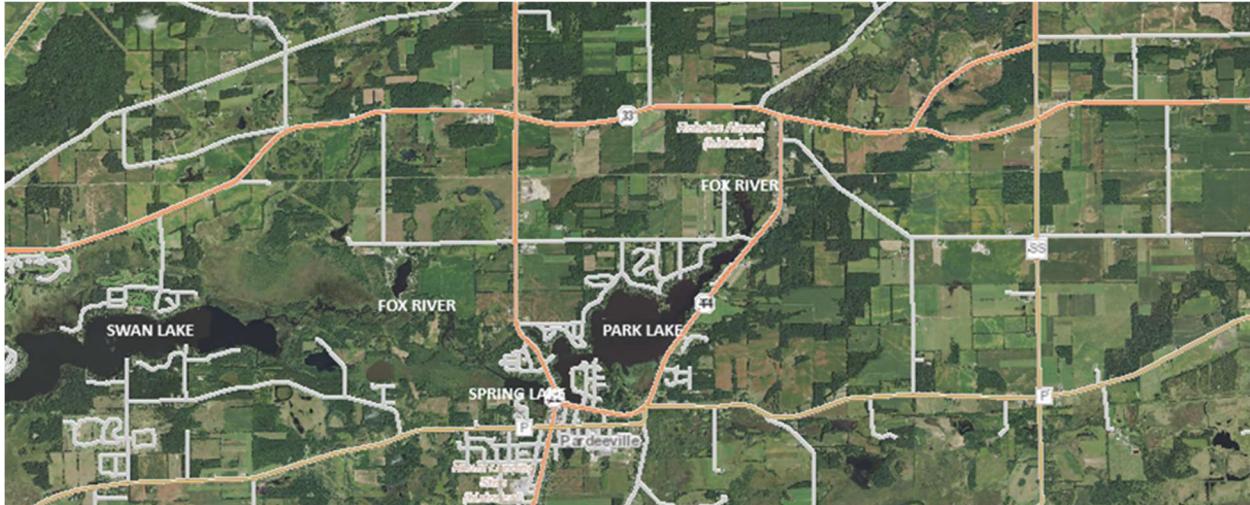


WISCONSIN DEPARTMENT OF NATURAL RESOURCES
Comprehensive Fishery Survey of Park Lake,
Columbia County, Wisconsin 2021

Waterbody Identification Code: 180300



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EXECUTIVE SUMMARY

A comprehensive fishery survey was conducted on Park Lake during the spring of 2021. Park Lake sampling included early fyke netting for northern pike and walleyes (SN1), early electrofishing to recapture marked walleyes (SE1), late spring electrofishing for bass and panfish (SE2) and fall electrofishing to assess walleye recruitment (FE). In general, gamefish species were present at abundances consistent with other lakes in the Complex Warm Dark lake class. Gamefish species exhibited good to excellent growth and body condition.

Panfish were common in Park Lake, but abundance varied among species. Park Lake had the highest abundance of yellow perch of any lake in the Poynette management area based on fyke net catch rates. Perch growth was above the state average and lake class median, but the size structure was poor because the age structure was young. yellow perch averaged 9 inches by age 5. Bluegill abundance was low across all comparisons (area, state and lake class) based on spring electrofishing catch rates. However, bluegill growth was above area and state averages and lake class medians, and size structure was improved from 2011. Bluegills averaged over 8 inches by age 6. Black crappie abundance was reduced significantly from 2011, but black crappie growth was among the best of area lakes, trailing only Lake Wisconsin. Population size structure was better than all other area lakes based on proportional size distribution (PSD) values. Black crappies averaged over 10 inches by age 3 and nearly 12 inches by age 5. Ages 4 and 6 were very weak or missing year classes for yellow perch and black crappie and may indicate elevated predation pressure from age 1 walleyes stocked in the fall preceding those years.

The Chapman walleye population estimate (PE) of 0.6 adult walleyes \geq 15 inches per acre showed a nearly 50% decline from the 2011 PE of 1.1 adults/acre. A switch to alternate year stocking and a missed round of stocking in 2018 led to successive missing year classes (ages 3 and 4) which would form the bulk of the fishery in a typical lake. Expanding the PE found there were 3.4 walleyes/acre \geq 12 inches in Park Lake in 2021, reflective of the 2019 stocking of extended growth (EG) fingerlings (age 2). The FE survey found no naturally produced fingerlings, meaning successful natural reproduction does not occur in Park Lake. Walleye growth was excellent, well ahead of area and state averages and lake class medians. Walleyes averaged over 18 inches by age 4.

Northern pike were present in Park Lake, and abundance appeared to be unchanged since 2011 based on the SN1 catch rates in both years. The Schnabel population estimate for sexually mature northern pike in 2021 was 300 fish or 1.0 fish/acre (no 2011 value for comparison). Three percent of northern pike larger than 14 inches exceeded 32 inches and thus were legal to harvest ($PSD-32 = 3$). Northern pike growth was good, with mean length at age at or above area and state averages and lake class

medians through age 7. Only female northern pike reached legal harvest size in Park Lake, with some exceeding 32 inches by age 4. Preliminary results of genetic analysis matched 24% (17/72) of sampled northern pike < 26 inches that were ages 1-4 to DNR hatchery parents; stocked fish contribute substantially to the northern pike population in Park Lake.

FUTURE MANAGEMENT RECOMMENDATIONS

1. Future stocking of panfish is not recommended and will not be approved by the Wisconsin Department of Natural Resources (DNR). It is recommended that the Pardeeville Lakes Management District (PLMD) spend funding earmarked for panfish stocking be spent on habitat initiatives instead. Habitat additions such as fish sticks are likely to have more wide-ranging benefits to fish in Park Lake than additional panfish stocking.
2. The panfish abundance goal established in the 2012 Implementation Plan for the 2007 Park Lake Comprehensive Management Plan should be modified to be bluegill-specific: ≥ 100 bluegills/mile during SE2. This more closely reflects values expected for Complex Warm Dark lakes (median CPUE = 117 bluegills/mile) and is more in line with bluegill abundance goals on other area lakes.
3. Largemouth bass abundance and size structure metrics established in the 2012 Implementation Plan for the 2007 Park Lake Comprehensive Management Plan are realistic and should remain unchanged. Based on the lack of any evidence that stocking largemouth bass increased their abundance in Park Lake, the PLMD should consider reallocating money spent annually on bass stocking to habitat initiatives such as fish sticks instead.
4. Smallmouth bass stocking from private sources may continue as long as fish with Lake Michigan genetics are stocked, although only 16 were captured in our spring and fall surveys.
5. The adult walleye abundance goal of 2.0 adults/acre is realistic and should continue to be the goal moving forward. State-raised walleye stocking should continue at the rate of 15 EG walleyes/acre in even-numbered years.
6. Supplemental stocking of privately sourced walleyes by the PLMD in odd-numbered years to increase adult walleye density to the desired density may be considered for Park Lake if the private producer is able to provide Lake Michigan strain walleyes.
7. Northern pike stocking in Park Lake should continue, using small fingerlings stocked at the rate of 10 fish/acre. All northern pike stocking in Park Lake, public or private, should utilize Lake Michigan genetics.
8. One or more FE surveys should be completed prior to the next comprehensive survey in 2031 to assess common carp and gizzard shad abundance relative to goals established in the Park Lake Comprehensive Management Plan. This could occur as soon as 2023.

9. Fishing regulations for walleye, northern pike and largemouth bass designed to affect a biomanipulation (reduction in common carp and gizzard shad abundance via predation) should remain in effect.

GENERAL LAKE INFORMATION

Lake & Location

Park Lake, Village of Pardeeville, Columbia County
T12N, R10E, Sections 2, 3 (Town of Wyocena)

Physical/Chemical Attributes

Morphometry: 312 acres, maximum depth of 27 feet, average depth of 7 feet

Watershed: 53.8 square miles with 3% (1.6 square miles) draining directly into the lake and 97% (52.2 square miles) draining into the Fox River (Cunningham et al. 2007)

Lake Type: Drainage (artificial impoundment of the Fox River)

Water Clarity: Turbid with summer algal blooms

Littoral Substrate: 67% sand, 23% muck, 6% silt, 4% gravel

Trophic Status: Eutrophic, the Fox River watershed above Park Lake is highly agricultural.

Aquatic Vegetation: Diversity decreased from 15 species in 1978 to six species by 2003. Submersed aquatic vegetation is rare and is dominated by Eurasian watermilfoil and curly leaf pondweed. Park Lake has shifted from a plant dominated to an algal dominated community.

Winterkill: Infrequent

Boat Landings: Three public boat access points exist on the lake; two are controlled by the Town of Wyocena and one by Columbia County.

Other Features: There are two dams; one is located at the northwest end of the lake and one is located at southwest end of the lake that has a top draw spillway. Hook and line fishing season dates, minimum harvest lengths and bag limits can be found in Table 1.

Purpose of Survey

Baseline lake survey Tier 1 assessment.

Dates of Fieldwork

Fyke netting survey conducted March 14 through April 6, 2021 (SN1).

Spring electrofishing surveys conducted April 6, 2021 (SE1) and May 17-18, 2021 (SE2).

Fall electrofishing survey conducted October 12, 2021.

Fishery

Yellow perch were abundant. Channel catfish were common. Black crappie, largemouth bass, bluegill, walleye and northern pike were present.

Introduction

Park Lake is a 312-acre artificial impoundment of the Fox River in north central Columbia County. Water from the lake is released from a small hydroelectric dam on the southwest corner of the lake that drains into Spring Lake, which outlets directly to the Fox River upstream of Swan Lake. Water also flows out of Park Lake through the primary dam on the Fox River in the northwest corner of the lake. Park Lake has a maximum depth of 27 feet and a mean depth of 7 feet. Two public boat access points exist on the lake; one is controlled by the Town of Wyocena and one by Columbia County. The access site controlled by the county is located on State Road 44 and has a paved surface, launching dock and parking spaces for up to 25 vehicle-trailer units. The town boat landing (Rohde's Landing) is located on the north side of the lake at the end of Island Drive, with parking for up to five vehicle-trailer units along the launch corridor.

Park Lake is highly eutrophic, receiving nutrient inputs from the Fox River watershed upstream of the lake; the land use in this watershed is dominated by small-scale dairy and livestock operations along with row crop agriculture. The lake formerly had an abundant and diverse aquatic plant community, but in recent times has converted to low abundance and diversity of submerged aquatic vegetation, and the plant community is dominated by algae. The number of species of aquatic vegetation decreased from 15 in 1978 to six by 2003, with Eurasian watermilfoil and sago pondweed the only submersed species remaining (Cunningham et al. 2007). Curly leaf pondweed appeared in the lake by 2006 (Cunningham et al. 2007).

The lake is in a nearly constant turbid state. Common carp and gizzard shad are two nuisance fish species that contribute to this turbid state. The Wisconsin Department of Natural Resources (DNR) partnered with the PLMD in 1998 on a program of high-density walleye stocking, which continued through 2006. The goal of the program was to perform a biomanipulation whereby gizzard shad would be controlled through predation by walleyes. Small fingerling walleyes were stocked at rates from 100 to 500 per acre every year (2 to 10 times the recommended every other year stocking

rate, Cunningham et al. 2007). These stockings of small fingerlings were supplemented with occasional stockings of fry and large fingerlings. The program was ended following 2006; a walleye population estimate in the spring of 2007 placed the density of adult walleyes \geq 15 inches at 1.9 per acre and 3.8 total walleyes per acre. This was slightly below the two adults \geq 15 inches per acre goal of a stocked walleye fishery in southern Wisconsin. The gizzard shad population did not appear to be affected, and the program was deemed unsuccessful in controlling the gizzard shad. Extra protection for walleyes in the form of an increased minimum length limit and a decreased bag limit likely would have helped to increase the numbers and population size structure of adult walleye had they been in place, but that was not the case.

Park Lake has an extensive history of fish stocking. Largemouth bass (primarily from private hatcheries) were stocked on a few occasions in the 1970s, again in 2005 and each year from 2015-2020. Muskellunge and tiger muskellunge were stocked on several occasions beginning in the late 1980s and running through the early 2000s. These were a mixture of fish produced by DNR hatcheries and DNR co-op ponds (Portage Musky Club). Musky and tiger musky stocking ceased as the management philosophy moved away from stocking muskies on top of naturally reproducing native northern pike, and the Portage Musky Club ceased musky rearing operations at their facility. Northern pike from both DNR and private sources were stocked periodically from the mid-1970s through 2009 and annually from 2012-2020.

A stocked walleye fishery is maintained by stocking DNR-raised fish. After a period of annual stocking of 18 small fingerling walleye (mean length 1.5 inches) per acre, Park Lake began receiving 15 extended growth (EG) fingerlings (mean length 7 inches) per acre during even-numbered years in 2014. This was made possible by the Wisconsin Walleye Stocking Initiative. The 2014 and 2016 walleye stockings happened as scheduled. Walleyes were not stocked in 2018 due to the inability of a private supplier to produce fish for the quota. Walleye were then stocked in back-to-back years in 2019 and 2020.

Channel catfish have been stocked periodically since 1996, with fish coming from both a federal and private hatchery. Bluegills stocked in 2005 and from 2015-2020 were purchased from a private hatchery. The same was true for black crappies stocked in 2019 and 2020. Current DNR base stocking quotas include 15 EG walleyes per acre in even-numbered years and 10 small fingerling northern pike per acre annually.

Historically, Park Lake supported a good fishery for bluegills, black crappies, largemouth bass and northern pike. However, when comparing catch rates of bluegills, black crappies and largemouth bass in 1996 vs. 2007, a severe decline in the fishery was apparent. Bluegill fyke net catch per unit of effort (CPUE) declined from 458 per net night to 62 per net night, black crappie fyke net CPUE declined from 340 per net night to 26 per net night, and largemouth bass electrofishing CPUE declined from 23 per mile to seven per mile (Cunningham et al. 2007). During fall electrofishing surveys from 1997 to 2005, largemouth bass CPUE declined from nearly 60 per mile to less than 10 per mile (Cunningham et al. 2007). Walleye and northern pike CPUE fluctuated during this period but remained within the normal range compared to similar lakes in Wisconsin (Cunningham et al. 2007). One event of note was a mass die-off of northern pike in July 1995, where an estimated 500-600 northern pike perished; a necropsy of deceased fish by DNR fish health personnel determined the cause of death to be heat stress.

In 2007, PLMD, DNR and Columbia County produced a Park Lake Comprehensive Management Plan, and this plan was approved by the DNR in 2009. This management plan was the result of a thorough study of the watershed, the aquatic plant community and the fishery in the lake. Recommended actions outlined in the management plan included a whole lake restoration that would require a drawdown of the lake level. This drawdown would facilitate natural compaction of the lake bottom sediments to allow the re-establishment of native aquatic vegetation following the re-filling of the lake. It would also allow for an affordable chemical treatment of the lake with rotenone during the drawdown to eradicate nuisance

common carp and gizzard shad and provide for the re-establishment of a desirable fishery through fish stocking. Additional recommended actions included changing fishing regulations to protect predator fish through increased minimum length limits and decreased daily bag limits, and establishing no wake zones to aid in the protection of recovering submerged aquatic vegetation. The ultimate goal of the whole lake restoration was to restore a clear water state with abundant aquatic plants instead of the turbid lake dominated by algae.

Once approved by the DNR, a team was formed to implement the Park Lake Comprehensive Management Plan. The team included representatives from the PLMD, the Village of Pardeeville, the Town of Wyocena, the Columbia County Land and Water Conservation Department and the DNR (Fisheries Management, Water Resources and Environmental Analysis personnel). This team developed the Implementation Plan, and early in 2012, the PLMD and the Town of Wyocena voted to approve the plan, but the vote by the Village of Pardeeville Board ended in a tie, so no action was taken. A second vote by the Village Board on a Saturday one month later saw the Implementation Plan defeated by a single vote, and it was not undertaken. Concerns from village residents included the length of the required drawdown and the restoration of abundant aquatic plants that they deemed a nuisance.

Fishing regulations on Park Lake in the past followed the statewide general inland fishing regulations until a rule change in 2014 raised the minimum length limit on walleye from 15 to 18 inches, with the daily bag limit lowered from five fish to three. The minimum length limit on largemouth and smallmouth bass increased from 14 to 18 inches, and the daily bag limit decreased from five fish to one. The minimum size limit for northern pike was raised from 26 to 32 inches, with the daily bag limit lowered from two fish per day to one. These changes in size and bag limits offered more protection to these predator gamefish to increase their population levels and size structure and to combat nuisance common carp and gizzard shad (biomanipulation). This was one recommended action from the management plan that had enough support to move forward.

SURVEY EFFORT

Following ice-out at the upper end of the lake, two 2-foot frame fyke nets with rectangular hoops, 0.7-inch bar and 1.4-inch stretch mesh, and three 3-foot standard fyke nets with circular hoops, 0.7-inch bar and 1.4-inch stretch mesh were set on March 14, 2018. Nets were added gradually as the ice receded until eight total nets were set by March 21. Nets were added, removed or moved to new locations as necessary until the final net was removed on April 6. The fyke nets targeted northern pike and walleye (SN1), and the total effort was 148 net nights. Fyke net descriptions and locations (GPS coordinates) can be found in Table 2.

Gamefish, as defined in Wisconsin Statutes Section 29.001 (41), includes all varieties of fish except rough fish and minnows. Panfish are therefore gamefish, and by definition in Wisconsin Administrative Code Section 20.03 (29), panfish includes yellow perch, bluegill, black crappie, white crappie, pumpkinseed, green sunfish, warmouth and orangespotted sunfish (orangespotted sunfish are not present in Park Lake). For the purposes of this report, sport fish refers to a subset of gamefish including walleye, northern pike, largemouth bass, smallmouth bass and channel catfish.

Gamefish were measured to the nearest 0.1 inch, and a subsample of each species was weighed to the nearest 0.01 pound. Aging structures were taken from a subsample of bluegills, black crappies, yellow perch, walleyes, northern pike, largemouth bass, smallmouth bass and channel catfish. The calcified structures used to age each species are listed in Table 3. The goal was to take structures from five fish per half-inch group for bluegills, black crappies, largemouth bass, smallmouth bass and channel catfish. Five structures per half-inch group from each sex were removed from walleye, northern pike and yellow perch. Sex was recorded when evident for walleye, northern pike and yellow perch. Captured walleyes that were 12.0 inches and larger were marked with a top caudal fin clip, while fish smaller than 12.0 inches received a bottom caudal fin clip. Sexually mature northern pike were marked with a top caudal fin clip, and immature fish were marked with a bottom caudal fin

clip. Largemouth bass \geq 8 inches were marked with a top caudal fin clip, and fish \leq 8 inches were marked with a bottom caudal fin clip. Fin clips were given for the purpose of calculating mark-recapture PE for the species listed.

A DNR standard direct current (DC) boom shocker boat was used to sample fish on Park Lake, with the first electrofishing survey occurring on the night of April 6 (SE1) to recapture walleyes that were marked during SN1 and to mark largemouth bass for a PE. The entire shoreline was sampled, and all sport fish were collected and measured to the nearest 0.1 inch. Hard structures were removed, and fish were weighed as needed to fill out length bins for age and growth analysis. Walleyes were examined for marks for calculation of the PE and tagging of new walleyes \geq 12 inches continued. Largemouth bass were marked with fin clips as during SN1.

The late-spring electrofishing survey (SE2) occurred on May 17, 2021 to assess the relative abundance of panfish and recapture marked bass for a PE. Electrofishing output ranged from 160-180 volts at 20 amps with a pulse rate set at 60 cycles per second, and the duty cycle was 25%. The first station began at the State Road 44 boat landing and was 2 miles of shoreline in length. All species were collected during the first 0.5 miles, while sport fish only were collected for the remaining 1.5 miles. Subsequent all-species and sport fish stations continued in order, moving counterclockwise around the lake, with each station beginning where the previous station had ended until two all-species and three sport fish stations had been completed, encompassing the entire shoreline of the lake. Non-game fish were also collected and measured while sampling the 0.5-mile all-species stations, except common carp which were counted but not dipped. All gamefish were measured to the nearest 0.1 inch. Aging structures were taken, and weights were recorded as necessary to fill out length bins. Sport fish were examined for marks given in previous sampling. Starting and ending GPS coordinates for electrofishing stations can be found in Table 4.

The 2021 FE survey of Park Lake occurred on the night of Oct. 12, and the entire shoreline of the lake was sampled. The purpose of the fall survey was to assess the

abundance of walleyes that were stocked in 2020 and marked with a left ventral (LV) fin clip and to collect data from other sport fish species. All sport fish were collected and measured to the nearest 0.1 inch.

Methods

The walleye PE (number of adult fish \geq 15 inches) was calculated using the Chapman modification of the Petersen single-census method, where fish are marked during multiple fyke netting events (SN1), followed by a single recapture event (SE1). The formula is noted here:

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

where N is the estimated population size, M is the number of fish that were marked, C is the number of fish captured on the recapture run and examined for marks, and R represents the number of fish captured on the recapture run that had marks. Once calculated, the estimate was divided by the surface area of the lake to determine adult walleye density (number of fish \geq 15 inches / acre). This density was then compared to average densities for stocked and naturally reproducing walleye fisheries in Wisconsin.

A multiple census mark-recapture PE for northern pike was calculated using the Schnabel method. The formula for the Schnabel method is noted here:

$$N = \frac{\sum(C_t M_t)}{R+1}$$

where N is the population size, C_t is the number captured on day t, M_t is the number marked on day t, and R is the total number of recaptures from the survey (Ricker 1975). The PE is recalculated each successive day throughout the survey as new data are collected.

Various data analyses were completed using both Microsoft Excel and R (version 4.0.5) combined with R Studio (version 1.4.1106). For all sampling periods, total catch and catch-per-unit of effort (CPUE) was calculated by gear type for all species. Length

frequency distributions were generated for gamefish species of interest. Length range, mean and median lengths were calculated for gamefish species as well. Proportional size distribution (PSD), proportional size distribution of fish sizes often acceptable for harvest (PSD-H, either socially acceptable or legally acceptable under current fishing regulations) and proportional size distribution of preferred length fish (PSD-P) were calculated for all gamefish species of interest with more than 100 stock size individuals collected (Anderson and Neumann 1996, Guy et al. 2007). Length designations for stock, quality, harvestable, preferred, memorable and trophy sizes of the gamefish species collected from Park Lake can be found in Table 5; these values were used for calculating PSD (Anderson and Neumann 1996, Guy et al. 2007). For bluegills, PSD calculations were reported separately for fyke netting and electrofishing due to possible bias, with fyke nets being selective for larger bluegills (Laarman and Ryckman 1982).

Ages were estimated from calcified structures for a subsample of each species, and age and size data of these fish were used to generate age-length keys and ages were assigned to all fish sampled to estimate the age frequency of the population based on the aged subsample (Isermann and Knight 2005). Age frequency distributions were then generated for each species. Once age frequency distributions were completed for each species, inferences were made about year class strength and mortality when possible. Catch curves were generated for species exhibiting consistent recruitment and used to calculate total annual mortality rates. Mean length-at-age was used to make inferences about fish growth in Park Lake by comparing the lake to area, regional and statewide averages. Area averages are calculated from the mean length at age values from lakes managed out of the Poynette Fisheries office and surveyed from 2010-2021. Area comparisons are helpful for local anglers who are interested in knowing which of the lakes in their area that they might fish in a given day offer the greatest fishing potential for a certain species. Statewide comparisons help to give anglers a better idea how a given lake compares on a broader scale. Lake class

comparisons help anglers understand how a given lake shapes up against other lakes in the state that are the most like that lake.

Lakes classification systems have been developed by several states, and newly developed lake classes and comparison tools offer an opportunity not previously available for Wisconsin lakes. After several years of study by several DNR scientists, around 6,000 Wisconsin lakes were grouped into 15 classes based on the fish community in the lake (simple or complex), temperature (cool, warm, harsh), clarity (clear or dark) and hydrology (riverine, two-story, trout pond) (Rypel et al. 2019). Comparing fishery performance of a given lake to others within its lake class will help guide future management decisions and will help to inform the public by shaping more realistic expectations of how the fishery in that lake should perform. For instance, one should not expect a Simple-Warm-Dark lake to offer the same fishing experience as a Complex-Riverine lake. Park Lake is classified as Complex-Warm-Dark lake, a classification that includes 198 lakes across Wisconsin (Rypel et al. 2019). Lakes in this classification account for 3% of classified lakes by number, but account for 31% of the total surface area of classified lakes, which is more than any other lake class. Complex-Warm-Dark lakes have four or more sportfish species present, a high number of degree days, low water clarity, are located low in the landscape, contain walleyes, may contain abundant black crappie populations and may develop quality northern pike or musky size structure (Rypel et al. 2019).

Mean length-at-age was calculated using methods outlined in Bettoli and Miranda (2001), with the formula listed here:

$$\bar{L}_i = (\sum N_{ij} \bar{l}_{ij}) / N_i$$

where \bar{L}_i represents the mean length of the i th age group, $N_{ij} = N_j \left(\frac{n_{ij}}{n_j} \right)$, N_j is the number of fish in the j th length group, n_{ij} = number of fish of the i th age group subsampled in the j th length group, n_j is the number of fish subsampled in the j th length group, and $N_i = \sum N_{ij}$ over all j length groups. The inputs to this equation are derived from the length frequency distribution of the sample and the age-length key.

Relative weights were calculated to evaluate the body condition of the fish. Relative weight (W_r) is a tool that compares the length of the fish to an expected weight for that length. Standard weights were calculated for individuals of each species that had weights recorded, and standard weights were only calculated for individuals larger than the minimum recommended length for each species (Murphy et al. 1991, Anderson and Neumann 1996). Relative weights for each fish were calculated by dividing a fish's actual weight by the standard weight for a fish of that length. Average relative weight was then 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.

Results

GENERAL FISH COMMUNITY

In total, 12,000 fish representing 21 species and hybrids from nine families were collected during spring netting and electrofishing on Park Lake in 2021, with species listed by family in Table 6. Catch and catch rate (CPUE) by gear type are shown for each species collected in Table 7. Length, age and relative weight data are summarized in Table 8.

YELLOW PERCH

In total, 4,718 yellow perch were collected; catch rates were 32.0 fish/net night during SN1 and 7.0 fish/mile during SE2. The SN1 catch rate was slightly lower than the previous survey in 2011 (39.9 fish/net night) but was still the highest yellow perch fyke net catch rate out of 14 lakes surveyed in the Poynette management area since 2010. Compared to other lakes in its class across the state (Complex-Warm-Dark, 198 total lakes), the yellow perch catch rate was high, well above the 75% percentile for the class (Figure 1). Lengths of 1,198 yellow perch measured during SN1 and SE2 ranged from 3.8 to 11.3 inches, and the mean and median lengths were 6.1 and 6.0

inches, respectively. The yellow perch length frequency distribution is presented in Figure 2.

The 2021 PSD, PSD-9 and PSD-P values were 3, 1 and zero, respectively. The PSD values were lower than in 2011 when they were 8, 3 and zero, respectively. Compared to other area lakes surveyed since 2009, Park Lake ranks last in terms of yellow perch size structure when comparing PSD values (Table 9). Female PSD values were higher than males, and females accounted for 90% of the catch that measured 8 inches or larger. Therefore, the fish that anglers would find acceptable for harvest are predominantly female, which is relatively common across area lakes. Males ($n = 754$) ranged from 4.9 to 8.8 inches and averaged 5.9 inches, while females ($n = 416$) ranged from 5.3 to 11.3 inches and averaged 6.5 inches. An additional seven yellow perch were collected during SE2; lengths ranged from 3.8 to 6.4 inches and averaged 5.6 inches.

Yellow perch were fully recruited to the sampling gear by age 2, and this was true for males and females alike. While yellow perch recruitment is generally very good in Park Lake, age classes 4 and 6 were relatively weak compared to neighboring year classes (Figure 3). Interestingly, those year classes (produced in 2015 and 2017) correspond to the years following EG walleye stockings in 2014 and 2016. While applying a catch curve to the yellow perch data was not possible due to a couple of weak year classes, it appears that mortality is high after age 2. High mortality is most likely due to natural factors such as predation pressure by other fish rather than angler harvest based on the size of fish at ages 2 and 3. Yellow perch mean length-at-age was ahead of the state averages and lake class medians and on par with area averages, with fish averaging 9.0 inches by age 5 (Figure 4). Females grew faster and reached larger sizes than males, averaging 9.5 inches at age 5 compared to 7.8 inches at age 5 for males.

Overall, yellow perch in Park Lake were in excellent condition; relative weight values of 91 fish averaged 98.1 and were nearly equal when comparing females ($W_r = 97.8$) to males ($W_r = 98.5$). Four fish (4.3%) had a relative weight value ≤ 75 , indicating poor

body condition, and 36 fish (39.6%) had relative weight values ≥ 100 , indicating excellent body condition.

BLUEGILL

In total, 1,766 bluegills were collected during the spring; the catch rates were 11.7 fish/net night during SN1 and 43.0 fish/mile of shoreline during SE2. The SE2 catch rate was lower than the 2011 survey (71.0 fish/mile). The bluegill SE2 catch rate also ranked near the bottom when compared to other lakes in the Poynette management area (Table 10). Compared to other Complex-Warm-Dark lakes, Park Lake again compared poorly in terms of SE2 catch rate, placing below the 25th percentile (Figure 5). By all metrics, bluegill abundance in Park Lake in 2021 was lower than in 2011 and was low in general compared to nearby lakes and lakes in the same class statewide.

In total, 956 bluegills collected during SN1 and 43 collected during SE2 were measured and aging structures were taken from a subsample of 59 fish with lengths between 3.0 and 9.3 inches. Overall, lengths of 999 bluegills ranged from 3.0 to 9.3 inches, with mean and median lengths of 5.7 and 5.9 inches, respectively. The length frequency distribution for bluegills is presented in Figure 6. The PSD, PSD-7 and PSD-P values from SN1 were 50, 11 and 3, respectively. Size structure appeared to be better in 2021 compared to 2011 when the SN1 PSD, PSD-7 and PSD-P values were 35, 8 and 1, respectively. While drawing size structure comparisons from netting data is not preferable, too few bluegills were collected during SE2 in 2011 and 2021 to allow for meaningful PSD calculations or comparisons between years based on electrofishing data.

Recruitment appeared to be relatively steady based on the age frequency distribution, with relatively high annual mortality after age 3 through age 10 (Figure 7). The decline in number-at-age after age 3 may have coincided with bluegills reaching sizes anglers found acceptable for harvest by age 4 when some fish exceeded 7 inches. The total annual mortality estimated from the catch curve was 54.7% (Figure 8). This was relatively low compared to estimates from other area lakes

(10 lakes; range 41.2%-89.7%) and indicates that bluegill harvest is likely not excessive. Bluegills as old as age 10 were collected in 2021, compared to age 7 being the oldest in 2011. This may have been reflective of more accurate and precise age estimates arising from a switch from scales to otoliths as the preferred age structure.

Bluegill mean length-at-age in Park Lake appeared to generally be better than statewide averages and lake class medians and was on par with area averages, with fish averaging over 8 inches by age 6 (Figure 9). Mean length at age values in 2021 were higher than those observed in 2011, but again this may have reflected the switch from scales to otoliths as the age structure of choice as opposed to an actual improvement in growth. Overall, bluegills larger than 3 inches were in good condition; relative weight averaged 95.0. Nineteen bluegills (32.2%) had relative weight values >100, indicating excellent condition, while only two (3.3%) had relative weight values <75, indicating poor condition.

BLACK CRAPPIE

In total, 518 black crappies were collected; the catch rates were 3.5 fish/net night during SN1 and 1.0 fish/mile during SE2. The SN1 catch rate was drastically lower than the last survey in 2011 (113.9 fish/net night). The SN1 catch rate compared more favorably on the lake class level, falling slightly below the median for Complex-Warm-Dark lakes (Figure 10). Lengths of 354 black crappies measured during SN1 ranged from 2.8 to 13.3 inches, and mean and median lengths were both 10.4 inches. The PSD, PSD-9, PSD-P and PSD-M values were 91, 87, 77 and 27, respectively, and these values are indicative of good size structure when compared to other area lakes; Park Lake ranks at or near the top in every category (Table 11). The PSD values in 2021 were higher than those observed in 2011 when they were 89, 66, 11 and zero, respectively. The black crappie length frequency distribution from the 2021 survey is presented in Figure 11.

Ages ranged from 1 to 7 years with age 3 fish being the most common in the distribution (Figure 12). Two weak year classes were noticeable, ages 4 and 6, which

would have been produced in 2015 and 2017. These were the same weak year classes that were observed in yellow perch in Park Lake. The weak year classes violated the assumption of constant recruitment; thus, the application of a catch curve to the crappie data was impossible and no inference on annual mortality could be made. Mean length-at-age values for black crappies in Park Lake were higher than area and state averages and lake class medians for ages 2-7, with fish averaging over 10 inches by age 3 (Figure 13). Black crappie growth in Park Lake was very similar to its downstream neighbor on the Fox River, Swan Lake, and only fell a little behind Lake Wisconsin for the best in the area.

Overall, black crappies in Park Lake were in excellent condition; relative weight values of 83 fish averaged 99.1. Three fish (3.6%) had a relative weight value ≤ 75 , indicating poor body condition, and 46 fish (55.4%) had relative weight values ≥ 100 , indicating excellent body condition.

WALLEYE

In total, 991 walleyes were sampled during the spring including recaptures. The catch rates were 4.7 fish/net night (SN1), 35.2 fish/mile during SE1 and 18.3 fish/mile during SE2. The 2021 SN1 catch rate was lower than the last survey in 2011 (12.0 fish/net night) but was well above the median for the Complex-Warm-Dark lake class (Figure 14). Interestingly, the SE1 catch rate was far higher in 2021 compared to 2011 (35.2 fish/mile vs. 12.9 fish/mile). The same was true for the SE2 catch rate (18.3 fish/mile vs. 7.0 fish/mile). For the population estimate, a total of 68 walleyes ≥ 15 inches were marked during SN1 (M). Twenty-one were captured during SE1 (C) and seven were recaptures (R). The Chapman population estimate was 189 walleyes ≥ 15 inches (95% CI = 116-373) or 0.6 fish/acre (95% CI = 0.4-1.2 fish/acre). This was lower than the 2011 estimate of 1.1 walleyes ≥ 15 inches per acre, but the 95% confidence intervals of the 2011 and 2021 estimates overlapped. The coefficient of variation (CV) value is a measure of the precision of the estimate, and the CV for the population estimate was 26.7%, which is higher than the 20% or less recommended for reporting a PE (Krebs 1999).

When the PE was expanded to include all walleyes \geq 12 inches (age 2 and older walleyes), a total of 210 walleyes was marked during SN1 (M). During SE1, 110 walleyes were collected during SE1 (C), and 21 were recaptures (R). The Chapman population estimate was 1,064 walleyes \geq 12 inches (95% CI = 744-1,620, CV = 18.7%) or 3.4 fish/acre (95% CI = 2.4-5.2 fish/acre). This was higher than the 2011 estimate of 2.0 walleyes \geq 12 inches per acre, but once again, the 95% confidence intervals for the two estimates overlapped.

In total, 868 unique walleyes were measured during spring sampling periods (total catch excluding recaptures), and lengths ranged from 6.8 to 27.7 inches with mean and median lengths of 11.3 and 9.1 inches, respectively. The length frequency distribution is presented in Figure 15. For known-sex walleyes sampled during SN1 and SE1, males ($n = 188$) ranged from 9.8-22.4 inches with mean and median lengths of 14.4 and 13.7 inches, respectively. Female walleyes ($n = 50$) ranged from 14.4 to 27.7 inches, with mean and median lengths of 23.3 and 23.0 inches, respectively.

Age 1 fish were the most common in the distribution (61.3%), followed by age 2 (29.5%), representing recent stocking efforts in 2019 and 2020 (EG fingerlings). The age frequency distribution is presented in Figure 16. Typically, the age frequency would peak around age 3 or 4 when walleyes are fully vulnerable to the sampling gear. However, age 3 (0.8%) and age 4 (0.3%) were nearly absent from the distribution, consistent with 2017 and 2018 being non-stocked years and natural reproduction in Park Lake being virtually nonexistent. Age 5 walleyes stocked in 2016 as EG fingerlings were marked with LV fin clips at stocking. Those fin clips were still evident in 2021, and age 5 was the third strongest age class in the distribution (3.5%). No age 6 fish were collected, consistent with a non-stocked year in 2015. Age 7 fish (1.6%) were from the first year of EG fingerling stocking in 2014. Age 8-11 walleyes were from the period 2010-2013 when small fingerlings were stocked each year. Interestingly, all LV clipped age 5 walleyes sampled in the survey were female. Missing year classes due to alternate year stocking, a lack of natural reproduction and a missed stocking year

(2018; private producer failure) prevents the application of a catch curve to the age data to make inferences on annual mortality.

Walleyes grew relatively quickly in Park Lake, with mean length-at-age values generally at or above area and statewide averages and lake class median values. Overall, walleyes averaged over 15 inches by age 3, over 18 inches by age 4 and 22.6 inches by age 5 (Figure 17). Due to the inconsistent recent stocking history for Park Lake, age 7 was the youngest age for which more than one individual of each sex was sampled. Female walleyes grew faster and reached larger sizes than males, averaging 26.2 inches at age 7 compared to 19.9 inches for males. A von Bertalanffy growth model was fitted to the length at age data (all walleyes regardless of sex), and the result is presented in Figure 18, including the parameter estimates for L_{∞} (24.0 inches), k (0.44343063) and t_0 (0.03169191).

The condition of walleyes in Park Lake was excellent overall based on relative weights, which averaged 100.5 for 145 weighed walleyes. Females averaged 107.4, males averaged 97.9 and immature fish averaged 96.9. No walleye had a relative weight ≤ 75 (poor condition), while 74 walleyes (51.0%) had relative weights ≥ 100 , indicating excellent condition.

CHANNEL CATFISH

In total, 483 channel catfish were collected during the spring including recaptures. The catch rates were 3.1 fish/net night (SN1), 2.8 fish/mile during SE1 and 2.7 fish/mile during SE2. In total, 471 unique channel catfish ranged from 5.2 to 28.9 inches, and the mean and median lengths were both 17.0 inches. The length frequency distribution is presented in Figure 19. Size structure was good based on PSD values; the PSD and PSD-P values were 56 and 5, respectively. The largest channel catfish sampled weighed nearly 11 pounds.

The channel catfish age frequency distribution in Park Lake was bimodal with peaks at age 5 and age 8, and age frequency declined steadily after age 8 through age 12 (Figure 20). The largest year classes dated to years when stocking did not occur, and year classes were produced in all non-stocked years in the distribution. Channel

catfish natural reproduction in Park Lake is significant, and the lake is not reliant on stocking to maintain the population. Channel catfish mean length at age values in Park Lake were at or slightly below those observed in Swan Lake, a natural lake located on the Fox River approximately 5 miles downstream of Park Lake (Figure 21). Swan Lake is the only other lake in the area with a similar channel catfish population and ample data available for comparison. Channel catfish averaged nearly 20 inches by age 8 in Park Lake.

Body condition was good based on relative weights which averaged 98.6 for 147 weighed fish. Only 2.7% ($n = 4$) of weighed channel catfish had a relative weight below 75, indicating poor body condition, while 42.2% ($n = 62$) had relative weights ≥ 100 , indicating excellent body condition.

NORTHERN PIKE

In total, 194 northern pike were sampled during the spring, including recaptures. The catch rates were 1.3 fish/net night (SN1), 1.0 fish/mile during SE1 and 0.4 fish/mile during SE2. The 2021 SN1 catch rate was almost the same as the last survey in 2011 (1.4 fish/net night). The 2021 SN1 catch rate placed Park Lake just above the 50th percentile (median) compared to other Complex-Warm-Dark lakes (Figure 22). Northern pike were marked during SN1, and a Schnabel population estimate was calculated using the number of marked and unmarked northern pike sampled each day. Ultimately, 137 sexually mature northern pike were marked and 41 were recaptured. The Schnabel population estimate for sexually mature northern pike was 300 fish (95% CI 227-443 fish, CV = 15.2%) or 1.0 mature northern pike per acre (95%CI 0.7-1.4 fish/acre).

Lengths of 152 unique northern pike from all sampling periods ranged from 11.2 to 37.9 inches, and the mean and median lengths were 23.9 and 24.7 inches, respectively. The length frequency distribution for northern pike is presented in Figure 23. The PSD, PSD-26, PSD-P and PSD-32 values were 79, 40, 23 and 3, respectively. The PSD-32 value indicated a small proportion of harvestable-sized fish in the population. The

PSD, PSD-26 and PSD-P values compared favorably with other area lakes with significant northern pike populations (Table 12). Too few northern pike were collected in 2011 to calculate PSD values. Therefore, population size-structure comparisons between 2011 and 2021 using PSD values were not possible. However, when simply looking at the percentage of the total northern pike catch larger than 26 inches, 2021 was higher than 2011 (37.5% vs. 25.5%), which seems to indicate an improvement in northern pike size structure.

Overall, northern pike ages ranged from 1 to 9 years, with age 4 fish being the most common (11.4%) and age frequency declining steadily after age 4, as represented in Figure 24. Recruitment appears to be relatively consistent based on the lack of missing year classes, and numbers at age tail off prior to most fish reaching legal harvest size. Consistent recruitment is not unexpected considering the history of annual fingerling stocking. A small amount of mortality can be explained by harvest (faster growing females that reach 32 inches), but by and large most of the northern pike in Park Lake aren't vulnerable to harvest until later in life (slower growing females) or ever (males). Natural mortality likely plays a much bigger role in the overall mortality picture than fishing in Park Lake. Total annual mortality was 55.3% after age 4 based on the catch curve, which is slightly higher than the middle pack compared to six other area lakes with comparable data (range 34.9–66.5%, median = 49%). The catch curve is presented in Figure 25.

Northern pike growth in Park Lake was good; mean length at age values were at or above the area and state averages and lake class median values through age 7 (Figure 26). Ages 8 and 9 lagged in those departments, but this was due to each age class being represented by a single male fish. Male northern pike mean length at age typically lags behind female fish, which accounts for the smaller mean length at age for the oldest fish in Park Lake. Northern pike averaged over 26 inches by age 5, which is slightly better than the mean length at age 5 across Columbia and Sauk counties lakes with northern pike population data available (25.7 inches, 11 lakes). While northern pike did not average over 32 inches in Park Lake at any age, some

faster growing females did exceed 32 inches by age 4. When looking at the sexes separately, it was evident that females likely make up 100% of the northern pike harvest in Park Lake. Male mean length-at-age never exceeded 28 inches, and the largest male sampled was 28.6 inches long.

Preliminary results of analysis of 91 genetic samples collected from northern pike <26 inches during the survey found that 72 of 91 fish were ages 1-4 and 24% (n=17/72) came from DNR hatchery parents. Of those, zero were from 2017 (age 4), three were from 2018 (age 3), four were from 2019 (age 2), and 10 were from 2021 (age 1). Park Lake had the fifth-highest contribution from stocked fish out of 12 total lakes in the study.

The condition of northern pike was good to excellent; relative weights of 141 fish averaged 105.8. Relative weights for northern pike were generally lower for males, which averaged 98.0, while females averaged 114.4 and unknown sex fish averaged 104.8. No northern pike had a relative weight value below 75, indicating poor body condition. Fifty-nine percent of weighed northern pike (n = 83) had relative weight values \geq 100, indicating excellent body condition.

LARGEMOUTH BASS

In total, 169 largemouth bass were collected including recaptures; catch rates were 0.3 fish/net night during SN1, 15.2 fish/mile during SE1 and 6.3 fish/mile during SE2. The SE1 catch rate was slightly more than double the catch rate from the 2011 survey (7.6 fish/mile). By contrast, the SE2 catch rate was slightly less than half of the SE2 catch rate in 2011 (13.5 fish/mile). The 2021 SE2 catch rate was slightly above the 25th percentile compared to other Complex-Warm-Dark lakes (Figure 27); largemouth bass abundance in Park Lake was relatively low compared to what one should expect to see from a lake in this class. Park Lake also compared poorly on a local level, ranking 18th for total catch rate out of 23 lakes surveyed in the Poynette management area since 2010. The catch rate of fish \geq 8 inches (CPUE-8; stock size) during SE2 was 5.4 fish/mile, and this ranked 20th out of 23 area lakes. Catch rates of larger bass

compared slightly more favorably on a local level, with Park Lake ranking 16th out of 23 lakes for CPUE-14 (2.9 fish/mile) and 5th out of 23 lakes for CPUE-18 (1.0 fish/mile). Rankings for local lakes based on various size-specific largemouth bass electrofishing catch rates can be found in Table 13.

Lengths of 157 unique largemouth bass ranged from 6.4 to 19.6 inches, and the mean and median lengths were 12.5 and 11.2 inches, respectively. The length frequency distribution is presented in Figure 28. Of the largemouth bass \geq 8 inches in length (stock size), fish \geq 12 inches were present in good proportion (PSD = 58), as were fish \geq 14 inches (PSD-14 = 44) and legally harvestable fish (PSD-18 = 8). Too few largemouth bass \geq 8 inches were collected in 2011 to allow for meaningful PSD calculations; thus, PSD comparisons between 2021 and 2011 were not possible.

Age 3 was the most common in the distribution (35.0%), with age frequency declining steadily thereafter through age 12 (Figure 29). The descending limb of the catch curve begins several years before most largemouth bass are vulnerable to harvest in Park Lake (18 inches), and harvest does not appear to be impacting the population excessively. Recruitment, while relatively low, appeared to be relatively consistent and annual mortality estimated from the catch curve in Figure 30 was 33.3% which was not high compared to other area lakes surveyed since 2012 (range 19.2-78.4%, median = 37.3%). Largemouth bass mean length-at-age in Park Lake was higher than area and state averages and lake class median values through age 9, then remained at or above area averages and lake class medians through age 12 (Figure 31). Some faster growing largemouth bass exceeded 14 inches in Park Lake by age 3, and largemouth bass averaged over 14 inches by age 4. The mean length at age 6 was 16.6 inches, which was better than the previous survey in 2011 (15.2 inches) and was the best of all area lakes surveyed since 2010 (Table 14). Some largemouth bass reach the minimum harvest size of 18 inches by age 6, but mean length does not exceed 18 inches until age 8.

The condition of largemouth bass in Park Lake was excellent; relative weights of 104 fish averaged 113.5. Zero fish had a relative weight below 75, and 88.4% of weighed

fish had relative weights greater than 100 ($n = 92$). There was no apparent relationship between fish length and relative weight.

OTHER SPECIES OF INTEREST

Other species of interest to anglers included yellow bass, yellow bullhead, pumpkinseed and smallmouth bass. In total, 601 yellow bass were collected, and the catch rates were 3.5 fish/net night during SN1 and 86 fish/mile during SE2. Lengths of 224 measured yellow bass ranged from 3.0 to 10.6 inches, averaging 5.9 inches. In total, 250 yellow bullheads were collected (all during SN1) when the catch rate was 1.7 fish/net night; 124 measured fish ranged from 5.5 to 11.2 inches, averaging 8.3 inches. All 151 pumpkinseeds were collected during SN1 when the catch rate was 1.0 fish/net night; 104 measured fish ranged from 3.5 to 6.7 inches, averaging 5.4 inches. Eight smallmouth bass collected during SE1 and SE2 ranged from 5.1 to 11.0 inches, averaging 9.0 inches. Ages ranged from 1 to 3 years; one age 1 fish measured 5.1 inches, six age 2 fish averaged 9.8 inches and one age 3 fish measured 8.1 inches.

DETRIMENTAL SPECIES

Common carp were collected during SN1 ($n = 35$) and observed and counted during SE2 ($n = 5$). The catch rates were 0.2 fish per net night during SN1 and five fish/mile during SE2. The catch rates of common carp were lower than in 2011, which were 1.3 fish/net night during SN1 and eight fish/mile during SE2. Lengths of 27 common carp measured during SN1 ranged from 14.7 to 26.8 inches, averaging 21.3 inches. Gizzard shad were abundant, with the bulk of the fish collected during SN1 ($n = 1,551$, catch rate = 10.6 fish/net night). The catch rate during SE2 was 31.0 fish/mile. The SN1 catch rate was higher than the 2011 catch rate, which was 1.8 fish/net night. Gizzard shad were not collected during SE2 in 2011. Gizzard shad collected during SN1 were primarily between 3-6 inches in length. However, large individuals up to 17 inches in length were observed during SE1 and SE2. Based on spring survey metrics, it appears that common carp were less abundant in 2021 compared to 2011, while gizzard shad were more abundant in 2021 than in 2011.

Abundance goals were set in the fish community objectives within the Park Lake Comprehensive Management Plan for common carp and gizzard shad. However, those abundance metrics were based on fall electrofishing catch rates, and common carp and gizzard shad data were not collected during the fall 2021 electrofishing survey, therefore a direct assessment of common carp and gizzard shad populations in 2021 relative to abundance goals set in 2011 was not possible. One or more FE surveys should be completed prior to the next comprehensive survey in 2031 to assess where common carp and gizzard shad abundance sits relative to established goals.

FALL ELECTROFISHING SURVEY

Sport fish were sampled during the FE survey in October, which covered the entire shoreline of the lake. In total, 122 largemouth bass were collected for a catch rate of 21.0 fish per mile, which was slightly lower than the fall 2011 catch rate of 27.8 fish per mile. The 2021 survey included the entire shoreline (5.8 miles), whereas the 2011 survey only included about 2/3 of the shoreline (4 miles). Few sportfish of any species were collected in the additional 1.8 miles sampled in 2021, which drove the overall catch rate lower than what it would have been if the survey stopped at the 4-mile mark. Largemouth bass lengths ranged from 7.1 to 19.1 inches, with mean and median values of 12.3 and 12.1 inches, respectively. Seventy-one walleyes were collected for a catch rate of 12.2 fish/mile. The fall walleye catch rate in 2021 was lower than in 2011 (25.8 fish/mile) because of the extra sampling in 2021 that yielded almost no fish and because about 30% of the 2011 catch was age 0 walleyes that had been stocked earlier that summer. Walleyes were not stocked in 2021, and no age 0 walleyes were collected, indicating there was no natural reproduction.

Walleye lengths in fall 2021 ranged from 11.5 to 24.4 inches, with mean and median lengths of 14.8 and 13.7 inches, respectively. Age 1+ walleyes were noted by the presence of a LV fin clip. These fish were stocked as EG fingerlings in the fall of 2020. During the spring of 2021, this age class ranged from 6.8 to 10.4 inches in length. By fall, this group ranged from 11.5 to 15.7 inches representing growth of about 5 inches during their first growing season in the lake with some fish already exceeding 15

inches. As noted in the analysis of the spring survey data, walleye growth in Park Lake is excellent. Eight smallmouth bass, five northern pike and five channel catfish were also collected, and length summaries for all species can be found in Table 15. Length frequency distributions for largemouth bass and walleyes from the fall survey are presented in Figures 32 and 33.

Discussion

In general, panfish populations in Park Lake provide valuable forage for predatory gamefish as well as a harvest opportunity for anglers. The abundance of the various panfish species varies from low to high in Park Lake relative to other Complex-Warm-Dark lakes, but in all cases, the populations are self-sustaining. The PLMD funded stocking of panfish in the past including black crappies (2019-2021), bluegills (2015-2021) and yellow perch (2016-2018) with fish purchased from a private hatchery. These stockings were completed against the advice of the area fisheries biologist, and the stocking of panfish is not needed to sustain these populations. Panfish stocking can even be counterproductive in that it provides additional forage for predator species that are being managed for maximum predation on common carp and gizzard shad in the lake. Stocking is not needed to maintain populations of panfish in most lakes, including Park Lake. Future stocking of panfish is not recommended and will not be approved by the DNR. The PLMD is encouraged to spend funding earmarked for fish stocking on habitat initiatives instead. Habitat additions such as fish sticks are likely to have more wide-ranging benefits to fish in Park Lake than additional fish stocking.

Yellow perch are more abundant in Park Lake than in any other lake in the area and abundance was essentially unchanged from 2011 to 2021. However, size structure and therefore appeal to anglers remains poor, and this is likely a function of both angling mortality and high natural mortality. Growth of yellow perch is slightly above average, and some females may reach 10 inches, but mortality after age 2 is high, especially for females, which may receive more harvest pressure from anglers because they grow faster and attain larger sizes than males. Conversely, most male

yellow perch don't attain large sizes because they don't live long enough. While female yellow perch average nearly 8 inches by age 3, most male yellow perch in Park Lake don't reach 8 inches until age 5, but very few live that long. One factor confounding the assessment of yellow perch annual mortality is the weak yellow perch year classes observed in years following EG fingerling walleye stocking (ages 4 and 6). This prevented the application of a catch curve to the age frequency data and limited inferences on total annual mortality. It also indicated that young of year yellow perch are potentially a highly valuable prey source for juvenile walleyes.

In any case, poor to average growth and a short life span limit quality yellow perch harvest opportunities in many lakes across southcentral and southwestern Wisconsin. Exceptions to this rule come in larger lakes, such as Lake Mendota and Lake Wisconsin, or smaller lakes with an open connection to a large river system, such as Swan Lake. In those larger, more productive systems, better growth rates allow yellow perch to attain larger sizes at earlier ages prior to natural mortality, and they provide a higher quality perch fishery for anglers. Yellow perch are probably most valuable in Park Lake as forage for predatory gamefish, with the occasional harvest of larger individuals by anglers. There are no species-specific management goals for yellow perch in Park Lake. Yellow perch will benefit from littoral zone habitat improvements such as fish sticks which will increase the amount of quality spawning and nursery habitat available for the species.

Black crappie abundance in Park Lake in 2011 was the highest of any lake in Columbia and Sauk counties in recent history, with a catch rate of 113.9 fish/net night. High crappie abundance in Park Lake made sense; crappies often thrive in shallow turbid systems, and Park Lake appeared to be no exception. However, the SN1 catch rate was 97% lower in 2021 at 3.5 fish/net night. The reason for the drastic decline in black crappie abundance is not apparent. Recruitment appeared to be steady except for weaker year classes evident in years following EG fingerling walleye stocking (also seen in yellow perch). Two weak year classes alone cannot explain the decline in abundance, especially when one considers that those same two weak year classes in

yellow perch appeared to have little to no impact on overall abundance. Conditions in the lake haven't changed; the lake remains turbid with little aquatic vegetation and low to moderate predator densities. The effects of competition for zooplankton between young of year gizzard shad and crappies aren't typically felt as acutely as in bluegills and largemouth bass, so that can probably be ruled out. In any case, excellent black crappie growth and population size structure in Park Lake help to offset the decline in abundance by providing anglers with one of the best lakes for catching large crappies in Columbia and Sauk counties. Black crappies utilize the abundant forage in Park Lake to great effect and may prey heavily on young of year gizzard shad in summer and early fall, and the resulting growth pushes black crappies past 10 inches on average by age 3 at which time angling mortality likely increases. There are currently no population-specific goals or objectives for black crappie. Coarse woody habitat additions (fish sticks) in the littoral zone will benefit crappies and may also benefit anglers by concentrating fish around the installations and making them easier to target.

Bluegill size structure was somewhat better in 2021 compared to 2011, as was growth (mean length at age), with Park Lake showing average to above average growth compared to other lakes. Comparing bluegill growth in Park Lake between 2011 and 2021 may be of limited value, however because different aging structures were used in each survey. The 2021 survey utilized otoliths which are easier to interpret and yield more accurate and precise age estimates than scales for bluegills and many other species. Differences in growth between 2011 and 2021 could be attributed to higher-quality age data as opposed to an actual change in fish growth. Previously, poor bluegill growth was attributed at least in part to competition for food (zooplankton) between larval and juvenile bluegills and young of year gizzard shad (DeVries and Stein 1992, Dettmers and Stein 1992, Aday 2003). This competition can lead to reduced growth rates and condition of bluegill throughout life (Aday 2003). However, the 2021 survey found that bluegill growth was not bad at all, and perhaps

impacts of competition with gizzard shad have less impact on bluegill growth than previously thought.

Bluegill abundance in Park Lake was reduced somewhat from 2011 and is low compared to lakes across the area, within the Complex-Warm-Dark lake class and across the state as a whole. Reasons for the decline in abundance from low to even lower are not readily apparent and occurred despite the stocking of bluegills by the PLMD. Panfish electrofishing stations in 2021 matched those sampled in 2011, so differences are not due to sampling different areas. Recruitment, although probably low in general, is relatively steady (no missing year classes), and the total annual mortality rate is relatively low indicating harvest is not likely to blame. Predator abundances have remained static over the last 10 years. The driver of low bluegill abundance in general is poor habitat quality, and this hasn't changed from 2011. Much like largemouth bass, bluegills thrive in lakes with abundant submersed aquatic vegetation. Park Lake is largely devoid of submersed aquatic vegetation and bluegill numbers suffer as a result. Returning to a clear water state with abundant aquatic vegetation is the surest way to improve bluegill abundance. Hurdles to water quality and fish habitat improvement, such as detrimental species (common carp and gizzard shad), sediment destabilization and nutrient cycling, must be removed, and the lake bottom sediments must be given a chance to stabilize to make it happen. As outlined in the 2007 Park Lake Comprehensive Management Plan, a whole-lake manipulation (drawdown, chemical fish eradication, re-stocking) offers the best chance to return Park Lake to a clear water state, and this remains true today. However, that course of action has proven highly undesirable for some Park Lake stakeholders due to the trade-offs involved in carrying out the plan. These trade-offs include lost boating time due to the drawdown, a perceived loss of quality of the boating and swimming experience arising from an increase in aquatic macrophytes, and the time involved in re-establishing fishable populations of sport fish.

The panfish abundance objective of an electrofishing catch rate of ≥ 100 combined panfish per mile during SE2 set in the Implementation Plan and the 2011 survey

report is not being met. Typically, the total catch of panfish during SE2 is composed almost entirely of bluegills; for example, in 2021 in Park Lake, the SE2 panfish catch was composed of 84% bluegill, 14% yellow perch and 2% black crappie. Moving forward, the panfish abundance goal should be modified to be bluegill-specific; ≥ 100 bluegills/mile during SE2. This is close to the median value of 117 bluegills/mile for Complex-Warm-Dark lakes and is more in line with bluegill abundance goals on other area lakes. Without the large-scale habitat changes in Park Lake outlined above, this abundance objective is not likely to be met.

Previous surveys indicated a decline in largemouth bass abundance between the mid-1990s and 2011. Much of this decline was attributed to the transition of the lake from a vegetation-dominated clear water state to a turbid algal-dominated state. This greatly reduced the habitat quality for largemouth bass, which thrive in systems with abundant aquatic vegetation. The arrival of gizzard shad in Park Lake also likely impacted largemouth bass negatively, primarily through reduced recruitment. Young of year gizzard shad compete with young of year largemouth bass for zooplankton and have a head start because they hatch earlier in the spring than the bass (Becker 1983, Dettmers and Stein 1992, Aday et al. 2005), and largemouth bass recruitment may suffer as a result. Largemouth bass recruitment appears to be steady but relatively low based on low overall abundance in 2021, which was comparable to 2011. Abundance remained low despite supplemental stocking of fingerling largemouth bass by the PLMD and a regulation change in the minimum length limit from 14 inches to 18 inches, and a reduction in the daily bag limit from five to one in 2014. Growth remains strong; largemouth bass in Park Lake grow faster than in any other lake in the area based on mean length at age 6. Largemouth bass that recruit in Park Lake have abundant forage available to them and attain large sizes relatively quickly. Increased regulatory protection did produce slight increases in population size structure as measured by size-specific electrofishing catch rates during SE2. The catch rate of fish ≥ 14 inches (CPUE-14) increased from 2.8 to 2.9 fish/mile from 2011 to

2021. Likewise, CPUE-15 increased from 1.8 to 2.5 fish/mile, and CPUE-18 increased from 0.3 to 1.0 fish/mile.

The final report on the 2011 comprehensive survey outlined the goal of reducing the abundance of undesirable species (common carp and gizzard shad) through predation by gamefish. The abundance objective for largemouth bass set to accomplish this goal was a catch rate of 30-50 fish \geq 8 inches per mile during SE2. The 2021 survey found this objective was not being met. However, the objective is reasonable in the general sense considering that a SE2 catch rate of 37.3 fish/mile or greater would place Park Lake above the 75th percentile for Complex-Warm-Dark lakes. The previous abundance objective should remain unchanged moving forward.

The size structure objective for largemouth bass outlined in the implementation plan was a PSD-14 \geq 40, and the 2021 survey found that this size structure objective was being met. The fast growth of largemouth bass and protection from harvest until fish reach 18 inches helped ensure that this objective was met and should not change.

However, looking ahead, increased regulatory protection and supplemental stocking of largemouth bass will not increase largemouth bass abundance significantly in Park Lake. Large-scale habitat changes will be needed to move the needle. As described for bluegills, actions required to bring about large-scale habitat changes in Park Lake are unpopular with many stakeholders. In the absence of a whole-lake manipulation, small-scale habitat improvement measures such as adding coarse woody habitat in the littoral zone (fish sticks) may benefit bass by enhancing suitable nesting locations. Largemouth bass have been observed nesting around the fish sticks already installed along the shoreline of Chandler Park in Pardeeville. Installation of additional fish sticks structures in the littoral zone is recommended. Based on the lack of any evidence that stocking largemouth bass increased their abundance in Park Lake, the PLMD should consider reallocating money spent annually on bass stocking to habitat initiatives instead. The 2021 survey indicated that privately sourced stockings of smallmouth bass have established a small population with

three age classes present. Stocking of privately sourced smallmouth bass may continue as long as Lake Michigan genetic strain fish are used.

Adult walleye (≥ 15 inches) density in Park Lake was nearly 50% lower in 2021 compared to 2011 (1.1 vs. 0.6 adults/acre), which was well short of the objective of ≥ 2.0 adult walleyes per acre outlined in the 2011 survey report. However, the abundance of all walleyes age 2 and older was higher in 2021 than in 2011 (3.4 fish/acre vs. 2.1 fish/acre). Differences in the age composition of the walleye population between the 2011 and 2021 surveys can be attributed to a change in the walleye stocking strategy. For 15 years preceding the 2011 survey, Park Lake was stocked with walleyes every year except in 2007 (stocking rates and fingerling size did vary). This led to constant recruitment to the adult fishery, and no missing year classes were noted in 2011. Annual stocking continued until the Wisconsin Walleye Stocking Initiative (WSI) necessitated a change to alternate-year stocking to help balance demands within the hatchery system. Beginning in 2014, Park Lake switched from stocking small fingerlings every year to stocking EG fingerlings in even-numbered years. Stocking in 2014 and 2016 occurred as planned, but no fish were stocked in 2018 due to a production failure at the private hatchery contracted to produce the fish for the state. By 2021, the effect of missing year classes was evident in the fishery, with numbers of age 3, 4 and 6 walleyes at or near zero and the adult fishery composed primarily of ages 5 and 7-11, with few individuals older than age 5 remaining. Had the 2018 stocking occurred as planned, total adult walleye density would have been closer to about 1.5 fish/acre, much closer to the desired objective. Walleyes were stocked in 2019 as a make-up year for the lost 2018 year class, and those fish made up the bulk of the 3.4 fish/acre ≥ 12 inches in spring 2021. Some of those fish exceeded 15 inches already by the spring of 2021, and undoubtedly more had reached that mark by fall of 2021. Walleyes were also stocked in 2020 (the normal even year), and by fall of 2021, some of those fish (marked with LV fin clips) exceeded 15 inches. Had the comprehensive survey occurred in 2022 instead of 2021, the adult walleye picture in Park Lake would have looked vastly different. Walleye growth is

excellent in Park Lake, with mean length at age values comparable to those observed in Lake Wisconsin. Even at a high stocking density, walleyes have sufficient forage in Park Lake to reach adult size as early as age 2, and some will reach the minimum harvest size of 18 inches by age 3. Young of year yellow perch and black crappie may be especially important in the diets of juvenile walleyes in Park Lake.

Walleye natural reproduction does not occur on any measurable level in Park Lake. Due to this complete dependence on stocking to maintain the population, missing year classes, especially in consecutive years, can have a significant impact on adult walleye abundance in Park Lake. In that context, EG walleye stocking should not be considered a failure despite the low adult density in 2021. Stocking should continue at the rate of 15 EG walleyes/acre in even-numbered years. The density objective remains \geq 2.0 adult walleyes/acre, which is slightly above the average of 1.7 adults/acre in stocked lakes in Wisconsin. Downstream escapement through dams is a common occurrence in impoundments and has been observed in the past with LV-clipped walleyes stocked in Park Lake appearing in surveys of Spring Lake and Swan Lake, the two lakes immediately downstream of Park Lake in 2018. Escapement loss of walleyes is something managers and stakeholders alike must accept when managing populations in impoundments. Supplemental stocking of privately sourced walleyes by the PLMD in odd-numbered years may help to increase adult density to the desired level by eliminating missing year classes and stabilizing recruitment to the adult fishery. Similar supplemental stocking occurs elsewhere in the Poynette management area, specifically in Lake Redstone. To protect the native genetic strain of walleyes in the Fox River, private walleye stocking may be considered for Park Lake if the private producer is able to provide Lake Michigan strain walleyes.

Northern Pike abundance in Park Lake in 2021 was in the middle of the pack compared to other Complex-Warm-Dark lakes. Based on the fyke net catch rate, northern pike abundance was unchanged in Park Lake from 2011 to 2021. The duration of the 2011 survey and the associated netting effort was short compared to 2021: 30 net nights over one week in 2011 vs. 148 net nights over 3.5 weeks in 2021. As

a result, relatively few northern pike were collected in 2011, preventing any in-depth comparisons to 2021 for growth, population size structure and population age structure metrics. One very simple comparison of the percentage of the catch larger than 26 inches indicated an improvement in the northern pike size structure from 2011 to 2021. This would make sense considering the regulation change from a 26-inch minimum length limit and two-fish daily bag limit to a 32-inch minimum length limit and a one-fish daily bag limit in 2014. The 2021 survey indicated that northern pike recruitment is steady, which makes sense because stocking occurs every year. The Implementation Plan proposed a northern pike population density goal of three to five northern pike \geq 20 inches per acre. This high-density fishery was proposed as part of a plan to reduce abundance of common carp and gizzard shad through predation (biomanipulation). However, this high-density population objective for northern pike may be unrealistic. Only two lakes in the Poynette management area, Dutch Hollow Lake (Complex-Warm-Clear; 4.2 adults/acre) and Mirror Lake (Complex-Riverine; 6.6 adults/acre), have northern pike densities that high. Both lakes are fairly deep impoundments that, have clear water and abundant and diverse aquatic vegetation communities, excellent spawning habitat (inlet creeks and connected marshes) resulting in excellent natural recruitment, and perhaps most importantly, the lakes have cool water refuges where northern pike can escape extreme summer water temperatures (deep water or large coldwater streams flowing in). Park Lake, by contrast, is shallow, turbid, mostly devoid of aquatic vegetation, has minimal natural recruitment and has no cool water summer refuge, which has led to summer die-offs of northern pike in the past. Additionally, Park Lake is an impoundment of a larger river and has multiple outlets. Park Lake may thus experience a greater degree of fish loss through downstream escapement than either Dutch Hollow Lake or Mirror Lake. Recruitment (via natural reproduction and stocking) does not appear sufficient to outweigh losses via escapement and natural mortality, such that the lake may never be able to build a high-density northern pike population, even with stocking and the increased regulatory protection from harvest.

Because northern pike population estimates are not required and therefore, not routinely completed by all biologists, perhaps a more appropriate northern pike abundance metric is the SN1 catch rate (fish/net night). Such data are widely available for all lakes where netting surveys occur. Comparisons on the lake class level are easy to make and probably offer a more realistic picture of the potential of a lake in a given class to produce a high-density northern pike population. To that end, the abundance objective for northern pike in Park Lake is a SN1 catch rate of \geq 3.7 fish/net night. That catch rate would place Park Lake at or above the 75th percentile for the Complex-Warm-Dark lake class. The size structure objective outlined in the Implementation Plan was a PSD-30 \geq 10. This size structure objective is probably more realistic than the abundance objective, especially under a 32-inch minimum length limit. Park Lake is not there yet (2021 PSD-30 = 7), but the size structure may slowly improve and reach the objective in time. Past northern pike stocking has consisted primarily of small fingerlings raised by the DNR and stocked in June, with some supplemental stocking of fall fingerlings purchased from a private producer by the PLMD.

The preliminary results of the 2021 genetics study found that roughly one in four northern pike in Park Lake under the age of 5 came from the state hatchery system. Northern Pike raised in state hatcheries make a sizable contribution to the fishery of Park Lake, and stocking should continue, using small fingerlings stocked at the rate of 10 fish/acre annually. Final analysis and completion of the northern pike genetics study will inform future stocking strategies across the state, but for now, the stocking strategy at Park Lake will continue unchanged. All northern pike stocking in Park Lake, public or private, should utilize Lake Michigan genetics. It should be noted that during the first two years of the study (2017 and 2018), stocking of privately-sourced large fingerling northern pike occurred in Park Lake in addition to the state-raised small fingerlings stocked for the study. The private stockings may have confounded some of the interpretation of the study results in that the non-DNR hatchery contribution to the fishery from those years may reflect those privately stocked fish

(for which the DNR did not obtain genetic information from the parent fish) as opposed to naturally recruited fish. Thus, the contribution of stocked fish (regardless of source) may be higher than the state-raised contribution quantified by the study alone.

Channel catfish provide a quality angling opportunity in Park Lake and their abundance appears to have nearly doubled since 2011 based on the SN1 catch rate. Natural reproduction and supplemental stocking in some years have helped affect the increase in abundance. In addition to the angling opportunity that they provide, channel catfish also help the lake by consuming gizzard shad (both alive and dead). The strongest channel catfish year classes present appear to date to years when stocking did not occur, and natural reproduction may very well be enough to sustain the population. Strict adherence to genetic guidelines for stocking moving forward may make stocking privately raised channel catfish in Park Lake difficult as the privately raised fish come from a Wisconsin private fish farm that sources their channel catfish from producers in Arkansas. Any future stocking will need to be sourced from the Lake Michigan drainage basin. However, the lack of a need for stocking in Park Lake likely makes this a moot point. There are no species-specific goals for channel catfish moving forward. Abundance should be monitored during SN1, and age analysis should be completed during future surveys to determine if natural reproduction is sufficiently maintaining the fishery.

Based on spring sampling data, common carp abundance appears to have decreased slightly since 2011, while gizzard shad abundance appears to have increased. However, abundance metrics for common carp and gizzard shad were based on FE catch rates, and common carp and gizzard shad data were not collected during the 2021 FE survey. Therefore, a direct assessment of common carp and gizzard shad populations in 2021 relative to the abundance goals set in 2011 was not possible. It is recommended that one or more FE surveys should be completed prior to the next comprehensive survey in 2031 to assess where common carp and gizzard shad abundance sits relative to goals established in the Park Lake Comprehensive

Management Plan. This could occur as soon as 2023. Until a more thorough assessment of common carp and gizzard shad abundance is completed, fishing regulations for walleye, northern pike and largemouth bass designed to affect a biomanipulation (reduction in common carp and gizzard shad abundance via predation) should remain in effect.

Recommendations

1. Future stocking of panfish is not recommended and will not be approved by the DNR. It is recommended that the PLMD spend funding earmarked for panfish stocking on habitat initiatives instead. Habitat additions such as fish sticks are likely to have more wide-ranging benefits to fish in Park Lake than additional panfish stocking.
2. The panfish abundance goal established in the 2012 Implementation Plan for the 2007 Park Lake Comprehensive Management Plan should be modified to be bluegill-specific: ≥ 100 bluegills/mile during SE2. This more closely reflects values expected for Complex-Warm-Dark lakes (median CPUE = 117 bluegills/mile) and is more in line with bluegill abundance goals on other area lakes.
3. Largemouth bass abundance and size structure metrics established in the implementation plan for the 2007 Park Lake Comprehensive Management Plan are realistic and should remain unchanged. Based on the lack of any evidence that stocking largemouth bass increased their abundance in Park Lake, the PLMD should consider reallocating money spent annually on bass stocking to habitat initiatives such as fish sticks instead.
4. Smallmouth bass stocking from private sources may continue as long as fish with Lake Michigan genetics are stocked, although only eight were captured in our surveys.
5. The adult walleye abundance goal of 2.0 adults/acre is realistic and should continue to be the goal moving forward. State-raised walleye stocking should continue at the rate of 15 EG walleyes/acre in even-numbered years.
6. Supplemental stocking of privately sourced walleyes by the PLMD in odd-numbered years to increase adult walleye density to the desired level may be considered for Park Lake if the private producer is able to provide Lake Michigan strain walleyes.
7. Northern pike stocking in Park Lake should continue, using small fingerlings stocked at the rate of 10 fish/acre. All northern pike stocking in Park Lake, public or private, should utilize Lake Michigan genetics.
8. One or more late summer/fall electrofishing surveys should be completed prior to the next comprehensive survey in 2031 to assess common carp and

- gizzard shad abundance relative to goals established in the Park Lake Comprehensive Management Plan. This could occur as soon as 2023.
9. Fishing regulations for walleye, northern pike and largemouth bass designed to affect a biomanipulation (reduction in common carp and gizzard shad abundance via predation) should remain in effect.

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Tables

Table 1. Current fishing regulations for Park Lake, Columbia County, Wisconsin.

SPECIES	SEASON DATES	LENGTH AND BAG LIMITS
Catfish	Open All Year	No minimum length limit and the daily bag limit is 10.
Panfish (bluegill, pumpkinseed, sunfish, crappie and yellow perch)	Open All Year	No minimum length limit and the daily bag limit is 25.
Largemouth bass and smallmouth bass	First Saturday in May through the first Sunday in March	The minimum length limit is 18" and the daily bag limit is 1.
Northern pike	First Saturday in May through the first Sunday in March	The minimum length limit is 32" and the daily bag limit is 1.
walleye, sauger and hybrids	First Saturday in May through the first Sunday in March	The minimum length limit is 18" and the daily bag limit is 3.
Bullheads	Open All Year	No minimum length limit and the daily bag limit is unlimited.
Rough fish	Open All Year	No minimum length limit and the daily bag limit is unlimited.

Table 2. Dimensions, dates and locations (GPS coordinates) of fyke nets used during the spring 2021 survey of Park Lake, Columbia County, Wisconsin.

NET NUMBER	LEAD LENGTH (FEET)	FRAME HEIGHT (FEET)	SET DATE	FINAL LIFT DATE	LATITUDE	LONGITUDE
1	75	2	03/14/2021	03/19/2021	43.55500	-89.27255
2	75	2	03/14/2021	03/15/2021	43.55320	-89.27640
3	50	3	03/14/2021	03/19/2021	43.55740	-89.27866
4	50	3	03/14/2021	03/19/2021	43.54851	-89.28287
5	75	3	03/14/2021	03/23/2021	43.54928	-89.27875
6	75	3	03/16/2021	03/21/2021	43.55589	-89.27227
7	75	2	03/19/2021	03/30/2021	43.54495	-89.29045
8	50	3	03/19/2021	03/29/2021	43.54516	-89.28165
9	75	2	03/19/2021	04/02/2021	43.54272	-89.28414
10	75	3	03/19/2021	04/05/2021	43.54390	-89.29507
11	50	3	03/19/2021	03/22/2021	43.55091	-89.28957
12	50	3	03/19/2021	03/25/2021	43.55154	-89.27930
13	50	4	03/21/2021	04/05/2021	43.54463	-89.29456
14	50	3	03/22/2021	03/24/2021	43.54354	-89.29978
15	75	3	03/23/2021	03/26/2021	43.54716	-89.28071
16	50	3	03/24/2021	04/05/2021	43.54498	-89.29508
17	75	3	03/26/2021	03/31/2021	43.54819	-89.29259
18	75	3	03/26/2021	04/05/2021	43.54449	-89.28252
19	50	3	03/29/2021	04/05/2021	43.54412	-89.30082
20	75	3	03/31/2021	04/06/2021	43.54897	-89.29259

Table 3. Calcified structures used to estimate ages of fish collected during the 2021 comprehensive fishery survey of Park Lake, Columbia County, Wisconsin.

SPECIES	SIZE CATEGORY	AGING STRUCTURE
Black crappie	ALL	otolith
Bluegill	ALL	otolith
Largemouth bass	ALL	dorsal spine
Smallmouth bass	ALL	dorsal spine
Northern pike	ALL	pelvic fin ray
Yellow perch	ALL	anal fin spine
Walleye	ALL	dorsal spine

Table 4. Locations of electrofishing stations (GPS coordinates) sampled during SE2 on Park Lake, Columbia County, Wisconsin in 2021.

STATION NAME	DATE	START TIME	END TIME	DISTANCE SAMPLED (MILES)	WATER TEMPERATURE (F)	START LATITUDE	START LONGITUDE	END LATITUDE	END LONGITUDE
PANFISH 1	5/17/2021	2050	2115	0.5	68.8	43.54355	-89.28363	43.55109	-89.27899
GAMEFISH 1	5/17/2021	2145	2230	1.5	70.2	43.55109	-89.27899	43.54841	-89.29420
PANFISH 2	5/17/2021	2250	2350	0.5	68.0	43.54841	-89.29420	43.54374	-89.29716
GAMEFISH 2	5/17/2021	2330	0005	1.5	67.6	43.54374	-89.29716	43.54239	-89.29657
GAMEFISH 3	5/18/2021	0030	0100	1.2	65.6	43.54239	-89.29657	43.54355	-89.28363

Table 5. The PSD length categories (inches) for selected fish species that were collected from Park Lake in 2021 (Anderson and Neumann 1996, Guy et al. 2007).

SPECIES	STOCK	QUALITY (PSD)	HARVEST (PSD-H)¹	PREFERRED (PSD-P)	MEMORABLE (PSD-M)	TROPHY (PSD-T)
Bluegill	3	6	7	8	10	12
Black crappie	5	8	9	10	12	15
Yellow perch	5	8	9	10	12	15
Largemouth bass	8	12	18	15	20	25
Smallmouth bass	7	11	14	14	17	20
Northern pike	14	21	32	28	34	44
Walleye	10	15	18	20	25	30
Channel catfish	11	16		24	28	36

¹Lengths of fish found socially (bluegill, black crappie, yellow perch) or legally (largemouth bass, northern pike, smallmouth bass, walleye) acceptable for harvest by anglers.

Table 6. Families and species of fish collected during the 2021 comprehensive fishery survey of Park Lake, Columbia County, Wisconsin.

FAMILY-SCIENTIFIC NAME	FAMILY-COMMON NAME	NUMBER OF SPECIES COLLECTED	SPECIES LIST (COMMON NAME)
<i>Amiidae</i>	Bowfins	1	Bowfin
<i>Catostomidae</i>	Suckers	1	White sucker
<i>Centrarchidae</i>	Sunfishes	8	Black crappie, bluegill, green sunfish, green sunfish x pumpkinseed hybrid, largemouth bass, pumpkinseed, pumpkinseed x bluegill hybrid, smallmouth bass
<i>Clupeidae</i>	Shads	1	Gizzard shad
<i>Cyprinidae</i>	Minnows	2	Common carp, golden shiner
<i>Esocidae</i>	Pikes	1	Northern pike
<i>Ictaluridae</i>	Catfishes	4	Black bullhead, brown bullhead, channel catfish, yellow bullhead
<i>Moronidae</i>	Temperate Basses	1	Yellow bass
<i>Percidae</i>	Perches	2	Walleye, yellow perch

Table 7. Summary of catch and catch-per-unit effort (CPUE) by sampling period during the 2021 comprehensive fishery survey of Park Lake, Columbia County, Wisconsin.

SPECIES ¹	CATCH				CPUE (FISH/NET NIGHT)						
	SN1	SE1	SE2	Total	SN1	SE1	(FISH/MILE)	SE2	(FISH/HOUR)	SE1	(FISH/HOUR)
Black bullhead	18		0	18	0.1			0.0		0.0	0.0
Black crappie	517		1	518	3.5			1.0		1.5	
Bluegill	1,723		43	1,766	11.7			43.0		64.2	
Bowfin	3		0	3	0.0			0.0		0.0	
Brown bullhead	6		0	6	0.0			0.0		0.0	
Channel catfish	453	16	14	483	3.1	2.8		2.7	5.9	5.6	
Common carp	35		5	40	0.2			5.0		7.5	
Gizzard shad	1,551		31	1,582	10.6			31.0		46.3	
Golden shiner	19		3	22	0.1			3.0		4.5	
Green sunfish	48		0	48	0.3			0.0		0.0	
GSFxPKS hybrid	5		0	5	0.0			0.0		0.0	
Largemouth bass	48	88	33	169	0.3	15.2		6.3	32.6	13.2	
Northern pike	186	6	2	194	1.3	1.0		0.4	2.2	0.8	
Pumpkinseed	151		0	151	1.0			0.0		0.0	
PKSxBLG hybrid	1		0	1	0.0			0.0		0.0	
Smallmouth bass	0	3	5	8	0.0	0.5		1.0	1.1	2.0	
Walleye	692	204	95	991	4.7	35.2		18.3	75.6	38.0	
White sucker	337		89	426	2.3			89.0		132.8	
Yellow bass	515		86	601	3.5			86.0		128.4	
Yellow bullhead	250		0	250	1.7			0.0		0.0	
Yellow perch	4,711		7	4,718	32.0			7.0		10.4	
	11,269	317	414	12,000							

¹GSF = green sunfish, PKS = pumpkinseed, BLG = bluegill.

Table 8. Summary of lengths (inches), PSD and ages of gamefish sampled during the 2021 comprehensive fishery survey of Park Lake, Columbia County, Wisconsin.

SPECIES ¹	PERIOD	NUMBER	NUMBER	LENGTH	MEAN	MEDIAN				AGE	MEAN RELATIVE WEIGHT	
		COLLECTED	MEASURED	RANGE	LENGTH	LENGTH	PSD	PSD-H	PSD-P	PSD-M		
Bluegill	SN1	1,723	956	3.5-9.3	5.7	5.9	50	11	3	0	95.0	2-10
Bluegill	SE2	43	43	3.0-7.6	5.6	5.7						
Bluegill	ALL	1,766	999	3.0-9.3	5.7	5.9	49	11	3	0	95.0	2-10
Black crappie	SN1	511	351	2.9-13.5	10.4	10.4	92	88	77	27	99.1	1-7
Yellow perch	ALL	4,718	1,195	3.8-11.3	6.1	6.0	2	1	0	0	98.1	1-8
Channel catfish	ALL	476	471	5.2-28.9	17.0	17.0	56		5		98.6	2-12
LMB	SN1	41	41	6.4-19.5	13.0	13.3						
LMB	SE1	85	85	6.8-18.8	12.1	11.2						
LMB	SE2	31	31	6.5-19.6	13.0	12.7						
LMB	ALL	157	157	6.4-19.6	12.5	12.2	58	44	34	8	113.5	2-12
SMB	ALL	8	8	5.1-11.0	9.0	9.4						2-3
Northern pike	ALL	152	152	11.2-37.9	23.9	24.7	79	40	23	1	105.8	1-9
Walleye	SN1	610	610	6.8-27.7	11.2	9.0						
Walleye	SE1	172	172	6.8-26.8	11.7	12.6						
Walleye	SE2	86	86	7.0-26.8	11.1	9.6						
Walleye	ALL	868	796	6.8-27.7	11.3	9.1	26	21	18	3	100.5	1-11

1. LMB = largemouth bass, SMB = smallmouth bass

Table 9. Yellow perch size structure metrics for lakes in the Poynette management area, 2009-2021.

LAKE ¹	COUNTY	YEAR	GEAR TYPE	NUMBER COLLECTED	NUMBER MEASURED	PSD	PSD9	PSDP	PSDM	MEAN LENGTH	MEDIAN LENGTH	LARGEST FISH
White Mound	Sauk	2019	Fyke, EF	131	130	71	42	16	0	8.6	8.7	11.9
Devils	Sauk	2013	Fyke	106	106	63	51	37	10	9.0	9.1	13.5
Swan	Columbia	2018	Fyke	887	887	26	8	2	0	7.3	7.2	12.0
Crystal	Dane	2015	Fyke	590	590	23	3	0	0	7.4	7.5	9.8
Wisconsin	Col/Sauk	2017	Fyke	281	281	13	3	1	0	7.0	6.9	11.3
Redstone	Sauk	2010	Fyke	127	127	9	1	0	0	6.3	9.2	9.0
Park	Columbia	2011	Fyke	1,122	675	8	3	1	0	6.1	5.7	10.5
Park	Columbia	2021	Fyke, EF	4,718	1,197	3	1	0	0	6.1	6.0	11.3
Mirror	Sauk	2014	Fyke	267	267	6	2	0	0	6.2	6.0	9.9
Fish	Dane	2021	Fyke	369	72					6.3	6.3	8.8

1. Fish and Mud lakes in Dane County combined into one lake when rising lake levels inundated Fish Lake Road in 2019 and did not recede.

Table 10. Bluegill size-specific electrofishing catch rates (CPUE; fish/mile) from SE2 surveys of lakes in the Poynette management area, 2010-2021.

			CPUE				AREA CPUE RANK			
Lake ^{1,2}	County	Year	Total	6"+	7"+	8"+	Total	6"+	7"+	8"+
Silver	Columbia	2016	345.0	5.0	0.0	0.0	1	20	22	22
Tarrant	Columbia	2018	267.0	37.0	22.0	7.0	2	13	6	2
Blass	Sauk	2017	190.0	50.0	27.3	1.3	3	6	3	7
Fish	Dane	2021	189.0	16.0	1.0	0.0	4	16	20	20
Mirror	Sauk	2014	143.3	62.0	14.7	0.0	5	3	9	13
Dutch Hollow	Sauk	2016	141.3	69.3	30.7	6.0	6	2	1	3
Fish	Dane	2015	135.0	46.0	8.0	0.0	7	9	12	16
Seeley	Sauk	2016	123.4	85.5	14.5	0.0	8	1	10	14
Lazy	Columbia	2011	122.0	24.0	13.0	0.0	9	15	11	15
Mud	Dane	2015	120.7	38.0	0.0	0.0	10	12	21	21
White Mound	Sauk	2019	102.0	48.0	22.0	7.0	11	8	5	1
George	Columbia	2013	101.0	53.5	19.2	0.0	12	5	7	12
West	Columbia	2019	86.7	2.7	1.3	0.0	13	22	19	19
Crystal	Dane/Col	2015	79.3	62.0	28.7	0.0	14	4	2	11
Swan	Columbia	2018	74.0	38.7	6.7	0.7	15	11	13	10
Delton	Sauk	2021	68.0	50.0	3.0	0.0	16	7	15	17
Wisconsin	Col/Sauk	2017	59.8	29.0	15.0	1.2	17	14	8	8
Virginia	Sauk	2016	53.9	38.8	26.7	4.2	18	10	4	4
Park	Columbia	2021	43.0	15.0	2.0	0.0	19	17	18	18
Spring	Columbia	2018	32.0	2.0	0.0	0.0	20	23	23	23
La Valle Millpond	Sauk	2021	29.0	1.0	0.0	0.0	21	24	24	24
Crystal	Columbia	2014	20.0	2.9	2.9	2.9	22	21	17	6
Devils	Sauk	2013	12.0	6.0	3.0	3.0	23	19	16	5
Redstone	Sauk	2010	10.5	8.5	5.5	1.0	24	18	14	9
Mean			106.2	33.0	11.1	1.4				
Median			93.9	37.5	7.3	0.0				

1. Mud Lake and Fish Lake are listed separately for 2015 and as one combined lake for 2021. In 2019 rising lake levels inundated Fish Lake Road, causing the two lakes to become one.

2. Crystal Lake in Columbia County is 28 acres and is located within the Peter Helland Wildlife Area near Pardeeville.

Table 11. Black crappie size structure metrics for lakes in the Poynette management area, 2010-2021.

LAKE ¹	COUNTY	YEAR	SURFACE		NUMBER MEASURED	MEAN LENGTH	MEDIAN LENGTH	LARGEST FISH			
			AREA (ACRES)	NUMBER COLLECTED				PSD8	PSD9	PSD10	PSD12
Mud	Dane	2015	85	1,344	473	8.2	8.7	9.8	97	37	0
Park	Columbia	2021	312	512	351	10.4	10.4	13.5	92	88	77
Lazy	Columbia	2011	161	342	173	8.4	8.8	12.0	86	52	17
Crystal	Dane	2015	600	764	764	8.3	8.4	10.8	78	17	1
Swan	Columbia	2018	406	525	525	9.2	9.7	13.0	78	68	43
Wisconsin	Columbia	2017	7,200	501	501	8.8	8.4	14.2	70	34	26
Delton	Sauk	2014	267	1,661	635	8.1	8.3	9.4	68	4	0
Redstone	Sauk	2010	605	533	533	8.4	8.3	14.4	62	39	23
Spring	Columbia	2018	24	951	845	7.4	7.4	12.3	34	12	4
Fish	Dane	2021	404	3,173	495	7.2	7.6	12.5	29	3	0
Mirror	Sauk	2014	139	510	508	7.5	7.2	12.8	28	17	3
Fish	Dane	2015	258	1,627	877	5.3	4.3	9.8	24	4	0
Dutch Hollow	Sauk	2016	166	76	76	9.3	9.8	12.2			
White Mound	Sauk	2019	104	35	35	5.9	4.0	13.2			
Devils	Sauk	2013	375	17	17	4.9	4.1	11.5			

1. Mud Lake and Fish Lake are listed separately for 2015 and as one combined lake for 2021. In 2019 rising lake levels inundated Fish Lake Road, causing the two lakes to become one.

Table 12. Northern pike abundance and size structure metrics for lakes in the Poynette management area, 2011-2021. Lengths are reported in inches.

LAKE ¹	COUNTY	AREA (ACRES)	YEAR	NUMBER OF UNIQUE FISH SAMPLED		MEAN LENGTH	MAX LENGTH	n>40"	PSD	PSD26	PSDP	PSD32	PSDM	PSD40
				PE ²										
Delton	Sauk	267	2014	250	1.3	27.7	41.4	2	92	59	45	19	14	1
Devils	Sauk	375	2013	119	0.5	30.2	40.0	1	87	73	65	49	41	1
Park	Columbia	312	2021	151	0.9	23.9	37.9	0	79	40	24	3	1	0
Fish	Dane	405	2021	323	1.5	24.5	43.7	6	77	35	24	9	5	2
Swan	Columbia	406	2018	268	1.7	21.9	33.5	0	66	27	19	1	0	0
Lazy	Columbia	161	2011	384	7.4	22.4	37.5	0	64	31	16	7	3	0
Mirror	Sauk	139	2014	302	6.6	21.0	42.0	3	56	10	3	2	2	1
Dutch Hollow	Sauk	166	2016	469	4.2	19.1	35.9	0	22	4	2	1	0	0
Fish	Dane	258	2015	86		22.8	38.2	0						
Wisconsin	Col/Sauk	7,200	2017	58		21.6	39.3	0						
Spring	Columbia	24	2018	46		22.8	29.7	0						
White Mound	Sauk	104	2019	45		24.0	38.1	0						
Crystal	Dane	600	2015	18		26.0	34.3	0						
Mud	Dane	85	2015	1		26.4	26.4	0						

1. Mud Lake and Fish Lake are listed separately for 2015 and as one combined lake for 2021. In 2019 rising lake levels inundated Fish Lake Road, causing the two lakes to become one.

2. PE = Population Estimate; an estimate of the number of sexually mature northern pike per surface acre of water.

Table 13. Largemouth bass size-specific electrofishing catch rates (CPUE; fish/mile) from SE2 surveys of lakes in the Poynette management area, 2010-2021.

			CPUE						AREA CPUE RANK					
LAKE ^{1,2}	COUNTY	YEAR	Total	8"+	12"+	14"+	18"+	20"+	Total	8"+	12"+	14"+	18"+	20"+
White Mound	Sauk	2019	273.2	243.2	102.4	5.2	1.6	0.8	1	1	2	10	4	1
Virginia	Sauk	2016	207.9	201.2	172.7	2.4	0.0	0.0	2	2	1	17	NA	NA
Crystal	Columbia	2014	190.5	184.8	23.8	0.0	0.0	0.0	3	3	7	NA	NA	NA
Tarrant	Columbia	2018	81.0	76.0	44.0	31.0	0.0	0.0	4	5	3	1	NA	NA
Dutch Hollow	Sauk	2016	79.2	76.2	43.3	11.3	0.7	0.0	5	4	4	3	7	NA
Silver	Columbia	2016	72.4	59.6	23.2	10.4	0.0	0.0	6	6	8	4	NA	NA
Devils	Sauk	2013	55.8	51.9	32.2	0.6	0.3	0.0	7	7	5	21	10	NA
George	Columbia	2013	49.5	45.5	13.1	1.0	0.0	0.0	8	8	10	18	NA	NA
Fish	Dane	2015	35.3	26.5	23.9	15.6	2.1	0.3	9	10	6	2	1	5
Blass	Sauk	2017	32.7	28.7	12.0	6.7	0.0	0.0	10	9	11	9	NA	NA
Lazy	Columbia	2011	32.5	26.0	11.5	3.8	0.3	0.3	11	11	12	14	11	6
Seeley	Sauk	2016	25.8	21.0	13.7	8.1	0.0	0.0	12	13	9	6	NA	NA
Crystal	Dane/Col.	2015	23.7	22.1	11.3	7.6	2.1	0.5	13	12	13	7	2	2
Fish	Dane	2021	20.8	18.5	9.6	4.6	1.7	0.4	14	14	15	11	3	4
Mud	Dane	2015	18.7	4.7	1.3	0.7	0.0	0.0	15	22	22	20	NA	NA
Mirror	Sauk	2014	18.2	17.0	11.2	9.0	0.3	0.0	16	15	14	5	9	NA
Delton	Sauk	2021	10.6	10.3	9.4	7.1	0.5	0.0	17	16	16	8	8	NA
Wisconsin	Col/Sauk	2017	7.8	6.5	5.2	3.7	0.0	0.0	18	18	17	15	NA	NA
Swan	Columbia	2018	7.4	7.0	5.0	3.9	0.9	0.4	19	17	18	13	6	3
Spring	Columbia	2018	7.0	6.0	4.0	4.0	0.0	0.0	20	19	19	12	NA	NA
Park	Columbia	2021	6.3	5.4	3.7	2.9	1.0	0.0	21	20	20	16	5	NA
Redstone	Sauk	2010	4.7	4.7	3.3	0.9	0.1	0.0	22	21	21	19	12	NA
West	Columbia	2019	2.7	0.0	0.0	0.0	0.0	0.0	23	NA	NA	NA	NA	NA
Mean			45.0	40.9	21.7	6.1	0.4	0.1						
Median			24.7	21.6	11.4	3.9	0.1	0.0						

1. Crystal Lake in Columbia County is 28 acres and is located within the Peter Helland Wildlife Area near Pardeeville.

2. Mud Lake and Fish Lake are listed separately for 2015 and as one combined lake for 2021. In 2019 rising lake levels inundated Fish Lake Road, causing the two lakes to become one.

Table 14. Mean length at age 6 (MLA-6) of largemouth bass in lakes in the Poynette management area, 2010-2021.

LAKE	COUNTY	YEAR	MLA-6
Park	Columbia	2021	16.6
Fish	Dane	2021	15.8
Spring	Columbia	2018	15.6
Wisconsin	Col/Sauk	2017	15.5
Delton	Sauk	2014	15.4
Swan	Columbia	2018	15.3
Park	Columbia	2011	15.2
Redstone	Sauk	2010	14.5
Lazy	Columbia	2011	14.4
Mirror	Sauk	2014	14.2
Fish	Dane	2015	13.1
Crystal	Dane/Col.	2015	13.1
White Mound	Sauk	2019	12.8
Virginia	Sauk	2016	12.5
Dutch Hollow	Sauk	2016	12.2
Devils	Sauk	2013	10.8
Mean			14.2
Median			14.6

Table 15. Total catch, catch per unit effort (CPUE; fish/mile) and length summaries for sportfish species collected during the fall 2021 electrofishing survey of Park Lake, Columbia County, Wisconsin.

SPECIES	CATCH	CPUE	LENGTH RANGE (INCHES)	MEAN LENGTH	MEDIAN LENGTH
Largemouth bass	122	21.0	7.5-19.1	12.3	12.1
Walleye	71	12.2	11.5-24.4	14.8	13.7
Smallmouth bass	8	1.4	9.9-13.3	12.0	12.0
Northern pike	5	0.9	16.3-28.2	22.1	20.5
Channel catfish	5	0.9	8.1-23.9	15.9	13.6

Figures

Park Lake Yellow Perch 2021 compared to interquartile range
of all Complex Warm Dark lakes

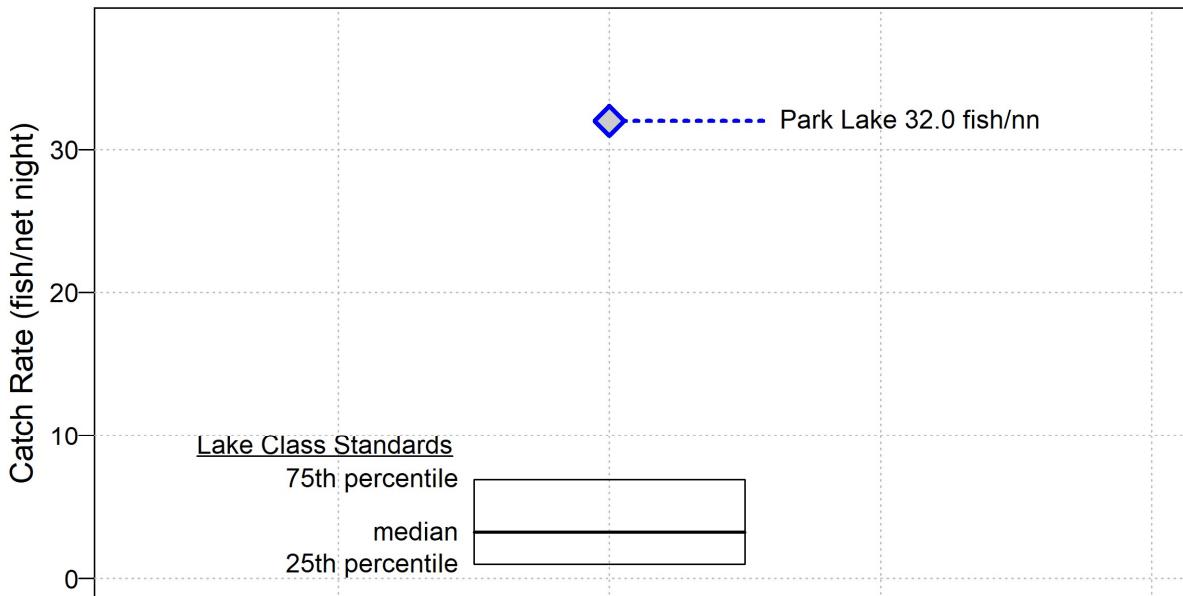


Figure 1. Yellow perch fyke net catch rate lake class comparison for Park Lake, Columbia County, Wisconsin. Lake class is Complex-Warm-Dark.

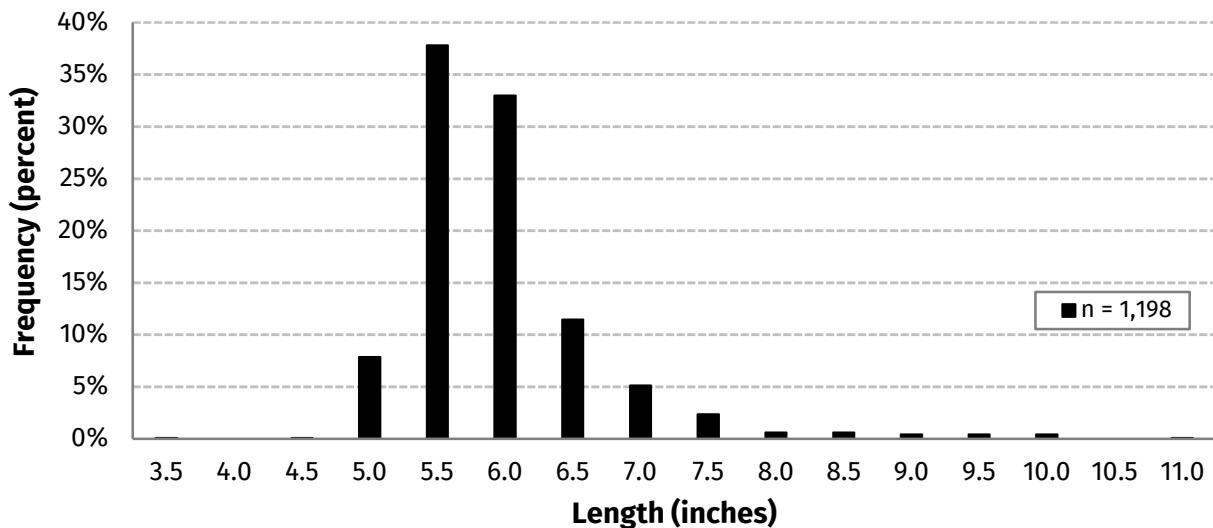


Figure 2. Length frequency distribution of yellow perch sampled during the 2021 comprehensive fishery survey of Park Lake, Columbia County, Wisconsin.

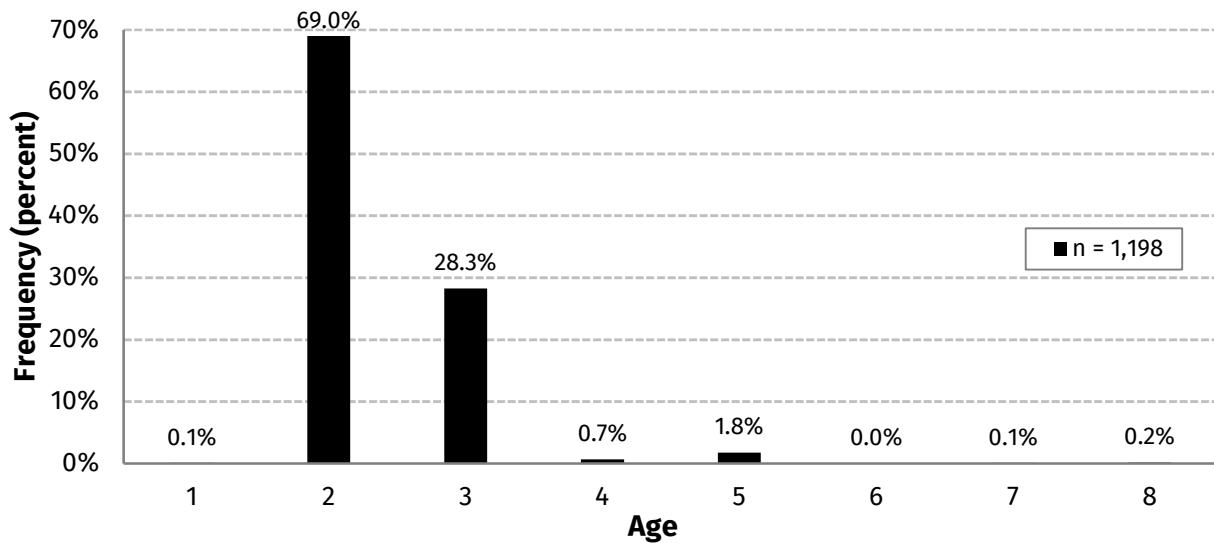


Figure 3. Age frequency distribution of yellow perch sampled during the 2021 comprehensive fishery survey of Park Lake, Columbia County, Wisconsin.

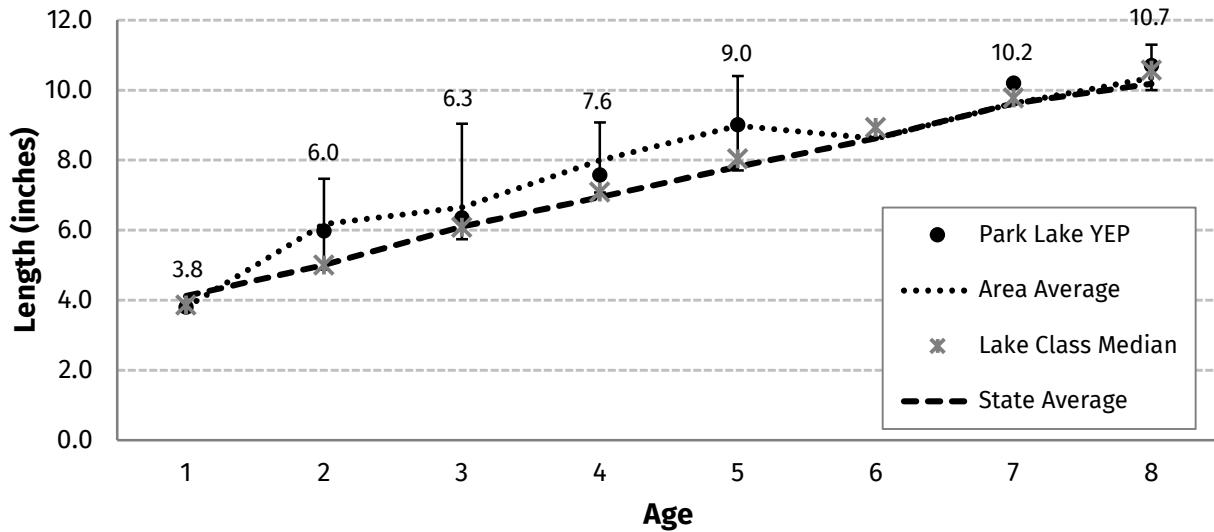


Figure 4. Mean length at age of yellow perch (YEP) sampled during the 2021 comprehensive fishery survey of Park Lake, Columbia County, Wisconsin.

**Park Lake Bluegill 2021 compared to interquartile range
of all Complex Warm Dark lakes**

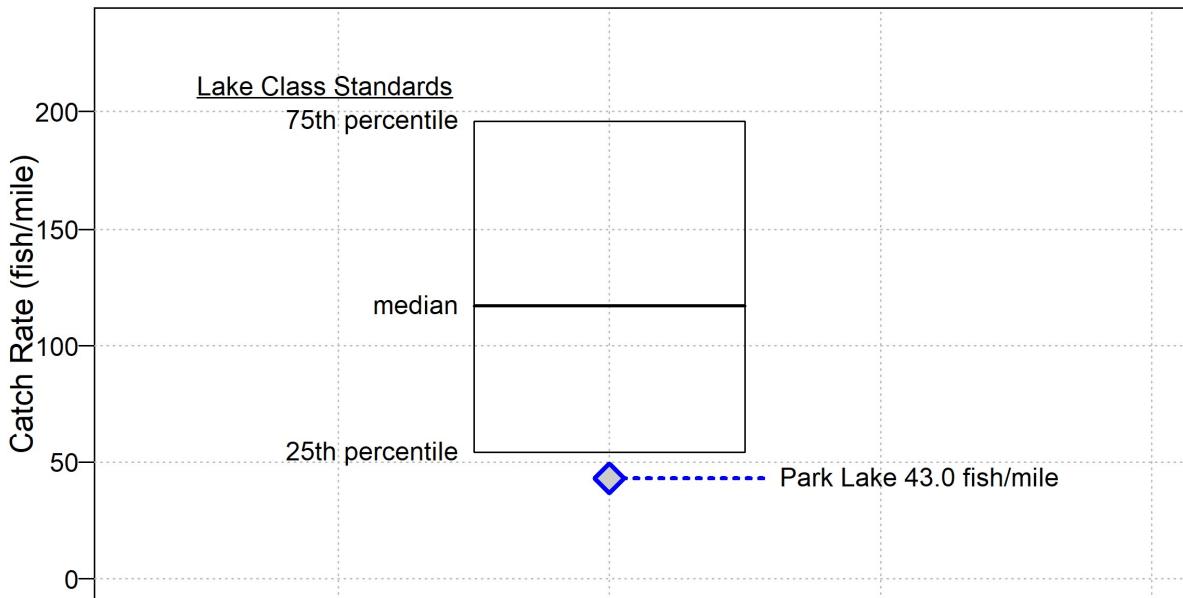


Figure 5. Bluegill electrofishing catch rate lake class comparison for Park Lake, Columbia County, Wisconsin. Lake class is Complex-Warm-Dark.

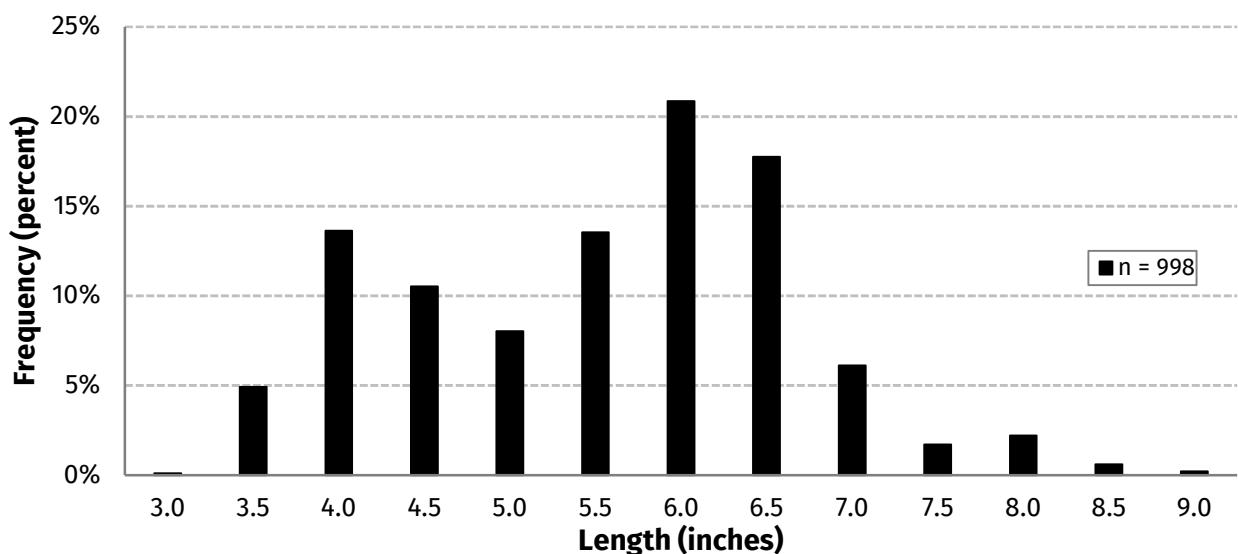


Figure 6. Length frequency distribution of bluegills sampled during the 2021 comprehensive fishery survey of Park Lake, Columbia County, Wisconsin.

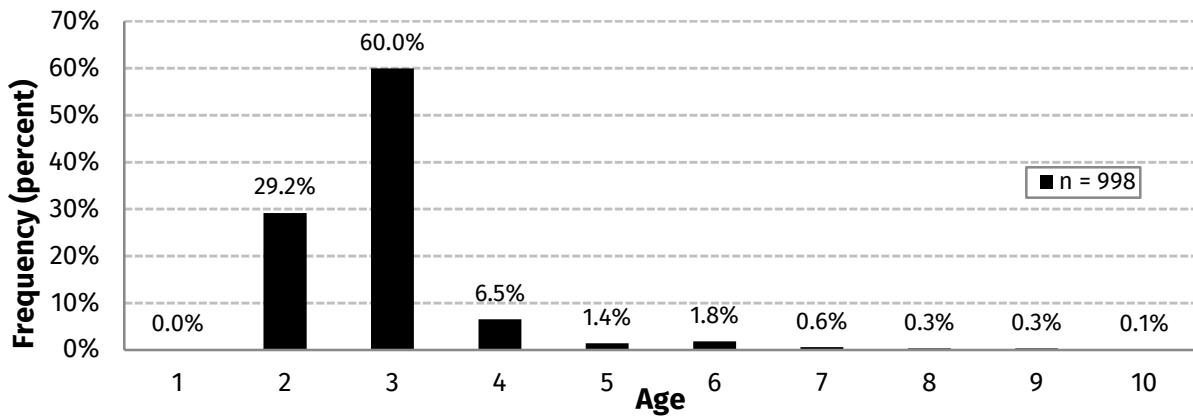


Figure 7. Age frequency distribution of bluegills sampled during the 2021 comprehensive fishery survey of Park Lake, Columbia County, Wisconsin.

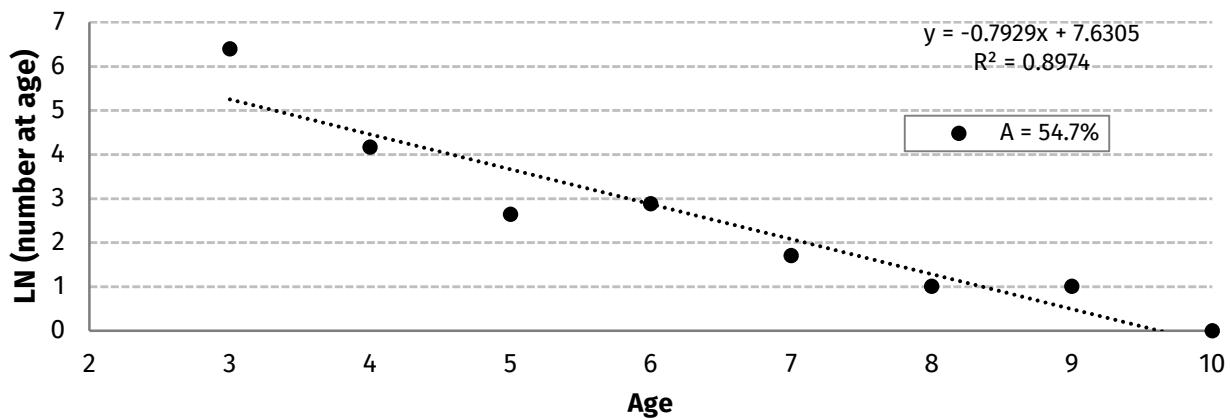


Figure 8. Catch curve for bluegills sampled during the 2021 comprehensive fishery survey of Park Lake, Columbia County, Wisconsin: A = Annual Mortality.

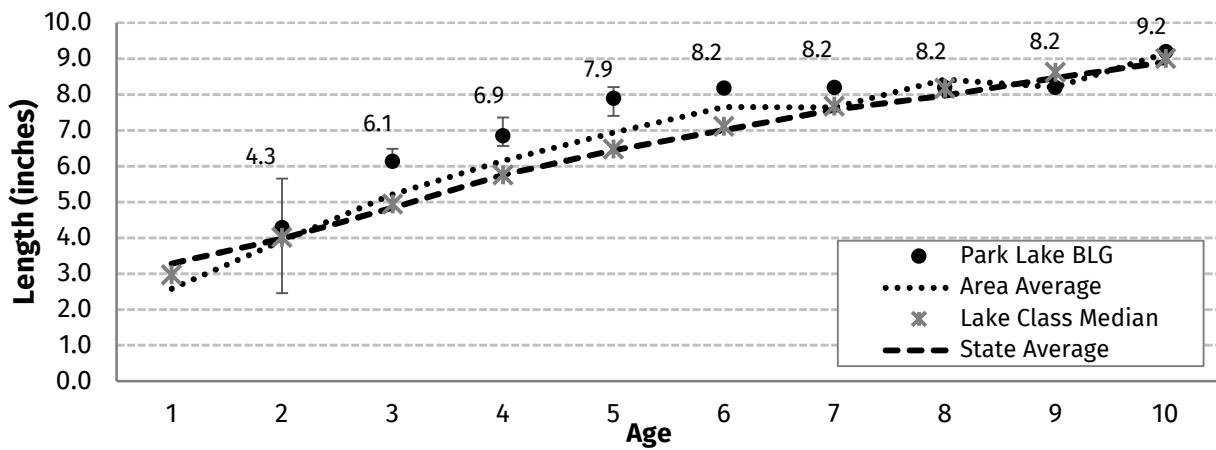


Figure 9. Mean length at age of bluegills sampled during the 2021 comprehensive fishery survey of Park Lake, Columbia County, Wisconsin.

**Park Lake Black Crappie 2021 compared to interquartile range
of all Complex Warm Dark lakes**

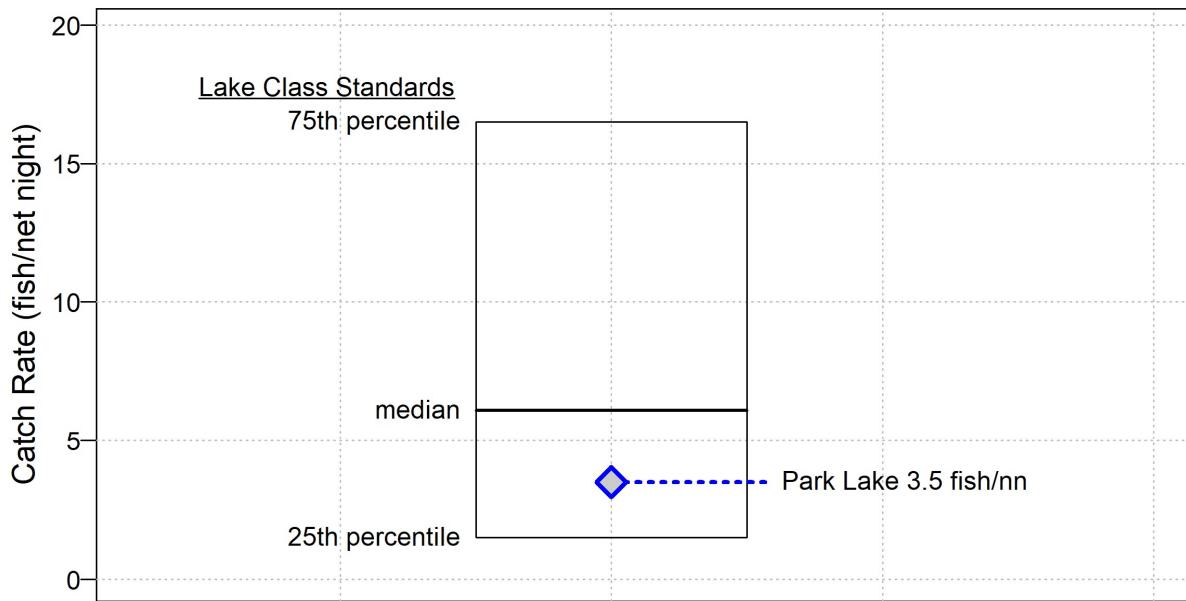


Figure 10. Black crappie fyke net catch rate lake class comparison for Park Lake, Columbia County, Wisconsin. Lake class is Complex-Warm-Dark.

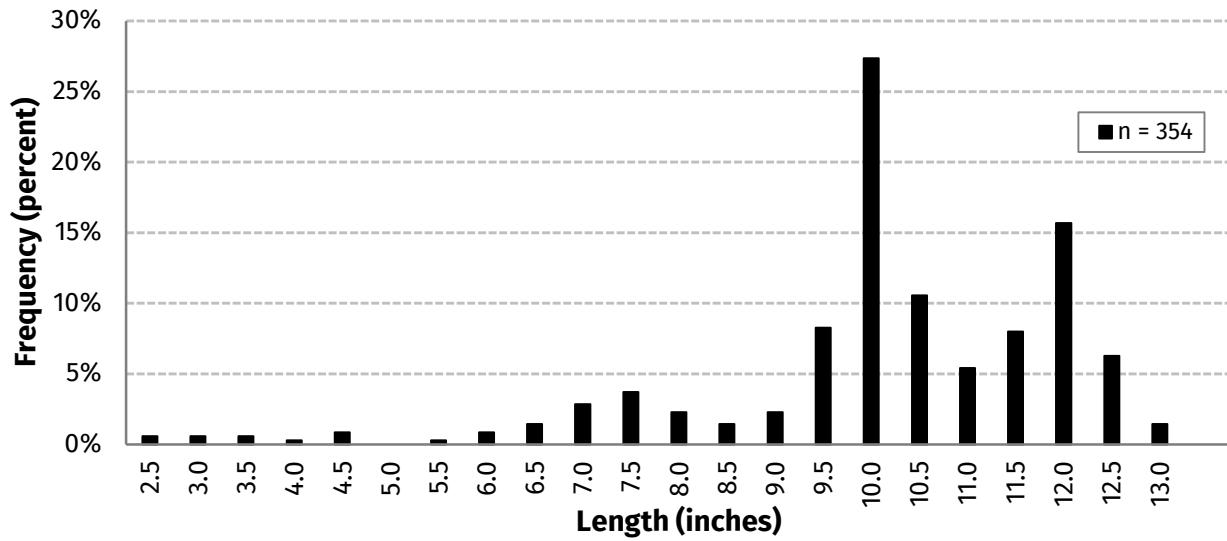


Figure 11. Length frequency distribution of black crappies sampled during the 2021 comprehensive fishery survey of Park Lake, Columbia County, Wisconsin.

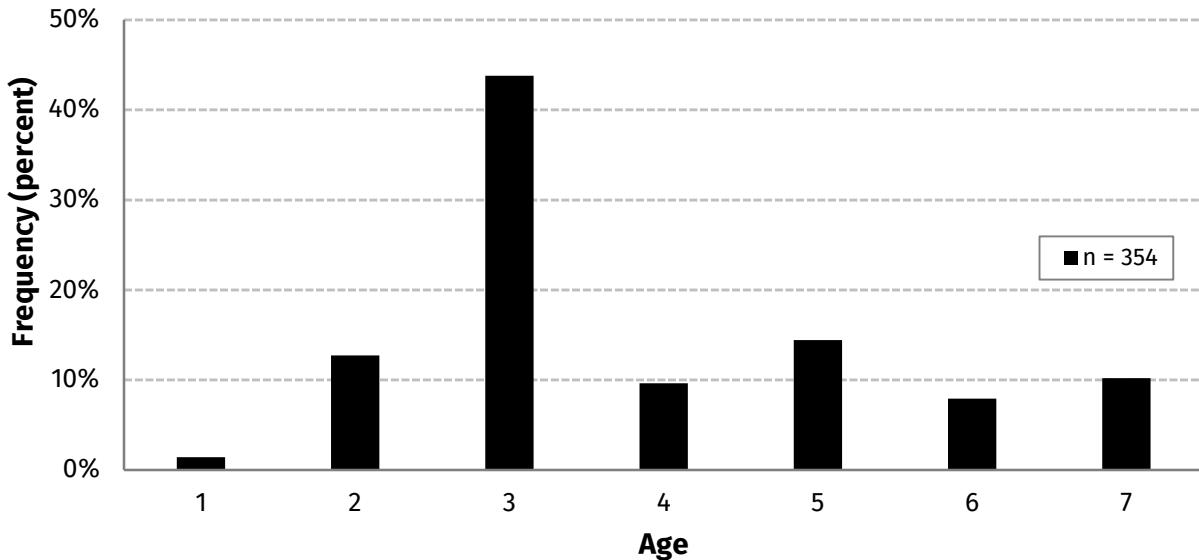


Figure 12. Age frequency distribution of black crappies sampled during the 2021 comprehensive fishery survey of Park Lake, Columbia County, Wisconsin.

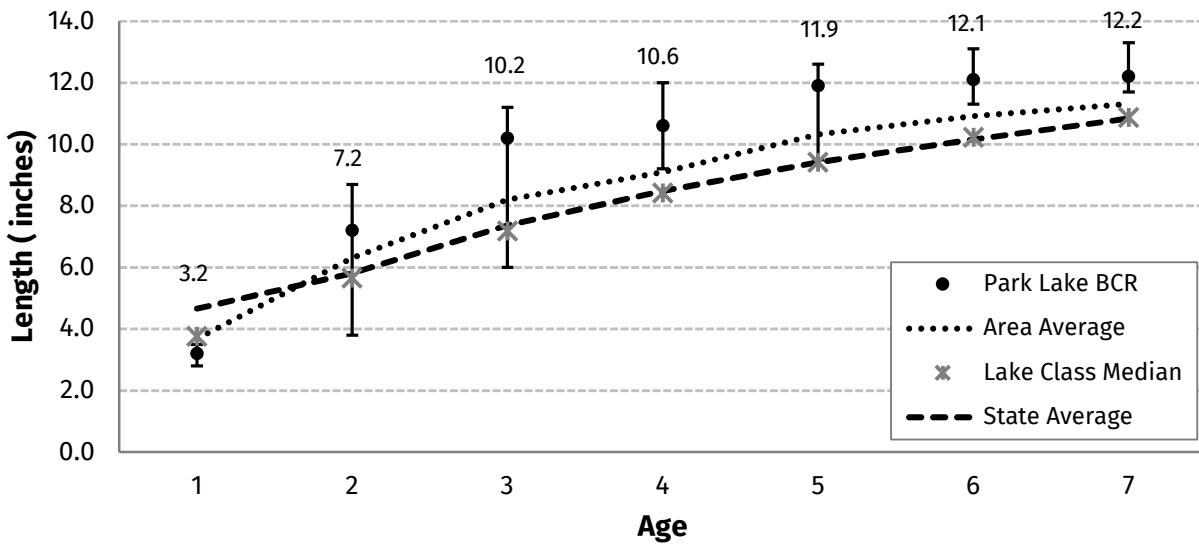


Figure 13. Mean length at age of black crappies (BCR) sampled during the 2021 comprehensive fishery survey of Park Lake, Columbia County, Wisconsin.

**Park Lake Walleye 2021 compared to interquartile range
of all Complex Warm Dark lakes**

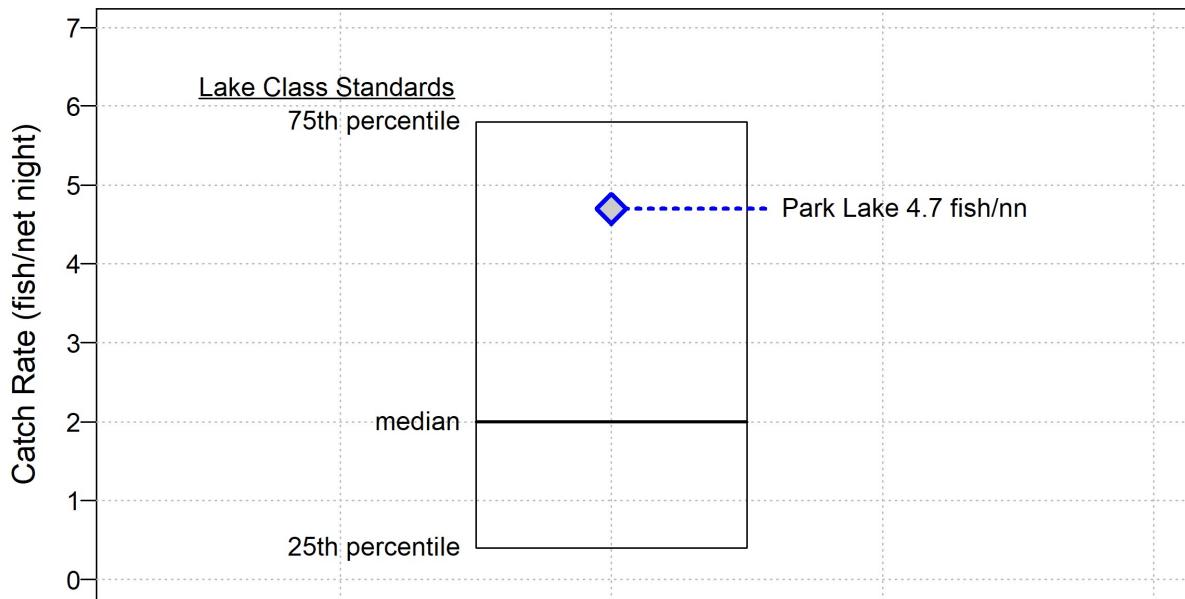


Figure 14. Walleye fyke net catch rate lake class comparison for Park Lake, Columbia County, Wisconsin. Lake class is Complex-Warm-Dark.

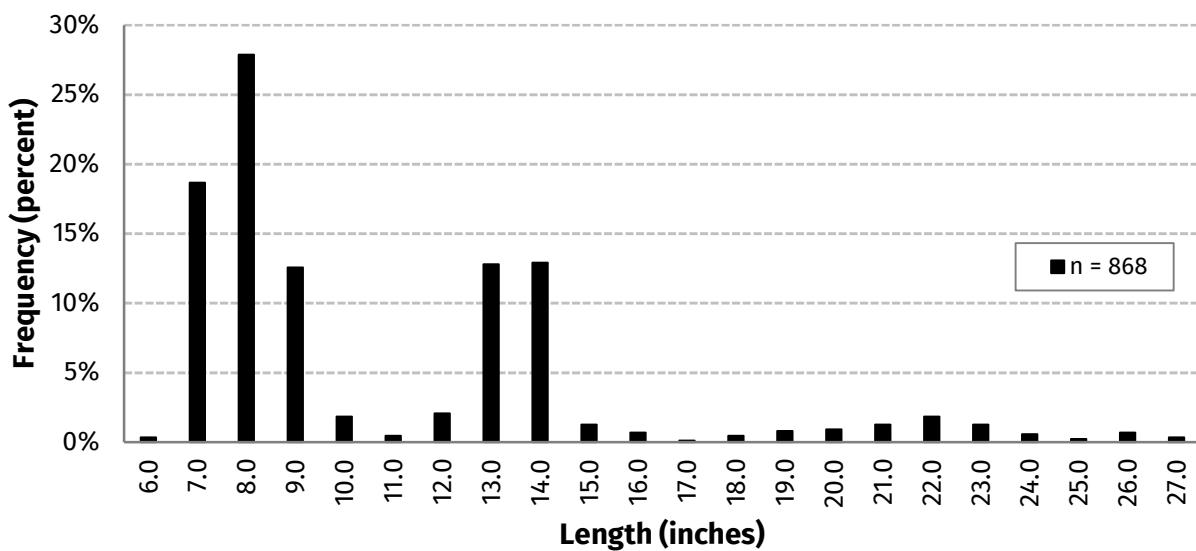


Figure 15. Length frequency distribution of walleyes sampled during the 2021 comprehensive fishery survey of Park Lake, Columbia County, Wisconsin.

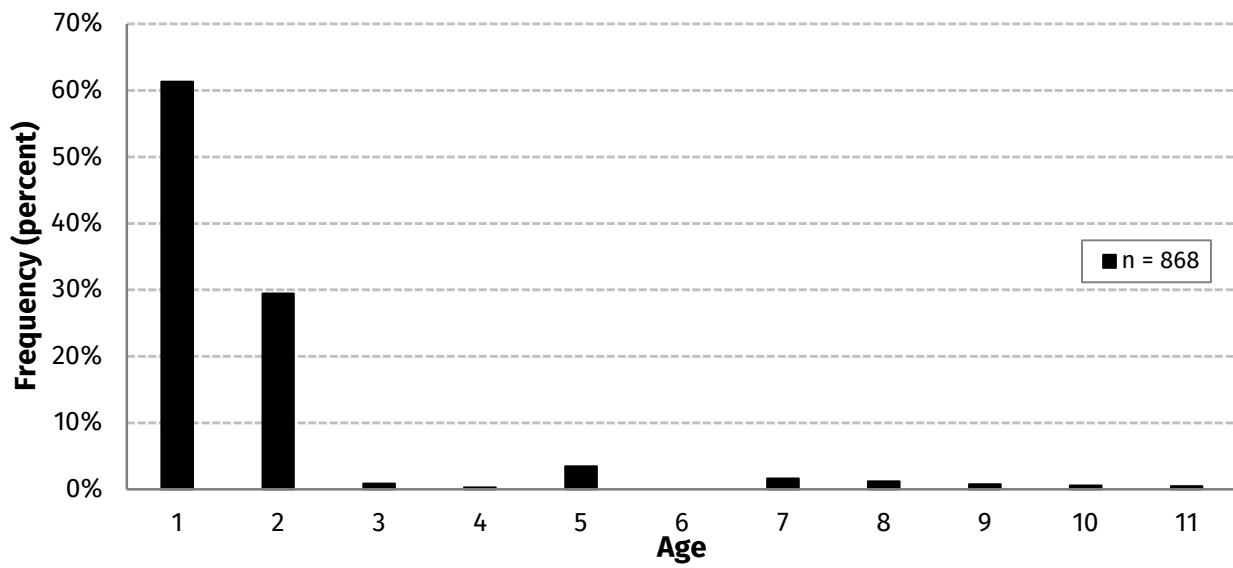


Figure 16. Age frequency distribution of walleyes sampled during the 2021 comprehensive fishery survey of Park Lake, Columbia County, Wisconsin.

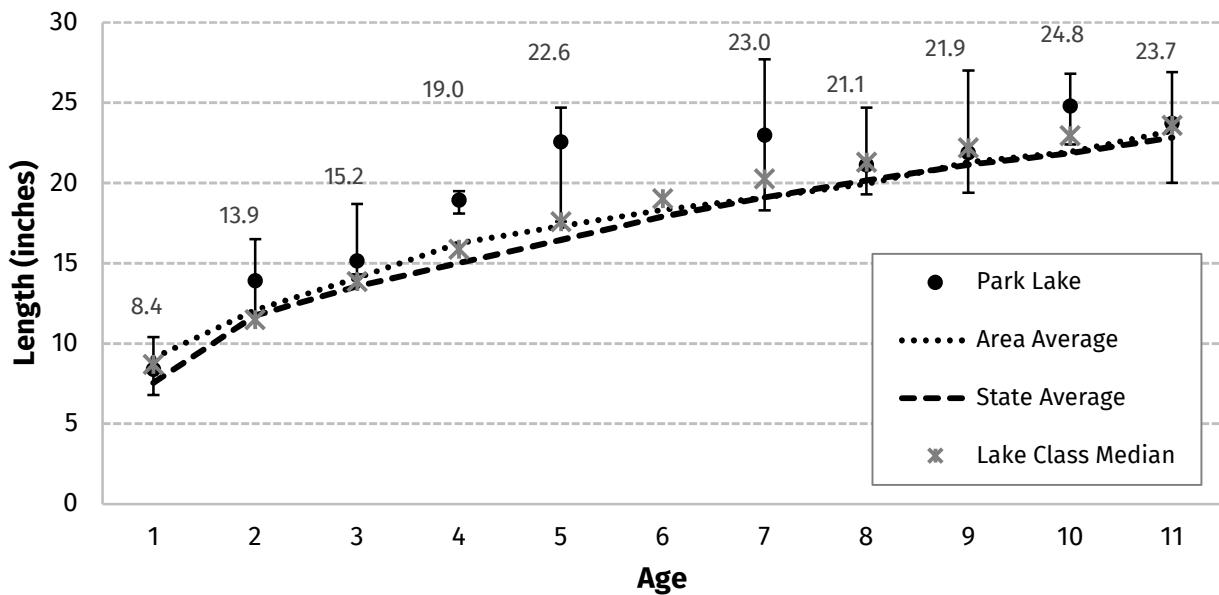


Figure 17. Mean length at age of walleyes sampled during the 2021 comprehensive fishery survey of Park Lake, Columbia County, Wisconsin.

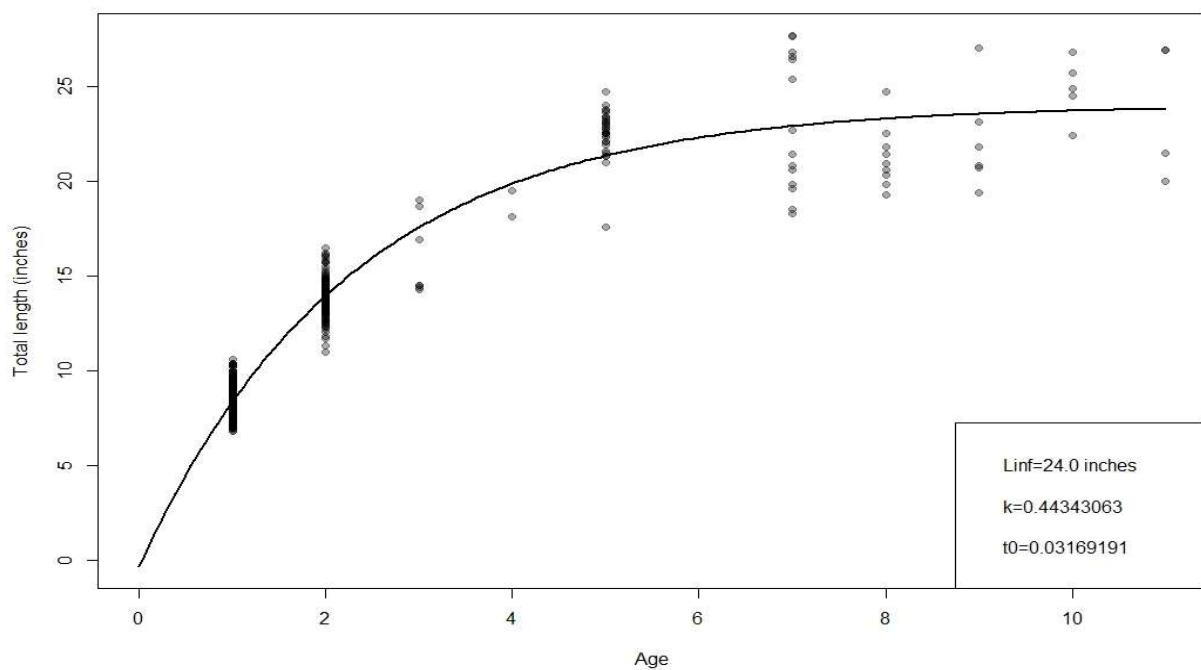


Figure 18. Length at age of walleyes sampled during the 2021 comprehensive fishery survey of Park Lake, Columbia County, Wisconsin, with a von Bertalanffy growth curve fitted to the data.

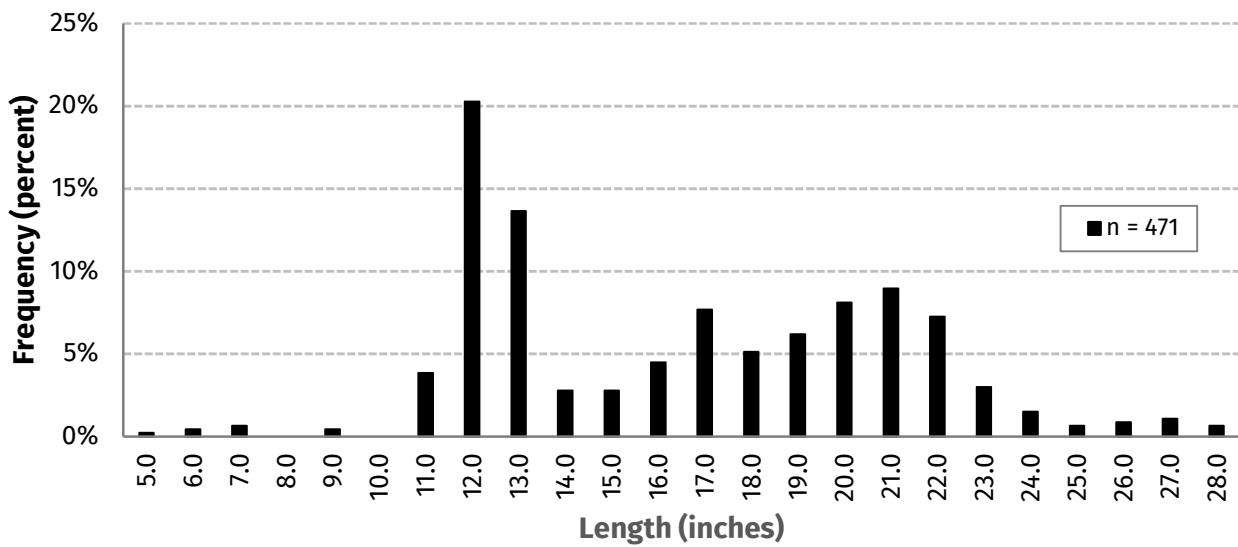


Figure 19. Length frequency distribution of channel catfish sampled during the 2021 comprehensive fishery survey of Park Lake, Columbia County, Wisconsin.

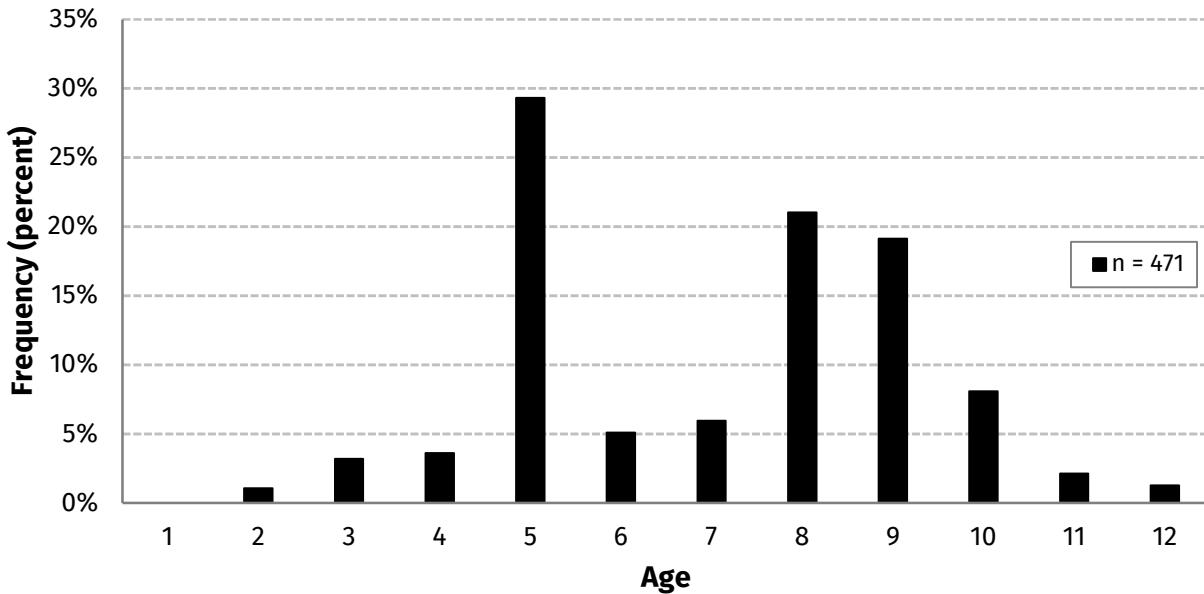


Figure 20. Age frequency distribution of channel catfish sampled during the 2021 comprehensive fishery survey of Park Lake, Columbia County, Wisconsin.

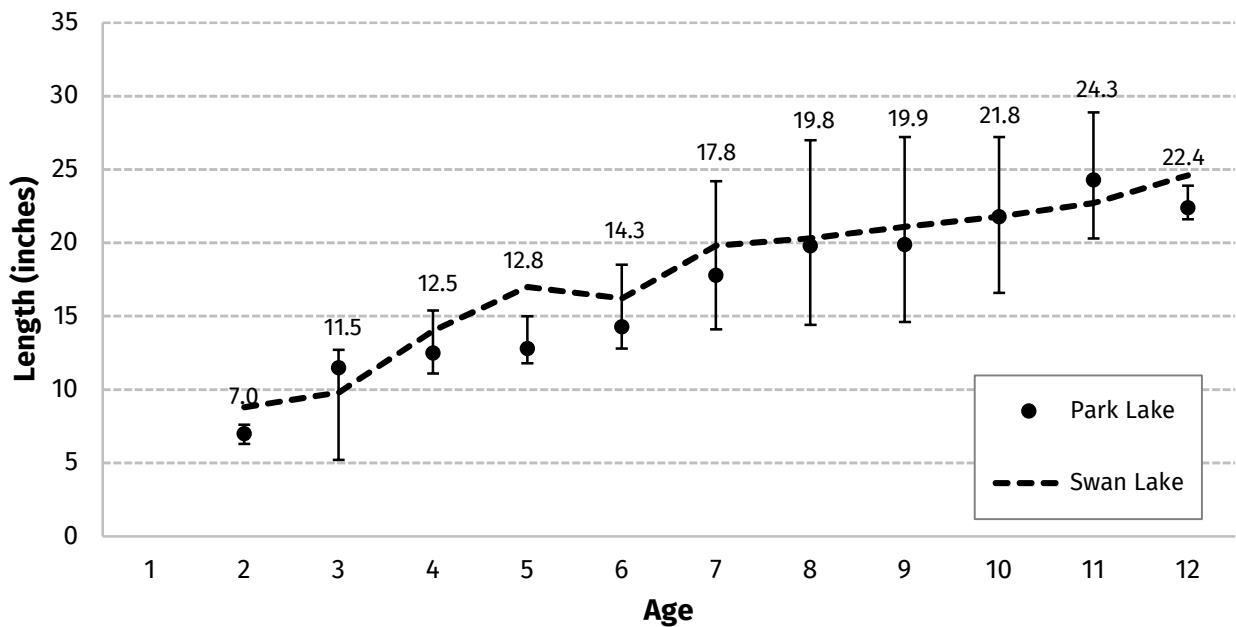


Figure 21. Mean length at age of channel catfish sampled during the 2021 comprehensive fishery survey of Park Lake, Columbia County, Wisconsin. Data from the only other area lake with a comparable catfish population, Swan Lake, are also presented.

**Park Lake Northern Pike 2021 compared to interquartile range
of all Complex Warm Dark lakes**

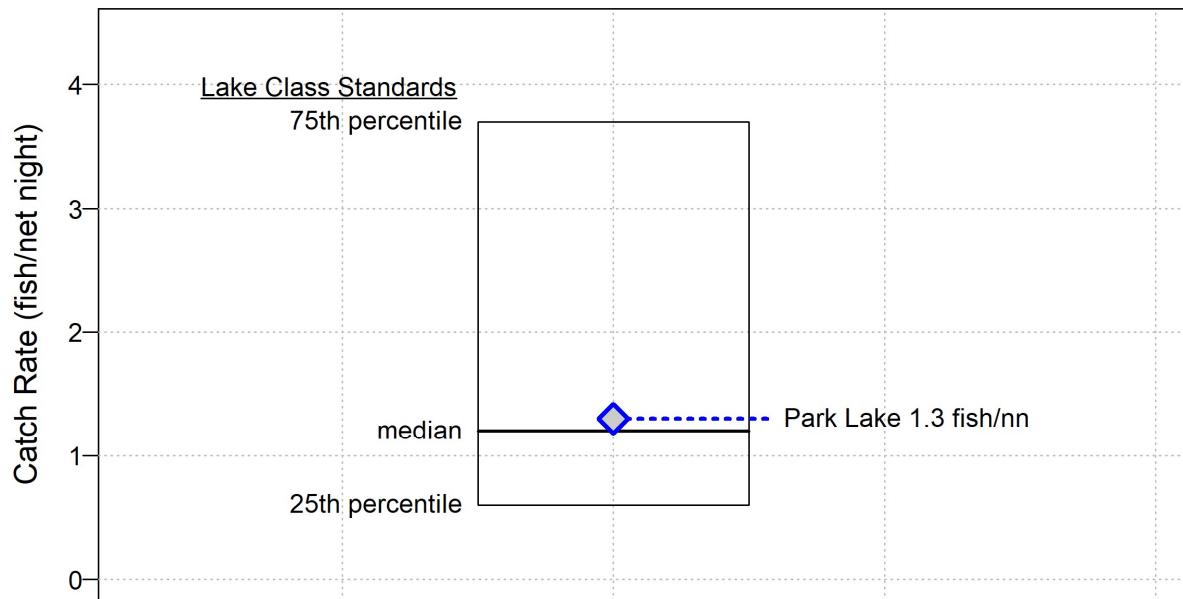


Figure 22. Northern pike fyke net catch rate lake class comparison for Park Lake, Columbia County, Wisconsin. Lake class is Complex-Warm-Dark.

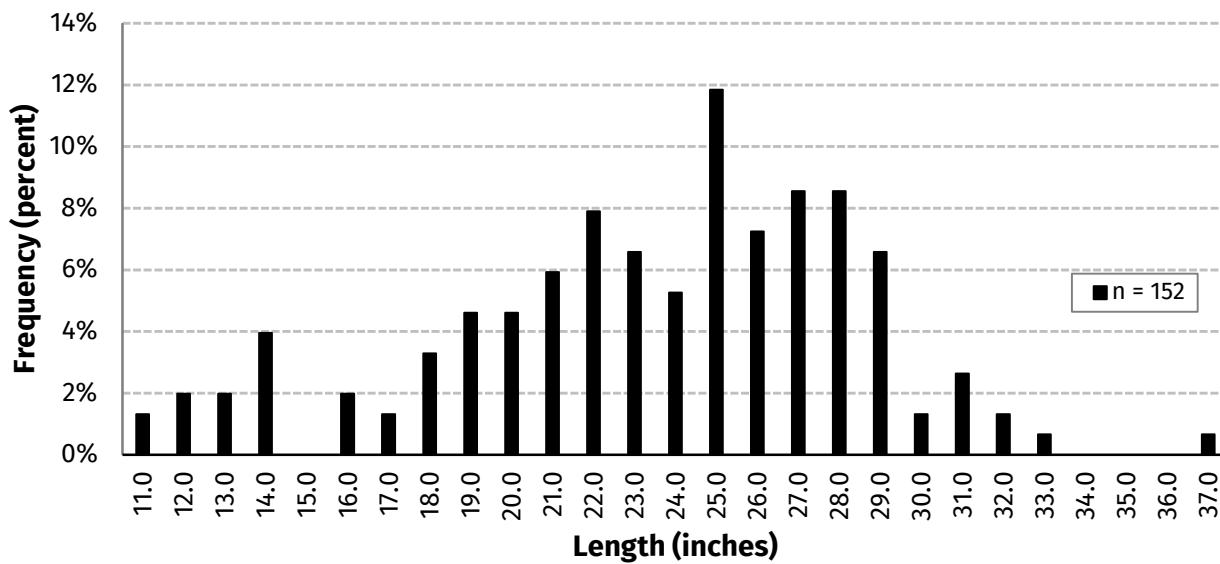


Figure 23. Length frequency distribution of northern pike sampled during the 2021 comprehensive fishery survey of Park Lake, Columbia County, Wisconsin.

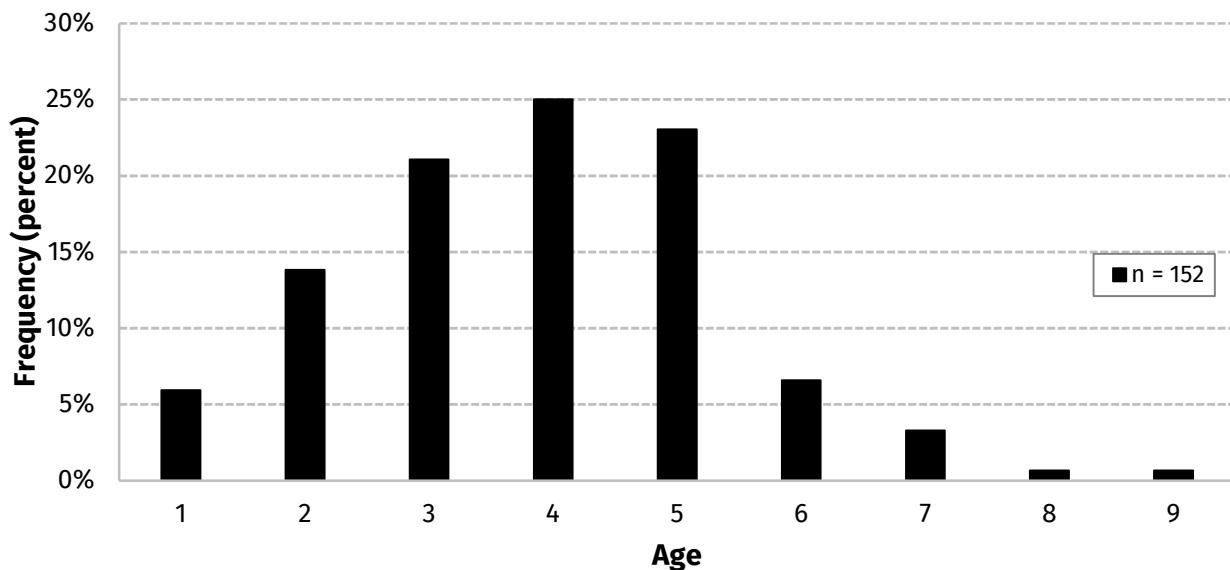


Figure 24. Age frequency distribution of northern pike sampled during the 2021 comprehensive fishery survey of Park Lake, Columbia County, Wisconsin.

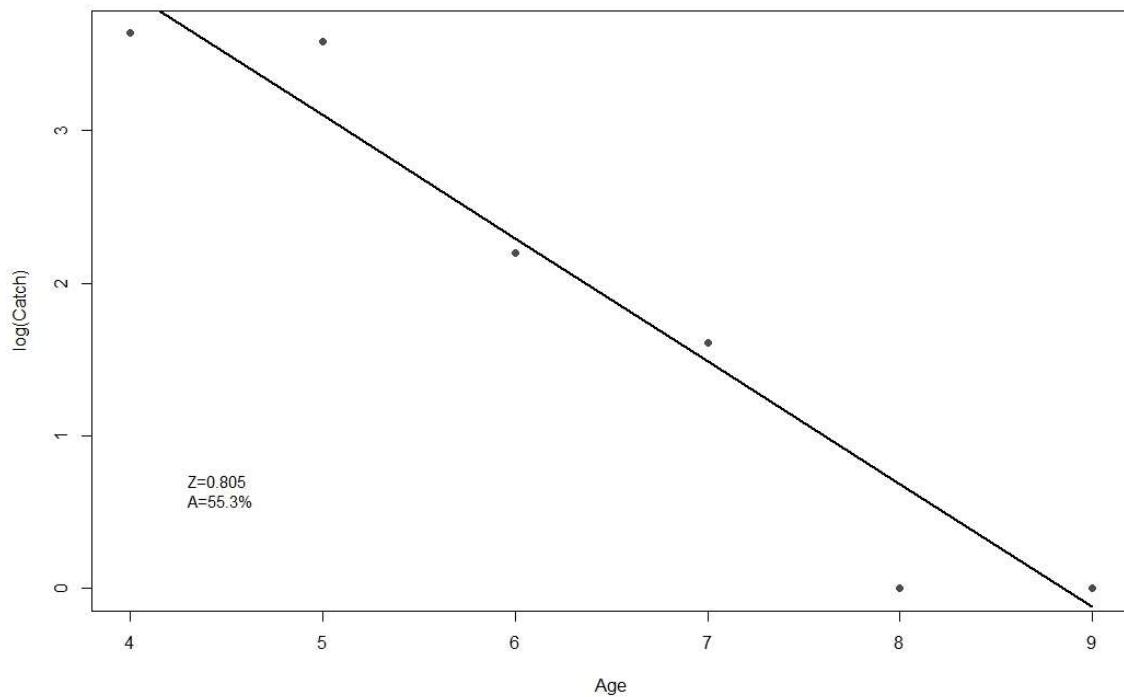


Figure 25. Catch curve for northern pike sampled during the 2021 comprehensive fishery survey of Park Lake, Columbia County, Wisconsin (Z= Instantaneous Mortality; A = Annual Mortality).

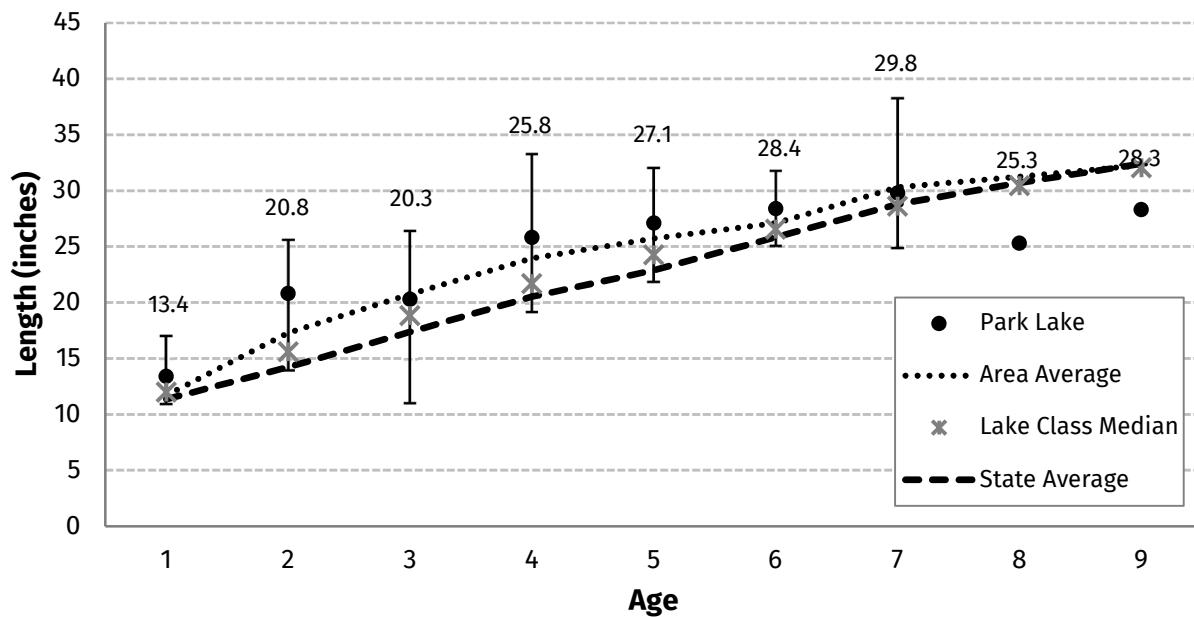


Figure 26. Mean length at age of northern pike sampled during the 2021 comprehensive fishery survey of Park Lake, Columbia County, Wisconsin.

Park Lake Largemouth Bass 2021 compared to interquartile range of all Complex Warm Dark lakes

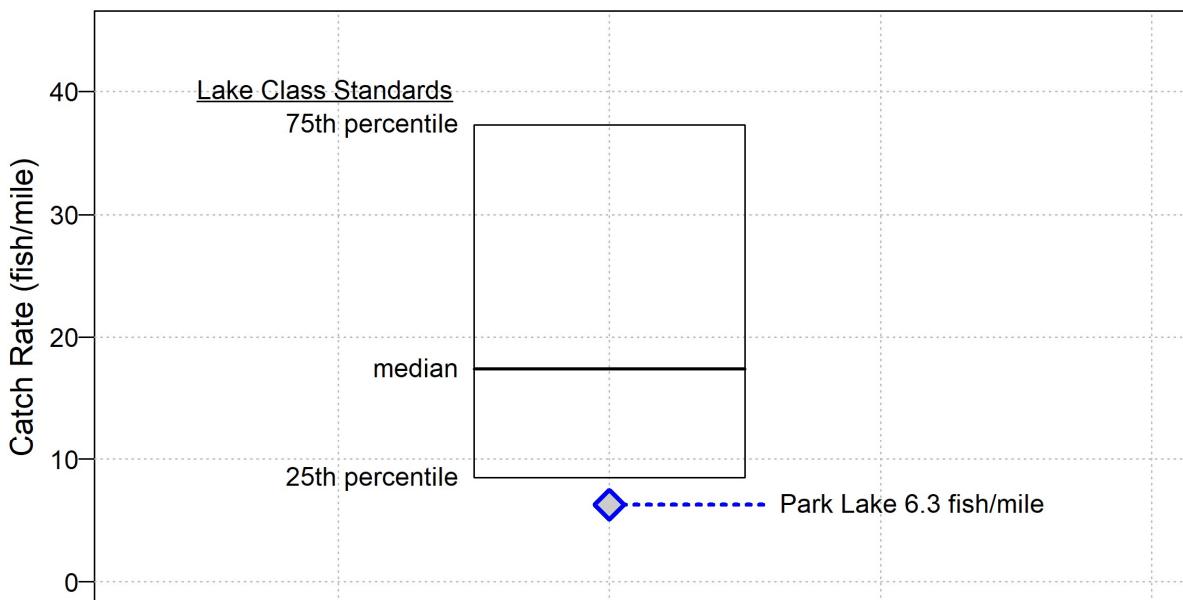


Figure 27. Largemouth bass spring electrofishing catch rate (SE2) lake class comparison for Park Lake, Columbia County, Wisconsin. Lake class is Complex-Warm-Dark.

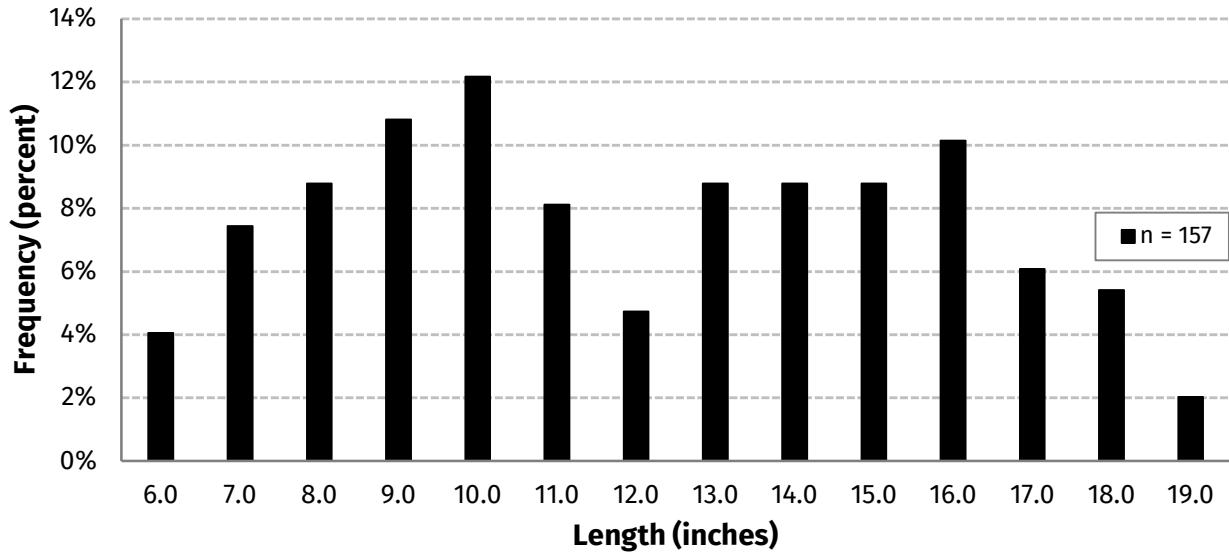


Figure 28. Length frequency distribution of largemouth bass sampled during the 2021 comprehensive fishery survey of Park Lake, Columbia County, Wisconsin.

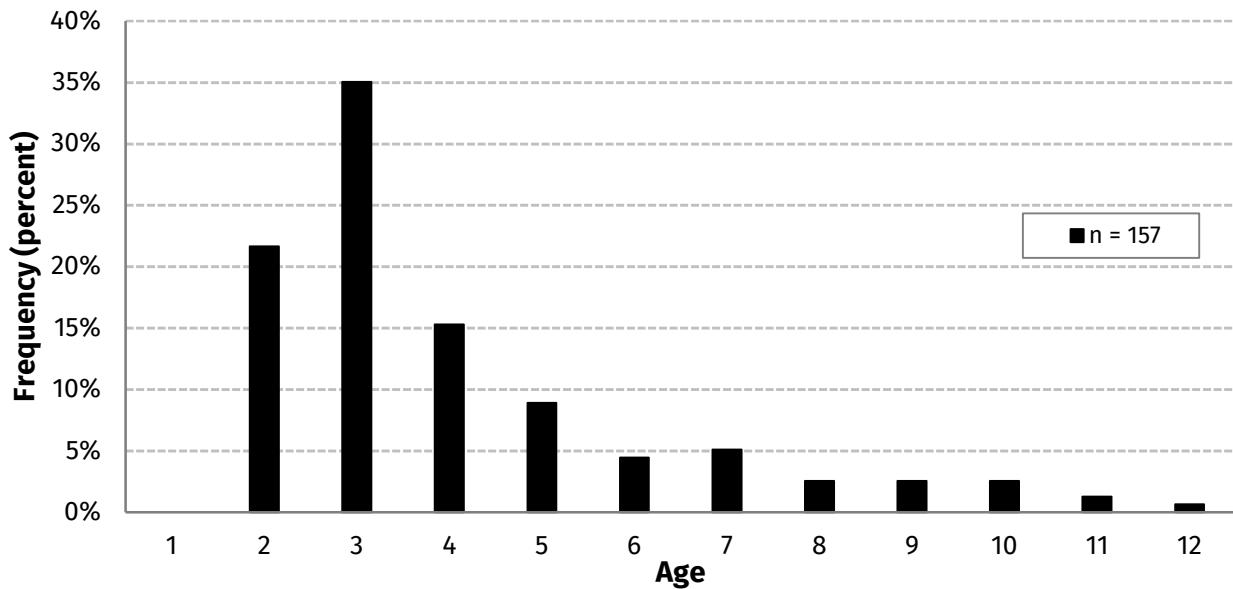


Figure 29. Age frequency distribution of largemouth bass sampled during the 2021 comprehensive fishery survey of Park Lake, Columbia County, Wisconsin.

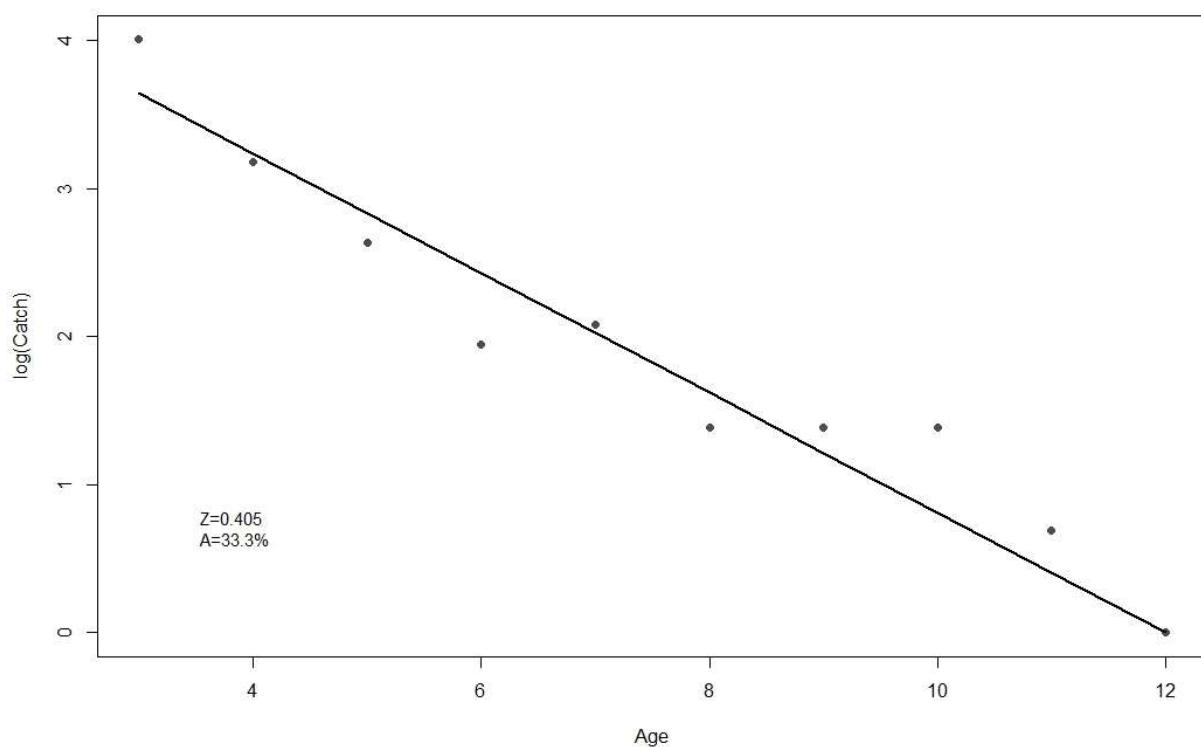


Figure 30. Catch curve for largemouth bass sampled during the 2021 comprehensive fishery survey of Park Lake, Columbia County, Wisconsin (Z= Instantaneous Mortality; A = Annual Mortality).

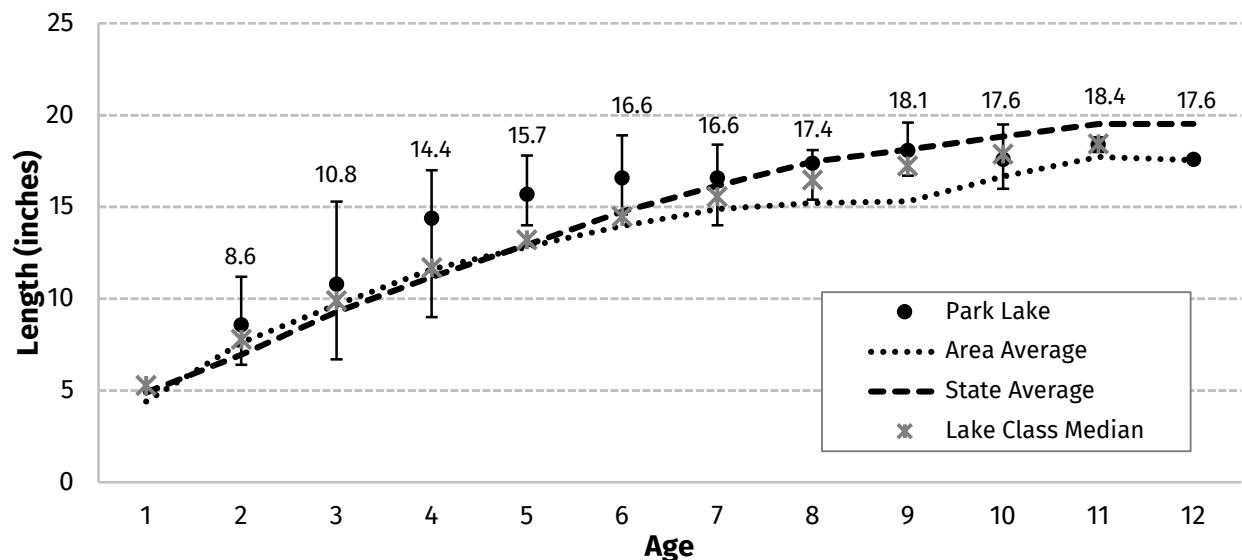


Figure 31. Mean length at age of largemouth bass sampled during the 2021 comprehensive fishery survey of Park Lake, Columbia County, Wisconsin.

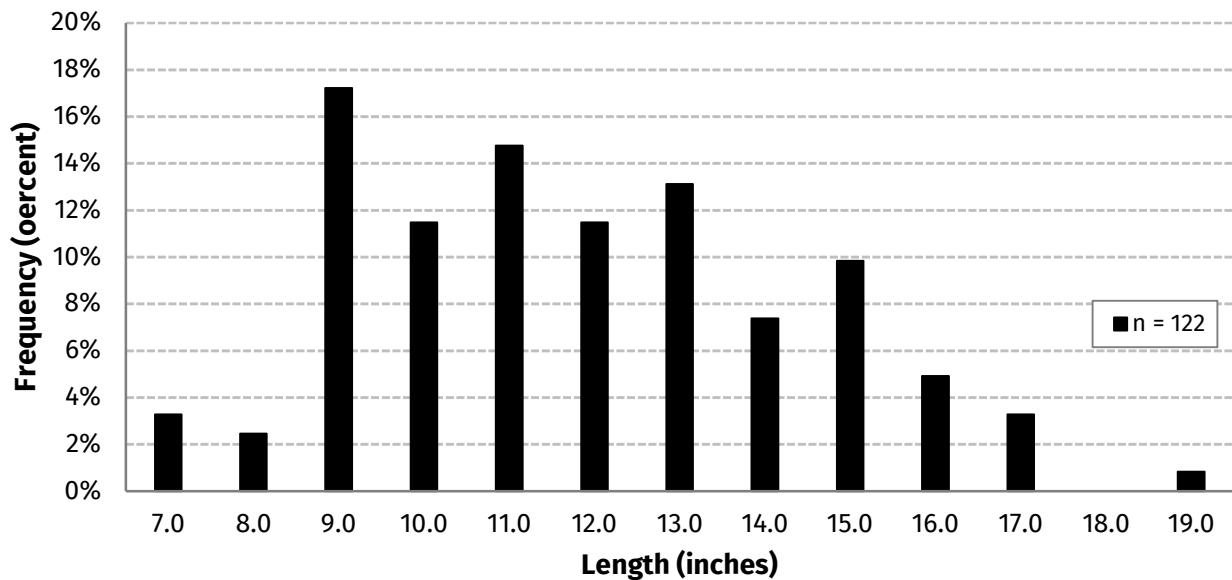


Figure 32. Length frequency distribution of largemouth bass sampled during the fall 2021 electrofishing survey of Park Lake, Columbia County, Wisconsin.

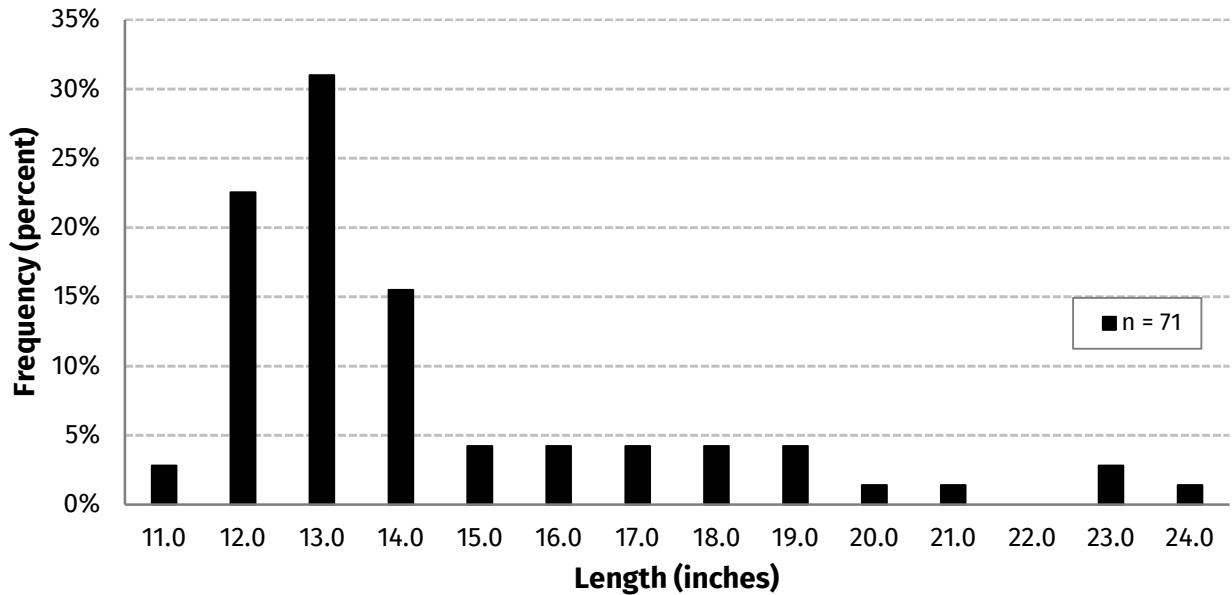


Figure 33. Length frequency distribution of walleyes sampled during the fall 2021 electrofishing survey of Park Lake, Columbia County, Wisconsin.