WISCONSIN DEPARTMENT OF NATURAL RESOURCES

2022 Comprehensive Summary Report
Big Green Lake, Green Lake County

Waterbody Code 146100

Written By: Scott Bunde and Adam Nickel

Introduction and Objectives

In 2022, the Wisconsin Department of Natural Resources (WDNR) conducted a comprehensive fish survey of Big Green Lake in order to monitor the fishery and guide fisheries management. The survey included spring fyke netting that targeted northern pike, muskellunge, and walleye at various locations including Silver Creek, Norwegian Bay, K Marsh and the main lake. Spring electrofishing to assess bass/panfish, fall gill netting to assess lake trout/cisco, and fall shocking to assess walleye recruitment. Primary sampling objectives are to characterize species composition, relative abundance and size structure. This report provides a summary of survey and Silver Creek movement study results, including management recommendations.

FYKE NETTING SURVEY INFORMATION

Site Location	Survey Dates	Target Species	Net Nights
Silver Creek	03/23/22-04/19/22 : 04/04/22-05/16/22	Northern pike : Muskellunge	93 : 107
County K Marsh	03/30/2022-04/04/2022	Northern pike	8
Norwegian Bay	04/09/22-04/19/22 : 5/10/22-5/16/22	Northern pike : Muskellunge	22 : 21
Lakewide	04/19/2022-05/04/2022	Walleye	94

Metric Descriptions

- **Catch per unit effort (CPUE) is an index used to measure fish population relative abundance**, which simply refers to the number of fish captured per unit of distance or time. For netting surveys, we typically quantify CPUE by the number and size of fish per net night. For electrofishing, we quantify CPUE as the number caught per mile of water electrofished. CPUE indexes are compared to statewide data by percentiles and within lake trends. For example, if a CPUE is in the 90th percentile, it is higher than 90% of the other CPUEs in the state.
- **Total abundance is a metric that describes population size and is estimated by mark and recapture.** In our study, all captured (northern pike, walleye, muskellunge) were given a partial pectoral fin clip and released. Each time the nets were checked, all (northern pike, walleye, muskellunge) were examined for a partial pectoral fin clip. The number of previously captured individuals (i.e., fin clipped) was recorded, and proportions of marked individuals to unmarked individuals were used to estimate the total abundance of the (northern pike, walleye, muskellunge) population.
- **Proportional Stock Density (PSD) is an index used to describe the size structure of fish populations.** It is calculated by dividing the number of quality size fish by the number of stock size fish for a given species. PSD values between 40 - 60 generally describe a balanced fish population.
- **Length frequency distribution (LFD) is a graphical representation of the number or percentage of fish captured by half-inch or one-inch size intervals.** Smaller fish (or younger age classes) may not always be represented in the length frequency due to different habitat usage or sampling gear limitations.
- **Mean age at length is an index used to assess fish growth.** Calcified structures (e.g., otoliths, spines or scales) are collected from a specified length bin of interest (e.g., 6.0-7.0 inches for bluegill). Mean age is compared to statewide data by percentile with growth characterized by the following benchmarks: slow (<33rd percentile); moderate (33rd to 66th percentile); and fast (>66th percentile).
- **Relative weight is an index used to assess the plumpness (i.e., condition) of fish.** It is calculated by comparing the observed weight of a fish to the standard weight (i.e., predicted average weight) of that fish, given its length. A relative weight of 93 means it has average plumpness/weight compared to other fish of the same length. Relative weights above 93 mean it is more plump than average.

RELATIVE ABUNDANCE — CATCH PER UNIT EFFORT (CPUE) SPRING NETTING I (SNI)

Species	Location	Year	Total Sampled	CPUE (Net Night)	Statewide Percentile	Lake Class Percentile
Northern pike	Silver Creek	2022	1454	15.6	94%	95-99%
Northern pike	Silver Creek	2016	730	6.4	88%	95-99%
Muskellunge	Silver Creek	2022	18	0.17	21%	10-25%
Muskellunge	Silver Creek	2016	10	0.09	7%	5-10%
Northern pike	Norwegian Bay	2022	24	1.1	56%	25-50%
Muskellunge	Norwegian Bay	2022	0	0	-	-
Northern pike	County K Marsh	2022	55	6.9	88%	95-99%
Walleye	Lakewide	2022	838	8.9	73%	50-75%
Walleye	Lakewide	2016	670	6.3	65%	25-50%

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Lake Information

Acres: 7,920
Max. Depth: 236
Mean Depth: 104
Shoreline Miles: 27+
Public Access: 8 Boat Landings
Lake Class: Complex Two Story

Regulations

Statewide Default all Species
Panfish = 25 total
Walleye = 15” minimum, 5 bag, 2022 to 15” minimum, **3** bag, April 2024
Bass = 14” minimum, 5 bag
Northern Pike = 26” minimum, 2 bag
Muskellunge = 40” minimum, 1 bag
Lake Trout = 17” minimum, 2 bag
Other Trout = 14” minimum, 3 bag
Cisco = no minimum, 10 bag

Survey Method

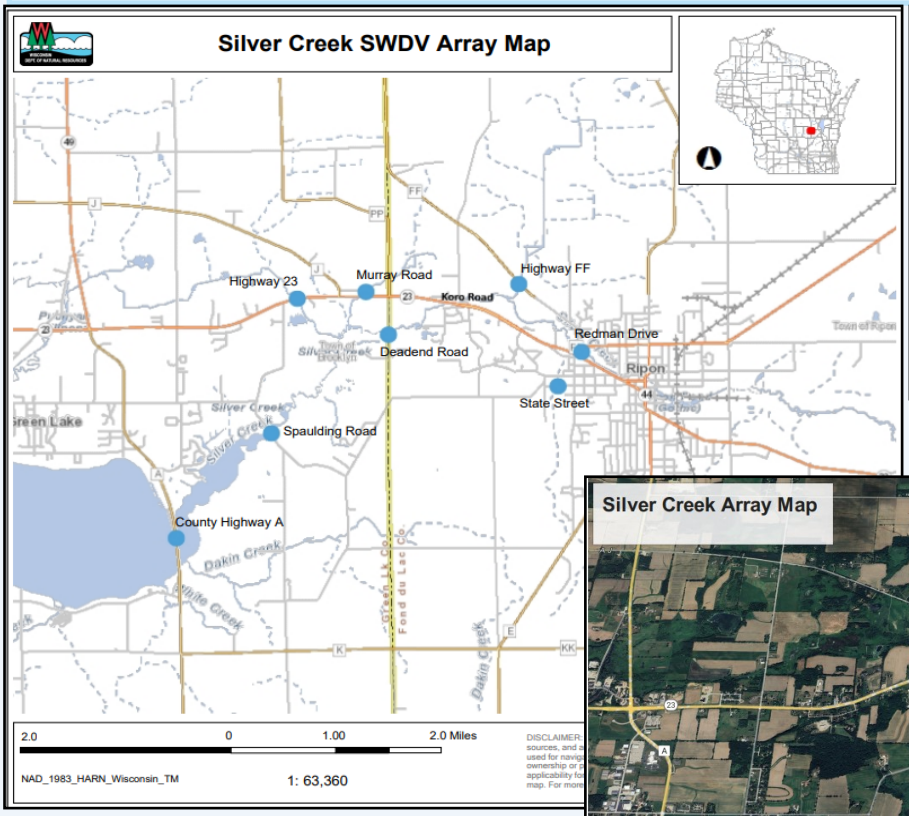
- Green Lake was sampled according to spring netting I (SNI), spring netting II (SNII), spring electrofishing I (SEI), spring electrofishing II (SEII) and fall electrofishing (FE) protocols as outlined in DNR Fisheries Monitoring Protocols. The primary objective of the spring fyke netting I survey is to count and measure adult walleye, northern pike and mark adult walleyes to estimate walleye abundance. The primary objective of the spring netting II survey is to count, measure and mark adult muskellunge. The primary objective of the spring electrofishing II survey is to count and measure adult largemouth bass, smallmouth bass, and panfish. Other species of fish may be sampled during each survey, but are considered by-catch as part of that survey.

- Fyke nets were deployed in areas of the lake that contained spawning habitat or were likely travel areas. Northern pike and muskellunge netting efforts focused on Silver Creek and Norwegian Bay. Walleye netting efforts focused on traditional spawning points and areas in the main lake. All newly captured northern pike, muskellunge and walleye were given a partial fin clip. Population estimates were calculated for northern pike and walleye. A subsample of fish were given PIT tags and floy tags as part of an exploitation and Silver Creek fish movement study. Aging structures and weights were also taken from a subsample of fish.

Silver Creek Array Movement Study

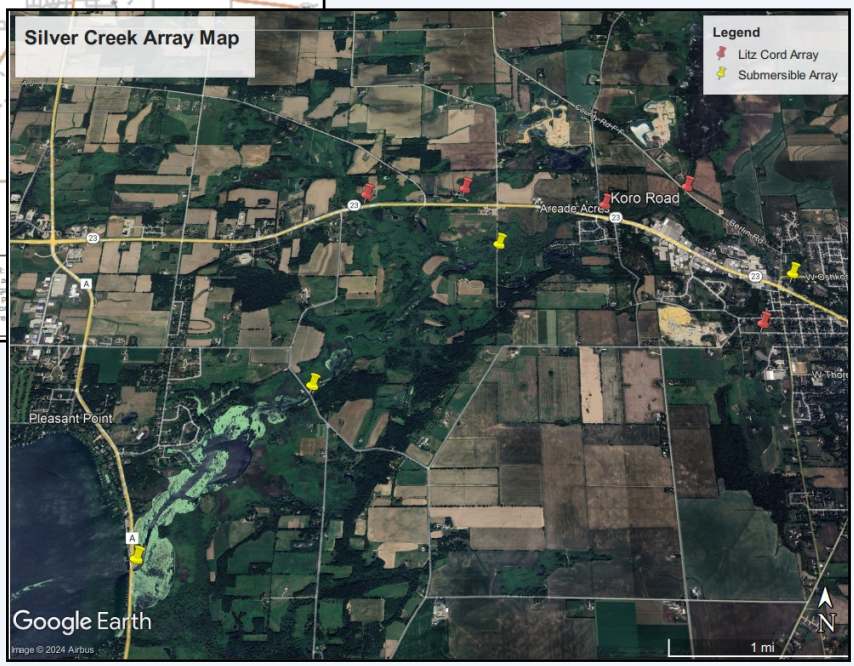
In conjunction with the 2022 comprehensive fish survey, DNR staff teamed up with local stakeholders to conduct a fish movement project on Big Green Lake and Silver Creek during the spring of 2022 and 2023. The project entailed strategically placing PIT tag arrays from the mouth of Silver Creek on Big Green Lake upstream to the City of Ripon. These submersible arrays remotely record PIT tagged fish as they pass overhead and are effective in shallow water where narrowing restricts fish movement to be directly over the antennae array. Litz cord arrays were placed in Silver Creek at County Highway A, Spaulding Road, Deadend Road and Redman Drive. Submersible arrays were placed in four Unnamed Tributaries to Silver Creek that included WBIC 146900 at Highway 23, WBIC 147000 at Murry Road, 147400 at Highway FF, and WBIC 5026964 at State Street. A submersible array was also placed below the Koro Road crossing culvert in 2022 and 2023. The primary objectives of the project were to evaluate fish passage in the Silver Creek watershed, track northern pike and walleye spawning runs, evaluate fish habitat use and assess the bubble barrier at County Highway A.

Arrays were in place from March through June during the 2022 comprehensive fish survey. Green Lake Sanitary staff led weekly battery changes and data downloads for the arrays. Local partners including Green Lake Sanitary District, Norton's Dry Dock, Green Lake Campground and the Cold Water Fishery Council raised $5,000 for purchasing PIT tags that were used for the project. The array equipment used was originally funded by DNR and a grant from the Fox River Natural Resource Damage Assessment (NRDA) for fish movement and habitat studies on the Winnebago System. This was a collaborative project that could not have been completed without the help and funding from partners. A total of 1,445 fish were PIT tagged during the comprehensive fish survey as part of the project that consisted of 11 different species. Species results from the study are included in the species summaries of this report.



Litz Cord Array, Photo Credit Adam Nickel

Submersible Array, Photo Credit Adam Nickel



Northern Pike

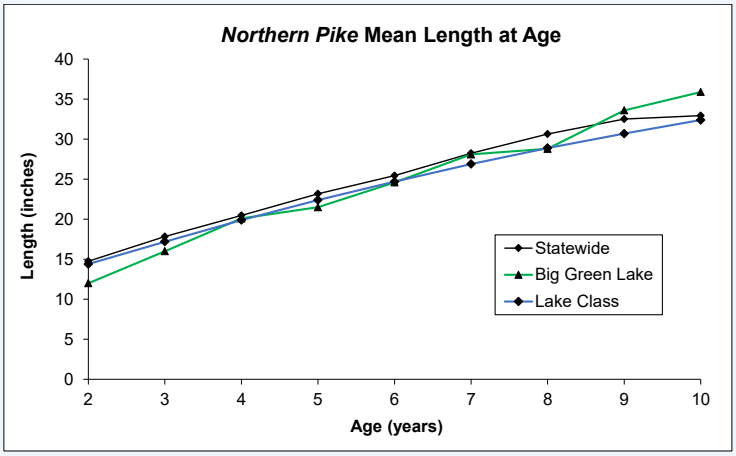
- Fyke netting is the preferred sampling gear for northern pike at ice out. Relative abundance is reported by sampling location and year below. All size structure and population estimate results presented below are from northern pike fyke netting in Silver Creek. Similar sampling methods were used in 2022 and 2016 to allow for comparison between years. Most of the northern pike in Green Lake likely use these areas for spawning and comprise the Green Lake population.

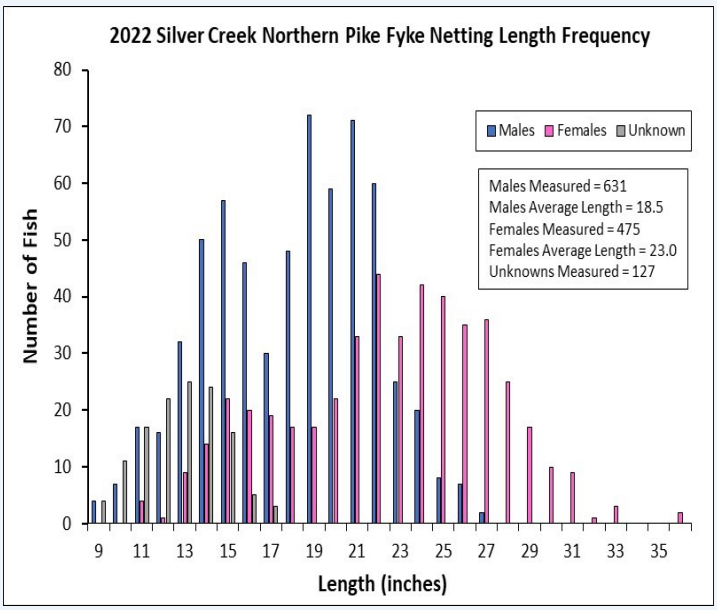
RELATIVE ABUNDANCE — CATCH PER UNIT EFFORT (CPUE) SPRING NETTING I (SNI)						
Species	Location	Year	Total Sampled	CPUE (Net Night)	Statewide Percentile	Lake Class Percentile
Northern pike	Silver Creek	2022	1454	15.6	94%	95-99%
Northern pike	Silver Creek	2016	730	6.4	88%	95-99%
Northern pike	Norwegian Bay	2022	24	1.1	56%	25-50%
Northern pike	County K Marsh	2022	55	6.9	88%	95-99%

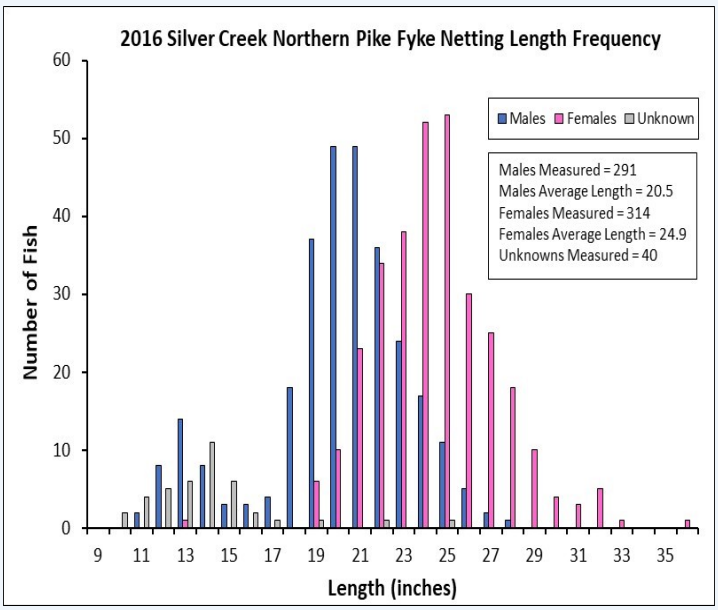
YEAR SIZE STRUCTURE METRICS								
Total Number Measured	Average Length (inches)	Length Range (inches)	Stock and Quality Size (inches)	Stock Number	Quality Number	PSD	Percentile Rank	Size Rating
1233	19.7	9.4–36.2	14.0 and 21.0	1064	523	49	59th	Moderate

SIZE STRUCTURE TRENDS					
PSD by Year		RSD-26 by Year		RSD-34 by Year	
2016	2022	2016	2022	2016	2022
74	49	17	14	0.17	0.19

SILVER CREEK ADULT ABUNDANCE (POPULATION ESTIMATE)				
Year	Marked	Captured	Recaptures	Population Estimate (95% CI)
2022	1174	1388	214	3,729 (3,267-4,344)
2016	639	716	77	2,800 (2,266-3,662)







Northern Pike Species Summary

- Northern pike were sampled at three locations with a total catch of 1,454 fish at the Silver Creek Estuary, 55 at County K Marsh and 24 at Norwegian Bay. Catch rates for northern pike in the Silver Creek Estuary were higher in the 2022 survey 15.6/net night (N/N) compared to 2016 (6.4/NN). The 2022 catch rates ranked in the 94th percentile compared to statewide rates and in the 95-99th percentile when compared to lakes in the same lake class (Complex Two Story). Catch rates were lower at County K Marsh (6.9/NN) and Norwegian Bay (1.1/NN).
- The population estimate attained at Silver Creek Estuary in 2022 was higher, 3,729, compared to the 2016 survey, 2,800. Although the survey indicated that a large percentage of northern pike used the Silver Creek Estuary for spawning. It should be noted that these population estimates are representative of the Silver Creek Estuary spawning population and are not lake-wide estimates.
- Average length for males (18.5 inches) and females (23.0 inches) decreased during the 2022 compared to 2016 (20.5 inches for males and 24.9 inches for females). This was represented in PSD values of 49 in 2022 and 74 in 2016. A PSD of 49 ranks in the 42nd percentile compared to statewide. RSD-26 and RSD-34 was similar during both years. In 2022, 14% of the fish measured over 14 inches were also over the legal size of 26 inches, with the largest measured at 36.2 inches.
- Growth rates for northern pike were average when compared to lakes of the same class and slightly below average when compared to growth rates statewide.
- There were 817 northern pike tagged during the Silver Creek PIT tag array study. A total of 472 northern pike (421 males and 51 females) were tagged during netting in the Silver Creek Estuary (County A to Spaulding Bridge). Out of the 472 fish tagged in the Estuary, 268 (56%) were detected at County A only, confirming a large percentage of the lakewide northern pike population uses the Silver Creek Estuary to spawn. There were 47 fish (10%) detected upstream at the Spaulding Bridge array. Upstream movement was also documented at the Deadend Road. array, with 5 fish detected.
- A total of 225 northern pike were PIT tagged during netting above Spaulding Bridge. The Deadend array upstream detected 19 fish (8%; 11 males and 8 females) from the tagged fish at Spaulding Bridge. One female was detected at the Koro Road array. In addition, two females were detected at the Murray Road array, an unnamed tributary that flows into Silver Creek.

Partial right pectoral fin clip given to a female northern pike during fyke netting survey. Left pectoral fin clip given to males.

Injecting a passive integrated transponder (PTT) tag between the pectoral fins of a northern pike for the movement study.

Keeping our nets clean from filamentous algae was a daily challenge when surveying the Silver Creek estuary.

Walleye

- Fyke netting is the preferred sampling gear for walleye when water temperatures reach 45F. Relative abundance is reported by sampling location and year below. All size structure and population estimate results presented below are from walleye fyke netting in Big Green Lake proper and does not include Silver Creek sampling. Similar sampling methods were used in 2022 and 2016 to allow for comparison between years.

RELATIVE ABUNDANCE — CATCH PER UNIT EFFORT (CPUE) SPRING NETTING I (SNI)

Species	Location	Year	Total Sampled	CPUE (Net Night)	Statewide Percentile	Lake Class Percentile
Walleye	Lakewide	2022	838	8.9	73%	50%
Walleye	Lakewide	2016	670	6.3	65%	50%

YEAR SIZE STRUCTURE METRICS

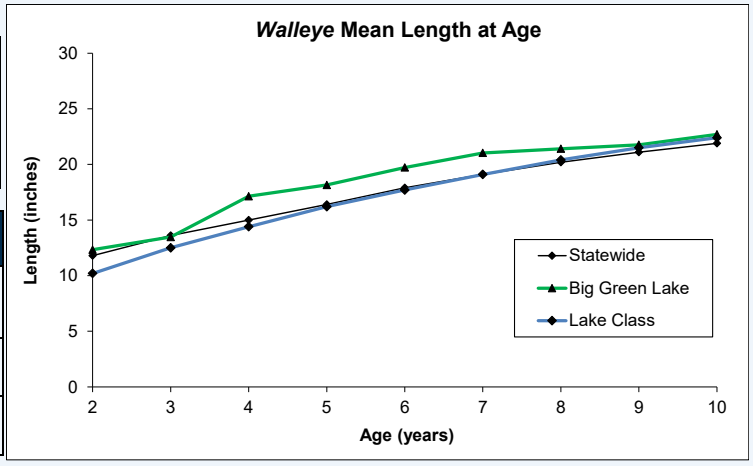
Total Number Measured	Average Length (inches)	Length Range (inches)	Stock and Quality Size (inches)	Stock Number	Quality Number	PSD	Percentile Rank	Size Rating
787	19.3	8.9–29.1	10.0 and 15.0	787	787	100	93rd-100th	High

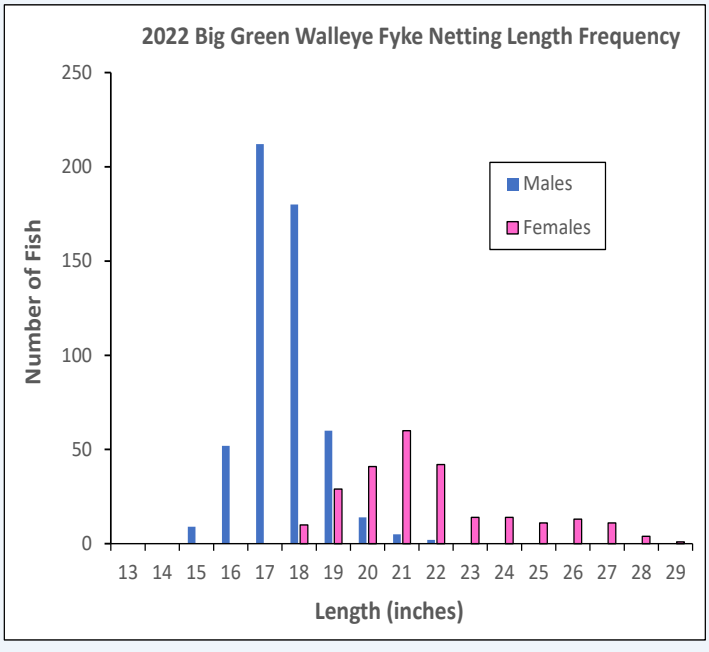
SIZE STRUCTURE TRENDS

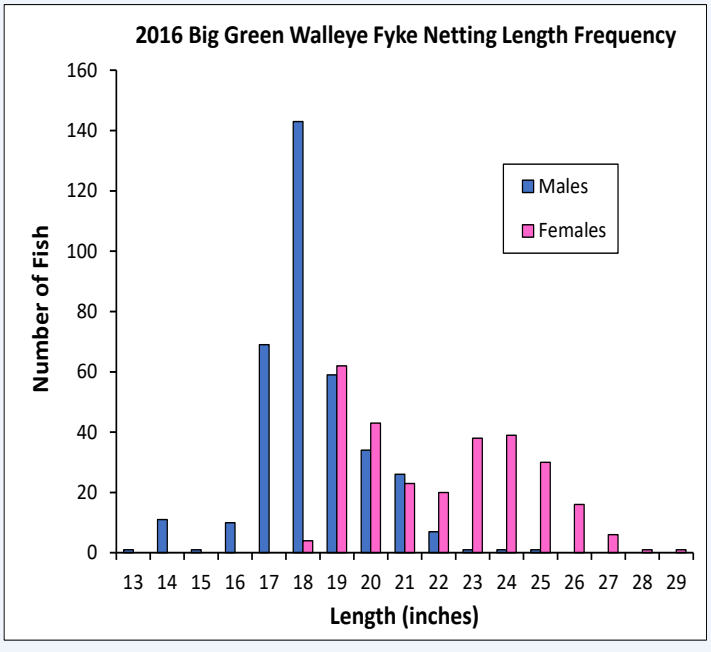
PSD by Year		RSD-20by Year		RSD-25 by Year	
2016	2022	2016	2022	2016	2022
98	100	44	29	8	5

ADULT ABUNDANCE (POPULATION ESTIMATE)

Year	Marked	Captured	Recaptures	Population Estimate (95% CI)	Number per Acre
2022	1166	874	135	7,507 (6,443-8,831)	0.95
2016	832	833	75	9,140 (7,395-11,474)	1.15







Walleye Species Summary

- We sampled a total of 838 walleye during our survey of Green Lake. Catch rates for walleye in Green Lake proper were higher in the 2022 survey 8.9/net night (N/N) compared to 2016 (6.3/NN). The 2022 catch rates ranked in the 73rd percentile compared to statewide rates and in the 50th percentile when compared to lakes in the same lake class (Complex Two Story).
- The population estimate in 2022 was slightly lower, 7,507 (0.95/acre), compared to the 2016 survey, 9,140 (1.15/acre).
- Average length for males (18.0 inches) and females (22.2 inches) decreased during 2022 compared to 2016 (18.7 inches for males and 22.6 inches for females). This was not represented in PSD values of 100 in 2022 and 98 in 2016, but was represented in the RSD analysis. A PSD of 100 ranks in the 93rd-100th percentile compared to statewide. RSD-20 decreased from 44 in 2016 to 29 in 2022. RSD-25 decreased from 8 in 2016 to 5 in 2022. The largest fish measured was a 29.1 inch female.
- Growth rates for walleye were slightly above average when compared to lakes of the same class and when compared to growth rates statewide. Fish reach the legal size of 15.0 inches during their 4th year. The oldest fish we sampled was a 25.9 inch male that was at least 15 years old and a 27.1 inch female that was at least 14 years old. The oldest fish we have sampled recently (2016) was a 21.6 inch male that was 18+ years old based of floy tagging done by Walleyes for Tomorrow in 2002.
- We floy tagged 1,583 walleye during our surveys on Green Lake in 2022. Tag returns resulted in an exploitation rate of 13.4% in the first year. Unsafe ice conditions the winter of 2022/23 resulted in little to no ice fishing on the main lake and likely skewed these numbers a bit compared to a good ice year. There were a couple open water fishermen that ventured out and turned in some tags in January and February 2023.This late season open water fishing has become very popular starting in the fall/winter of 2023/24. Unseasonably warm weather resulted in packed boat landings in November and December of 2023 with reports of fantastic walleye fishing. **The walleye bag limit statewide including Green Lake changed April 1, 2024 from 5 fish 15 inches and larger to 3 fish.**
- There were a total of 351 walleyes tagged during the Silver Creek movement study that included 176 adult males, 172 adult females and 3 unknowns. A total of 6 walleye were captured and PIT tagged during Silver Creek netting efforts, the rest (345 fish) were PIT tagged during fyke netting efforts on the main lake. A total of 21 walleyes were detected on the Silver Creek PIT tag arrays, 6 were originally tagged during Silver Creek fyke netting and 15 were tagged during lakeside netting. The majority of tagged fish were detected at the County A array (6 males and 14 females), with 2 female and 1 male walleye being detected at the Spaulding Array. Lastly, 1 female walleye was detected at the Deadend Road array.
- The Silver Creek walleye run was well known historically, with reports indicating spring walleye runs upstream to the City of Ripon along with good catches of fish in Silver Creek netting locations. More recent surveys since the 1990s indicate a switch with few walleye being captured in Silver Creek and the majority coming from lake set nets.

Fisheries biologist Adam Nickel with a floy tagged walleye. Notice the white tag attached near the soft dorsal fin.

Photo by WDNR Staff

- There has always been interest in the walleye fishery in Green Lake and in 1992 a Walleyes for Tomorrow chapter was formed for Green Lake. The chapter was created “due to the lack of NR due to dramatic changes through the years in Silver Creek.” The first fry stocked by their hatchery was in 1999. In the early 2000’s the Department decided it needed to assess the contribution of portable hatcheries to the fisheries and required WFT to use oxytetracycline (OTC) to mark the fry. Fry were marked with OTC from 2009-2014. Attempts were made by the Department to sample young of year for each year after with little success. Finally the survey in the fall of 2014 found 74 young of year walleye and 22 (~30%) of them had the OTC marking from the Walleyes for Tomorrow hatchery. Walleyes for Tomorrow was no longer required to mark fry and therefore increased the number of fry stocked from ~3 million to ~6 million plus. Starting in 2016 annual fry stocking has been more than 8 million fry.
- In spring of 2023 Walleyes for Tomorrow worked with the Department to take genetic samples from all of the adult fish they spawned to assess the contribution again of their hatchery to the walleye population in Green Lake. In the fall of 2023 the DNR sampled 81 young of year and submitted genetics to the lab at U.W. Stevens Point. Results showed ~70% of these fish were stocked by WFT. The 2023 study indicated that WFT stocking efforts made a significant contribution to the 2023 walleye year class and indicates that stocking efforts are important for maintaining the adult walleye population. It was also encouraging to document contribution from natural reproduction as well.

Muskellunge

- Fyke netting is the preferred sampling gear for muskellunge when water temperatures reach 50, however, in some waterbodies spawning may begin at ice out. Relative abundance is reported by sampling location and year below. Size structure presented below are from overall muskellunge fyke netting efforts. Similar sampling methods were used in 2022 and 2016 at Silver Creek that allows for comparison between years.

RELATIVE ABUNDANCE — CATCH PER UNIT EFFORT (CPUE) SPRING NETTING 2 (SN2)

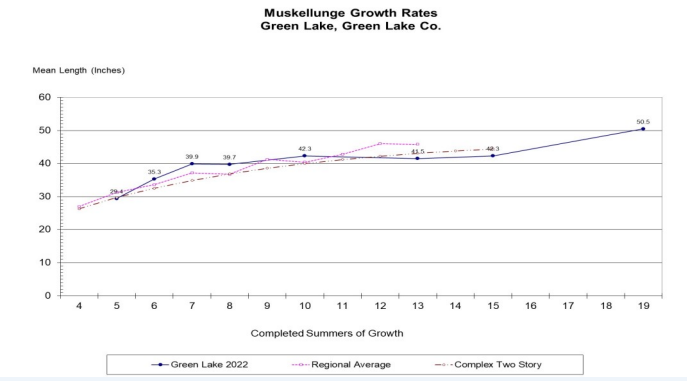
Species	Location	Year	Total Sampled	CPUE (Net Night)	Statewide Percentile	Lake Class Percentile
Muskellunge	Silver Creek	2022	7	0.3	37th	25th

YEAR SIZE STRUCTURE METRICS SPRING NETTING 1 & 2 COMBINED

Total Number Measured	Average Length (inches)	Length Range (inches)	Stock and Quality Size (inches)	Stock Number	Quality Number	PSD	Percentile Rank	Size Rating
18	38.4	29.4 –50.5	20.0 and 30 .0	17	16	94	94th	High

SIZE STRUCTURE TRENDS

PSD30 by Year		RSD-40 by Year		RSD-45 by Year		RSD-50 by Year	
2016	2022	2016	2022	2016	2022	2016	2022
100	94	55	33	18	5.6	0	5.6



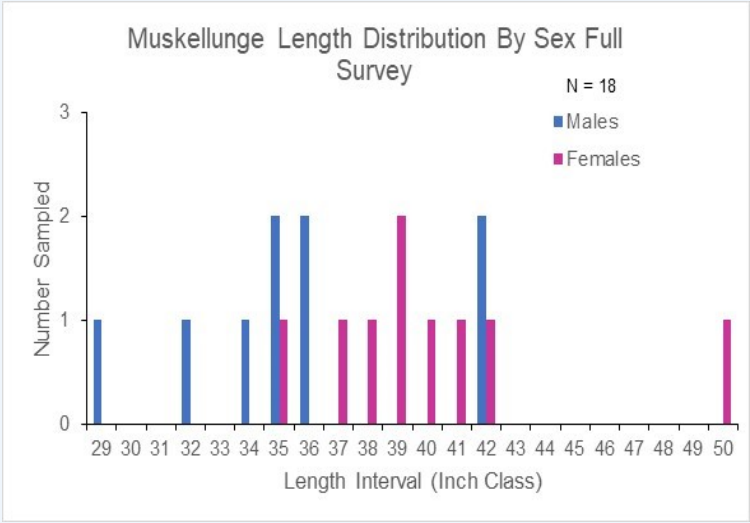


Photo by WDNR Staff

Species Summary

- This was our first targeted survey effort for musky on Green Lake since they were first allowed to be stocked in 1988. A second year recapture survey was not conducted to try to attain a population estimate. Captured fish were PIT tagged for future age growth and spines were taken for aging.
- Green Lake supports a low density musky population with catch rates of 0.3 fish per net night. A catch rate of 0.3 fish per net night ranks in the 37th percentile among lakes throughout Wisconsin and in the 25th percentile range when comparing to lakes from the same lake class (complex two story).
- The fish captured indicated the size structure of musky in Green Lake is high with a PSD value of 94% which ranks in the 94th percentile when compared to statewide values. Our largest fish was 50.5 inches compared to 48.0 inches in 2016.
- Growth metrics calculated from age estimates indicate that musky in Green Lake in general have above average growth rates when compared to growth rates from musky populations statewide and of same lake class (complex two story).
- There were18 musky PIT tagged in the Silver Creek Estuary for the PIT tag array study. The County A array detected 16 of the 18 musky PIT tagged, which indicated good array detection. There were 2 females and 1 male musky detected upstream at the Spaulding Bridge array, documenting movement to at least Spaulding Bridge.

Largemouth Bass

- Largemouth bass (*Micropterus Salmoides*) are a common predatory fish species found in many Wisconsin waterbodies. Largemouth bass typically spawn in shallow nearshore areas consisting of sand/mud or gravel substrate at approximately 60-70°F water temperatures. Electrofishing is the preferred sampling gear for bass. All results presented for largemouth bass are from spring electrofishing surveys.

YEAR SIZE STRUCTURE METRICS								
Total Number Measured	Average Length (inches)	Length Range (inches)	Stock and Quality Size (inches)	Stock Number	Quality Number	PSD	Percentile Rank	Size Rating
282	12.0	5.2 –19.8	8.0 and 12.0 inches	251	106	42	25th	Low

RELATIVE ABUNDANCE (CPUE = NUMBER PER MILE)									
Total Sampled 2011	2011	Total Sampled 2016	2016	Total Sampled 2022	2022	Historical Median	2022 Statewide Percentile Rank	2022 Lake Class Percentile Range	2022 Abundance Rating
72	6	232	19.3	282	23.5	16.3	65th	75-90%	Moderate

SIZE STRUCTURE (PSD) TRENDS				
PSD by Year			Historical Median	Historical Percentile
2011	2016	2022		
84	87	42	71	69th

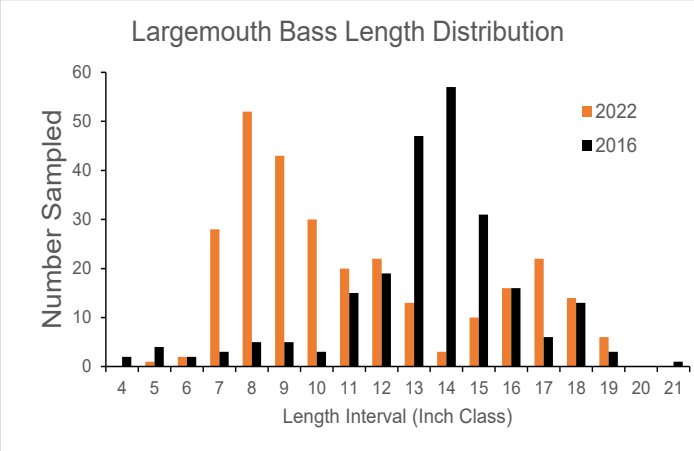


Photo by WDNR Staff

Species Summary

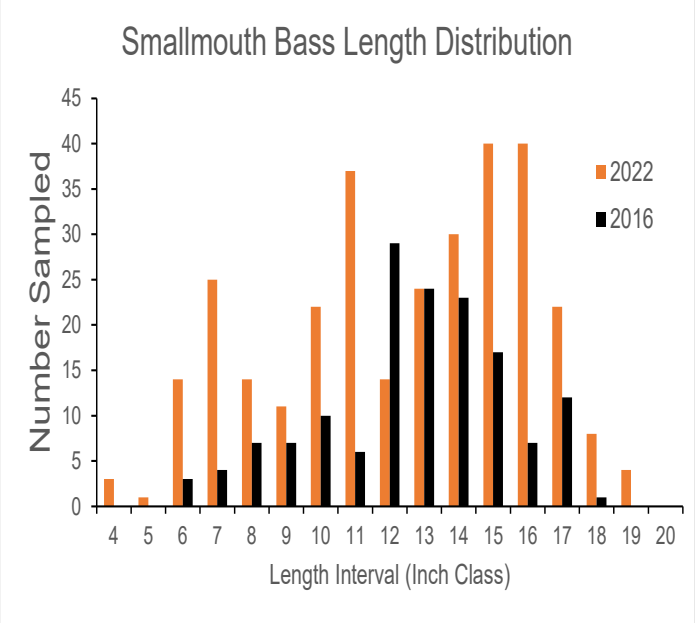
- Green Lake supports a moderately high density largemouth bass population with catch rates of 23.5 fish per mile of electrofishing. A catch rate of 23.5 fish per mile ranks in the 65th percentile among lakes throughout Wisconsin and in the 75-90th percentile range when comparing to lakes from the same lake class (Complex Two Story). Relative abundance comparisons among years indicate that abundance is continuing to increase over the years.
- The size structure of Largemouth Bass in Green Lake was low with a PSD value of 42% which ranks in the 25th percentile when compared to statewide values. When compared to recent surveys on Green Lake, Largemouth Bass PSD values have declined indicating that size structure of Largemouth Bass has decreased. The low PSD score is likely due to an increase in the abundance of smaller fish, which we typically didn't see in past surveys. The increase in smaller fish should be a nice boost for the fishery in the future.
- Growth metrics calculated from age estimates in the past indicate that largemouth bass in Green Lake have above average growth rates when compared to growth rates from largemouth bass populations across the state.
- The current status of the largemouth bass population on Green Lake appears to be positive. The gradual increase in abundance and especially in smaller fish should result in angling opportunity to catch more Largemouth Bass of all sizes including harvestable or target size classes.
- There were 210 largemouth bass 14.0 inches and larger floy tagged during the survey. For fish 14.0 inches and larger, 16.4% of tagged fish were reported. Anglers kept few fish, with an exploitation rate of 3.6%. The creel survey also estimated few fish harvested, 189 total.
- A total of 47 largemouth bass were PIT tagged in the Silver Creek Estuary netting. There were 18 largemouth bass PIT tagged on the lakeside, mostly in Norwegian Bay and only one of these fish were detected at County A. The County A array detected 24 of the 47 largemouth bass PIT tagged in Silver Creek Estuary. The Spaulding Bridge array detected 6 fish and 1 fish was detected further upstream at the Deadend Road. These 7 fish were not detected at the County Road A array, indicating that they had not moved out of Silver Creek Estuary

Smallmouth Bass

- Smallmouth bass (*Micropterus Dolomieui*) are a fairly common predatory fish species found in Wisconsin waterbodies. Smallmouth bass typically spawn around sandy substrate with logs or large rocks present. Smallmouth often spawn on gravel and rock substrate and will spawn on sandy or silty substrate if needed but then they often clear the area to gravel. Spawning typically occurs at water temps between 55-70°F. Electrofishing is the preferred sampling gear for bass. All results presented are from spring electrofishing II survey (SEII).

YEAR SIZE STRUCTURE METRICS								
Total Number Measured	Average Length (inches)	Length Range (inches)	Stock and Quality Size (inches)	Stock Number	Quality Number	PSD	Percentile Rank	Size Rating
309	13.1	4.0 –19.9	7.0 and 11.0 inches	291	219	75	50th	Moderate

RELATIVE ABUNDANCE (CPUE = NUMBER PER MILE)									
Total Sampled 2011	2011	Total Sampled 2016	2016	Total Sampled 2022	2022	Historical Median	2022 Statewide Percentile Rank	2022 Lake Class Percentile Ranking	2022 Abundance Rating
150	12.5	150	12.5	309	25.8	19.2	97th	95-99%	High



SIZE STRUCTURE (PSD) TRENDS				
PSD by Year			Historical Median	Historical Percentile
2011	2016	2022		
78	81	75	78	53rd

Photo by WDNR Staff

Species Summary

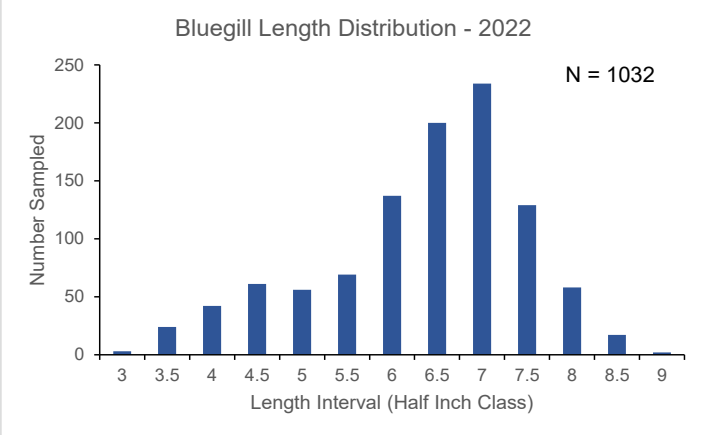
- Green Lake supports a high density smallmouth bass population with catch rates of 25.8 fish per mile of electrofishing. A catch rate of 25.8 fish per mile ranks in the 97th percentile among lakes throughout Wisconsin and in the 75-90th percentile range when comparing to lakes from the same lake class (Complex Two Story). Relative abundance comparisons among years indicate that abundance has doubled since the last 2 surveys.
- Size structure of smallmouth bass in Green Lake was moderate with a PSD value of 75% which ranks in the 50th percentile when compared to statewide values. When compared to recent surveys on Green Lake, smallmouth bass PSD values have remained relatively unchanged over the last few surveys. The increase in smallmouth bass abundance coupled with the relatively good size structure should result in continued excellent smallmouth bass fishing on Green Lake.
- Growth metrics calculated from age estimates in the past indicate that smallmouth bass in Green Lake have slightly above average growth rates when compared to growth rates from largemouth bass populations across the state.
- There were 152 smallmouth bass floy tagged during the survey. For fish 14 inches and larger, 33.2% of tagged smallmouth bass were reported. Anglers kept few fish, with a exploitation rate of 2.4%. The creel survey resulted in limited harvest as well, 441 fish total.

Bluegill

- Bluegill (*Lepomis macrochirus*) are a popular and very common panfish species distributed widely across many Wisconsin waterbodies. Bluegill typically spawn in nearshore areas consisting of sand/mud or gravel substrate at approximately 67-80°F water temperatures. Electrofishing and fyke netting can be effective gear for sampling bluegill, but electrofishing is the protocol and the data is used in this report.

YEAR SIZE STRUCTURE METRICS

Total Number Measured	Average Length (inches)	Length Range (inches)	Stock and Quality Size (inches)	Stock Number	Quality Number	PSD	Percentile Rank	Size Rating
Electrofishing	6.8	3.1 –9.2	3.0 and 6.0	1032	777	75	90th	High



RELATIVE ABUNDANCE (CPUE = NUMBER PER MILE)

Total 2011	2011	Total 2016	2016	Total 2022	2022	Historical Median	2022 Statewide Percentile Rank	2022 Lake Class Percentile Range	2022 Abundance Rating
24	8	18	6	1032	344	119	97th	95 –99%	High

SIZE STRUCTURE (PSD) TRENDS

PSD by Year			Historical Median	Historical Percentile
2011	2016	2022		
50	83	75	69	87th

AVERAGE AGE AT SPECIFIC LENGTH

Specie	Sex	Count	Length Bin	Average Age	Age Range	Percentile	Rating
Bluegill	Male	5	6	3	3	100	High
Bluegill	Female	10	6	2.9	2 –3	99.3	High
Bluegill	All	18	6	2.93	2 –3	98.1	High

Bluegill Growth Rates - Green Lake, Green Lake Co.

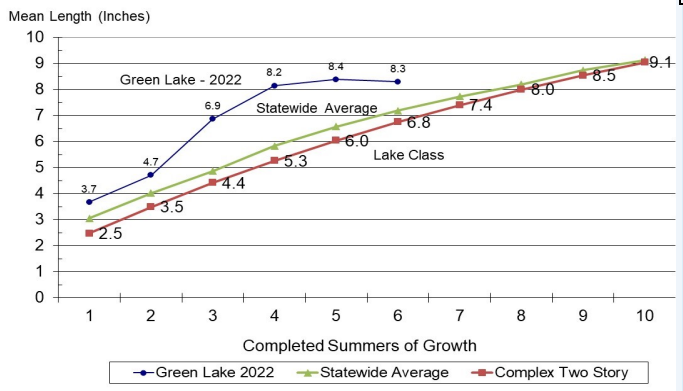


Photo by WDNR Staff

Species Summary

- Green Lake in 2022 supports a high density bluegill population with catch rates of 344 fish per mile of electrofishing from the boom shocking survey. Catch rates of 344 per mile is high when compared to all lakes statewide along with lakes in the same lake class.
- Size structure of bluegill in Green Lake was characterized as high based on data from the electrofishing survey. Length data collected from the electrofishing survey resulted in a PSD value of 75 which is in the 90th percentile when compared to statewide values.
- Population trends appear to be increasing significantly over the recent years on Green Lake. There were a total of 24 bluegills sampled in the 2011 survey and 18 bluegills sampled in 2016 compared to 1,032 in 2022.
- Growth metrics calculated from age estimates indicate that bluegill in Green Lake have above average growth rates when compared to growth rates from bluegill populations across the state in general and from the same lake class (complex two story). Growth metrics were in the high rating for all compared length bins and for both male and female sexes.
- There were 608 bluegill floy tagged during the spring survey. Annual exploitation based off the tagging was 36.6% for fish 6 inches and larger. Anglers kept 70% of the 6 inch fish, 97% of the 7 inch and 100% of the 8 inch fish they caught. Creel survey results estimated a harvest of 197,795 bluegill (8.9 per acre) with an average length of 7.9 inches.

Black Crappie

Black crappie (*Pomoxis nigromaculatus*) are a common panfish species distributed widely across many Wisconsin waterbodies. Black crappie typically spawn in nearshore areas consisting of detritus, sand/mud or gravel substrate at approximately 58-68°F water temperatures. Electrofishing and fyke netting can be effective sampling gear for black crappie and therefore, some results from both gears are presented.

YEAR SIZE STRUCTURE METRICS

Gear	Total Number	Average Length	Length Range	Stock and Quality	Stock Number	Quality	PSD	Percentile	Size Rating
Fyke Netting	224	8.3	6.3 –10.9	5.0 and 8.0	97	47	48%	39th	Moderate
Electrofishing	1	7.1	7.1	5.0 and 8.0	-	-	-	-	-

RELATIVE ABUNDANCE (CPUE = NUMBER PER MILE)

Total Sampled 2011	2011	Total Sampled 2016	2016	Total Sampled 2022	2022	Historical Median	2022 Statewide Percentile Rank	2022 Abundance Rating
1	0.3	0	0	1	0.3	0.2	1	Low

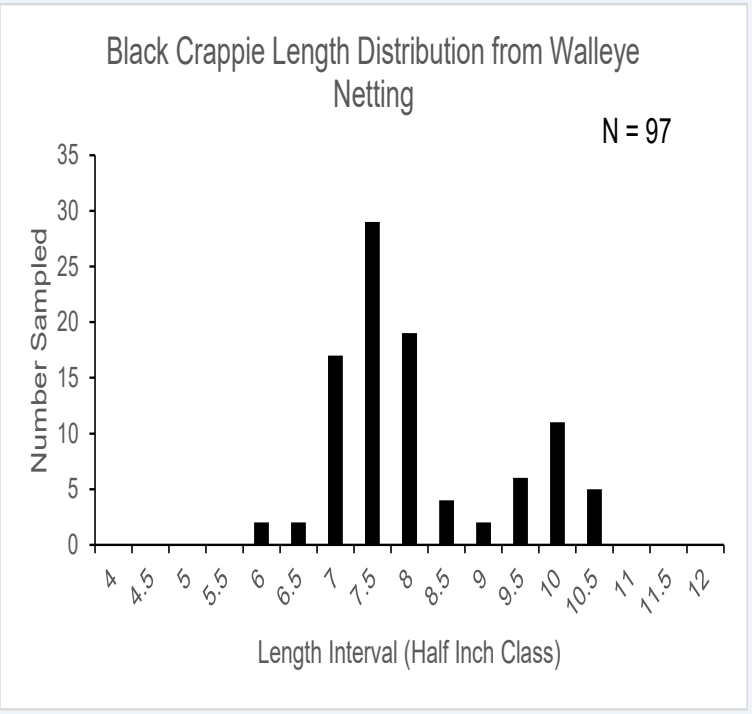
RELATIVE ABUNDANCE (CPUE = # PER NET NIGHT)

NUMBER PER NET NIGHT		Historical Median	2022 Lake Class Percentile	2022 Statewide Percentile	Abundance Rating
2016	2022				
0.5	2.4	1.45	50th	42nd	Moderate

SIZE STRUCTURE (PSD) TRENDS

PSD by Year		Historical Median	Historical Percentile
2016	2022		
93%	48%	58.5	48th

Photo by WDNR Staff



Species Summary

- Black crappie are known for their boom and bust populations and the surveys we use to assess our fisheries rarely give a reliable idea of the existing crappie population. Numbers presented are being used to compare to a similar survey in 2016.
- Green Lake in 2022 supports a low - moderate density black crappie population with catch rates of 0.3 fish per mile of electrofishing from the boom shocking survey. Catch rates of 0.3 per mile is low when compared to all lakes statewide. Catch rates with fyke net were 2.4 per net night which is moderate compared to lakes statewide and same lake class.
- Size structure of black crappie in Green Lake was moderate based on data from the netting survey. Length data collected from the netting survey resulted in a PSD value of 48 which is in the 39th percentile when compared to statewide values.
- Population trends appear to be increasing slightly over the 2016 survey on Green Lake. Black crappie populations are well known for fluctuating greatly from year to year and there appears to be a fairly strong year class from 2020.
- Growth metrics calculated from age estimates indicate black crappie in Green Lake have above average growth rates when compared to growth rates from black crappie across the state.

Yellow Perch

Yellow perch (*Perca flavescens*) are a common and very popular panfish species distributed widely across many Wisconsin waterbodies. Yellow perch typically spawn in nearshore areas consisting of wood and plants shortly after ice out at water temperatures of 45-52°F. Electrofishing and fyke netting can be effective sampling gear for yellow perch and therefore, some results from both gears are presented.

YEAR SIZE STRUCTURE METRICS

Gear	Total Number Measured	Average Length (inches)	Length Range (inches)	Stock and Quality Size (inches)	Stock Number	Quality Number	PSD	Statewide Percentile Ranking	Size Rating
Fyke Netting (Silver Cr. Estuary)	176	6.1	4.3 –9.5	5.0 and 8.0	176	1	1%	10th	Low
Electrofishing	36	6.6	3.2 –11.3	5.0 and 8.0	32	3	13%	45th	Moderate

RELATIVE ABUNDANCE (CPUE = NUMBER PER MILE)

Total Sampled 2011	2011	Total Sampled 2016	2016	Total Sampled 2022	2022	Historical Median	2022 Statewide Percentile Rank	2022 Abundance Rating
49	16.3	46	15.3	36	12	14.5	57th	Moderate

SILVER CREEK ESTUARY FYKE NETTING CPUE TRENDS (NUMBER PER NET NIGHT)

2022 Number Sampled	2016	2022	Historical Median	2022 Statewide Percentile Rank	2022 Lake Class Percentile Ranking	2022 Abundance Rating
2,012	6.1	23.5	14.8	83rd	75 –90%	Moderately High

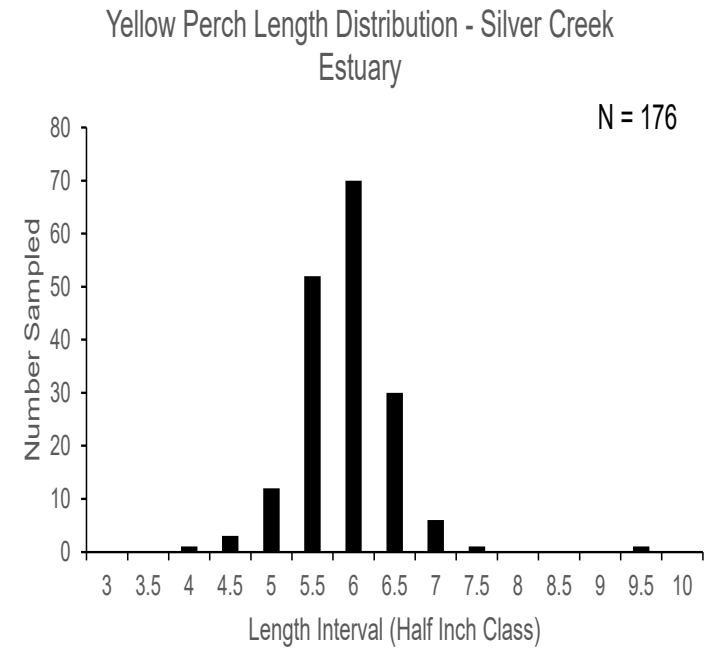


Photo by WDNR Staff

Species Summary

- Green Lake in 2022 supported a moderately high population of yellow perch compared to statewide and similar lake class statistics, with catch rates of 23.5 per net night in the Silver Creek Estuary. The estuary was used as our sample site since it provides ideal spawning conditions and our nets were present in this location during the proper spawning period.
- Size structure of yellow perch in Green Lake is low based on data from the netting survey. Length data collected from the netting survey resulted in a PSD value of 1 which is in the 10th percentile when compared to statewide values.
- Population trends appear to be increasing significantly from the 2016 survey on Green Lake, Silver Creek Estuary. Improvements in water quality and vegetation reestablishment has likely contributed to the increase.
- Growth metrics calculated from age estimates indicate yellow perch in Green Lake have slightly below average growth rates when compared to growth rates from yellow perch across the state and close to average when compared to lakes in the same complex two story lake class.

County K Marsh Estuary Survey and Summary

- The County K estuary is an approximately 233 acre bay off the southwest end of Green Lake. Three streams flow into the bay and its average depth is less than 2 feet. Restoration in the estuary has been the focus of several partner groups due to high phosphorous loading to Green Lake and the desire to limit this impairment.
- A main goal of stakeholder groups is to convert the marsh back to a plant dominated state and tie up the phosphorous. The activities of common carp (carp) has been theorized to be a key component in preventing this goal. The carp can cause turbidity by stirring up the bottom and not only destroying existing plant beds, but hindering light penetration for establishing new plants.
- Different types of barriers and traps have been used with variable success over the years to reduce the amount of carp entering the bay. The current barrier was installed in 2009 by the DNR and has been retrofitted over the years, a replacement barrier is being proposed. A radio telemetry study in 2015 showed most if not all adult carp want to leave the estuary in the fall and return in the spring.
- Commercial harvest has been going on for some time both lakeside and in the estuary with minimal impact in the bay. Commercial seining combined with a carp die off in 2016 and explosion in the bluegill population appears to have resulted in a decline in the carp population system wide.
- Deep loose sediment and highly conductive water makes sampling certain fish via electrofishing challenging. Carp especially dive into the loose sediment when they feel the electrical current.
- Fyke nets were run for 4 days to get a snapshot of the northern pike population. We sampled 55 fish with a catch rate of 6.9 per net night. Fish ranged from 11.5 - 27.7 inches with an average length of 20.2 inches. We didn't get a population estimate but this catch rate ranks in the 88th percentile compared statewide, thus a good number of northern pike were using the marsh for spawning purposes. White suckers at 173 per net night were by far the most abundant fish sampled in our early spring fyke netting survey. These fish ranged in sizes small enough to likely fit between the barriers bar openings and were looking to spawn in one of the 3 tributaries flowing into County K estuary.
- The electrofishing survey in 2022 showed some positive trends for largemouth bass, black crappie and bluegill. Numbers are lower than we would expect to see in a healthy lake situation, but have increased substantially from the survey in 2016. Bluegills are a very effective predator on carp fry so increasing their abundance may be a key component in reversing the damage.

COUNTY K — RELATIVE ABUNDANCE — CATCH PER UNIT EFFORT (CPUE) SPRING ELECTROFISHING (SEII)

Species	Protocol	Length Range In.	Avg Length	Total Number Captured	CPUE	Units
Largemouth bass	SE2	7.8 –19.0	15.6	15	4.2	Per Mile
Largemouth bass	SE2 (2016)	11.0 –14.5	13	2	0.6	Per MIle
Bluegill	SE2	3.0 –7.9	5.0	155	43	Per Mile
Bluegill	SE2 (2016)	3.0 –6.0	5.0	10	2.8	Per MIle
Black crappie	SE2	6.7 –9.5	7.8	17	4.7	Per Mile
Black crappie	SE2 (2016)	-	-	0	0	Per MIle
Pumpkinseed	SE2	7.3	7.3	3	0.8	Per Mile
Pumpkinseed	SE2 (2016)	-	-	0	0	Per MIle
Rock bass	SE2	4.0	4.0	1	0.3	Per Mile
Rock bass	SE2 (2016)	7.5 –8.5	8.3	2	0.6	Per MIle
White sucker	SE2	-	-	13	13	Per Mile
White sucker	SE2 (2016)	-	-	133	37	Per MIle
Yellow perch	SE2	4.8 –5.9	5.5	`7	1.9	Per Mile
Yellow perch	SE2 (2016)	2.5 –7.0	4.8	14	3.9	Per MIle
Bullheads (sp)	SE2	4.8 –12.3	-	90	90	Per Mile
Bullheads (sp)	SE2 (2016)	-	-	79	22	Per MIle
Common carp	SE2	-	-	7	7	Per Mile
Channel catfish	SE2	24.0	24.0	1	1	Per Mile
Freshwater drum	SE2	-	-	1	1	Per Mile
Golden shiners	SE2	-	-	1	1	Per Mile
Pumpkinseed x Bluegill	SE2	7.3	7.3	1	1	Per Mile
Walleye	SE2	7.7 –8.1	7.9	2	0.6	Per Mile

RELATIVE ABUNDANCE — CATCH PER UNIT EFFORT (CPUE) SPRING NETTING I (SNI)

Species	Location	Year	Total Sampled	Length Range (in)	Average Length (in)	CPUE (Net Night)
Northern pike	County K Marsh	2022	55	11.5 - 27.7	20.2	6.9
Black crappie	County K Marsh	2022	232	3.7 - 14.5	8.0	29
White bass	County K Marsh	2022	144	5 - 6.7	5.6	18
White sucker	County K Marsh	2022	1,384	5.5 - 12.8	11.4	173

Silver Creek PIT Tag Array Summary

- The movement project was designed to evaluate fish movement, habitat use and potential fish passage barriers in Silver Creek as far upstream as the Ripon (Gothic) Millpond Dam and connecting tributaries. The decline of the Silver Creek walleye and white bass spawning runs and potential fish passage limitations have been a common discussion topic among anglers, stakeholders and Walleyes for Tomorrow.
- The Silver Creek movement project indicated significant white sucker movement upstream to Koro Road (4.5 miles from HWY A). White sucker tagging efforts indicated that 13 of 25 fish tagged at Spaulding Bridge were able to reach the Koro Road array and 1 northern pike was detected as well. PIT tagged white suckers were also detected the following year on a submersible array placed below Koro Road. The detection of 19 northern pike, 1 walleye, and 1 largemouth bass indicated that these species were able to make it through the Spaulding Road to Deadend Road stretch. This stretch was thought to have potential structure passage issues, however, it appears that fish movement to Deadend Road (3.5 miles from HWY A) was possible in 2022, which was particularly demonstrated by white suckers.
- The array study revealed heavy spawning use by northern pike, musky and largemouth bass in Silver Creek estuary marsh areas. Netting and array data also indicated a notable northern pike spawning run upstream of Spaulding Bridge (1.5 miles from A), with some fish detected further upstream at Deadend and Koro Roads. The study also revealed the first documented northern pike movement at the unnamed tributary at Murray Road. Musky and largemouth bass were also documented at Spaulding Bridge.
- No fish were detected at the Redman Array located on Silver Creek upstream of Koro Road. In addition, no fish were detected on submersible arrays placed in unnamed tributaries to Silver Creek (upstream of Koro Road) at Highway FF and State Street. Therefore, the 2022 movement study indicated that there was fish passage up to Koro Road. However, the Koro Road culvert was identified as a full fish passage barrier based on the movement study results and a follow up culvert crossing inventory. The current culvert is severely undersized (currently 16.8 feet by 8 foot opening on the upstream side) and is a complete barrier for fish passage due to velocity (measured at 8.3 ft./sec through the structure on May 4, 2023). In addition, a concrete spillway on the downstream end of the culvert poses significant passage limitations.
- Restoring fish passage a Koro Road is a major recommendation from the movement study. Historical anecdotal reports indicate that the spring walleye spawning run used to included upstream areas above Koro Road, potentially up to the Ripon Millpond Dam. This stretch (2.8 miles) is mainly comprised of rocky substrate with riffle habitat that could serve as good walleye spawning habitat. In addition, fish passage to connecting tributaries could be restored, including up to 4.4 miles of the North Tributary to Silver Creek (WBIC 147400) and up to 3.3 miles of Unnamed Tributary to Silver Creek (WBIC 5026964). These tributaries lead to major wetland marsh complexes and could provide access to 450 acres of wetland and marsh habitat.
- It is likely that a bridge replacement may be the best approach to replacing the Koro Road culvert, which will be costly. However, local stakeholders are very interested in the project and the project is eligible for several grant funding sources. With a coordinated effort, restoring fish passage at Koro Road may be attainable and would largely benefit the fishery and community. Overall fish passage should be evaluated throughout the Silver Creek watershed and float trips from Highway 23 downstream to Spaulding Bridge should be conducted to further investigate habitat changes and any potential passage limitations.

Downstream End Koro Road Culvert

Concrete Spillway at Culvert End

White Suckers Stranded Below Culvert
Photos by WDNR Staff

County Highway A Bubble Barrier Evaluation

- The County Highway A bubble barrier was also evaluated as part of the Sliver Creek movement study. Common carp have been a concern for all of the bays on Green Lake and removal attempts have occurred since at least the 1950's. The Silver Creek Estuary for many years was turbid with high levels of suspended solids.
- Agencies and local stakeholders worked to restore the vegetation using several methods in the early 2000's. This included watershed land use improvements, propagule plantings, commercial removals of carp and installation of a bubble barrier. The estuary has since recovered to a mostly vegetated estuary. However, carp are still observed spawning in the estuary leading to questions about the effectiveness of the bubble barrier.
- To evaluate effectiveness a subsample of fish captured during estuary fyke netting were PIT tagged and released lakeside to determine if they would move back through the barrier into the estuary. Of the18 adult carp tagged and released below the barrier,16 were detected above the barrier soon after. Confirming adult carp were passing through the barrier during the study (May 2022). Despite this, the Silver Creek Estuary has maintained its vegetation and shown resiliency to potential carp impacts.
- Movement through the barrier was detected for most species released below the barrier as shown in the table.

Species	# PIT Tagged and Released Below Barrier	# Detected Above Barrier	Percent Passed
Common carp	18	16	89
Bluegill	40	33	83
Channel catfish	5	3	60
Black crappie	10	4	40
Largemouth bass	4	2	50
Northern pike	27	2	7
Smallmouth bass	2	0	0
Musky	2	0	0
White sucker	1	0	0
Total	109	60	55

RELATIVE ABUNDANCE — CATCH PER UNIT EFFORT (CPUE) SPRING ELECTROFISHING (SEII)

Summary of catch per unit effort for all species caught during our spring electrofishing 2 sampling. This sampling method is not part of our protocol for all species listed, therefore percentile rankings may not exist.

	Average CPUE			Minimum CPUE		Maximum CPUE		Count			CPUE/Mile			Lake Class Statewide Percentile Rankings		Statewide Percentile
Species	2011	2016	2022	2016	2022	2016	2022	2011	2016	2022	2011	2016	2022	2016	2022	2022
BLACK CRAPPIE	6.3		7.1		7.1		7.1	1	0	1	0.3	0.0	0.3	0%		1st
BLUEGILL	6.2	7.0	6.8	5.2	3.1	8.5	9.2	24	18	1032	8.0	6.0	344.0	10 - 25%	>95%	94th
BROWN BULLHEAD		11.9		8.8		16.4		0	11	12	0.0	3.7	4.0			
CHANNEL CATFISH	15.7	17.3	26.9	17.3	20.7	17.3	31.2	1	1	22	0.3	0.3	7.3			
COMMON CARP		7.0		7		7		0	8	2	0.0	2.7	0.7			
GOLDEN SHINER								0	1	1	0.0	0.3	0.3			
LARGEMOUTH BASS	14.1	13.9	12.0	4.8	5.2	21	19.8	72	232	282	6.0	19.3	23.5	50 - 75%	75 - 90%	66th
MOTTLED SCULPIN								0	0	1	0.0	0.0	0.3			
MUSKELLUNGE			41.5		40.5		42.4	0	0	2	0.0	0.0	0.2			12th
NORTHERN PIKE		25.2	25.1	19.4	22.1	29	31.2	0	7	12	0.0	0.6	1.0			33rd
PUMPKINSEED		4.8		4.8		4.8		0	1		0.0	0.3	0.0	0%	0%	
PKSD X BLUEGILL			6.8		6.8		6.8	0	0	1	0.0	0.0	0.3			
ROCK BASS		8.1	7.5	3.6	3.6	10.7	10.6	0	136	246	0.0	45.3	82.0	90 - 95%	95 - 99%	99th
SMALLMOUTH BASS	13.5	13.1	13.1	6.3	4	18.5	19.9	150	150	309	12.5	12.5	25.8	75 - 90%	95 - 99%	97th
WALLEYE		15.6	12.9	8.1	7	25.5	23.7	0	30	60	0.0	2.5	5.0			36th
WHITE BASS	9.3	14.6		13.9		15		7	4		2.3	1.3	0.0			
WHITE SUCKER		17.6		12.3		21.7		0	5	31	0.0	1.7	10.3			
YELLOW BULLHEAD		11.6		9.9		13.4		0	15	6	0.0	5.0	2.0			
YELLOW PERCH	5.8	5.2	6.6	3.8	3.2	9	11.3	49	46	36	16.3	15.3	12.0			57th

Lake Trout

Lake trout (*Salvelinus namaycush*) are native to the Great Lakes of Wisconsin. They are only found in a handful of Lakes in Wisconsin and were first introduced to Green Lake around 1952. The lake trout fishery is a very popular fishery on Green Lake. In late October– November lake trout typically spawn over large clean rock if available. Gill nets have been the gear of choice over the years to sample lake trout on Green Lake.

GILL NET SURVEY INFORMATION

Site Location	Survey Dates	Water Temp °F	Target Species	Gear
Green Lake	Oct. 18-22, 2022	52-53	Lake Trout	Gill Net

RELATIVE ABUNDANCE — CATCH PER UNIT EFFORT (CPUE)

Species	Total Number Captured	Avg. Length (Inches)	Length Range (inches)	CPUE / 500 Foot of Gill Net
Lake trout	186	23.9	12.5 - 37.3	7.15
Cisco/Lake herring	264	14.7	10.9 –18.0	9.5
Walleye	20	12.7	11.5 –15.5	0.73
Rock bass	19	7.1	6.3 – 8.5	0.68
Channel catfish	12	12	7.7 –21.7	0.54
Yellow bullhead	2	8.8	8.7 –8.8	0.09
Brown bullhead	1	10.6	-	0.05

Survey Method

Green Lake was sampled in a method similar to surveys done in the past for comparative data. Nets ranging from 900-1,200 feet in length were fished in 3 separate locations on the south shore two consecutive nights and the north shore for two consecutive nights. Nets were checked daily. Nets were 2.5 inch stretch and made from both nylon and or monofilament. The primary objective for these sampling periods is to count and measure adult Lake Trout and Cisco. Other gamefish/panfish may be sampled but are considered by-catch as part of this survey.

2022 SIZE STRUCTURE METRICS

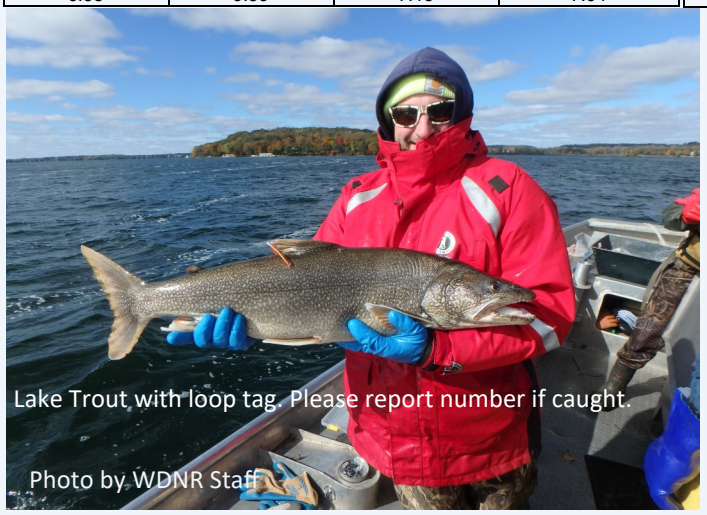
Total Number	Average Length (inches)	Length Range	Stock and Quality Size (inches)	Stock Number	Quality Number	PSD
186	23.9	12.5 – 37.3	12 and 20	185	146	79

RELATIVE ABUNDANCE (CPUE = NUMBER PER 500 Ft Net)

2011	2016	2022	Historical Median
6.38	9.39	7.15	7.64

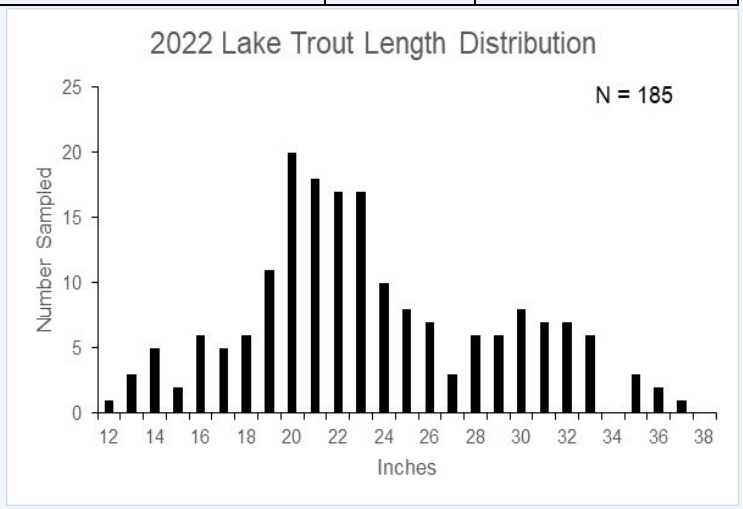
SIZE STRUCTURE (PSD) TRENDS

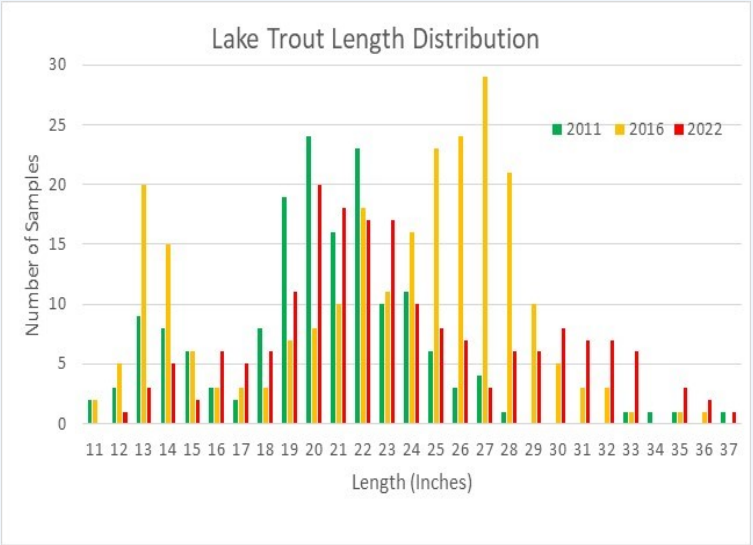
PSD by Year			Historical Median
2011	2016	2022	
64	75	79	72.7



Lake Trout with loop tag. Please report number if caught.

Photo by WDNR Staff





SIZE STRUCTURE (AVG LENGTH) TRENDS

Average Length by Year	
Year	Avg Length Inches
1959	24.4
1964	20.2
1972	15.8
1974	19.3
1977	25.4
1985	24.7
2001	17.5
2011	20.7
2016	23.2
2022	23.9
Historical Median	21.51

Cisco

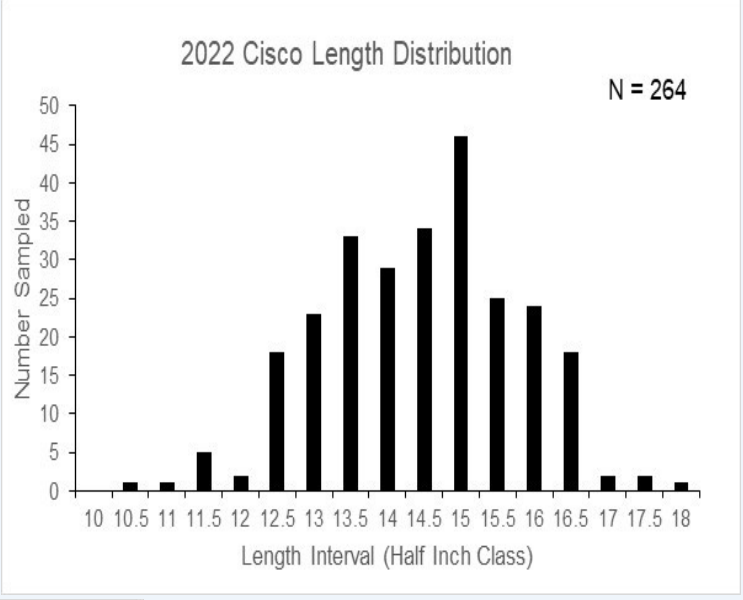
Cisco (*Coregonus artedi*) occur in few inland lakes in Wisconsin. Cisco need deep lakes where water near the bottom remains cold and well oxygenated year-round. Cisco feed primarily on zooplankton and are a great food source for gamefish and people. Cisco spawning typically occurs after dark in November—December. Gill nets are an effective method of sampling cisco so information is obtained while doing the lake trout survey.

2022 SIZE STRUCTURE		
Total Number Measured	**Average Length (inches)**	**Length Range (inches)**
264	14.7	10.9 – 18.0

RELATIVE ABUNDANCE (CPUE = NUMBER PER 500 Ft Net)			
2011	**2016**	**2022**	**Historical Median**
12.42	46.77	9.5	22.9

SIZE STRUCTURE (PSD) TRENDS			
Average Length by Year			**Historical Median**
2011	**2016**	**2022**	
16.3	13.0	14.7	14.7


Photos by WDNR Staff



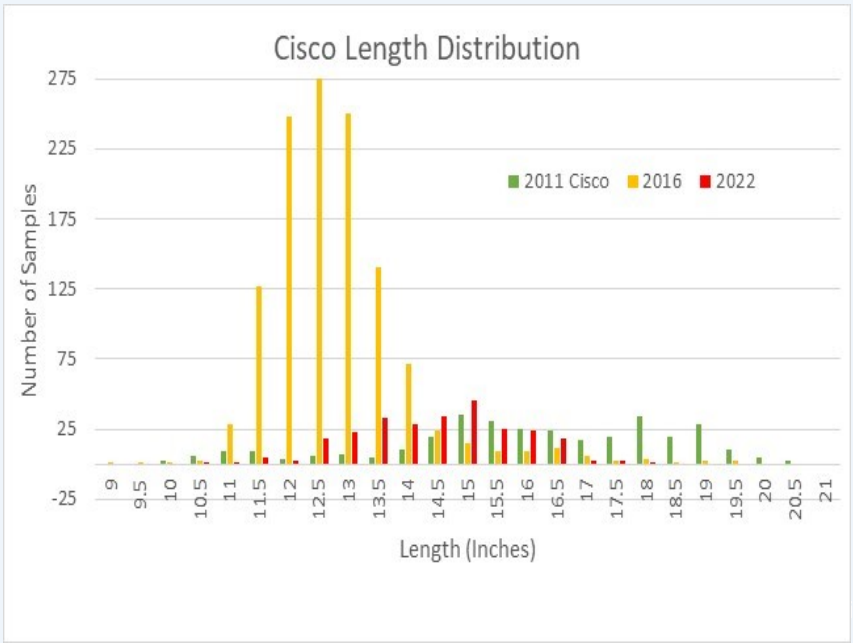



Photo by WDNR Staff

Creel Survey

A creel survey was run on Green Lake from May 7, 2022 through March 31, 2023. A creel survey is an assessment tool used to sample the fishing activities of anglers on a body of water and make projections, or estimates, of harvest and other fishery parameters. Creel survey clerks work on randomly selected days and shifts, forty hours per week. The survey is run during daylight hours, and shift times change from month to month as day length changes. Results may be impacted by angler habits, such as many walleye anglers fished after dark and therefore were not taken into account by our creel clerk. Poor to no ice on the main lake during this survey definitely impacted effort, catch rates and harvest of certain species that are typically heavily targeted by ice fishermen. The tables below are some summaries of what the survey showed and a much more in depth report is available.

Month	Number of Angler Party Interviews	Total Angler Hours	Total Angler Hours/ Acre
May	17	12,552	1.58
June	22	19,389	2.45
July	20	44,355	5.60
August	20	23,212	2.93
September	22	19,909	2.51
October	18	9,199	1.16
November	5	381	0.05
December	14	7,423	0.94
January	18	14,725	1.86
February	15	15,101	1.91
March	22	5,807	0.73
Summer Total	124	128,997	16.29
Winter Total	69	43,056	5.44
Grand Total	193	172,053	21.72

Species	Directed Effort (Hours)	Percent of Total	Total Est Catch	Specific Catch Rate (Hours/Fish)	Total Harvest	Specific Harvest Rate (Hours/Fish)	Mean Harvest Length
Walleye	18,407	8.2%	2,302	9.53	891	22.75	19.8
Northern Pike	7,495	3.4%	2,878	5.02	253	31.48	29.1
Muskellunge	3,884	1.7%	90	60.32	0	None	None
Smallmouth Bass	40,647	18.2%	24,010	1.96	441	127.82	15.6
Largemouth Bass	28,261	12.6%	16,738	2.25	189	286.92	17.2
Yellow Perch	23,222	10.4%	84,837	0.35	17,074	1.47	8.1
Bluegill	53,488	23.9%	197,795	0.27	70,731	0.76	7.9
Black Crappie	12,914	5.8%	4,931	3.20	2,206	6.71	10.1
Pumpkinseed	4,015	1.8%	1,463	3.13	731	6.09	6.8
Rock Bass	1,844	0.8%	22,863	1.21	751	2.51	8.6
Lake Trout	19,453	8.7%	2,815	7.68	1,103	17.91	20.6
White Bass	2,900	1.3%	1,620	3.41	916	4.19	15.8

Number of Angler Party Interviews is the number of groups of anglers interviewed by the creel clerk. A party is considered the members of a group who fish together in the same boat, ice shanty or from shore. The clerk fills out one interview form for each group of anglers. The number of individual anglers actually contacted by the clerk is usually much greater than the number of groups listed in this table since most groups consist of more than one angler.

Total Angler Hours is the estimated total number of hours that anglers spent fishing on Green Lake during each month surveyed.

Total Angler Hours/Acre is the total angler hours divided by the area of the lake in acres. This is useful in order to compare effort on Green Lake to other lakes.

Full Summary

Walleye

Green Lake contains an average walleye population at 0.95 adults/acre compared to lakes in the same lake class and relatively unchanged from 1.15 adults/acre in 2016. Size structure is great with 100% of the mature fish 15 inches or larger. The percentage of fish 20 inches and larger has decreased from 44% to 29%. With walleyes continuing to show above average growth rates the decrease in larger fish may be attributed to overharvest even though our exploitation tagging study showed exploitation at 13.4%. The recent popularity and success of late fall/early winter fishing may be something to keep an eye on over time. April 1, 2024 the statewide walleye bag limit went from 5 to 3 fish and this will be something to evaluate down the road. Through genetic sampling the Walleyes for Tomorrow hatchery was shown to have contributed ~70% of the 2023 year class of walleye. With the new bag limit change in 2024, no regulation changes are currently being proposed.

Walleye caught during our spring electrofishing.

Northern Pike

The northern pike assessment was done primarily on Silver Creek estuary. We did net a couple days in the County K estuary to evaluate northern pike usage. A large percentage of the population uses the Silver Creek area to spawn because of the suitable habitat not found on much of the main lakes shoreline. Netting on the lake over the years has proven to be ineffective. The pike population in the estuary appears to have increased from 6.4 per net night to 15.6. Growth rates are average and size structure has decreased from PSD = 74 (2016) to PSD = 49. Percentage of legal fish has remained relatively unchanged at 14%.

Northern Pike caught in Silver Creek fyke net

Muskellunge

A total of 18 muskies were caught in our entire survey and 7 in our target survey, which was not a large enough sample to calculate a population estimate. The sample also did not provide reasonable size structure data, but some fish were tagged and structures obtained for ageing. Growth rates were shown to be above average and fish over 50 inches were sampled. Green Lake will continue to be managed as a low density and big fish Class 1A musky fishery.

Lake Trout

Only a handful of inland lakes in the state provide a quality lake trout fishery and Green Lake is one of them. Lake trout were first introduced to Green Lake around 1952 and been stocked most years ever since. The fishery is primarily supported through stocking with little to no natural reproduction documented over the years. We tagged 146 of the186 lake trout captured using an orange loop tag. These tags are very visible and retention should last much longer than the standard T-bar floy tags. Tag returns from anglers showed an approximate 22% annual exploitation rate. Unfortunately for our study period Green Lake had little to no safe ice cover the winter of 2022-23 which is typically a period of heavy angling pressure for lake trout. Lake trout lengths ranged from 12.5 –37.3 inches with an average length of 23.9 inches which is above the long term average of 21.5 inches. A coded wire tagging project began in 2015, with first fish being stocked in 2016. All fish stocked since 2016 have a coded wire tag in there nose and adipose fin clip. Some of the interesting information we have gathered so far from lake trout heads and carcasses being returned to us is it takes lake trout an average of four years after they are stocked in the lake to reach the legal size of 17 inches. They are a little over a year old when stocked. When it comes to diet 6% of the fish had empty stomachs and 79% of the fish with food had eaten freshwater shrimp.

36.0 inch 23.6 pound lake trout

Photos by WDNR Staff

Brown Trout

Annual stocking of seeforellen brown trout resumed in 2021. We sampled 16 brown trout throughout our 2022 survey. Fish size ranged from 11.6 –26.5 inches.

Rainbow Trout

There was one 16.9 inch rainbow trout sampled during our survey. It was sampled in County K estuary with a fyke net. All rainbow trout would have come from a stocking as they are not naturally reproducing in the lake.

Cisco

Cisco require cold, well oxygenated water and are found in few inland lakes in Wisconsin. Historically cisco were reported from 188 individual lakes in Wisconsin. A survey from 2011-2014 showed cisco were still present in 94. Green lake is fortunate to still have a cisco population, but as nutrients and temperatures increase their existence could be challenged. Cisco are an excellent food source for many top line predators. Surveys to specifically target cisco have not been done, but we use our lake trout gill net surveys as a way to monitor them. Numbers do fluctuate based off year class strength and are down significantly from the 2016 survey but are relatively similar to the survey done in 2011. Concern for the cisco population was brought to light through public meetings in 2015 and a more restrictive regulation was passed and put in place April of 2020.

Full Summary

Smallmouth Bass
Green lake supports a high density smallmouth bass population. At 25.8 fish per mile Green Lake ranks in the 97th percentile among lakes throughout Wisconsin and in the 75th –90th percentile range when compared to lakes of the same lake class. Size structure of smallmouth bass has remained relatively unchanged over the years and is moderate with 49% of fish larger than 7 inches also being over the legal size of 14 inches. Fish sampled ranged from 4.0 –19.9 inches. Growth in the past has been above average. Smallmouth bass are a very popular species among fishermen on Green Lake and 20 inch plus fish are present.

Ice anglers on Beyers Cove.

Largemouth Bass
Green Lake supports a moderately high density population of largemouth bass. At 23.5 per mile of shoreline it ranks in the 65th percentile when compared to lakes statewide and in the 75-90th percentile when compared to lakes of the same lake class. Size structure based off our SE2 survey ranked in the 25th percentile. This lower ranking is likely due to an increase in smaller fish, which we haven't seen in past surveys. Fish sampled ranged from 5.2—19.8 inches. Above average growth rates of bass in the past and an increase in smaller fish numbers should result in some pretty good fishing in future years.

Bluegill
Bluegill populations in Green Lake fluctuate drastically over the years but were at high levels in 2022. A catch rate of 344/mile is in the 97th percentile statewide and up significantly from the 8 per mile in 2011 and 6 per mile in 2016. Size structure is in the 90th percentile with 75% of the Bluegill larger than 3 inches also larger than 6 inches. Sizes of Bluegill sampled ranged from 3.1 –9.2 inches with an average size of 6.8 inches. Growth rates for bluegill are above average and in the 98th percentile with it taking fish 3 years to reach over 6 inches in length. Exploitation rates based off our tagging study are fairly high at 37.2%. The bluegill fishery on Green Lake would likely benefit from a reduced bag limit.

Black Crappie
Crappie numbers showed an increase from the survey in 2016. Catch rates 2.4 per net night showed a moderate density when compared to lakes statewide and same lake class. Size structure was moderate with a PSD value of 48, which is in the 39th percentile. Growth rates for black crappie are above average with fish reaching 8 inches between 2-3 years. Fish ranged from 6.3 –10.9 inches and averaged 8.3 inches.

Yellow Perch
Green Lake supports a moderately high population of yellow perch when compared to statewide and same lake class statistics. Our netting in the Silver Creek estuary showed a significant increase from the 2016 netting survey. Size structure has been low over the years and continues to be low with Green Lake perch falling in the 10th percentile. Fish ranged from 3.2-11.3 inches and averaged 6.1 inches. Growth rates are slightly below average when compared to lakes in the same lake class.

Rock Bass
Green Lake supports a high population of rock bass when compared to statewide and same lake class statistics. Number per mile increased from 45.3 in 2016 to 82 in 2022. Average size decreased from 8.1 inches in 2016 to 7.5 inches in 2022.

Channel Catfish
Channel catfish appear to be more abundant in Green Lake. Spring electrofishing surveys sampled 23 in 2022 compared to 2 in 2016 in the main lake. Numbers in K estuary increased from 1 in 2011 & 2016 to 22. Range = 20.7—31.2 inches.

White Bass
White bass continue to be a mystery with reports of nice fish being occasionally caught by anglers. The only white bass sampled during the survey were in the County K estuary with fyke nets. We sampled 144 juvenile white bass ranging from 5.0 -6.7 inches.

Juvenile white bass.

Photo by WDNR Staff

Common Carp
A survey targeting common carp abundance was not part of the 2022 survey. Anecdotal evidence seems to show a decline in numbers of carp. Reports from the Sanitary District of fewer fish showing up at the barriers and in the removals may suggest a reduction in numbers. The surge in bluegill numbers recently should also be helping in control of young of year fish.

White Suckers
We sampled 1,384 white suckers in K estuary. The catch rate is 173/net night with fish ranging from 5.5 - 12.8 inches. Average = 11.4. It's unknown if a majority of these fish migrate into K estuary to spawn or if they are residence. White suckers provide excellent forage, at reasonable levels they are a desirable species in a large lake system with walleye, northern and musky.

Other Species
Other species sampled during our 2022 survey were black bullhead, bowfin, brown bullhead, common shiner, creek chub, freshwater drum, golden shiner, green sunfish, longnose gar, mottled sculpin, pumpkinseed hybrid and yellow bullhead.