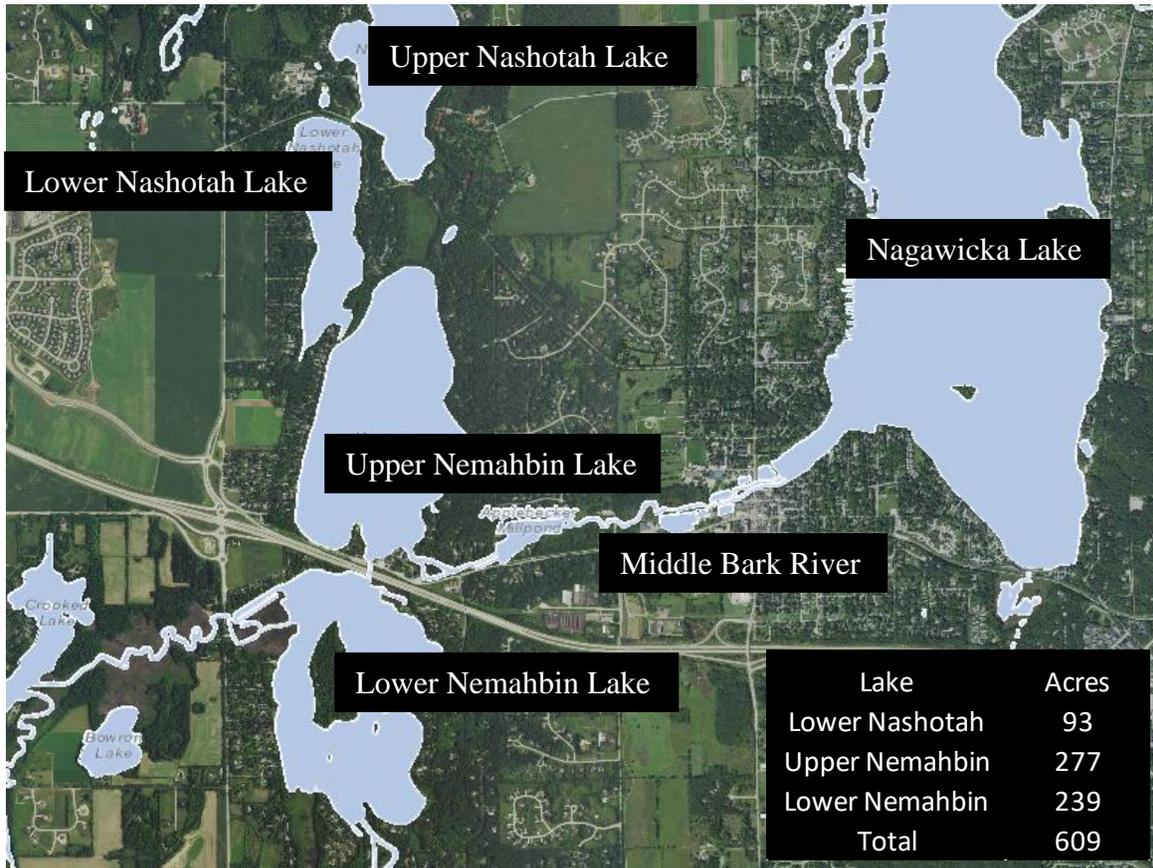


**2016 Nemahbin Lakes  
Fisheries Summary Report**  
Wisconsin Department of Natural Resources  
Fisheries Management - Eagle Work Unit  
Benjamin Heussner, Steven Gospodarek, Kyle Olson

**INTRODUCTION**

Nestled in the heart of the Lake Country of northern Waukesha County, is the Bark River chain of lakes. These lakes are commonly referred to as “glacial kettle lakes” as they formed over 10,000 years ago during the glaciated period. The Upper Bark River flows out of Nagawicka Lake into the Middle Bark River and next into Upper Nemahbin Lake. After passing underneath I-94, the Bark River continues into Lower Nemahbin Lake and outlets a low head dam at Hwy P, southwest of Delafield. Upper and Lower Nashotah are seepage lakes that also flow into Upper Nemahbin Lake. All data taken from this survey was combined because continual fish passage occurs between the three lower lakes in this chain. Upper Nashotah does not have public access nor does it have substantial fish passage to Lower Nashotah, therefore Upper Nashotah Lake is not included as a part of this survey report. For this fisheries management report, Nemahbins Lakes refers to Upper Nemahbin, Lower Nemahbin and Lower Nashotah Lakes. The total combined acreage for Lower Nashotah, Upper Nemahbin and Lower Nemahbin Lakes is 609 acres. Upper Nemahbin is the deepest lake at 60 feet max depth, followed by Lower Nashotah (43 feet) and Lower Nemahbin (36 feet).





WDNR Fisheries Technician, Arthur Watkinson holding a 26" female walleye captured in Upper Nemahbin Lake

## METHODS

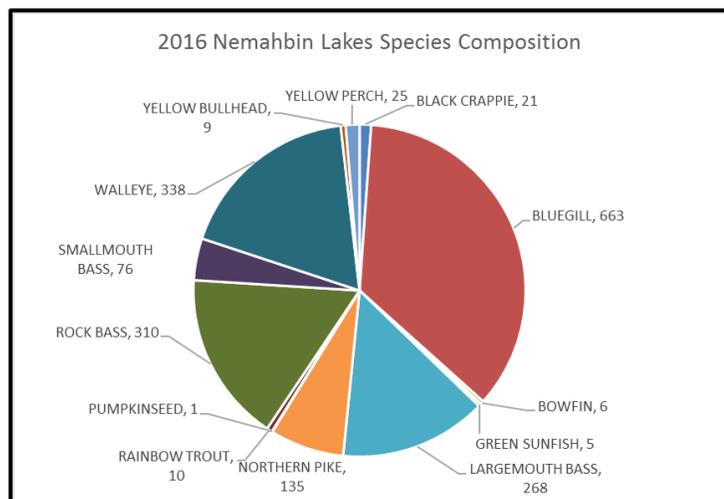
Starting on March 21, the Wisconsin DNR fisheries management crew, stationed at Eagle Wisconsin, began the 2016 Nemahbin Lakes fisheries survey by setting 10 fyke nets on Nemahbin Lakes. In addition to sampling Upper and Lower Nemahbin Lakes, three fyke nets were set on Lower Nashotah Lake. On April 21, spring electrofishing began with a one night walleye electrofishing sampling effort. Throughout fyke netting and spring electrofishing, northern pike and walleye were marked using fin clips. Females were given a right pectoral clip, males were given a left pectoral fin clip and unknown gender were given an upper caudle fin clip. All sub sampled fish species were measured to the nearest tenth-inch and gamefish that were included in the age sub-sample were weighed

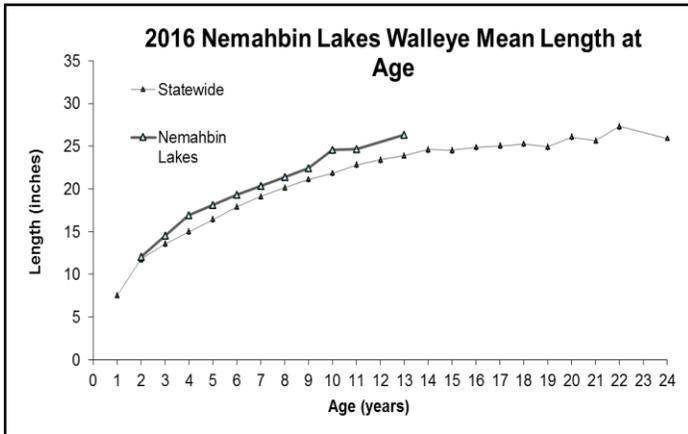
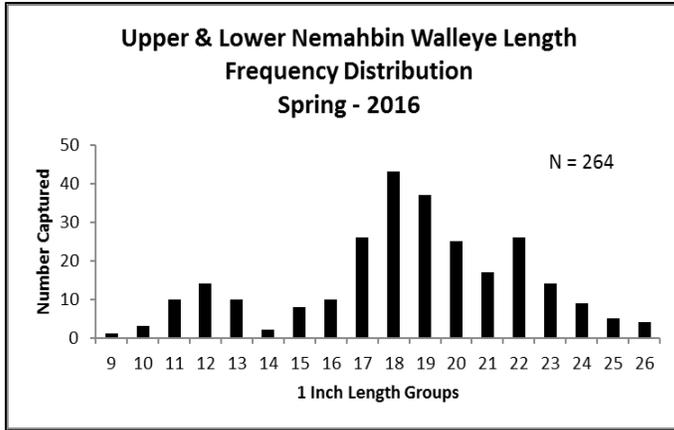
to the nearest tenth-pound. To estimate age and growth, dorsal spines were sampled from walleye, anal fin rays were sampled from northern pike and scales were sampled from bass. Mark and recapture efforts during fyke netting and electrofishing produced population estimate for walleye. Walleye abundance was estimated using the Petersen formula ( $N = M \cdot C / R$ ), where M is the number of marked fish at large, C is the number of fish captured during the recapture run, and R is the number of recaptured fish identified during the recapture run. Size structure, abundance and growth parameters were evaluated for walleye, northern pike and bass.

On May 10, electrofishing once again started where bass and panfish were the primary targeted species. Size structure and relative abundance were evaluated for bass and panfish species. Bass aging structures were also taken at this time to estimate age and growth. The final electrofishing effort occurred on October 5 & 18, where walleye were the primary targeted gamefish species and all gamefish species were collected.

## RESULTS

A total of 13 species combined for a grand total of 1,867 individual fish captured throughout the survey. Walleye, largemouth bass and northern pike were the primary gamefish species captured. Bluegill and rock bass were the most frequently captured panfish species. Very few rough fish species were captured with bowfin sampled in low numbers. White suckers were frequently encountered during this survey and are an important forage species found throughout the Bark River drainage.





**WALLEYE**

A total of 338 walleyes were sampled in 2016 including both spring and fall samples. Fluctuating water temperatures during spring of 2016 caused poor spawning conditions resulting in prolonged spawning season. As water temperatures reached the low 50's, adult female walleyes were captured that had not yet released their eggs. This is an unusual circumstance as walleye typically spawn prior to water temperatures reaching 50. Egg take for hatchery crews was difficult in southern Wisconsin in spring of 2016. Because of the long drawn out spawning period and potential upstream emigration, the adult walleye population was largely missed by our sampling efforts. Coefficient of variation for Peterson mark and recapture efforts resulted in values above 20% resulting in a non-reportable population estimate for walleye in 2016.

Relative abundance of walleye using

the spring electrofishing sample data revealed a catch rate of 3.6 walleyes per mile. Proportional Stock Density (PSD) is the percentage of fish greater than a given stock length that is also larger than a specified quality length and is used to describe size structure. Using a stock size of 12 inches and a quality size of 15 inches, proportional stock density or PSD15 was calculated at 47% for walleye during spring electrofishing. PSD15 for walleye captured in fyke nets was much higher at 92%. Growth of Nemahbin Lakes walleyes is excellent exhibiting a mean length at age above the statewide average.

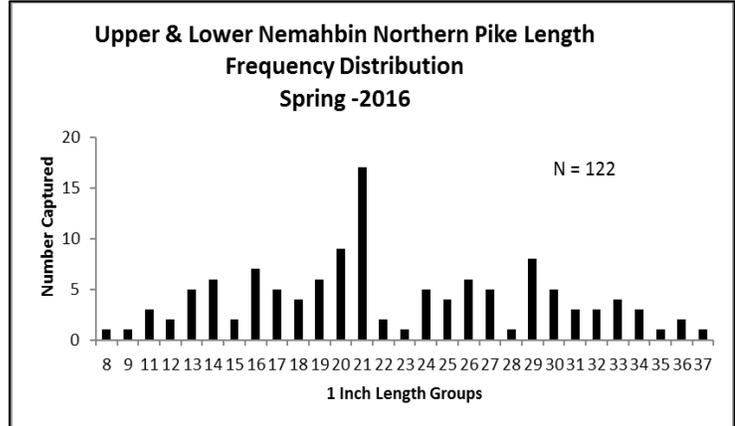
Walleye stocking practices prior to 2014 consisted of small fingerlings at a rate of 35 per surface acre. Small fingerling walleye stocking was determined to be ineffective from 2009 through 2013. Large fingerling walleyes have been stocked at a rate of 15 & 20 per acre for Upper and Lower Nemahbin in 2014 & 2016. The 2014-year class was well represented in our 2016 sample as demonstrated by the length frequency distribution. By the spring of 2016, the 2014-year class had completed two summers of growth, (one at the hatchery and one in the Nemahbin Lakes) with a mean length of 12 inches, indicating excellent growth and survival.



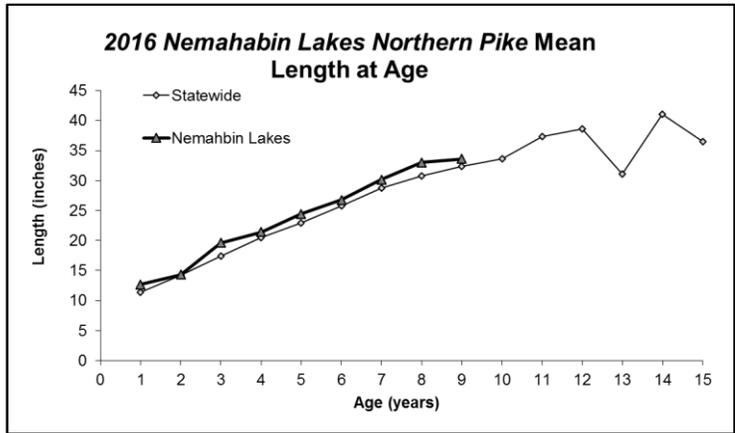
WDNR Fisheries Technician, Steven Gospodarek, holding a 17" left ventral fin clipped

**NORTHERN PIKE**

Northern pike catch rates were moderate at 0.4 pike per net night. The PSD21 value for northern pike was 63%. Northern pike growth rates were also higher than the statewide average with quality size fish captured above the thirty-inch mark. The largest fish captured during netting measured 37.5 inches. Based on our sample, northern pike size structure can be described as quality.



Recent northern pike stocking efforts has consisted of 8-10 inch large fingerlings from Wild Rose State Fish Hatchery (WRSFH). Pike at WRSFH are *intensively* reared, pellet fed and stocked in fall. From 2014-2017, stocked northern pike have been fin clipped using alternating ventral fin clips to evaluate relative contribution to the fishery. Northern pike, muskellunge and walleye have traditionally been reared *extensively*; outdoors in earth ponds

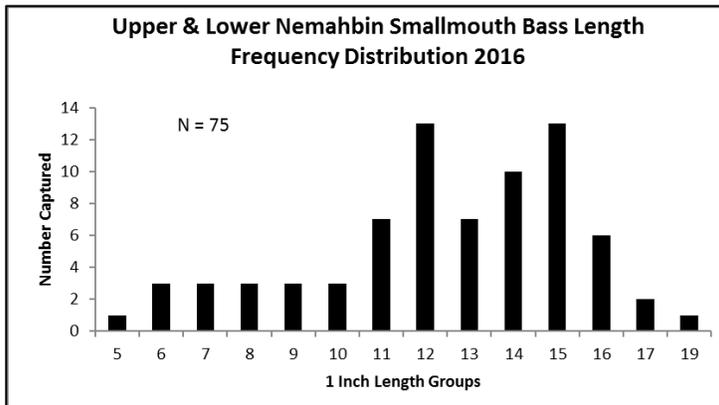
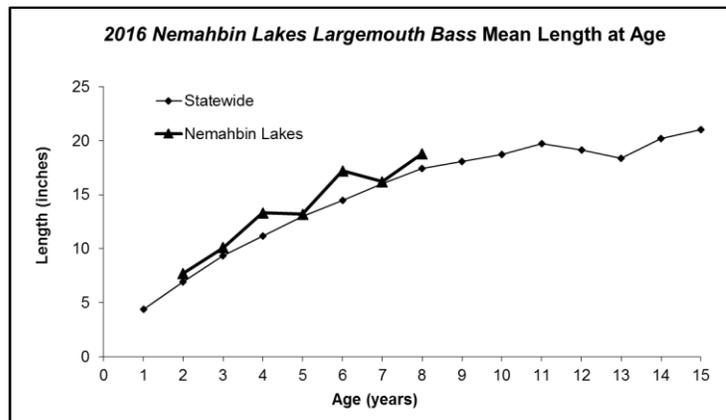
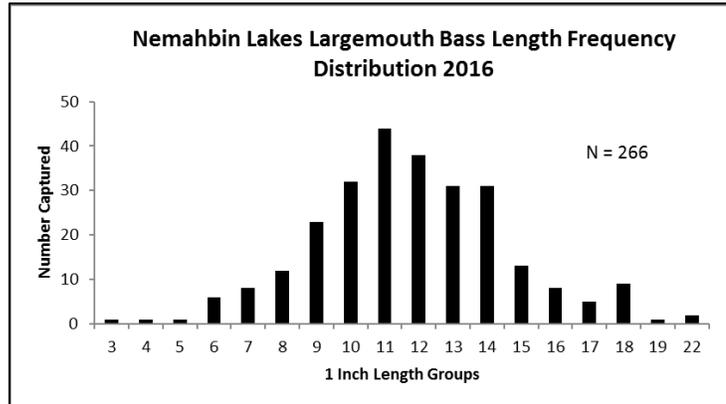


and fed minnows. At a rate of 2 per surface acre, the Nemahbin Lakes receives approximately 1000 large fingerlings per year. At the time of this survey, northern pike stocked with the differential fin clips were not yet mature and not easily captured by sampling gear. Preliminary results have shown minimal contribution from the pellet reared large fingerlings, as represented as a small percentage of our 2016 sample. Future electrofishing and netting surveys will better reveal relative contribution of the fin clipped, WRSFH pike. The stocking table provided below indicates LV for left ventral and RV for right ventral fin clips.

Nemahbin Lakes Northern Pike Stocking Evaluation 2014-2016 Stocking Data					
STOCKED LAKES	2014	2015	2016	2017	
Mark	LV	RV	LV	RV	Total
UPPER NEMAHBIN LAKE	566	470	609	499	2,144
LOWER NEMAHBIN LAKE	542	450	525	429	1,946
					4,090

## LARGEMOUTH BASS

Largemouth bass were captured at a moderate spring electrofishing rate of 6.4 per mile and a fall electrofishing rate of 9.6 per mile. Largemouth bass showed decent size structure with a proportional stock density (PSD12) of 50%. PSD12 in this example can also be described as the proportion of fish larger than stock size of 8 inches, that is also greater than 12 inches. Quality size largemouth bass were well represented in the sample with a good number fish in the high teens and the largest fish measuring 22.3 inches. Scales were taken from a subsample of bass and used to estimate age and growth. Growth of Largemouth bass, starting at the age of 2, was slightly faster than the statewide average as demonstrated by the adjacent growth curve.



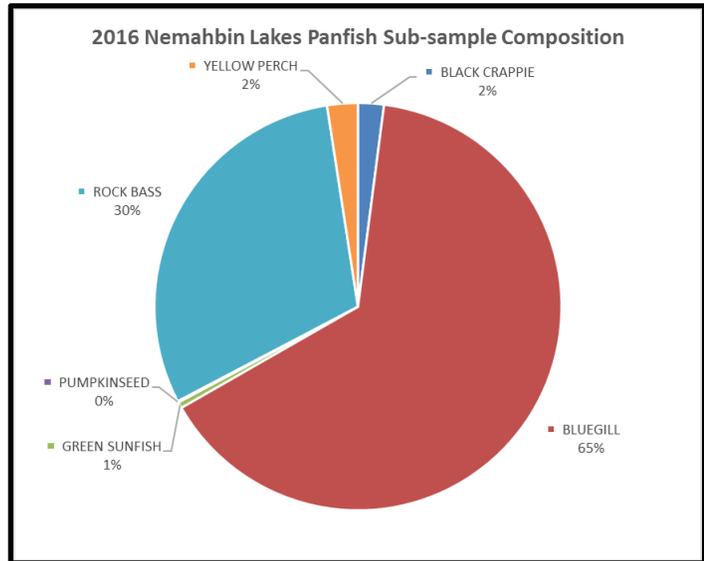
## SMALLMOUTH BASS

Smallmouth bass complement the gamefish population in Nemahbin Lakes very well, with the largest fish in our sample measuring 19.6 inches in length. Smallmouth bass habitat on the upstream portions of the Middle Bark River is consistent with other high-quality warmwater riverine habitat in the Lakes Country of Waukesha County. Size structure of smallmouth bass is well

represented by multiple year classes indicating consistent recruitment. Smallmouth bass proportional stock density (PSD11) was 76% in fall and 80% during spring indicating excellent size structure. Smallmouth bass were captured at a relatively low rate of 2.3 fish per mile in fall and 2.0 fish per mile in spring electrofishing surveys.

**PANFISH**

The total panfish sample comprised of 65% bluegill 30% rock bass. Black crappies and yellow perch combined to account for 4% of the total panfish catch with minimal numbers of pumpkinseed and green sunfish. The bluegill PSD6 value was 38% and rock bass PSD7 was 35%. Rock bass showed excellent size structure with the largest measuring 12 inches. Bluegills show decent size structure with 21% of the entire sample being larger than 7 inches.



**DISCUSSION**

Nemahbin Lakes showed excellent sport fish diversity as well as quality size structure. Northern pike and walleye have moderate densities resulting from mixed recruitment, or fish originating from both natural reproduction and hatchery origin. Short term survival of stocked large fingerling northern pike appears to be low, but more information is needed as gear avoidance by juvenile pike may be a factor.

The recent large fingerling walleye stocking efforts are showing good short term survival and growth. The removal of the Roller Mill Dam in 2013 has allowed fish passage to valuable walleye spawning habitat in the Middle Bark River. Natural reproduction of walleye on this system has been documented in non-stocked years. Both largemouth and smallmouth bass provide excellent angling opportunities, consistent recruitment of new fish into the fishery and excellent growth rates. Bluegill and rock bass provide much of the pan-fishing opportunities while yellow perch, black crappies, pumpkinseed and green sunfish are present in low numbers. White suckers are the predominant forage species resulting in excellent growth and healthy size structure of gamefish. This healthy and diverse gamefish population maintains a moderate panfish population level, in-turn resulting in adequate panfish growth rates and size structure.

Species	PSD VALUE	Spring		Spring		Fall	
		Catch / Mile	PSD	Catch / Net Night	PSD	Catch / Mile	PSD
Largemouth Bass	PSD12	6.4	49%	0.2	72%	9.6	51%
Smallmouth Bass	PSD11	2	80%	0.1	95%	2.3	76%
Walleye	PSD15	3.6	47%	0.8	92%	1.5	
Northern Pike	PSD21			0.4	63%	1.5	

Species	Number Captured
BLACK CRAPPIE	21
BLUEGILL	663
BOWFIN	6
GREEN SUNFISH	5
LARGEMOUTH BASS	268
NORTHERN PIKE	135
PUMPKINSEED	1
RAINBOW TROUT	10
ROCK BASS	310
SMALLMOUTH BASS	76
WALLEYE	338
YELLOW BULLHEAD	9
YELLOW PERCH	25
<b>Total</b>	<b>1867</b>

## **FISHERIES MANAGEMENT RECOMMENDATIONS**

- Continue stocking large fingerling walleye and northern pike until recruitment to creel is fully evaluated
- Maintain current special walleye regulations of 18” minimum length limit and daily bag limit of 3
- Maintain current statewide standard regulations for all other species
- Promote habitat protection and enhancement best management practices including the addition of woody structure or “fish sticks” in littoral habitat
- Promote fish passage on connected portions of the Bark River providing additional diversity of habitat for improved natural reproduction and nursery habitat of native fish species.

If you have questions, comments or concerns regarding this management report, please contact the following;

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