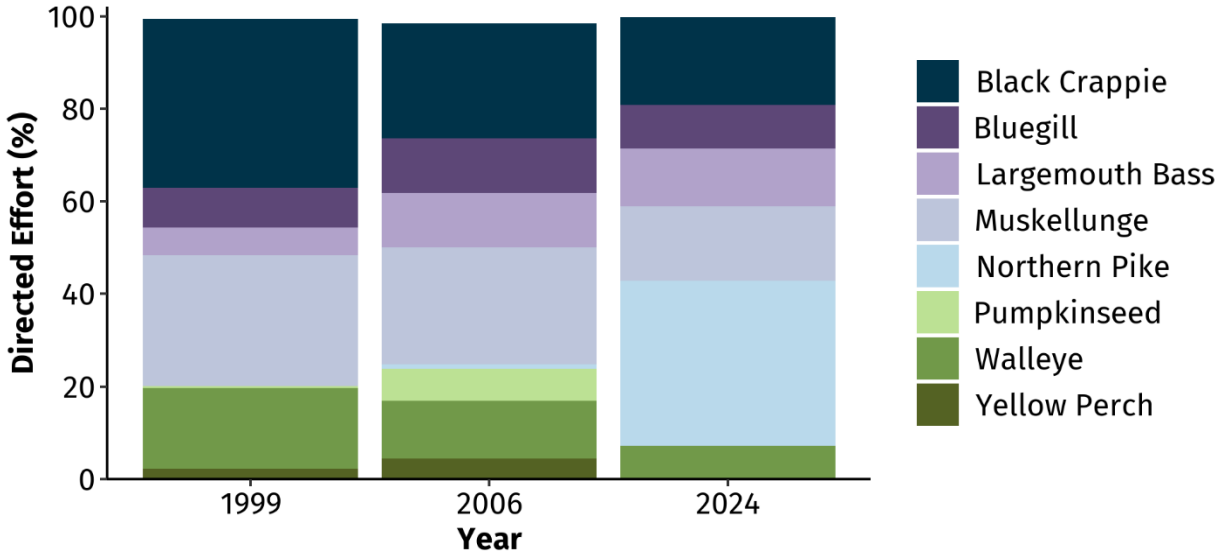

Figure 1. Percent of total directed angling effort on Amnicon Lake by species in 1999, 2006 and 2024. Species with less than 2% of directed effort were removed for clarity.

MUSKELLUNGE

FISH SURVEY

Muskellunge captured during the population estimate on Amnicon Lake in 2024 and 2025 ranged from 12.9 to 48.6 inches (Figure 2). The largest male sampled was 40.3 inches, and the largest female sampled was 48.6 inches. The adult muskellunge (≥ 30 inches or sexable) population was estimated to be 65 fish (95% CI = 36-94) or 0.15 adults/acre (95% CI = 0.08-0.22; Figure 3). This density was much lower than the 2007 estimate of 1.8 adults/acre (Figure 3). The PSD-42 was 25, which was much higher than the 2007 survey (<1) and above average for other muskellunge lakes throughout the state (Figure 4). It took about 7 years to reach 35 inches and about 15 years to reach 40 inches (Figure 5). More muskellunge were present at older ages, indicating declining natural reproduction, except for age-6 muskellunge which was the only stocked year class present at the time of this survey (Figure 6).

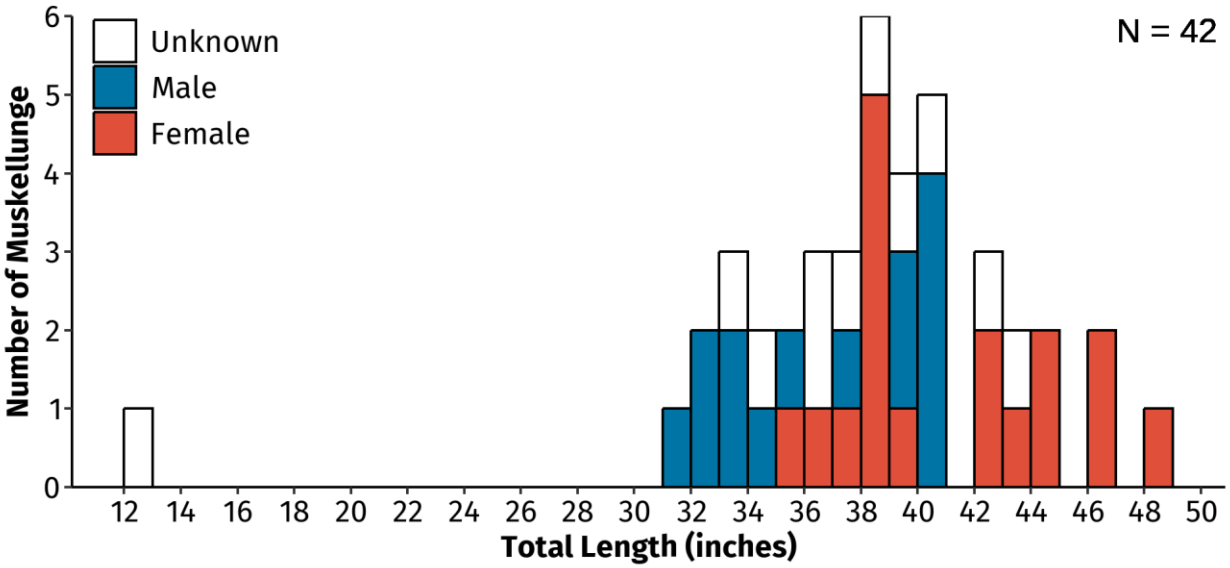

Figure 2. Length frequency histogram of female (red), male (blue) and unknown sex (white) muskellunge captured during spring fyke net surveys (SN1 and SN2) on Amnicon Lake in 2024 and 2025 with recaptured fish removed.

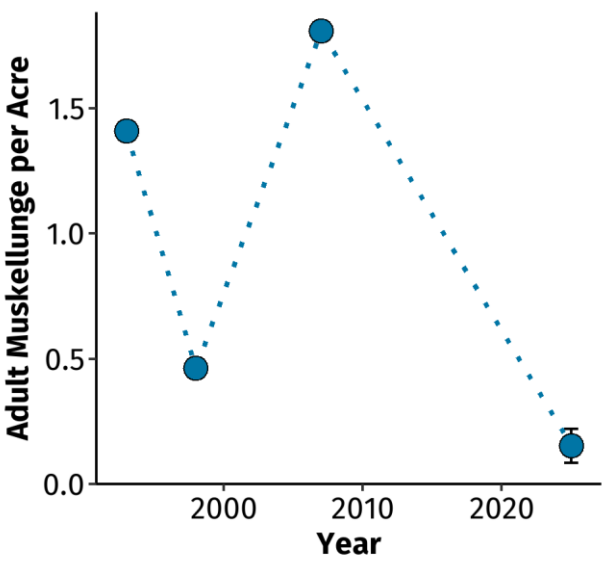

Figure 3. Adult muskellunge (≥ 30 inches or sexable) density estimates (adult fish/acre) with 95% confidence intervals from mark recapture surveys on Amnicon Lake from 1993 to 2025.

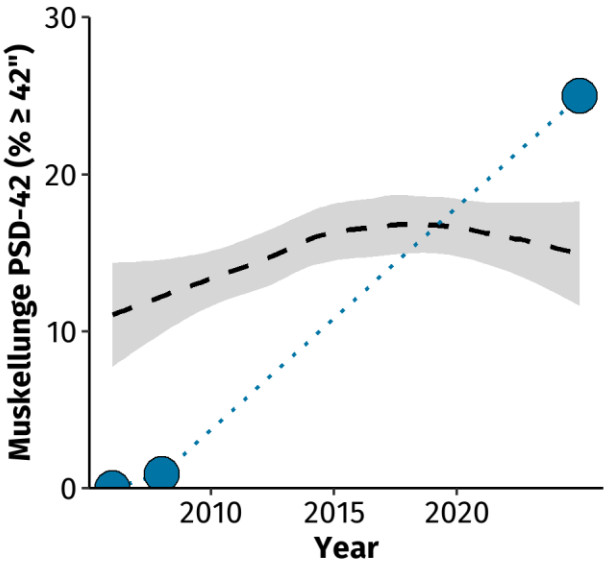

Figure 4. Proportional size distribution (PSD-42, % ≥ 42 inches) of muskellunge captured during spring surveys (SN1, SE1 and SN2) on Amnicon Lake (blue circles) from 2006 to 2025. Running average (dashed line) and 95% confidence interval (shaded area) of other muskellunge lakes throughout the state were used for comparison.

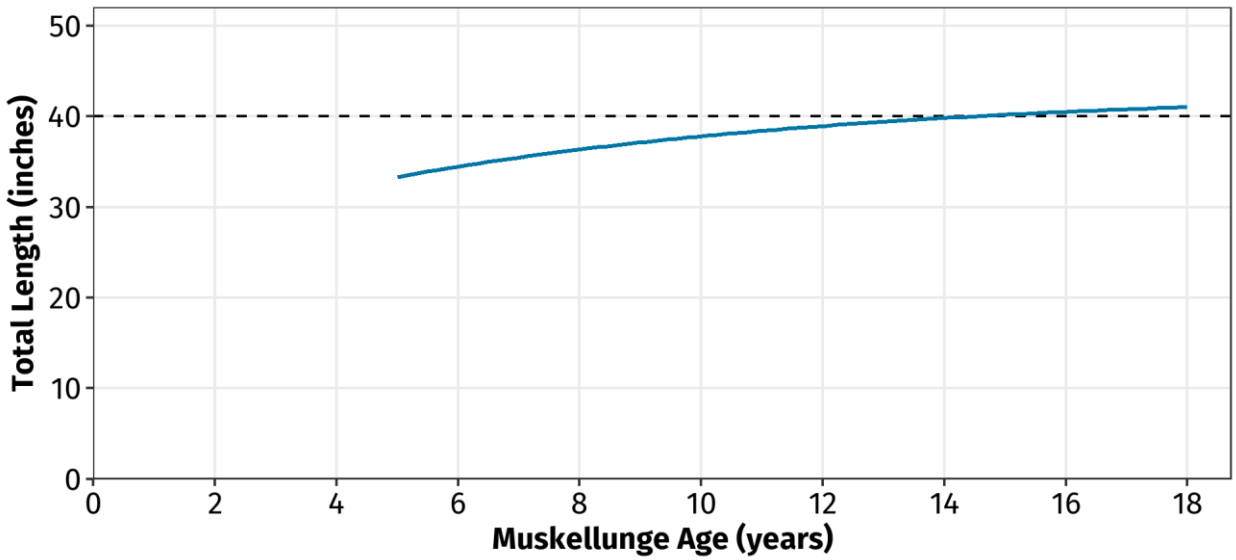

Figure 5. Von Bertalanffy growth curve for muskellunge captured during spring surveys (SN1, SE1 and SN2) on Amnicon Lake in 2024 and 2025. The horizontal dashed line represents the minimum length limit.

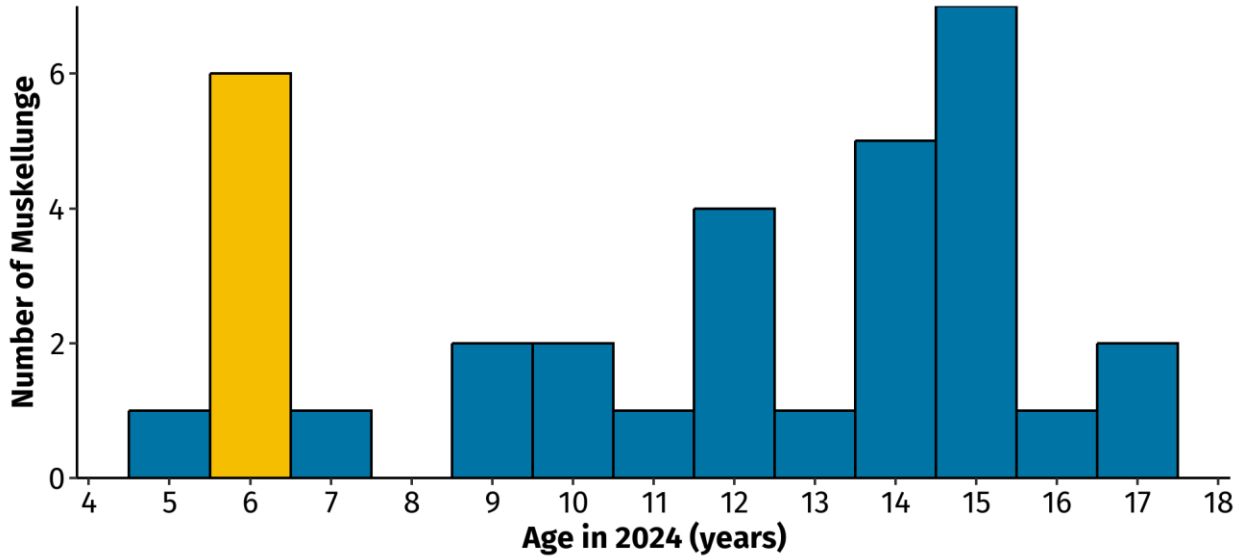

Figure 6. Age structure of muskellunge captured during spring surveys (SN1, SE1 and SN2) on Amnicon Lake in 2024 and 2025. Yellow bars represent year classes with stocking and blue bars indicate naturally reproduced year classes.

CREEL SURVEY

Muskellunge were the third most targeted species on Amnicon Lake in 2024 with 2,161 hours or 16% of the total directed effort (Figure 1). Muskellunge angling effort was 5.5 hours/acre in 2024, which was lower than in 2006 (10.0) and 1999 (9.9) but near the average for creel surveys in Ceded Territory lakes with muskellunge (Figure 7, left panel). It took anglers an average of 27 hours to catch a muskellunge, which was much longer than in 2006 (7.6) and 1999 (6.5) but near the average for Ceded Territory

creel surveys (Figure 7, middle panel). Muskellunge exploitation was low with no angler harvest of muskellunge documented in the 2024 creel survey (Figure 7, right panel). Tribal harvest of muskellunge has also been low on Amnicon Lake. There were no muskellunge harvested via tribal spearing in 2024 and a total of 11 muskellunge harvested via tribal spearing from 2000 to 2025.

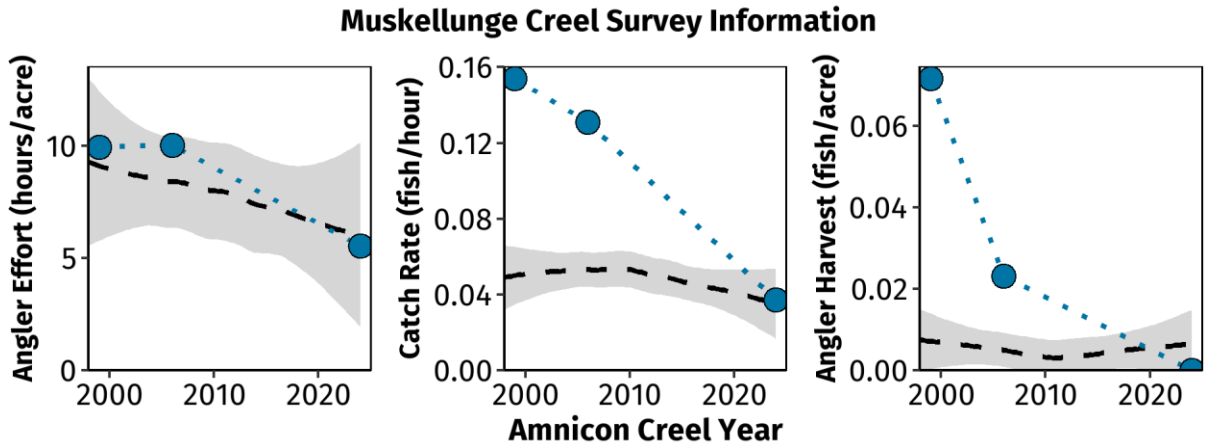

Figure 7. Muskellunge angler effort (left), catch rate (middle) and angler harvest (right) on Amnicon Lake (blue circles) from 1999 to 2024. Running average (dashed line) and 95% confidence interval (shaded area) of creel surveys from Ceded Territory lakes were used for comparison.

NORTHERN PIKE

FISH SURVEY

During the 2024 SN1 survey, 102 northern pike were captured that ranged from 6.9 to 29.0 inches (Figure 8). The northern pike catch rate was 1.7 fish/net-night, which was much higher than in 2006 (0.1) when northern pike were first documented in Amnicon Lake, but still below average for complex-cool-dark lakes (average = 4.5). However, most northern pike had already spawned by the sampling period and were not as vulnerable to capture. The northern pike PSD-21 was 33, which was below average for complex-cool-dark lakes (average = 42).

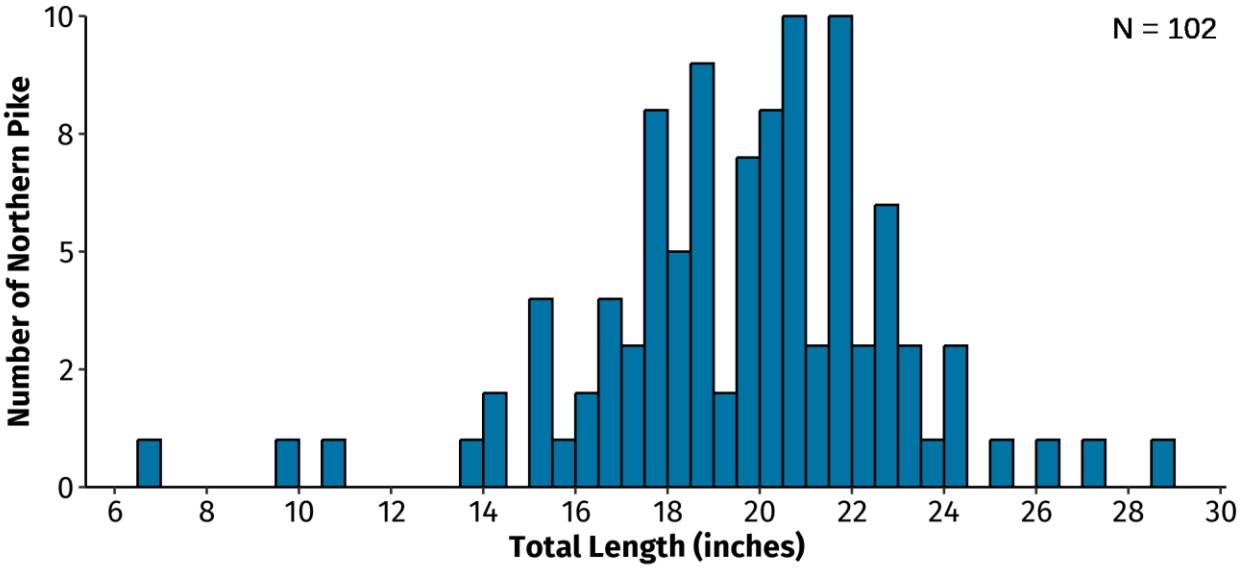

Figure 8. Length frequency histogram of northern pike captured during the early spring fyke net survey (SN1) on Amnicon Lake in 2024.

CREEL SURVEY

Northern pike were the most targeted species on Amnicon Lake in 2024 with 4,785 hours, or 36% of the total directed effort (Figure 1). The estimated angling effort directed at northern pike was 12.3 hours/acre, which was well above average for Ceded Territory creel surveys (Figure 9, left panel). The angler catch rate was 0.8 northern pike/hour, which was above average for Ceded Territory creel surveys (Figure 9, middle panel). Anglers harvested approximately 629 northern pike (1.6 northern pike/acre), which was the eighth highest northern pike harvest rate ever documented in a Ceded Territory creel survey (Figure 9, right panel).

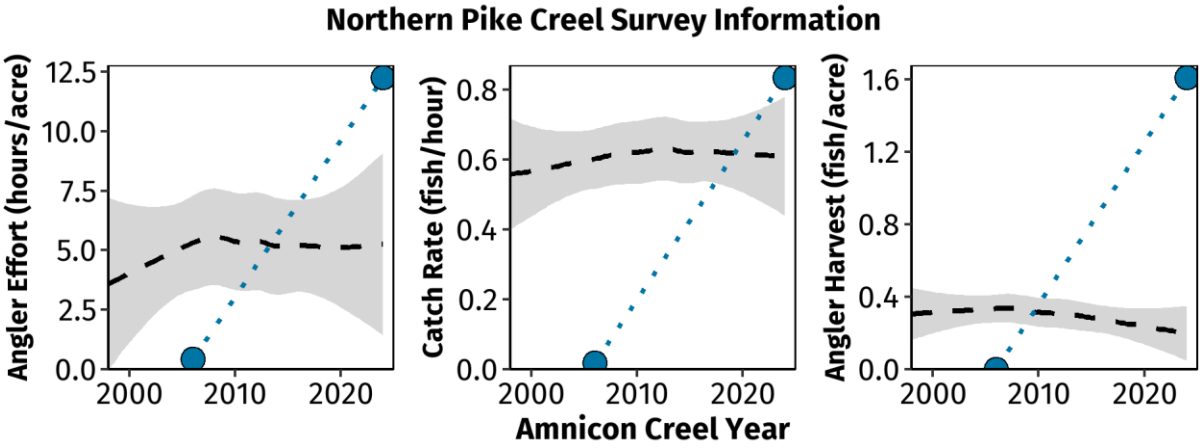

Figure 9. Northern pike effort (left), catch rate (middle) and angler harvest (right) on Amnicon Lake (blue circles) from 2006 to 2024. Running average (dashed line) and 95% confidence interval (shaded area) of creel surveys from Ceded Territory lakes were used for comparison.

WALLEYE

FISH SURVEY

Walleye captured during the SN1 survey ranged from 8.4 to 26.7 inches, with 64% of the fish larger than the 18-inch minimum length limit (Figure 10). The largest male sampled was 23.4 inches, and the largest female sampled was 26.7 inches. There was 1.0 male for every female in 2024, down from 4.3 in 2014 and 4.0 in 2006. The adult walleye population in Amnicon Lake was estimated to be 377 fish or 0.9 adults/acre in 2024 (Figure 11). This density was higher than the 2014 estimate (0.2 adults/acre), but well below population estimates from 2006 (2.9 adults/acre) and 1999 (4.2 adults/acre; Figure 11).

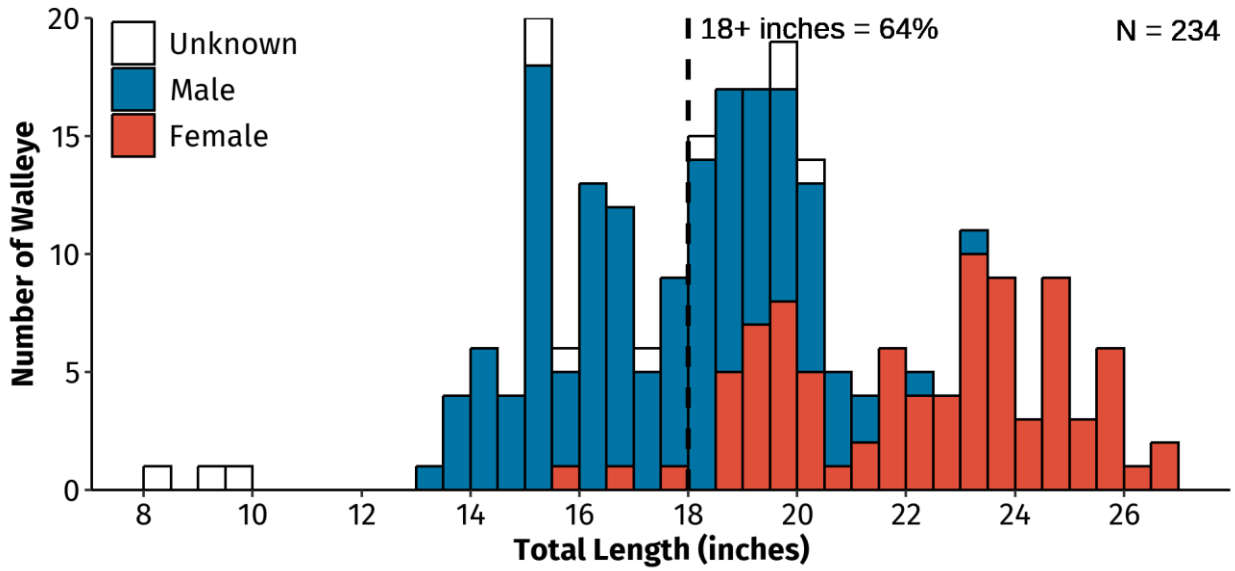

Figure 10. Length frequency histogram of female (red), male (blue) and unknown sex (white) walleye captured during the early spring fyke net survey (SN1) on Amnicon Lake in 2024 with recaptured fish removed. Sixty-four percent of the fish were ≥ the 18-inch minimum length limit (vertical dashed line).

No age-0 or age-1 walleye were captured in the 2024 fall electrofishing survey. Age-0 and age-1 walleye have only been captured in four of the 17 fall electrofishing surveys on Amnicon Lake since 1989 and no surveys have found more than five age-0 or two age-1 walleye per mile (15 age-0 and eight age-1 per mile are typically enough to produce a fishable adult year-class). Sampling efficiency during fall electrofishing surveys on Amnicon Lake was generally poor due to dense vegetation.

The PSD-15 in the SN1 survey was 94, which was much higher than all previous surveys and above average for complex-cool-dark lakes supported primarily by stocking (Figure 12). For walleye to reach 18 inches in Amnicon Lake, it takes 4-5 years for females and about 5-6 years for males (Figure 13). Stocked year classes were more

abundant, but some naturally reproduced fish were present in years without stocking (Figure 14).

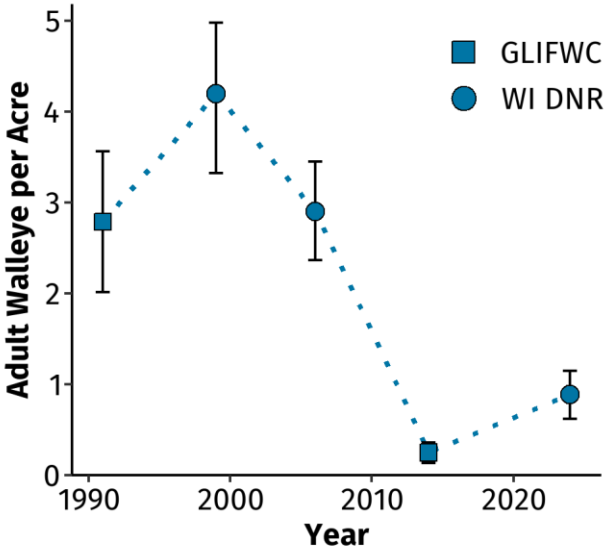

Figure 11. Adult walleye density estimates (adult fish/acre) with 95% confidence intervals from WI DNR (circles) and Great Lakes Indian Fish and Wildlife Commission (GLIFWC; squares) mark-recapture surveys on Amnicon Lake from 1991 to 2024.

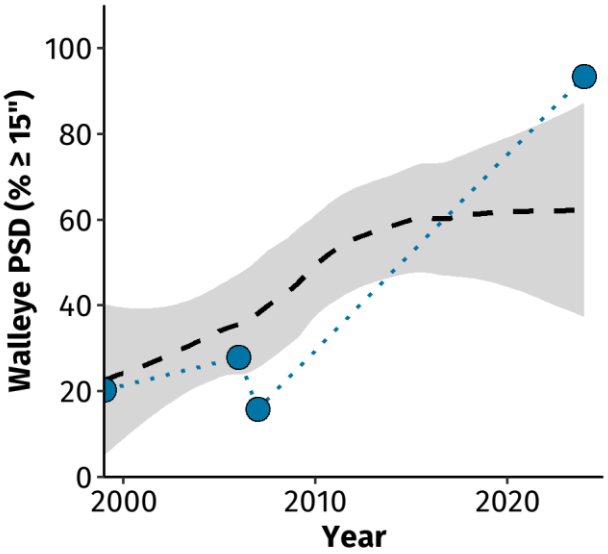

Figure 12. Proportional size distribution (PSD, % ≥ 15 inches) of walleye captured during the early spring fyke net survey (SN1) on Amnicon Lake (circles) from 1999 to 2024. Running average (dashed line) and 95% confidence interval (shaded area) of complex-cool-dark lakes with a combination of stocking and natural walleye recruitment were used for comparison.

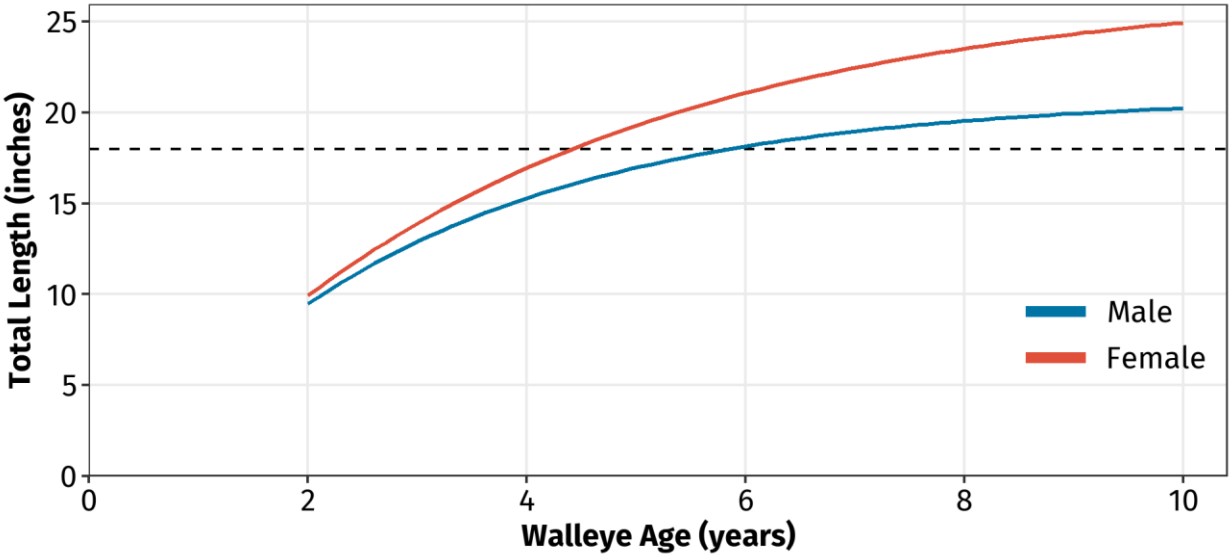

Figure 13. Von Bertalanffy growth curves of male (blue line) and female (red line) walleye captured during the 2024 early spring fyke net survey (SN1) on Amnicon Lake. The horizontal dashed line represents the 18-inch minimum length limit.

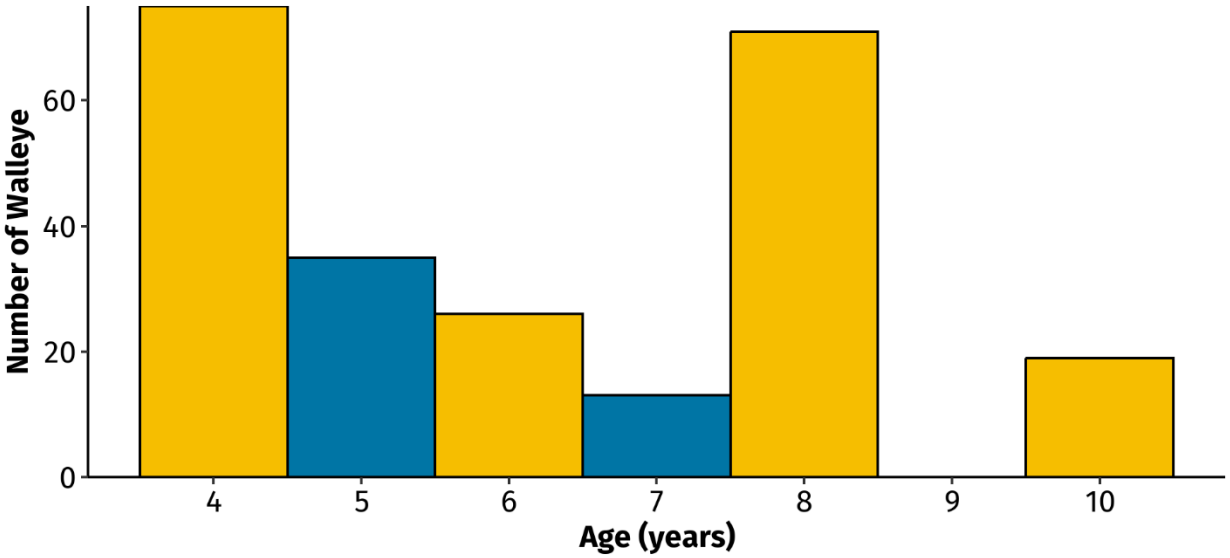

Figure 14. Estimated age structure of walleye captured during spring surveys (SN1 and SE1) on Amnicon Lake in 2024. Yellow bars represent year classes with stocking and blue bars indicate naturally reproduced year classes.

CREEL SURVEY

Walleye were the sixth most targeted species on Amnicon Lake in 2024 with 7% of the total directed effort (Figure 1). Walleye angling effort was 2.4 hours/acre, which was about half of 2006 (5.0 hours/acre) and followed the trend of other Ceded Territory creel surveys (Figure 15, left panel). Similarly, the angler catch rate was 0.04 walleye/hour, which was lower than 2006 (0.11 walleye/hour) and well below average for Ceded Territory creel surveys (Figure 15, middle panel). Angler harvest remained low and well below average for Ceded Territory creel surveys with 16 walleye harvested (Figure 15, right panel).

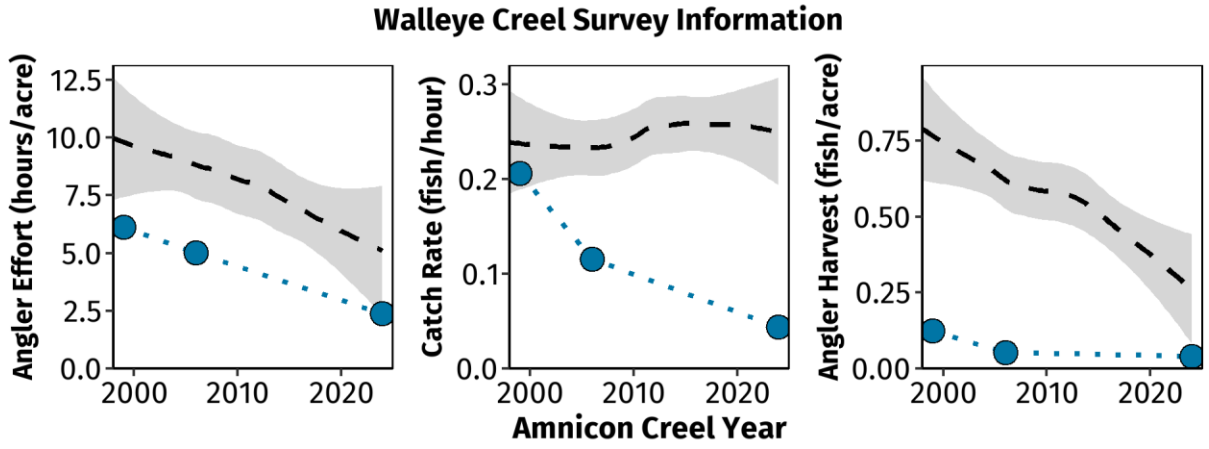

Figure 15. Walleye angler effort (left), catch rate (middle) and angler harvest (right) on Amnicon Lake (blue circles) from 1999 to 2024. Running average (dashed line) and 95% confidence interval (shaded area) of creel surveys from Ceded Territory lakes were used for comparison.

The total walleye exploitation rate (% of the adult population harvested) was 0.8% in 2024 and all estimates have been <1%. Safe harvest is established as less than a 1-in-40 chance of exceeding 35% exploitation, so Amnicon Lake is well below that threshold. No walleyes were harvested by tribal spearing in 2024, so all harvest was by anglers. Tribal spear harvest on Amnicon Lake has been low in recent years with a total of 26 walleyes harvested from 2011 to 2024.

LARGEMOUTH BASS

FISH SURVEY

During the 2024 SE2 survey, 32 largemouth bass were captured that ranged from 9.1 to 20.3 inches, with 38% larger than the 14-inch minimum length limit (Figure 16). No other SE2 surveys have been conducted on Amnicon Lake so trends over time could not be assessed. The largemouth bass catch rate was 8.1 fish/mile, which was near the average for complex-cool-dark lakes (average = 9.6). The largemouth bass PSD-12 was 81, which was slightly above average for complex-cool-dark lakes (average = 65).

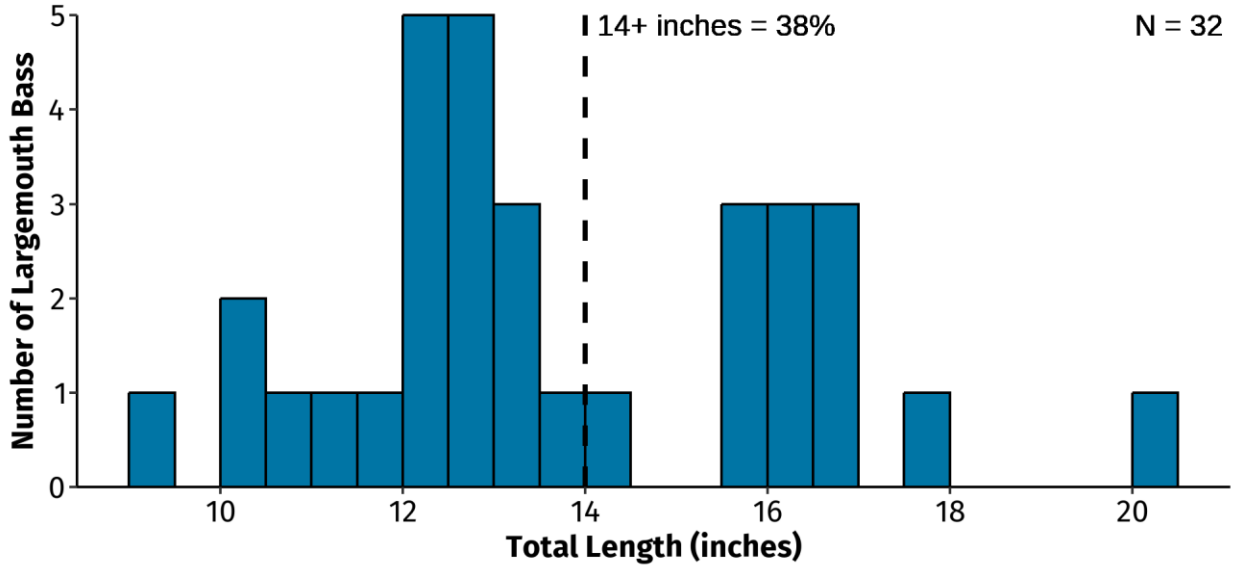

Figure 16. Length frequency histogram of largemouth bass captured during the late spring electrofishing survey (SE2) on Amnicon Lake in 2024. Thirty-eight percent of largemouth bass were ≥ the 14-inch minimum length limit (vertical dashed line).

CREEL SURVEY

Largemouth bass were the fourth most targeted species on Amnicon Lake in 2024 with 1,678 hours or 13% of the total directed effort (Figure 1). Estimated angling effort targeting largemouth bass was 4.3 hours/acre, which was similar to 2006 (4.7) but below average for Ceded Territory creel surveys (Figure 17, left panel). The angler catch rate was 0.6 largemouth bass/hour, which was slightly lower than in 2006 (0.7) and near the average for Ceded Territory creel surveys (Figure 17, middle panel). Estimated angler harvest was low with 0.09 largemouth bass/acre harvested but was

higher than in 2006 (0.02) and below the average for Ceded Territory creel surveys (Figure 17, right panel).

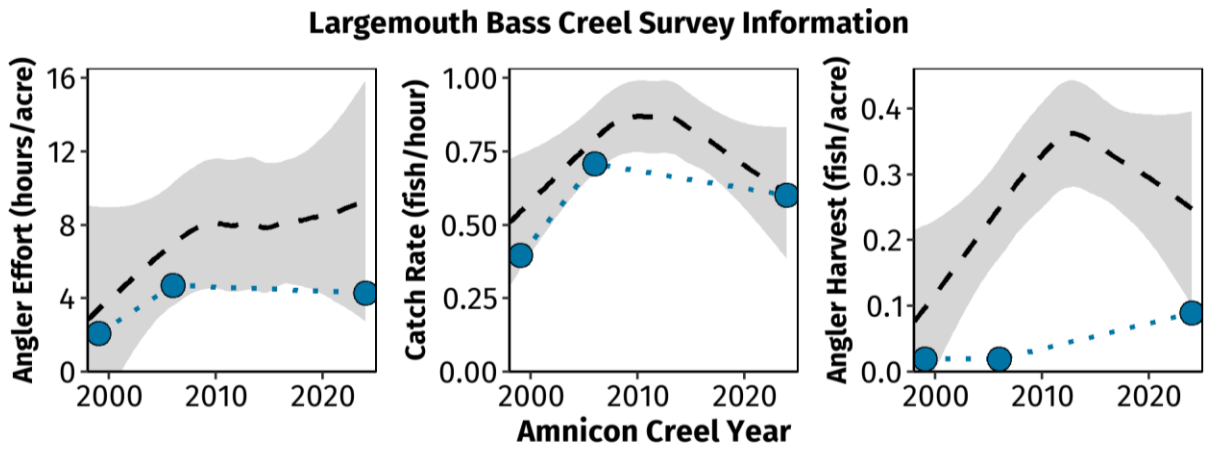

Figure 17. Largemouth bass effort (left), catch rate (middle) and angler harvest (right) on Amnicon Lake (blue circles) from 1999 to 2024. Running average (dashed line) and 95% confidence interval (shaded area) of creel surveys from Ceded Territory lakes were used for comparison.

BLACK CRAPPIE

FISH SURVEY

During the 2024 SN2 survey, 487 black crappie were captured that ranged from 2.8 to 12.5 inches (Figure 18). The black crappie catch rate was 14.3 fish/net-night in the SN2 survey, which was higher than in 2017 (7.5) and near the average for complex-cool-dark lakes (Figure 19, left panel). The black crappie PSD-8 was 15, which was lower than in 2017 (39) and well below average for complex-cool-dark lakes (Figure 19, right panel). Twenty-two 8-9-inch black crappies were kept for aging. Age ranged from 6 to 12 years with a mean of 7.8 years, which is much slower than average growth for similar lakes (5.8 years; Figure 20).

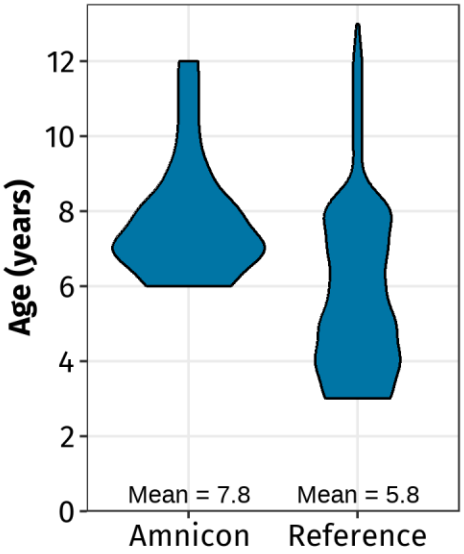

Figure 20. Age of 8-9-inch black crappies captured during the 2025 late spring fyke net survey (SN2) on Amnicon Lake and reference lakes. Wider bars indicate more fish at that age. Reference lakes include other complex-cool-dark lakes since 2010.

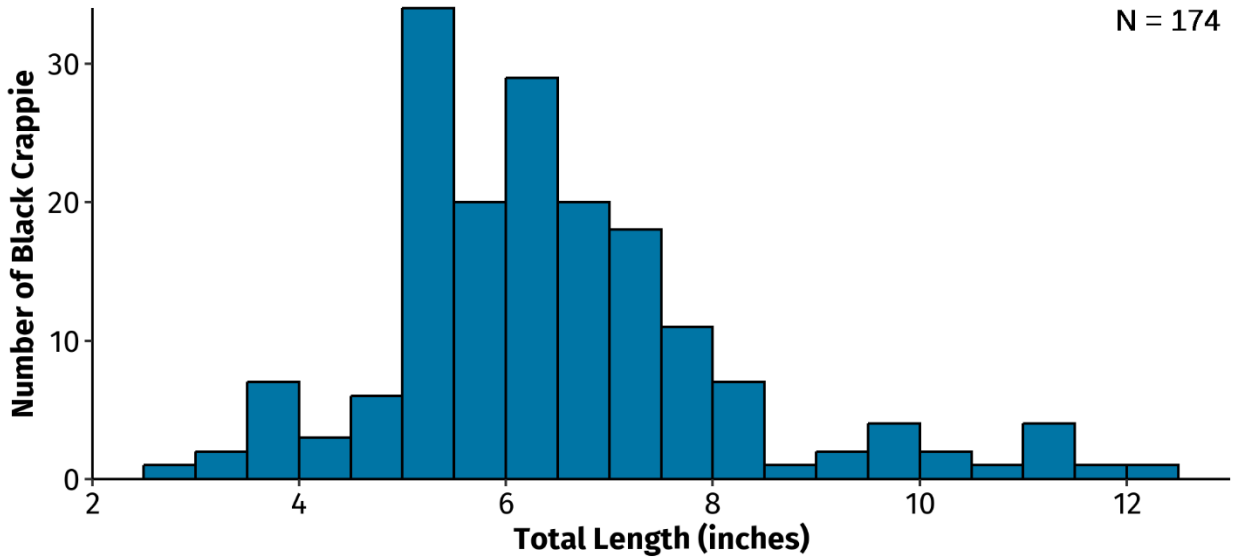

Figure 18. Length frequency histogram of black crappie captured during the late spring fyke net survey (SN2) on Amnicon Lake in 2024.

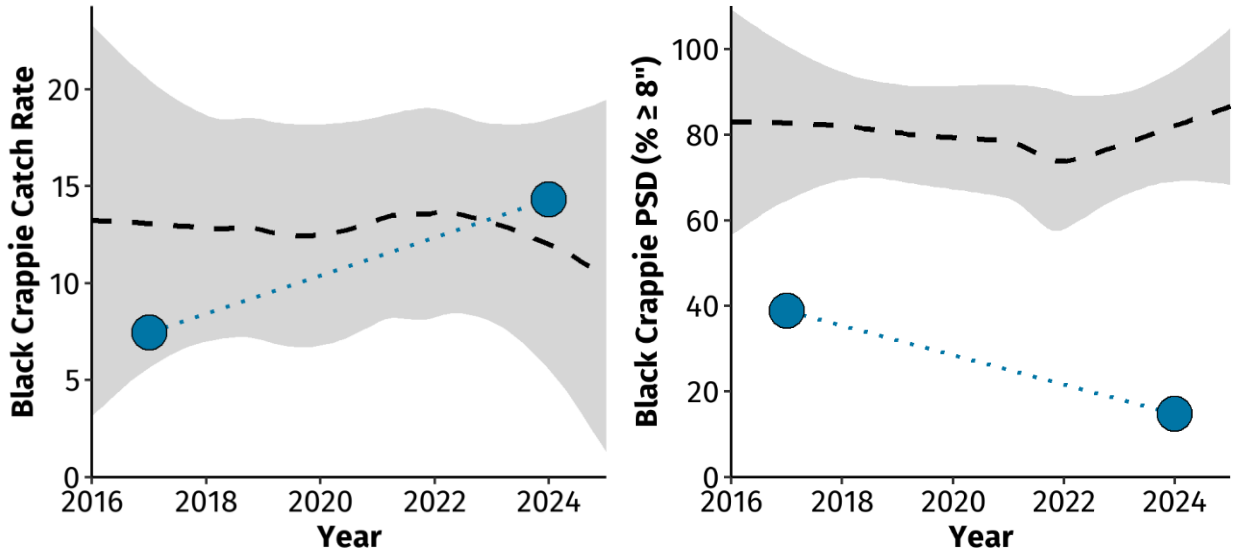

Figure 19. Black crappie catch rate (left; fish/net-night) and proportional size distribution (right; PSD; % ≥ 8 inches) during the late spring fyke net survey (SN2) on Amnicon Lake (blue circles) in 2017 and 2024. Running average (dashed line) and 95% confidence interval (shaded area) of complex-cool-dark lakes were used for comparison.

CREEL SURVEY

Black crappie were the second most targeted species on Amnicon Lake in 2024 with 2,559 hours, or 19% of the total directed effort (Figure 1). Estimated angling effort targeting black crappie was 6.6 hours/acre, which was lower than in 2006 (9.9) and near the average for Ceded Territory creel surveys (Figure 21, left panel). The angler catch rate was 2.3 black crappie/hour, which was much higher than in 2006 (1.4) and well above average for Ceded Territory creel surveys (Figure 21, middle panel). Angler catch rate was in the top 5% of creel surveys statewide. Estimated angler harvest was

2.0 black crappie/acre, which was much lower than in 2006 (5.8) and slightly below the average for Ceded Territory creel surveys (Figure 21, right panel).

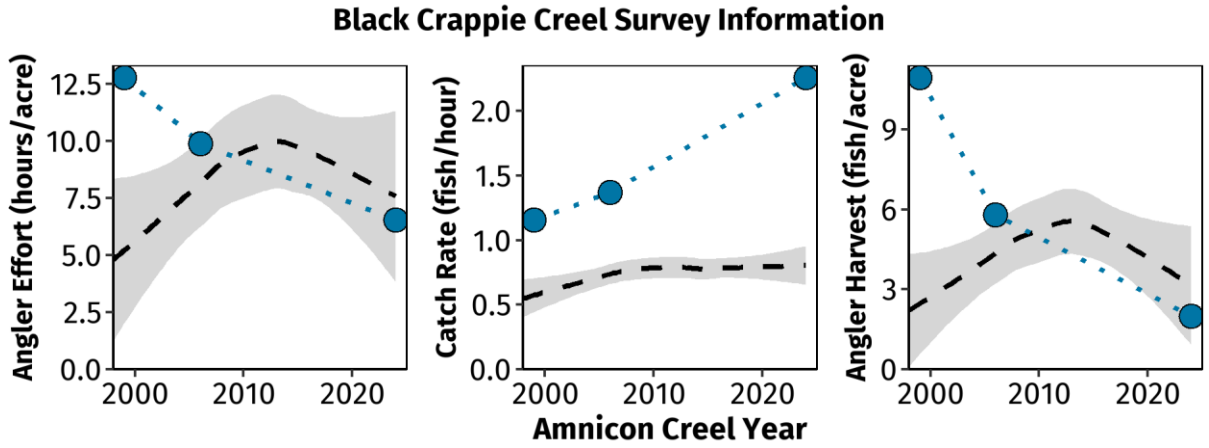

Figure 21. Black crappie effort (left), catch rate (middle) and angler harvest (right) on Amnicon Lake (blue circles) from 1999 to 2024. Running average (dashed line) and 95% confidence interval (shaded area) of creel surveys from Ceded Territory lakes were used for comparison.

BLUEGILL

FISH SURVEY

During the 2024 SE2 survey, 145 bluegills were captured that ranged from 2.5 to 7.6 inches (Figure 22). No other SE2 surveys have been conducted on Amnicon Lake so trends over time could not be assessed. The bluegill catch rate was 145 fish/mile, which was near the average for complex-cool-dark lakes (average = 120). The bluegill PSD-6 was 15, which was below average for complex-cool-dark lakes (average = 42). Twenty-one 6-7-inch bluegills were kept for aging. Age ranged from 4 to 9 years with a mean of 6.3 years, which is slower than average growth for similar lakes (5.9 years; Figure 23).

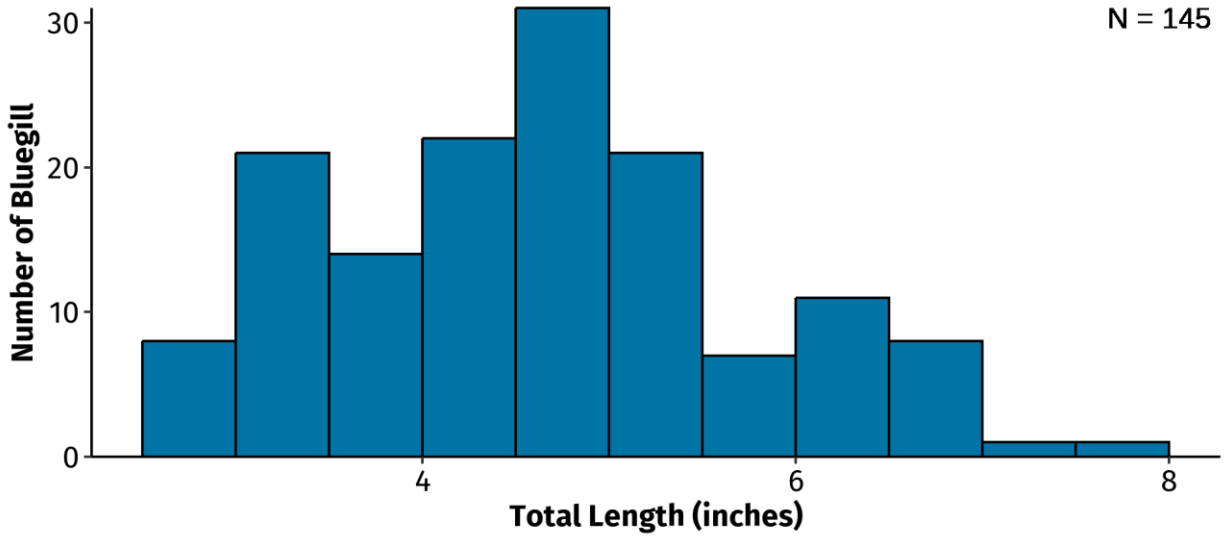

Figure 22. Length frequency histogram of bluegill captured during the late spring electrofishing survey (SE2) on Amnicon Lake in 2024.

CREEL SURVEY

Bluegill were the fifth most targeted species on Amnicon Lake in 2024 with 1,274 hours, or 9% of the total directed effort (Figure 1). Estimated angling effort targeting bluegill was 3.3 hours/acre, which was less than in 2006 (4.7) and below average of Ceded Territory creel surveys (Figure 24, left panel). The angler catch rate was 2.3 bluegill/hour, which was higher than in 2006 (1.6) and near the average for Ceded Territory creel surveys (Figure 24, middle panel). Estimated angler harvest was 1.5 bluegill/acre, which was much higher than in 2006 (0.1) and below average for Ceded Territory creel surveys (Figure 24, right panel).

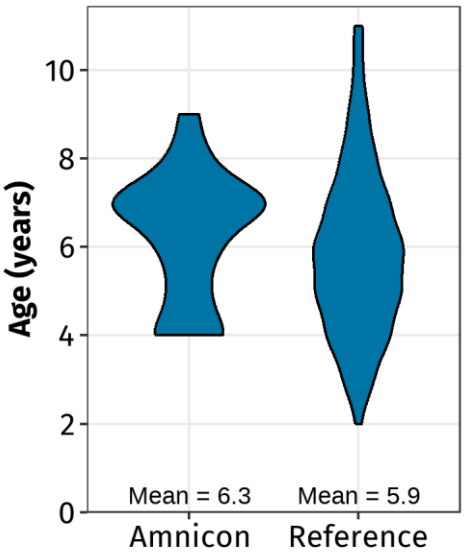

Figure 23. Age of 6-7-inch bluegills captured during the 2024 late spring electrofishing survey (SE2) on Amnicon Lake and reference lakes. Wider bars indicate more fish at that age. Reference lakes include other complex-cool-dark lakes since 2010.

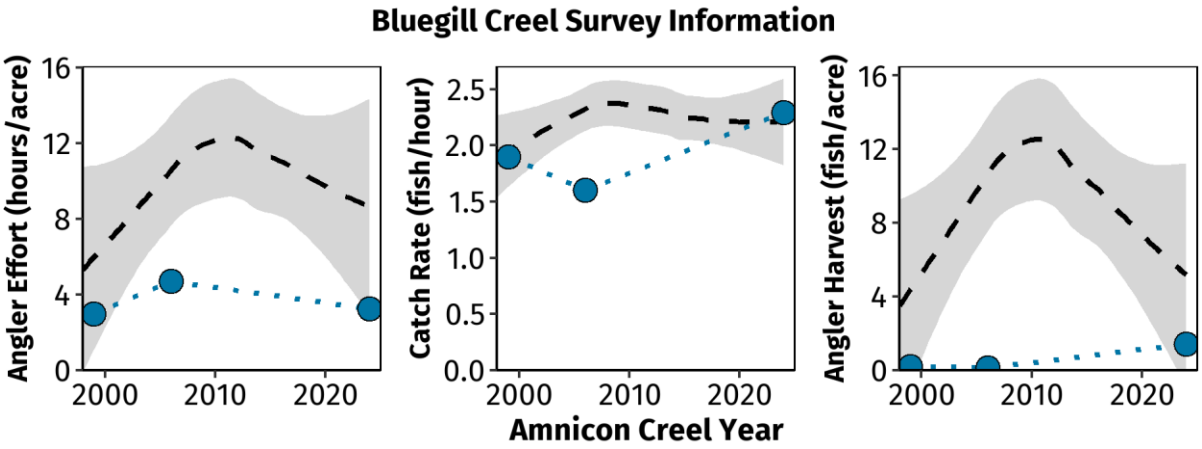

Figure 24. Bluegill effort (left), catch rate (middle) and angler harvest (right) on Amnicon Lake (blue circles) from 1999 to 2024. Running average (dashed line) and 95% confidence interval (shaded area) of creel surveys from Ceded Territory lakes were used for comparison.

OTHER SPECIES

Other species captured during the 2024 Amnicon Lake fyke net and electrofishing surveys included 114 white suckers, 37 pumpkinseeds, 30 golden shiners, 22 yellow perch, 16 yellow bullheads, five spottail shiners, three creek chubs, two central mudminnows, two common shiners, one johnny darter and one tadpole madtom. Pumpkinseeds ranged from 3.4 to 8.4 inches. Yellow perch ranged from 3.8 to 6.0 inches.

Discussion

Fisheries in Amnicon Lake have changed substantially over the last two decades with the introduction of northern pike, a decline in muskellunge abundance and reshaping of the walleye population. With these changes in the fishery, angler effort has also changed as more effort is directed at northern pike and less effort was directed at muskellunge and walleye. Despite these changes, total angling effort has remained relatively constant since 1999.

The largest change in the Amnicon Lake fishery has been the introduction of northern pike. Northern pike were first detected in Bear Lake in 1997 and likely traveled through Bear Creek and the Amnicon River to invade Amnicon Lake. They were first documented in Amnicon Lake in 2006 when one was captured in a fyke net, and another was reported in the creel survey (Toshner 2010). Since then, abundance has increased, and anglers now target northern pike more than any other species in Amnicon Lake. Despite the high angler catch rate, the 2024 early spring fyke net survey found a relatively low abundance of northern pike. However, nets were set over a week after the initial ice-out date on Amnicon Lake in 2024 due to a cold front and a small area of ice blocking the boat ramp. It is likely that many northern pike spawned after the initial ice-out date but before nets were set and were not as vulnerable to capture during the survey. Therefore, the northern pike population may be more abundant than what was documented in this survey. In future surveys, nets should be set as soon after ice-out as possible to effectively capture northern pike in addition to walleyes. Northern pike introductions often result in decreased abundance but larger size of other species, particularly muskellunge (Inskip and Magnuson 1983; Harvey 2009; Wolter 2024). Anglers are encouraged to harvest northern pike in Amnicon Lake to help decrease their abundance. Harvest of small northern pike (<20 inches) will also be necessary to minimize impacts on other species.

Following the introduction of northern pike, the muskellunge population has responded by shifting from a high abundance, low size structure, action fishery to a lower abundance, higher size structure, quality or trophy fishery. At its recent peak, Amnicon Lake supported approximately 771 adult muskellunge but now supports about 65. However, less than 1% of the population reached 40 inches with the higher abundance and now nearly half of the population reaches that mark. Similar trends have been seen in other lakes in Northern Wisconsin following northern pike introductions (Inskip and Magnuson 1983; Harvey 2009; Wolter 2024) and were anticipated when northern pike were first documented in Amnicon Lake (Toshner 2010). A lower density and higher size structure muskellunge population can be expected moving forward, but high harvest of northern pike may increase muskellunge abundance. Since northern pike spawn earlier than muskellunge in similar habitats, northern pike introductions often limit natural reproduction of muskellunge. As such, stocking of muskellunge should continue in alternate years in Amnicon Lake. Only one age class of stocked muskellunge was present at the time of

this survey and that age class was the second most abundant age class. Without continued stocking, it is likely that the musky population will decrease as the larger naturally reproduced age classes age out of the fishery. However, since we were only able to assess one stocked year class, continued monitoring will be essential to evaluate long term stocking success. To encourage natural reproduction of muskellunge, protection of shallow water aquatic plants, fine sediments and shoreline vegetation is critical. Most high-quality muskellunge spawning habitat is in the southern third of the lake and is primarily along privately owned shoreline where landowners are encouraged to maintain natural shorelines. Our management objective is to maintain muskellunge density between 0.15 to 0.30 per acre with a PSD-42 of at least 15 to meet the goals of a quality muskellunge fishery. The muskellunge population and stocking success should be assessed again with a population estimate survey in 2036 and 2037.

The walleye population can be classified as having low abundance and high size structure. Walleye abundance shifted from a high of 4.2 adults per acre in 1999 to a low of 0.3 adults per acre in 2014 and has since rebounded to 0.9 adults per acre in 2024. Along with the changes in abundance came changes in size structure, where only 20% of walleye reached 15 inches in 1999 and now 94% reached 15 inches and 64% reached 18 inches in 2024. Despite these population changes, walleye have not been a primary species of interest for Amnicon Lake anglers since at least 1999. Contribution of stocking versus natural reproduction to the adult walleye population is currently unknown since fall juvenile walleye electrofishing surveys are ineffective on Amnicon Lake due to dense vegetation growth around most of the lake. Based on the estimated age frequency, most of the population was from stocked age classes, but non-stocked age classes were still represented in the population. As a result of the low adult density and low angler use, current walleye stocking review criteria have identified Amnicon Lake as a lower priority than other stocked fisheries and walleye stocking has been deferred. Moving forward, the walleye fishery will rely on natural reproduction for recruitment, which occurs primarily on shallow gravel on the north and east sides of Amnicon Lake. To maintain or improve these habitats, which are currently some of the most developed sections of shoreline, and to encourage natural reproduction of walleye, protection or restoration of shoreline vegetation is critical. Landowners are encouraged to go to Wisconsin's Healthy Lakes Program for more information. The 18-inch minimum length limit remains effective in protecting walleyes until they spawn at least once (3-6 years old). Angler harvest remains low despite almost two thirds of the population being at least 18 inches. Since it is unlikely that DNR raised walleye will be stocked into Amnicon Lake in the near future, it is expected that based on recent levels of natural reproduction, the walleye population will have a lower density population (< 1 adult walleye per acre) with higher size structure. The walleye population should be assessed again with a population estimate survey in 2036.

Largemouth bass had average abundance and size structure compared to similar lakes. No other late spring electrofishing surveys, which target bass and bluegill, have

been completed on Amnicon Lake. Angler catch rates remained good, so the low harvest rate indicates that most anglers prefer to catch and release largemouth bass. Approximately 38% of the population was harvestable size, so the statewide 14-inch minimum length limit is still appropriate. To maintain a quality largemouth bass fishery, our management objective is to maintain a catch rate of 5 to 15 per mile with a PSD-12 of at least 60. Moving forward, a late spring electrofishing survey should be completed every 6 years (i.e., 2030).

Black crappie and bluegill each had moderate abundance with low size structure and slow growth. The angler catch rate was extremely high for black crappie and moderate for bluegill, but harvest was low for each likely due to small size. Slow growth and low size structure indicates overabundance, so anglers are encouraged to harvest these smaller black crappies and bluegill. Increased harvest will increase food availability for the remaining fish and improve growth rates. Yellow perch were small and primarily serve as an additional prey fish for walleye, muskellunge, northern pike and largemouth bass in Amnicon Lake.

Management Recommendations

1. **Encourage harvest of northern pike to minimize impacts on other species.**
   Northern pike were first found in Amnicon Lake in 2006 and have expanded rapidly. Reducing abundance of northern pike (including fish <20 inches) may help minimize impacts on other species, especially muskellunge.

2. **Maintain muskellunge density between 0.15 to 0.30 per acre with a PSD-42 of at least 15.**
   A high density muskellunge fishery is no longer feasible after the introduction of northern pike. However, maintaining a moderate abundance of larger muskellunge is still desirable for many anglers.

3. **Maintain a lower density, higher size structure walleye population supported by natural reproduction.**
   As a result of the low adult density and low angler use, walleye stocking has been deferred. However, natural reproduction is likely to support a small population of larger walleyes. The 18-inch minimum length limit allows walleye to spawn at least once before being vulnerable to angler harvest, yet 64% of the population is still large enough to harvest.

4. **Maintain a catch rate of 5 to 15 largemouth bass per mile with a PSD-12 of at least 60.**
   Largemouth bass are moderately abundant with average size structure in Amnicon Lake.

5. **Maintain statewide regulations for panfish and encourage harvest of black crappie and bluegill.**
   Black crappie and bluegill each have moderate abundance with low size structure and slow growth. Angler harvest is encouraged to help improve growth rates and size structure.

6. **Continue monitoring the fisheries with late-spring electrofishing surveys every 6 years and walleye and muskellunge population estimates every 12 years.**
   Recurring monitoring is critical to evaluating stocking needs and regulation changes. Late spring electrofishing surveys are used to monitor bass and bluegills, walleye netting is used to monitor walleyes and northern pike, and muskellunge netting is used to monitor muskellunge and black crappies.

7. **Protect and restore shoreline and littoral habitat.**
   Although fishing regulations and stocking can at times improve a fishery, degrading habitat can overwhelm other improvement efforts. Landowners are encouraged to maintain and restore shoreline vegetation buffers and woody habitat. See Wisconsin's Healthy Lakes Program for more information.

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Appendix

Table A1. General fishing regulations for Amnicon Lake in 2025.

SPECIES	SEASON DATES	DAILY BAG LIMIT	SIZE LIMIT
Muskellunge	Saturday nearest Memorial Day to Dec 31	1	40 inches
Northern Pike	1st Saturday in May to 1st Sunday in March	5	None
Walleye	1st Saturday in May to 1st Sunday in March	3	18 inches
Largemouth Bass	1st Saturday in May to 1st Sunday in March	5	14 inches
Panfish	Open all year	25	None

Table A2. Stocking history on Amnicon Lake since 1990.

YEAR	Species	Number Stocked	Size
2024	Muskellunge	194	Large Fingerling
2022	Walleye	1,948	Large Fingerling
2020	Walleye	2,146	Large Fingerling
2018	Muskellunge	215	Large Fingerling
2018	Walleye	1,951	Large Fingerling
2016	Walleye	1,950	Large Fingerling
2014	Walleye	2,187	Large Fingerling
2007	Walleye	125,000	Fry
2006	Walleye	161,000	Fry
2005	Walleye	400,000	Fry
2003	Walleye	300,000	Fry
2002	Walleye	500,000	Fry
1997	Muskellunge	200	Large Fingerling
1996	Muskellunge	1600	Fingerling
1993	Muskellunge	400	Fingerling
1992	Muskellunge	400	Fingerling
1991	Muskellunge	400	Fingerling
1990	Muskellunge	200	Fingerling

Table A3. Standard DNR surveys for inland lakes, gear used and target water temperature and species.

SURVEY	GEAR	TARGET WATER TEMPERATURE (°F)	TARGET SPECIES
Early spring netting (SN1)	Fyke net	40-50	Walleye Muskellunge Northern pike Yellow perch
Early spring electrofishing (SE1)	Electrofishing boat	45-50	Walleye
Late spring netting (SN2)	Fyke net	50-55	Muskellunge Northern pike Black crappie
Late spring electrofishing (SE2)	Electrofishing boat	55-70	Bass Panfish
Fall electrofishing (FE1)	Electrofishing boat	50-65	Juvenile walleye

Table A4. Length categories for species of interest captured in Amnicon Lake.

SPECIES	LENGTH CATEGORY (inches)				
	Stock	Quality	Preferred	Memorable	Trophy
Walleye	10	15	20	25	30
Muskellunge	30	34	38	42	50
Northern pike	14	21	28	34	44
Largemouth bass	8	12	15	20	25
Black crappie	5	8	10	12	15
Bluegill	3	6	8	10	12