

Berry Lake, Oconto County (WBIC 418300)
2019 Spring Electrofishing Survey Report

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Berry Lake is a hard water seepage lake of 209 acres that is located approximately 8 miles west of Gillett, WI. The lake has a maximum depth of 27 feet and a mean depth of 8 feet (WDNR Register of Waterbodies). Berry Lake has no outlet and water levels tend to fluctuate considerably. A USGS water level monitoring station documented a rise in the lake levels of 4.5 feet from October 2013 to September 2019 (Figure 1). Partial winter fish kills were reported in 1995 and 2009. The majority of the 3.5 miles of shoreline is developed, but the Menominee Indian Tribe of Wisconsin owns several hundred feet of un-developed shoreline on the western portion of the lake. Berry Lake contains a diverse aquatic plant population (Onterra 2017), but an invasive plant, Eurasian water milfoil (EWM), was documented in 2007. It was later determined that some of the milfoil population was actually a hybrid between EWM and native northern water milfoil. Various surveys and treatments have been conducted in an effort to reduce hybrid water-milfoil since 2007 and remain ongoing (Onterra 2017). Non-native *Phragmites australis* was documented in 2014 (Onterra 2015). Pale-yellow iris and reed canary grass are two other invasive species that have been found in Berry Lake.

The Town of Underhill owns and maintains a public boat landing on the eastern end of the lake. The landing was installed in 1972 and is adequate under most conditions, but it can be difficult to utilize when lake levels are low (Cory Wienandt, WI DNR, personal communication). The Menominee Indian Tribe of Wisconsin owns several hundred feet of un-developed shoreline on the western portion of the lake. The Berry Lake Property Owners Association is a non-profit group that is active in lake management.

Previous surveys include a fyke netting survey in October 1949 and a seining survey in 1972, both of which revealed slow-growing bluegill and black crappie. Bullheads dominated the catch in a 1985 ice-out survey and electrofishing surveys by Langhurst (1988). At that time, the abundant bluegill population was stunted. Size structure for largemouth bass was low, and a 14-inch size minimum was recommended. A mini-fyke netting survey and fall electrofishing survey in 2003 was dominated by bluegill, pumpkinseed, and largemouth bass (Kapusinski 2006). An ice-out survey and spring electrofishing survey was completed in 2007. At that time, size structure of panfish had improved and low water levels impacting fish habitat were noted (Rowe 2008).

Berry Lake follows the standard inland fishing regulations. Northern pike were stocked for four years in the 1970's and again in 1991. Walleye were stocked by private group in 1992, 1996, and 2006 (Table 1). Due to poor results, continuing predator stocking was not recommended by Kapuscinski (2006).

The purpose of this report is to calculate catch per effort (CPE), assess the growth and age composition of Berry Lake's bass and panfish populations, and to compare results to the 2007 spring electrofishing survey.

METHODS

Data collection

A WI DNR standard direct current electrofishing boat was used to sample the entire shoreline on the evening of May 22, 2019. The survey was conducted following WDNR monitoring protocols for SEII (spring electrofishing 2) surveys for bass/panfish lakes. All fish were identified to species and gamefish and panfish were measured to the nearest 0.1 inch. Scales (panfish), dorsal spines (largemouth bass), and anal fin rays (northern pike) were collected from a sub-sample of fish within 0.5 inch bins. All fish were collected at two separate ½ mile stations. Gamefish only were collected along the remaining shoreline.

Data analysis

Total catch and catch per mile of shoreline electrofished were calculated for all species. Mean length at age analyses were conducted for largemouth bass, bluegill, and northern pike. An age length key was created to assign ages to un-aged fish based on proportional representation of the known age fish

subsample, within 0.5 inch length bins. Total mortality was estimated using a catch curve analysis (Ricker 1975) for largemouth bass, where the assumptions of constant recruitment and mortality appeared valid.

RESULTS AND DISCUSSION

A total of 283 fish of ten different species were collected in the samples. Catch per mile of shoreline electrofished are shown for each species sampled in Berry Lake (Table 2). Largemouth bass were the most abundant species sampled. Bluegill, black crappie, northern pike, and brown and yellow bullhead were common. Rock bass, yellow perch, pumpkinseed, and golden shiners were sampled in low numbers.

Black crappie

There were a total of 16 black crappie sampled. Average length was 10 inches with a range from 6.2 to 13.1 inches. Although there were relatively few sampled, black crappie showed comparable growth rates with northeast Wisconsin averages for black crappie.

Bluegill

A total of 56 bluegills averaging 4.9 inches (range 1.6-7.6) were sampled from Berry Lake. The CPE increased from 15/mile in 2007 to 56/mile in 2019 and an increase in bluegill over 5 inches was observed in 2019 (Figure 2). The median bluegill CPE for other simple, cool, dark lakes in Wisconsin is 110/mile. Comparison of the bluegill length at age showed slower growth compared to northeast Wisconsin averages (Figure 3). Age classes 1 through 8 were present but ages 3, 4, and 6 were most common. Only 9 bluegill were aged in the 2007 electrofishing survey so it is difficult to make comparisons. However, the spring fyke netting surveys in 2007 (Rowe 2008) and 1985 (Langhurst 1988) both revealed slower growth of bluegills.

Largemouth bass

A total of 141 largemouth bass were sampled in 2019 with an average length of 12.2 inches (range 4.7-18.7). The CPE increased from 7/mile in 2007 to 40/mile in 2019. This value is well above the 75th percentile for largemouth bass when compared to lakes of a similar classification in Wisconsin. Age classes 2 through 7 were present. The total annual mortality for ages 5-7 bass was estimated at 71% in 2007 and fell to 22% in 2019 for the same age classes. Despite the very high density of largemouth, the growth rate is near average for northeast Wisconsin (Figure 4) but with few bass over the 14-inch length limit (Figure 5). Berry Lake is in the Southern Bass management zone with a daily bag of 5 fish, 14 inch minimum. It takes an average of 6 years for a bass in Berry Lake to reach the 14-inch size minimum. If there is adequate local support, a regulation change to 5 fish, no minimum length limit may be pursued. The management goals would be to reduce over-abundant smaller bass and, increase average length and growth rates.

Northern pike

A total of 19 northern pike were sampled, averaging 20.1 inches (range 14.1-37.4). Ages 3, 4, and 5 northern pike had slower growth rates compared to other northeast Wisconsin lakes, while older, larger fish had good growth rates. In the 2007 fyke netting survey, a population estimate of 473 fish (95%C.I. 223-911), or 2.3/acre, was calculated (Rowe 2008). A 2019 population estimate could not be calculated from a single electroshocking survey.

Other species

A total of 6 pumpkinseeds averaging 5.0 inches were sampled. Rock bass, yellow perch, and green sunfish showed decreases in abundance from 2007. In the 2007 SEII survey, bullheads dominated the catch, at 18/mile. Although bullhead CPE was higher in 2019 (40/mile) compared to 2007, largemouth bass and bluegill were more numerous in 2019.

CONCLUSIONS AND RECOMMENDATIONS

Fish populations of Berry Lake in 2019 have generally improved compared to 2007. This may in part be due to higher water levels and increases in lake volume and littoral habitat. Species in the sunfish family, including largemouth bass, bluegill, and black crappie, all showed increases in both size and abundance. Northern pike are exhibiting slow growth at younger ages for unknown reasons.

Berry Lake has a very high density of largemouth bass with a CPE of 40/mile. This is well above the 75th percentile for largemouth bass when compared to other lakes of similar type in Wisconsin. Even with the high density of largemouth, the growth rate is near the state average but with relatively few bass over the 14-inch length limit. Mortality estimates have decreased considerably since 2007. Berry Lake is in the Southern Bass management zone with a daily bag of 5 fish, 14 inch minimum. If there is adequate local support, a regulation change to 5 fish, no minimum length limit may be pursued. I will consult with the lake association on this rule change and consider their comments before preparing a rule change. The management goals would be to reduce over-abundant smaller bass and increase average length and growth rates.

Bluegill density has improved since the 2007 survey but remains below the median for lakes of the same classification. Slower growth of bluegill was noted in 1985 and 2007 and continues to be below the northeast Wisconsin average. A change in the bass regulation could positively influence the size structure of bluegill.

Rowe (2008) recommended that riparian landowners consider habitat improvements to provide fisheries benefits and this recommendation is still applicable. The addition of whole trees (fish sticks) would increase littoral habitat, particularly in years of low water when fish populations may be most affected. Buffering shorelines with native plantings in place of mowed grass would help improve water quality by potentially reducing nutrient inputs. I will discuss those recommendations with the lake association.

ACKNOWLEDGMENTS

Ron Rhode, Ben Ewoldt, and Tammie Paoli completed the 2019 electrofishing survey. Ron Rhode collated the data and aged the fish.

LITERATURE CITED

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Table 1. Fish stocking history of Berry Lake, 1972 to 2019.

Year	Species	Number Fish Stocked	Average fish Length (inch)	Source Type
1972	NORTHERN PIKE	300	15	FEDERAL HATCHERY
1974	NORTHERN PIKE	300	15	FEDERAL HATCHERY
1975	NORTHERN PIKE	1200	-	FEDERAL HATCHERY
1976	NORTHERN PIKE	300	13	FEDERAL HATCHERY
1991	NORTHERN PIKE	680	8	DNR HATCHERY
1992	WALLEYE	1000	7	PRIVATE HATCHERY
1995	WALLEYE	640	7	PRIVATE HATCHERY
2006	WALLEYE	700	6.5	PRIVATE HATCHERY

Table 2. Catch summary for spring electrofishing surveys in Berry Lake in 2007 and 2019. See Methods for sampling details.

	2007 Spring Electrofishing ^a 22-May-2007		2019 Spring Electrofishing ^b 22-May-2019	
	Total Catch	Catch per mile	Total Catch	Catch per mile
	Black Crappie	2	1	16
Bluegill	30	15	56	56
Largemouth Bass	24	6.9	141	40.3
Northern Pike	4	1.1	19	5.4
Pumpkinseed	2	1	6	6
Green Sunfish	16	8	0	0
Rock Bass	6	3	1	1
Walleye	2	0.6	0	0
Yellow Perch	15	7.5	1	1
Bullhead spp.	36	18	40	40

^aGamefish collected for entire 3.5 mile shoreline. Panfish also collected for 2 miles

^bGamefish collected for entire 3.5 mile shoreline. Panfish also collected for 1 mile

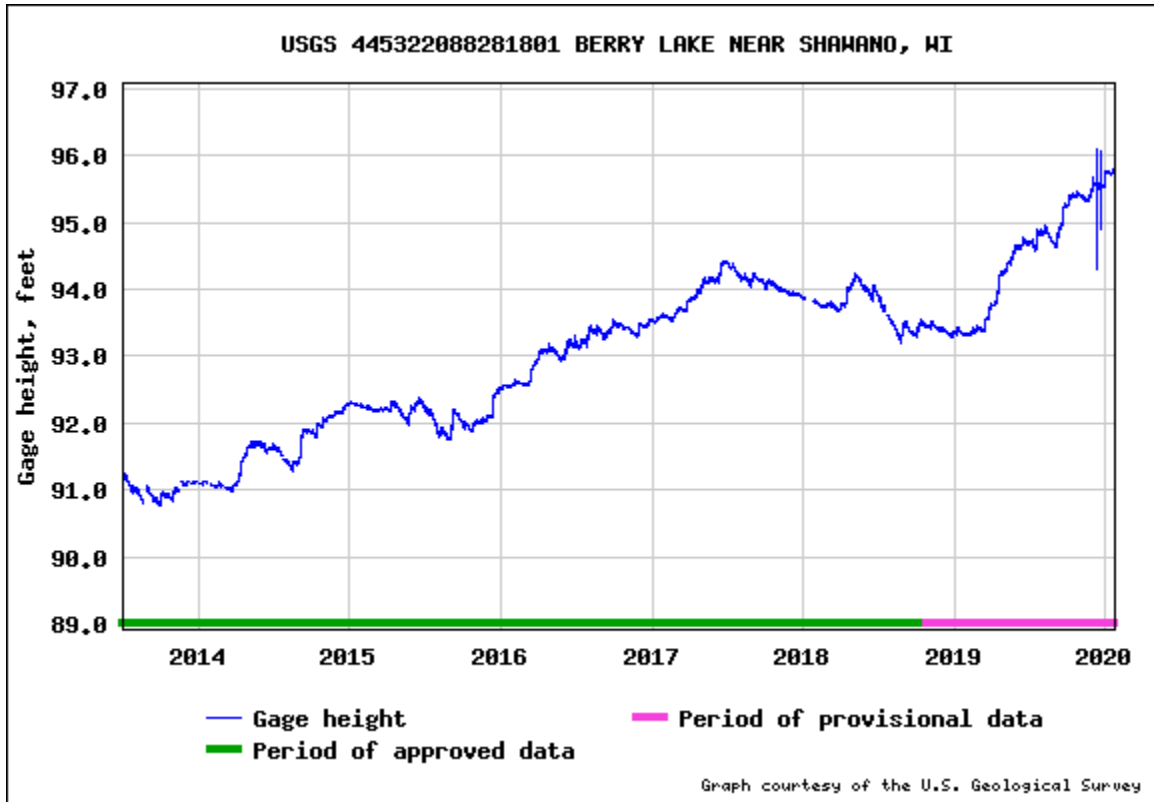


Figure 1. United States Geological Survey gage height measured at Berry Lake, Oconto County, WI.

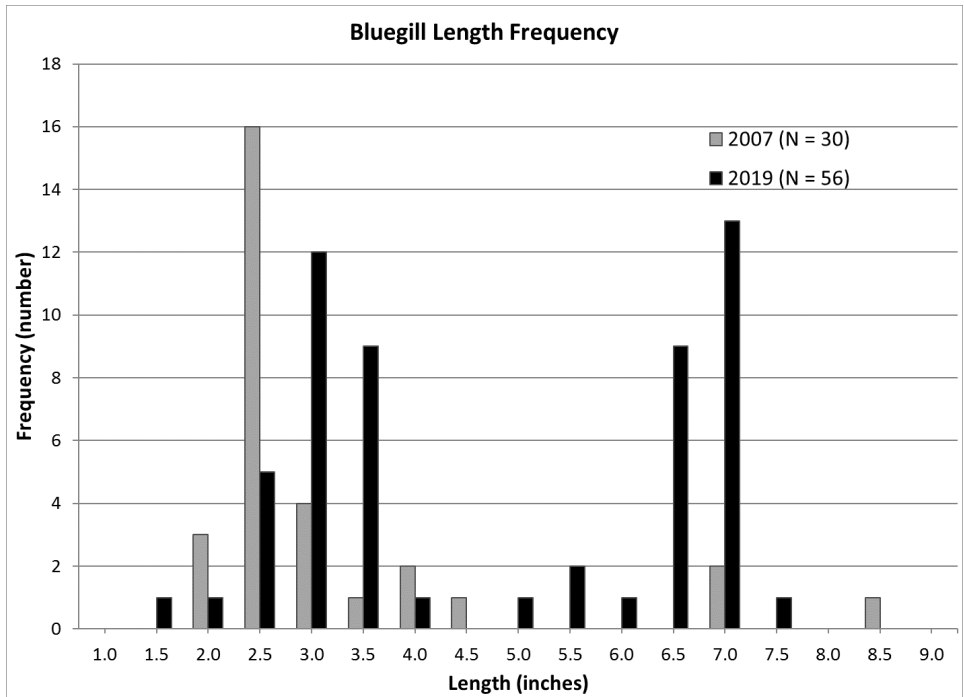


Figure 2. Length frequency of bluegill captured in May electrofishing surveys in 2007 and 2019.

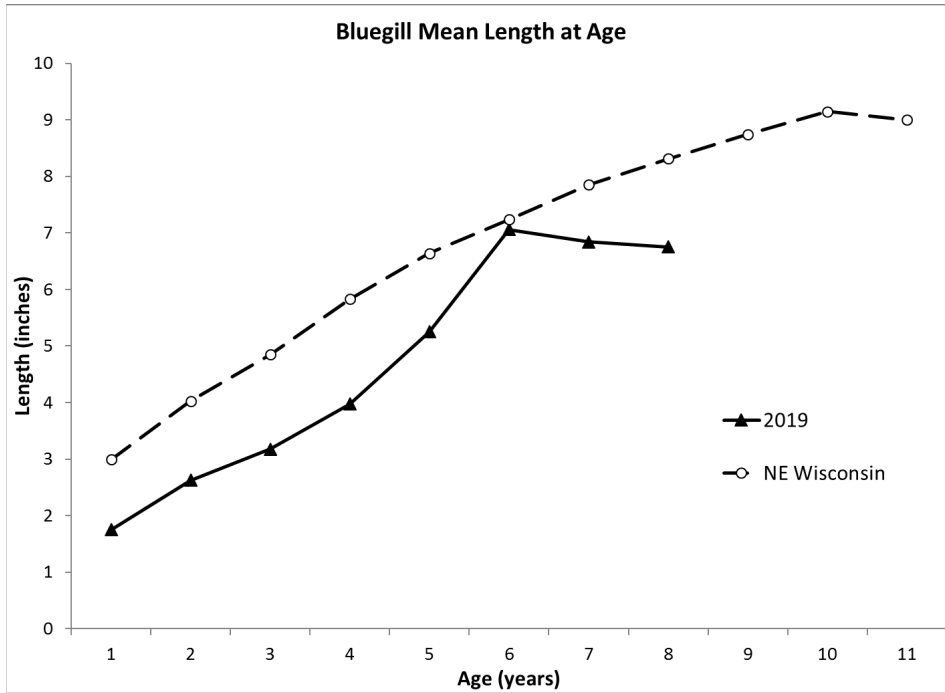


Figure 3. Bluegill mean length at age in Berry Lake, May 2019, compared to other lakes in northeast Wisconsin.

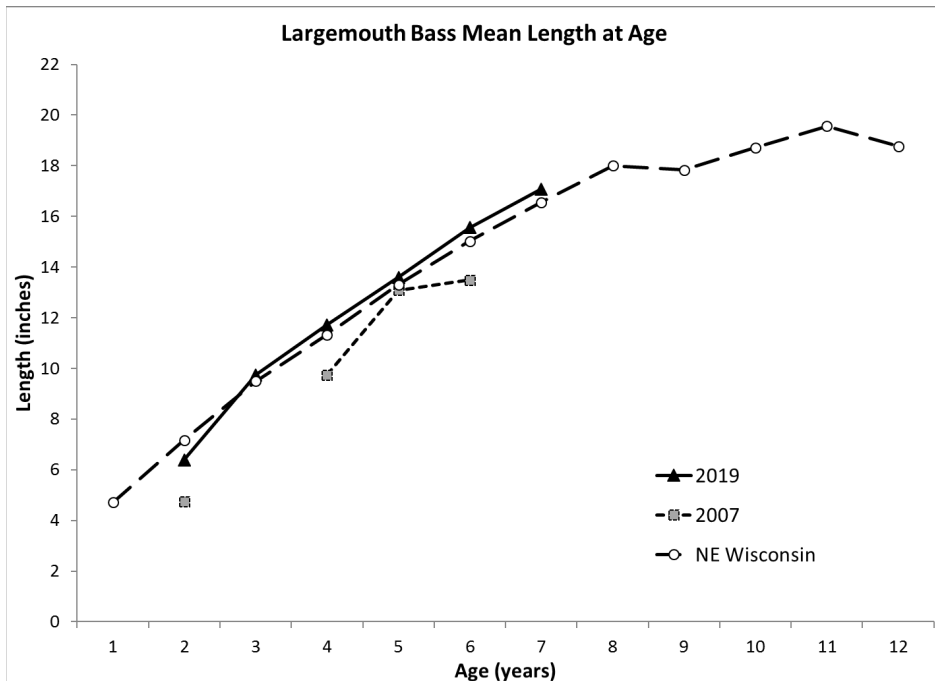


Figure 4. Largemouth bass mean length at age in Berry Lake, May 2019 and May 2007 compared to other lakes in northeast Wisconsin.

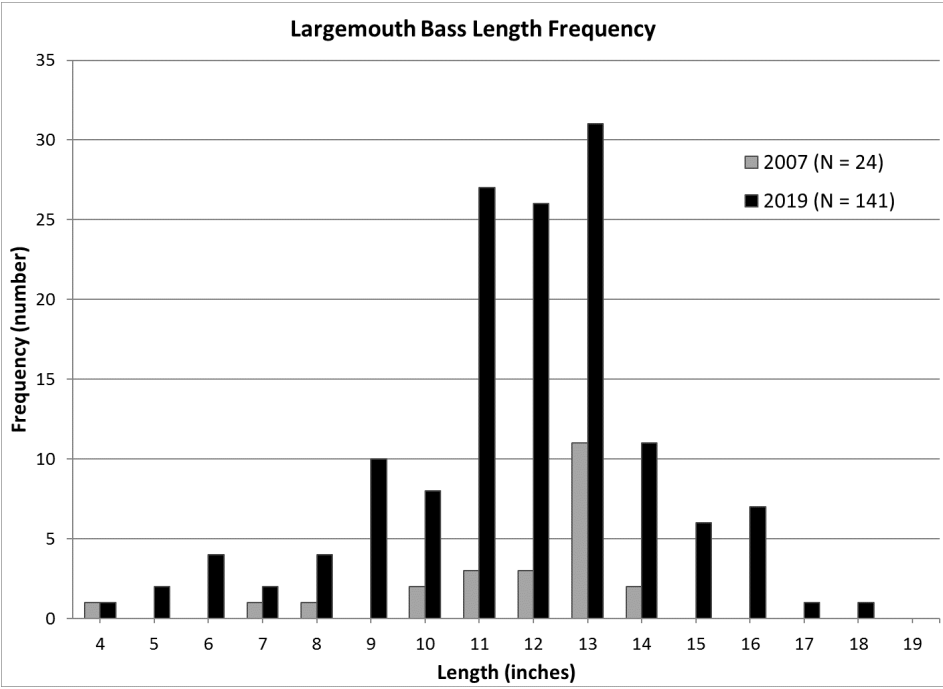


Figure 5. Length frequency of largemouth bass captured in May electrofishing surveys in 2007 and 2019.