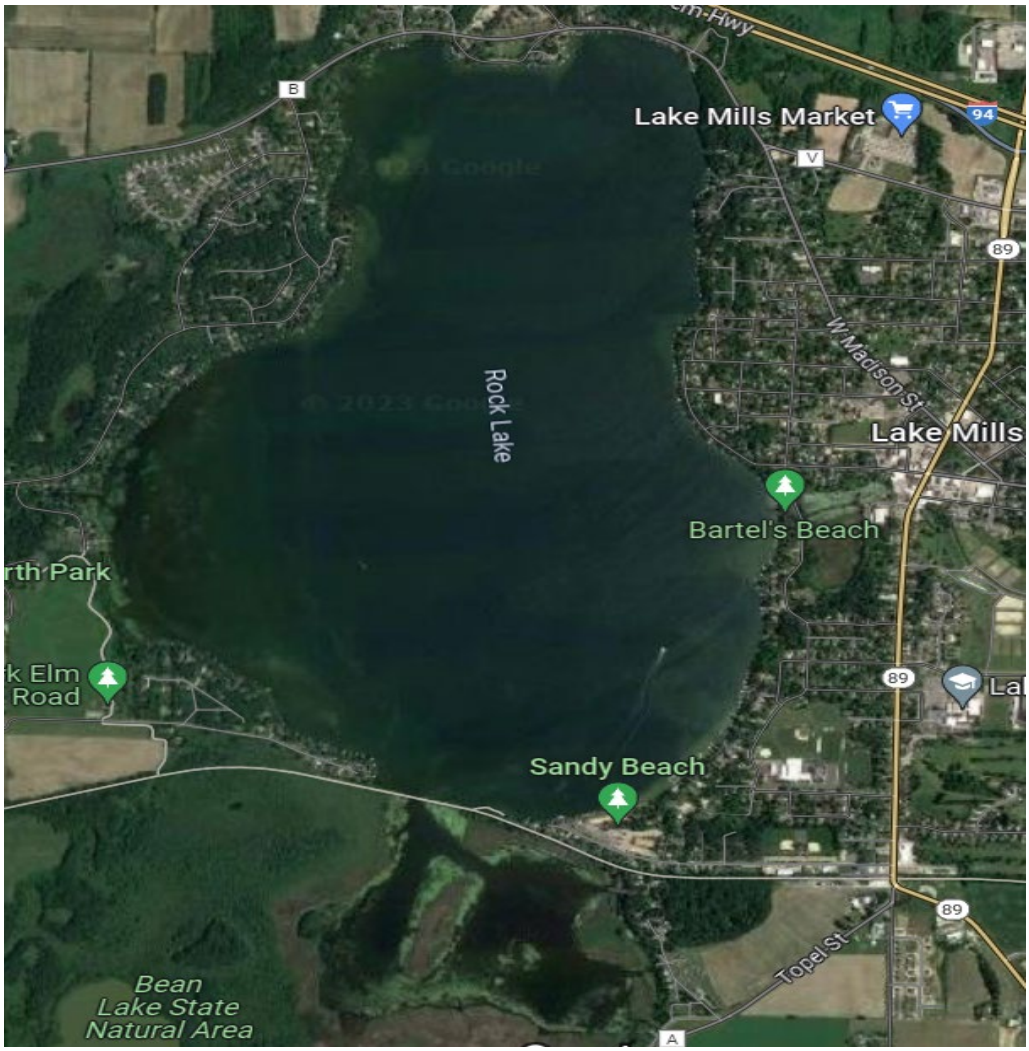
# WISCONSIN DEPARTMENT OF NATURAL RESOURCES

## Fisheries Survey Report of Rock Lake, Jefferson County, Wisconsin 2022

Waterbody Identification Code 830700

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December 2023

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# Executive Summary

In 2022, a comprehensive fishery survey was conducted on Rock Lake using a variety of sampling methods throughout the open water period to sample the major components of the fishery. The objectives of the survey were to 1) assess the status of the northern pike (*Esox lucius*), walleye (*Sander vitreus*), largemouth bass (*Micropterus salmoides*) and panfish populations, 2) attain a population estimate for northern pike and walleye and 3) update management recommendations for the fishery of Rock Lake. The results of the 2022 survey were compared to lakes with similar characteristics and the prior comprehensive fishery surveys the Department of Natural Resources (DNR) conducted on Rock Lake in 2008 and 2014. Based on 2022 survey results, Rock Lake continues to offer quality fishing opportunities for northern pike, walleye, largemouth bass, smallmouth bass (*Micropterus dolomieu)* and bluegill (*Lepomis macrochirus*).

Northern pike catch rates were relatively similar between survey years with 3.9 northern pike/net night in the 2008 spring fyke netting (SNI) survey, increasing to 5.2/net night in 2014, and a slight decrease to 4.1/net night in 2022. All catch rates are above the 75$^{th}$ percentile for similar lakes (complex fishery, warm water temps and clear water). The percent of northern pike measured over the legal-size limit of 26.0 inches decreased from 11.3% in 2008 to 2.5% in 2014 and 2.9% in 2022. The average length also decreased from 21.2 inches in 2008 to 18.5 inches in 2014 but increased to 20.4 inches in 2022. The ratio of female to male northern pike changed from 44% female and 52% male in 2008 to 34% female and 60% male in 2014. In 2022, the ratio flipped to 59% female and 39% male. The northern pike population is self-sustained through natural reproduction as northern pike were last stocked into Rock Lake in 1999. Future surveys should continue to closely monitor the population to help decide if a regulation change would be warranted to improve the size structure and growth rate of this species.

Walleye catch rate doubled from 6.8/net night in the 2008 SNI survey and 7.0/net night in the 2014 SNI to 14.5/net night in the 2022 SNI survey. All rates are above the 90$^{th}$ percentile for similar lakes. The average length of walleye sampled declined slightly from 19.3 inches in 2008, to 18.6 inches in 2014 and 18.2 inches in 2022. The percent of walleye over the legal-size limit of 15.0 inches remained similar with 99.0% in 2008, 96.0% in 2014 and 98.3% in 2022. Male to female ratios of walleye in Rock Lake appear to be skewing towards a male dominated population. In 2008, males accounted for 53.8% and females accounted for 46.2% of the population. In 2014, the ratio shifted to 72.2% male and 27.8% female. In 2022, it continued to shift as the sex ratio became 87.5% male and 12.5% female. More investigation into this ongoing trend should be the focus of future surveys as an unbalanced sex population could result in limited or no potential natural reproduction in the lake. Rock Lake is stocked by the DNR in odd years with large fingerling walleye at a rate of 15 per acre.

Largemouth bass catch rates decreased during spring electrofishing II (SEII) sampling from 25.3 per mile (49th percentile for similar lakes) in 2008 to 10.1 per mile (15th percentile for similar lakes) in 2014. This catch rate rebounded to 24.6 per mile (48th percentile) in 2022. The proportional size distribution (PSD), or the proportion of fish sampled above a quality size (12 inches) compared to the stock size (8 inches) for the species increased from 17 in 2008 to 45 in 2014 and 43 in 2022.

Bluegill catch rates declined slightly between 2008 (149.5 per mile), 2014 (136.5 per mile) and 2022 (126.0 per mile). All rates are above the 35th percentile for similar lakes. PSD for bluegill also declined slightly from 24 in 2008 to 17 in 2014 and 15 in 2022. Future surveys should focus on bluegill growth and catch rates to see if this decline continues. Protective regulations on panfish may help alleviate this trend.

Current DNR sampling protocols do not accurately assess yellow perch (*Perca flavescens*) or black crappie (*Pomoxis nigromaculatus*). Angler concerns over the populations of these species should lead to more intensive sampling in the next survey to address the potential impacts and develop science-based decisions on their management.

**Management recommendations include:**

1. Monitor the northern pike population and reevaluate size structure, abundance, growth, length at age, relative weight and conduct a population estimate in the next comprehensive fishery survey. Monitor the abundance of quality and preferred sized northern pike. Consider a more restrictive or protective regulation to protect the population.
2. Monitor the walleye population and reevaluate size structure, abundance, growth, length at age, relative weight and conduct a population estimate in the next comprehensive fishery survey. Continue to stock large fingerling walleye at 15/acre in alternate, odd years.
3. Improve adult walleye density to at least 1.5 adults/acre. Conduct genetic analyses and fall electrofishing in unstocked years to determine the extent of natural reproduction in the walleye population. Consider a more restrictive or protective regulation to protect the population.
4. Monitor the largemouth bass population and reevaluate size structure, abundance, length at age, relative weight and growth in the next comprehensive fishery survey.
5. Monitor the black crappie population to evaluate size structure, abundance, growth, length at age and relative weight in the next comprehensive fishery survey.
6. Monitor the bluegill population and reevaluate size structure, abundance, length at age, relative weight and growth in the next comprehensive fishery survey. Improve catch rates and PSD by exploring potential regulation changes to reduce harvest and protect the population.

7. Monitor the yellow perch population to evaluate size structure, abundance, growth, length at age and relative weight in the next comprehensive fishery survey.
8. Monitor the relative abundance of the common carp (*Cyprinus carpio*) population, via catch rates, in the next comprehensive fishery survey.
9. Conduct a lake-wide creel survey to estimate angler exploitation of all fish species in Rock Lake. With the large size of the lake and the current DNR budget situation, this may be cost prohibitive.

# Introduction

Rock Lake is a 1,365-acre, deep, lowland, mesotrophic drainage lake located in northwestern Jefferson County (Figure 1). It lies within the town of Lake Mills. The city of Lake Mills is located along the eastern shoreline and includes a millpond and Rock Creek outlet of the lake. The lake is formed by an impoundment of Rock Creek which is the major inlet that flows from Mud Lake northward to the Marsh Lake portion of Rock Lake. Rock Creek exits the lake and eventually flows into the Crawfish River upstream of Milford. The lake has a maximum depth of 60 feet with an average depth of 16 feet. The bottom substrate is a mixture of sand, gravel and muck.

Documented invasive species include common carp, banded mystery snail (*Viviparus georgianus*), Chinese mystery snail (*Cipangopaludina chinensis*), curly-leaf pondweed (*Potamogeton crispus*), Eurasian water-milfoil (*Myriophyllum spicatum*), hybrid Eurasian/northern water-milfoil (*Myriophyllum spicatum x Myriophyllum sibiricum*), yellow iris (*Iris pseudacorus*), and zebra mussel (*Dreissena polymorpha*). The lake supports multiple rare fish species such as the state special concern banded killifish (*Fundulus diaphanous*) and lake chubsucker (*Erimyzon sucetta*), the state threatened pugnose shiner (*Notropis* anogenus) and the only known lake population of the state endangered slender madtom (*Noturus exilis*).

One measure of a lake's health is the trophic state, which relates to the amount of algae in the water. Rock Lake's average summer trophic state for the last 5 years was 42 (Mesotrophic) and was determined using chlorophyll data. For a deep lowland lake, this is considered excellent. Deep lowland lakes stratify, or form separate layers of water, in the summer months and have a watershed greater than 4 square miles.

There are five public boat launches on the lake including Rock Lake Park County boat launch on Highway B on the north side of the lake, operated by Jefferson County. Ferry Park Landing on the northwest end of the lake and Elm Point Landing on the southwest end of the lake, both operated by the Town of Lake Mills. Sandy Beach Launch on the southeast end of the lake, and Rock Lake Millpond Access on the east end of the lake, both operated by the City of Lake Mills. There are also public access locations along the Glacial Drumlin state trail on the south end that separates the main lake from Marsh Lake, multiple city piers along the east shore, Tyranena Park on

the northeast shore, and the DNR Rock Lake Carry In Access on the northwest shore. The lake has 8.3 miles of shoreline that is primarily residential. The southern portion of the lake is called Marsh Lake and is mostly lined by cattail and cedar swamp with over half of the shoreline connected to DNR public land. Extensive public access provides recreational opportunities for both anglers and recreational boaters. Recreational use is heavy year-round, especially during summer weekends.

The fishery is an important resource for anglers throughout Jefferson and surrounding counties. Its proximity to the interstate connecting Madison and Milwaukee makes it an easy destination. Northern pike, walleye, largemouth bass and smallmouth bass are the primary gamefish species. Bluegill, black crappie, yellow perch and pumpkinseed (*Lepomis gibbosus*) are the primary panfish species. Walleye, northern pike, smallmouth bass and rock bass (*Ambloplites rupestris*) are abundant. Largemouth bass, bluegill, black crappie, pumpkinseed, yellow perch and bowfin (*Amia calva*) are common. Longnose gar (*Lepisosteus osseus*), golden shiner (*Notemigonus crysoleucas*), white sucker (*Catostomus commersonii*), lake chubsucker (*Erimyzon sucetta*), black bullhead (*Ameiurus melas*), brown bullhead (*Ameiurus nebulosus*), yellow bullhead (*Ameiurus natalis*) and common carp are present.

Rock Lake currently receives large fingerling walleye at 15/acre in alternate odd years (Table 1). The most recent fish stocking events include 20,563 large fingerling walleye from the DNR Lake Mills State Fish Hatchery in 2017. In 2019, it received 20,587 large fingerling walleye from the DNR Wild Rose State Fish Hatchery. And in 2021, it received 20,563 large fingerling walleye from the DNR West Central Region ponds.

Current fishing regulations follow the general statewide inland regulations. The significance of the fishery and high, year-round public use justifies regular monitoring of the fish community to assess management options and maximize the potential of the fishery.

# Methods

This survey was scheduled to be completed in 2021, but since it was a part of the statewide Wisconsin Walleye Initiative, it was postponed for a year to allow three year classes of stocked large fingerling walleye to become susceptible to DNR sampling gear. On March 29, 2022, four white nylon fyke nets (0.75-inch bar mesh, 3 x 6-foot frames) were set in the Marsh Lake portion of Rock Lake to target spawning northern pike. On April 2, 2022, three more nets were set in Rock Lake to target spawning walleye. On April 4, 2022, one more net was added to Rock Lake to target spawning walleye as nets in Marsh Lake were removed. On April 10, 2022, two more nets were added to Rock Lake to target spawning walleye. Nets were checked daily and were removed as catch rates dropped. All nets were removed on April 21, 2022, for a total of 112 net nights of effort. All gamefish sampled were measured to the nearest 0.1 inch and weights were taken to the nearest 0.06 pound on a subsample of

northern pike, walleye, largemouth bass, bluegill, pumpkinseed, black crappie and rock bass. To attain population estimates, northern pike and walleye were given a sex-specific fin clip. Males received a left pelvic fin clip, females received a right pelvic fin clip, and unknown fish received a top caudal (tail) fin clip. All largemouth and smallmouth bass were given top caudal fin clips to eliminate duplicate counts. Throughout the survey, northern pike, walleye, largemouth and smallmouth bass were examined for marks and noted as recaptures if marks were found. Additionally, aging structures were removed from northern pike, walleye, largemouth bass, smallmouth bass, black crappie and bluegill according to standard sampling protocols for age and growth estimates for each species. These protocols included removing a pelvic fin ray from northern pike, a second or third anterior dorsal spine from walleye greater than 12 inches, scales from walleye less than 12 inches, dorsal spines and anal spines from largemouth and smallmouth bass greater than 10 inches, scales from largemouth and smallmouth bass less than 10 inches, and otoliths from black crappie and bluegill. Aging structures were collected until five structures were collected for each species and each sex for every half inch increment. For most other species, a subsample was measured to the nearest 0.1 inch. Other fish species encountered in low numbers were identified to species and counted. All walleye 15 inches and larger were given a bright green numbered Floy tag with a telephone number to report the catch. Catch, growth and harvest rates will be estimated with this ongoing study.

Spring electrofishing I (SEI) using a DNR standard pulsed direct current (PDC) boom shocker boat was conducted at night on April 27. Sampling used two probes (each with eight droppers), two dippers and a dip net bar mesh of 0.375 inches. One 7.48-mile transect around the lake was sampled exclusively for walleye. The objective was to identify walleye marked from the SNI survey to calculate a population estimate. New walleye encountered were measured to the nearest 0.1-inch and given a numbered Floy tag if they were 15 inches or larger.

Spring centrarchid electrofishing (SEII) using a DNR standard PDC boom shocker boat was conducted at night on June 1 and June 7, targeting largemouth bass, panfish species and common carp. A boat motor issue on June 1 caused a delay in completing the protocol until June 7. Two 2.0-mile stations along the shoreline were completed each night of the survey with the west side of the lake being sampled on June 1 and the east side of the lake on June 7. For each 2.0-mile station, all fish species were netted and catchable common carp counted in the first 0.5 mile. Only largemouth and smallmouth bass were sampled in the remaining 1.5 miles. The total SEII effort was 8.0 miles for largemouth and smallmouth bass and 2.0 miles for all other species. At stations targeting all species, all fish were collected and gamefish and panfish were measured to the nearest 0.1 inch. Other fish were identified to species and counted. Any catchable carp were also counted. At stations targeting only largemouth and smallmouth bass, all largemouth and smallmouth bass sampled were measured to the nearest 0.1 inch. All gamefish were examined for the presence of fin clip marks from SNI. Age structures were taken from a subset of bluegill, largemouth and

smallmouth bass. Dense mats of aquatic vegetation in the Marsh Lake portion of Rock Lake made sampling difficult as heavy vegetation dampens the electrical field produced by the equipment and limits its effectiveness on the fish. Sampling used two probes (each with eight droppers), two dippers and a dip net bar mesh of 0.375 inches.

Fall electrofishing (FE) using a DNR standard PDC boom shocker boat was conducted at night on October 19 to assess the abundance of young-of-the-year (YOY) and juvenile walleye that do not tend to be sampled by gear at other times of the year. One 6.53-mile transect around the lake was completed with 49 walleye being captured. All walleye were measured to the nearest 0.1-inch and aging structures were taken from all walleye under 12.0 inches. New walleye 15 inches or larger received a numbered Floy tag.

Relative weight, the ratio of a fish's weight to the weight of a standard fish of the same length based on a scale of 100, was used to assess body condition of northern pike, walleye and largemouth bass. Mean relative weight ($W_r$) was calculated by length group as an index of northern pike, walleye and largemouth bass condition using a standard length-at-weight equation (Willis, 1989). Average relative weight was calculated for each species and for each sex separately when sex data were available. Relative weight values between 75 and 100 indicate normal weight for a given length. A relative weight value greater than 100 indicates that a fish is in excellent condition. A relative weight value less than 75 indicates that a fish is in poor condition.

Proportional size distribution (PSD) was calculated for northern pike, walleye, largemouth bass, bluegill, black crappie, pumpkinseed and rock bass to assess population size-structure. PSD takes the number of quality length fish sampled divided by the number of stock length fish multiplied by 100 to produce a whole number that represents the proportion of the population that is of quality size. Each species has acceptable ranges of values that indicate a balanced population. Stock lengths are based on standardized lengths for each species: northern pike (14 inches), walleye (10 inches), largemouth bass (8 inches), bluegill (3 inches), black crappie (5 inches), pumpkinseed (3 inches) and rock bass (4 inches). Quality lengths used were: northern pike (21 inches), walleye (15 inches), largemouth bass (12 inches) bluegill (6 inches), black crappie (8 inches), pumpkinseed (6 inches) and rock bass (7 inches). Proportional size distribution-preferred (PSD-P) was also calculated for northern pike, walleye, largemouth bass, bluegill, black crappie, pumpkinseed and rock bass to assess the proportion of fish in the population that are a preferred length by anglers. These are based on standardized lengths for each species: northern pike (28 inches), walleye (20 inches), largemouth bass (15 inches), bluegill (8 inches), black crappie (10 inches), pumpkinseed (8 inches) and rock bass (9 inches) (Anderson and Neuman, 1996).

Growth information from northern pike, walleye, largemouth bass, smallmouth bass, bluegill and black crappie was obtained according to established protocols for each

species and included fin rays, dorsal spines, otoliths and scale samples collected throughout the comprehensive fishery survey. Growth data from Rock Lake was compared to average statewide and south district growth rates utilized in the DNR Fisheries Management Information System database.

# Results and Discussion

A total of 4,225 fish from eighteen different species were collected during the 2022 comprehensive fishery survey, with most fish sampled during SNI (Table 2). Walleye, largemouth bass and bluegill were abundant. Black crappie, bowfin, northern pike, pumpkinseed, rock bass, smallmouth bass and yellow bullhead were common. Brown bullhead, golden shiner, lake chubsucker, longnose gar, white sucker, and yellow perch were present.

## WALLEYE

During the 2022 SNI, 1,622 walleye were sampled for a catch rate of 14.5 walleye/net night. This catch rate is above average (95$^{th}$ percentile) compared to lakes with similar characteristics (complex fishery with warm water temps and clear water) across the state. Lengths ranged from 13.4 to 25.9 inches with an average length of 18.2 inches (Figure 2). In 2014 SNI, 595 walleye were sampled for a catch rate of 7.0 walleye per net night. This catch rate is above average (91$^{st}$ percentile) for similar lakes. Lengths ranged from 8.1 to 26.6 inches with an average length of 18.6 inches. In 2008 SNI, 1,123 walleye were sampled for a catch rate of 6.8 walleye per net night. This catch rate is above average (91$^{st}$ percentile) for similar lakes. Lengths ranged from 14.8 to 26.8 inches with an average length of 19.3 inches. In 2022, the percent of walleye over the 15-inch minimum size limit was 98.3%. This was nearly identical to 2014 (96.1%) and 2008 (99.0%). The average relative weight of walleye in Rock Lake has also remained similar with a value of 94 in 2022, 96 in 2014, and 96 in 2008.

Of the 1,622 walleye sampled during the 2022 SNI, 12.4% were female, 87.2% were male and 0.4% were immature/unknown sex compared to 27.4% female, 71.4% male and 1.2% immature/unknown sex in 2014. In the 2008 survey, 34.4% were female, 65.0% were male and 0.6% were immature/unknown sex. This trend of shifting to a male dominated population is concerning and should be investigated in future surveys. Stocking records indicate that the Rock-Fox strain walleye stocked into Rock Lake have come from different hatcheries during the last few stocking events, so potential issues from one hatchery source is likely not driving the skewed sex ratio of walleye in Rock Lake.

The size structure of the walleye population has shifted since previous surveys. Walleye PSD values have remained constant from 2022 (99), to 2014 (97) and 2008 (99), indicating that a majority of the population is quality sized (equal to or greater than 15 inches). However, PSD-P values, or the proportion of walleye equal to or greater than the preferred length of 20 inches, has declined. In 2022 PSD-P was 8, in 2014 it

was 26, and in 2008 it was 31. Creel data would be a beneficial tool to evaluate the harvest level of walleye in Rock Lake and give insight into whether a regulation change could be warranted. A creel was scheduled for Rock Lake in 2022, but a lack of qualified applicants forced the survey to be cancelled.

A population estimate was calculated using the 965 walleye marked during 2022 SNI as the number of marked walleye at large. During the 2022 SEI survey, 94 adult walleye were examined for marks with 66 being recaptures for a R/C of 0.70 and a Peterson estimate of 1,374 walleye (95% CI = 1,218–1,611) or 1.0 adults per acre with a CV of 6.72%. The population estimate in 2014 was 1.7 adults per acre, however the number of fish sampled during SEI was low (17 total with 3 recaptures) resulting in a less precise estimate. The population estimate in 2008 was 0.6 adults per acre.

Walleye age estimations ranged from age-2 to age-11, indicating several year classes exist and natural reproduction may be occurring in Rock Lake. Walleye growth rates were comparable with statewide and south district averages (Figure 3). In 2022, male walleye between 15.0 and 15.9 inches were in the 80$^{th}$ percentile for growth versus the 44$^{th}$ percentile in 2014. Female walleye in 2022 between 18.0 and 18.9 inches were in the 52$^{nd}$ percentile for growth versus the 21$^{st}$ percentile in 2014. A weighted regression of the catch curve for walleye age 7-11 in 2022 showed instantaneous mortality was approximately 35% with angling mortality approximately 15% (Figure 4). The tagging survey, along with a creel, could better estimate harvest of walleye from the system and provide insight into whether a more restrictive regulation may be warranted to protect the species.

During the 2022 FE survey, 49 walleye were sampled for a catch rate of 7.5 walleye/mile. Lengths ranged from 7.0 to 22.8 inches with an average length of 14.5 inches (Figure 5). In the 2014 FE, 22 walleye were sampled for a catch rate of 2.8 walleye/mile. Lengths ranged from 7.5 to 26.5 inches with an average length of 15.9 inches. In the 2008 FE, 7 walleye were sampled for a catch rate of 1.4 walleye/mile. Lengths ranged from 13.0 to 24.0 inches with an average length of 18.2 inches. Out of the 49 walleye captured in 2022 FE, eight were aged as young-of-year (YOY). In 2014, 4 out of the 22 walleye sampled were aged as YOY. No YOY walleye were collected during the 2008 FE. This shows indications of natural reproduction returning to the system, as the lake gets stocked in odd years. Future studies using genetic analysis should focus on identifying natural reproduction and recruitment of these year classes of fish to the population.

## NORTHERN PIKE

In the 2022 SNI, 458 northern pike were sampled for a catch rate of 4.1 northern pike/net night. This catch rate is above average (79$^{th}$ percentile) compared to lakes with similar characteristics (complex fishery, warm water temperatures and clear water) across the state. Lengths in 2022 ranged from 9.2 to 35.3 inches with an average length of 20.4 inches (Figure 6). In the 2014 SNI, the catch rate was 5.2/net

night (82nd percentile) and lengths ranged from 8.6 to 30.9 inches with an average length of 18.5 inches. In the 2008 SNI, the catch rate was 3.9/net night (78th percentile) and lengths ranged from 12.8 to 42.0 inches with an average length of 21.2 inches.

The percent of northern pike over the current 26-inch minimum length limit in the 2022 SNI was only 2.9%. This is slightly higher than in 2014 (2.7%), but much lower than in 2008 (11.3%). No creel data is available to estimate angler harvest levels of northern pike that could potentially be leading to the decrease in fish over the minimum length limit.

In 2022, northern pike PSD was 40, indicating that there is a modest proportion of quality sized northern pike (equal to or greater than 21 inches) present in Rock Lake. Historic PSD levels are similar in 2014 (26) and 2008 (47). PSD-P remains low in Rock Lake throughout the survey years indicating that there is a diminished population of preferred size northern pike (equal to or greater than 28 inches) present.

Northern pike body condition was good as suggested by $W_r$ values that ranged from 48 to 218 and averaged 90.2 (N=414) in 2022. This was similar to $W_r$ values in 2014 that ranged from 50 to 153 and averaged 88.2 (N=416) and 2008 that ranged from 59 to 136 and averaged 89.9 (N=284). This indicates that the forage base is adequate to maintain the three top predator species (northern pike, walleye and largemouth bass) and density dependent factors may not currently be affecting the size structure of northern pike in Rock Lake.

Northern pike ages ranged from age-2 to age-9, indicating several year classes are present in the lake. Northern pike have not been stocked in Rock Lake since 1999. Growth rates of northern pike in Rock Lake mimicked statewide averages but were significantly slower than south district averages (Figure 7). A weighted regression of the catch curve for northern pike in 2022 showed instantaneous mortality was approximately 29% and angling mortality was around 9% (Figure 8). A population estimate was calculated from the mark and recapture events during SNI. In total, 409 northern pike were marked and 45 were recaptured for a Schnabel estimate of 1,916 northern pike or 1.4 adults/per acre. The lower limit for the estimate was 1,449 and the upper limit was 2,827 with a R/C of 0.10. The population estimate in 2014 was also 1.4 adults per acre. A creel survey would help estimate true harvest levels of northern pike in Rock Lake and provide insight to whether a more restrictive harvest regulation would benefit the size structure of the population.

During the 2022 SEII, four northern pike were captured for a catch rate of 2.0/mile. Lengths ranged from 9.7 to 22.3 inches and averaged 13.9 inches. None of the northern pike sampled were marked from the SNI survey.

## LARGEMOUTH BASS

During the 2022 SNI, 31 largemouth bass were captured for a catch rate of 0.3/net night. This is similar to catch rates of 1.5/net night in 2014 and 0.5/net night in 2008. Largemouth bass are difficult to sample during fyke net surveys, which is why data collected for this species is focused during SEII. Lengths ranged from 5.4 to 19.4 inches and averaged 10.1 inches.

In the 2022 SEII, 197 largemouth bass were captured for a catch rate of 24.6/mile. This is in the 47$^{th}$ percentile for lakes with similar characteristics. Lengths ranged from 0.7 to 15.6 inches and averaged 10.5 inches (Figure 9). This catch rate is much higher than the 10.1/mile in the 2014 SEII (14$^{th}$ percentile) and slightly lower than the 25.3/mile (49$^{th}$ percentile) in 2008 SEII. During the 2014 SEII, lengths ranged from 5.7 to 17.0 inches with an average length of 10.9 inches. During the 2008 SEII, lengths ranged from 2.6 to 16.9 inches with an average length of 9.8 inches. Largemouth bass PSD calculated from fish sampled in SEII was 43 in 2022, 45 in 2014 and 17 in 2008. This indicates that quality sized largemouth bass (equal to or greater than 12 inches) are common in the population. PSD-P (15 inches) remains low throughout all surveys with 4 in 2022, 10 in 2014 and 2 in 2008, indicating few fish reach a preferred size for the species.

Relative weight was above average for largemouth bass in 2022 (113) and 2014 (110). Growth rates for largemouth bass in Rock Lake fall below the south district and statewide averages (Figure 10). A weighted regression of the catch curve of largemouth bass ages 3-9 shows instantaneous mortality is approximately 24% with angling mortality approximately 4% (Figure 11). This suggests that overharvest is not currently causing the size structure and growth issues of largemouth bass in Rock Lake. A closer look at size structure and growth will be important for the next survey to see if this trend continues.

## BLUEGILL

During the 2022 SNI, 489 bluegill were sampled for a catch rate of 4.4/net night. Lengths ranged from 2.6 to 9.1 inches with an average length of 5.7 inches (Figure 12). In the 2014 SNI, 2,777 bluegill were sampled for a catch rate of 31.2/net night. Lengths ranged from 2.9 to 8.8 inches with an average length of 4.5 inches. In the 2008 SNI, 910 bluegill were sampled for a catch rate of 5.5/net night. Lengths ranged from 2.8 to 9.6 inches with an average length of 5.7 inches.

In the 2022 SEII, 357 bluegill were captured for a catch rate of 178.5/mile. This catch rate is in the 52$^{nd}$ percentile for lakes with similar characteristics. Lengths ranged from 1.5 to 9.2 inches and averaged 4.2 inches. In 2014, 379 bluegill were captured for a catch rate of 136.5/mile (38$^{th}$ percentile). Lengths ranged from 1.7 to 8.7 inches and averaged 4.3 inches. In 2008, 151 bluegill were captured for a catch rate of 149.5/mile (42$^{nd}$ percentile). Lengths ranged from 2.4 to 8.0 inches and averaged 4.9 inches. PSD values declined during SEII events with a value of 15 in 2022, 17 in 2014 and 24 in 2008.

PSD-P values were low throughout all survey years, 2022 (1), 2014 (2) and 2008 (1). This indicates that relatively few bluegill are of quality size (6 inches) and even fewer reach a preferred size of 8 inches.
The average length at age-3 of bluegill was 4.6 inches, indicating a moderately fast growth rate. When compared to state averages, length at age of bluegill were similar until age-3 where growth in Rock Lake exceeded the statewide average. Length at age was much lower than south district averages until age-5 where bluegill growth in Rock Lake began to closely resemble the south district average (Figure 13). A weighted regression of the catch curve for ages 3-8 was run for bluegill and indicated an instantaneous mortality of approximately 23% and angling mortality approximately 3% (Figure 14). This suggests that angling mortality is currently not affecting the bluegill population in Rock Lake, however a creel survey would help to define harvest levels of bluegill more accurately.

## BLACK CRAPPIE

During 2022 SNI on Rock Lake, 172 black crappie were sampled for a catch rate of 1.5 black crappie/net night. This is slightly less than in 2014 (2.0/net night) and slightly more than 2008 (0.9/net night). Lengths in 2022 ranged from 3.4 to 13.4 inches and averaged 7.1 inches. Lengths in 2014 ranged from 3.4 to 13.0 inches and averaged 7.1 inches (Figure 15). Lengths in 2008 ranged from 2.8 to 11.8 inches and averaged 7.9 inches. In 2022, catch rates declined slightly to just below average (44$^{th}$ percentile) compared to lakes with similar characteristics. In 2014, catch rates were just above average (52$^{nd}$ percentile). Catch rates in 2008 were well below average (28$^{th}$ percentile). Current DNR protocols do not sample black crappie well, as is evident from no black crappie being caught in any survey year during SEII sampling events.

PSD for black crappie was calculated using SNI data, since no black crappie are caught during SEII sampling events. The PSD of black crappie has been declining in Rock Lake. In 2022 the value was 28 indicating a modest amount of black crappie were quality sized (8 inches) or larger. PSD was slightly higher in 2014 with a value of 38, but still much lower than 2008 with a value was 70, indicating that a majority of black crappie in Rock Lake were quality sized or larger. Generally accepted PSD ranges for balanced black crappie populations are 30-60 (Willis 1993). PSD-P values (10 inches or greater) also saw a decline, with values in 2022 of 9 that was lower than 17 in 2014 and 2008. PSD-M (memorable size of 12 inches or greater) values increased to 4 in 2022 from 1 in 2014 and 0 in 2008, indicating that a few memorable size fish are currently present in Rock Lake.

Black crappie growth from age estimations was slower than statewide and south district averages up to age-5 where growth rates met and exceeded these averages for older black crappie (Figure 16). A weighted regression of the catch curve for black crappie ages 4-8 in Rock Lake shows instantaneous mortality to be approximately 35% with an angling mortality of approximately 15% (Figure 17). A creel survey would

help to evaluate whether angler harvest of black crappie in Rock Lake is affecting the population.

## PUMPKINSEED

During the 2022 SNI survey, 96 pumpkinseed were sampled for a catch rate of 0.9/net night. The average length was 6.5 inches. In 2014, a total of 418 pumpkinseed were sampled for a catch rate of 4.7/net night. Average length was 5.7 inches. In 2008, a total of 116 pumpkinseed were sampled for a catch rate of 0.7/net night. Average length was 5.7 inches (Figure 18).

During the 2022 SEII survey, 34 pumpkinseed were captured for a catch rate of 17.0/mile (75$^{th}$ percentile for similar lake classes). PSD was 56 indicating a good percentage of pumpkinseed were quality size (6 inches) or greater. In 2014, 27 pumpkinseed were captured for a catch rate of 13.5/mile (66$^{th}$ percentile) and PSD was also 56. No pumpkinseed were sampled in 2008 SEII.

## ROCK BASS

During 2022 SNI, 174 rock bass were sampled for a catch rate of 1.6/net night. This was lower than in 2014, where 421 rock bass were sampled for a catch rate of 4.7/net night and 2008, where 408 rock bass were sampled for a catch rate of 2.5/net night. The average length in 2022 was 8.3 inches, versus 6.9 inches in 2014 and 7.5 inches in 2008 (Figure 19).

In the 2022 SEII survey, 35 rock bass were sampled for a catch rate of 17.5/mile (76$^{th}$ percentage for similar lakes). In the 2014 SEII, 25 rock bass were sampled for a catch rate of 12.5/mile (62$^{nd}$ percentile). In 2008, 25 rock bass were sampled for a catch rate of 24.8/mile (87$^{th}$ percentile). PSD was 32 in 2022 SEII, indicating a decent amount of rock bass were reaching quality size (7 inches). This was a decline from a value of 55 in 2014 SEII and 46 in 2008 SEII. PSD-P (9 inches) decreased with a value of 6 in 2022 SEII versus 18 in 2014 SEII. No rock bass reached preferred size in 2008 SEII. PSD-M (11 inches) was 5 in 2022 SEII, indicating that rock bass were reaching memorable size in Rock Lake. No rock bass reached memorable size in 2014 or 2008.

## YELLOW PERCH

In the 2022 SNI, nine yellow perch were sampled for a catch rate of 0.1 yellow perch/net night. This catch rate is well below average (2$^{nd}$ percentile) compared to similar lakes. Lengths ranged from 5.6 to 8.0 inches and averaged 6.8 inches. In 2014, 30 yellow perch were sampled for a catch rate of 0.3/net night. This catch rate was also below average (16$^{th}$ percentile). Lengths ranged from 4.5 to 9.8 inches and averaged 6.4 inches. In 2008, 17 yellow perch were sampled for a catch rate of 0.1/net night. This catch rate is well below average (2$^{nd}$ percentile). Lengths ranged from 5.6 to 8.8 inches and averaged 7.6 inches.

During the 2022 SEII survey, only 15 yellow perch were sampled for a catch rate of 7.5/mile. Lengths ranged from 3.5 to 8.8 inches and averaged 5.6 inches. In 2014, 14 yellow perch were sampled for a catch rate of 7.0/mile. Lengths ranged from 3.5 to 6.7 inches and averaged 5.2 inches. In 2008, 17 yellow perch were sampled for a catch rate of 16.8/mile. Lengths ranged from 3.0 to 8.6 inches and averaged 5.1 inches. Too few yellow perch were sampled in all survey types and years to calculate PSD values, however few fish from any sampling year reached quality size (8 inches) or greater. Current DNR protocols do not sample yellow perch well.

### COMMON CARP

In the 2022 SEII, a total of four common carp were sampled for a catch rate of 2.0/mile. This catch rate is average (52$^{nd}$ percentile) compared to lakes with similar characteristics. In the 2014 SEII, 12 common carp were sampled for a catch rate of 6.0/mile. This catch rate is above average (71$^{st}$ percentile). In 2008 SEII, three common carp were sampled for a catch rate of 3.0/mile. This catch rate is slightly above average (56$^{th}$ percentile). Data suggests that Rock Lake has a low-density population comprised of large sized carp that do not currently affect aquatic macrophytes or water quality.

### OTHER SPECIES

Other species sampled during the 2022 SNI included: longnose gar, golden shiner, white sucker, lake chubsucker (State Special Concern species), black bullhead, brown bullhead and yellow bullhead. Other species sampled during the 2022 SEII included: banded killifish (State Special Concern species). These fish can play an important role in the trophic status of the lake. Catch rates of these species have been highly variable in Rock Lake during all survey years.

## Management Recommendations

Rock Lake has a multitude of habitats within its 1,365 acres, including a rocky east shoreline with steeper drop offs, a shallow macrophyte dominated west shoreline and a deep marsh complex on the south end of the lake. It has excellent water quality for a mesotrophic, deep lowland lake.

The walleye population appears to be stable with an increase in adults/acre from 0.6 in 2008 to 1.0 in 2022. However, it is not meeting the minimum required density of 1.5 adults/acre for stocked lakes. Stocking may be suspended if hatchery production is limited. Catch rates of walleye during SNI surveys remain well above average. PSD values remain well above average (97 to 99) indicating that most of the walleye sampled are quality size of 15 inches or greater. Walleye age estimations denoted several year classes, and young-of-year walleye have been captured in FE surveys indicating some natural reproduction is occurring. Some concern about the decline in relative weight, average length, PSD-P values and male dominated sex ratio should

be a focus for future surveys. Growth rates for walleye continue to mirror south district and statewide averages. Both male and female average age at lengths improved in 2022 with males 15.0-15.9 increasing to the 80$^{th}$ percentile (44$^{th}$ percentile in 2014) and females 18.0-18.9 increasing to the 52$^{nd}$ percentile (21$^{st}$ percentile in 2014). A creel survey would assist in determining if the calculated 15% angling mortality is close to the true value or is higher and affecting the population.

Northern pike catch rates throughout all survey years remained around the 80$^{th}$ percentile for similar lakes during SNI. The population estimates for both 2022 and 2014 northern pike were 1.4/acre indicating that natural reproduction in the lake is supporting the species. Relative weights have remained constant around 90 throughout survey years. The percentage of northern pike over the legal size limit of 26 inches has declined since 2008. The growth rate of northern pike has mimicked statewide averages but falls well below the south district average. Angling mortality was approximately 9%. Future surveys should look at age and growth metrics to define if the population has a growth issue based on competition with other species for available food.

The catch rate for largemouth bass during the SEII survey returned to 2008 levels after a decline in 2014. Catch rates were in the 47$^{th}$ percentile in 2022 and PSD was good. Relative weight was excellent across years, but growth rates fall below both statewide and south district averages. Future surveys should continue to focus on taking weights and age structures to monitor the largemouth bass population and help determine whether there is a growth issue based on competition with other species for available food.

The catch rates of bluegill have been average or below average throughout all survey years. PSD values indicate that relatively few fish are reaching quality size of 6 inches and even fewer are reaching a preferred size of 8 inches. Average length at age data suggests the population is moderately fast growing. The estimated angling mortality is low at 3% which suggests that something else may be limiting the growth potential of bluegill in Rock Lake. Inter-species competition for available food or predation may be the reason. Diet and zooplankton studies may be necessary to answer this question.

DNR protocols do not sample black crappie well. The catch rate of black crappie during SNI surveys are below average. Black crappie are not sampled effectively in SEII surveys in Rock Lake. The average length of black crappie has remained consistently over 7.0 inches in all survey years. PSD has declined greatly since 2008 while PSD-P has increased slightly. Growth of black crappie in Rock Lake was slower than statewide and south district averages until age 5. Angling mortality was approximately 15%, which may be coupling with competition for food to cause the early growth issues. Future surveys should concentrate on length, weight and age data to monitor the trends in this species.

Yellow perch catch rates have been well below average for SNI on Rock Lake throughout all survey years. Due to the low number of fish sampled, PSD values were not calculated. Declining numbers of quality (8-inch) and no preferred (10-inch) yellow perch were captured during surveys in Rock Lake. Length, weight and age data should be collected in future surveys to monitor the trends in this species. Predation from other fish and competition for available food may be comingling factors affecting yellow perch in Rock Lake.

Currently, no changes to the fishing regulations appear to be necessary, however a more restrictive walleye regulation may help the population reach the minimum density if angler harvest is high. The walleye tagging study may provide some harvest estimations. The skewed walleye sex ratio should be investigated in future surveys. Growth issues of multiple species should be a focus of the next survey and potential solutions, such as more restrictive regulations, should be vetted with local stakeholders to drive the management of the fishery of Rock Lake.

**Management recommendations include:**

1. Monitor the northern pike population and reevaluate size structure, abundance, growth, length at age, relative weight and conduct a population estimate in the next comprehensive fishery survey. Monitor the abundance of quality and preferred sized northern pike and consider a more restrictive regulation to protect the population if warranted.
2. Monitor the walleye population and reevaluate size structure, abundance, growth, length at age, relative weight, sex ratio and conduct a population estimate in the next comprehensive fishery survey. Continue to stock large fingerling walleye at 15/acre in alternate, odd years if available.
3. Improve adult walleye density to at least 1.5 adults/acre. Consider a more restrictive regulation to protect the population. Conduct genetic analyses and/or fall young-of-year surveys in unstocked years to determine the extent of natural reproduction in the walleye population.
4. Monitor the largemouth bass population and reevaluate size structure, abundance, growth, length at age and relative weight in the next comprehensive fishery survey.
5. Monitor the black crappie population to evaluate size structure, abundance, growth, length at age and relative weight in the next comprehensive fishery survey. Consider exploring potential regulation changes to reduce harvest and protect the population.
6. Monitor the bluegill population and reevaluate size structure, abundance, growth, length at age and relative weight in the next comprehensive fishery survey. Improve catch rates and PSD by exploring potential regulation changes to reduce harvest and protect the population.
7. Monitor the yellow perch population to evaluate size structure, abundance, growth, length at age and relative weight in the next comprehensive fishery

survey. Consider exploring potential regulation changes to reduce harvest and protect the population.

8. Monitor the relative abundance of the common carp (*Cyprinus carpio*) population, via catch rates, in the next comprehensive fishery survey.
9. Conduct a lake-wide creel survey to estimate angler exploitation of all fish species in Rock Lake. With the large size of the lake and the current DNR budget situation, this may be cost prohibitive.

# Tables

*Table 1. Walleye stocking history 2005-2021 from both WDNR and private hatchery in Rock Lake, Jefferson County, WI.*

| Year | Species | Age Class | Number Stocked |
|---|---|---|---|
| 2005 | Walleye | Fry | 499,200 |
| 2006 | Walleye | Fry | 184,100 |
| 2006 | Walleye | Fry | 67,500 |
| 2007 | Walleye | Fry | 10,000 |
| 2009 | Walleye | Small Fingerling | 68,550 |
| 2011 | Walleye | Small Fingerling | 68,550 |
| 2013 | Walleye | Small Fingerling | 57,706 |
| 2015 | Walleye | Large Fingerling | 13,685 |
| 2015 | Walleye | Large Fingerling | 5,879 |
| 2017 | Walleye | Large Fingerling | 20,563 |
| 2019 | Walleye | Large Fingerling | 20,587 |
| 2021 | Walleye | Large Fingerling | 20,563 |

*Table 2. Catch summary of all gear types in 2022 on Rock Lake, Jefferson County, WI.*

| ALL GEARS | 2022 | | | |
|---|---|---|---|---|
| **Species** | **Number** | **Percent** | **Average Length (Inches)** | **Length Range (Inches)** |
| Black Bullhead | 1 | 0.02% | 12.3 | |
| Black Crappie | 172 | 4.08% | 7.1 | 3.4-13.4 |
| Bluegill | 846 | 20.05% | 5.2 | 1.5-9.2 |
| Bowfin | 111 | 2.63% | 22.6 | 18.8-28.2 |
| Brown Bullhead | 20 | 0.47% | 12.6 | 10.2-14.7 |
| Golden Shiner | 23 | 0.55% | 6.7 | 5.3-8.1 |
| Lake Chubsucker | 29 | 0.69% | 8.5 | 5.9-10.2 |
| Largemouth Bass | 228 | 5.40% | 10.5 | 0.7-19.4 |
| Longnose Gar | 2 | 0.05% | 25.9 | 25.7-26.0 |
| Mudpuppy | 50 | 1.18% | 12.0 | 10.2-13.5 |
| Northern Pike | 462 | 10.95% | 20.4 | 9.2-35.3 |
| Pumpkinseed | 130 | 3.08% | 6.4 | 3.0-8.2 |
| Rock Bass | 209 | 4.95% | 7.9 | 2.7-11.6 |
| Smallmouth Bass | 111 | 2.63% | 9.7 | 2.9-17.5 |
| Walleye | 1774 | 42.04% | 17.9 | 5.9-25.9 |
| White Sucker | 4 | 0.09% | 20.8 | 19.0-22.4 |
| Yellow Bullhead | 24 | 0.57% | 11.1 | 8.2-14.8 |
| Yellow Perch | 24 | 0.57% | 6.0 | 3.5-8.8 |
| **Total** | **4220** | **100.00%** | **-** | |

*Table 3. Catch summary of the 2022 spring fyke netting (SNI) survey of Rock Lake, Jefferson County, WI.*

| SNI | 2022 | | | | |
|---|---|---|---|---|---|
| Species | Number | Percent | Average Length | Length Range (Inches) | #/Net Night |
| Black Bullhead | 1 | 0.03% | 12.3 | | 0.01 |
| Black Crappie | 172 | 5.17% | 7.1 | 3.4-13.4 | 1.54 |
| Bluegill | 489 | 14.69% | 5.7 | 2.6-9.1 | 4.37 |
| Bowfin | 111 | 3.34% | 22.6 | 18.8-28.2 | 0.99 |
| Brown Bullhead | 12 | 0.36% | 12.8 | 10.2-14.7 | 0.11 |
| Golden Shiner | 22 | 0.66% | 6.7 | 5.3-8.1 | 0.20 |
| Lake Chubsucker | 26 | 0.78% | 8.5 | 5.9-10.2 | 0.23 |
| Largemouth Bass | 31 | 0.93% | 10.1 | 5.4-19.4 | 0.28 |
| Longnose Gar | 1 | 0.03% | 26.0 | | 0.01 |
| Mudpuppy | 50 | 1.50% | | | 0.45 |
| Northern Pike | 458 | 13.76% | 20.4 | 9.2-35.3 | 4.09 |
| Pumpkinseed | 96 | 2.88% | 6.5 | 3.1-8.2 | 0.86 |
| Rock Bass | 174 | 5.23% | 8.3 | 3.4-11.6 | 1.55 |
| Smallmouth Bass | 27 | 0.81% | 12.2 | 7.3-17.5 | 0.24 |
| Walleye | 1622 | 48.74% | 18.2 | 13.4-25.9 | 14.48 |
| White Sucker | 4 | 0.12% | 20.8 | 19.0-22.4 | 0.04 |
| Yellow Bullhead | 23 | 0.69% | 11.1 | 8.2-14.8 | 0.21 |
| Yellow Perch | 9 | 0.27% | 6.8 | 5.6-8.0 | 0.08 |
| **Total** | **3328** | **100.00%** | | | **29.71** |

# Figures

*Figure 1. Contour map of Rock Lake, Jefferson County, WI.*

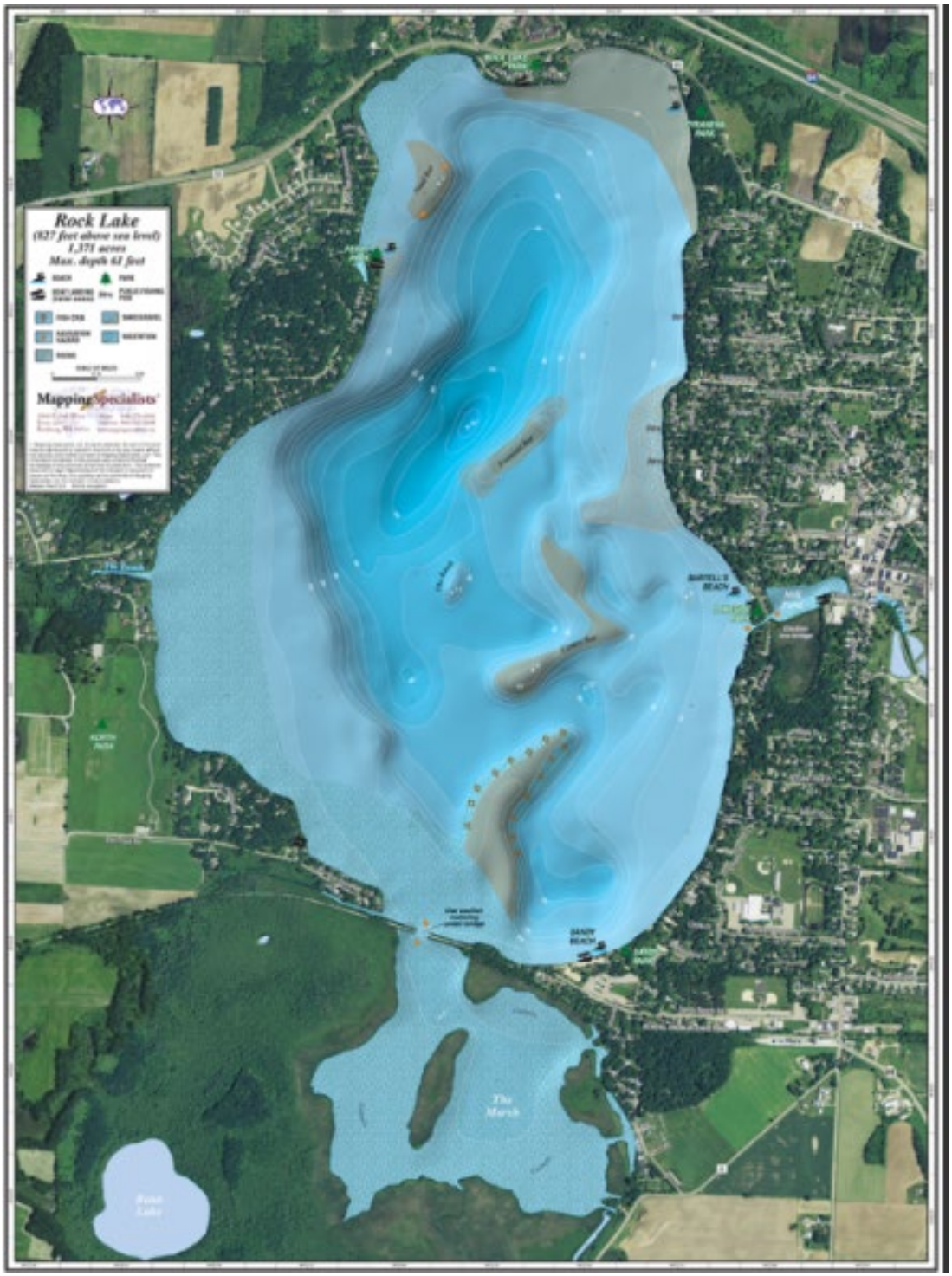


*Figure 2. Length-frequency histogram of walleye sampled during the 2014 and 2022 spring fyke netting (SNI) surveys of Rock Lake, Jefferson County, WI.*

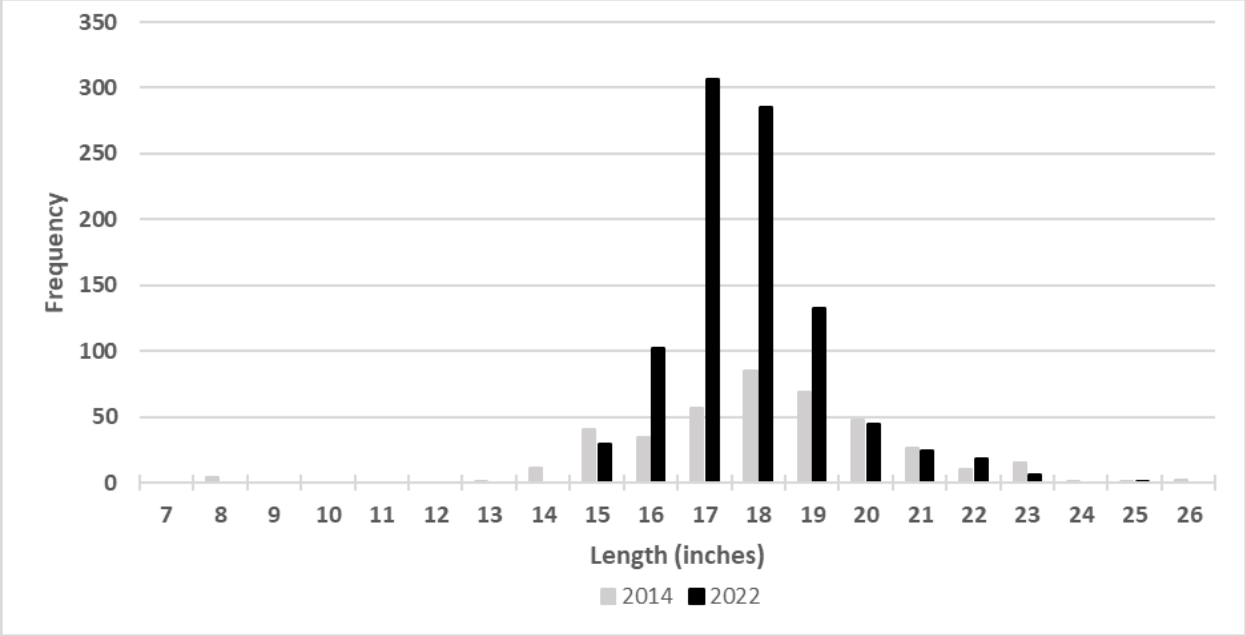



*Figure 3. Walleye mean length at age compared to statewide and south district averages determined using dorsal spines collected during the 2022 spring fyke netting (SNI) survey of Rock Lake, Jefferson County, WI.*

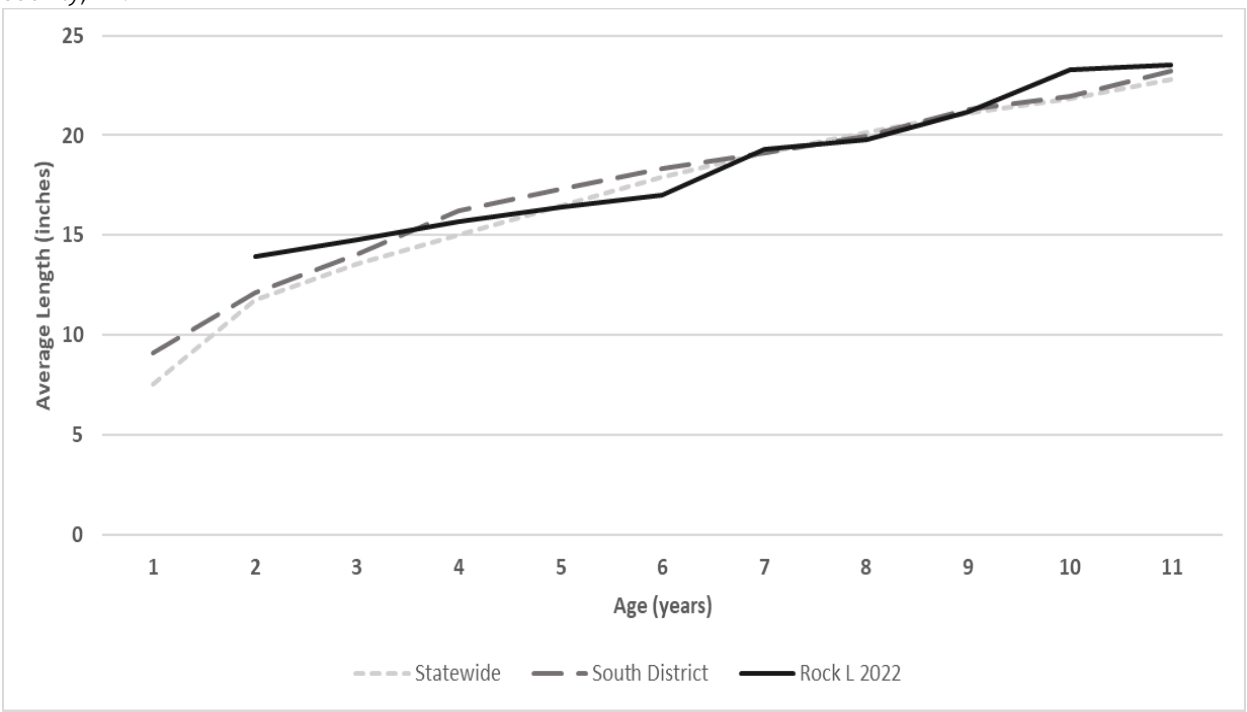


*Figure 4. Walleye catch curve for Rock Lake, Jefferson County, WI calculated from fish sampled during the 2022 spring fyke netting (SNI) survey. Z=0.35, S=0.70, A=0.30, F=0.15, Ages 7-11.*

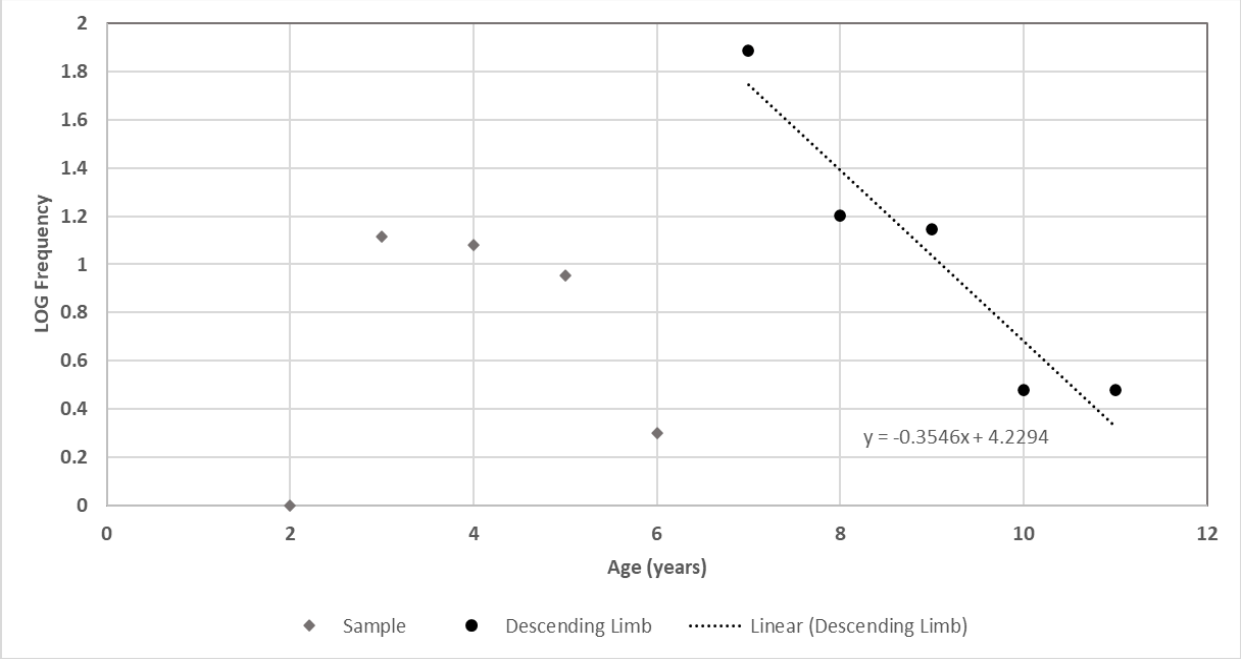



*Figure 5. Length-frequency histogram of walleye sampled during the 2022 fall electrofishing (FE) survey of Rock Lake, Jefferson County, WI.*

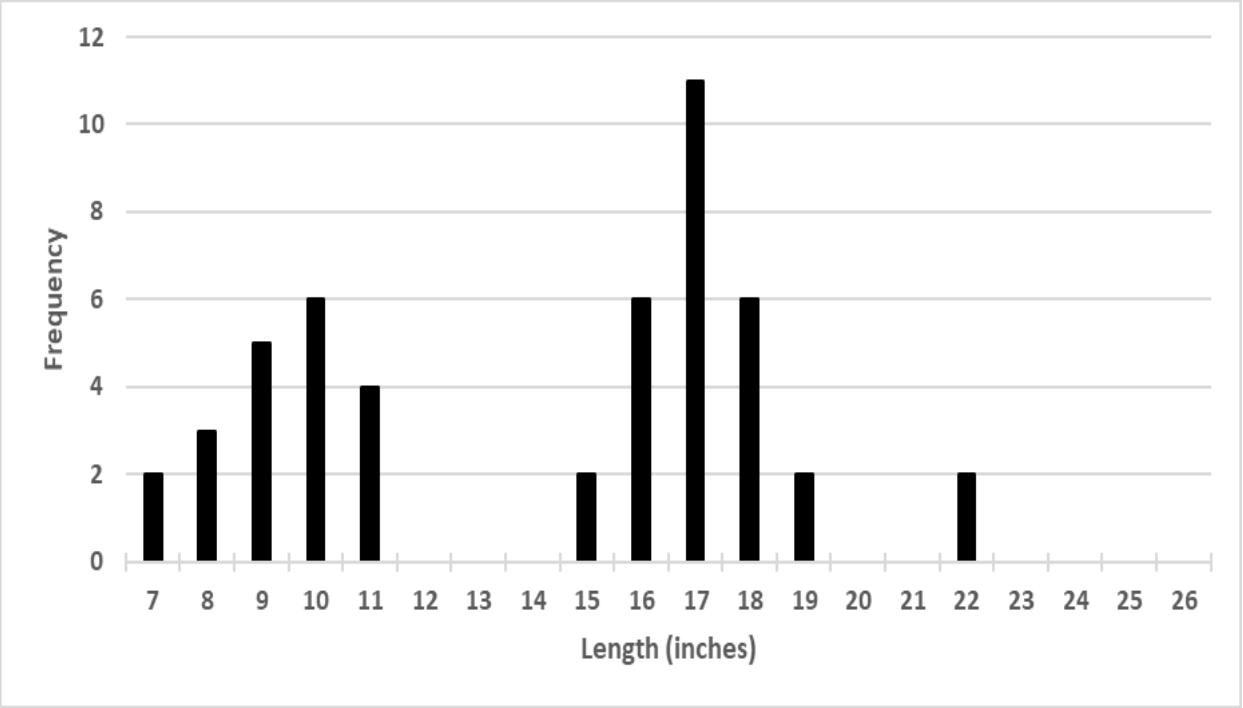


*Figure 6. Length-frequency histogram of northern pike sampled during the 2014 and 2022 spring fyke netting (SNI) surveys of Rock Lake, Jefferson County, WI.*

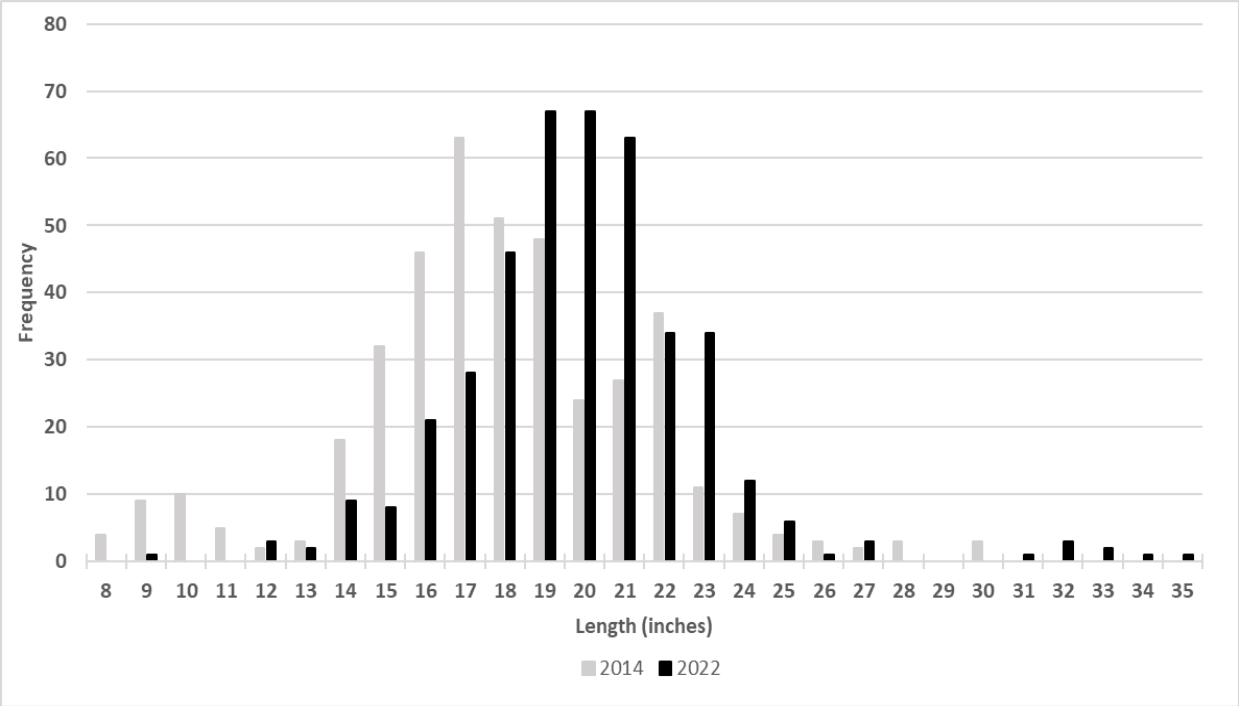



*Figure 7. Northern pike mean length at age compared to statewide and south district averages determined using pelvic fin rays collected during the 2022 spring fyke netting (SNI) survey of Rock Lake, Jefferson County, WI.*

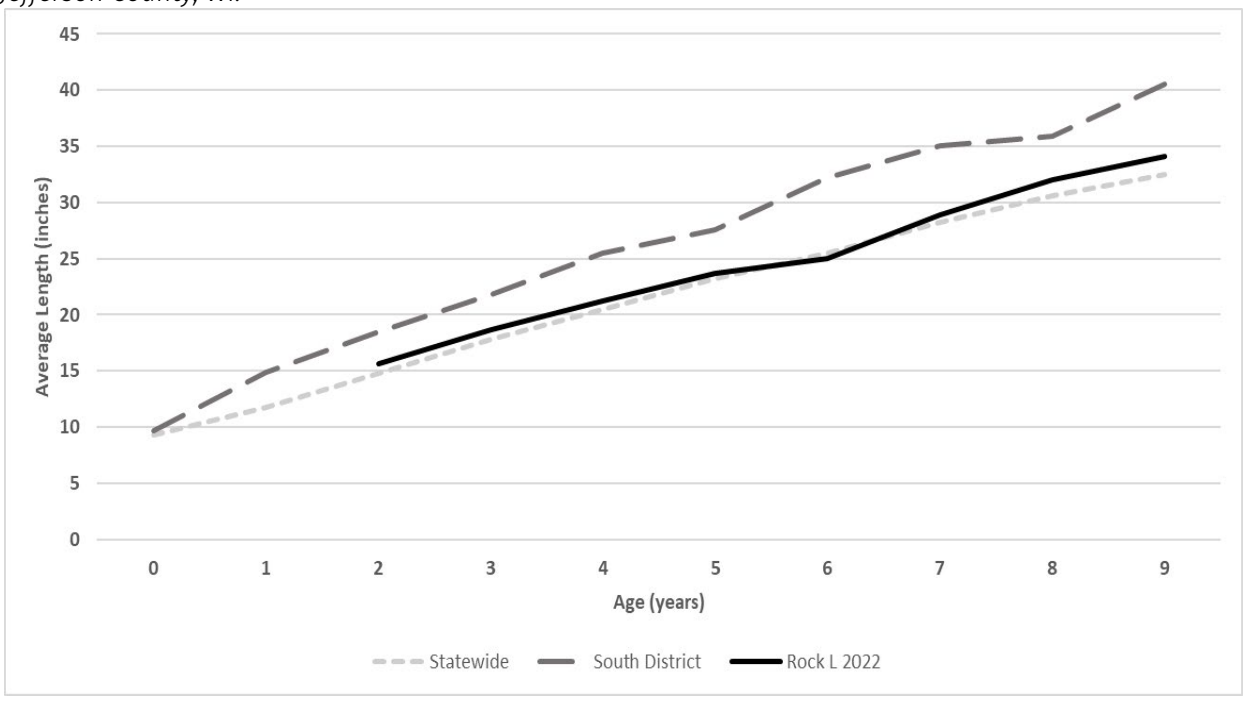


*Figure 8. Northern pike catch curve for Rock Lake, Jefferson County, WI calculated from fish sampled during the 2022 spring fyke netting (SNI) survey. Z=0.29, S=0.75, A=0.25, F=0.09, Ages 3-9.*


*Figure 9. Length-frequency histogram of largemouth bass sampled during the 2014 and 2022 spring electrofishing (SEII) surveys of Rock Lake, Jefferson County, WI.*

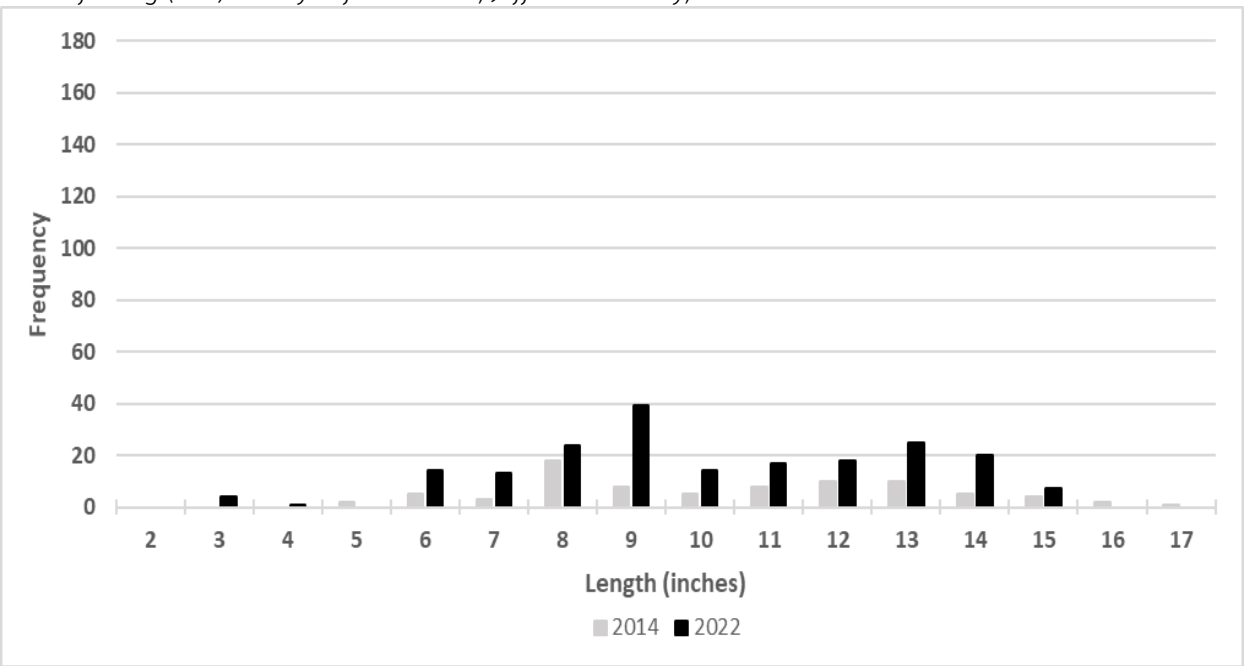


*Figure 10. Largemouth bass mean length at age compared to statewide and south district averages determined using anal fin rays and scales collected during the 2022 spring fyke netting (SNI) and 2022 spring electrofishing (SEII) survey of Rock Lake, Jefferson County, WI.*

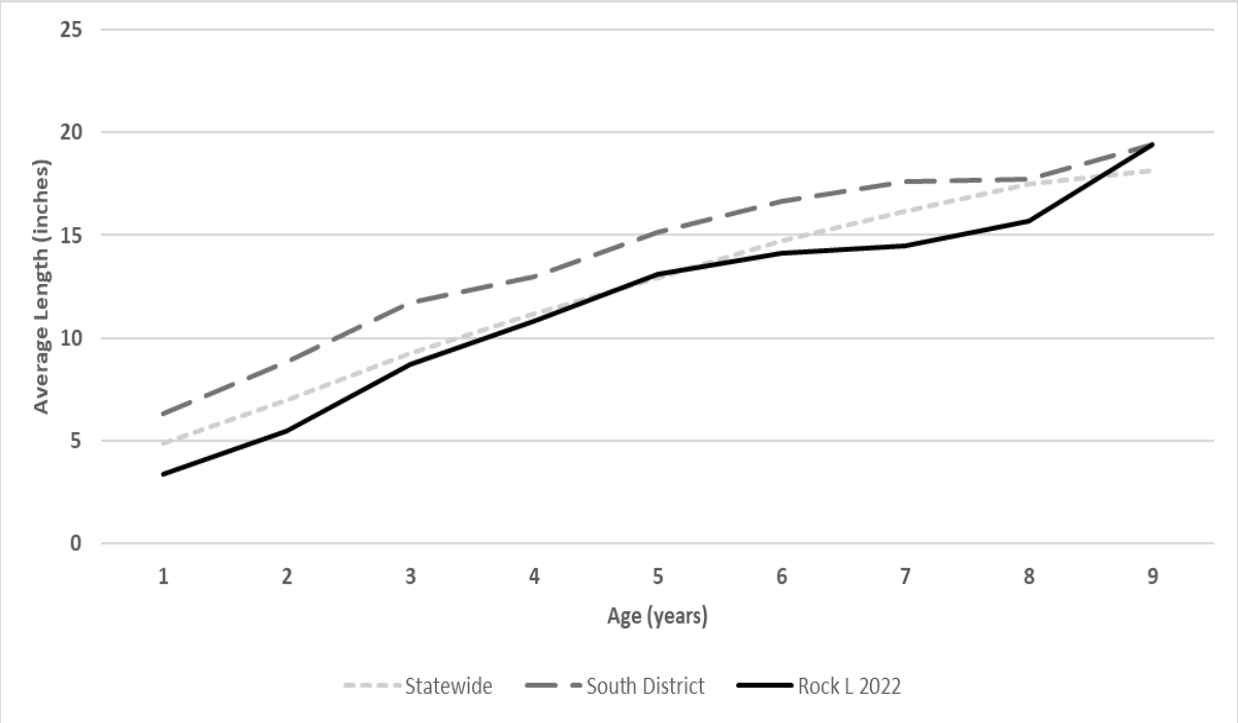



*Figure 11. Largemouth bass catch curve for Rock Lake, Jefferson County, WI calculated from fish sampled during the 2022 spring fyke netting (SNI) and 2022 centrarchid electrofishing (SEII) surveys. Z=0.24, S=0.79, A=0.21, F=0.04, Ages 3-9.*

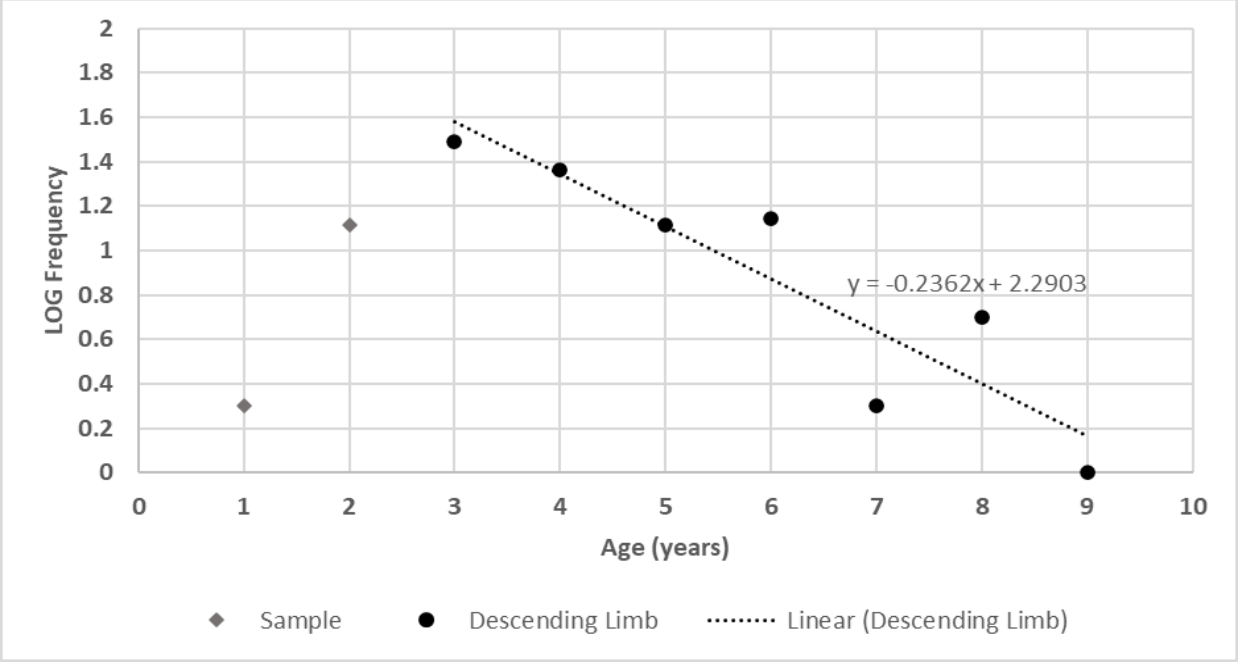


*Figure 12. Length-frequency histogram of bluegill sampled during the 2014 and 2022 spring fyke netting (SNI) surveys of Rock Lake, Jefferson County, WI.*

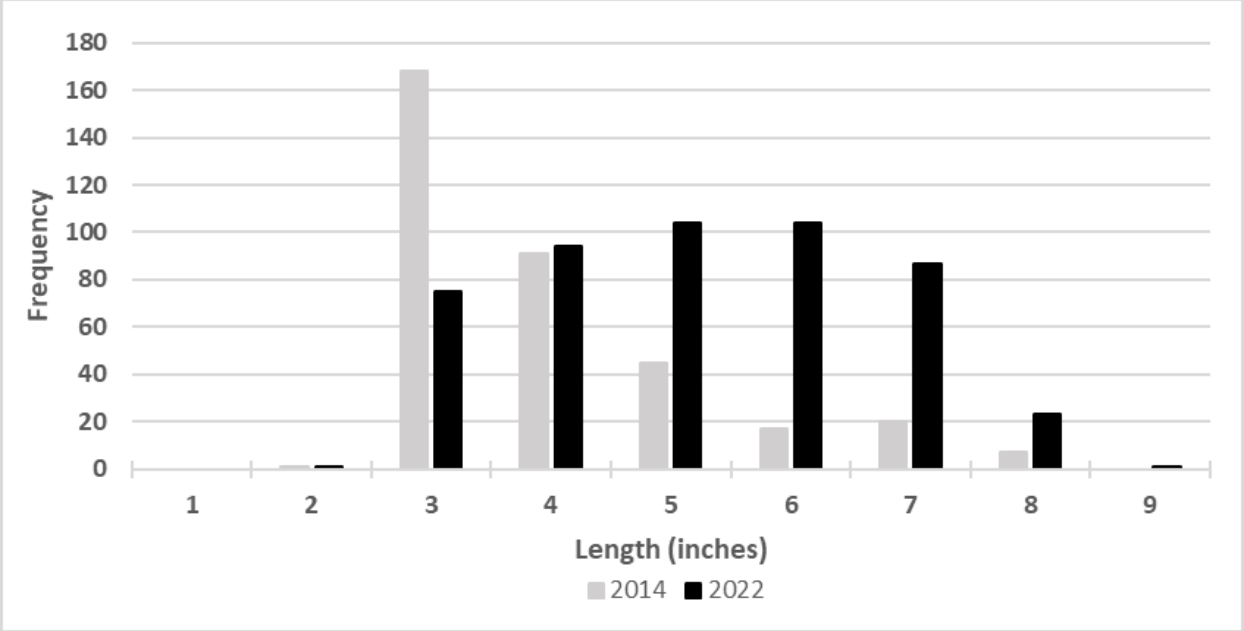



*Figure 13. Bluegill mean length at age compared to statewide and south district averages determined using otoliths collected during the 2022 spring fyke netting (SNI) and 2022 spring electrofishing (SEII) survey of Rock Lake, Jefferson County, WI.*

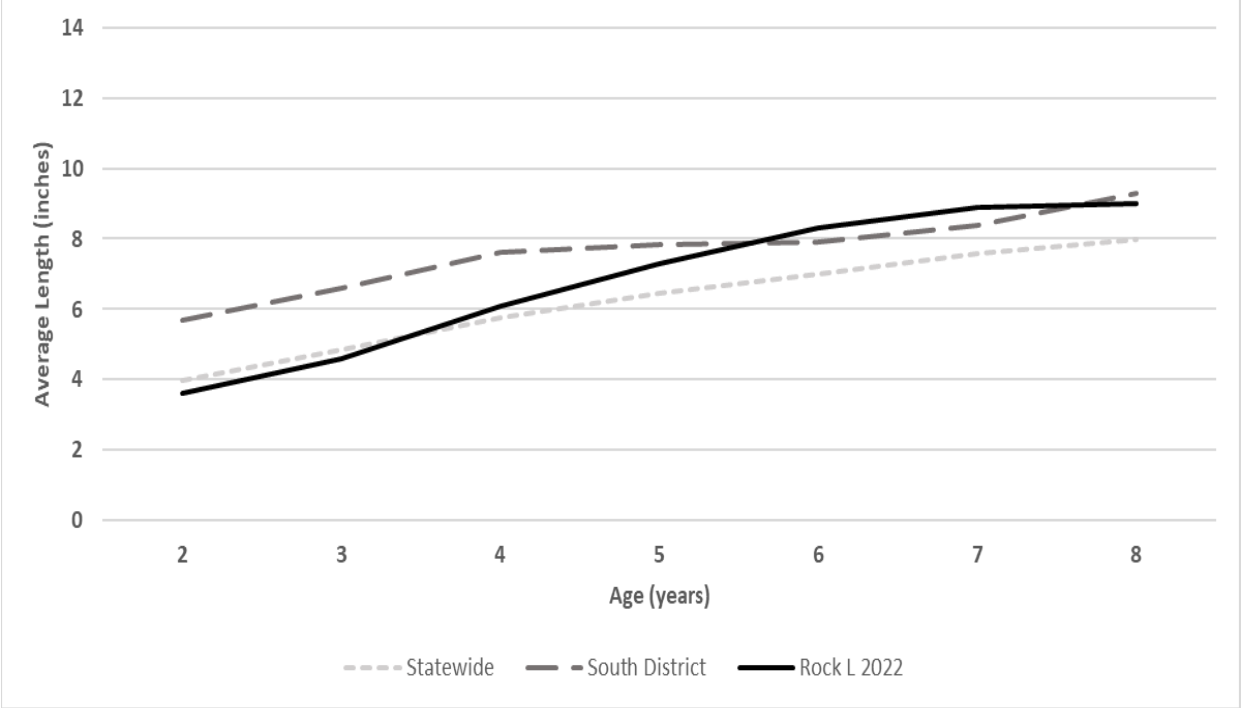


*Figure 14. Bluegill catch curve for Rock Lake, Jefferson County calculated from fish sampled during the 2022 spring fyke netting (SNI) and 2022 spring centrarchid electrofishing (SEII) survey. Z=0.23, S=0.79, A=0.21, F=0.03, Ages 3-8.*

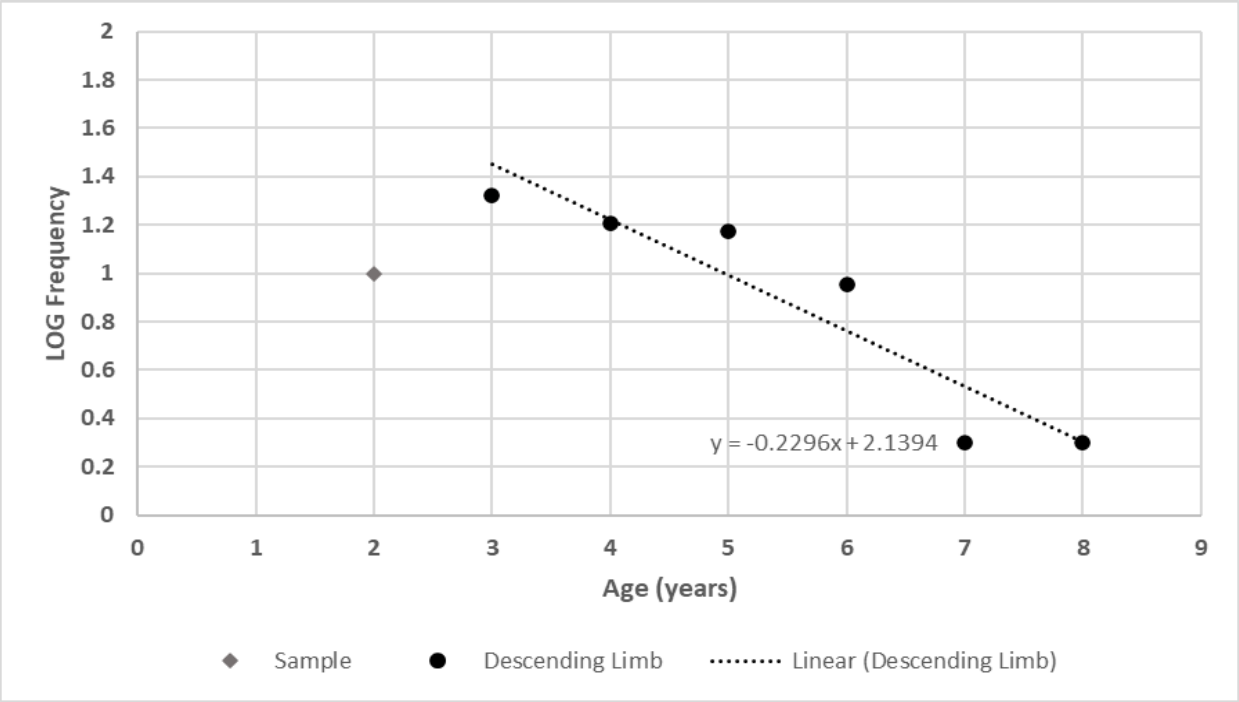



*Figure 15. Length-frequency histogram of black crappie sampled during the 2014 and 2022 spring fyke netting (SNI) survey of Rock Lake, Jefferson County, WI.*

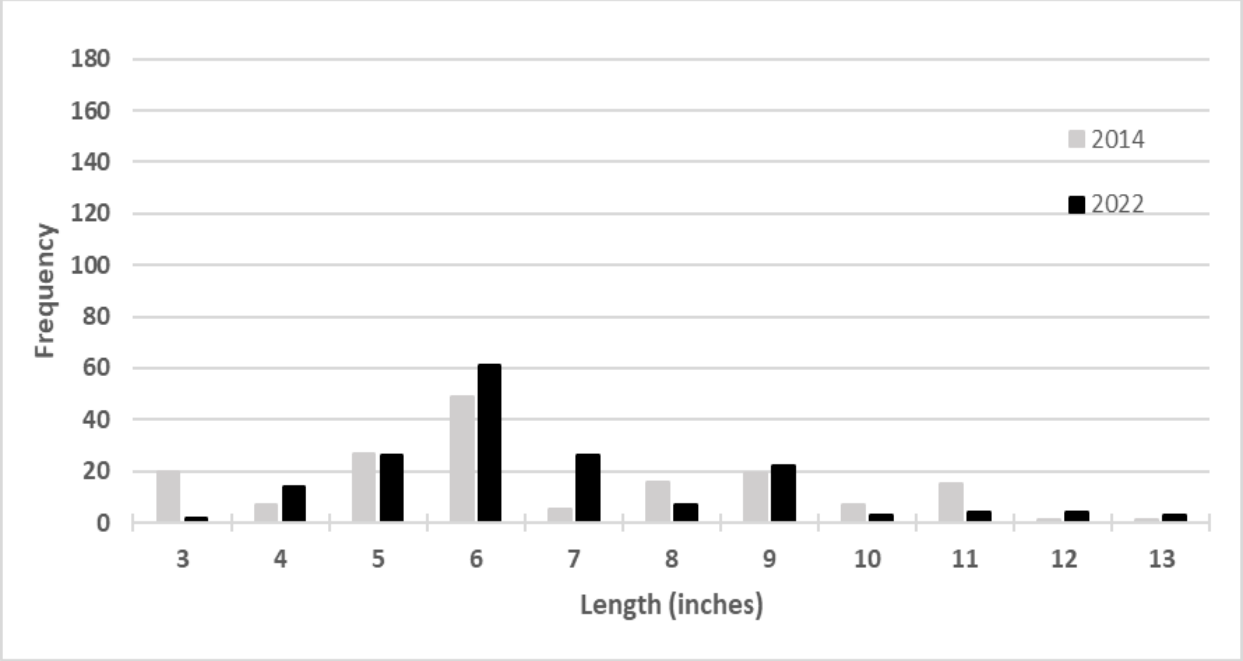


*Figure 16. Black crappie mean length at age compared to statewide and south district averages determined using otoliths collected during the 2022 spring fyke netting (SNI) survey of Rock Lake, Jefferson County, WI.*

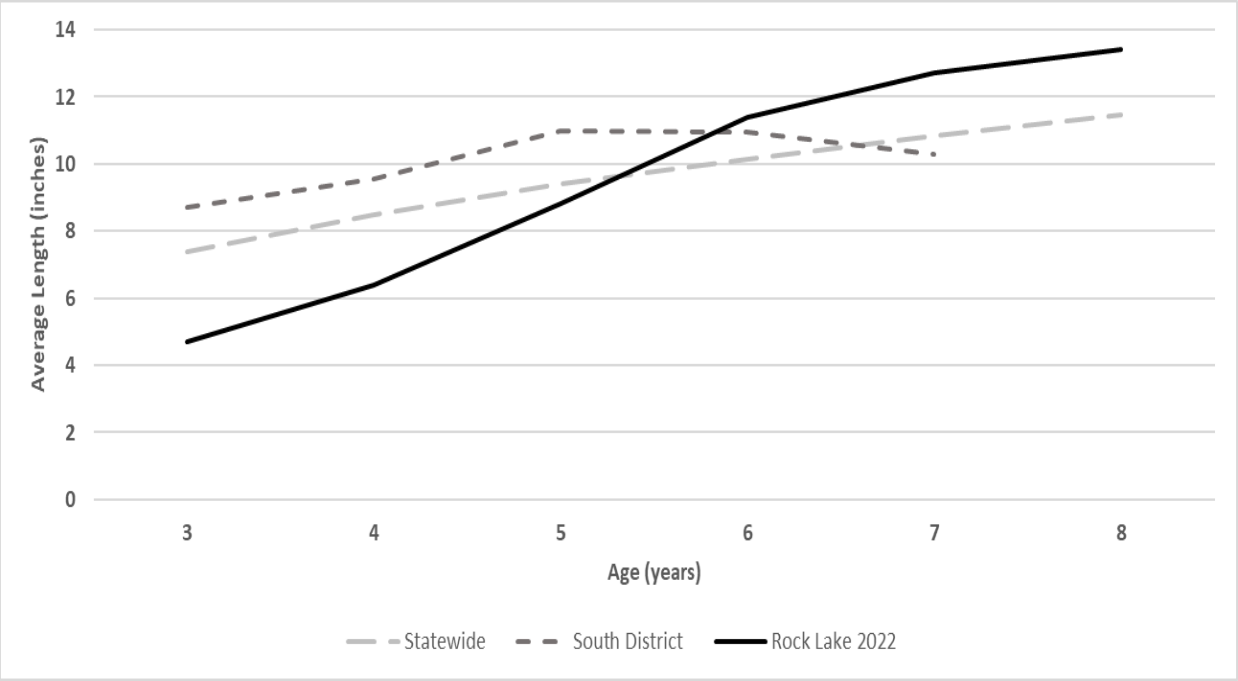



*Figure 17. Black crappie catch curve for Rock Lake, Jefferson County, WI calculated from fish sampled during the 2022 spring fyke netting (SNI) survey. Z=0.35, S=0.70, A=0.30, F=0.15, Ages 4-8.*

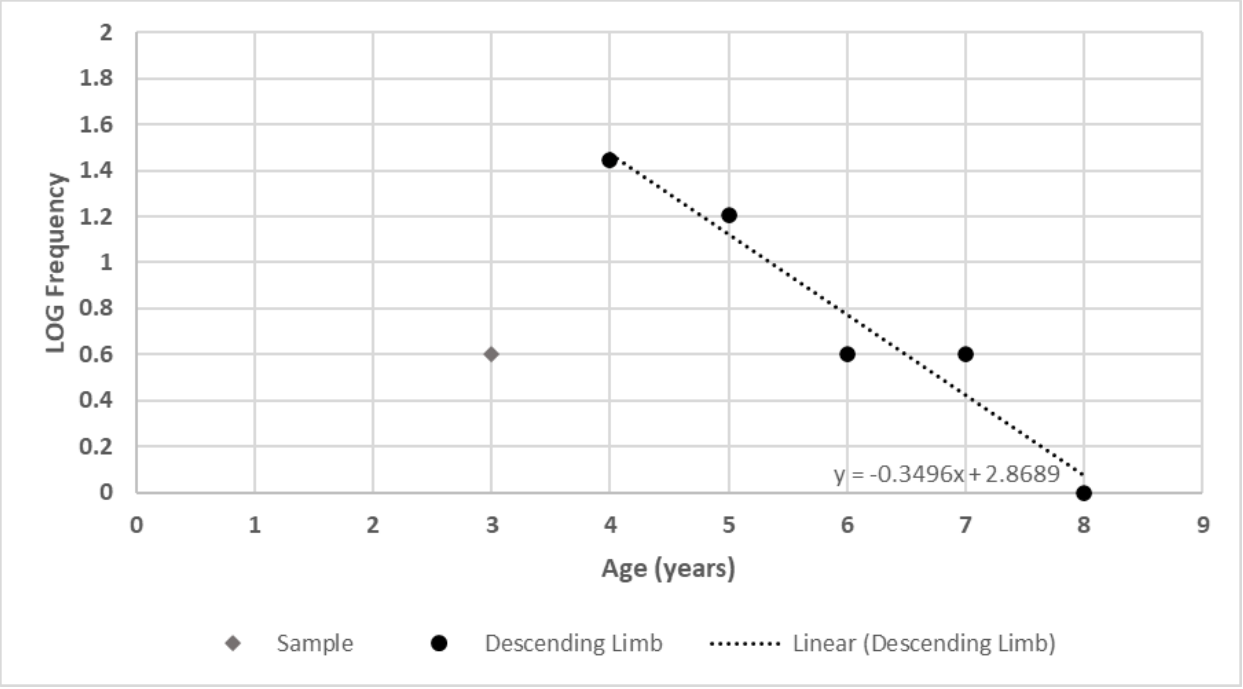


*Figure 18. Length-frequency histogram of pumpkinseed sampled during the 2014 and 2022 spring fyke netting (SNI) survey of Rock Lake, Jefferson County, WI.*

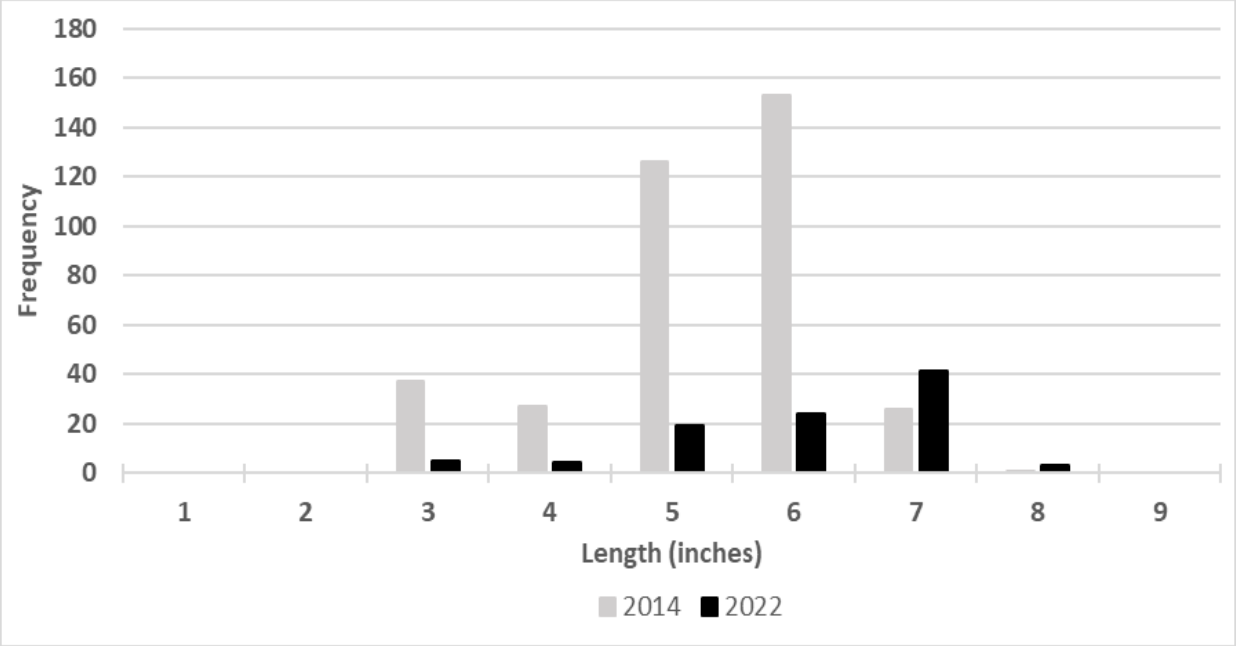
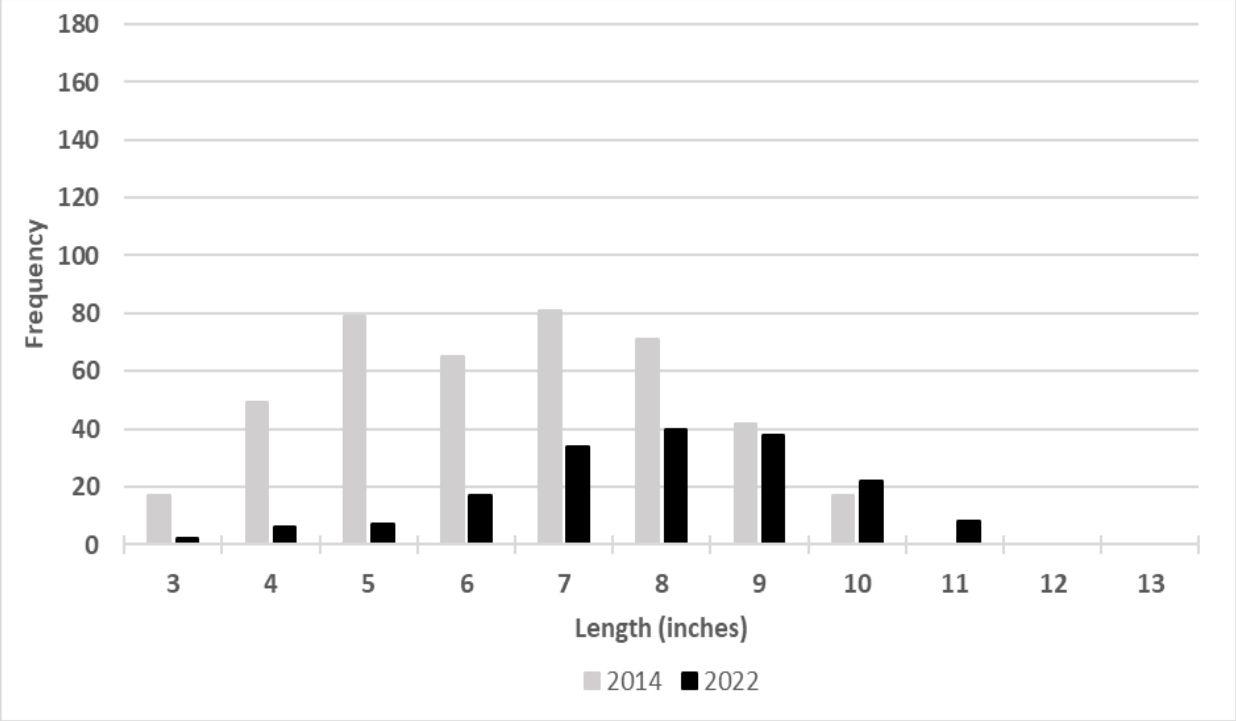



*Figure 19. Length-frequency histogram of rock bass sampled during the 2014 and 2022 spring fyke netting (SNI) survey of Rock Lake, Jefferson County, WI.*



# Acknowledgments

The field work, data collection, scale, spine, fin ray and otolith aging and data entry required for this survey was conducted by DNR Biologist Kristina Pechacek and DNR Fisheries Technicians Mark Baldock and Megan Drymalski. Report reviews and editing were provided by DNR Fisheries Management staff including Laura Stremick, Kristina Pechacek and Tim Simonson.

# References

Anderson, R.O. and R.M. Neumann. (1996) Length, Weight and Associated Structural Indices. Pages 447-482 in B.R. Murphy and D.W. Willis, editors. Fisheries Techniques, 2nd edition. American Fisheries Society, Bethesda, Maryland.

Hansen, G.J.A., Gaeta, J.W., Hansen, J.F & Carpenter, S.R. (2015) Learning to Manage and Managing to Learn: Sustaining Freshwater Recreational Fisheries in a Changing Environment. Fisheries 40(2):56-64.

Murphy, B.R., and D.W. Willis (1996) Fisheries techniques, 2nd edition. American Fisheries Society, Bethesda, Maryland.

Schneider, J. C. (1978) Selection of minimum size limits for Walleye fishing in Michigan. American Fisheries Society Special Publication 11:398–407.

Willis, D.W. (1989). Proposed standard length-weight equation for northern pike. North American Journal of Fisheries Management 9:203-208.

Willis, D.W., B.R. Murphy, and C.S. Guy. (1993) Stock density indices: development, use, and limitations. Reviews in Fisheries Science 1:203-222.