WISCONSIN DEPARTMENT OF NATURAL RESOURCES
2021 Comprehensive Fish Survey Summary Report

Silver Lake (WBIC 107900)

Waushara County

Introduction and Objectives

In 2021, the Wisconsin Department of Natural Resources conducted a comprehensive fish survey of Silver Lake in order to 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.

Combined Acres: 328
Lake Type: Seepage
Regulations: Statewide Default Regulations

Shoreline Miles: 4.6
Public Access: 3 Public Boat Launch

Maximum Depth (feet): 50

Survey Methods

- Silver Lake was sampled according to spring netting I (SNI), and spring electrofishing II (SEII) protocols as outlined in the statewide lake protocol. The primary objective of the spring fyke netting I survey is to count and measure adult Walleye, Northern Pike and panfish, as well as mark adult Walleyes to estimate Walleye abundance. The primary objective of the SNI survey is act as a recapture event to estimate walleye abundance. The primary objective of the SEII 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.
- Spring fyke netting takes place shortly after ice out since the goal is to capture Walleye and Northern Pike as they begin to spawn. Fyke Nets were deployed in areas of the lake that contained spawning habitat or were likely travel areas for Northern Pike and Walleyes. All captured fish were identified to species and gamefish and panfish were measured for length. All newly captured Walleye were given a top caudal fin clip. All Walleye and Northern Pike were weighed and age structures (i.e. otoliths, fin rays and spines) were collected from a subsample of Northern Pike, Bluegill and Back Crappie for age and growth analysis.
- Spring electrofishing takes place after netting is complete and water temperatures warm to at least 55°F, just as Largemouth Bass and panfish move into shallow water to spawn. The entire shoreline was electroshocked as part of this survey. All fish captured were identified to species and gamefish and panfish were measured for length.
- Fish metrics used to describe fish populations include catch per unit effort, total abundance, proportional stock density, length frequency distribution and mean age at length.

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FKYE NETTING SURVEY INFORMATION - SNI

Site Location	Survey Dates	Water Temperature (°F)	Target Species	Gear	Number of Nets	Net Nights
Silver Lake	3/25/2021 - 4/6/2021	40 - 49	Northern Pike and Walleye	Fyke Net	6	84

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	6/1/2021	67	Bass and Panfish	4.6	5	Boom shocker	2 (1 Shocking Boats)

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.

Total abundance is a metric that describes population size and is estimated by mark and recapture. In the fyke netting survey, all Northern Pike that were captured were examined for a partial caudal fin (i.e., tail fin) clip. If a partial fin clip was not observed, one was given and the fish was released. If a partial caudal fin clip was observed, it was noted on the data sheet and the fish was released. The number of fin clipped fish versus unmarked fish was kept track of daily and used to estimate the Northern Pike abundance in Silver Lake.

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 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., 7.0-7.5 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).

Northern Pike

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

2021 NORTHERN PIKE 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
114	19.7	8.9 - 30.6	14.0 and 21.0	109	43	39	45th	Moderate

NORTHERN PIKE RELATIVE ABUNDANCE (CPUE = NUMBER PER NET NIGHT)

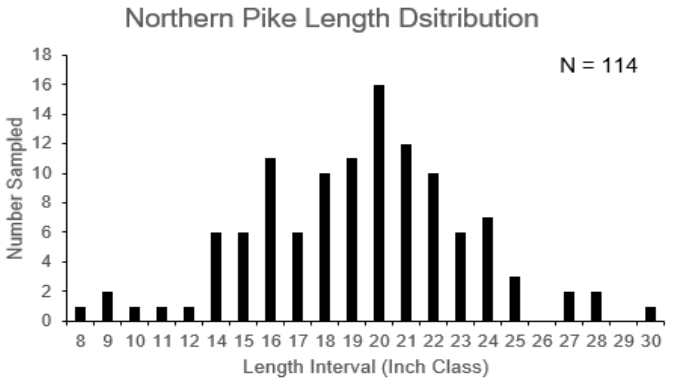
2021 Total Sampled	2015	2021	Historical Median	2021 Statewide Percentile Rank	2021 Abundance Rating
114	1.0	1.6	1.3	48th	Moderate

NORTHERN PIKE SIZE STRUCTURE (PSD) TRENDS

PSD by Year		Historical Median
2015	2021	
26	39	32.5

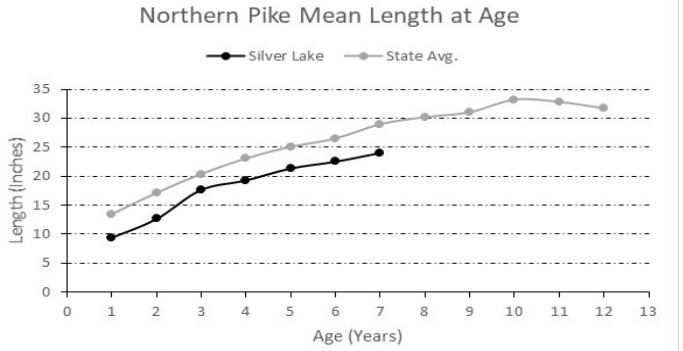
NORTHERN PIKE ADULT ABUNDANCE (POPULATION ESTIMATE)

Marked	Captured	Recaptures	Population Estimate (95% CI)	Number per Acre	Abundance Rating
110	134	19	348.2 (231.7 - 699.9)	1.1	Moderate



Northern Pike Summary

- Silver Lake supports a moderate density Northern Pike population, with catch rates being 1.6 per net night in the 2021 fyke netting survey. A catch rate of 1.6 ranks out in the 48th percentile when compared to lakes throughout Wisconsin. Catch rates of Northern Pike on Silver Lake in historical fyke netting surveys have been similar, from 1.0 - 1.6/ net night.
- Size structure of Northern Pike in the 2021 fyke netting survey was moderate with a PSD of 39 which ranks out in the 45th percentile when compared to lakes throughout Wisconsin. Size structure in 2021 was similar to a previous fyke netting survey in 2015, when PSD was 36.
- Population estimates of Northern Pike have slightly increased over the last six years in Silver Lake, but show a below average fishery while having 1.1 adult Northern Pike per acre captured with only 4.3% of the catch being ≥26 inches.
- Growth rates are below average taking more than 6 years to reach 26 inches.



Largemouth Bass

- Electrofishing is the preferred sampling gear for Largemouth Bass. All results presented for Largemouth Bass are from SE2 surveys.

2021 LARGEMOUTH BASS SIZE STRUCTURE METRICS

Total Number Sampled	Average Length (inches)	Length Range (inches)	Stock and Quality Size (inches)	Stock Number	Quality Number	PSD	Percentile Rank	Size Rating
366	9.9	3.2 - 20.4	8.0 and 12.0	210	121	58	47th	Moderate

2021 LARGEMOUTH BASS RELATIVE ABUNDANCE (CPUE = NUMBER PER MILE TOTAL AND ≥ STOCK SIZE

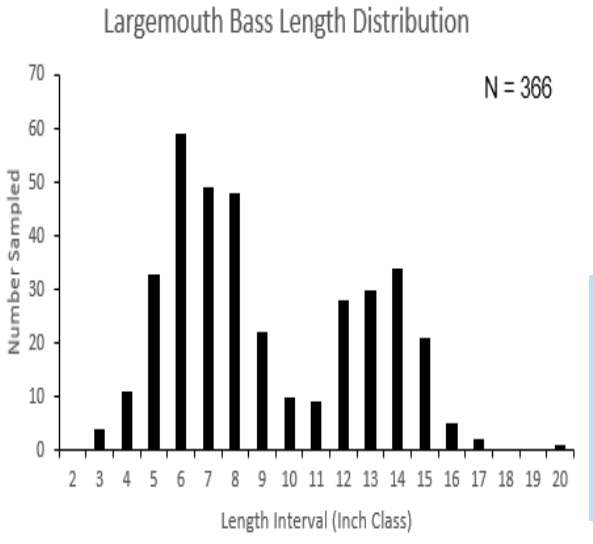
CPUE ≥ Stock	CPUE ≥ Stock\Hour	Percentile Rank	Overall Abundance Rating	Length Index	Length Index CPUE	Length Index Percentile Rank	Length Index Abundance Rating
45.7	97.7	87th	High	≥ 14.0 inches	13.7	92nd	High

LARGEMOUTH BASS RELATIVE ABUNDANCE TRENDS (CPUE = NUMBER PER MILE ≥ Stock Size)

CPUE by Year			Historical Median
2010	2015	2021	
39.8	41	45.7	42.2

LARGEMOUTH BASS SIZE STRUCTURE TRENDS (PSD)

PSD by Year			Historical Median
2010	2015	2021	
70	52	58	60



Largemouth Bass Summary

- Silver Lake supports a high density Largemouth Bass population. Catch rates of Largemouth Bass in the spring electrofishing survey were 45.7 Largemouth Bass per mile of electrofishing, which ranks out in the 87th percentile when compared to lakes throughout Wisconsin. Catch rates fish ≥ 8 inches over the years of electrofishing surveys are very similar, ranging between 39.8—45.7 per mile of electrofishing.
- Size structure of Largemouth Bass in 2021 was also good with a PSD of 58 but down from the 2010 survey when 70% of fish larger than 8 inches were also larger than 12 inches.

Black Crappie

- Fyke netting is the only gear that we sampled enough numbers of crappies to use for analysis.

2021 BLACK CRAPPIE SIZE STRUCTURE METRICS

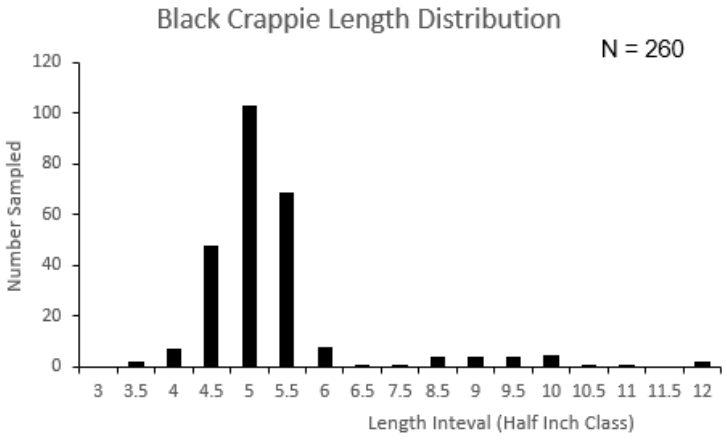
Gear	Number Measured	Average Length	Length Range	Stock and Quality	Stock	Quality	PSD	Percentile Rank	Size Rating
Fyke Netting	276	5.6	3.9 - 12.4	5.0 and 8.0 inches	203	21	10	6th	Low
Electrofishing	6	8.5	5.2 - 9.7	5.0 and 8.0 inches	6	5	83	Too Few Fish	Too Few Fish

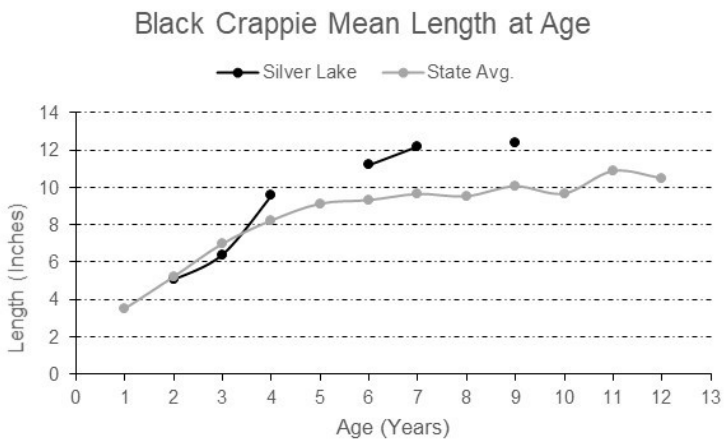
BLACK CRAPPIE TRENDS CPUE (NUMBER PER NET NIGHT)

2021 Number Sampled	2015	2021	Historical Median	2021 Statewide Percentile Rank	2021 Abundance Rating
260	6.6	3.3	5.0	50th	Moderate

BLACK CRAPPIE FYKE NETTING SIZE STRUCTURE (PSD) TRENDS

PSD by Year		Historical Median
2015	2021	
5	10	7.5





Bluegill

- Both fyke netting and electrofishing can be useful gears to sample Bluegill. Therefore, results from both gears will be presented.

2021 BLUEGILL 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	491	4.8	2.7 - 9.6	3.0 and 6.0 inches	490	59	12	7st	Low
Electrofishing	339	4.9	2.0 - 9.5	3.0 and 6.0 inches	243	48	20	33rd	Low

BLUEGILL FYKE NETTING CPUE (NUMBER PER NET NIGHT) TRENDS

2021 Number Sampled	2015	2021	Historical Median	2021 Statewide Percentile Rank	2021 Abundance Rating
491	8.0	13.6	10.8	80th	High

BLUEGILL FYKE NETTING SIZE STRUCTURE (PSD) TRENDS

PSD by Year		Historical Median
2015	2021	
49	12	30.5

2021 BLUEGILL 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
339	93rd	High	≥ 3.0 inches	243	92nd	High

BLUEGILL ELECTROFISHING CPUE (NUMBER PER MILE ≥ 3 INCHES) TRENDS

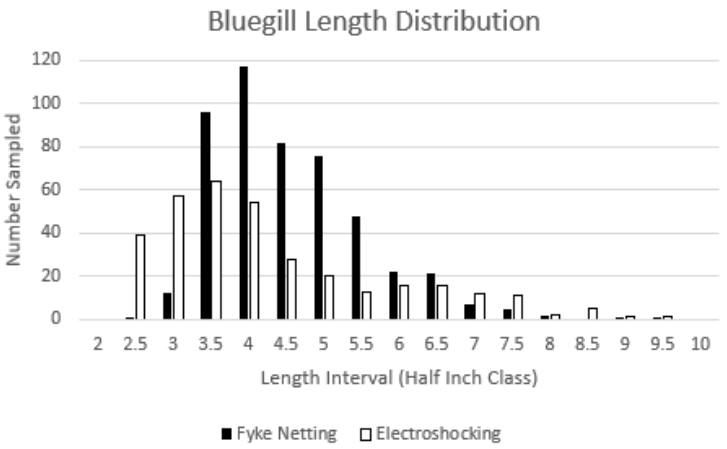
CPUE by Year			Historical Median
2010	2015	2021	
394	324	243	320.3

BLUEGILL ELECTROFISHING SIZE STRUCTURE (PSD) TRENDS

PSD by Year			Historical Median
2010	2015	2021	
19	26	20	21.7

2021 BLUEGILL GROWTH METRICS

Number Measured	Length Bin (inches)	Mean Age	Age Range	Percentile Rank	Growth Rating
11	5.5 - 6.4	4.3	3 - 6	55.7	Moderate
10	6.5 - 7.4	4.8	4 -6	66.5	Moderate



Pumpkinseed

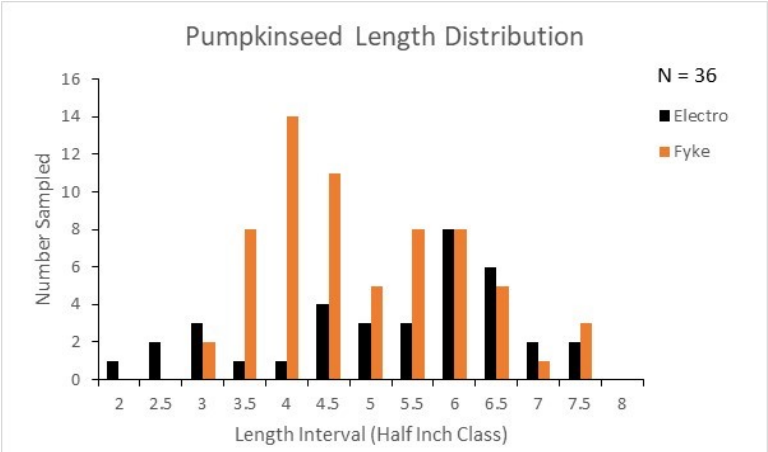
- Both fyke netting and electrofishing can be useful gears to sample Pumpkinseed. Therefore, results from both gears will be presented.

2021 PUMPINSEED 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	65	5.1	3.2 - 7.7	3.0 and 6.0 inches	65	17	26	30th	Low
Electrofishing	36	5.4	2.4 - 7.9	3.0 and 6.0 inches	33	18	55	71th	Moderate

PUMPKINSEED FYKE NETTING CPUE (NUMBER PER NET NIGHT) TRENDS

2021 Number Sampled	2015	2021	Historical Median	2021 Statewide Percentile Rank	2021 Abundance Rating
65	1.1	0.8	0.95	50th	Moderate



PUMPKINSEED FYKE NETTING SIZE STRUCTURE (PSD) TRENDS

PSD by Year		Historical Median
2015	2021	
-	26	-

2021 PUMPKINSEED 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
36	88th	High	≥ 7.0 inches	7	93rd	High

PUMPKINSEED ELECTROFISHING CPUE (NUMBER PER MILE) TRENDS

CPUE by Year		Historical Median
2015	2021	
59	36	47.5

PUMPKINSEED ELECTROFISHING SIZE STRUCTURE (PSD) TRENDS

PSD by Year		Historical Median
2015	2021	
44	55	49.5

Panfish Summary

- Catch rates of Black Crappies in Silver Lake were moderate in the 2021 spring fyke netting survey being 3.3 per net night. Catch rates from the fyke netting and electrofishing survey ranked out in the 50th percentiles when compared to lakes throughout Wisconsin. Black cCappie populations are typically variable through time and driven by strong year classes.
- Black Crappie PSD in the spring 2021 fyke netting survey was poor, with the majority of fish sampled coming from the 2019 year class. The 2019 year class appears to be a strong one made up of 4 –6 inch fish. Black Crappies above average growth rates should put these fish in the quality size of 8 inches by fall of 2021. Another good year class appears to be from 2017 and these fish are in the 10 inch range. Neither one of these surveys are designed to target crappies and most of the fish we sample are incidental either prior to or after they spawn.
- Catch rates of Bluegill ≥ 3 inches in Silver Lake were high in the spring electrofishing survey at 243 per mile of electrofishing. Ranking out in the 92nd percentiles when compared to lakes throughout Wisconsin. Even though numbers were high in this survey they are still down from surveys conducted in 2015 and 2010 (324 and 394 per mile).
- Bluegills PSD values in the 2021 spring fyke netting (12) and spring electrofishing (20) both show the size structure of Bluegills in Silver Lake currently is poor. Furthermore, Bluegill growth rates are moderate as they grow to 6 inches in roughly 4 - 5 years. Bluegill abundance for Silver Lake appears to be good, but it may be a year or two until it produces a good number of quality size fish.
- Catch rates of Pumpkinseed were high in the spring electrofishing survey at 36 per mile of electrofishing (88th percentile), but not as high as the 59 per mile in the 2015 survey.
- Pumpkinseed PSD values have been good over the last couple surveys and provide an opportunity for harvestable fish (≥6 inches).
- Netting surveys don't always give us a good assessment of the Yellow Perch population. Generally, the perch population in Silver Lake appears to be relatively low at this time with smaller fish less than 8 inches making up most of it.
- When it comes to spawning habitat, Yellow Perch rely heavily on wood in the form of trees and branches to lay their eggs on. Silver Lake is lacking in this type of habitat.

Final Summary

Northern Pike:

- Silver Lake supports a moderate density Northern Pike population. Plenty of cold water along with ample forage should allow for Northern Pike to grow to 30+ inches. Though we only sampled one.
- Areas of Silver lake that have shallow water and emergent vegetation should be protected or enhanced to ensure Northern Pike have abundant spawning and nursery habitat in the future.
- Northern Pike in Silver Lake can be difficult to sample because the lake is deep, lacks good Northern Pike spawning habitat and takes a longer time to warm up at ice out for optimal spawning conditions. In 2021, we believe many of the larger fish went into Irogami Lake to spawn, as water levels were high enough to allow this.

Walleye:

- Silver Lake supports a very low density Walleye population due to stocking efforts from the public. Only eight were sampled during fyke netting and none during electrofishing. Habitat for Walleyes in Silver lake is minimal and the only documented natural reproduction was in 1966, despite regular stocking from 1935-1990. The last recorded stocking of Walleyes was in 2011 and two of those fish were caught during this survey. Both fish were females and in the 24 inch range.
- While anglers aren't likely to catch many Walleyes in the Silver Lake, Walleyes growth rates are average and we did sample one fish that was 27.3 inches.

Largemouth Bass:

- The Largemouth Bass fishery on Silver Lake has been and continues to be one of the best in Waushara County and keeping the CPUE of 3 inch and larger fish between 35 –70 fish/mile is recommended.
- The size structure continues to be in good shape with a PSD=58 and RSD = 30. The PSD has fluctuated from 52 in 2015 to 70 in 2010 and managing for between 50-70 is our goal.

Bluegill:

- Bluegill are the dominant panfish in Silver Lake and are present in good numbers. The CPUE of fish 3 inches and larger was 243/mile, which is down from 394 in 2010 and 324 in 2015, but still in the management zone of 200-300/mile we like to see in this area.
- Size structure of Bluegill was low with a PSD = 12. We would like to see that PSD from 40-50. Growth rates appear to be average with fish reaching 6 inches in a little over four years.

Black Crappie:

- Neither of these surveys were targeting Black Crappies but comparisons are made to other like surveys around the state.
- Black Crappie are well known for their cyclical populations and Silver Lake is no exception. There appears to be a good year classes from 2019 and 2017. Growth rates are average for smaller fish, but improve as the fish reach around 8 inches.

Pumpkinseed:

- Pumpkinseed densities were high and size structure is good compared to other waters in the state. We don't manage for Pumpkinseed, but they do provide a fishing/harvest opportunity for anglers at their current numbers. Like all fish, Pumpkinseed would benefit from nearshore habitat.

Yellow Perch:

- Yellow Perch were present in our sampling but in low densities. Neither of these surveys directly target Yellow Perch, but if a healthy population exist it will show. Numbers are compared to other like surveys from around the state. Perch rely heavily on the proper type of spawning habitat such as wood to sustain a healthy population. We have seen positive responses on area lake after wood has been added.

Recommendations:

- Change the Northern Pike regulation on Silver Lake to match the regulation on Irogami Lake may be a benefit given the potential for movement between the lakes. The Irogami Lake regulation changed on April 1, 2022 from a minimum length of 26 inch and 2 fish bag limit to no fish between 25-35 inches and a 2 fish bag limit.
- Manage Largemouth Bass densities at or near current levels to provide quality bass fishing and maintain panfish densities to avoid overabundance.
- Optimal fish habitat is very limited in most parts of Silver Lake. Interested lakeshore owners should promote a diverse mix of native emergent, floating and submergent vegetation as well as add wood in the form of tree drops, fish sticks or dock hab along their shoreline.