



2021 COMPREHENSIVE SURVEY REPORT

WATER: PATTEN LAKE

COUNTY: FLORENCE

INTRODUCTION AND SURVEY OBJECTIVES

The Wisconsin Department of Natural Resources conducted a comprehensive survey of Patten Lake, Florence County, to analyze the health of its fishery. A comprehensive survey includes surveys designed to assess abundance, size structure and recruitment of all the major fish populations within the lake; for species specific survey details see the table below. The summary that follows will detail the current fishery, as well as the changes observed in this fishery after a major walleye rehabilitation project conducted in 2011. Patten Lake is located approximately 6 miles Southwest of Florence off of HWY 101, with boat access to Patten Lake off of North Shore Road.

Acres: 255
Lake Type: Drainage

Shoreline Miles: 3.8
Public Access: Florence County Boat Landing (Daily/Seasonal Fee)

Maximum Depth (feet): 52

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Table 1. Summary of all surveys conducted during 2021

SURVEY INFORMATION

Species	Survey Date(s)	Gear Used	Effort	Water Temp. (°F)
Walleye, Northern Pike, Yellow Perch, Black Crappie	4/5-4/7/2021	Fyke Net	24 Net-Nights	43-49
Walleye	4/7/2021	Boomshocker	4.4 miles	53
Largemouth and Smallmouth Bass	5/6, 5/11, 5/12, 5/20, 5/26 and 6/1/2021	Boomshocker	25.1 miles	50-66
Bluegill, Pumpkinseed, Rock Bass	6/22-6/25/2021	Fyke Net	24 Net-Nights	65-72
Walleye	10/6/2021	Boomshocker	3.9 miles	66

FISH METRIC DESCRIPTIONS

Population estimate (PE) is estimated by marking a portion of the population, then capturing another sample of fish and using the ratio of new fish : previously marked fish to estimate the number of fish that are in the population.

Catch per unit effort (CPUE) is the number of fish per mile (electrofishing) or per net-night (netting), and is used to index abundance when we are unable to get a PE.

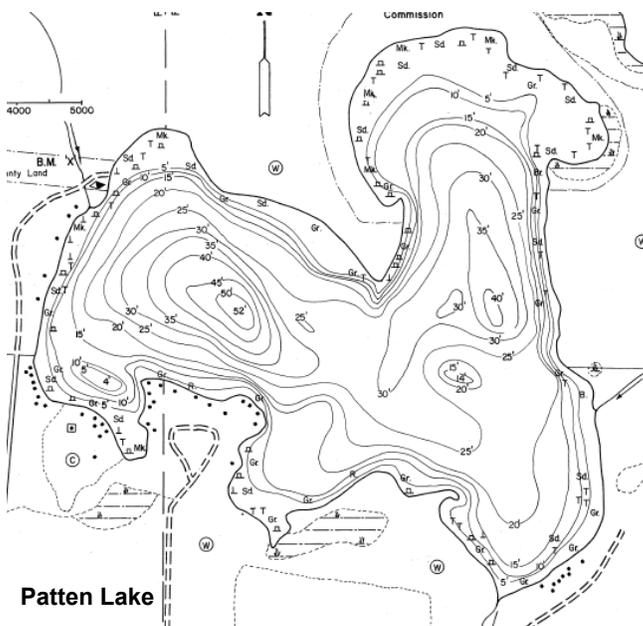
Relative stock density (RSD) is an index used to describe size structure of fish populations. It is calculated by dividing the number of fish larger than a certain length by the number of stock size fish for a given species. Stock size is a length set for each species, and is used to offset potential large year classes of juvenile fish.

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

Mean length at age is used to index growth. Structures are taken from a subsample of fish captured, these structures can be used to estimate the age of that particular fish. The mean length at each age is then used to characterize growth of the entire population.

SURVEY METHODS

- Surveys are designed to evaluate each species when they are particularly vulnerable to our gear.
- Standard fyke nets and electrofishing gear is used to capture fish.
- Data is collected from the target species of each survey to gather population metrics.
- Fish metrics are compared to previous surveys of this water, lakes with similar characteristics, other waters in the area or region, and all waters of the state.
- Data collected is used to monitor the fishery, determine if stocking is necessary, evaluate fishing regulations, and determine how to improve the fishery.



GEAR USED DURING THIS SURVEY

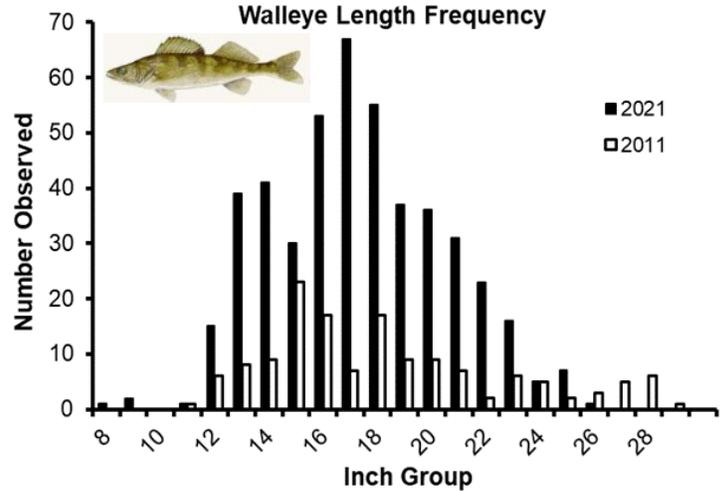
- **Fyke Nets** are set in areas where we anticipate fish to congregate. Fish traveling along the shoreline will be met by a "lead" which is similar to a fence. The lead directs the fish toward the trap end of the net, fish travel through a series of funnels and eventually become trapped. Fish are then removed from the net and placed in holding tanks to gather data before being returned to the lake.
- **Boomshocker** is a specially designed boat that creates an electric current in the water immediately in front of the boat. The boat is driven along the shoreline and shallow areas of the lake, when the boat encounters fish they are momentarily stunned. Once the fish is stunned they can be netted out of the lake and placed in a holding tank. After data is collected the fish are returned to the lake.



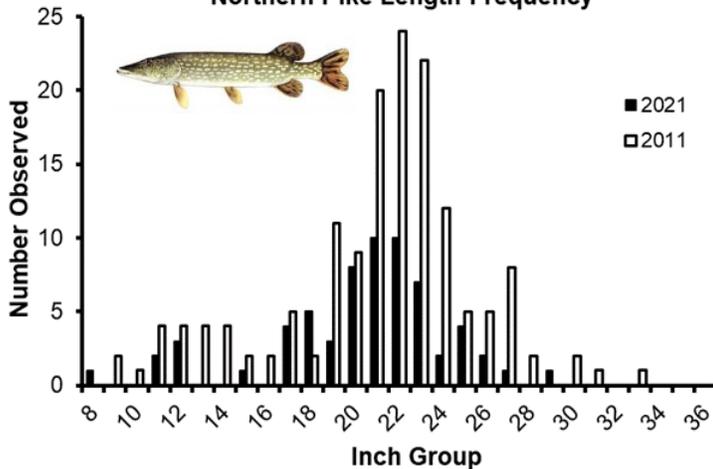
WALLEYE

A mark-recapture survey was conducted to estimate the abundance of adult Walleye in Patten Lake. Over a three day period in April a total of 460 different Walleye were captured during fyke net and electrofishing surveys. Based on our survey data we estimate the adult Walleye population in Patten Lake to be approximately 763 fish (2.99/acre), which has now hit the lower threshold of an abundant population. The Walleye population has more than tripled since 2011 when a Walleye rehabilitation project (large scale Bullhead removal) occurred. This population should continue to grow substantially for a few years because Walleye recruitment has been exceptionally high in recent years.

Every Walleye captured was measured to assess the size structure of the population. Size structure of Walleye in Patten Lake is very good with approximately 79% being ≥ 15 inches, and 26% ≥ 20 inches. At the time of this survey 23% of the fish were within the 20-24" protected slot, making a total of 55.4% of the Walleye captured during this survey available for harvest.



Northern Pike Length Frequency



NORTHERN PIKE

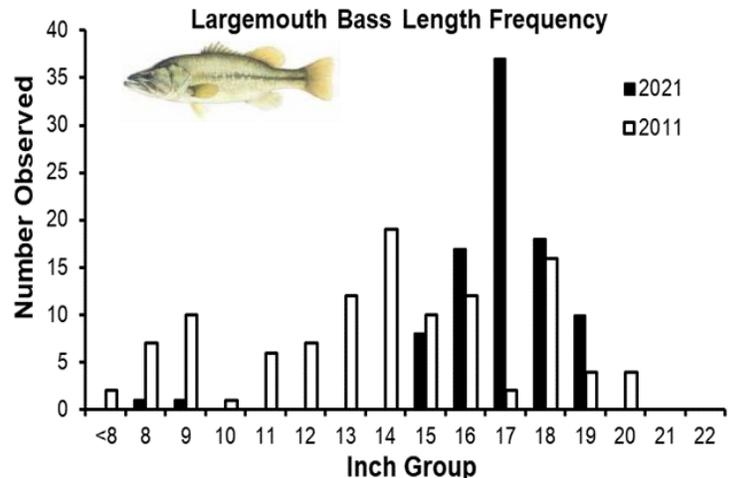
During 2011, before the Walleye rehabilitation project, Patten Lake had the most abundant Northern Pike population in Florence County at approximately 6.7 adult Northern Pike per acre. We assessed the Northern Pike population in 2016, 5 years after the bullhead removal, and we were surprised to see that the abundance of adult Pike had declined approximately 45% to 3.7 adults/acre. This years data shows that Pike abundance has declined to a point where we could not capture enough fish to estimate the adult population. The current population has a relative abundance of 2.6 Northern Pike/net-night, well below the area average of 4.4/net-night.

Every Northern Pike captured during this year's early spring survey was measured to assess size structure. The size structure of Northern Pike has decreased since 2011. During 2021, approximately 63.8% of the Northern Pike greater than 14 inches were ≥ 21 inches and 1.7% were ≥ 28 inches, compared to 74% and 4.4% during 2011. The current size structure is well below the area average, but would be expected to increase if abundance stays low.

LARGEMOUTH BASS

During 2011, before the Walleye rehabilitation project, and this year, 10 years after, the Largemouth Bass population was assessed the same way. All Largemouth Bass captured during spring fyke net surveys and numerous electrofishing surveys targeting Bass received an identifiable fin clip to estimate the abundance of the Largemouth Bass population (≥ 8.0 inches). After analyzing the data the current Largemouth Bass population is estimated at approximately 175 fish (0.69/acre). This suggests a major reduction (39%) since 2011, when the Largemouth population was estimated at approximately 1.13 fish/acre.

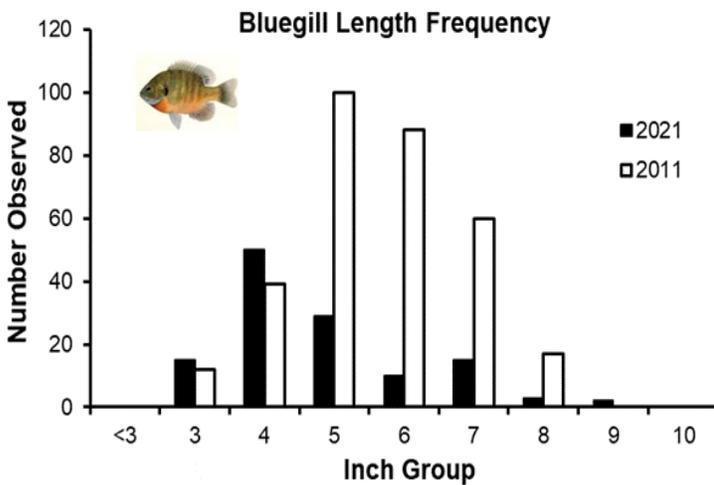
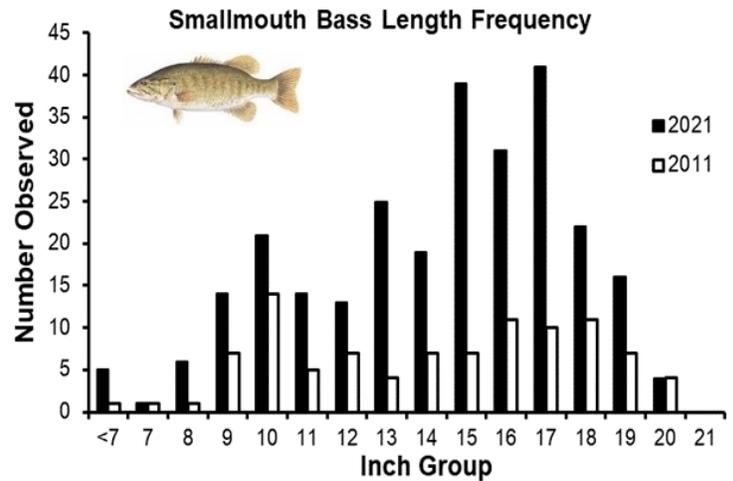
Every Largemouth Bass captured, was measured to assess size structure. The size structure of the Largemouth Bass population in Patten Lake has changed drastically since the 2011 survey. This year, approximately 97.8% of the Largemouth Bass captured were ≥ 15 inches, substantially higher than the 43.6% ≥ 15 inches in 2011. The current size structure is artificially high, and completely unsustainable, it is expected that Largemouth Bass will become nothing more than a background species in Patten Lake in the years to come. This drastic change is undoubtedly caused by the Walleye rehabilitation project which is changing the fishery from a Bluegill / Largemouth Bass / Northern Pike system to a Yellow Perch / Smallmouth Bass / Walleye system.



SMALLMOUTH BASS

The Smallmouth Bass population was assessed during the same surveys conducted for Largemouth Bass. The data from these surveys estimate the Smallmouth Bass population (≥ 8.0 inches) to be approximately 463 fish (1.82/acre). This suggests that the population has doubled since 2011 when the population was estimated at 0.90 Smallmouth Bass/acre.

Every Smallmouth Bass captured was measured to assess size structure. The size structure of the current population is incredibly good, with approximately 64.7% of the fish greater than 7 inches being ≥ 14.0 inches and 31.2% ≥ 17.0 inches. What is even more surprising is how stable the size structure has been, considering all of the drastic changes that have taken place within this fishery over the last 10 years.



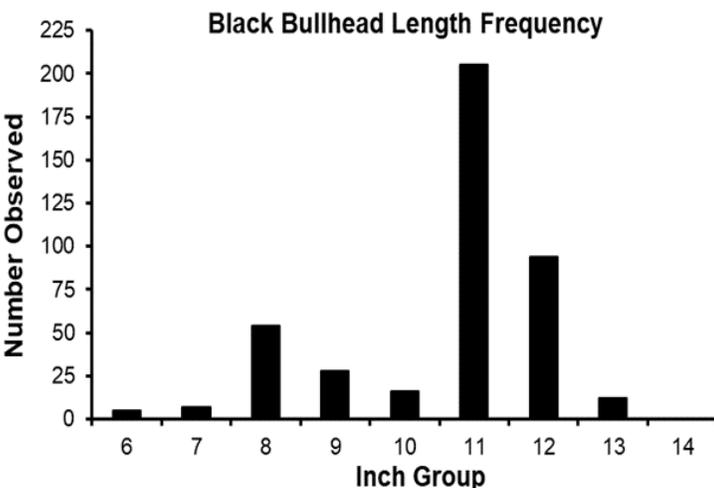
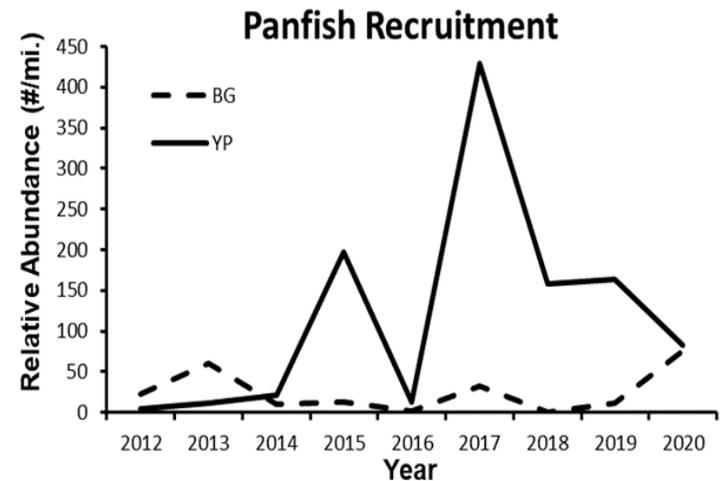
BLUEGILL

We assessed the Bluegill population using the 12 net locations with the highest Bluegill catch during the 2011 survey, each location was fished for 2 days during 2021. Bluegill relative abundance has decreased approximately 92% since 2011, dropping from 67.5 fish/net-night in 2011 to 5.2 fish/net-night in 2021. Like the Northern Pike and Largemouth Bass populations, the decrease in Bluegill abundance can be attributed to the Walleye rehabilitation project. That project will likely result in Yellow Perch becoming the dominant panfish in Patten Lake.

Bluegill size structure has decreased in the past 10 years, with 16.1% of this years catch being ≥ 6 inches and 4.3% ≥ 8 inches, compared to 24.4% and 5.4% in 2011.

YELLOW PERCH

Adult Yellow Perch relative abundance has declined from 3.0/net-night in 2011, to 0.5/net-night in 2016, to the current relative abundance of 0.1/net-night. However, over this same time period Yellow Perch have shown the highest recruitment of all panfish species. At this point we do not know whether our surveys are inaccurately sampling Perch, or if the abundant young Perch are simply being consumed by Walleye and other predators in the system. However, since they have the strongest recruitment, it is likely that they will eventually be the dominant panfish in Patten Lake.



BLACK BULLHEAD

Black Bullhead have been the target of the Walleye rehabilitation project on Patten Lake. It was hypothesized that if we were able to remove the majority of the overabundant Bullhead population that Walleye natural reproduction would increase significantly. Bullhead relative abundance decreased from 55.7/net-night in 2011, to 0.2/net-night in 2016, and then rose to 4.3/net-night during this years spring survey. While this is still a low abundance, and has not slowed down walleye reproduction, we went out of our way to capture and remove as many Bullhead as we could during 2021, a total of 471 fish.

A total of 421 Black Bullhead were measured during this year's removal effort, with 73.9% of them being ≥ 11 inches. During 2011 the largest bullhead measured was 10.4 inches.