

**WISCONSIN DEPARTMENT OF NATURAL RESOURCES**  
**Fishery Survey Report for Diamond Lake,**  
**Bayfield County, Wisconsin 2024-2025**

Waterbody Code: 2897100



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February 2026



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## Executive Summary

A comprehensive fisheries survey was conducted on Diamond Lake from April 2024 to March 2025 to assess the status of the fishery, evaluate trends in fish populations and assess angler effort and harvest. The adult walleye population had a density of 1.6 fish/acre with moderate size structure. The 1.6 fish/acre density was over five times higher than the 2021 estimate and walleye anglers caught about two and half times more walleye per hour fished compared to 2021. The largemouth and smallmouth bass populations have moderate to high size structure and abundance that have both increased since 2018. Northern pike abundance was low with moderate size structure. Bluegill and black crappie abundances were low to moderate with moderate size structure. During the 2024-25 fishing season, bass were the most popular species for Diamond Lake anglers comprising just under 70% of all directed effort, with a relatively even split between largemouth (35%) and smallmouth (33%). Overall, Diamond Lake offers anglers excellent fisheries for both smallmouth and largemouth bass, quality sized panfish and modest opportunities for quality walleye and northern pike. Management recommendations are to retain all fishing regulations and continue walleye stocking (depending on availability). If the adult walleye density declines to < 1.5 fish/acre, then stocking should be reconsidered, and management focus could change to other species. Landowners are encouraged to restore and protect the nearshore habitat and encourage efforts to prevent the spread of new aquatic invasive species into Diamond Lake.

## Introduction

Wisconsin Department of Natural Resources (DNR) fisheries management staff surveyed Diamond Lake in 2024 to assess the status of the fishery. A population estimate of adult walleye was determined using mark-recapture sampling methods. The catch rate of northern pike, black crappie, largemouth bass, smallmouth bass and bluegill were used to index relative abundance, and size structure was assessed for all species when possible. Additionally, an angler creel survey was conducted during the 2024-2025 fishing season to assess overall angler effort, species specific fishing effort, catch rates, harvest/acre as well as walleye exploitation (i.e., percent of the population harvested).

The Diamond Lake walleye population is dependent on stocking, as natural recruitment has only been documented in nine years since 1989 and none since 2007. Because of the lack of natural recruitment, small and large fingerling walleye have been stocked into Diamond Lake dating back to the 1970s. Since 2013, Diamond Lake has been stocked as part of the [Wisconsin Walleye Initiative](#) (Appendix Table A1).

Various fishing regulations have been used to manage fish populations in Diamond Lake. Currently, largemouth and smallmouth bass and northern pike are managed with special regulations. The bass regulation is a no minimum length limit for largemouth and an 18-inch minimum length limit for smallmouth with a combined

daily bag limit of five bass and only one can be a smallmouth. Northern pike have a 26-inch minimum length limit two fish daily bag limit. All other species follow regional or statewide regulations. Regulation details by species are listed in the appendix (Appendix Table A2).

## LAKE & WATERSHED CHARACTERISTICS

Diamond Lake is a 341-acre drainage lake located in the Eighteenmile Creek headwaters within the White River watershed of the Lake Superior basin in southeastern Bayfield County. The lake has a mean depth of 33 feet and a maximum depth of 83 feet with a total watershed area of 1,511 acres. The current trophic state of Diamond Lake is mesotrophic. Based on the number of fish species present, water temperature and clarity, Diamond Lake is classified as “Complex-Two Story” in the DNR fisheries lake classification system (Rypel et al. 2019).

Natural land cover types comprise 90% of the Diamond Lake watershed, with forests totaling 48% and wetland and water each with 21%. Only 5% of the watershed is developed (i.e., urban or agriculture). Approximately 13% of Diamond Lake shoreline is developed with year-round and seasonal residences ([Midwest Glacial Lakes Conservation Planner](#)). Diamond Lake has one public boat landing. The [DNR Lake Page for Diamond Lake](#) provides information on additional lake characteristics such as substrate types, bathymetry and invasive species present.

## Methods

### FISH SURVEY

Survey methods followed standard DNR Treaty comprehensive assessment protocols ([Cichosz 2024](#)). Sampling consisted of fyke net surveys in the spring and electrofishing surveys in the spring and fall. All fish captured during these surveys were identified to species, counted and measured to the nearest 0.1 inch. Additional details about these standard DNR surveys are listed in the appendix (Appendix Table A3). Fyke nets were deployed immediately after ice-out for the early spring netting survey (SN1) to mark walleye with fin clips. This was followed by an early spring electrofishing survey (SE1) of the entire shoreline that targeted walleye. All walleye collected during the SE1 survey were examined for marks. The number of walleye marked during the SN1 and the number of marked and unmarked walleye captured during the SE1 were used to calculate a population estimate for adult walleye by means of the Lincoln-Peterson estimator with Chapman modification (Ricker 1975):

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

where  $N$  = population estimate,  $M$  = number of walleye marked during the SN1,  $C$  = total number of walleye captured during the SE1 and  $R$  = number of marked walleye captured during the SE1.

Male, female and immature walleye  $\geq 15$  inches were included in the population estimate. Aging structures were collected from five walleye per half inch length bin per sex, dorsal spines from fish  $\geq 12$  inches and scales from fish  $< 12$  inches. The von Bertalanffy growth model was fit to length at age data to model growth of the walleye population for females and males separately due to sex-specific growth variation using the following equation (von Bertalanffy 1938):

$$L_t = L_{inf} (1 - e^{-k(t-t_0)}),$$

where  $L_t$  = length at time  $t$ ,  $L_{inf}$  = maximum theoretical length (length infinity),  $e$  = exponent for natural logarithms,  $k$  = growth coefficient,  $t$  = age in years and  $t_0$  = age when  $L_t$  is zero.

An age length key was used to assign ages to all adult walleye captured in the SN1 and the proportion of age-5 fish was multiplied by the adult abundance to determine age-5 abundance. The age-5 abundance was divided by the total number of fish stocked for that year class five years prior to estimate survival to age-5 (assuming minimal or no natural recruitment). Cost per adult stocked walleye was determined by multiplying the average cost per stocked fingerling by total number of fingerlings stocked then dividing that total cost by the number of fish that survived to age-5.

In addition to walleye, northern pike and black crappie were collected from the SN1 to index the relative abundance using catch rate (fish/net) and assess size structure. A late spring electrofishing survey (SE2) was conducted to assess the abundance and size structure of bass and bluegill. The SE2 survey consisted of two 0.5-mile-long shoreline stations where all species were targeted and 4 miles of shoreline where only gamefish were targeted. Catch rate (fish/mile) was used to index relative abundance of bluegill, largemouth bass and smallmouth bass. Size structure for each species was visualized using length frequency plots and quantified using the proportional size distribution (PSD) metric:

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

For PSD evaluations, length categories established for North American freshwater fish species were used (Gabelhouse 1984; Appendix Table A4). When less than 30 fish were measured in most survey years mean length was used to quantify size structure.

To evaluate bluegill growth, aging structures (otoliths) were collected from 6-6.9-inch fish. Age was estimated for each fish and the mean age was compared to the mean otolith age for the same length range of bluegills from other Ceded Territory lakes of the same "Complex-Two Story" lake class.

A fall electrofishing (FE) survey was conducted to evaluate walleye recruitment, specifically to determine if natural recruitment occurred and assess survival of stocked fish to age-1. The catch rate (fish/mile) of age-0 (fish hatched that year) and age-1 walleye (fish hatched or stocked the previous year) was calculated to index relative abundance and assess year class strength. Age-0 walleye caught in the FE survey are naturally reproduced because the sampling is completed prior to any stocking of large fingerlings that year. Survival to age-1 was assessed using the Shaw Index calculator (Shaw and Sass 2020) which produced an age-1 abundance from the catch rate of age-1 walleye in the FE survey. The age-1 abundance was then divided by the total number stocked the previous year to generate an age-1 survival estimate.

Comparisons were made to previous surveys conducted on Diamond Lake to evaluate trends through time and compared to similar lakes to determine the status relative to other populations. For walleye, similar lakes included Ceded Territory lakes sustained by stocking. For all other species, similar lakes included Ceded Territory lakes of the same “Complex-Two Story” lake class.

## **CREEL SURVEY**

An angler creel survey was conducted during the open water (May-October 2024) and the ice seasons (December 2024-March 2025) following standard DNR treaty comprehensive assessment protocol ([Cichosz 2024](#)). Total angler effort was estimated along with species-specific fishing effort, catch per hour and harvest per acre. Angler exploitation 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. Total walleye exploitation was calculated as the sum of angler and tribal exploitation. Comparisons were made to previous creel surveys conducted on Diamond Lake to evaluate trends through time and compared to other similar lakes to evaluate angler metrics of similar fisheries. For walleye creel metrics, similar lakes included Ceded Territory lakes sustained by stocking and for all other species similar lakes included Ceded Territory lakes of the same “Complex-Two Story” lake class.

## **Results**

### **CREEL SURVEY**

Anglers spent a total of 3,016 hours fishing on Diamond Lake in 2024 equating to 8.8 hours/acre which was the same as in 2021 and below average compared to similar lakes (Figure 1). Angling effort was highest for largemouth bass at 35% followed by smallmouth bass at 33% (Figure 2). Other species targeted by anglers in 2024 were walleye, black crappie, northern pike and bluegill (Figure 2).

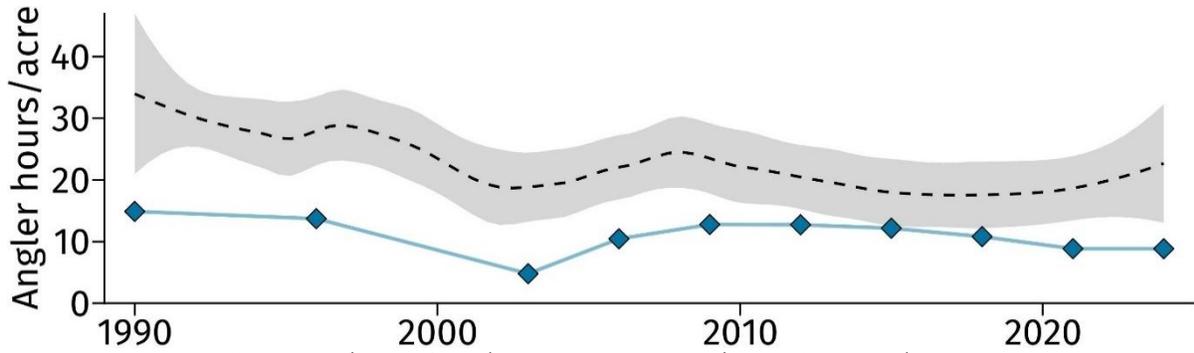


Figure 1. Total angling effort (hours/acre) on Diamond Lake (blue diamonds) with the running average (dashed line) and 95% confidence interval (gray) on similar lakes for comparison.

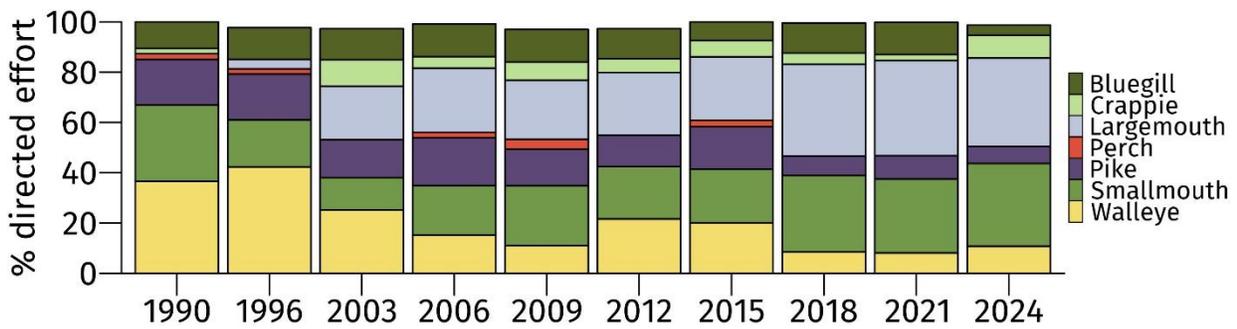


Figure 2. Percent of the total directed (species specific) angling effort by species in Diamond Lake with species receiving < 2% directed effort removed for clarity.

## WALLEYE

### FISH SURVEY

The adult walleye (males, females and immature fish  $\geq 15$  inches) abundance estimate was 556 (95% CI = 237-874) or 1.6 adults/acre (95% CI = 0.7-2.6; Figure 3). This density was 1.3 adults/acre higher than the previous estimate in 2021 of 0.3 and is the highest density observed since 2003 (1.7 adults/acre; Figure 3).

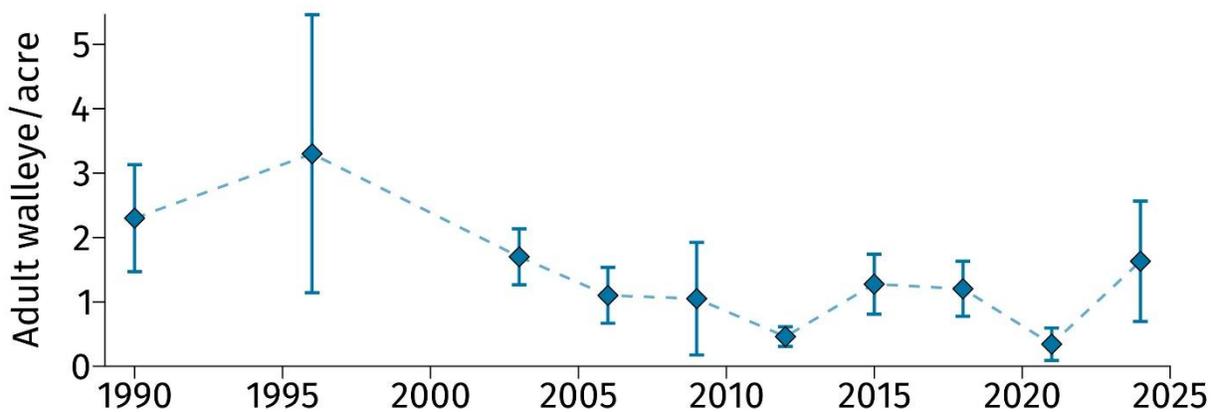


Figure 3. Walleye density estimates (adult fish/acre; blue diamonds) with 95% confidence intervals (error bar) from mark-recapture surveys in Diamond Lake.

The juvenile walleye CPUE during the 2024 fall electrofishing survey was 1.4 age 1/mile and no age-0 walleye were captured (Figure 4). Since 2007, no age-0 walleye have been caught. Since the mid-2010s, age-1 walleye CPUE is consistently higher for stocked years than non-stocked years (Figure 4). Survival to age-1 of walleye stocked in 2023 was 10%.

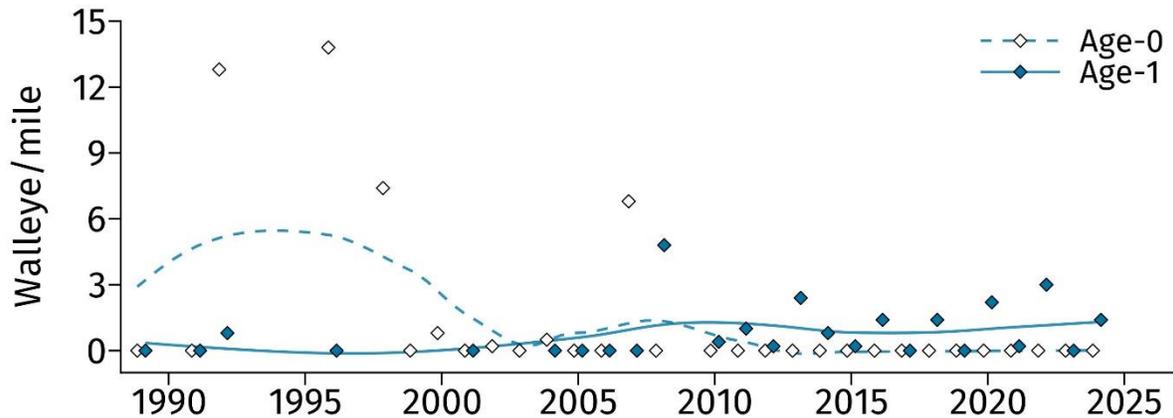


Figure 4. Number of age-0 (white diamonds) and age-1 (blue diamonds) walleye captured per mile during fall electrofishing surveys in Diamond Lake with smoothed running average trend lines for age-0 (dashed line) and age-1 (solid line).

Walleye captured during the SN1 survey ranged from 7.1-26.7 inches, 81% of the fish were  $\geq 15$  inches (minimum length limit) and 27% of the fish were within the 20-24 inch no harvest slot (Figure 5). The PSD of walleye ( $\geq 15$  inches) was 75, which was the lowest ever observed on Diamond Lake, but similar to the average PSD in similar lakes (Figure 6). It takes about four years for a female walleye to reach 18 inches and about five years for a male walleye to reach 18 inches in Diamond Lake (Figure 7). Survival to age-5 of walleye stocked in 2019 was 14.0%, substantially higher than the 2013 stocking (1.0%) and the 2010 stocking (2.4%). As such the cost per age-5 walleye stocked in 2019 was substantially lower at \$7.63 compared to walleye stocked in 2013 (\$101.77) and 2010 (\$43.73).

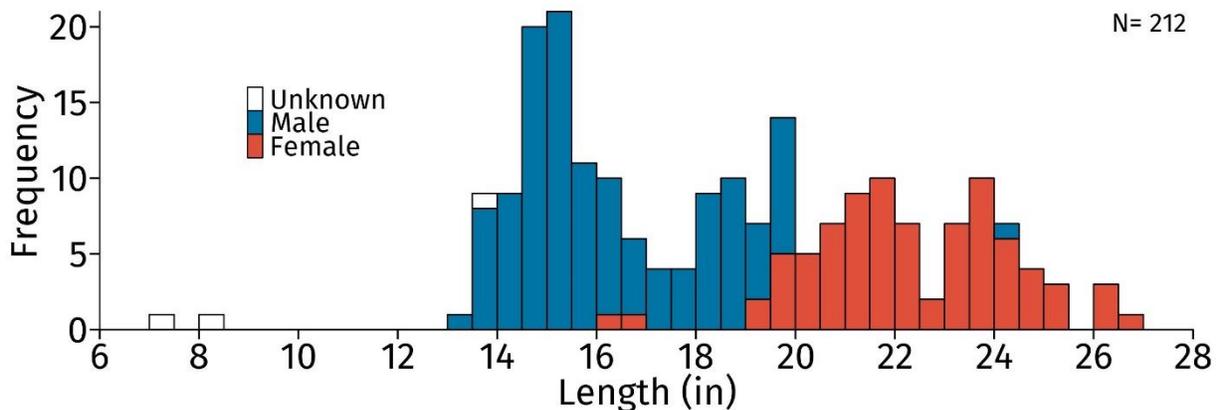


Figure 5. Length frequency histogram of unknown sex (white), male (blue) and female (red) walleye captured during the 2024 SN1 survey in Diamond Lake.

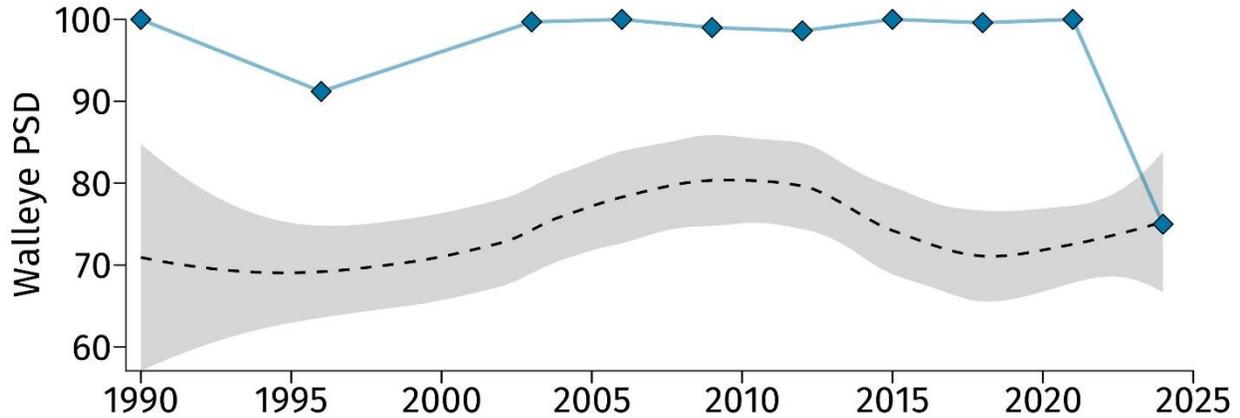


Figure 6. Proportional size distribution (PSD) of quality length ( $\geq 15$  inches) walleye captured during SN1 surveys in Diamond Lake (blue diamonds) with the running average (dashed line) and 95% confidence interval (gray) in similar lakes for comparison.

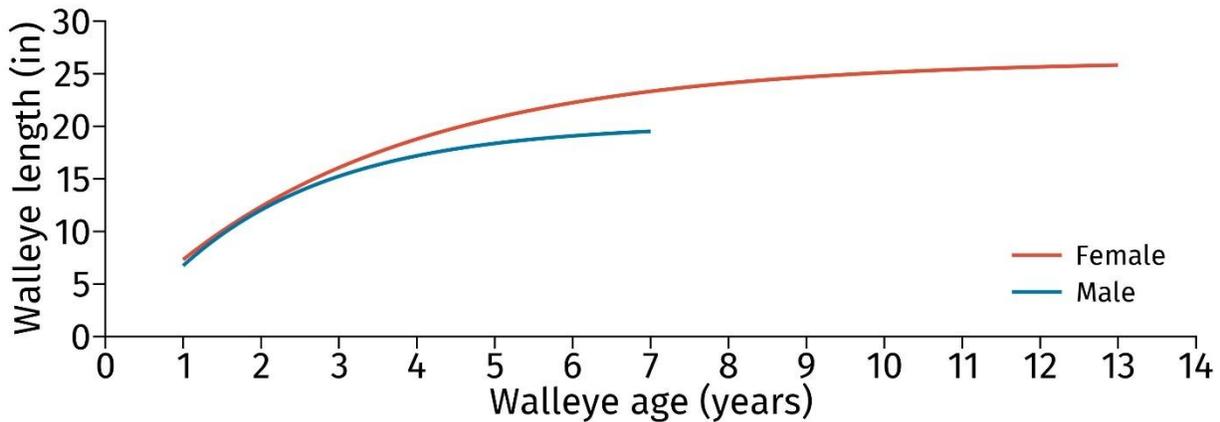


Figure 7. Growth curves for male (blue) and female (red) walleye captured during spring surveys in Diamond Lake in 2024.

### CREEL SURVEY

Angling effort targeting walleye in 2024 was 1.8 hours/acre, which was slightly higher than in 2021 (1.4) and lower than the average walleye effort on similar lakes (Figure 8, left panel). Walleye catch rate in 2024 was 0.10 fish/hour, which was higher than in 2021 (0.04) but lower than the average catch rate in similar lakes (Figure 8, middle panel). Walleye angler harvest in 2024 was 0.07 fish/acre which was higher than in 2021 (0.03) and slightly lower than the average harvest in similar lakes (Figure 8, right panel). Angler exploitation of walleye in 2024 was 4.5%, which was lower than in 2021 (7.7%) and slightly higher than the average angler exploitation in similar lakes (Figure 9, left panel). Walleye exploitation by tribal spearing in 2024 was 1.4%, which was lower than in 2021 (1.7%) and lower than the average tribal spearing exploitation in similar lakes (Figure 9, middle panel). The total (angler + tribal spearing) walleye exploitation in 2024 was 5.9%, which was lower than in 2021 (14.5%) and lower than the average total exploitation in similar lakes (Figure 9, right panel).

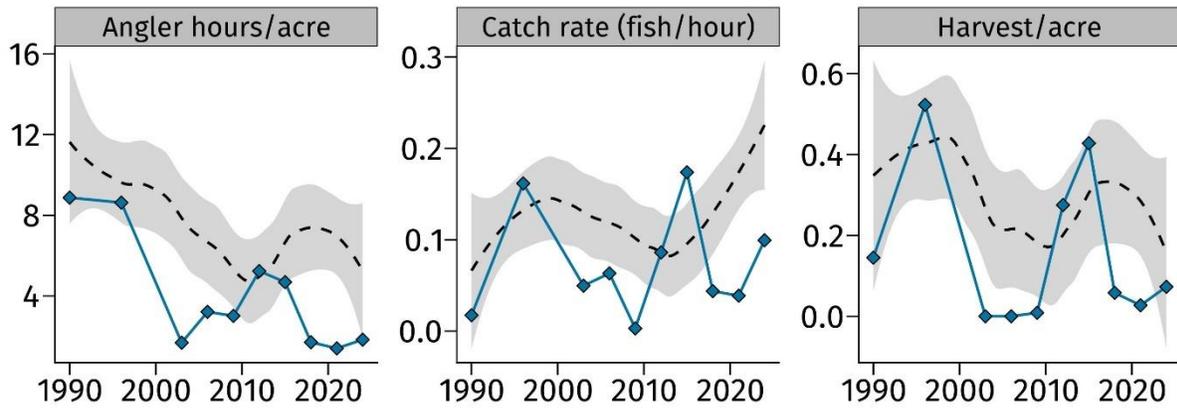


Figure 8. Walleye effort (left), catch rate (middle) and angler harvest (right) in Diamond Lake (blue diamonds) with the running average (dashed line) and 95% confidence interval (gray) in other similar lakes for comparison.

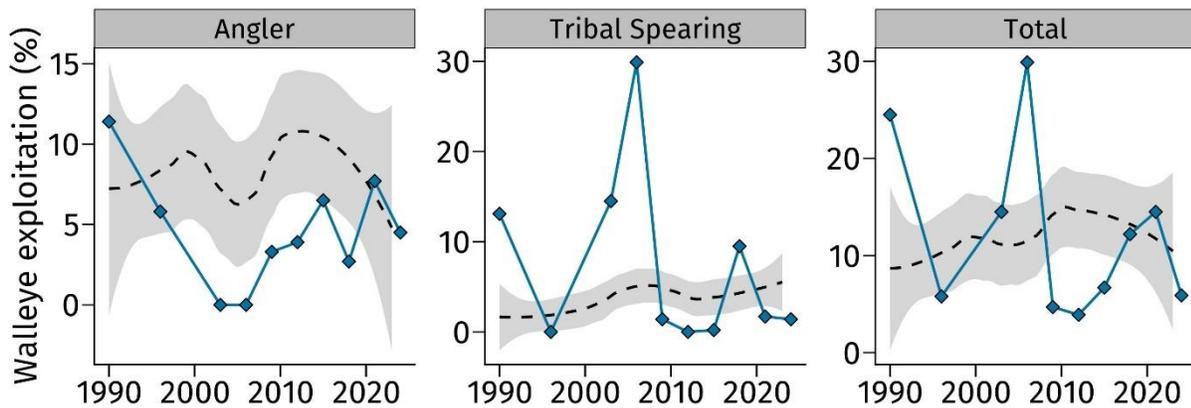


Figure 9. Angler (left), tribal spearing (middle) and total (right) walleye exploitation in Diamond Lake (blue diamonds) with the running average (dashed line) and 95% confidence interval (gray) in other similar lakes for comparison.

## LARGEMOUTH BASS

### FISH SURVEY

A total of 127 largemouth bass were captured during the spring 2024 SE2 survey ranging from 2.2-20.1 inches (Figure 10). Largemouth bass PSD (%  $\geq$  12 inches) was 63, which was lower than in 2018 (85) and slightly higher than the average PSD in similar lakes (Figure 11). Largemouth bass catch rate was 27.5 fish/mile, which was the second highest ever observed in Diamond Lake and higher than the average catch rate in similar lakes (Figure 12).

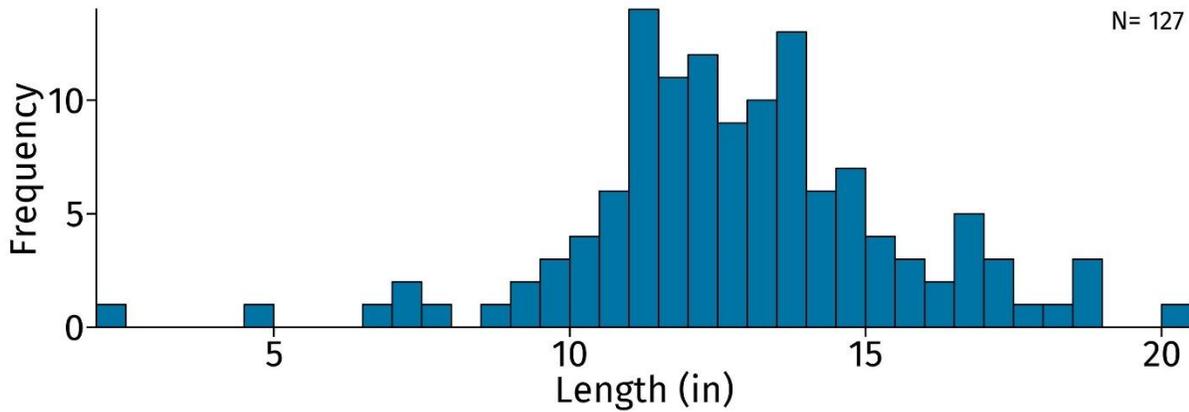


Figure 10. Length frequency histogram of largemouth bass captured during the SE2 survey in Diamond Lake in 2024.

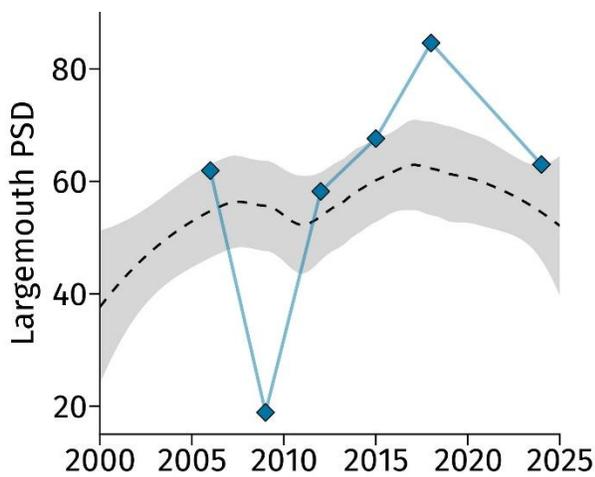


Figure 11. Proportional size distribution (PSD) of quality length ( $\geq 12$  inches) largemouth bass captured during SE2 surveys in Diamond Lake (blue diamonds) with the running average (dashed line) and 95% confidence interval (gray) in similar lakes for comparison.

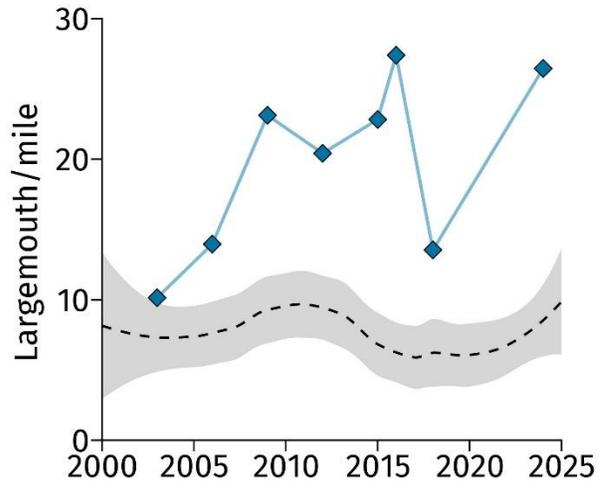


Figure 12. Largemouth bass caught per mile during SE2 surveys in Diamond Lake (blue diamonds) with the running average (dashed line) and 95% confidence interval (gray) in other similar lakes for comparison.

**CREEL SURVEY**

Angling effort targeting largemouth bass in 2024 was 5.9 hours/acre, which was lower than in 2021 (6.6) and slightly higher than the average largemouth bass effort on similar lakes (Figure 13, left panel). Largemouth bass catch rate in 2024 was 0.9 fish/hour, which was similar to the catch rate in 2021 (0.9) and higher than average catch rate in similar lakes (Figure 13, middle panel). Largemouth bass angler harvest in 2024 was 0.05 fish/acre which was lower than in 2021 (0.73) and lower than the average harvest in similar lakes (Figure 13, right panel).

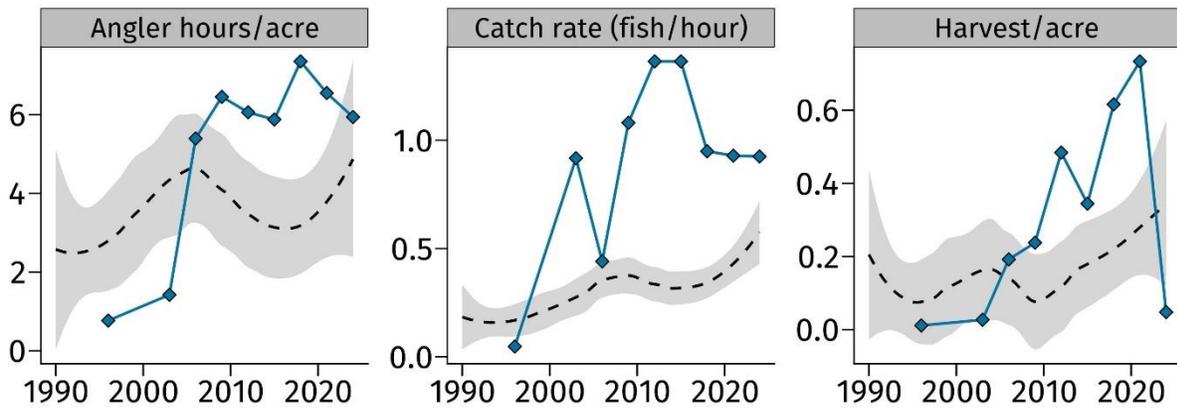


Figure 13. Largemouth bass effort (left), catch rate (middle) and angler harvest (right) in Diamond Lake (blue diamonds) with the running average (dashed line) and 95% confidence interval (gray) in other similar lakes for comparison.

## SMALLMOUTH BASS

### FISH SURVEY

A total of 32 smallmouth bass were captured during the spring 2024 SE2 survey ranging from 2.7-19.5 inches (Figure 14). Smallmouth bass mean length was 13.8 inches, which was similar to the mean length in 2018 (13.9) and higher than the average mean length in similar lakes (Figure 15). The smallmouth bass catch rate was 7.6 fish/mile, which is the highest ever observed in Diamond Lake and similar to the average catch rate in similar lakes (Figure 16).

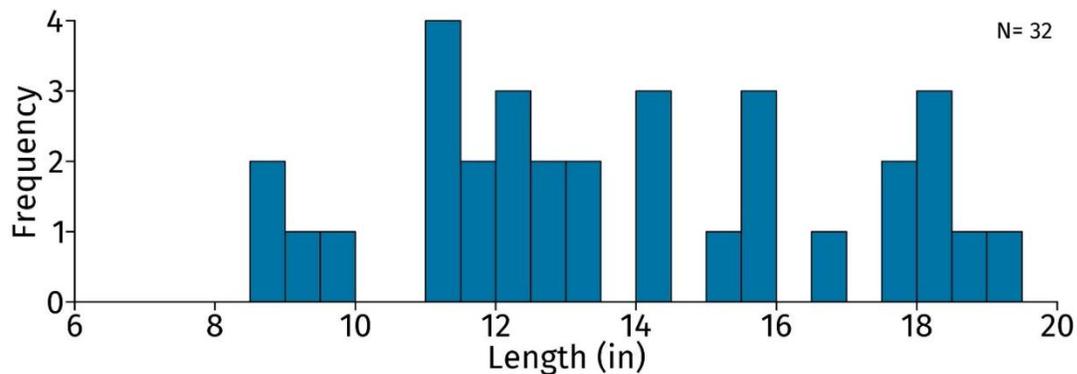


Figure 14. Length frequency histogram of smallmouth bass captured during the SE2 survey in Diamond Lake in 2024.

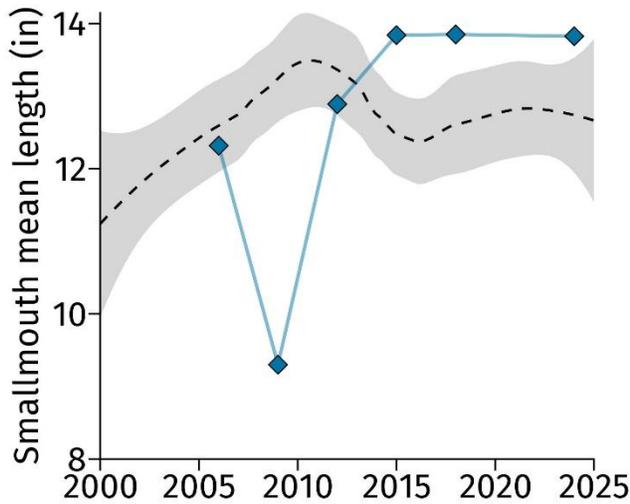


Figure 15. Mean length (in) of smallmouth bass captured during SE2 surveys in Diamond Lake (blue diamonds) with the running average (dashed line) and 95% confidence interval (gray) in other similar lakes for comparison.

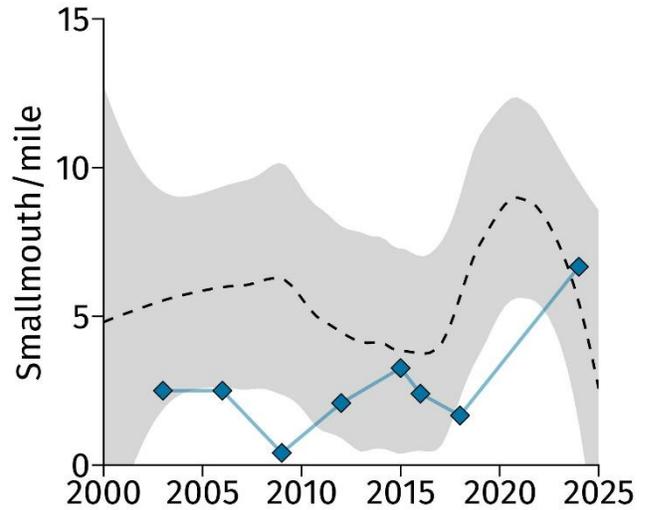


Figure 16. Smallmouth bass caught per mile during SE2 surveys in Diamond Lake (blue diamonds) with the running average (dashed line) and 95% confidence interval (gray) in other similar lakes for comparison.

### CREEL SURVEY

Angling effort targeting smallmouth bass in 2024 was 5.6 hours/acre, which was higher than in 2021 (5.1) and higher than the average smallmouth bass effort on similar lakes (Figure 17, left panel). Smallmouth bass catch rate in 2024 was 0.4 fish/hour, which was similar to the catch rate in 2021 (0.4) and similar to the average catch rate in similar lakes (Figure 17, middle panel). Smallmouth bass angler harvest in 2024 was 0.04 fish/acre which was higher than in 2021 (0.03) and similar to the average harvest in similar lakes (Figure 17, right panel).

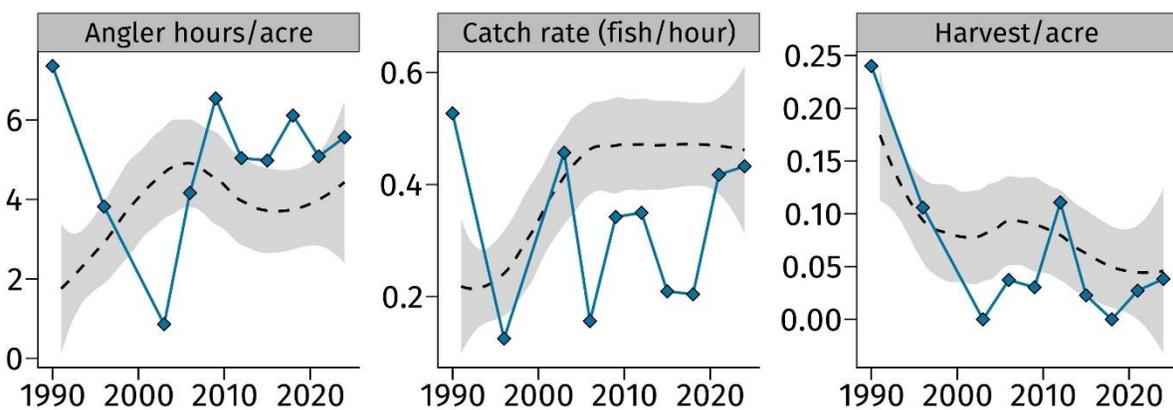


Figure 17. Smallmouth bass effort (left), catch rate (middle) and angler harvest (right) in Diamond Lake (blue diamonds) with the running average (dashed line) and 95% confidence interval (gray) in other similar lakes for comparison.

## NORTHERN PIKE

### FISH SURVEY

Northern pike captured during the 2024 SN1 survey ranged from 9.3-31.2 inches (Figure 18). Northern pike mean length was 19.6 inches, lower than in 2021 (21.1) and lower than mean length in other similar lakes (Figure 19). Northern pike catch rate was 0.8 fish/net-night in 2024, which was higher than in 2021 (0.6) but lower than the average catch rate in other similar lakes (Figure 20).

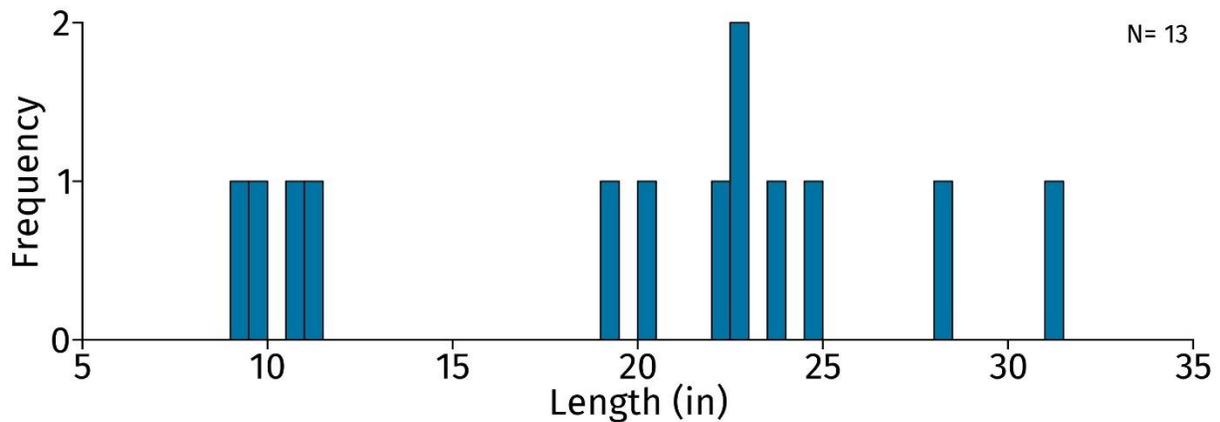


Figure 18. Length frequency histogram of northern pike captured during the SN1 survey in Diamond Lake in 2024.

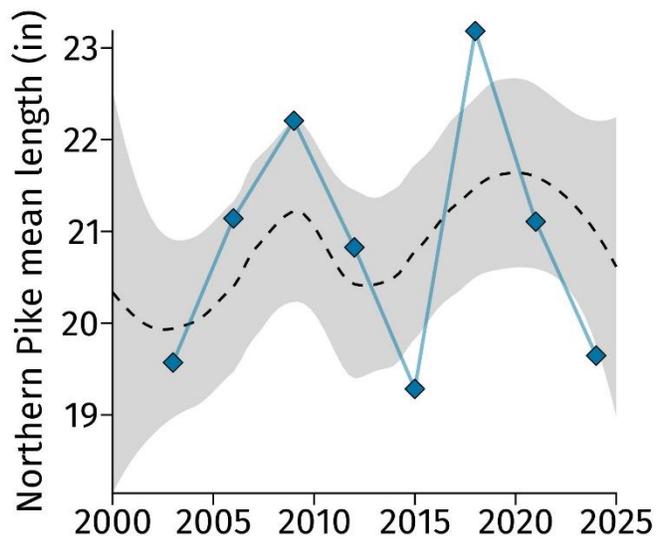


Figure 19. Mean length (in) of northern pike captured during SN1 surveys in Diamond Lake (blue diamonds) with the running average (dashed line) and 95% confidence interval (gray) in similar lakes for comparison.

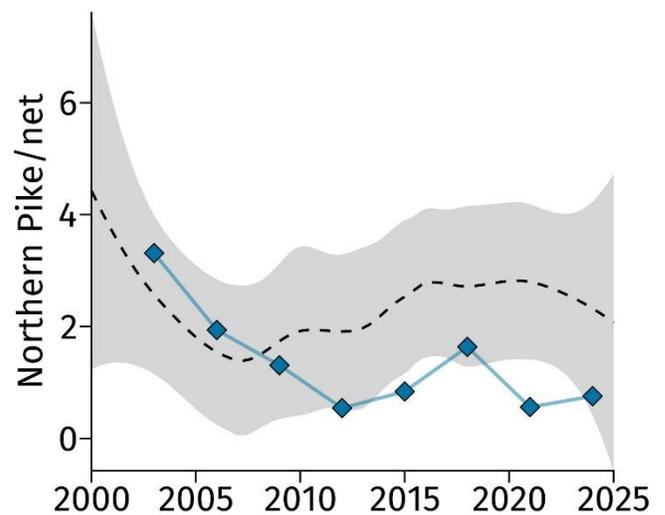


Figure 20. Northern pike caught per fyke net during SN1 surveys in Diamond Lake (blue diamonds) with the running average (dashed line) and 95% confidence interval (gray) in similar lakes for comparison.

## CREEL SURVEY

Angling effort targeting northern pike in 2024 was 1.1 angler hours/acre which was slightly lower than in 2021 (1.6) and slightly lower than the average effort on similar lakes (Figure 21; left panel). Northern pike catch rate in 2024 was 0.09 fish/hour, which was lower than in 2021 (0.12) and lower than the average catch rate in similar lakes (Figure 21; middle panel). Northern pike angler harvest in 2024 was 0.04 fish/acre which was higher than in 2021 (0.01) and slightly lower than the average harvest in similar lakes (Figure 21; right panel).

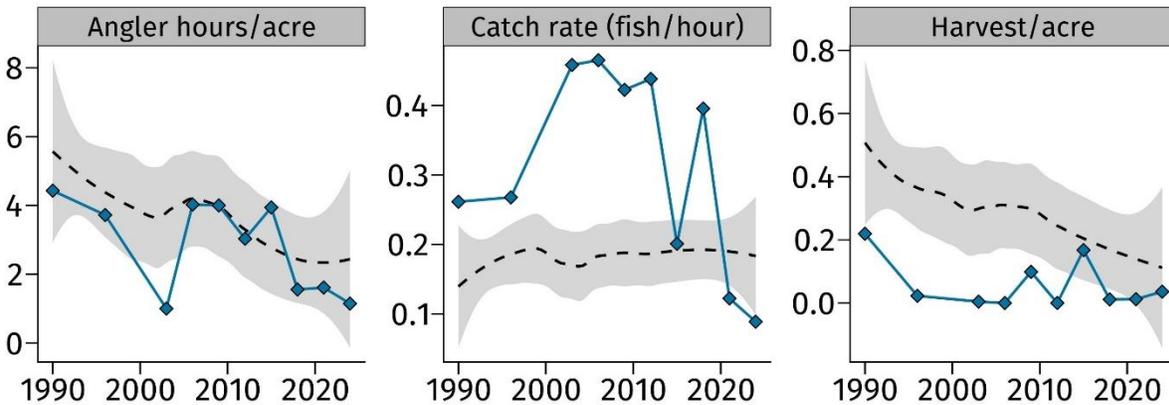


Figure 21. Northern pike effort (left), catch rate (middle) and angler harvest (right) in Diamond Lake (blue diamonds) with the running average (dashed line) and 95% confidence interval (gray) in similar lakes for comparison.

## BLACK CRAPPIE

### FISH SURVEY

A total of 29 black crappie were captured during the 2024 SN1 survey ranging from 5.6-11.0 inches (Figure 22). The black crappie mean length was 7.0 inches, which was the highest mean length observed since 2009 but lower than the mean length in similar lakes (Figure 23). Black crappie catch rate was 0.6 fish/net-night, which was lower than in 2021 (4.2) but similar to 2018 (0.5) and lower than the average catch rate in other similar lakes (Figure 24).

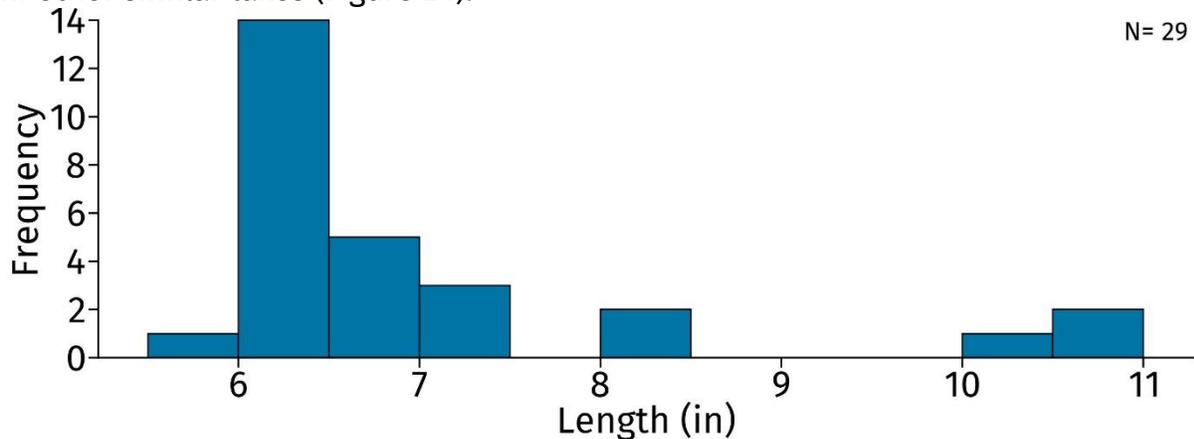


Figure 22. Length frequency histogram of black crappie captured during the SN1 survey in Diamond Lake in 2024.

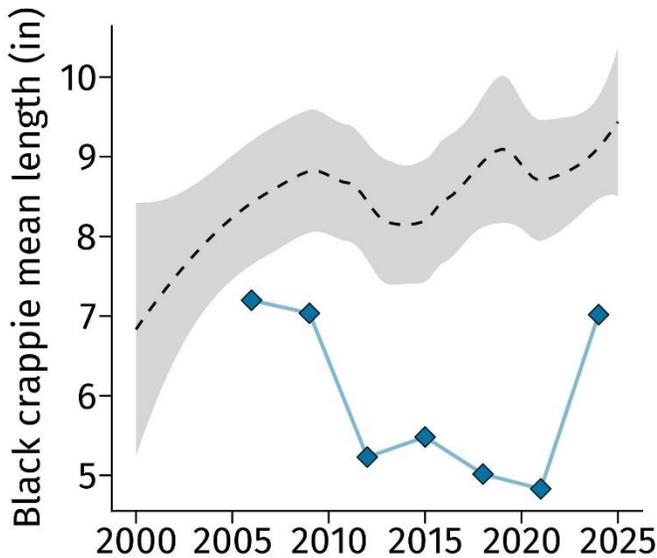


Figure 23. Mean length (in) of black crappie captured during SN1 surveys in Diamond Lake (blue diamonds) with the running average (dashed line) and 95% confidence interval (gray) in other similar lakes for comparison.

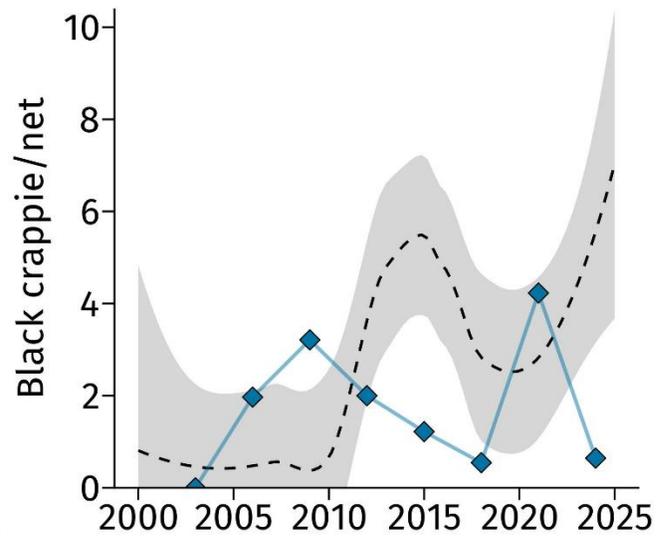


Figure 24. Black crappie caught per fyke net during SN1 surveys in Diamond Lake (blue diamonds) with the running average (dashed line) and 95% confidence interval (gray) in other similar lakes for comparison.

### CREEL SURVEY

Angling effort targeting black crappie in 2024 was 1.5 hours/acre which was higher than in 2021 (0.4) and lower than the average effort on similar lakes (Figure 25; left panel). Black crappie catch rate in 2024 was 0.2 fish/hour which was higher than in 2021 (0.0) and lower than the average catch rate in similar lakes (Figure 25; middle panel). Black crappie angler harvest in 2024 was 0.33 fish/acre which was higher than in 2021 (0.01) and slightly lower than the average harvest in similar lakes (Figure 25; right panel).

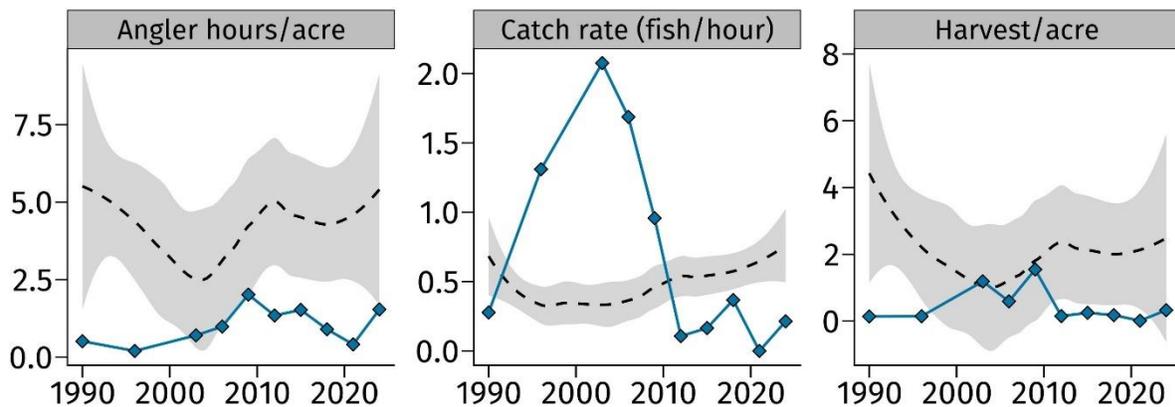


Figure 25. Black crappie effort (left), catch rate (middle) and angler harvest (right) in Diamond Lake (blue diamonds) with the running average (dashed line) and 95% confidence interval (gray) in other similar lakes for comparison.

## BLUEGILL

### FISH SURVEY

Bluegill captured during the 2024 SE2 survey ranged from 1.4-8.7 inches (Figure 26). Bluegill PSD ( $\geq 6$  inches) was 36, substantially higher than in 2018 (9) and slightly below average compared to other similar lakes (Figure 27). Bluegill catch rate was 144 fish/mile, the highest ever observed in Diamond Lake and slightly higher than the average catch rate in other similar lakes (Figure 28). Mean age for a 6-6.9-inch bluegill in Diamond Lake was 5.1 years which was substantially faster growth than in similar lakes (mean = 5.8 years).

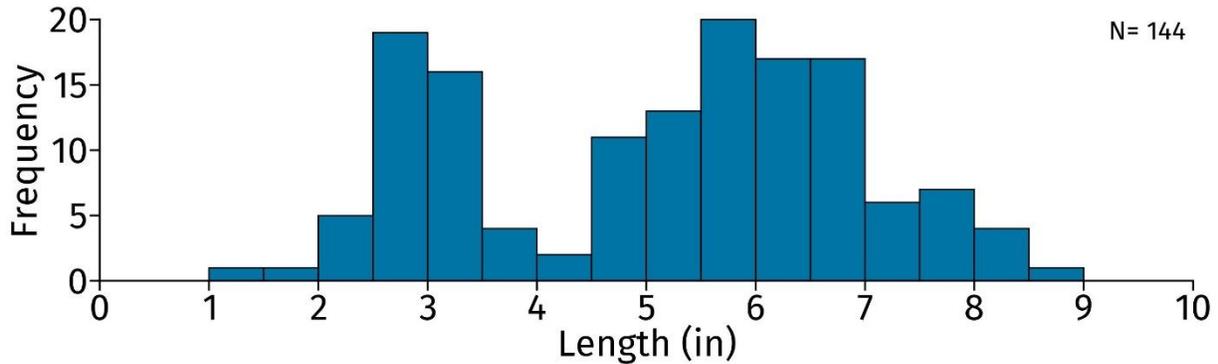


Figure 26. Length frequency histogram of bluegill captured during the SE2 survey in Diamond Lake in 2024.

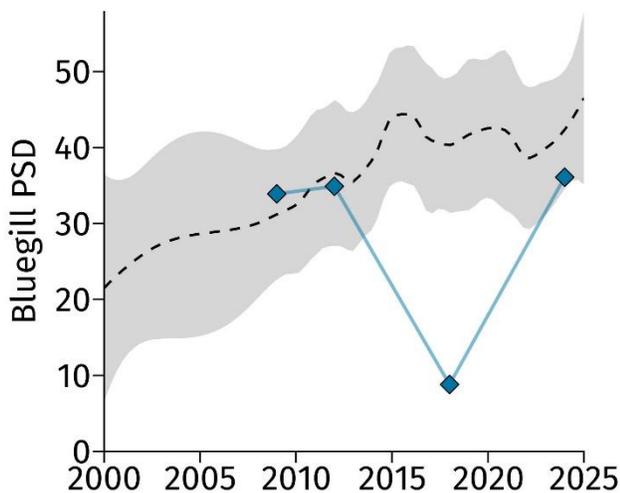


Figure 27. Proportional size distribution (PSD) of quality length ( $\geq 6$  inches) bluegill captured during SE2 surveys in Diamond Lake (blue diamonds) with the running average (dashed line) and 95% confidence interval (gray) in similar lakes for comparison.

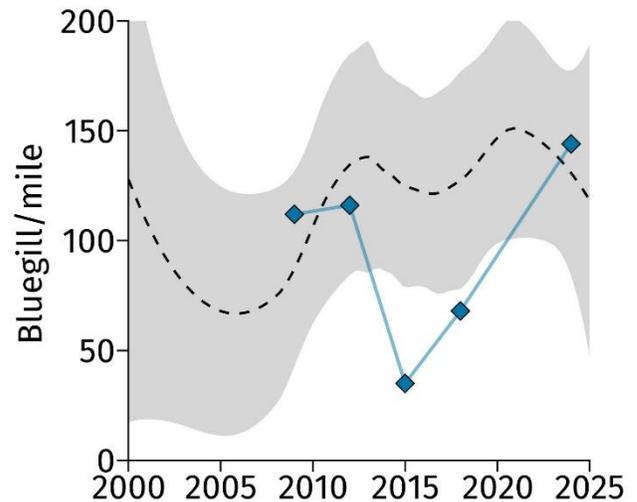


Figure 28. Bluegill caught per mile during SE2 surveys in Diamond Lake (blue diamonds) with the running average (dashed line) and 95% confidence interval (gray) in similar lakes for comparison.

## CREEL SURVEY

The estimated angling hours/acre targeting bluegill in 2024 was 0.7 which was lower than in 2002 (2.2) and lower than the average effort on similar lakes (Figure 29; left panel). Bluegill catch rate in 2024 was 2.7 fish/hour which was higher than in 2021 (1.5) and similar to the average catch rate in similar lakes (Figure 29; middle panel). Bluegill angler harvest in 2024 was 0.6 fish/acre which was similar to 2021 (0.5) and lower than the average harvest in similar lakes (Figure 29; right panel).

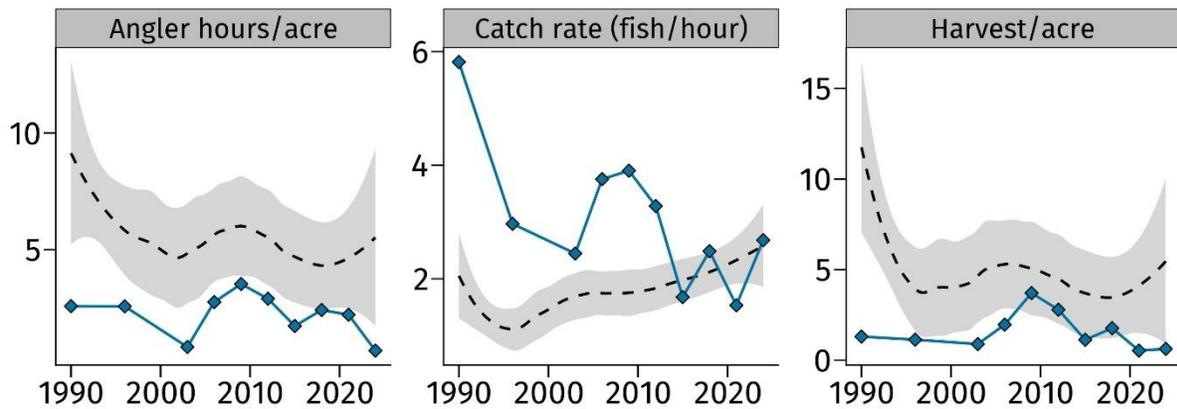


Figure 29. Bluegill effort (left), catch rate (middle) and angler harvest (right) in Diamond Lake (blue diamonds) with the running average (dashed line) and 95% confidence interval (gray) in similar lakes for comparison.

## OTHER SPECIES

Other species captured during the 2024 Diamond Lake fyke net and electrofishing surveys included 18 rock bass, 10 rainbow smelt, six pumpkinseeds, five white sucker, one creek chub, one yellow bullhead and one yellow perch. Rainbow smelt were observed in high abundances during the SE1 survey and larger mesh nets were used to avoid excessive processing times. As such, low catches of rainbow smelt are not an indication of low abundance.

## Discussion

Diamond Lake offers anglers an excellent bass fishery and a quality bluegill fishery with some opportunity for low density but quality sized black crappie, walleye and northern pike. Size structure metrics (i.e., PSD or mean length) for all species was moderate to high compared to similar lakes which indicated these populations overall are experiencing full growth potential likely a result of well-balanced predator prey dynamics and sustainable harvest. Similar to recent creel surveys in 2018 and 2021, the majority of the angling effort during the 2024 fishing season focused on largemouth and smallmouth bass.

Both bass populations in Diamond Lake are in great condition. Since 2018 catch rates of largemouth and smallmouth increased and size structure was above average. Largemouth bass catch rate ranked above the 90<sup>th</sup> percentile of similar lakes within

the last ten years, whereas smallmouth catch rate ranked between the 75<sup>th</sup> and 80<sup>th</sup> percentile. Smallmouth bass catch rate increased by over four times since 2018 and size structure remained above average compared to similar lakes. In addition to the high density of quality sized fish, trophy sized bass were captured including smallmouth up to 19.5 inches and largemouth up to 20.1 inches.

After nearly two decades of low abundance but exceptional size structure of walleye, the 2024 survey revealed an influx of younger males into the population which led to more moderate size structure and density with fast growth relative to similar lakes. From 2021 to 2024, adult density increased by over five times from 0.3 to 1.6 fish/acre, which is just below the average for Ceded Territory lakes primarily sustained by stocking since 2000. This increase was largely driven by abundant 3-year-old and 5-year-old fish, primarily males, in the 14–17-inch range. Survival to age-1 of the 2021-year class (age-3 in 2024) was 19% and the 2019-year class (age-5 in 2024) was 24%, whereas the next highest survival to age-1 of a stocked year class was 13%. As a result of the influx of smaller walleye, PSD declined but remained good for similar lakes. Walleye in Diamond Lake grow faster than walleye in similar lakes; a five-year-old female walleye was about 20 inches in Diamond Lake compared to about 18 inches in similar lakes, and a five-year-old male was about 17 inches in Diamond Lake compared to about 16 inches in similar lakes. Because these lakes all have similar environmental conditions (e.g. water temperature and clarity) the fast growth is likely a result of a plentiful prey base within Diamond Lake (Venturelli et al. 2010).

The walleye population in Diamond Lake is sustained by stocking. There has been little to no natural reproduction as no age-0 fish have been caught in fall electrofishing surveys since 2007. Further corroborating the absence of natural reproduction is the increase in age-1 catch rates in the year after stocking occurred compared to age-1 catch rates in years when stocking did not occur the previous year. The survival of stocked fish to age-5 was generally low in the mid to late 2010s averaging 1.7% of the 2010 and 2013 stocked year classes, however the 2024 survey documented a substantial increase in survival of stocked fish to age-5 at 14% of the 2019-year class resulting in a much cheaper cost to produce an adult walleye. It is unclear why the 2019 stocking survived so well. Future surveys will indicate if the 2019 survival is unusual or if this higher survival becomes normal for Diamond Lake. Evaluation of the return on investment is critical for stocking justification and continued monitoring of the walleye population in Diamond Lake will be integral in guiding future walleye management.

The bluegill and black crappie populations in Diamond Lake provide anglers quality opportunities. Despite a decline in black crappie catch rates from 4.2 fish/net in 2021 to 0.6 fish/net in 2024, size structure increased from a mean length of 4.8 inches to 7.0 inches which is the highest mean length observed in Diamond Lake since 2009. Bluegill catch rate and size structure increased substantially (i.e., over four times for both metrics) since 2015 and are currently at moderate levels compared to similar lakes. Panfish (bluegill + black crappie) angling effort has typically been low relative

to similar lakes but consistently has been about 10-20% of the total directed effort on Diamond Lake. Panfish angling effort in 2024 was 13% which was the third most behind largemouth (35%) and smallmouth (33%), which indicated that panfish serve an important role in the Diamond Lake sport fishery. Continued monitoring of panfish abundance, size structure and growth will be valuable to accurately assess angler influence on these harvest-oriented species.

The northern pike population is at a low abundance with moderate size structure and received low levels of angling effort relative to bass, panfish and walleye in Diamond Lake in 2024. Despite the low abundance and interest from anglers, the northern pike population has moderate size structure and likely plays an important role in structuring the panfish populations through predation. The current special regulation has maintained moderate size structure, however, if size structure declines and catch rates increase to above average levels, a regulation change to provide more harvest opportunity could be considered. Continued monitoring of the northern pike population during SN1 surveys will be useful to effectively manage the Diamond Lake fishery.

## **Management Recommendations**

### **1. Retain current regulations for all species**

Data from the 2024 survey indicate fish populations are unlikely to benefit from a fishing regulation change.

### **2. Continue fish surveys to evaluate the fishery**

Conduct annual fall electrofishing surveys to assess walleye recruitment and survival of stocking walleye to age-1, conduct adult walleye population estimate every three years, and a late spring electrofishing (SE2) survey every six years to assess the smallmouth bass, largemouth bass and bluegill populations.

### **3. Continue stocking walleye**

The walleye population is primarily supported by stocking and continued monitoring of the adult population is necessary to determine if stocking is producing the desired walleye fishery. If adult density is < 1.5 fish/acre for six consecutive years (two consecutive population estimates), stocking should be reconsidered, and management focus could be shifted to other species.

### **4. Maintain and improve habitat and water quality and prevent AIS**

Landowners are encouraged to implement best practices outlined in the [Wisconsin's Healthy Lakes Program](#) to restore and protect the nearshore habitat. Efforts to prevent the spread of new aquatic invasive species into Diamond Lake are also encouraged.

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## Appendix

Table A1. Stocking history in Diamond Lake since 1992.

YEAR	WALLEYE	
	Number Stocked	Size
2025	1,609	Large Fingerling
2023	1,610	Large Fingerling
2021	1,888	Large Fingerling
2019	1,612	Large Fingerling
2017	1,611	Large Fingerling
2015	1,608	Large Fingerling
2013	1,705	Large Fingerling
2012	1,705	Large Fingerling
2011	1,536	Large Fingerling
2010	1,650	Large Fingerling
2009	3,410	Large Fingerling
2007	6,820	Large Fingerling
2006	7,544	Small Fingerling
2004	17,061	Small Fingerling
2002	17,050	Small Fingerling
2000	17,050	Small Fingerling
1998	17,050	Small Fingerling
1996	17,050	Fingerling
1994	17,787	Fingerling
1992	25,575	Fingerling

Table A2. General fishing regulation for Diamond Lake in 2024.

SPECIES	SEASON DATES	DAILY BAG LIMIT	SIZE LIMIT
Smallmouth Bass	3 <sup>rd</sup> Saturday in June to 1 <sup>st</sup> Sunday in March	1	18 inches
Largemouth Bass	1 <sup>st</sup> Saturday in May to 1 <sup>st</sup> Sunday in March	5 combined with smallmouth bass	None
Northern Pike	1 <sup>st</sup> Saturday in May to 1 <sup>st</sup> Sunday in March	2	26 inches
Walleye	1 <sup>st</sup> Saturday in May to 1 <sup>st</sup> Sunday in March	3 with 1 over 24 inches	15 inches with 20-24 inch no harvest slot
Panfish	Open all year	25	None

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

<b>SURVEY</b>	<b>GEAR</b>	<b>TARGET WATER TEMPERATURE (°F)</b>	<b>TARGET SPECIES</b>
Early Spring Netting (SN1)	Fyke Net	40-50	Walleye Muskellunge Northern Pike Black Crappie
Early Spring Electrofishing (SE1)	Boat Electrofisher	45-50	Walleye
Late Spring Netting (SN2)	Fyke Net	50-55	Muskellunge Northern Pike Black Crappie
Late Spring Electrofishing (SE2)	Boat Electrofisher	55-70	Bass and Panfish
Fall Electrofishing (FE1)	Boat Electrofisher	50-65	Juvenile Walleye

Table A4. Length categories for species of interest captured in Diamond Lake, Bayfield County, WI.

<b>SPECIES</b>	<b>LENGTH CATEGORY (INCHES)</b>				
	<b>Stock</b>	<b>Quality</b>	<b>Preferred</b>	<b>Memorable</b>	<b>Trophy</b>
Walleye	10	15	20	25	30
Northern Pike	14	21	28	34	44
Largemouth Bass	8	12	15	20	25
Smallmouth Bass	7	11	14	17	20
Bluegill	3	6	8	10	12
Black Crappie	5	8	10	12	15