WISCONSIN DEPARTMENT OF NATURAL RESOURCES

2021 Comprehensive Summary Report
White Clay Lake, Shawano County
326400

Introduction And Objectives

In 2022, the Wisconsin Department of Natural Resources (DNR) conducted a comprehensive fish survey of White Clay Lake in order to provide insight and direction for the future fisheries management of this system. Comprehensive fish surveys include both spring fyke netting and spring electrofishing surveys. The 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 White Clay Lake.

DNR Contact

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Lake Information

Combined Acres:334
Max. Depth: 52
Shoreline Miles: 4.8
Public Access: 1 Boat Landing
Complex - Warm - Dark

Regulations

Statewide Regulations except panfish regulation of 25 bag limit but only 10 of any one species.

SURVEY INFORMATION

Site Location	Survey Dates	Water Temperature (°F)	Target Species	Gear	Number of Nets	Effort
White Clay Lake	3/30/2021 - 4/8/2021	40 - 52	Northern Pike Walleye	Fyke Net	6	54 net nights
White Clay Lake	5/19/2021	66	Bass and Panfish	Boomshocker	N/A	2.75 miles

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.
- **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., 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).

Survey Method

- White Clay Lake was sampled according to spring netting I (SNI) and spring electrofishing II (SEII) protocols as outlined in the DNR Fisheries Monitoring Protocols. The primary objective of the spring fyke netting I survey is to count and measure adult walleye and northern pike, and mark adult walleyes and northern pike to estimate abundance. 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.
- Boom shockers were used to electrofish 2.75 miles of shoreline. Gamefish were collected and measured throughout. Panfish were collected and counted along 1.5 miles of shoreline.
- Fyke nets were deployed in areas of the lake that contained spawning habitat or were likely travel areas for northern pike and walleye. Aging structures (spines/otoliths) were taken from a sample of northern pike, bluegill and black crappie for age and growth analyses.

RELATIVE ABUNDANCE — CATCH PER UNIT EFFORT (CPUE)

Species	Protocol	Total Number Captured	CPUE	Units	Statewide Percentile
northern pike	Spring Netting I	801	12.5	fish/net night	93rd
walleye	Spring Netting I	131	2.0	fish/net night	38th
largemouth bass	Spring Electrofishing II	64	23.3	fish/mile	64th
black crappie	Spring Netting II	272	4.5	fish/net night	56th
bluegill	Spring Electrofishing II	86	57.3	fish/mile	38th
pumpkinseed	Spring Electrofishing II	7	4.7	fish/mile	38th
yellow perch	Spring Netting I	304	4.8	fish/net night	62nd

Northern Pike

- Northern pike (*Esox lucius*) are a common predatory fish species found across many Wisconsin waterbodies. Northern pike spawn in areas of emergent vegetation at approximately 34-40°F water temperatures. Fyke netting is the preferred sampling gear for northern pike. All results presented for northern pike are from spring fyke netting surveys.

2021 SIZE STRUCTURE METRICS

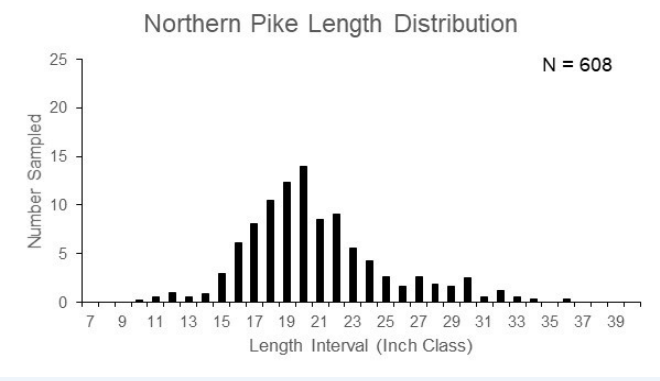
Total Number Measured	Average Length (inches)	Length Range (inches)	Stock and Quality Size (inches)	Stock Number	Quality Number	PSD	Percentile Rank	Size Rating
608	21.2	10.7 - 36.8	14.0 and 21.0	595	262	44	52nd	Moderate

RELATIVE ABUNDANCE (CPUE = NUMBER PER NET NIGHT)

2021 Total Sampled	1994	2000	2009	2016	2021	Historical Median	2022 Statewide Percentile Rank	2021 Abundance Rating
801	15.0	13.2	13.3	10.0	12.5	11.2	93rd	High

SIZE STRUCTURE (PSD) TRENDS

PSD by Year					Historical Median
1994	2000	2009	2016	2021	
24	36	47	60	44	36



ADULT ABUNDANCE (POPULATION ESTIMATE)

Marked	Captured	Recaptures	Population Estimate (95% CI)	Number per Acre
607	801	194	1,189 (1,021 - 1,424)	5.0

Species Summary

- White Clay Lake supports a high-density northern pike population, with catch rates of 12.5 per net night in the 2021 fyke netting survey. A catch rate of 12.5 ranks in the 93rd percentile when compared to lakes throughout Wisconsin. Catch rates of northern pike in historical fyke netting surveys have been similar, ranging from 10.0 -15.0 per net night.
- Size structure of northern pike in the 2021 fyke netting survey was moderate with a PSD of 44, which ranks in the 52nd percentile when compared to lakes throughout Wisconsin. Size structure in 2021 was similar to previous fyke netting surveys between 1994 - 2016, with PSD ranges of 24 - 60.
- Population estimates of northern pike are slightly below the average of 1305 in White Clay Lake, but still show an excellent fishery while having 5.0 adult northern pike per acre.


Photo Credit: DNR Staff

Walleye

- Walleyes (*Sander vitreus*) are a predatory fish species found throughout many Wisconsin waterbodies. Typically, walleyes migrate to spawn in areas of rock or gravel substrate at approximately 40-50°F water temperatures. Fyke netting and electrofishing are both suitable gears for capturing walleye; however, electrofishing was not conducted during this survey, and all results presented for walleyes are from fyke netting surveys.

2021 SIZE STRUCTURE METRICS

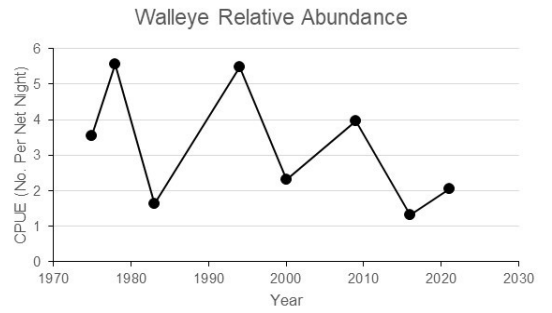
Total Number Measured	Average Length (inches)	Length Range (inches)	Stock and Quality Size (inches)	Stock Number	Quality Number	PSD	Percentile Rank	Size Rating
114	21.7	13.2 - 28.3	10.0 and 15.0	114	113	99	91st	High

RELATIVE ABUNDANCE (CPUE = NUMBER PER NET NIGHT)

2021 Total Sampled	1994	2000	2009	2016	2021	Historical Median	2021 Statewide Percentile Rank	2021 Abundance Rating
131	5.5	2.3	4.0	1.3	2.0	2.9	38th	Moderate - Low

SIZE STRUCTURE (PSD) TRENDS

PSD by Year					Historical Median
1994	2000	2009	2016	2021	
96	96	93	100	99	99



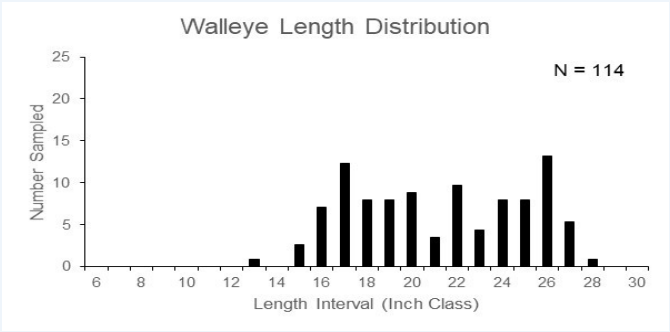



Photo Credit: DNR Staff

Species Summary

- Despite intense stocking efforts over the last 20 years, densities of walleyes in White Clay Lake remain low. Catch rates of 2.0 per net night rank in the 38th percentile when compared to other lakes throughout the state.
- Walleye catch rates have improved since the last survey but are still low, which is to be expected as stocking is the sole reason for walleyes in White Clay Lake. Despite the expected higher survival of large fingerlings, adult walleye densities remain low.
- Walleyes in White Clay Lake do grow very fast and reach large sizes, as can occur in stocked fisheries with excellent forage available.


Photo Credit: DNR Staff

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 largemouth bass. All results presented for largemouth bass are from spring electrofishing surveys.

2021 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
64	14.1	3.6 - 19.4	8.0 and 12.0	61	50	82	84th	Moderate - High

2021 RELATIVE ABUNDANCE (CPUE = NUMBER PER MILE)

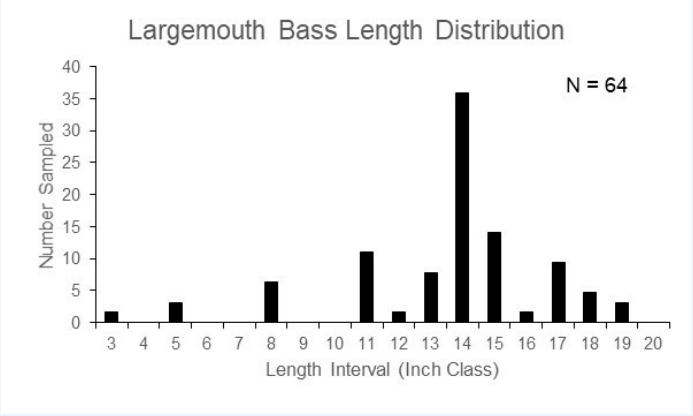
CPUE Total	Percentile Rank	Overall Abundance Rating	Length Index	Length Index CPUE	Length Index Percentile Rank	Length Index Abundance Rating
23.3	64th	Moderate	≥ 14.0 inches	16.0	94th	High

SIZE STRUCTURE (PSD) TRENDS

PSD by Year			Historical Median
2009	2016	2021	
68	91	82	82

RELATIVE ABUNDANCE TRENDS (CPUE = NUMBER PER MILE)

CPUE by Year			Historical Median
2009	2016	2021	
20.5	23.0	23.3	23.0



Species Summary

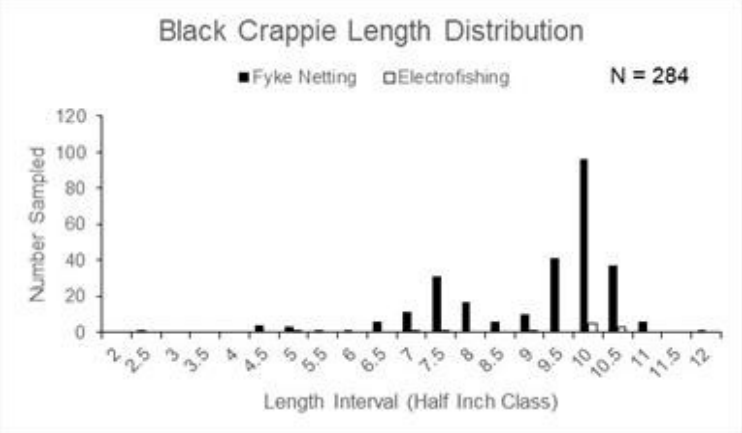
- White Clay Lake supports a moderate-density largemouth bass population. Catch rates of largemouth bass in the spring electrofishing survey were 23.3 largemouth bass per mile of electrofishing, which ranks in the 64th percentile when compared to lakes throughout Wisconsin. Catch rates over the last three spring electrofishing surveys were very similar, ranging between 20.5 - 23.3
- Size structure of largemouth bass in 2021 was also good with a PSD of 82 and one of the highest catch rates of largemouth bass ≥14-inches in the state of Wisconsin. A concerning point of the largemouth bass fishery is the fact that there are very few smaller fish to recruit into the fishery in the coming years.
- Optimal habitat for largemouth bass is present in White Clay Lake. Interested lakeshore property owners should promote a diverse mix of native emergent, floating and submergent vegetation, as well as fish sticks and large woody habitat. Recently, fish sticks have been placed in areas of the lake just offshore of the abundance of cattails.

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, results from both gears are presented for black crappie

2021 SIZE STRUCTURE METRICS

Gear	Number Measured	Average Length (inches)	Length Range (inches)	Stock and Quality Size (inches)	Stock	Quality	PSD	Percentile Rank	Size Rating
Fyke Netting	272	9.4	2.5 - 12.0	5.0 and 8.0 inches	267	214	80	70th	Moderate - High
Electrofishing	12	9.4	5.0 - 9.6	5.0 and 8.0 inches	12	9	75	78th	Moderate - High



FYKE NETTING CPUE TRENDS (NUMBER PER NET NIGHT)

2021 Number Sampled	1994	2009	2016	2021	Historical Median	2021 Statewide Percentile Rank	2021 Abundance Rating
285	5.1	37.8	4.2	4.5	5.5	56th	Moderate

SIZE STRUCTURE (PSD) TRENDS FYKE NETTING

PSD by Year				Historical Median
1994	2009	2016	2021	
14	36	83	80	62

2021 GROWTH METRICS

Sample (n)	Length Bin	Mean	Age Range	Percentile	Growth Rating
11	7.5 - 8.4	3	3 - 3	98th	Fast
8	8.5 - 9.4	4.1	4 - 5	68th	Moderate - Fast
11	9.5 - 10.4	5.0	5 - 5	67th	Moderate - Fast

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
8.0	58th	Moderate	≥ 8.0 inches	6.0	73rd	Moderate - High

ELECTROFISHING TRENDS CPUE (NUMBER PER MILE)

CPUE by Year			Historical Median
2009	2016	2021	
73.0	14.0	8.0	14.0

ELECTROFISHING SIZE STRUCTURE (PSD) TRENDS

PSD by Year			Historical Median
2009	2016	2021	
37	50	75	50

Species Summary

- Catch rates of black crappies in White Clay Lake were moderate in both the 2021 spring fyke netting survey (4.5 per net night) and spring electrofishing survey (8.0 per mile of electrofishing). Catch rates from the fyke netting and electrofishing survey ranked in the 56th and 58th percentiles when compared to lakes throughout Wisconsin. Catch rates of black crappies have been variable through time, driven by strong and weak year classes.

- Black crappie PSD in the spring 2021 fyke netting survey was the highest it has been in the last 25 years. The majority of the black crappies captured were between 9 -11-inches and were 5 years old, which is considered fast growth.

Bluegill

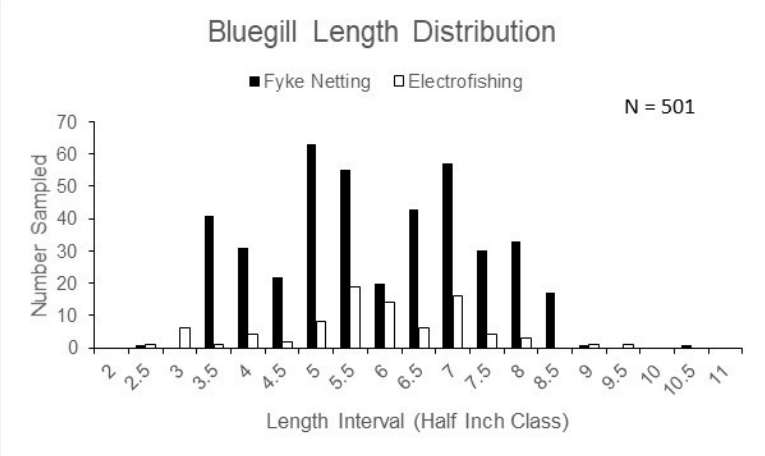
- Bluegills (*Lepomis macrochirus*) are a very common panfish species distributed widely across many Wisconsin waterbodies. Bluegills typically spawn in nearshore areas consisting of sand, mud or gravel substrate at approximately 67-80°F water temperatures. Electrofishing is the standard sampling gear for bluegills, but fyke netting can show some information as well. When comparing bluegill populations to other waterbodies electrofishing data is to be used for our surveys.

2021 SIZE STRUCTURE METRICS

Gear	Number Measured	Average Length (inches)	Length Range (inches)	Stock and Quality Size (inches)	Stock	Quality	PSD	Percentile Rank	Size Rating
Fyke Netting	415	6.1	2.6 - 10.9	3.0 and 6.0	414	202	49	40th	Moderate
Electrofishing	86	6.1	2.8 - 9.6	3.0 and 6.0	85	45	53	74th	Moderate - High

FYKE NETTING CPUE TRENDS (NUMBER PER NET NIGHT)

2021 Number Sampled	1994	2009	2016	2021	Historical Median	2021 Statewide Percentile Rank	2021 Abundance Rating
415	10.7	13.1	10.5	6.5	8.5	48th	Moderate



SIZE STRUCTURE (PSD) TRENDS FYKE NETTING

PSD by Year				Historical Median
1994	2009	2016	2021	
78	61	94	49	70

2021 GROWTH METRICS

Sample (n)	Length Bin	Mean	Age Range	Percentile	Growth Rating
11	5.5 - 6.4	3.1	3 - 4	86th	Moderate - Fast
11	6.5 - 7.4	4	4	83rd	Moderate - Fast
9	7.5 - 8.4	4.8	4 - 6	90th	Fast

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
57.3	38th	Moderate	≥ 7.0 inches	16.7	73rd	Moderate - High

ELECTROFISHING TRENDS CPUE (NUMBER PER MILE)

CPUE by Year			Historical Median
2009	2016	2021	
61.0	58.0	57.3	57.3

ELECTROFISHING SIZE STRUCTURE (PSD) TRENDS

PSD by Year			Historical Median
2009	2016	2021	
23	52	53	52

Species Summary

- Catch rates of bluegills in White Clay Lake were moderate in the spring electrofishing survey, with 57.3 per mile of electrofishing. Catch rates from the electrofishing survey rank out in the 38th percentile when compared to lakes throughout Wisconsin. Catch rates have been stable over time when looking at historical data in White Clay Lake.
- Bluegills PSD value is 53, which indicate healthy levels when looking at the bluegill population as a whole. The PSD value when compared to other lakes statewide is in the 74th percentile.
- Bluegills growth rates in White Clay Lake are moderate to fast and are in the 86th percentile or higher when compared to lakes throughout Wisconsin, across multiple length bins.
- The quality of White Clay lake bluegills is high, with excellent size structure and moderate abundance levels.

Pumpkinseed

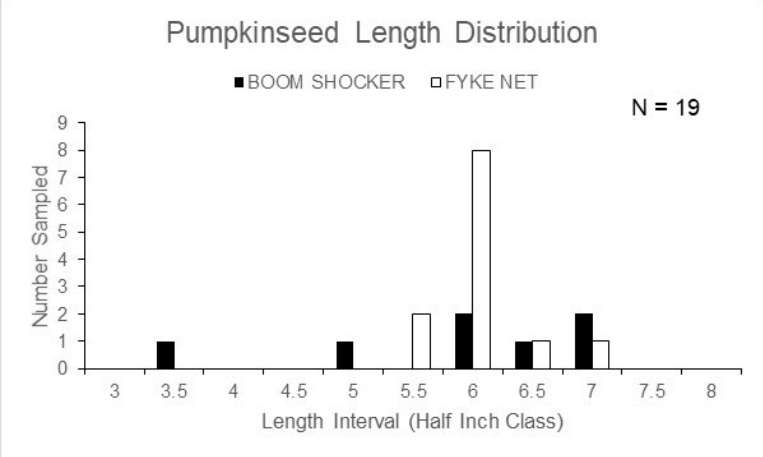
- Pumpkinseeds (*Lepomis gibbosus*) are a common panfish species distributed widely across many Wisconsin waterbodies. Pumpkinseeds typically spawn in nearshore areas consisting of sand or gravel substrate at approximately 60-70°F water temperatures. Electrofishing is the standard sampling gear for pumpkinseed, but fyke netting can provide information as well. Electrofishing data will be used to compare pumpkinseeds populations to other waterbodies..

2021 SIZE STRUCTURE METRICS

Gear	Number Measured	Average Length (inches)	Length Range (inches)	Stock and Quality Size (inches)	Stock	Quality	PSD	Percentile Rank	Size Rating
Fyke Netting	12	6.3	5.6 - 7.3	3.0 and 6.0 inches	12	10	83	90th	High
Electrofishing	7	6.1	3.9 - 7.2	3.0 and 6.0 inches	7	5	71	86th	Moderate - High

FYKE NETTING CPUE TRENDS (NUMBER PER NET NIGHT)

2021 Number Sampled	1994	2009	2016	2021	Historical Median	2021 Statewide Percentile Rank	2021 Abundance Rating
415	10.7	13.1	10.5	6.5	8.5	48th	Moderate



SIZE STRUCTURE (PSD) TRENDS FYKE NETTING

PSD by Year				Historical Median
1994	2009	2016	2021	
78	61	94	49	70

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
4.7	38th	Moderate - Low	≥ 7.0 inches	1.3	66th	Moderate

ELECTROFISHING TRENDS CPUE (NUMBER PER MILE)

CPUE by Year			Historical Median
2009	2016	2021	
1.0	42.0	4.7	4.7

ELECTROFISHING SIZE STRUCTURE (PSD) TRENDS

PSD by Year			Historical Median
2009	2016	2021	
0	76	71	71

Species Summary

- Pumpkinseeds catch rates were moderate in the spring electrofishing survey with a catch rate of 4.7 per mile of electrofishing. A catch rate of 4.7 per mile of electrofishing ranks in the 38th percentile when compared to others lakes throughout the state. Catch rates of pumpkinseed in White Clay Lake have fluctuated over the last few surveys.
- White Clay Lake had a PSD of 71, which is in the 86th percentile when compared to other lakes throughout the state. PSD values have been variable over the last few surveys.
- While low numbers of pumpkinseed were in observed in the last survey, they still provide a fishing opportunity and the chance to catch pumpkinseeds >6.0-inches.

Yellow Perch

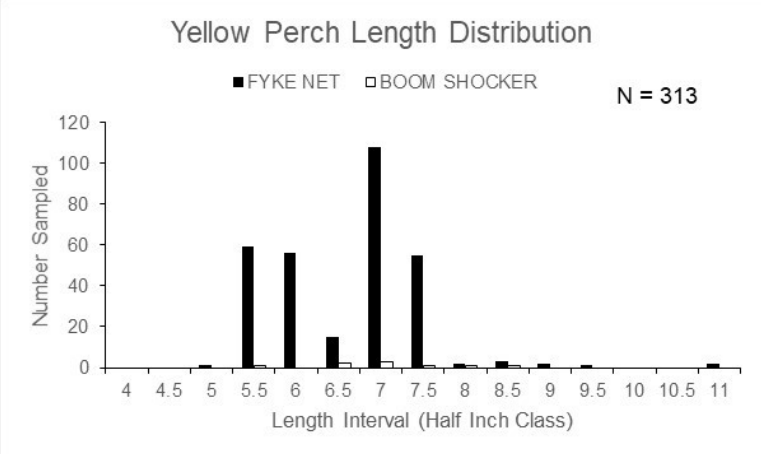
- Yellow perch (*Perca flavescens*) are a common panfish species found throughout many Wisconsin waterbodies. Typically yellow perch spawn in areas of emergent or submergent vegetation or submerged brush at approximately 45-50°F water temperatures. Electrofishing and fyke netting can be effective sampling gear for yellow perch and therefore, results from both gears are presented for yellow perch.

2021 SIZE STRUCTURE METRICS

Gear	Number Measured	Average Length (inches)	Length Range (inches)	Stock and Quality Size (inches)	Stock	Quality	PSD	Percentile Rank	Size Rating
Fyke Netting	304	6.9	5.4 - 11.5	5.0 and 8.0 inches	304	10	3	20th	Low
Electrofishing	9	7.3	5.7 - 8.5	5.0 and 8.0 inches	9	2	22	83rd	Moderate - High

FYKE NETTING CPUE TRENDS (NUMBER PER NET NIGHT)

2021 Number Sampled	1994	2009	2016	2021	Historical Median	2021 Statewide Percentile Rank	2021 Abundance Rating
304	7.8	10.7	0.4	4.8	4.8	62nd	Moderate



SIZE STRUCTURE (PSD) TRENDS FYKE NETTING

PSD by Year				Historical Median
1994	2009	2016	2021	
19	16	22	3	17

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
6	39th	Moderate	≥ 8.0 inches	1.3	77th	Moderate - High

ELECTROFISHING TRENDS CPUE (NUMBER PER MILE)

CPUE by Year			Historical Median
2009	2016	2021	
30.0	53.0	6.0	30.0

ELECTROFISHING SIZE STRUCTURE (PSD) TRENDS

PSD by Year			Historical Median
2009	2016	2021	
0	10	22	10

Species Summary

- Yellow perch catch rates were moderate in the spring fyke netting and electrofishing surveys, with catch rates of 4.8 per net night and 6.0 per mile of electrofishing. A catch rate of 4.8 per night ranks in the 62nd percentile when compared to others lakes throughout the state. A catch rate of 6.0 per mile of electrofishing ranks in the 39th percentile. Catch rates of yellow perch in White Clay Lake have fluctuated over the last few surveys.

Final Summary and Management Recommendations

Northern Pike:

White Clay Lake supports a high-density northern pike population. Plenty of cold water along with ample forage allows for northern pike to grow to 30.0-inches or larger. The areas of White Clay 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.

Walleye:

White Clay Lake supports a low-density walleye population that is sustained through stocking. Despite switching from stocking small fingerling walleyes to large fingerling walleyes, densities of adult walleyes have not increased enough to create a population that is meeting adult density objectives. While anglers aren't likely to catch many walleyes in White Clay Lake, walleyes grow very quickly and reach large sizes, providing the opportunity to catch a trophy walleye. Optimal walleye habitat is limited and competition from several other predators is keeping walleye densities low. The DNR will continue to monitor the survival of stocked walleyes in the future to determine if walleye stocking continues to be unsuccessful at producing a harvestable population.

Largemouth Bass:

White Clay Lake supports a healthy largemouth bass population with some of the highest catch rates of legal sizes (i.e., ≥14 –inches) largemouth bass in the state. The largemouth bass population had moderate-density levels with good growth potential and good numbers of largemouth bass >16.0-inches. Low numbers of smaller sized largemouth bass is concerning and we will continue to watch their numbers during the next survey. We will also continue monitoring overall largemouth bass density. The goal is to keep them stable to prevent panfish populations from becoming overabundant and stunting.

Panfish:

Catch rates of all four common panfish species (i.e., black crappie, bluegills, pumpkinseeds and yellow perch) were moderate. Size structure of black crappies and yellow perch were higher in 2021 surveys than in previous years. Bluegills and pumpkinseeds size structure and densities have remained similar to the last survey in 2016. Furthermore, growth rates of bluegills and black crappie were moderate to fast. Faster growth along with good size structure has resulted in high-quality panfish fisheries over the last 20 years in White Clay Lake. The black crappie population is dominated by two large year-classes that are 3 and 5 years old, with a large portion of the black crappie being in the 10.0-inch range. Erratic recruitment with populations dominated by 1-2 large year-classes is common with black crappies.

Other Management Recommendations:

White Clay Lake is somewhat unique among lakes in the area in that it has minimal development near shore and is almost completely surrounded by cattails. Agriculture in the area has impacted nutrient loading over the years as White Clay Lake has an abundance of algae blooms throughout the year. Maintaining minimal shoreline development will benefit the lake. Optimal fish habitat is very limited in certain parts of White Clay Lake. Interested lakeshore owners should promote a diverse mix of native emergent, floating and submergent vegetation as well as add fish sticks along their shoreline. Fish sticks have been place in areas of the lake in the past few years. This could be further expanded on as wood is a desirable habitat for many fish species.