2024 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. Comprehensive surveys are designed to assess 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 since a major walleye rehabilitation project that took place in 2011. Patten Lake is located approximately 6 miles Southwest of Florence, with boat access off of North Shore Road.

Acres: 255 | Shoreline Miles: 3.9 | Maximum Depth (feet): 52
Lake Type: Drainage | Public Access: Boat Landing | Lake Class: Complex - Cool - Dark
Regulations: Statewide Regulations

WISCONSIN DNR CONTACT INFO.

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Florence, WI 54121
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Table 1. Summary of all surveys conducted during 2023

SURVEY INFORMATION				
Species	**Survey Date(s)**	**Gear Used**	**Effort**	**Water Temp. (°F)**
Walleye, Northern Pike, Yellow Perch, Black Crappie	3/19-4/9/2024	Fyke Net	113 Net-Nights	35-42
Walleye (Recapture)	4/9/2024	Boomshocker	4.65 miles	43
Smallmouth and Largemouth Bass	5/28/2024	Boomshocker	4.20 miles	62
Bluegill, Pumpkinseed, Lepomis Hybrids, Rock Bass	6/4-6/7/2024	Fyke Net	24 Net-Nights	64-67
Bullhead Removal	6/8-6/14/2024	Fyke Net	54 Net-Nights	66-67
Gamefish Recruitment	10/7/2024	Boomshocker	4.45 miles	57-59

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 to previously marked fish to estimate the number of fish in the population.

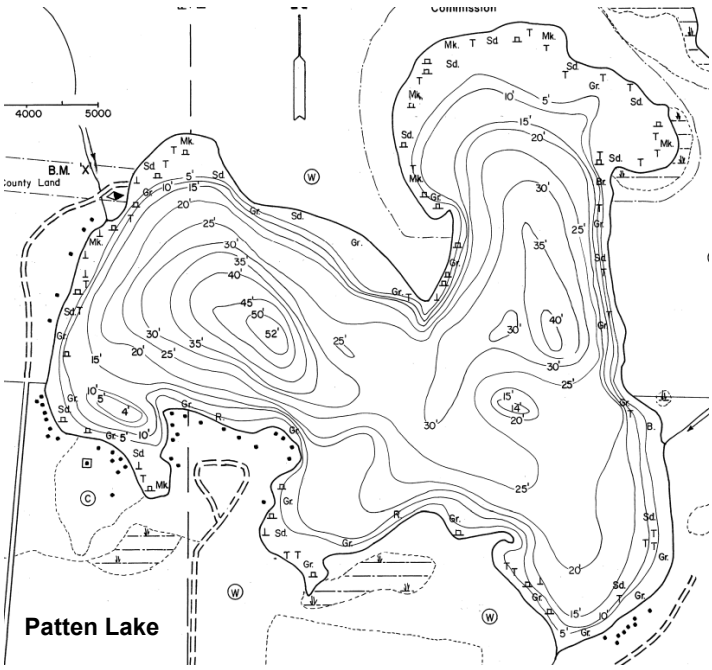
Catch per unit effort (CPUE) is the number of fish per mile (electrofishing) or per net -night (netting) and is used to index abundance when we are unable to get a PE.

Relative stock density (RSD) is an index used to describe the 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.

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 and the mean/median values for waters in this “area” (Florence and Forest Counties).
- 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

Photo Credit: Carl Sundberg

- **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.

Photo Credit: Wisconsin DNR

- **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.

BACKGROUND INFORMATION - WALLEYE

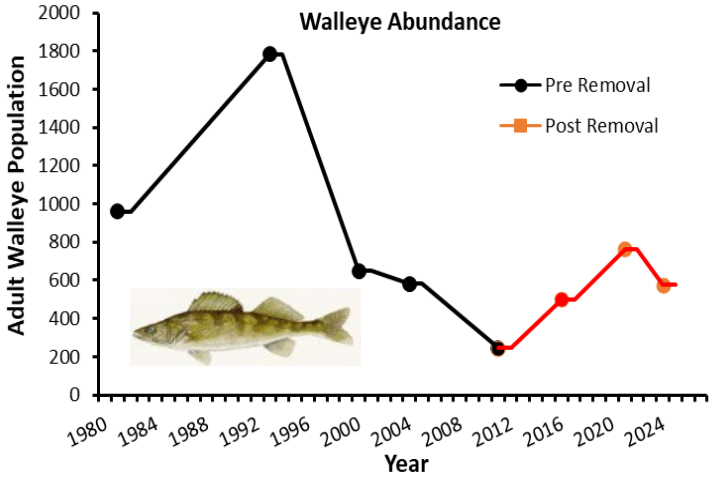
Patten Lake was stocked with walleye on 3 occasions in the mid-to-late 1970s. Walleye began to reproduce as soon as they matured making it one of only a handful of lakes in Florence County that walleye have naturally reproduced in. Walleye abundance continued to increase and became the most abundant walleye population in the area by the 1990's. The 1993 walleye assessment showed a population with very poor size structure, which is typical of high abundance populations. Walleye angling regulation changed in 1997 removing the minimum size limit. The intent of the new regulation was to allow the harvest of overabundant smaller walleye to allow for better growth and size structure. The regulation worked as intended, by reducing abundance and increasing size structure, however, abundance continued to decline to an all-time low of 0.97 adults/acre in 2011. As walleye abundance declined black bullhead abundance increased to an overabundant level. It was hypothesized that black bullhead were having a negative impact on walleye in Patten Lake, leading to a major bullhead removal project in 2011 in an attempt to rehabilitate the walleye population. This survey report will summarize the current Patten Lake fishery, and document changes observed since the walleye rehabilitation project.

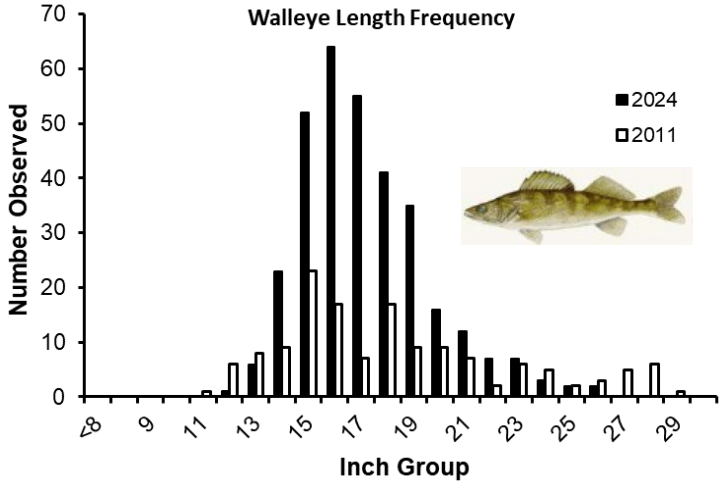
WALLEYE

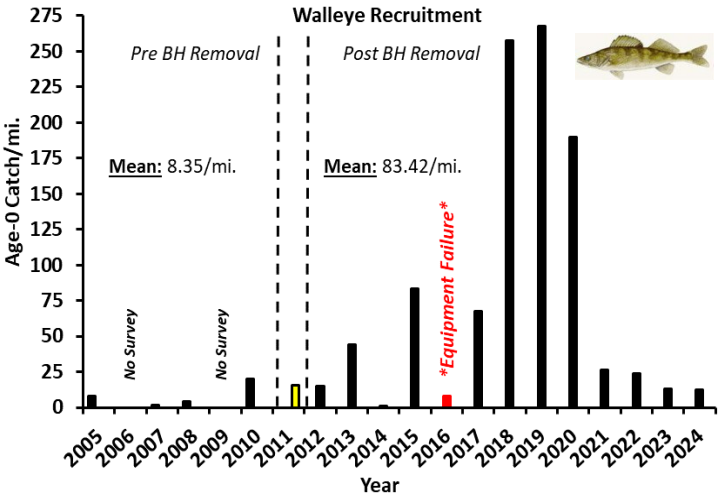
During 2024 a mark-recapture survey was conducted to estimate the abundance of adult walleye in Patten Lake. Ice went out extremely early (3/15), making this population estimate more difficult than normal. Fyke nets were set on 3/18/2024 and cold weather prevented the water from warming forcing staff to run nets until 4/9/2024 to capture enough walleye for a population estimate. During early spring netting we captured a total of 256 walleye (255 adults), which were marked with an identifiable fin clip. On the night of 4/9 we sampled the entire shoreline of Patten Lake capturing 124 adult walleye. 54 of the walleye captured (43.5%) during our recapture survey were marked with the fin clip given during fyke netting efforts. This data estimates the Patten Lake walleye population at 575 adults (2.25/acre). This population estimate ended a trend of increased adult walleye abundance since a major walleye rehabilitation project that took place in 2011. At 2.25 adults/acre, Patten Lake is the 2nd most abundant walleye population in Florence County, and above the average abundance for the area, which is 1.57 adults/acre. However, the population currently falls short of the goal for this water (≥ 3 adults/acre).

All walleye captured during our spring survey, a total of 326 fish, were measured to assess the size structure of the population. The size structure of the Patten Lake walleye population is quite desirable with nearly 91% of the walleye captured being ≥ 15 inches and 15% ≥ 20 inches. Typically as fish become more abundant, growth rates and size structure will decrease. This has been the case with the Patten Lake population, with size structure decreasing over the last 13 years while abundance has increased (Table Below). Patten Lake's walleye population has higher abundance than the area average, which is the main reason size structure is also below the area average of 84.6% and 40.6% ≥ 15 and 20 inches respectively.

Fall electrofishing surveys, which monitor walleye recruitment have been conducted 18 of the last 20 years (Figure Lower Right). During these surveys we capture all walleye and assess recruitment using the number of age-0 walleye captured per mile electrofished. Walleye recruitment in Patten Lake increased approximately 10-fold following the rehabilitation project. We generally consider a catch rate of ≥ 20 age-0 walleye per mile to be a strong year class. Typically, a fishery only needs 1 or 2 strong year classes every 5 years to maintain a healthy walleye population. Patten Lake has had strong year classes of walleye 8 of the last 13 years since the rehabilitation project, which is very consistent walleye recruitment. The 2018-2020 year classes were incredibly strong, most of those fish are now sexually mature and were expected to greatly increase adult abundance during this year's survey. However, it does not appear that these year classes have survived to adulthood in substantial numbers.



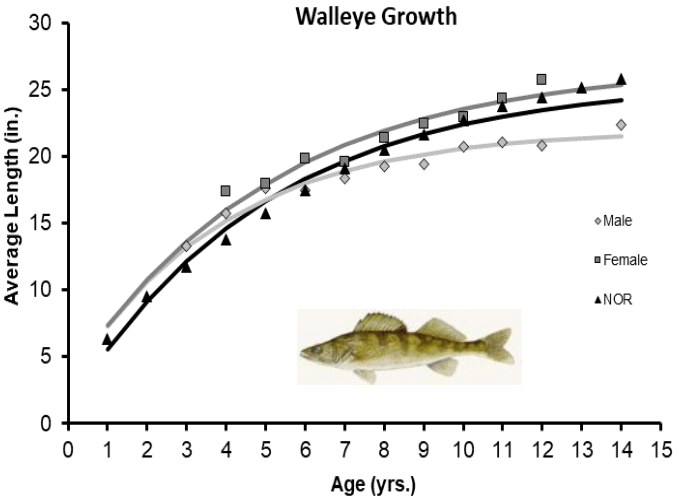


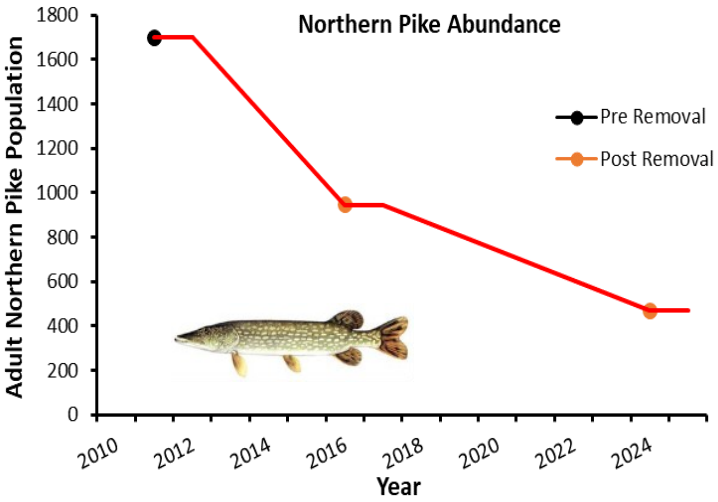


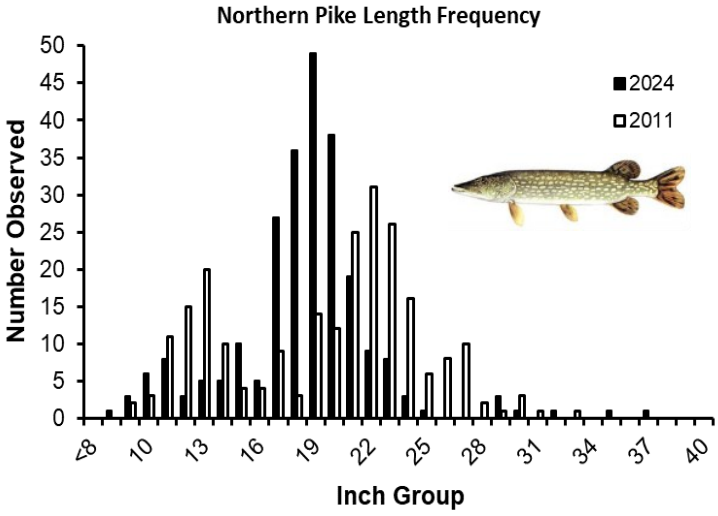
WALLEYE SIZE STRUCTURE - Patten Lake, Florence County, 2011-2024				
	2011	2016	2021	2024
RSD15	84.17	96.60	78.99	90.80
RSD18	51.80	59.86	46.17	38.34
RSD20	33.09	29.93	26.04	15.03
RSD24	15.83	5.78	2.84	2.15
RSD28	4.89	1.69	0.00	0.00
RSD30	0.00	0.00	0.00	0.00

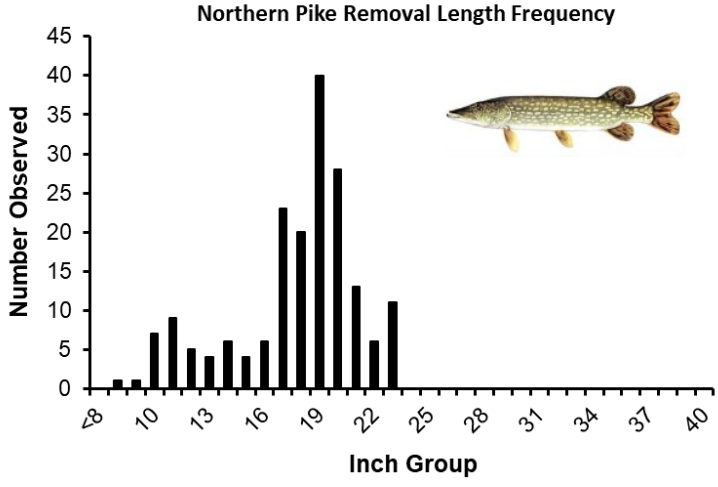
WALLEYE

Age and growth analysis was last conducted in 2021 for Patten Lake. At that time male and female walleye grew faster than the Northern Region of WI average for combined sex walleye to age-5. After age-5 male walleye growth slowed, which is typical of walleye populations.









NORTHERN PIKE

Similar to walleye, northern pike were introduced to Patten Lake in 1998. Northern pike abundance increased quickly and by 2011 northern pike were the most abundant gamefish in Patten Lake. The 2011 adult population estimate of 6.7 adults per acre made the Patten Lake population the most abundant northern pike population in Florence County. After the walleye rehabilitation project in 2011 northern pike abundance began to decline. The early ice-out this year and prolonged spawning period afforded us the opportunity to conduct another mark-recapture population estimate. All northern pike captured from 3/19 to 4/1, a total of 146 fish (142 adults), were given an identifiable fin clip and released back into the lake. Another sample of northern pike was collected from 4/2 to 4/9, a total of 134 fish (133 adults) and inspected for the mark given during the marking survey. Of these 133 adult pike, 38 fish (28.6%) were recaptures. These data estimate the adult northern pike population at 467 fish (1.8/acre), continuing the trend of declining abundance since the walleye rehabilitation project. The northern pike population has now declined approximately 72.5% over the last 13 years. The current pike population is substantially below the area average of 3.4 adults/acre.

Every northern pike captured during our survey was measured and size structure was indexed using Relative Stock Density. After excluding fish less than 14 inches, approximately 21.7% of the fish captured were ≥ 21 inches and 3.2% were ≥ 28 inches. The current size structure is worse than previous surveys of Patten Lake (Table Below), and substantially below the average size structure for this area (46.1% ≥ 21", 9.9% ≥ 28"). The current population is considered to have poor size structure.

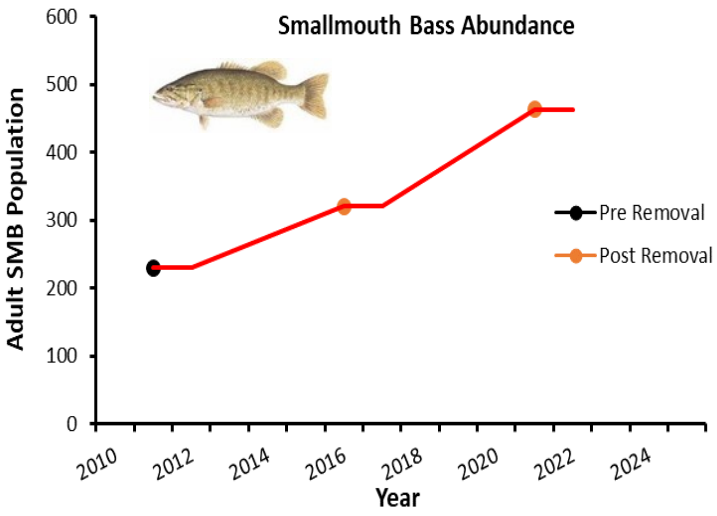
As mentioned earlier, the prolonged spawning season afforded a great opportunity to properly assess northern pike. It was also an opportunity to get a glimpse of the population prior to peak spawn. During the marking portion of the pike survey, 119 of the 146 pike captured (81.5%) were < 21 inches. This suggested that northern pike recruitment had increased in recent years. With walleye being the management focus for Patten Lake, smaller (≤ 23.9") northern pike were removed for the rest of the 2024 survey to limit potential expansion of the population. This effort resulted in the removal of 184 northern pike (166 adults). Based on the 2024 adult population estimate of 467 fish, this removal is estimated to have removed approximately 35.5% of the adult population.

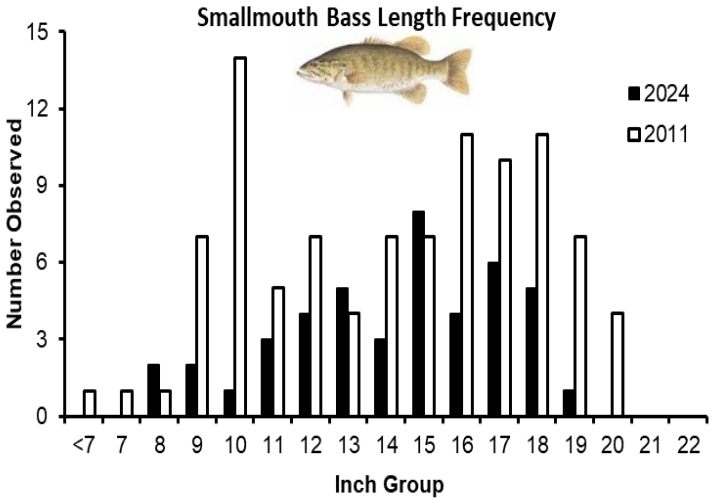
NORTHERN PIKE SIZE STRUCTURE - Patten Lake, Florence County, 2011-2024

	2011	2016	2021	2024
RSD21	74.50	57.40	63.79	21.66
RSD24	26.30	10.60	17.24	5.07
RSD28	4.40	2.60	1.72	3.23
RSD34	0.00	0.00	0.00	0.92

SMALLMOUTH BASS

The smallmouth bass population has been on the rise in Patten Lake for quite some time. Smallmouth bass were not observed during the 1993 comprehensive and creel survey, and only 17 fish were captured during the 2004 survey. During the 2011 comprehensive survey we conducted five electrofishing surveys for bass to obtain the first population estimate of approximately 230 adult smallmouth bass (0.9/acre). The walleye rehabilitation project in 2011 seems to have benefitted the smallmouth bass population and we saw the population grow to 320 fish in 2016, and 463 fish (1.8/acre) by 2021. This year we were not able to dedicate the amount of effort it takes to accurately estimate the smallmouth bass population, so we assessed the population with a single electrofishing survey on 5/28. The entire shoreline of Patten Lake was electrofished and 44 adult smallmouth bass were captured, giving a relative abundance of 10.5 adults/mile. The 2024 adult relative abundance is lower than 2021 (17.2/mile), and higher than 2016 (5.4/mile) and 2011 (6.0/mile). This would suggest that the smallmouth bass population has started to decline. However, relative abundance during a single electrofishing survey is less accurate than a mark-recapture population estimate that involves multiple electrofishing surveys. The current relative abundance is extremely close to the area average of 10.7 adults/mile, and the Patten Lake population is considered to be of moderate abundance. While abundance is considered moderate, it is noteworthy that the current relative abundance of this population is in the upper 5% of waters within this lake class.





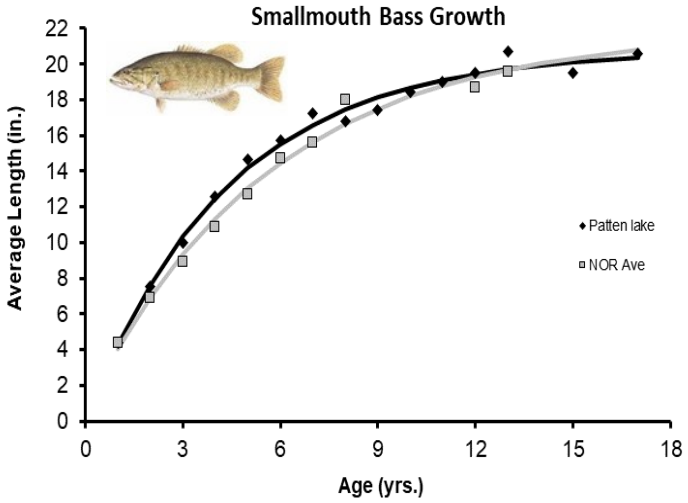
The 44 smallmouth bass captured during the 2024 bass electrofishing survey were measured to assess the size structure of the population. Size structure has remained surprisingly steady since 2011 (Table Below). This year approximately 61.2% of the fish captured were ≥ 14 inches, and 27.3% were ≥ 17 inches. The only major difference between the 2024 size structure and previous years is that we did not capture a smallmouth bass ≥ 20 inches. This is likely a result of conducting only one night of electrofishing this year, whereas during the previous surveys many more electrofishing surveys were conducted. The current size structure is substantially higher than the area average of 41.7% ≥ 14 inches and 12.2% ≥ 17 inches, which makes this population extremely desirable.

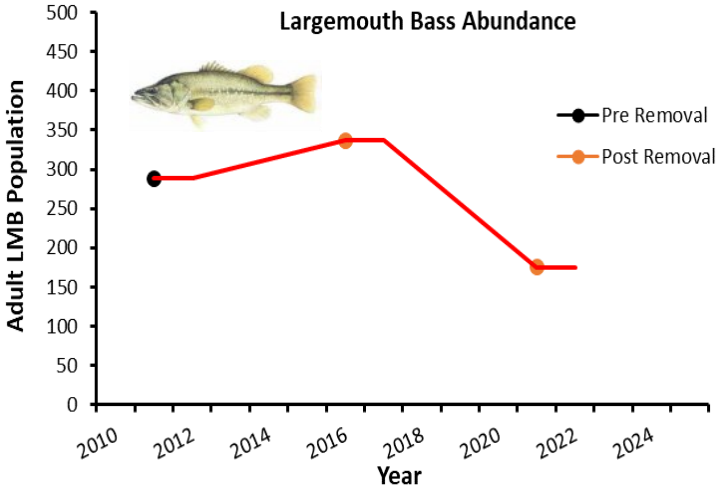
SMALLMOUTH BASS SIZE STRUCTURE - Patten Lake, Florence County, 2011-2024

	2011	2016	2021	2024
RSD11	76.04	88.24	84.21	88.64
RSD14	59.38	73.53	64.66	61.36
RSD17	29.17	34.12	31.20	27.27
RSD20	4.17	1.76	1.50	0.00

Age and growth analysis was last conducted in 2021 for Patten Lake. Unlike walleye, smallmouth bass do not have different growth rates between male and female fish, so we group both sexes together when assessing growth. During the 2021 analysis, smallmouth bass displayed growth rates well above the Northern Region of Wisconsin average. The best growth is displayed in the first 7 years, where Patten Lake smallmouth bass were growing to an average of 17.3 inches, almost 2 inches better than the Northern Region average of 15.6". Smallmouth bass also appear to have impressive longevity in Patten Lake, with fish as old as age-17 in the 2021 sample. The impressive growth rate and longevity of this population is what allows for great size structure.


Photo Credit: Wisconsin DNR



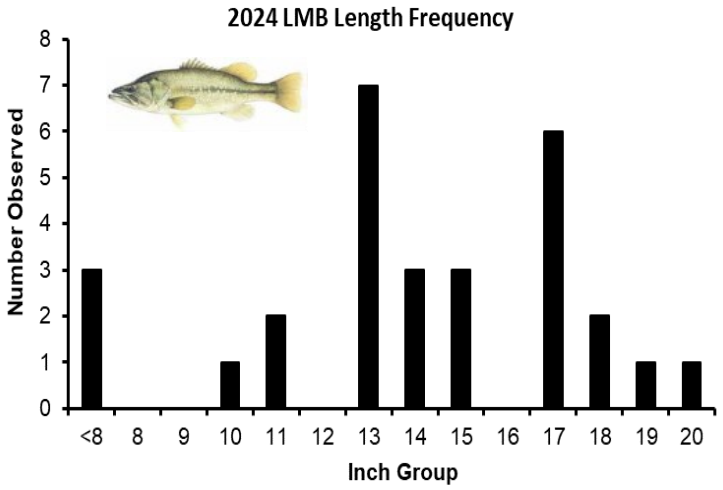


LARGEMOUTH BASS

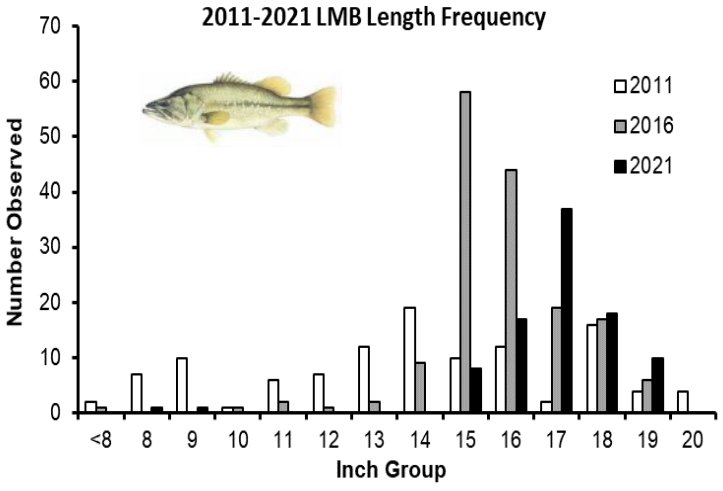
Historical fish surveys suggest that largemouth bass were the only predatory gamefish species in Patten Lake until walleye were introduced in 1974. Data suggests that largemouth bass were abundant at least into the 1980s, and then abundance declined to a lower level as walleye became abundant. Largemouth bass were assessed the same way as smallmouth bass, with population estimates completed in 2011, 2016, and 2021. Abundance of largemouth bass has declined since the walleye rehabilitation project from 288 adults (1.1/acre) in 2011 to 175 (0.7/acre) fish in 2021. This year we assessed the population with a single electrofishing survey on 5/28. The entire shoreline of Patten Lake was electrofished and 26 adult largemouth bass were captured, giving a relative abundance of 6.2 adults/mile. Relative abundance of largemouth bass has been stable, ranging from 5.4 to 6.2 adults/mile since 2011. The current relative abundance is near the median for the lake class, but well below the area average of 17.0 adults/mile, and the population is considered to be of low abundance.

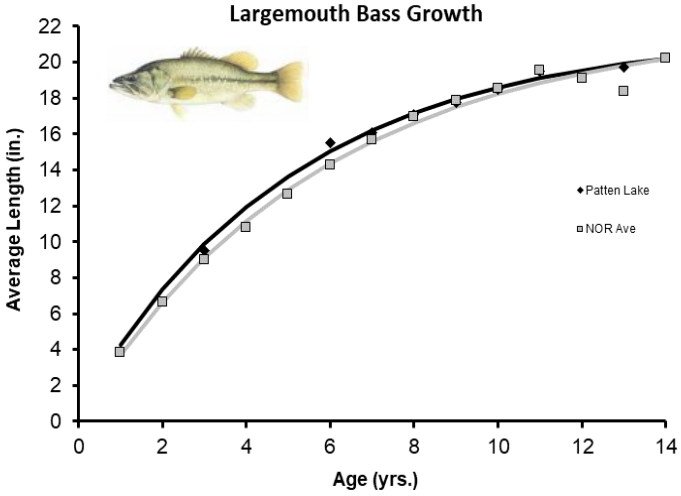
Every largemouth bass captured during the 2024 electrofishing survey was measured to assess the size structure of the population. With only a single electrofishing survey, the sample size for assessing size structure is fairly low, however, size structure appears to have remained incredibly high since 2011 (Table Below). This year approximately 38.5% of the fish captured were ≥ 16 inches, and 3.9% were ≥ 20 inches. The current size structure is substantially higher than the area average of 19.8% ≥ 16 inches and 0.7% ≥ 20 inches, which makes this population extremely desirable.

While the top end of the size structure has remained constant (majority of the fish being large), the bottom of the size structure (small fish) has changed substantially since the start of the walleye rehabilitation project in 2011 (Figure Lower Right). During 2011, 17% of the largemouth bass captured were ≤ 9.9 inches. These young fish then became exceptionally rare during 2016 and 2021 where largemouth ≤ 9.9" were only 0.6% and 2.2% of the fish captured. During this years survey, fish ≤ 9.9 inches made up 10.3% of the sample, only time will tell if recruitment is going to rise or if largemouth bass abundance will continue to decline in the future.



LARGEMOUTH BASS SIZE STRUCTURE - Patten Lake, Florence County, 2011-2024				
	2011	2016	2021	2024
RSD12	78.18	98.11	97.83	88.46
RSD14	60.91	96.23	97.83	61.54
RSD16	34.55	54.09	89.13	38.46
RSD18	21.82	14.47	30.43	15.38
RSD20	3.64	0.00	0.00	3.85





Age and growth analysis was last conducted in 2021 for Patten Lake. Just like smallmouth bass, largemouth bass do not have sexually dimorphic growth rates, so we group both sexes together when assessing growth. During the 2021 analysis largemouth bass displayed growth rates above the Northern Region of Wisconsin average.

BACKGROUND INFORMATION - PANFISH

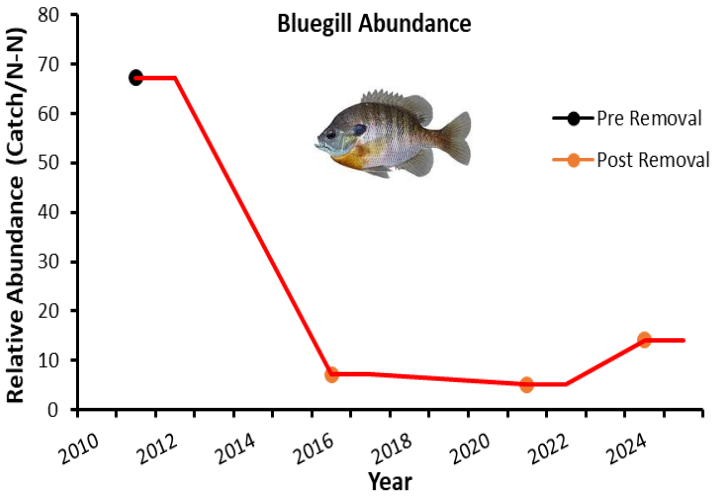
Typically we assess panfish populations with spring fyke net surveys. Panfish that spawn earlier in spring (yellow perch and black crappie) get assessed during the first netting survey which targets walleye and northern pike. The panfish species that spawn later in the year (bluegill, pumpkinseed, rock bass) are assessed during a late spring (May or June) netting survey specifically targeting these panfish species. Patten Lake has been surveyed for walleye regularly since 1981, suggesting that yellow perch and black crappie populations were relatively small from 1981 through 2011. Walleye were the main focus of the surveys conducted from 1981 to 2004, during these surveys later spawning panfish species were not evaluated. The only survey that evaluated late spawning panfish prior to 2011 was a fyke net survey was conducted in August of 1967. While that survey took place later than a typical survey for these species, the survey did show that bluegill were of high relative abundance at 101.7 fish/net-night. As you have read throughout this report, when the walleye population is thriving the fishery changes substantially. The pages that follow will detail the changes observed since 2011.

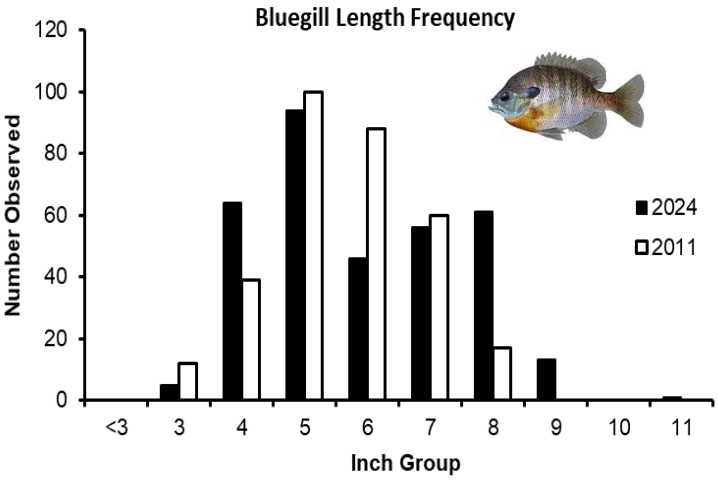
BLUEGILL

During 2011 we conducted a late spring panfish fyke net survey at the same time as the bullhead removal. Nets were fished at 34 different locations as we searched for bullhead, and bluegill relative abundance was measured at 51.0 fish/net-night. Sampling 34 different net locations was not feasible for future surveys, so we chose to repeat the survey using the 12 net locations that had the highest catch of bluegill. Since 2011 bluegill relative abundance has declined at these 12 net locations from 67.2 to 14.2 fish/net-night in 2024, suggesting a decline of 78.9%.

The abrupt reduction in bluegill relative abundance after the walleye rehabilitation project is hard to explain. However, we have seen this same trend in all of the other lakes that we have conducted bullhead removals on in this area (Sikora et al. 2021).

There has been an increase in bluegill relative abundance the past 3 years, from 5.2 to 14.2/net-night. We will continue to monitor the population to see if bluegill abundance continues to increase. The current population is well below the area average of 65.6 bluegill/net-night and is considered to be of low abundance.





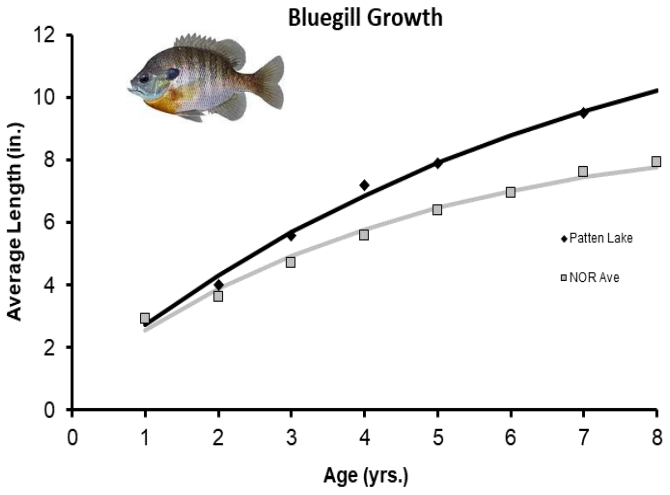
Every bluegill captured during this year's four day survey was measured to assess size structure. Of the 340 fish captured 52.1% were ≥ 6 inches and 22.1% were ≥ 8 inches in length. This year's size structure is better than what was observed during all surveys since 2011 (Table Below). The current population is slightly below the area average of 61.6% ≥ 6" and well above the average of 9.4% ≥ 8 inches in length. All things considered this is very good size structure, and provides a quality angling experience.

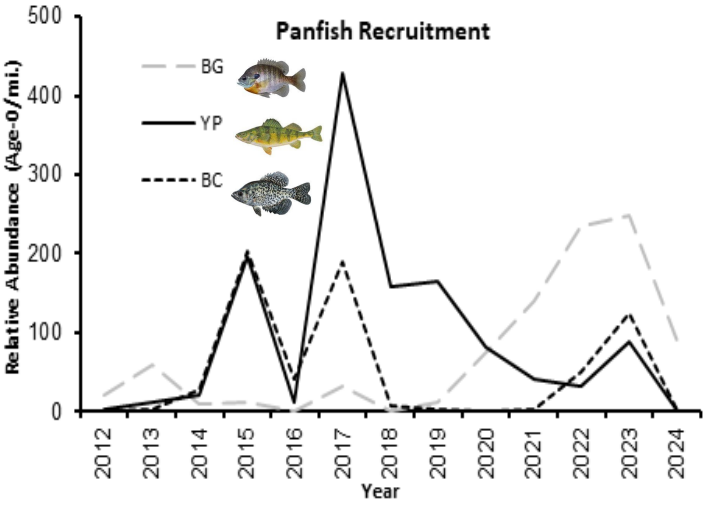
BLUEGILL SIZE STRUCTURE - Patten Lake, Florence County, 2011-2024

	2011	2016	2021	2024
RSD6	52.22	57.89	24.19	52.06
RSD7	24.37	29.82	16.13	38.53
RSD8	5.38	15.79	4.03	22.06
RSD9	0.00	5.26	1.61	4.12
RSD10	0.00	0.00	0.00	0.29

Bluegill growth was evaluated during 2021. At that time bluegill grew substantially faster in Patten Lake than the average growth in the Northern Region of Wisconsin. Mean length at age-4 was 7.2", which is more than an inch and a half larger than the average of 5.6" in northern Wisconsin.


Photo Credit: Wisconsin DNR



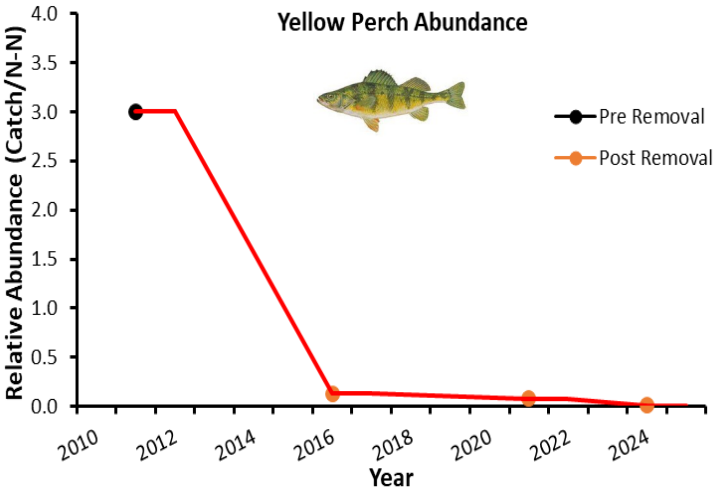


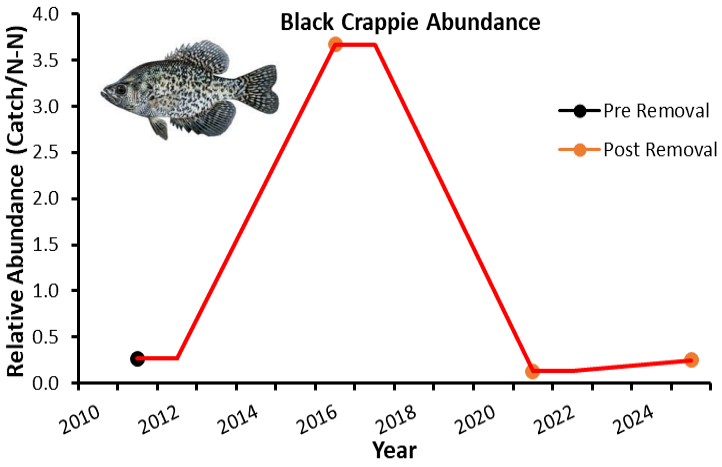
PANFISH RECRUITMENT

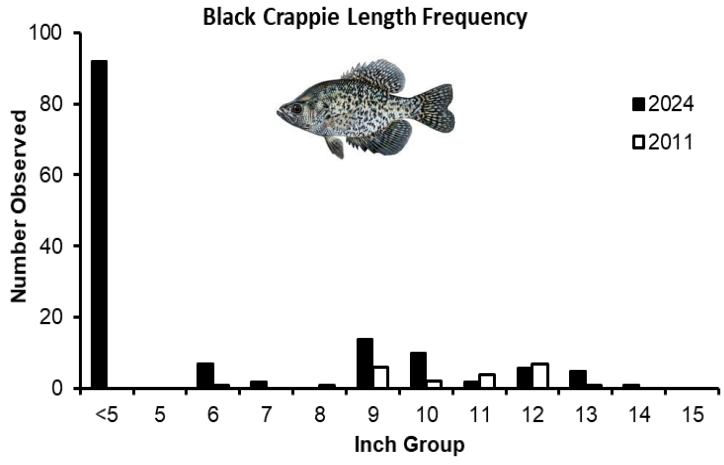
Panfish recruitment has been monitored annually since the bullhead removal in an effort to better understand the changes that were likely going to result from the biomanipulation project. Every fall we electrofish the same half mile station, collect all fish present, and assess recruitment using the relative abundance of age-0 fish. The figure to the left shows the relative abundance of age-0 fish for the three main panfish species in Patten Lake. Earlier in this report you have read that bluegill abundance has gone down substantially since 2011. Since bluegill abundance was substantially higher in the past, it can be assumed that bluegill recruitment was substantially higher than the low recruitment measured from 2012 to 2019. In recent years we have seen bluegill recruitment start to increase, which has likely resulted in the recent increase in bluegill abundance. Yellow perch appeared to be the panfish species that was going to benefit from the bullhead removal the most, showing generally strong recruitment from 2015 to 2023. Black crappie recruitment has been highly variable, with most years not producing a year class of black crappie. However, strong black crappie recruitment was observed in 2015, 2017, and 2023.

YELLOW PERCH

As mentioned in the previous section, yellow perch recruitment increased substantially since the walleye rehabilitation project, while other panfish species were showing lower recruitment. The recruitment data collected suggested that yellow perch would likely become the dominant panfish in Patten Lake, however, this has not happened. While recruitment of yellow perch increased substantially, these fish have not survived to become adults, with relative abundance dropping from 3 fish/net-night to 0.01/net-night during spring fyke net surveys since 2011. In fact, during an extensive spring fyke net survey this year we only captured 2 yellow perch, which was not enough to evaluate size structure.







BLACK CRAPPIE

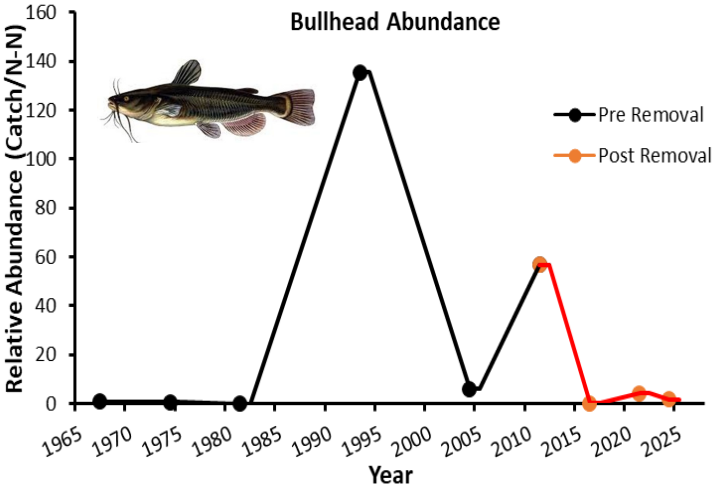
Like yellow perch, the black crappie population was also assessed during the early spring netting survey conducted in 2024. Relative abundance was measured at 0.25/net-night continuing a long history of black crappie being of very low abundance. We did see an uptick in black crappie abundance in 2016, which followed a large year class of age-0 black crappie produced in 2015. We did see a similar response this spring, which followed a large year class produced in 2023. With the strange spring weather that we had in 2024, we had days of spring netting that we did not include in our relative abundance data because water temps were very cold and fish were not very active. During the initial days of netting, which we are calling the “Pre-Early Spring Fyke Net Survey”, black crappie were captured at a rate of 2.79 fish/net-night, with the vast majority of these fish being age-1 crappie that were produced during 2023. Regardless of what netting data you look at, the Patten Lake black crappie population is well below the area average of 5.84 black crappie/net-night, and the population is considered to be of low abundance.

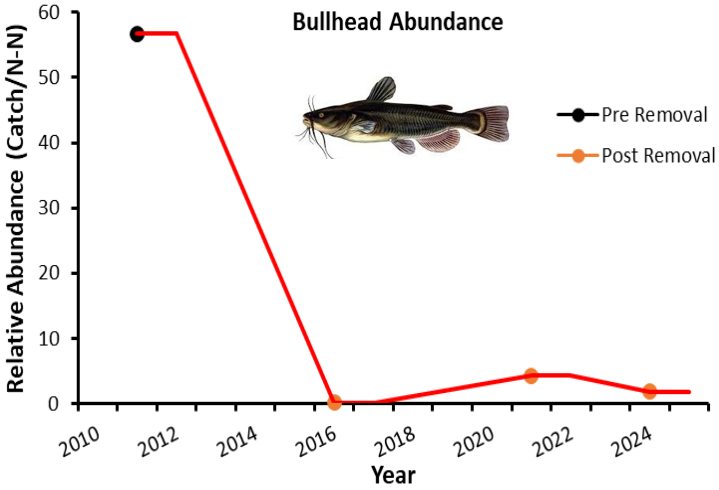
Every black crappie captured during our spring netting surveys was measured to assess the size structure of this population. As you can see in the figure to the left, 92 of the 139 black crappie measured were < 5 inches. After removing those fish < 5 inches, 80.9% and 25.5% of our sample was ≥ 8 and 12 inches respectively. The size structure of the current population is similar to the size structure in 2011 when 95.5% and 36.4% were ≥ 8 and 12 inches in length. This population has very high size structure, however, since the population is of such low abundance it likely doesn’t offer a lot of angling opportunity.

BULLHEAD

The species of bullhead present in Patten Lake are black bullhead. They are native to Patten Lake and were present in very low numbers (0.9/net-night) during the first survey of Patten Lake in 1967. Bullhead relative abundance remained below 1 fish/net-night during surveys conducted in 1974 and 1981. Surprisingly bullhead relative abundance skyrocketed to 135.5/net-night during the 1993 survey, however bullhead were only counted from two nets during that survey which reduces the reliability of those data. Bullhead relative abundance dropped back down to a more normal level (6.0/net-night) by 2004.

WDNR started hearing complaints form anglers that bullhead abundance was high and walleye abundance was low in the late 2000's. A fall electrofishing survey was conducted during the fall of 2010 which validated the angler complaints that bullhead abundance was very high. WDNR then began planning for a major bullhead removal which would occur in 2011 as part of a comprehensive fisheries survey.





Nets were set right at ice out during 2011 to sample walleye and northern pike. During this 4-day survey, we were able to capture and remove 1,474 bullhead. The peak daily relative abundance was measured at 93.6, with a mean relative abundance of 56.7 fish/net-night. We continued to remove all bullhead captured during each survey of Patten Lake, as well as a 17-day netting effort in June directly targeting bullhead. The total number of bullhead removed during 2011 was 5,999 fish weighing an estimated 2,580 pounds. Since 2011 we have removed all bullhead captured during every survey conducted on Patten Lake. Most year's we only conduct one night of electrofishing, with extended efforts occurring in 2012, 2016, 2021 and 2024 (Table Below). The figure to the left shows that since the bullhead removal in 2011 bullhead abundance has remained relatively low, with the current relative abundance being measured at 1.8/net-night.

The main reason bullhead abundance has remained low since 2011 is the dedication of the Patten Lake Association. Lake Association members have been given permits to remove juvenile bullhead when they huddle in large schools in shallow water during June and July (Photo Lower Left). This continued effort by volunteers has been incredibly important to the success of this rehabilitation project.

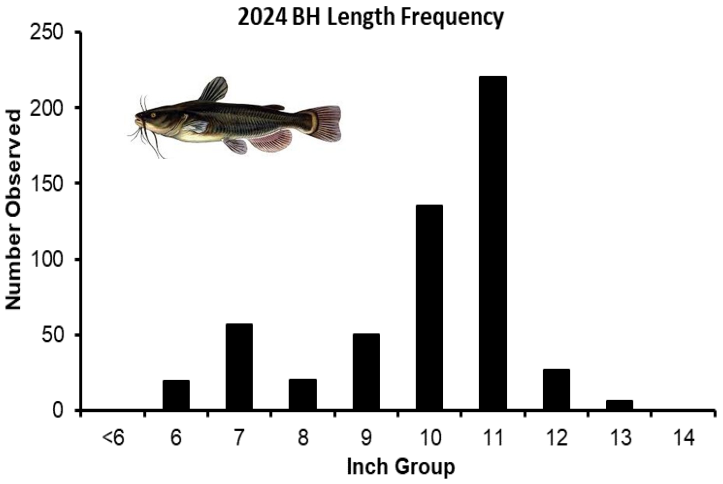
TOTAL NUMBER OF BULLHEAD REMOVED BY YEAR - Patten Lake, Florence County, 2011-2024														
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
BH Removed	5,999	31	6	0	0	19	1	7	7	0	480	3	18	1,052

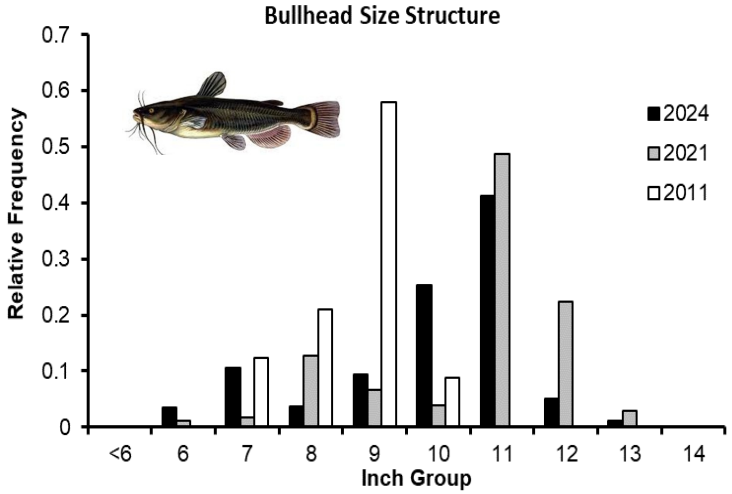

Photo Credit: Patten Lake Association


Photo Credit: Wisconsin DNR

BULLHEAD

During 2024 we captured and removed 1,052 bullhead, weighing an estimated 767.6 pounds, from Patten Lake. Random samples of bullhead were measured each day to assess size structure. Of the 534 fish measured this year, 72.7% were ≥ 10 inches in length. Size structure has increased substantially since the bullhead removal project took place (Figure Below). At the start of the removal project only 8.8% of fish were ≥ 10 inches, which rose to 77.7% in 2021 and then decreased slightly this year. Increased size structure with decreased abundance is a normal trend in fisheries management. When abundance decreases so does the competition for resources within the population, allowing for increased growth rates. The increase in size structure in Patten Lake is also amplified due to the great work by the Lake Association removing juvenile bullhead and limiting large year classes from entering the adult population. Increased size structure is further evidence that the methods we have deployed to reduce bullhead abundance in Patten Lake are working as intended.





OTHER SPECIES

During the 2024 survey there were 8 other fish species captured that were not detailed in this summary. The table below shows the relative abundance (catch/net-night) of these species during the different fyke net surveys. “Pre” spring netting #1 is the time period that we had nets in the water prior to water temperatures rising and walleye catch rates increasing. Spring netting #1 is a netting survey targeting adult walleye and northern pike, and spring netting #3 is a late spring survey that targets summer spawning panfish.

None of these species were captured in high numbers. Rock bass and pumpkinseed are likely the most significant populations. Pumpkinseed relative abundance has decreased since 2011 when they were captured at a rate of 2.1 fish/net-night during the late spring net survey. Rock bass abundance has increased slightly from 2.5/net-night in 2011.

The changes observed in the white sucker population is also worthy of note. Prior to the walleye rehabilitation project white sucker relative abundance was 5.7 fish/net-night during the spring netting #1 survey. White sucker abundance appears to have declined nearly 90% since the start of the project.

RELATIVE ABUNDANCE (Catch/Net-Night) DURING FYKE NET SURVEYS

Species	PKS	RKB	BG x PKS	G Sun	BKT	WS	CS	C Chub
“Pre” Spring Netting #1	0.03	0.09	0.06	0.00	0.06	0.15	0.00	0.03
Spring Netting #1	0.00	0.04	0.01	0.04	0.03	0.58	0.01	0.00
Spring Netting #3	0.79	3.25	0.08	0.00	0.00	0.04	0.00	0.00

NOTABLE FISH CAPTURED DURING THE 2024 SURVEY

Photo Credit: Wisconsin DNR


Photo Credit: Wisconsin DNR

MANAGEMENT RECOMMENDATIONS

Since public access was established to Patten Lake in 1966 the lake has had a large amount of active fish management. Walleye were introduced in 1974, which started to reproduce and became very abundant. Then walleye abundance steadily declined from the mid 1990s reaching an all time low of 0.97 adults/acre in 2011. Northern pike were also introduced to Patten Lake in 1998, and just like walleye, increased abundance quickly becoming the most abundant game fish (6.7 adults/acre) in Patten Lake by 2011. Smallmouth bass were first detected in Patten Lake during 2004 and slowly increased in abundance to approximately 0.9 adults/acre in 2011. Largemouth bass are the only native game fish to Patten Lake and while never adequately assessed it appears largemouth bass were abundant prior to the introduction of walleye. Largemouth bass abundance then declined to a low density population estimated at 1.13 adults/acre in 2011. This is a tremendous amount of change to the game fish populations in a 45-year span. The panfish populations in Patten Lake were not closely monitored until 2011. We know that bluegill were abundant prior to the introduction of walleye, and there is some data that suggest that the yellow perch population had good size structure and was more abundant than the population measured in 2011. There was most likely substantial change in the makeup of the panfish population with the introduction of 3 game fish species and drastic changes in abundance of walleye, northern pike, and largemouth bass. The 2011 survey showed that at that time bluegill were the dominant panfish species, with abundance above the area average, with yellow perch and black crappie populations of low abundance.

The last 13 years of management has been every bit as active as the first 45 years. The lack of walleye populations in the area ignited a walleye rehabilitation project in 2011. The goal of the project was to make walleye the most abundant game fish in Patten Lake while maintaining a walleye population $\geq$ 3 adults/acre. This survey summary detailed the major changes in all fish populations since the large-scale bullhead removal. Generally speaking walleye and smallmouth bass have increased in abundance while northern pike, largemouth bass, and bluegill populations have decreased. The impact of the project on yellow perch and black crappie is not as clear, recruitment has been high in some years but increases in adult abundance has not occurred.

Patten Lake should continue to be managed as a walleye fishery, and reasonable actions should be taken to give this walleye population the best conditions to thrive. The best way to do this is to continue to remove bullhead from Patten Lake during all fish surveys. As long as bullhead abundance stays low we should continue to have solid walleye recruitment. It appears that if we are successful with walleye management we will see further reductions or the maintenance of low density populations of northern pike, largemouth bass, and bluegill. Besides walleye, smallmouth bass appear to be the species that is benefitting the most from the bullhead removal. It is going to be critical to continue thorough fisheries assessments of Patten Lake so we can understand more about the long term impacts from this project. I recommend conducting bass population estimates during future surveys, if staffing and budget allow. Annual fall electrofishing surveys should continue for the foreseeable future to monitor gamefish recruitment, the index station should continue as part of these surveys so we can also assess panfish recruitment. Patten Lake is planned to receive another comprehensive survey in 2032 and then 2037. Ideally we would get another comprehensive survey in prior to 2032, if possible another survey of Patten Lake should occur in either 2028 or 2029 to continue the data set and allow for the most knowledge to be gained from this project.

As of right now all of the fishing regulations for Patten Lake are appropriate. The 15 inch minimum length limit (20-24” protected slot) protects recruits and gives the population an opportunity to grow while still allowing for angler harvest. The 14 inch minimum length limit for bass allows substantial protection to those populations and the late start to the harvest season for smallmouth bass provides smallmouth more opportunity to continue to flourish. Northern pike have no minimum length limit, which is appropriate for Patten Lake. Northern pike have shown the ability to increase to overabundant levels in Patten Lake and this regulation should allow anglers to keep the population in check. If angler harvest is not able to keep the northern pike population below 1.5 adults/acre fisheries management should continue to remove small northern pike during future fish surveys.

NOTABLE WALLEYE CAPTURED DURING SURVEYS OF PATTEN LAKE SINCE 2011




REFERENCES: Sikora, L.W., VanDeHey, J. A., Sass, G.G., Matzke, G., and Preul, M. 2021. Fish Community Changes Associated with Bullhead Removals in Four Northern Wisconsin Lakes. North American Journal of Fisheries Management, Volume 41, Issue S1, Pages S71–5S81.