

# 2018 Spring Netting (SNI and SNII) Summary Report

**Shawano Lake** (WBIC 322800) and **Washington Lake** (WBIC 323700)

Shawano County



## Introduction and Survey Objectives

In 2018, the Department of Natural Resources conducted a fyke netting survey of Shawano Lake and Washington Lake in order to provide insight and direction for the future fisheries management of the water body. Primary sampling objectives of this survey 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 that lake.

Combined Acres: 6,290      Combined Shoreline Miles: 19.78      Combined Maximum Depth (feet): 42  
 Lake Type: Both = Drainage      Public Access: 7 Public Boat Launches  
 Regulations for both waterbodies: Walleye (Bag limit of 3, 18" minimum) All other species Statewide Default Regulations.

## WISCONSIN DNR CONTACT INFO.

**Jason Breeggemann—Fisheries Biologist**  
**Elliot Hoffman - Fisheries Technician**  
 Wisconsin Department of Natural Resources  
 647 Lakeland Rd.  
 Shawano, WI 54166

Jason Breeggemann: 920-420-4619;  
 jason.breeggemann@wisconsin.gov

Elliot Hoffman: 920-420-9581;  
 elliot.hoffman@wisconsin.gov

## Survey Information

Site Location	Survey Dates	Water Temperature (°F)	Target Species	Gear	Number of Nets	Net Nights
Shawano Lake and Washington Lake	5/1/2018 - 5/12/2018	45 - 62	All	Fyke Net	18	94

## Survey Method

- Shawano Lake and Washington Lake were sampled according to spring netting (SNI and SNII) protocols as outlined in the statewide lake assessment protocol. The primary objective for this sampling period is to count and measure adult walleye and muskellunge. However, this survey can also be used to target adult northern pike. Other gamefish and 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 walleye and muskellunge. All captured fish were identified to species and gamefish and panfish measured for length. All newly captured walleye were given a partial fin clip (top caudal fin). All walleye were weighed and age structures (i.e., otoliths, fin rays, and spines) were collected from a subsample of bluegill, black crappie, and walleye for age and growth analysis. All muskellunge were given a passive integrated transponder (PIT) tag.
- 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.



## 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 walleye that were captured in fyke nets during the peak of the walleye spawn were given a partial caudal fin (i.e., tail fin) clip and released. Once the walleye spawn was winding down, a night time electrofishing survey was conducted to recapture walleyes marked during the fyke netting survey. The total number marked during fyke netting, the total number of walleyes captured in the electrofishing survey, and the number of marked walleyes captured in the electrofishing survey were used to estimate the abundance of walleyes.

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).

## Relative Abundance

Species	2018 Total Number Captured	CPUE (number per net night)					2018 Statewide Percentile Rank	2018 Abundance Rating
		Historical Median	2006	2010	2014	2018		
Black Bullhead	22	0.2	0.2	0.3	0.1	0.2	-	-
Black Crappie	1618	11.8	5.5	6.4	45.7	17.2	84th	Moderate - High
Bluegill	2512	22.2	21.8	14.6	22.5	26.7	71st	Moderate - High
Bowfin	116	0.9	1.0	0.8	0.4	1.2	-	-
Brown Bullhead	348	3.7	4.9	3.7	1.4	3.7	-	-
Common Carp	6	0.2	0.3	0.5	0.1	0.1	-	-
Lake Chubsucker	110	0.7	0.3	0.4	0.9	1.2	-	-
Largemouth Bass	171	2.0	2.2	2.4	0.8	1.8	86th	Moderate - High
Longnose Gar	42	0.1	0.0	0.1	0.0	0.5	-	-
Muskellunge	34	0.4	0.2	0.4	0.9	0.4	54th	Moderate
Northern Pike	112	1.4	1.4	1.3	4.1	1.2	44th	Moderate
Pumpkinseed	720	4.3	3.0	1.2	5.7	7.7	84th	Moderate - High
Rock Bass	326	1.9	2.0	1.8	1.5	3.5	-	-
Walleye	572	6.2	32.7	6.2	4.7	6.1	68th	Moderate - High
White Sucker	5	0.1	0.6	0.1	0.1	0.1	-	-
Yellow Bullhead	1197	4.9	3.7	6.1	3.0	12.7	-	-
Yellow Perch	20	0.2	0.6	0.2	0.2	0.2	18th	Low

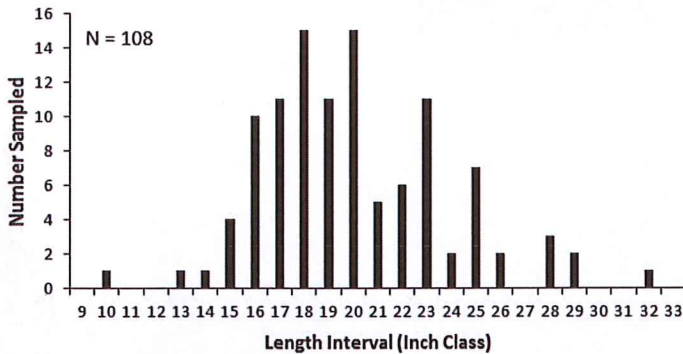


Gamefish Summary  
Shawano County

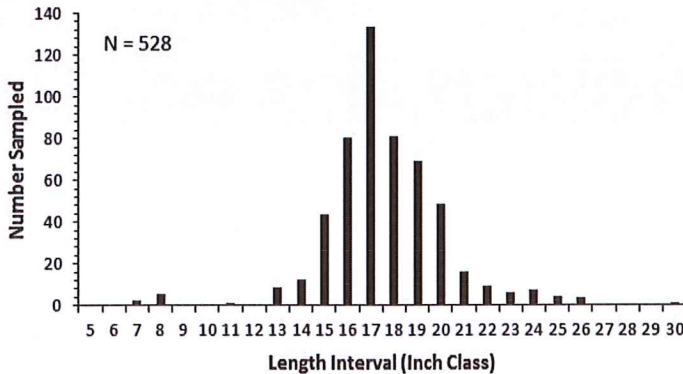
Size Structure Metrics

Species	Total	Average Length (inches)	Length Range (inches)	Stock and Quality Size (inches)	Stock Number	Quality Number	PSD	Percentile Rank	Size Rating
Northern Pike	108	20.6	10.8 - 32.6	14.0 and 21.0	106	39	37	44th	Moderate
Largemouth Bass	166	14.4	5.9 - 19.3	8.0 and 12.0	162	151	93	85th	Moderate - High
Muskellunge	32	37.7	18.8 - 47.6	30.0 and 34.0	29	21	72	55th	Moderate
Walleye	528	18.2	7.5 - 30.3	10.0 and 15.0	521	500	96	84th	Moderate - High

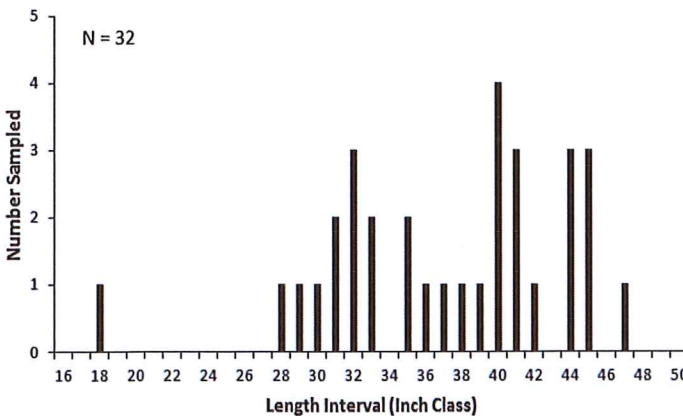
Northern Pike Length Distribution



Walleye Length Distribution



Muskellunge Length Distribution



Size Structure (PSD) Trends

Species	Historical Median (2006-Present)	PSD by Year			
		2006	2010	2014	2018
Northern Pike	32	29	17	34	37
Largemouth Bass	93	93	94	90	93
Muskellunge	74	53	76	76	72
Walleye	98	97	99	98	96

Total Adult Abundance (Mark and Recapture Population Estimate)

Species	Number Marked (Netting)	Number Captured (Electrofishing)	Number Recaptures (Electrofishing)	Population Estimate (95% CI)	Number per Acre	Abundance Rating
Walleye	468	38	4	3,657 (1,753 - 8,632)	0.58 (0.27 - 1.37)	Low

Gamefish Summary

Walleye

- Walleye CPUE and population estimates have increased since the last comprehensive survey conducted in 2014. However, population densities still remain relatively low at just over 0.5 adult walleyes per acre.
- Walleye size structure metrics showed a population primarily comprised of larger individuals. However, walleye PSD values have decreased slightly from the 2014 survey and the average size of walleyes captured decreased by nearly 2 inches from the 2014 survey as well, indicating more small walleyes in the population. This is likely the result of extensive stocking efforts by both the WDNR and Walleyes for Tomorrow with these stocked fish finally reaching maturity and recruiting to the fishery.

Muskellunge

- Results from the 2018 fyke netting survey showed a low - moderate density of muskellunge with optimal size structure.
- Shawano Lake is meeting its management objective of being a Class A1 musky fishery. This classification means that it is managed as a "trophy water" with lower densities and high growth potential.

Northern Pike

- Northern pike were captured in moderate densities in the 2018 fyke netting survey. Northern pike catch rates have declined since the 2014 survey, but are very similar to catch rates in 2006 and 2010. It is known that a significant number of the northern pike spawn in the Shawano Lake Outlet Channel, which was not surveyed in 2018. Therefore, catch rates in the 2018 survey may not be representative of the entire northern pike population.
- Northern pike size structure was found at moderate levels and PSD values in 2018 were the highest of any of the previous four fyke netting surveys meaning size structure has continued to trend upward.

Largemouth Bass

- Largemouth bass were captured in moderate - high densities with good size structure. However, electrofishing is a more preferred gear for evaluating the largemouth bass population. A spring electrofishing survey was also conducted in 2018. Results from that survey can be found on a separate report.

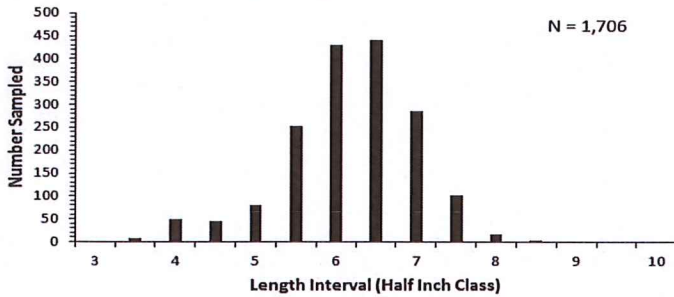


Panfish Summary  
Shawano County

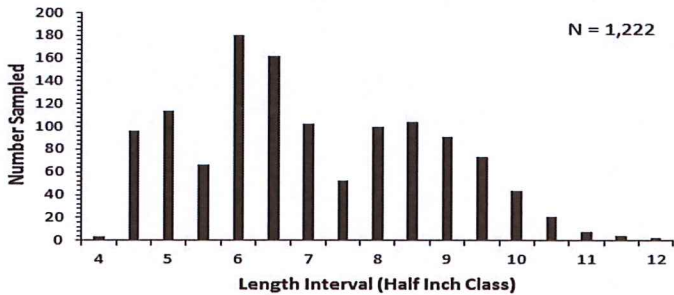
Size Structure Metrics

Species	Number Measured	Average Length (inches)	Length Range (inches)	Stock and Quality Sizes (inches)	Stock Number	Quality Number	PSD	Percentile Rank	Size Rating
Bluegill	1,706	6.4	3.6 - 8.5	3.0 and 6.0 inches	1,706	1,274	75	73rd	Moderate - High
Black Crappie	1,222	7.3	4.1 - 12.4	5.0 and 8.0 inches	1,123	447	40	33rd	Low - Moderate
Pumpkinseed	648	6.4	3.8 - 8.3	3.0 and 6.0 inches	648	459	71	85th	Moderate - High
Yellow Perch	20	6.5	5.6 - 9.7	5.0 and 8.0 inches	20	2	10	40th	Moderate

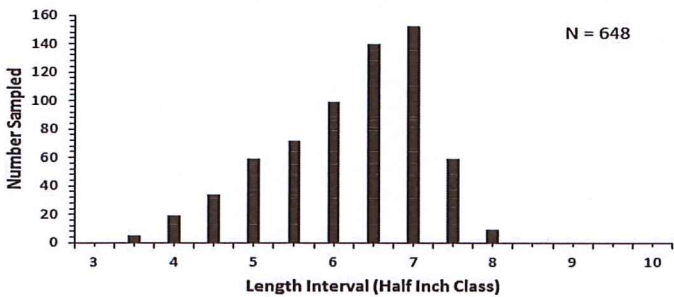
Bluegill Length Distribution



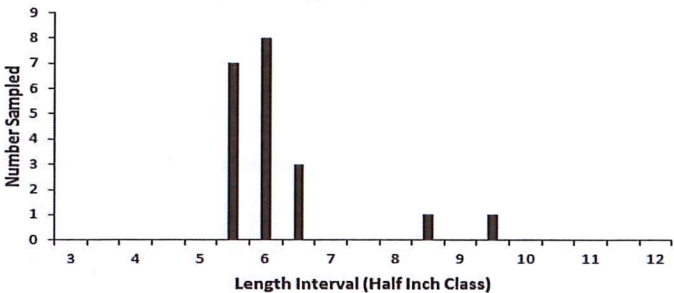
Black Crappie Length Distribution



Pumpkinseed Length Distribution



Yellow Perch Length Distribution



Size Structure (PSD) Trends

Species	Historical Median (2006 - Present)	PSD by Year			
		2006	2010	2014	2018
Bluegill	68	64	72	46	75
Black Crappie	51	64	62	20	40
Pumpkinseed	66	71	61	31	71
Yellow Perch	48	78	89	17	10

Growth Metrics

Species	Total	Length Bin (inches)	Mean Age	Age Range	Percentile Rank	Growth Rating
Bluegill	22	5.50 - 6.49	5.9	5 - 7	15	Slow
Bluegill	18	6.50 - 7.49	6.9	6 - 11	11	Slow
Black Crappie	20	7.50 - 8.49	5.2	3 - 8	10	Slow
Black Crappie	23	8.50 - 9.49	5.9	4 - 7	20	Slow
Black Crappie	24	9.50 - 10.49	6.3	4 - 9	23	Slow

Panfish Summary

Bluegill

- Bluegill were captured in moderate to high densities and size structure showed that a high percentage of the bluegill captured were  $\geq 6.0$  inches. However, only 24% of the bluegill captured were  $\geq 7.0$  inches and 1% was  $\geq 8.0$  inches.
- Bluegill growth rates are slow in Shawano and Washington Lakes compared to statewide growth data.
- Moderate to high densities of bluegill resulting in slower growth combined with intense angler pressure and harvest removing the largest individuals are likely driving the observed trends in the bluegill population.

Black Crappie

- Black crappie were also captured in moderate - high densities in the 2018 fyke netting survey.
- Black crappie size structure has increased from the 2014 survey but the population is still dominated by smaller individuals.
- Black crappie growth was slow, likely driven by high densities. Catch rates in the 2014 survey were nearly three times as high as the 2018 survey, meaning black crappie densities have been high for the last 5+ years.
- One or two strong younger year classes combined with slow growth are driving the observed trends in the black crappie fishery.

Pumpkinseed

- Pumpkinseed were also captured in moderate - high densities and showed the best size structure of any of the panfish species with 34% of the pumpkinseed captured being  $\geq 7.0$  inches.

Yellow Perch

- Few yellow perch that were primarily too small to be desired by anglers were captured in the spring fyke netting survey. However, fyke netting is not the preferred gear for evaluating the yellow perch fishery. Angler reports suggest that yellow perch fishing has been good for the past few years in Shawano Lake and Washington Lake.

Stocking History and Management Options

Shawano County



Stocking History 1972 - Present

Species	Year	Age	Source	Mean Length (inches)	Number Stocked
Walleye	2018	Fry	Private - WFT	0.75	4,448,000
Muskellunge	2018	Large Fingerling	DNR	11.7	2,246
Walleye	2017	Fry	Private - WFT	0.75	5,196,000
Walleye	2017	Large Fingerling	DNR	7.75	31,141
Walleye	2016	Fry	Private - WFT	0.75	5,378,000
Northern Pike	2016	Large Fingerling	DNR	8.6	5,524
Walleye	2015	Fry	Private - WFT	0.75	4,907,000
Walleye	2015	Large Fingerling	DNR	7.7	33,358
Walleye	2014	Fry	Private - WFT	0.2	2,550,000
Walleye	2013	Fry	Private - WFT	0.3	500,062
Walleye	2013	Large Fingerling	DNR	5.6	22,308
Muskellunge	2013	Large Fingerling	DNR	9.7	2,000
Walleye	2012	Fry	Private - WFT	0.3	1,169,000
Walleye	2011	Large Fingerling	DNR	5.6	2,987
Walleye	2011	Large Fingerling	DNR	7.3	6,778
Muskellunge	2011	Large Fingerling	DNR	9.4	1,495
Muskellunge	2009	Yearling	Private - Figure 8	13.5	583
Muskellunge	2009	Large Fingerling	DNR	10.6	2,499
Muskellunge	2008	Large Fingerling	Private - Figure 8	17.0	470
Muskellunge	2007	Large Fingerling	DNR	13.0	1,667
Muskellunge	2007	Large Fingerling	Private - Figure 8	15.0	1,000
Muskellunge	2006	Large Fingerling	Private - Figure 8	15.5	290
Muskellunge	2005	Large Fingerling	DNR	10.6	2,494
Muskellunge	2003	Large Fingerling	DNR	10.9	2,496
Muskellunge	2002	Large Fingerling	DNR	10.6	6,059
Muskellunge	2001	Large Fingerling	DNR	10.7	6,063
Muskellunge	1997	Large Fingerling	DNR	11.2	2,500
Muskellunge	1995	Fingerling	DNR	8.8	1,590
Muskellunge	1993	Fingerling	DNR	10.8	2,400
Muskellunge	1974	Fingerling	DNR	5.0	500
Muskellunge	1973	Fingerling	DNR	11.0	500

Management Options

Walleye

- Continue to stock 30,000+ large fingerling walleyes every other year and work with Walleyes for Tomorrow to stock 4 - 6 million fry every spring from their wall-eye wagon.
- Ideally, future stockings will result in a population estimate of approximately 2 walleyes per acre.
- The 18 inch minimum length limit and daily bag limit of 3 will protect small walleyes from harvest and should enhance the quality of the walleye fishery in the future.
- The spring 2018 walleye run happened very quickly due to the prolonged winter and rapid spring warm up. The WDNR is planning to work with Walleyes for Tomorrow to conduct an additional walleye population estimate in 2019 when weather conditions will hopefully allow for longer marking period and better recaptures in the electrofishing survey.



Northern Pike

- Maintain a moderate density northern pike fishery with quality size structure. Keeping adequate predators numbers will help keep panfish from experiencing density dependent stunting and improve panfish growth.
- It is known that a majority of the northern pike spawn in the Shawano Lake Outlet Channel prior to the ice melting on most of Shawano Lake. A netting survey is planned for the Shawano Lake Outlet during the next comprehensive survey in 2022.

Muskellunge

- Continue to maintain a low density, trophy muskellunge fishery.
- Muskellunge stocking was suspended for five years starting in 2013. Stocking muskellunge at a low density (i.e., 2,500 every other year) should resume in order to maintain the current muskellunge fishery and meet management objectives for this species in the future.
- Another spring fyke netting survey will be conducted in 2019 to serve as the recapture survey for a muskellunge population estimate.

Largemouth Bass

- Electrofishing is a more preferred gear for evaluating the largemouth bass population. A spring electrofishing survey was also conducted in 2018. Results from that survey can be found on a separate report.

Panfish

- Bluegill, pumpkinseed, and black crappies were all captured in moderate - high densities and growth rates showed the bluegill and black crappie were growing slowly.
- Consider a special regulation to lower harvest of adult bluegill. Having more large bluegill in the population will improve the quality of the fishery and may prevent bluegill from maturing at smaller sizes, potentially resulting in increased bluegill growth rates.
- Maintain or increase predator densities to prevent panfish densities from increasing and experiencing additional density dependent competition.

Other Management Objectives

- Continue to work with WDNR staff and local lake management organizations to manage aquatic plants as needed. High densities of invasive plants often inhibit the ability of predators to effectively forage resulting in slow growing predator populations. Additionally prey fish (e.g., bluegill) populations can become overabundant and slow growing when predators cannot effectively forage on them.
- Shawano Lake and Washington Lake are on a 4 year rotation with the next comprehensive survey scheduled for 2022.





# 2018 Spring Electrofishing (SEII) Summary Report

**Shawano Lake** (WBIC 322800) and **Washington Lake** (WBIC 323700)

Shawano County

## Introduction and Survey Objectives

In 2018, the Department of Natural Resources conducted a one night electrofishing survey of Shawano and Washington Lakes in order to provide insight and direction for the future fisheries management of these water bodies. 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 for Shawano Lake and Washington Lake.

Combined Acres: 6,290      Combined Shoreline Miles: 19.78      Combined Maximum Depth (feet): 42  
 Lake Type: Both = Drainage      Public Access: 7 Public Boat Launches  
 Regulations for both waterbodies: Walleye (Bag limit of 3, 18" minimum) All other species Statewide Default Regulations.

## WISCONSIN DNR CONTACT INFO.

**Jason Breeggemann - Fisheries Biologist**  
**Elliot Hoffman - Fisheries Technician**  
 Wisconsin Dept. of Natural Resources  
 647 Lakeland Rd.  
 Shawano, WI 54166

Jason Breeggemann: 920-420-4619  
 jason.breeggemann@wisconsin.gov

Elliot Hoffman: 920-420-9581  
 elliot.hoffman@wisconsin.gov

## Survey Information

Site Location	Survey Date	Water Temperature (°F)	Target Species	Total Miles Shocked	Number of Stations	Gear	Number of Netters
Shawano Lake and Washington Lake	5/22/2018	68	All	8	8	2x Boomshocker	4

## Survey Method

- Shawano Lake and Washington Lake were 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 largemouth bass and panfish. Other gamefish and panfish may be sampled but are considered by-catch as part of this survey.
- Eight miles were electrofished. All fish captured were identified to species and gamefish and panfish were measured for length.
- Fish metrics used to describe fish populations include proportional stock density, catch per unit effort, length frequency distributions, and mean ages at lengths.



## Fish Metric Descriptions

### PSD, CPUE, LFD, and Mean Age at Length

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.

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., 13.5 - 14.4 inches for largemouth bass). 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).

## 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
Black Crappie	6	7.9	5.9 - 10.4	5.0 and 8.0	6	2	33	50th	Moderate
Bluegill	180	4.8	2.6 - 7.8	3.0 and 6.0	170	35	21	40th	Moderate
Largemouth Bass	105	12.2	6.6 - 19.8	8.0 and 12.0	100	52	52	48th	Moderate
Pumpkinseed	65	5.5	2.9 - 8.2	3.0 and 6.0	64	26	41	68th	Moderate
Yellow Perch	56	5.3	3.5 - 8.5	5.0 and 8.0	28	3	11	65th	Moderate

## Abundance Metrics

Species	CPUE Total (No. per mile)	Percentile Rank	Overall Abundance Rating	Length Index	Length Index CPUE	Length Index Percentile Rank	Length Index Abundance Rating
Black Crappie	3.0	33rd	Low - Moderate	≥ 8.0 inches	1.0	33rd	Low - Moderate
Bluegill	90.0	51st	Moderate	≥ 7.0 inches	2.5	36th	Low - Moderate
Largemouth Bass	13.1	49th	Moderate	≥ 14.0 inches	3.9	60th	Moderate
Pumpkinseed	32.5	87th	Moderate - High	≥ 7.0 inches	2.5	81st	Moderate - High
Yellow Perch	28.0	77th	Moderate - High	≥ 8.0 inches	1.5	79th	Moderate - High

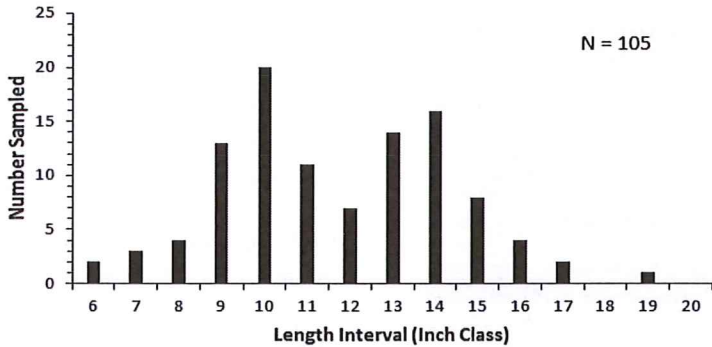


# 2018 Spring Electrofishing (SEII) Summary Report

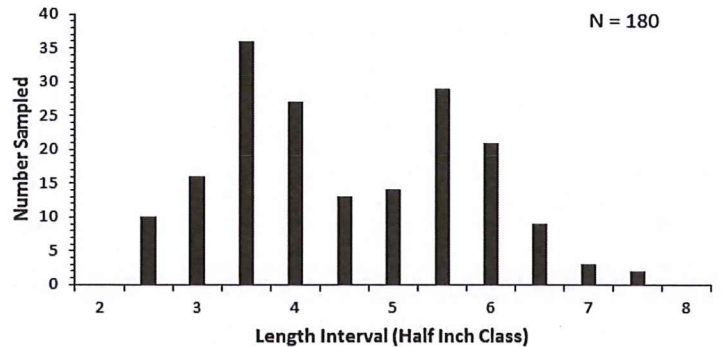
Shawano Lake (WBIC 322800) and Washington Lake (WBIC 323700)

Shawano County

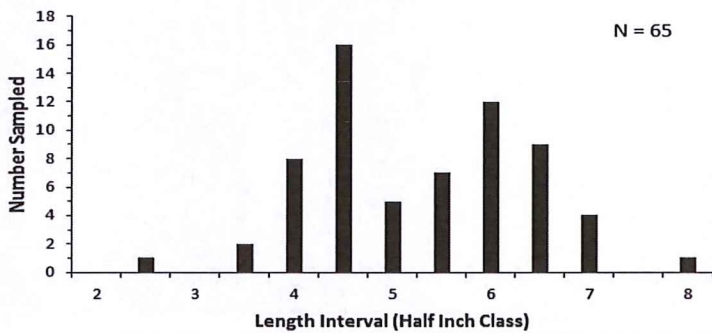
**Largemouth Bass Length Distribution**



**Bluegill Length Distribution**



**Pumpkinseed Length Distribution**



**Abundance (CPUE) Trends**

Species	Historical Median (2006 - 2018)	CPUE (No. per mile)			
		2006	2010	2014	2018
Black Crappie	5.0	35.3	7.0	0.5	3.0
Bluegill	97.8	134.7	81.5	105.5	90.0
Largemouth Bass	17.9	40.7	20.8	15.1	13.1
Pumpkinseed	28.75	22.0	27.0	30.5	32.5
Yellow Perch	20.9	17.3	10.5	24.5	28.0

**Size Structure (PSD) Trends**

Species	Stock and Quality Size (Inches)	Historical Median (2006 - 2018)	2006	2010	2014	2018
Black Crappie	5.0 and 8.0	31	69	29	0	33
Bluegill	3.0 and 6.0	32	33	30	36	21
Largemouth Bass	8.0 and 12.0	69	88	72	67	52
Pumpkinseed	3.0 and 6.0	61	64	57	67	41
Yellow Perch	5.0 and 8.0	5	33	0	0	11

**Growth Metrics - 2018**

Species	Total	Length Bin	Mean Age and Range	Percentile Rank	Growth Rating
Largemouth Bass	4	11.50 - 12.49	3.8 (3 - 5)	80th	Fast
Largemouth Bass	10	13.50 - 14.49	5.9 (5 - 6)	91st	Fast

## Summary

- A total of 522 fish from 14 different species were captured in the electrofishing survey. The most frequently encountered and common species were bluegill (180), largemouth bass (105), pumpkinseed (65), and yellow perch (56).
- Other species sampled in lower abundance include brown bullhead (30), yellow bullhead (24), walleye (18), rock bass (13), lake chubsucker (11), black crappie (6), golden shiner (6), northern pike (5), common carp (2), and bowfin (1).
- One invasive species (common carp) and one species of greatest conservation need (lake chubsucker) were captured in our survey.
- Largemouth bass were the dominant gamefish captured in our survey. Although largemouth bass densities have been declining over the last 15 years, densities were still found at moderate levels. Largemouth bass size structure was also found at moderate levels with a PSD of 52 and just under 4 largemouth bass  $\geq 14.0$  inches captured per mile of electrofishing. Largemouth bass growth rates were fast, likely driven by the abundant forage available in the lake.
- Bluegill, pumpkinseed, and yellow perch were the dominant panfish species captured in our survey. Densities of all three species were moderate to moderate-high. Bluegill PSD in 2018 was the lowest it had been in the last 15 years. A bluegill PSD of 21 indicates a population dominated by smaller individuals and only 2.5 bluegills  $\geq 7.0$  inches were captured per mile of electrofishing. Pumpkinseeds showed a little better size structure with a PSD of 41 and 2.5 pumpkinseed  $\geq 7.0$  inches captured per mile of electrofishing. Good numbers of yellow perch were captured, including some harvestable size fish. It is difficult to draw conclusions regarding the yellow perch fishery because spring electrofishing is not the optimal gear to sample this species.

## Management Options

This survey was primarily intended to assess largemouth bass and panfish populations. Other species are captured but different survey techniques are typically used to better assess their population metrics. Therefore, management recommendations are focused on bass and panfish.

### Largemouth Bass

- Largemouth bass were found at optimal levels in Shawano Lake and Washington Lake. Densities and size structure were moderate, growth rates were fast, and largemouth bass PSD showed a balanced population.
- No management actions recommended at this time.

### Panfish

- Bluegill, pumpkinseed, and yellow perch were all captured in moderate to high densities and size structure was moderate at best for these three species. Slower growth observed from bluegill and black crappie captured in the spring fyke netting survey combined with intense fishing pressure are likely driving the observed trends in size structure.
- Maintain or increase predator densities to prevent panfish numbers from increasing, resulting in additional competition for resources.
- Consider a regulation change to reduce angler harvest and increase the number of quality sized fish panfish in the population.

### Other Management Objectives

- Continue to work with WDNR staff and local management organizations to manage invasive aquatic plants as needed. High densities of invasive plants can inhibit the ability of predators to forage resulting in slow growing predator populations and overabundant, stunted panfish populations.