2023 Comprehensive Fish Survey Summary Report

Silver Lake (WBIC 67400)

Manitowoc County

Introduction and Objectives

In 2023, the Department of Natural Resources (DNR) conducted a comprehensive fish survey of Silver Lake to evaluate the current status of the fish population as Silver Lake underwent a significant rotenone treatment and fisheries restoration approximately 20 years ago and experienced a partial winterkill in 2015. This comprehensive fish survey will also provide insight and direction for the future fisheries management of this lake. Comprehensive fish surveys include both spring fyke netting and spring electrofishing surveys. Primary sampling objectives of these surveys are to characterize species composition, relative abundance and size structure. The following report is a brief summary of the activities conducted, general status of fish populations and future management options for Silver Lake.

Acres: 73 | Shoreline Miles: 1.3 | Maximum Depth (feet): 43

Lake Type: Drainage Lake | Lake Class: Simple Cool Dark | Public Access: 1 Public Boat Launch

Regulations: Statewide Default Regulations except only one northern pike may be kept and it must be at least 32 inches, one largemouth or smallmouth bass may be kept and it must be 18 inches, only three walleye may be kept and they must be 18 inches and only 10 panfish may be kept. Always check the Wisconsin Hook and Line Fishing Regulations to verify current regulations.

Wisconsin DNR Contact Info.

Jason Breeggemann
Senior Fisheries Biologist
Wisconsin Depart. of Natural Resources
2984 Shawano Ave
Green Bay, WI 54313

Phone: 920-420-4619
Email: jason.breeggemann@wisconsin.gov

Survey Methods

- Silver Lake was sampled according to spring netting I (SNI), and spring electrofishing II (SEII) protocols as outlined in the statewide lake sampling protocols. The primary objective of the SNI survey is to count and measure adult northern pike, walleye, and panfish. The primary objective of the SEII survey is to count and measure adult largemouth bass and panfish. Other species of fish may be sampled during each survey, but are considered by-catch as part of that survey.
- Spring fyke netting takes place shortly after ice out when walleye and northern pike begin to spawn. Fyke nets were deployed in areas of Silver Lake that contained spawning habitat or were likely travel areas for northern pike and walleye. All captured fish were identified to species and gamefish and panfish were measured for length. Age structures (i.e., otoliths, fin rays and fin spines) were collected from a subsample of northern pike, walleye, bluegill and black crappie for age and growth analysis.
- Spring electrofishing takes place later in the spring when water temperatures warm enough that largemouth bass and panfish move shallow to spawn. All fish captured were identified to species and gamefish and panfish were measured for length. Fin spines were removed from all largemouth bass for age and growth analysis.
- Fish metrics used to describe fish populations include catch per unit effort, proportional stock density, length frequency distribution, mean length at age and mean age at length.

Figure 1. Bluegill captured in DNR survey. Photo credit DNR.

FKYE NETTING SURVEY INFORMATION

Site Location	Survey Dates	Water Temperature (°F)	Target Species	Gear	Number of Nets	Net Nights
Silver Lake	04/02/2023 - 04/08/2023	38 - 42	Northern Pike, Walleye and Panfish	Fyke Netting	5	30

SPRING ELECTROFISHING II SURVEY INFORMATION

Site Location	Survey Date	Water Temperature (°F)	Target Species	Total Miles Shocked	Number of Stations	Gear	Number of Netters
Silver Lake	05/16/2023	61.6	Bass and Panfish	2.3	3	Boomshocker	2

Fish 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 surveys, we typically quantify CPUE by the number and size of fish captured per mile of shoreline. 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.

Proportional Stock Density (PSD) is an index used to describe 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 Length at Age is an index used to assess fish growth. Calcified structures (e.g., otoliths, fin spines or fin rays) are collected from fish of all sizes that are present in the sample. Mean lengths at ages are calculated as the average length of all fish of a given age.

Mean Age at Length is an index used to assess fish growth. Calcified structures (e.g., otoliths) are collected from a specified length bin of interest (e.g., 5.5 - 6.4 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).

Figure 2. Largemouth Bass captured in DNR survey. Photo credit DNR.

Northern Pike

- Fyke netting is the preferred sampling gear for northern pike. All results presented for northern pike are from spring fyke netting surveys.

2023 SIZE STRUCTURE METRICS

Gear	Total Number Measured	Average Length (inches)	Length Range (inches)	Stock and Quality Size (inches)	Stock Number	Quality Number	PSD	Percentile Rank	Size Rating
Fyke Netting	191	24.5	13.1 - 32.4	14.0 and 21.0	189	171	90	95th	Very High

FYKE NETTING RELATIVE ABUNDANCE (CPUE = Number Per Net Night)

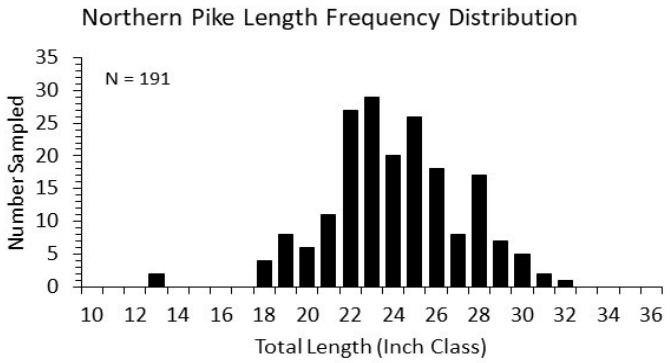
2023 Total Number Captured	2015	2023	2023 Statewide Percentile Rank	2023 Abundance Rating
264	13.2	8.8	89th	High

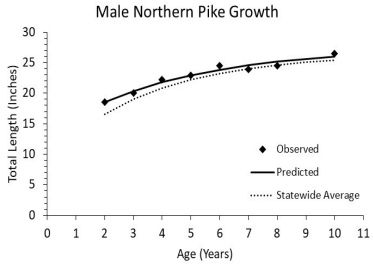
FYKE NETTING SIZE STRUCTURE (PSD) TRENDS

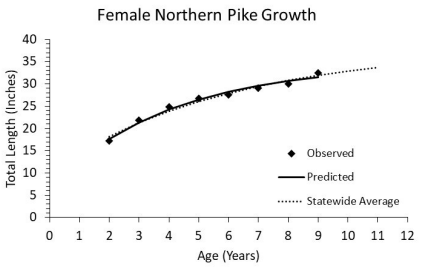
PSD by Year	
2015	2023
72	90

2023 NORTHERN PIKE TOTAL ADULT ABUNDANCE

Number Marked	Number Captured	Number Recaptures	Population Estimate (95% CI)	Number per Acre	Abundance Rating
191	263	72	325 (251 - 464)	4.5	Moderate -







Northern Pike Summary

- Catch rates of northern pike in 2023 were high at 8.8 northern pike per net night. This catch rates ranks out in the 89th percentile for all lakes in Wisconsin and ranks out just below the 90th percentile for Simple Cool Dark lakes. Furthermore, it was estimated that there are approximately 325 adult northern pike in Silver Lake, which is equivalent to 4.5 adult northern pike per acre. While catch rates of northern pike may have declined compared to the 2015 survey, catch rates and the adult population estimate in 2023 show that Silver Lake continues to support a high density of northern pike.
- Size structure of northern pike in 2023 was very high with a PSD of 90 and was higher than the size structure observed in the 2015 survey. Approximately 30% of the northern pike captured in 2023 were ≥26.0 inches, but only one northern pike was legal size (i.e., ≥32.0 inches).
- Growth rates of both male and female northern pike in 2023 were near the statewide average.

Figure 3. Northern pike captured in DNR fyke netting survey. Photo credit DNR.

Walleye

- Fyke netting is the preferred sampling gear for walleye. Spring electrofishing I surveys are used only to get a recapture sample for a population estimate. All results presented for walleye are from spring fyke netting surveys.

2023 SIZE STRUCTURE METRICS

Gear	Total Number Measured	Average Length (inches)	Length Range (inches)	Stock and Quality Size (inches)	Stock Number	Quality Number	PSD	Percentile Rank	Size Rating
Fyke Netting	35	20.9	18.0 - 23.9	10.0 and 15.0	35	35	100	100	Very High

FYKE NETTING RELATIVE ABUNDANCE (CPUE = NUMBER PER NET NIGHT)

2023 Total Number Captured	2015	2023	2023 Statewide Percentile Rank	2023 Abundance Rating
55	0.5	1.8	37th	Low - Moderate

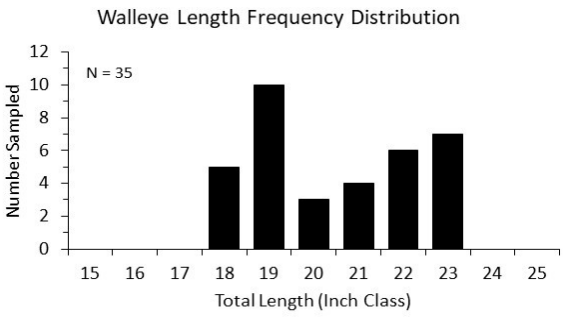
FYKE NETTING SIZE STRUCTURE (PSD) TRENDS

PSD by Year	
2015	2023
94	100

Walleye Summary

- Catch rates of walleye in 2023 were low - moderate at 1.8 walleye per net night. This catch rates ranks out at just the 37th percentile for all lakes in Wisconsin, but ranks out near the 95th percentile for Simple Cool Dark lakes. Furthermore, the catch rate in 2023 was quite a bit higher than the catch rate for walleye in the 2015 fyke netting survey, which was only 0.5 walleye per net night.
- Size structure of walleye in 2023 was very high with a PSD of 100 and was similar to the size structure observed in the 2015 fyke netting survey. Furthermore, all of the walleyes captured in 2023 were legal size (i.e., ≥18.0 inches) and over half of the walleyes that were captured were ≥20.0 inches.

Figure 4. Walleye captured in DNR fyke netting survey. Photo credit DNR.



Largemouth Bass

- Electrofishing is the preferred sampling gear for largemouth bass. All results presented for largemouth bass are from spring electrofishing surveys.

2023 SIZE STRUCTURE METRICS

Gear	Total Number Sampled	Average Length (inches)	Length Range (inches)	Stock and Quality Size (inches)	Stock Number	Quality Number	PSD	Percentile Rank	Size Rating
Electrofishing	53	12.6	5.1 - 18.3	8.0 and 12.0	47	27	57	46th	Moderate

2023 RELATIVE ABUNDANCE (CPUE = NUMBER PER MILE)

CPUE Total	Percentile Rank	Overall Abundance Rating	Length Index	Length Index CPUE	Length Index Percentile Rank	Length Index Abundance Rating
23.0	64th	Moderate	≥ 14.0 inches	9.6	85th	High

ELECTROFISHING CPUE (NUMBER PER MILE) TRENDS

CPUE by Year			Historical Median
2012	2015	2023	
10.5	0.5	23.0	10.5

ELECTROFISHING SIZE STRUCTURE (PSD) TRENDS

PSD by Year			Historical Median
2012	2015	2023	
100	100	57	100

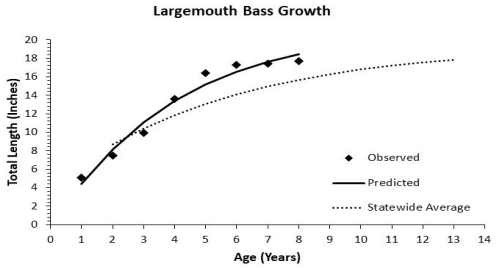
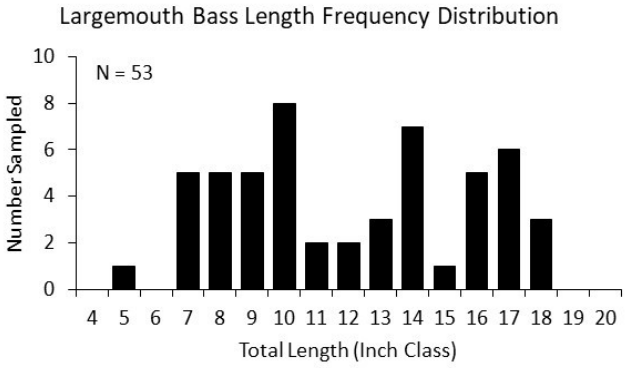


Figure 5. Largemouth Bass captured in DNR electrofishing survey. Photo credit DNR.



Largemouth Bass Summary

- Catch rates of largemouth bass in 2023 were moderate at 23.0 largemouth bass per mile of electrofishing. This catch rate ranks out in the 64th percentile for all lakes in Wisconsin and ranks just under the median catch rate for Simple Cool Dark lakes. Furthermore, the catch rate in 2023 is quite a bit higher than catch rates in the 2012 or 2015 electrofishing surveys.
- Size structure of largemouth bass in 2023 was moderate with a PSD of 57. Size structure of largemouth bass in 2023 was quite a bit lower than the size structure in the 2012 and 2015 electrofishing surveys, when only large adults were captured. Largemouth bass size structure in 2023 was indicative of a much healthier largemouth bass population with an even mix of large and small individuals.
- Largemouth bass growth rates in 2023 were at or above the statewide average. Sizes of older largemouth bass were quite a bit higher than the statewide average, likely due to fast growth among these age classes when they were young that resulted from abundant forage and from the bluegill stockings in 2018 and 2019.

Black Crappie

- Fyke netting is the preferred sampling gear for black crappie. All results presented for black crappie are from spring fyke netting surveys.

2023 SIZE STRUCTURE METRICS

Gear	Number Measured	Average Length (inches)	Length Range (inches)	Stock and Quality Sizes (inches)	Stock Number	Quality Number	PSD	Percentile Rank	Size Rating
Fyke Netting	464	6.8	3.4 - 10.8	5.0 and 8.0 inches	456	68	15	10th	Low

FYKE NETTING RELATIVE ABUNDANCE (CPUE = NUMBER PER NET NIGHT)

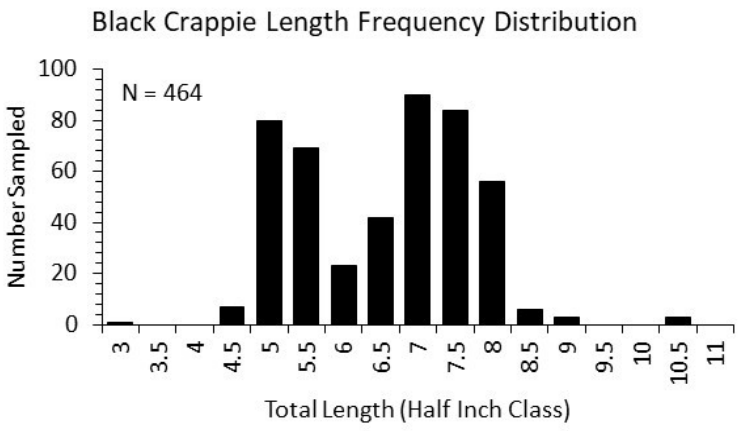
2023 Number Sampled	2015	2023	2023 Statewide Percentile Rank	2023 Abundance Rating
533	0.2	17.8	84th	High

BLACK CRAPPIE GROWTH METRICS

Total Number Sampled	Length Bin (inches)	Mean Age	Age Range	Percentile Rank	Growth Rating
4	7.5 - 8.4	4	4	66th	Moderate

FYKE NETTING SIZE STRUCTURE (PSD) TRENDS

PSD by Year	
2015	2023
7	15



Black Crappie Summary

- Catch rates of black crappie in 2023 were high at 17.8 black crappie per net night. This catch rate ranks out in the 84th percentile for all lakes in Wisconsin and is just above the 75th percentile for Simple Cool Dark lakes. Furthermore, this catch rate is much higher than the catch rate of 0.2 black crappies per net night in the 2015 fyke netting survey
- Black crappie size structure in 2023 was low with a PSD of just 15. The low PSD was a result of the vast majority of the crappies being from one or two strong year classes that were between 5 - 8 inches long.
- Black crappie growth rates in Silver Lake are moderate, reaching approximately 8 inches in four years. Given the large number of black crappies that are 7-9 inches, there should be a good number of 9 - 10 inch crappies in the next year or two.

Bluegill

- Electrofishing is the primary sampling gear for bluegill, but fyke netting can also provide useful supplementary information. Therefore, results from both gears will be presented.

2023 SIZE STRUCTURE METRICS

Gear	Number Measured	Average Length (inches)	Length Range (inches)	Stock and Quality Sizes (inches)	Stock Number	Quality Number	PSD	Percentile Rank	Size Rating
Fyke Netting	700	5.9	3.9 - 8.1	3.0 and 6.0 inches	700	382	55	47th	Moderate
Electrofishing	118	4.4	2.8 - 7.1	3.0 and 6.0 inches	116	9	8	11th	Low

FYKE NETTING CPUE (NUMBER PER NET NIGHT) TRENDS

2023 Number Sampled	2015	2023	2023 Statewide Percentile Rank	2023 Abundance Rating
817	0.6	27.2	80th	High

2023 ELECTROFISHING CPUE (NUMBER PER MILE)

CPUE Total	Percentile Rank	Overall Abundance Rating	Length Index	Length Index CPUE	Length Index Percentile Rank	Length Index Abundance Rating
118.0	61st	Moderate	≥ 7.0 inches	1.0	24th	Low

FYKE NETTING SIZE STRUCTURE (PSD) TRENDS

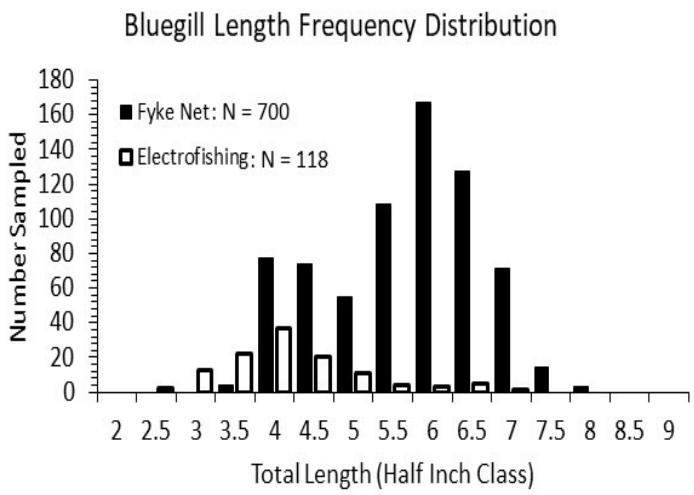
PSD by Year	
2015	2023
29	55

ELECTROFISHING CPUE (NUMBER PER MILE) TRENDS

CPUE by Year			Historical Median
2012	2015	2023	
1.7	6.7	118.0	6.7

ELECTROFISHING SIZE STRUCTURE (PSD) TRENDS

PSD by Year			Historical Median
2012	2015	2023	
33	25	8	25



BLUEGILL GROWTH METRICS

Total Number Sampled	Length Bin (inches)	Mean Age	Age Range	Percentile Rank	Growth Rating
5	5.5 - 6.4	3.2	2 - 4	86th	Fast

Bluegill Summary

- Catch rates of bluegill were moderate - high in both the 2023 fyke netting and electrofishing surveys. Catch rates of bluegill in the 2023 fyke netting survey were 27.2 bluegill per net night, which ranks out in the 80th percentile for all lakes in Wisconsin. Catch rates of bluegill in the 2023 electrofishing survey were 118.0 bluegill per mile of electrofishing, which ranks out in the 61st percentile for all lakes in Wisconsin and ranks out at just above the median catch rate for Simple Cool Dark lakes. Catch rates of bluegill from both gears in 2023 were quite a bit higher than catch rates in the 2012 or 2015 surveys.
- Bluegill size structure was moderate in the 2023 fyke netting survey with a PSD of 55 but low in the 2023 electrofishing survey with a PSD of 8 and a catch rate of bluegill ≥7 inches at 1.0 per mile of electrofishing. Size structure of bluegill in the 2023 fyke netting survey was quite a bit higher than the 2015 fyke netting survey whereas size structure in the 2023 electrofishing survey was similar to previous years' electrofishing surveys.
- Bluegill are growing fast in Silver Lake, reaching 6 inches in about 3.2 years.

Yellow Perch

- Fyke netting is the preferred sampling gear for yellow perch. All results presented for yellow perch are from spring fyke netting surveys.

2023 SIZE STRUCTURE METRICS

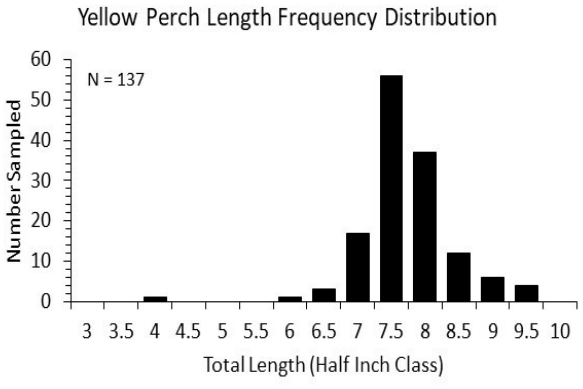
Gear	Number Measured	Average Length (inches)	Length Range (inches)	Stock and Quality Sizes (inches)	Stock Number	Quality Number	PSD	Percentile Rank	Size Rating
Fyke Netting	137	8.0	4.4 - 9.8	5.0 and 8.0 inches	136	59	43	81st	High

FYKE NETTING RELATIVE ABUNDANCE (CPUE = NUMBER PER NET NIGHT)

2023 Number Sampled	2015	2023	2023 Statewide Percentile Rank	2023 Abundance Rating
137	3.9	4.6	61st	Moderate

FYKE NETTING SIZE STRUCTURE (PSD) TRENDS

PSD by Year	
2015	2023
0	43



Yellow Perch Summary

- Catch rates of yellow perch in the 2023 fyke netting survey were moderate at 4.6 yellow perch per net night. This catch rate ranks out in the 61st percentile for all lakes in Wisconsin and ranks out just below the 75th percentile for Simple Cool Dark lakes. Also, the catch rate in the 2023 fyke netting survey was very close to the catch rate in the 2015 fyke netting survey, which was 3.9 yellow perch per net night.
- Yellow perch PSD in the spring 2023 fyke netting survey was 43. A PSD of 43 ranks out in the 81st percentile for lakes in Wisconsin indicating a high size structure for yellow perch in Silver Lake. Yellow perch PSD in 2023 was much higher than the yellow perch PSD in the 2015 fyke netting survey, which was 0.

Stocking History 2004 - Present

Species	Year	Age	Mean Length (inches)	Number Stocked
WALLEYE	2023	Large Fingerling	8.0	363
WALLEYE	2022	Yearling	8.3	405
LARGEMOUTH BASS	2020	Large Fingerling	2.3	1,810
WALLEYE	2019	Small Fingerling	1.8	4,749
LARGEMOUTH BASS	2019	Large Fingerling	2.7	1,812
NORTHERN PIKE	2019	Small Fingerling	2.7	2,063
BLUEGILL	2019	Large Fingerling	0.5	8,833
BLUEGILL	2018	Large Fingerling	1.3	11,200
LARGEMOUTH BASS	2018	Large Fingerling	2.2	1,805
LARGEMOUTH BASS	2017	Large Fingerling	2.1	1,812
WALLEYE	2017	Small Fingerling	1.7	2,539
LARGEMOUTH BASS	2016	Large Fingerling	2.2	4,313
NORTHERN PIKE	2015	Small Fingerling	2.9	6,798
WALLEYE	2015	Small Fingerling	1.7	3,073
NORTHERN PIKE	2013	Small Fingerling	2.9	6,780
WALLEYE	2013	Small Fingerling	2.0	1,344
NORTHERN PIKE	2012	Small Fingerling	2.7	6,790
LARGEMOUTH BASS	2012	Large Fingerling	3.0	3,400
WALLEYE	2012	Small Fingerling	2.5	1,045
WALLEYE	2011	Small Fingerling	1.9	1,494
LARGEMOUTH BASS	2011	Large Fingerling	3.0	2,997
NORTHERN PIKE	2011	Small Fingerling	4.3	7,995
NORTHERN PIKE	2010	Small Fingerling	2.7	8,482
WALLEYE	2010	Small Fingerling	1.4	2,395
WALLEYE	2009	Large Fingerling	6.7	1,360
NORTHERN PIKE	2009	Small Fingerling	2.3	6,790
NORTHERN PIKE	2008	Small Fingerling	3.1	6,780
WALLEYE	2008	Large Fingerling	6.7	1,358
WALLEYE	2007	Large Fingerling	8.3	1,358
WALLEYE	2006	Large Fingerling	7.9	1,360
NORTHERN PIKE	2006	Large Fingerling	7.7	3,000
WHITE SUCKER	2006	Adult	24.0	322
YELLOW PERCH	2005	Yearling	4.0	987
WHITE SUCKER	2005	Adult	20.0	255
WALLEYE	2005	Large Fingerling	7.4	1,356
LARGEMOUTH BASS	2005	Yearling	4.5	998
NORTHERN PIKE	2005	Small Fingerling	3.1	6,792
WALLEYE	2004	Small Fingerling	1.4	990
WHITE SUCKER	2004	Adult	20.0	252
NORTHERN PIKE	2004	Large Fingerling	14.0	95
NORTHERN PIKE	2004	Large Fingerling	7.0	2,160
FATHEAD MINNOW	2004	Adult	-	149,925
LARGEMOUTH BASS	2004	Small Fingerling	1.6	9,994
YELLOW PERCH	2004	Yearling	2.5	3,999

Final Summary and Management Recommendations

- Overall, the fishery appears to have recovered nicely from the rotenone treatment and restoration in the early 2000s and the most recent fish kill in the early winter of 2015.

Northern Pike:

- Catch rates of northern pike declined since the 2015 survey, but remained high in 2023.
- Size structure of northern pike was also high and growth rates of northern pike were near the statewide average.
- A new northern pike regulation with a 26 inch minimum length limit and daily bag limit of two was proposed and supported at the 2025 spring hearings. Therefore, this new northern pike regulation should go into effect in spring of 2026 and increase harvest opportunities.

Walleye:

- Catch rates of walleyes were moderate in 2023.
- Walleye size structure was very good with over 50% of the walleyes captured being ≥20 inches.
- Continue to stock large fingerling walleyes to maintain a fishery in the future.
- Continue to evaluate future stockings to ensure adequate survival.
- Leave the current walleye regulation in place to continue to promote a quality walleye fishery.

Largemouth Bass:

- Catch rates of largemouth bass were moderate in 2023.
- Largemouth bass size structure was moderate with growth rates at or above the statewide average.
- The largemouth bass population should be monitored in the future for changes in densities, size structure, and growth rates. If densities continue to increase and size structure and growth rates decline due to density dependent competition, the regulation should be changed back to the statewide default regulation of a 14 inch minimum length limit and daily bag limit of five.

Panfish:

- Catch rates of black crappie were high and catch rates of bluegill were moderate - high in 2023. Catch rates of both species were quite a bit higher than in the 2015 or 2012 surveys.
- Black crappie size structure was low with the majority of the population being between 5 - 8 inches long. Black crappie growth rates were moderate, so the quality of the black crappie fishery should increase in the next year or two as the large number of black crappies between 5 - 8 inches grows to harvestable size.
- Bluegill size structure was low - moderate, but bluegill growth rates were fast. The poor size structure was likely a result of the population recovering from the fish kill in 2015 and the stockings in 2018 and 2019 to try to boost the numbers of bluegill in the population. Size structure should improve over the next couple of years given the observed growth rates.
- Yellow perch provide another species for panfish anglers to target with about half of the yellow perch captured being harvestable size.
- Maintain adequate predator densities to keep panfish from becoming more abundant. High densities of panfish could result in slower growth and declines in the quality of the panfish fishery.
- Evaluate the panfish regulation in the next three to five years to see if the reduced bag limit continues to be necessary. If panfish densities continue to increase, consider changing the panfish regulation in the future.

Other Management Recommendations:

- Continue to monitor for low dissolved oxygen during winter months. If low dissolved oxygen continues to be a problem in the future, an aeration system may need to be considered to maintain the fishery.
- Consider adding coarse woody habitat along the shoreline where feasible. Coarse woody habitat is vital for fish spawning, to provide protection for small fish from predation, and to provide habitat for large predators to ambush prey from.

Figure 6. Bluegills caught in a DNR fyke netting survey. Photo credit DNR.