2019 Comprehensive Summary Report

Spring Netting (SN1)

Long Lake

Waushara County (WBIC 191100)

Introduction and Survey Objectives

In 2019, the Department of Natural Resources conducted a fyke netting and electrofishing survey of Long Lake in order to provide insight and direction for future fisheries management of this water body. Primary sampling objectives of this survey were 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.

Acres: 272 Shoreline Miles: 4.8 Maximum Depth (feet): 71
Lake Type: Seepage Public Access: One Public Boat Launch
Regulations: 3 trout no minimum length and all other species statewide default. Panfish Bag Limit = 10 (In Effect April 1,2020)

WISCONSIN DNR CONTACT INFO.

Dave Bartz—Fisheries Biologist
Scott Bunde - Fisheries Technician
Wisconsin Department of Natural Resources
427 East Tower Drive, Suite 100
Wautoma, WI 54982

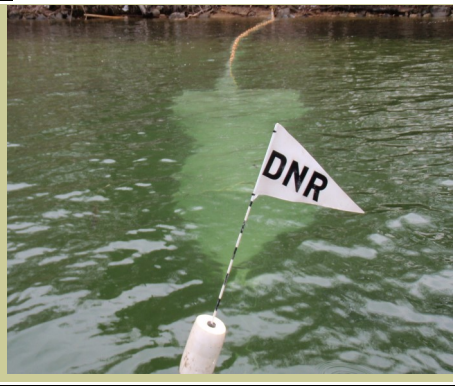
Dave Bartz: 920-787-3016;
david.bartz@wisconsin.gov

Scott Bunde: 920-787-5683;
scott.bunde@wisconsin.gov

Survey Netting Information						
Site location	Survey Dates	Water Temperature (°F)	Target Species	Gear	Number of Nets	Net Nights
Long Lake	4/10/2019 - 4/20/2019	37 - 47	Walleye, Northern Pike, Panfish	Fyke Net	6	56

Survey Method

- Long Lake was sampled according to spring netting (SNI) protocols as outlined in the statewide lake assessment protocol. The primary objective for this sampling period is to count and measure adult walleye and northern pike. Other gamefish/panfish may be sampled but are considered by-catch as part of this survey.
- Fyke Nets were deployed in areas of the lake that contained spawning habitat or were likely travel areas for northern pike and walleye. All newly captured northern pike and walleye were given a partial fin clip (top caudal fin). Some northern pike were weighed and age structures (i.e., anal fin rays) were collected. A subsample of bluegill, black crappie and yellow perch were also taken for age and growth analysis.
- Fish metrics used to describe fish populations include catch per unit effort, total abundance, proportional stock density, length frequency distribution, mean age at length, and relative weight.



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. 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 northern pike that were captured were given a partial caudal fin (i.e., tail fin) clip and released. Each time the nets were checked, all northern pike were examined for a partial caudal fin clip. The number of previously captured individuals (i.e., fin clipped) was recorded and proportions of marked individuals to unmarked individuals was used to estimate the total abundance of the northern pike population.

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. RSD values are the same concept except you choose the upper size of interest.

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).

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)						
Species	2019 Total Number Captured	CPUE (number per net night)			2019 Statewide Percentile Rank	2019 Abundance Rating
		2009	2014	2019		
BLACK CRAPPIE	7	0.1	3.3	0.1	5th	Low
BLUEGILL	35	0.8	20.2	0.6	15th	Low
LARGEMOUTH BASS	8	0.2	0.6	0.1	12th	Low
NORTHERN PIKE	426	1.0	1.9	10.2	91st	High
PUMPKINSEED	7	0.1	1.7	0.1	12th	Low
ROCK BASS	34	1.9	25.4	0.6	35th	Low-Medium
WHITE SUCKER	95	0.4	0.6	1.7	-	-
WALLEYE	131	2.1	3.8	3.6	52nd	Medium
YELLOW PERCH	127	0.2	0.3	2.3	51st	Medium

2019 Size Structure Metrics

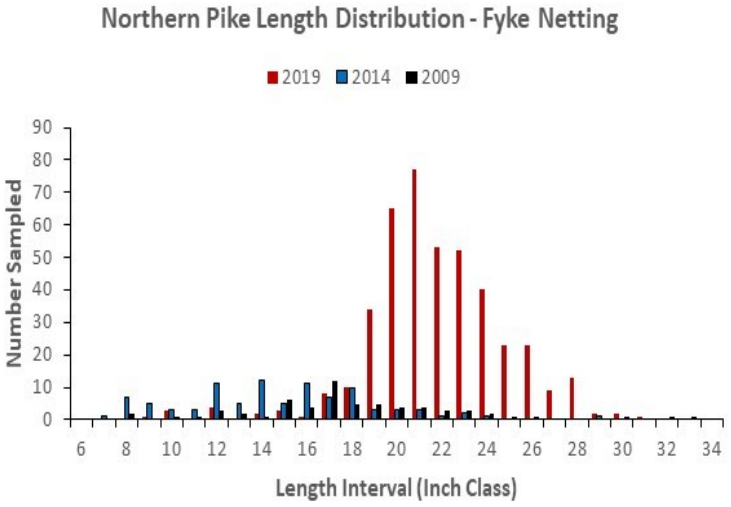
Species	Total	Average Length (inches)	Length Range (inches)	Stock and Quality Size (inches)	Stock Number	Quality Number	PSD	Percentile Rank	Size Rating
NORTHERN PIKE	426	22.4	9.5 - 31.5	14.0 and 21.0	418	295	71%	80th	Moderately High
WALLEYE	131	22.6	8.0 - 29.0	10.0 and 15.0	126	126	100%	100th	High
LARGEMOUTH BASS	8	13.9	6.0 - 16.5	8.0 and 12.0	7	6	Too	Few	Fish

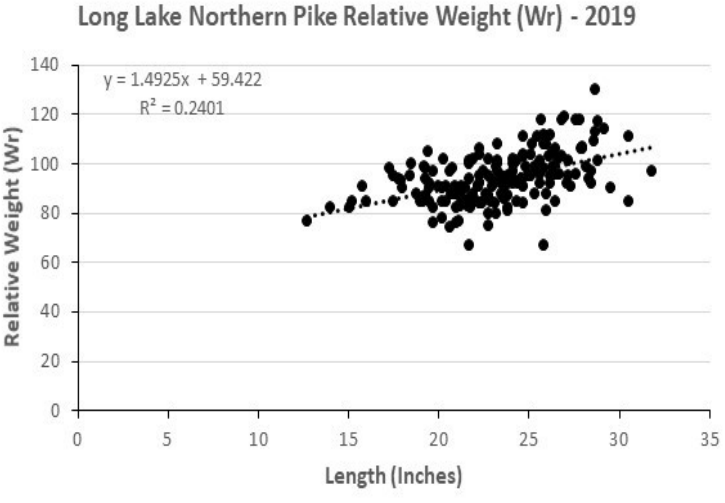
Historical Size Structure Metrics and Population Estimates

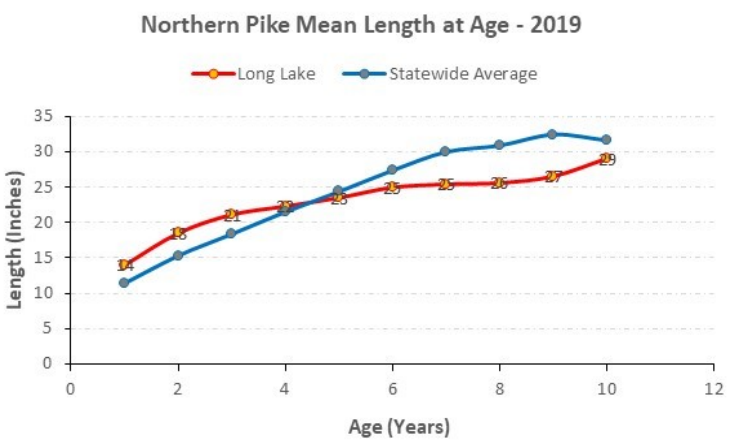
Species	Historical Median (2009-Present)	PSD by Year			NP RSD26 and WY RSD21			PE by Year (#/acre)				
		2009	2014	2019	2009	2014	2019	2002	2005	2009	2014	2019
NORTHERN PIKE	39%	31%	14%	71%	7%	2%	12%	Too Few Fish	Too Few Fish	Too Few Fish	Too Few Fish	3.1
WALLEYE	99%	100%	98%	100%	44%	59%	73%	0.9	1.2	0.70	0.55	0.64

2019 Total Adult Abundance (Mark and Recapture Population Estimate)

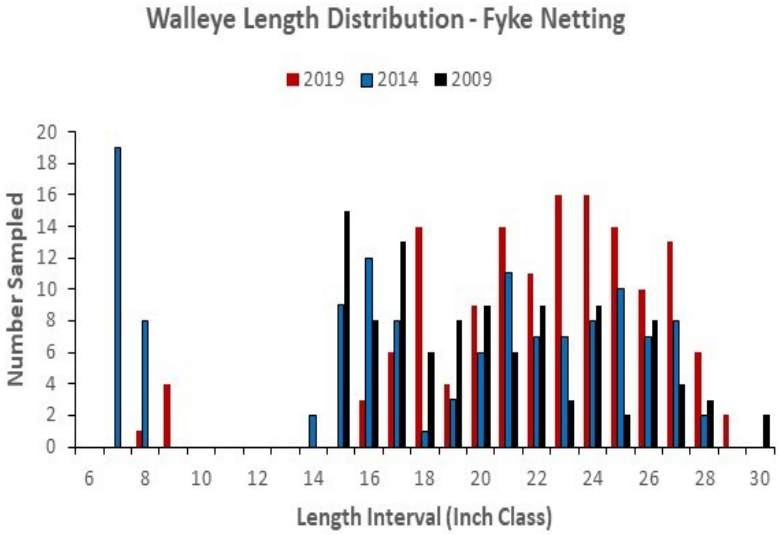
Species	Number Marked (Netting)	Number Sampling Events (Netting)	Number Recaptures (Netting)	Schnabel Population Estimate (95% C.I.)	Number per Acre	Abundance Rating
NORTHERN PIKE	429	7	131	846 (698–1,074)	3.1	Moderate
WALLEYE	117	8	60	174 (134-249)	0.64	Low







Dave Bartz with 29.0 inch 11+ pound Long Lake walleye.



Growth of Known Aged Fish Captured

Specie	Date Stocked	# Stocked	Clip	Length	Sex	Age
WALLEYE	04/19/2012	750	LP	23.7	MALE	8
WALLEYE	04/19/2012	750	LP	22.1	MALE	8
WALLEYE	11/11/2010	1,500	RV	22.5	MALE	9
WALLEYE	11/11/2010	1,500	RV	23.0	MALE	9
WALLEYE	11/11/2010	1,500	RV	23.0	MALE	9
WALLEYE	11/11/2010	1,500	RV	26.4	FEMALE	9
WALLEYE	11/11/2010	1,500	RV	27.0	FEMALE	9

LP Clip from 2012 Clipped & Stocked by We Really Kare Fishing Club

RV Clip from 2010 Clipped & Stocked by We Really Kare Fishing Club

Gamefish Summary

Northern Pike

- Density of northern pike were found at high levels (91st percentile) when compared to statewide data. Relative abundance in 2019 was 5-10 times higher than past surveys
- Size structure was moderately high (80th percentile) with 71% of fish larger than quality size of 21 inches, while 12% of fish sampled were larger than the size limit of 26 inches.
- Growth rates were above average for smaller fish and were below average once fish reached around 22 inches on average.
- Condition indices show that most pike have slightly below average weights for their lengths until they reach approximately 26 inches.

Walleye

- Walleye densities were medium (52nd percentile) compared to statewide average and size structure was and typically is high on Long Lake.
- Population estimates have stayed relatively unchanged over the last 3 surveys and has continuously been around that 1.0 adult or less fish per acre, fairly typical for a stocked fishery.
- Size structure was high (100th percentile) with 100% of fish larger than 10 inches also larger than 15 inches.
- Growth of known aged fish is above average and the 24.4 inch average of 9 year old fish is nearly identical to the 24.3 inch average of fish we aged using spines in 2009.

Largemouth Bass

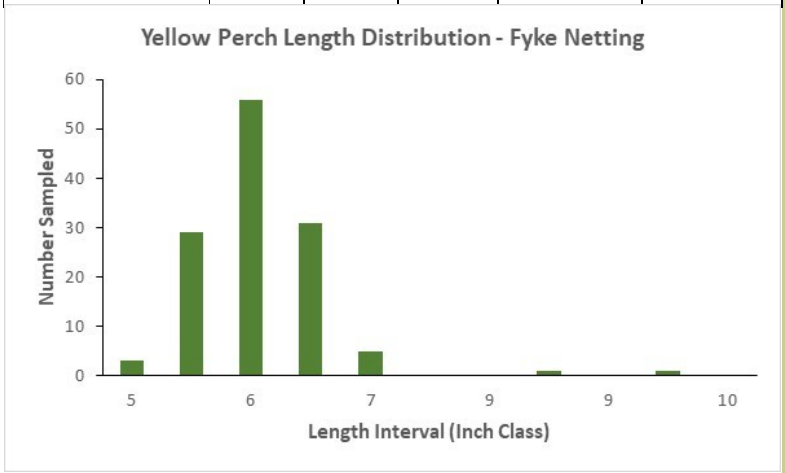
- Largemouth bass densities were low (12th percentile) compared to the statewide average of spring fyke netting. They were also down from the last survey which had a more moderate density.
- However, not enough fish were sampled to assess the size structure, nor are they the target species for this type of survey. Electrofishing is the preferred gear for evaluating the largemouth bass population and netting data is rarely used.

2019 Size Structure Metrics (Historic numbers aptured included for comparison)

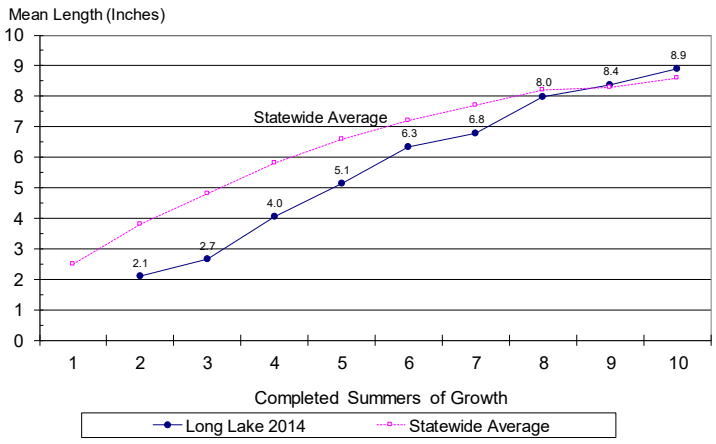
Species	2009 # Caught	2014 # Caught	2019 # Caught	Number Measured	Average Length (inches)	Length Range (inches)	Stock and Quality Sizes (inches)	Stock Number	Quality Number	PSD	Percentile Rank	Size Rating
BLUEGILL	55	1,048	35	35	6.1	3.0 - 9.0	3.0 and 6.0 inches	34	19	56%	48th	Moderate
BLACK CRAPPIE	4	170	7	7	11.1	10.0 - 12.0	5.0 and 8.0 inches	6	6	Too	Few	Fish
PUMPKINSEED	8	88	7	7	5.7	3.5 -6.5	3.0 and 6.0 inches	7	5	Too	Few	Fish
ROCK BASS	101	1,320	34	34	6.4	3.5 –10.0	4.0 and 7.0 inches	33	10	30%	26th	Low
YELLOW PERCH	12	15	127	127	6.3	5.0 - 9.5	5.0 and 8.0 inches	127	3	2.4%	15th	Low

Abundance Trends and Percentile Ranking

Species	CPUE Net Night 2009	CPUE Net Night 2014	CPUE Net Night 2019	Percentile Rank 2019	Catch Rating 2019
BLUEGILL	0.8	20.2	0.6	20th	Low
BLACK CRAPPIE	0.1	3.3	0.1	7th	Low
PUMPKINSEED	0.1	1.7	0.1	15th	Low
ROCK BASS	1.9	25.4	0.6	35th	Low-Moderate
YELLOW PERCH	0.2	0.3	2.3	51st	Moderate



Bluegill Growth Rates - Long Lake Waushara Co.



Panfish Summary

Bluegill

- Bluegill densities were low (20th percentile) and down significantly from 2014 spring survey. Size structure was found to be moderate with 56% of bluegill captured ≥ 6.0 inches, 34% of the bluegill captured ≥ 7.0 inches and 23% of the bluegill captured ≥ 8.0 inches. Keep in mind these numbers are based off a relatively small number of bluegills.
- Total catch of bluegills decreased almost 30 fold from 1,048 to 35. This CPE falls into the 20th percentile and is lower than 80% of lakes in the state. Nearshore habitat has always been a concern on Long Lake and now an increase in northern pike will likely effect the bluegill population. Spring netting surveys are rarely used to assess bluegill fisheries however. Late spring electrofishing is the preferred method.
- Growth rates were well below average for bluegill in 2002, 2009 and 2014, with fish reaching harvestable size (6 inches) between 6-7 summers of growth.

Black Crappie

- Black crappie densities were low at the 7th percentile and down from the 50th percentile in 2014 but the same as 2009 survey. Black crappie are known as a cyclical species which means their populations fluctuate greatly from year to year. With only 7 fish captured in the netting survey, size structure ratings are irrelevant. Black crappies have been stocked periodically over the years with the last stocking in 2017. Nearshore habitat is critically lacking for good black crappie reproduction.

Yellow Perch

- Yellow perch densities were moderate, increasing 7+ fold from 2014 and these numbers are made up of primarily 2 year classes less than 7 inches long. At total of 127 were sampled.
- Size structure was poor with only 2.4% of fish ≥ 8 inches, but the future looks promising with a couple strong year classes making their way into the fishery.
- Yellow perch are periodically stocked by the local fishing club and the most recent stocking prior to this survey was in 2017 when 3,000- 6 inch fish were stocked.

Pumpkinseed made up a small part of the fishery with 7 fish being sampled and rating in the 15th percentile for the state.

Rock bass were the 2nd most abundant panfish and there is no size limit, bag limit or season on rock bass.

Introduction and Survey Objectives

The Department of Natural Resources conducted a one night electrofishing survey of Long Lake as part of a comprehensive survey in order to provide insight and direction for the future fisheries management of this water body. Primary sampling objectives of this survey were to characterize species composition, relative abundance, and size structure. The following report is a brief summary of that survey including the general status of the fish populations and future management options.

Acres: 272 Shoreline Miles: 4.8 Maximum Depth (feet): 71
Lake Type: Seepage Public Access: One Public Boat Launch
Regulations: 3 trout no minimum length and all other species statewide default.

WISCONSIN DNR CONTACT INFO.

Dave Bartz- Fisheries Biologist
Scott Bunde - Fisheries Technician
Wisconsin Dept. of Natural Resources
427 East Tower Drive, Suite 100
Wautoma, WI 54982

Dave Bartz 920-787-3016
david.bartz@wisconsin.gov

Scott Bunde 920-787-5683
scott.bunde@wisconsin.gov

Electrofishing Survey Information							
Site location	Survey Date	Water Temperature (°F)	Target Species	Total Miles Shocked	Number of Stations	Gear	Number of Netters
Long Lake	5/29/2019	65	All	4.8	6	Boomshocker	2

Survey Method

- Long Lake was sampled according to spring electrofishing (SEII) protocols as outlined in the statewide lake assessment plan. The primary objective for this sampling period was to count and measure adult bass and panfish. Other gamefish may be sampled but are considered by-catch as part of this survey.
- The entire lake shoreline was sampled. All fish captured were identified to species and game-fish and panfish were measured for length.
- Fish metrics used to describe fish populations include proportional stock density, catch per unit effort, and length frequency distributions.

Fish Metric Descriptions
PSD, CPUE, and LFD

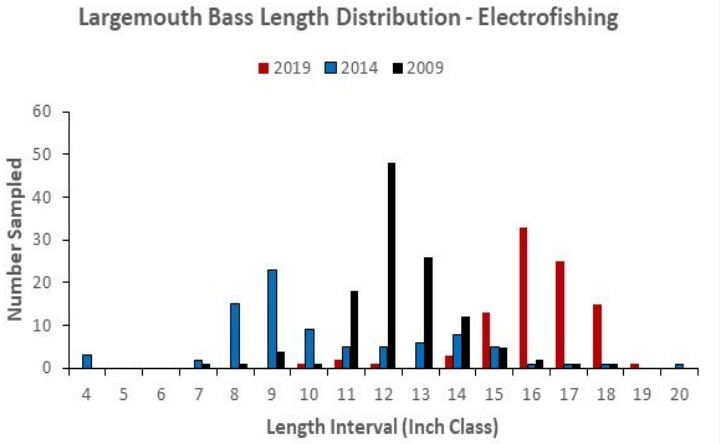
Proportional Stock Density (PSD) is an index used to describe size structure of fish populations. It is calculated by dividing the number of quality size fish by the number of stock size fish for a given species. PSD values between 40 - 60 generally describe a balanced fish population.

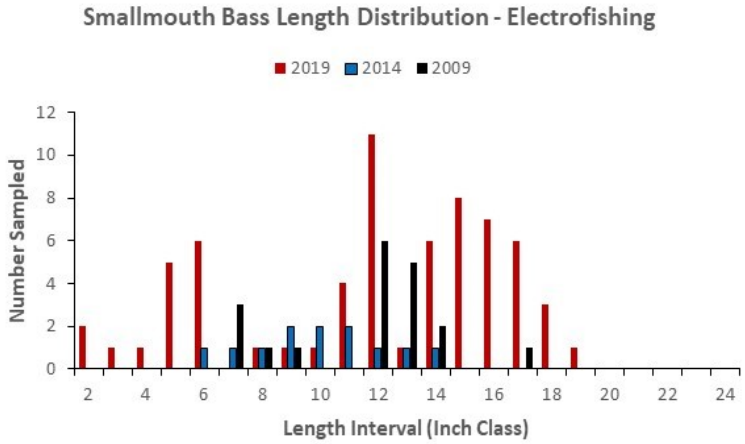
Catch per unit effort (CPUE) is an index used to measure fish population relative abundance, which simply refers to the number of fish captured per unit of distance or time. For electrofishing surveys, we typically quantify CPUE by the number and size of fish per mile of shoreline. CPUE indexes are compared to statewide data by percentiles. For example, if a CPUE is in the 90th percentile, it is higher than 90% of the other CPUEs in the state.

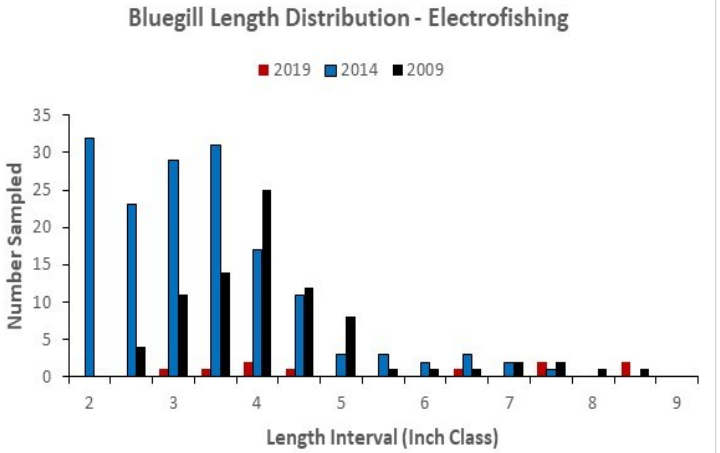
Length frequency distribution (LFD) is a graphical representation of the number or percentage of fish captured by half inch or one inch size intervals. Smaller fish (or younger age classes) may not always be represented in the length frequency due to different habitat usage or sampling gear limitations.

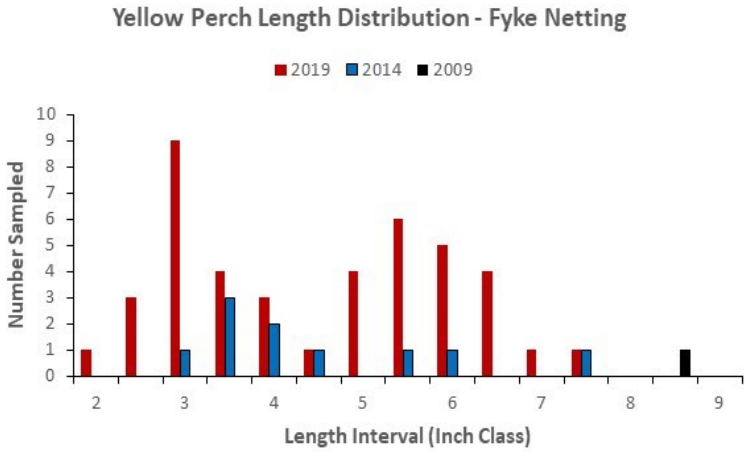
Size Structure Metrics									
Species	Total	Average Length (inches)	Length Range (inches)	Stock and Quality Size (inches)	Stock Number	Quality Number	PSD	Percentile Rank	Size Rating
Bluegill	10	6.0	3.0 - 8.9	3.0 and 6.0	10	5	Too	Few	Fish
Largemouth Bass	94	16.7	10.0 - 19.5	8.0 and 12.0	94	91	97%	98th	High
Northern Pike	22	23.2	19.1 - 29.4	14.0 and 21.0	22	20	91%	99th	High
Pumpkinseed	3	7.1	4.0 –8.5	3.0 and 6.0	3	2	Too	Few	Fish
Rock Bass	24	7.0	4.5 –11.0	4.0 and 7.0	24	11	46%	51st	Moderate
Smallmouth Bass	65	12.5	2.5 –19.0	7.0 and 11.0	50	47	94%	75th	Moderate-High
Walleye	3	17.9	9.5 –22.0	10.0 and 15.0	2	2	Too	Few	Fish
Yellow Perch	42	4.8	2.0 - 7.5	5.0 and 8.0	21	0	0	0	Low

Abundance Metrics								
Species	CPUE Total (No. per mile)	CPUE Total (No. per hr) ≥Stock Size	Percentile Rank (# mile)	Overall Abundance Rating	Length Index	Length Index CPUE per mile	Length Index Percentile Rank	Length Index Abundance Rating
Bluegill	10	21	13th	Low	≥ 7.0 inches	4	42nd	Moderate
Largemouth Bass	19.6	43	60th	Moderate	≥ 14.0 inches	18.8	96th	High
Northern Pike	4.4	10.2	81st	Moderate - High	≥ 26.0 inches	0.42	80th	Moderate - High
Pumpkinseed	3	6.4	46th	Moderate	≥ 7.0 inches	2	70th	Moderate – High
Rock Bass	24	51.4	86th	Moderate-High	≥ 9.0 inches	3	93rd	High
Smallmouth Bass	13.8	23	89th	Moderate-High	≥ 14.0 inches	6.5	95th	High
Walleye	0.63	1.4	7th	Low	≥ 15.0 inches	0.42	15th	Low
Yellow Perch	42	21	85th	Moderate –High	≥ 8.0 inches	0	0	Low









Population Size Structure Trends (PSD)						
Species	**Stock and Quality Size (Inches)**	**Mean**	**2005**	**2009**	**2014**	**2019**
Bluegill	3.0 and 6.0	19%	39%	10%	8%	Too Few
Largemouth Bass	8.0 and 12.0	70%	68%	80%	35%	97%

Abundance (CPUE) Trends					
Species	**Historical Mean (2006-Present)**	**SEII CPUE (Total No. per mile)**			
		2005	**2009**	**2014**	**2019**
Bluegill	117	222	81	154	10
Largemouth Bass	22.7	32.1	20.2	18.9	19.6
Northern Pike	5.6	7.6	6.3	4.0	4.4
Pumpkinseed	11.8	17	8	19	3
Rock Bass	35.5	47	54	17	24
Smallmouth Bass	5.2	2.1	2.3	2.7	13.8
Yellow Perch	14.8	6	1	10	42

Fish techs Kyle Kossel and Wes Reif hold 19 inch Largemouth & Smallmouth Bass.

Map turtles found surveying Long Lake.

Stocking History 1972 - Present

Species	Year	Age	Source	Mean Length In.	Pounds Stocked	Number Stocked
Walleye	1972	Yearling	Federal	11.0		2,120
Walleye	1972	Fingerling	DNR	3.0		12,000
Walleye	1973	Yearling	Federal	9.0		600
Smallmouth	1974	Fingerling	Private	3.0		5,000
Walleye	1975	Adult	Federal			100
Smallmouth	1975	Fingerling	DNR	3		10,000
Smallmouth	1976	Yearling				3,600
Northern	1981	Yearling	Transfer			218
Walleye	1982	Yearling	Transfer			18
Northern	1982	Yearling	Transfer			1,070
Northern	1982	Fingerling	DNR	9.0		1,150
Northern	1983	Fingerling	DNR	9.0		1,350
Northern	1984	Fingerling	DNR	9.0		1,060
Walleye	1984	Fingerling	Transfer	4.0		2,300
Largemouth	1984	Fingerling	Transfer	4.0		800
Northern	1985	Fingerling	DNR	9.0		1,375
Walleye	1987	Fingerling	DNR	9.0		36,000
Northern	1987	Fingerling	DNR	9		1,500
Largemouth	1987	Fingerling	Transfer	6		3,600
Muskellunge	1991	Fingerling	DNR	10		502
Walleye	1991	Fingerling	DNR	5		4,350
Muskellunge	1992	Yearling	DNR	17.5		154
Walleye	1992	Fingerling	DNR	3		6,902
Walleye	1994	Fingerling	Private	7.9		500
Muskellunge	1997	Yearling	DNR	18.9		23
Walleye	1997	Fingerling	DNR	2.7		10,000
Walleye	1998	Fingerling	DNR	1.3		6,421
Walleye	1999	Fingerling	Private	7.4		3,000
Walleye	1999	Fingerling	DNR	1.5		6,800
W. Suckers	1999	Adult	Field	9.3		1,284
W. Suckers	1999	Adult	Private	8.1		1,500
W. Suckers	2000	Adult	Private	7.2		1,500
Y. Perch	2000	Yearling	Field	3.5		2,000
Walleye	2000	Fingerling	Private	6.5		2,400
B. Crappie	2000	Fingerling	Private	4.9		2,500
Walleye	2000	Fingerling	DNR	1.7		27,000
Y. Perch	2000	Adult	Field	5.3		3,750
Largemouth	2001	Fingerling	DNR	1.3		2,250
Walleye	2001	Fingerling	Private	7.7		
Walleye	2001	Fingerling	DNR	1.6		27,200
W. Suckers	2001	Adult	Private	9.8		
Northern	2001	Adult	Private	17		
Fathead	2001	Adult	Private			
W. Suckers	2002	Yearling	Private	4.6		1,500
Fatheads	2002	Adult	Private	1.5		100,000
Walleye	2003	Yearling	Private			3,000
W. Sucker	2003	Yearling	Private			250
B. Crappie	2003	Yearling	Private			1,875
Northern	2003	Fingerling	Private			125
Walleye	2003	Fingerling	DNR	1.5		27,196
Y. Perch	2003	Adult	Private			1,000
B. Crappie	2004		Private	7.1		200
B. Crappie	2004	Yearling	Private	4.3		800
W. Sucker	2004	Adult	Transfer	18.8		1,385
Fatheads	2005	Adult	Private	1.5		80,000
Walleye	2005	Fingerling	Private	6.5		1,000
Walleye	2005	Fingerling	DNR	1.7		27,996
W. Sucker	2005	Adult	Field	20.3		1,170
Fatheads	2006	Adult	Private			160,000
Brook Trout	2006	Adult	Private	13		250
W. Sucker	2006	Adult	Field	24		1,175
B. Crappie	2007	Adult	Private	7		1,000
Rainbow Tr	2007	Adult	Private	10.5		2,000
Walleye	2007	Yearling	Private	6.5		2,000
Fatheads	2007	Yearling	Private			80,000
Brown Tr	2007	Fingerling	DNR	5.9		5,575
Walleye	2007	Fingerling	DNR	2.1		16,465
Rainbow Tr	2008	Adult	Private	10		2,000
Fatheads	2008	Adult	Private	1.5		80,000
Brown Tr	2008	Fingerling	DNR	5.7		9,997
Y. Perch	2008	Fingerling	Private	5		1,730
Brown Tr	2009	Adult	Private	8		2,000
Fatheads	2009	Adult	Private	2		75,000
Y. Perch	2009	Yearling	Private	5		1,730
Brown Tr.	2009	Fingerling	DNR	6		5,499
Walleye	2009	Fingerling	DNR	1.8		9,495
Y. Perch	2010	Adult	Private	6		1,280
Fatheads	2010	Adult	Private	2		150,000
Walleye	2010	Yearling	Private	5		1,500
Brown Tr	2010	Fingerling	DNR	6		3,418
Y. Perch	2011	Adult	Private	5.5		2,510
B. Crappie	2011	Adult	Private	5		800
Fatheads	2011	Adult	Private	2		1,500
Brown Tr.	2011	Fingerling	DNR	5.23		5,456
Walleye	2011	Fingerling	DNR	2.1		9,485
Brown Tr.	2011	Adult	DNR	22.0		126
Fatheads	2012	Adult	Private	2		75,000
Walleye	2012	Yearling	Private	6.8		750
W. Suckers	2012	Yearling	Private	9.0		400
Brown Tr.	2012	Fingerling	DNR	7.7		4,038
Brown Tr.	2012	Adult	DNR	20.5		196
Fatheads	2013	Adult	Private	2.0		

Stocking History 1972 - Present

Species	Year	Age	Source	Mean Length In.	Pounds Stocked	Number Stocked
W. Sucker	2013	Yearling	Private	8.0		1,292
Y. Perch	2013	Yearling	Private	5.0		1,150
Brown Tr.	2013	Fingerling	DNR	7.3		3,523
Walleye	2013	Fingerling	DNR	2.0		23,255
Brown Tr.	2013	Adult	DNR	22.2		80
W. Suckers	2014	Adult	Private	8.0		900
Fatheads	2014	Adult	Private	2.0		22,500
Y. Perch	2014	Yearling	Private	4.0		2,000
B. Crappie	2014	Yearling	Private	3.0		2,200
Brown Tr.	2014	Fingerling	DNR	5.8		6,156
W. Suckers	2015	Adult	Private	5.0		1,750
Fatheads	2015	Adult	Private	2.0		22,500
Brown Tr.	2015	Adult	DNR	15.0		51
Brown Tr.	2015	Fingerling	DNR	8.0		5,404
W. Suckers	2015	Adult	Private	9.0		1,800
Fatheads	2016	Adult	Private	2.0		12,000
Walleye	2016	Fingerling	DNR	7.9		1,271
Brown Tr.	2016	Fingerling	DNR	7.5		6,141
W. Suckers	2016	Fingerling	Private	7.7		6,700
W. Suckers	2016	Fingerling	Private	4.5		700
Fatheads	2017	Adult	Private	2.0		22,500
Y. Perch	2017	Yearling	Private	6.0		3,000
B. Crappie	2017	Yearling	Private	5.0		3,077
Brown Tr.	2017	Fingerling	DNR	5.9		6,351
B. Crappie	2017	Fingerling	Private	5.0		1,100
Fatheads	2018	Adult	Private	2.0		22,500
Walleye	2018	Fingerling	Private	7.0		700
W. Suckers	2018	Fingerling	Private	5.0		2,619
Brown Tr.	2019	Yearling	DNR	8.9		4,256
Y. Perch	2019	Yearling	Private	6.0		800
Fatheads	2019	Yearling	Private	2.0		22,500
Walleye	2019	Fingerling	DNR	7.0		1,271

DNR staff and We Really Kare fishing club members clipping stocked walleyes.

We Really Kare fishing club member Dan Wilz stocking some crappies.

Habitat Work

Like many lakes in Waushara County, Long Lake has very little nearshore habitat and this can have a big effect on a lakes fishery. Most all fish species in Long Lake will use this habitat at one time in their life, whether its feeding on other fish or insect life present, hiding from predators, spawning amongst or on the tree branches. Fish species such as yellow perch are desperate to find a place to hang their eggs until they hatch and this is what's being provided by the We Really Kare (WRK) fishing club and some private lake property owners on Long Lake. These structures can also help reduce wave energy and provide some shoreline protection during the high water levels Long Lake is experiencing at this time. The club is always looking for property owners on the lakes they sponsor willing to do some habitat work on their shorelines. This typically is done with little to no cost to the property owner and benefits all lake users.

Yellow perch eggs laid on a tree drop branch.

Summary & Management Options

Northern Pike

- Increased water levels have flooded some fantastic nearshore habitat which made our nets more effective at sampling the population. Lack of near-shore habitat and low water in the past resulted in fish spawning over deeper habitat, making our nets less efficient for sampling. With pike numbers increasing and a lower panfish population there is concern that growth rates might slow and pike numbers under the legal size limit of 26 inches could stock pile.
- There were 429 different fish sampled in the 2019 netting survey compared to 98 sampled in 2014. The population estimate had fairly tight confidence intervals and was 429 fish or 3.1/ acre. The increase in numbers could be due to the above average rainfalls the last few years resulting in higher lake levels, increasing nearshore spawning habitat that is now flooded. With this new spawning habitat available, increasing northern pike numbers are of concern. Yellow perch numbers are on the rise, but bluegill and crappie numbers are not. Suckers are stocked via the local fishing club to supplement forage numbers in the lake. Panfish and perch are prime northern food and could be preyed on heavily, reducing their numbers.
- The size structure is also of some concern. Though it was moderately high (80th percentile) with 71% of fish larger than quality size of 21 inches, only 12% were larger than the 26 inch legal minimum size limit. The lower numbers of certain panfish species/forage may start to contribute to a slowdown in northern pike growth rates as the population increases. Anglers have shown us pictures of 35-40 inch pike caught through ice during the winter of 2019-20 so we know Long will grow trophy fish, but we don't typically see them in our sampling gear.
- Growth rates were above average for younger fish but were below average once fish reached around 22 inches on average.
- The northern pike regulation of 26 inches and 2 fish may not be the proper regulation. As numbers increase, the forage base and growth rates may both decrease resulting in an over abundant stunted northern pike fishery. Northern Pike have the potential to reach trophy size in Long Lake and the appropriate regulation may be the slot limit regulation of only 2 northern pike may be kept and pike between 25—35 inches must be released. This should protect the species from overharvest and allow larger fish with good growth potential to reach trophy size.

Largemouth Bass

- Largemouth bass were found at moderate levels (43/hr $\geq$ 8 inches, 19.6/mile total) in our electrofishing survey, but have remained relatively unchanged since our 2014 survey (41/hr $\geq$ 8 inches, 18.9/mile total). Typically a catch rate of less than 100/hr $\geq$ 8 inches or 50/mile is a good number to shoot for in deep lakes in our area, especially with 3 other predator species present. Bass CPUE should continue to be monitored.
- The size structure of largemouth bass were found at high levels PSD12=97% (98th percentile) up from PSD12=35% in 2014. The RSD14 went up from 17 fish 14 inches or larger to 90 fish 14 inches or larger in 2019. With an abundance metric of 18.8 bass per mile $\geq$ 14 inches. Long Lake is now in the 96th percentile in the state for fish 14 inches or larger. This is also concerning since there are very few fish less than 14 inches coming up.
- Growth rates over the years have always been slightly below average with fish reaching the 14 inch statewide size limit after 6 summers of growth.
- We would like to see an increase in young fish and recruitment in the bass fishery. With the aid of tree drops/fish sticks and an increase in other spawning habitat from the high waters, hopefully we will see the PSD12 reduced to 40-60% and CPUE closer to 50/mile.

Walleye

- No natural reproduction occurs on Long lake and the walleye population exists because of the stocking efforts of the DNR and We Really Kare fishing club. They stock, on average, 3-7 extended growth fingerlings per acre on an almost every other year basis. The state stocks the alternate years.
- The number of walleye remained the same from 129 total (PE=0.55/acre) in 2014 to 131 total (PE=0.64/acre) in 2019. These are fairly typical numbers of a stocked walleye fishery.
- Size structure was high (100th percentile) with all fish larger than 10 inches also larger than 15 inches. The mean size increased from 18.6 inches to 22.6 inches.
- Growth rates of known aged fish were above average and the 24.4 inch average of 9 year old fish is nearly identical to the 24.3 inch average of fish we aged using spines in 2009. Decreases in bluegill and black crappie numbers could possibly effect growth rates of all gamefish including walleye.

Smallmouth Bass

- The smallmouth bass population has been so low in past surveys that little management consideration was given to the species. In the 2019 survey, smallmouth bass were found at 13.8/mile total (89th percentile), compared to 2.1/mile (2005), 2.3/mile (2009) and 2.7/mile in 2014. The number per mile of fish 14 inches and larger was 6.5 and that is in the 95th percentile.
- Size structure was good with 94% of fish larger than 7 inches also larger than 11 inches. The RSD14, the number of fish larger than 7 inches that are also larger than 14 inches (legal size limit), is 62%.
- The smallmouth bass fishery appears to be up and coming and could possibly be attributed to the addition of tree drops/fish sticks over the years. Unlike the largemouth bass fishery where only 3% of population was less than the 12 inch quality size, the smallmouth bass fishery is more balanced with 30% of fish less than the 11 inch quality size and this should help sustain this fishery in the near future..
- Long Lake should be managed as a lower density quality smallmouth bass fishery. With the aid from tree drops/fish sticks and an increase in spawning habitat from the high waters, we may likely see an increase in the population. If the population does continue to increase we would like to see the PSD11 reduced to 40-60% and a CPUE not exceed 25/mile.

Panfish

- Bluegill were found at low levels and down 15 fold from 2014. Only 10 fish were sampled in our SEII survey and this ranks in the 13th percentile. At 10/mile total, this is well below the 150+/mile we would like to see and what was present in 2014. With so few fish, size structure is irrelevant, but what we would like to see is a PSD6 = 40-60%. Netting survey reaffirmed the lack of bluegills with 0.6/net night compared to 20.2/net night in 2014. The deep cold characteristics of Long Lake combined with little nearshore vegetation have negative effects on bluegill growth. Growth has always been slow and likely will continue.
- Black crappie abundance was down from 3.3/net night (50th percentile) in 2014 to 0.1/net night (7th percentile) in 2019 fyke netting survey. Interesting enough is the 2019 numbers are the same as the 2009 survey. Black Crappies are known as a cyclical species and their populations fluctuate greatly on an annual basis. Only 1 crappie was sampled during the electrofishing survey. Low numbers of black crappies are stocked periodically by the local fishing club, but lack of nearshore habitat is of major concern for crappies along with all our panfish species.
- Yellow perch numbers on the other hand are way up with an increase of 7+ fold from the 2014 survey. These numbers were made up of a couple young year classes of fish less than 7 inches. There were 127 sampled in 2019 compared to 15 in 2014 and 12 in 2009 netting surveys. Size structure was poor with only 2.4% of fish $\geq$ 8 inches, but with new spawning habitat via tree drops/fish sticks, the fishery shows some promise. Yellow perch are also periodically stocked by our local fishing club and the most recent stocking was 2019 after our survey was completed. Metrics to shoot for would be 5-15/net night and a PSD8 = 40-60%
- Rock bass make up a good portion of the fishery on Long Lake. There were 34 caught in 2019 netting surveys, but there were 1,320 sampled in the 2014 netting survey. These numbers have also fluctuated greatly over the years of surveys and rock bass have been in the top 3 in abundance combined with panfish in each year. Size structure and abundance were low-moderate compared to other lakes in the state. There is no season, size or bag limit on them and they are not bad to eat.
- The reduced bag limit of 10 panfish went into effect on Long Lake April 1,2020 could not have come at a better time to help bolster the panfish fishery in Long Lake.

Other Management Objectives

- Continue to work with the local fishing club to identify lakeshore property owners that would be interested in doing some kind of nearshore habitat work.
- Long Lake is on a 5 year rotation and will be up for another comprehensive survey in 2024.