Pigeon Lake 2014 Fish Survey Report

Steve Hogler
Steve Surendonk
Rod Lange

Abstract

Pigeon Lake is a seepage lake located in south-central Manitowoc County. It has a surface area of 77 acres and a maximum depth of 67 feet. The lake is hard, clear and experiences heavy recreational use. The shoreline is highly developed with over sixty dwellings and a youth camp on its shores.

The 2014 fisheries survey on Pigeon Lake characterized the fish populations of the lake using various fisheries assessment gear during multiple seasons. Each gear type was efficient in capturing certain fish species and fish sizes. The use of multiple gears during different sampling seasons provided a clearer picture of the entire fish community and fish population characteristics of individual species within the lake. However, in 2014 the late spring and quick melt likely caused our spring surveys to miss much of the spring spawning period and the fish that we usually capture with fyke nets or electroshocking gear.

A total of 915 fish were collected during the fisheries survey of Pigeon Lake with Bluegill, Rock Bass and Largemouth Bass as the most common species captured during the survey.

Based on catch per effort data, Largemouth Bass were more abundant in 2014 than measured during the last comprehensive fish survey in 1984. The 2014 survey also noted an improvement in growth of Bass since the previous survey. Walleye were stable in number and continued to exhibit good growth. Natural reproduction of walleye was not noted in 2014 and if present, is likely very low. The Northern Pike population appeared to be stable with perhaps some decline in growth rate noted.

Panfish numbers were down since the previous comprehensive survey conducted 1984. Decreasing numbers have allowed growth rates to improve for Bluegill and Rock Bass.

It is recommended to continue Walleye stocking, to support a new DNR panfish study and conduct follow-up surveys following that initiative that evaluates changes in individual panfish daily bag limits to improve size structure in bluegill. We encourage the reestablishment of natural shorelines including diverse, native aquatic plant communities for the benefit of fish species.

Introduction

Pigeon Lake is a seepage lake located in south-central Manitowoc County (Figure 1). It has a surface area of 77 acres and a maximum depth of 67 feet. The lake is hard, clear and experiences heavy recreational use. The shoreline is highly developed with over sixty dwellings and a youth camp on its shores. Public access and parking is available in the northeast corner of the lake where Manitowoc County operates the boat launch. Currently, the lake is managed as a bass-bluegill fishery with odd calendar year walleye stocking by DNR to provide additional fishing opportunities. In some even years, the Pigeon Lake Association also stocks Walleye.

Figure 1. Pigeon Lake (circled in red) is located 15 miles southwest of the City of Manitowoc in south-central Manitowoc County.

A 1945 survey was the first to investigate the fish populations of the lake (Hogler and Peeters 1998). During this survey, the fyke net catch was dominated by Bluegill and Rock Bass. Largemouth Bass were the most common gamefish, with few Walleyes present in the catch. Fishing and other recreational uses of the lake were described as heavy. Beginning in 1956, a mixture of Rainbow and Brown Trout were stocked into Pigeon Lake to establish a two story lake. A 1963 electroshocking survey captured some Trout but the catch was dominated by Bluegill, Rock Bass, Yellow Perch and Bullhead. Largemouth Bass were the most common gamefish collected with several Northern Pike also captured. An intensive fisheries survey was conducted on Pigeon Lake in 1973. Bluegill, White Sucker, Yellow Perch and Walleye were the most common fish captured. This survey also characterized the fish populations of the lake as being slow growing. At this time, it was recommended to halt Trout stocking, to manage the lake as a warm water fishery and to stock Walleye.

The most recent comprehensive survey of Pigeon Lake occurred in 1984 (Hogler and Peeters 1998). A total of 3,312 fish representing twelve species were collected, with Bluegill dominating the catch. Substantially lower numbers of Rock Bass, Bullhead,

Walleye, Largemouth Bass, Northern Pike and Alewife were captured during the survey. Walleye and Largemouth Bass were the dominant gamefish, with the Walleye population sustained by stocking. Similar to past surveys, the growth of gamefish species were slower than state averages. The panfish community was dominated by Bluegill and Rock Bass and the growth of panfish species were less than state averages at all ages.

Recent fisheries activities on Pigeon Lake included a fish kill investigation in May 2000 (Hogler 2000) and a 2006 electroshocking survey (Hogler and Surendonk 2006). The fish kill was caused by super-saturation of dissolved oxygen following a large algae bloom. Fish mortality was considered to be light to moderate to the species affected by the kill; Walleye, Largemouth Bass, Bluegill, Black Crappie and Alewife.

During October 2006, Pigeon Lake was nighttime electroshocked to determine the status of the fish populations of the lake. Largemouth Bass and Bluegill dominated the catch with Walleye, Northern Pike and other panfish captured in much lower numbers. The growth of gamefish was less than state averages which was similar to results from previous studies but the growth of Bluegill was greater than in previous surveys and was likely due to lower competition for food resources because bluegill and other panfish were less abundant in 2006 then found historically. It was recommended to continue Walleye stocking to provide fishing opportunity.

A comprehensive fish survey was conducted in 2014 to evaluate the status of the fishery populations of Pigeon Lake as part baseline lake monitoring and followed DNR lake monitoring protocols.

METHODS

Spring Fyke Netting

A standard comprehensive fisheries survey on Pigeon Lake began in April 2014 and continued through September. Seven fyke nets were set following ice-out on April 21, fished until April 29 and were used to capture and mark spawning Walleye, Northern Pike and Yellow Perch for the purpose of estimating adult population size (Figure 2). Other species captured in fyke nets were also marked for potential population size estimation, but nets were set in habitats to target adult spawning Walleye. Overall, there were 42 net lifts for a total effort of 56 net-nights during the netting period. All fish were identified, measured, marked with a caudal fin clip and scales, anal rays or spines were removed from a sub-sample of fish for age determination.

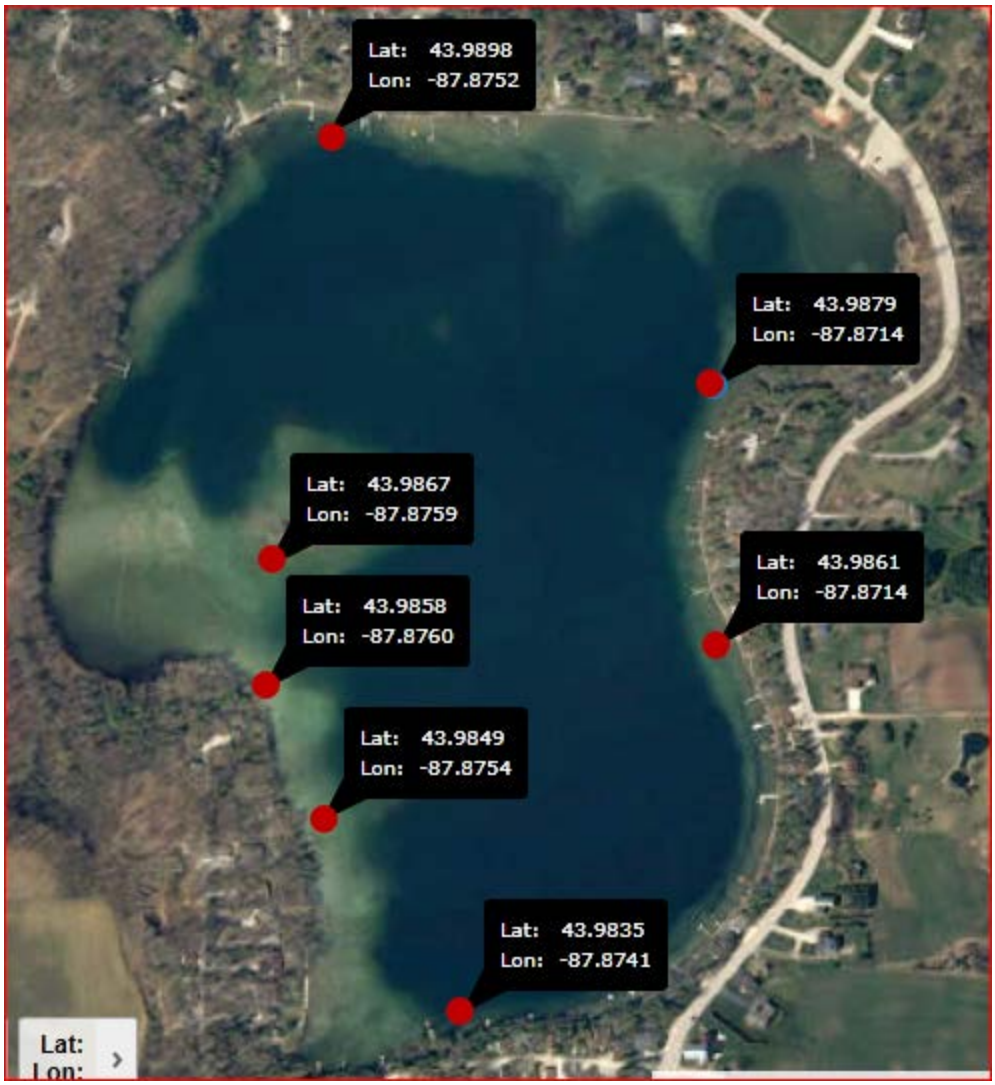

Figure 2. The locations of the seven fyke nets that were fished in Pigeon Lake from April 21 through April 29, 2014 are marked by a dot on the lake map.

Spring Electrofishing

Shortly after the completion of fyke netting, the entire shoreline was electroshocked on the night of May 5 to look for marked fish. All fish were netted, identified, examined for marks, and measured.

Centrarchid Electrofishing

Similarly, during the night of May 28 the entire shoreline was electroshocked to estimate Largemouth Bass and panfish relative abundance. All fish were netted, identified, examined for marks and measured.

Fall Recruitment and CPE Sampling

On the night of September 30, the entire shoreline was electroshocked to determine the abundance young-of-year fish and to assess the general population of fish. All fish were netted, identified, and counted. Gamefish and panfish were measured.

Statistical Analyses

Basic fisheries statistics, such as average length, length frequencies by survey type, age distributions, and population estimates were calculated. Mean length at age was determined first by using an age length key to extrapolate length age distributions from the sub-sample of fish that were aged to the full sample length frequency, then second calculating the arithmetic mean of the length for a given age from the estimated full sample age distribution.

The Petersen population estimation method was used when possible to estimate community population size when the recapture numbers were large enough to provide an unbiased estimate of population size. For the Petersen method, population size was estimated as the ratio between the number of fish initially marked and released during the marking period (M), times the number of fish captured and examined for marks (C) during the recapture period, divided by the number of fish that were found to have marks during the recapture period (R) using the Petersen estimator.

RESULTS

Spring Netting

Shortly after ice out, seven fyke nets were set in Pigeon Lake to capture spring spawning fish. The seven nets were lifted six times for a total effort of 42 or 56 net nights. During the fyke net portion of the survey, 579 fish were captured for a total catch per effort (CPE) of 10.3 fish per net per night (Table 1). Of the eleven species captured, Rock Bass, Bluegill and Yellow Perch dominated the catch, with substantially fewer Largemouth Bass, Walleye and Northern Pike captured.

Table 1. Fish captured by species from Pigeon Lake with fyke nets from April 21–29, 2014.

Species	Number	Catch Per Night (CPE)	Average Length (mm)	Size Range (mm)
Largemouth Bass	25	0.4	373	190-500
Northern Pike	24	0.4	567	280-792
Walleye	39	0.7	482	356-691
Bullhead Spp.	21	0.4	293	230-340
Black Crappie	8	0.1	255	184-324
Bluegill	155	2.8	145	88-210
Bluegill Hybrid	14	0.3	137	101-173
Green Sunfish	10	0.2	137	101-199
Pumpkinseed	9	0.2	121	94-155
Rock Bass	174	3.1	169	102-289
Yellow Perch	100	1.8	185	135-261
Total	579	10.3		

Gamefish

Walleye

Walleye were the most common gamefish that we captured during fyke netting (Table1). Since we were unable to determine the sex of many of the walleye that we captured, all walleye data was pooled for analysis. The 39 walleye that were captured ranged in length from 356 mm to 691 mm and had an average length 482 mm (Table 2). Thirty-six of the thirty-nine (92.3%) captured Walleye were greater than the 15" (381 mm) minimum Walleye size limit for anglers on the lake. In addition, 14 (35.9%) of the walleye were greater than 457 mm (18").

Age was determined for the Walleye using a dorsal spine. For Walleye captured during this survey, age ranged from age 2 through age 12 except for age 5 and age 9 fish which were absent from the sample (Table 3). Age 3 was the most common age Walleye followed by age 4 and age 8 fish. Age 3 walleye averaged 418 mm in length.

Based on the age data, it appears that in Pigeon Lake it takes Walleye three summers of growth to reach the minimum size (15") that anglers can harvest (Table 3). In addition, year class strength based on our limited sample appears to decline quickly after Walleye reach harvestable size. The growth of walleye, measured as the average length of each age class, indicates that in 2014 Walleye in Pigeon Lake grew at faster rates than they did in 1984 and appear to grow faster than Walleye in other lakes across Wisconsin (Table 4).

Table 2. The length distribution of gamefish captured with fyke nets from Pigeon Lake during April, 2014. Note that a single Largemouth Bass in the 190 mm range is not shown.

Length (mm)	Largemouth Bass	Northern Pike	Walleye	Bullhead Spp.
230				1
240				2
250				1
260	1			
270				1
280		1		3
290				4
300				2
310				2
320				2
330	2			2
340	1			1
350	2		2	
360	5		1	
370	3	1		
380				
390	4			
400	2	1	3	
410			2	
420			6	
430			1	
440	2		3	
450	1		1	
460		1		
470		1	1	
480			1	
490		1	2	
500	1	3	2	
510		2	1	
520			1	
530		1	2	
540		1	1	
550			2	
560		1		
570		2	1	
580			2	
590			2	
600				
610			1	
620				
630		1		
640				
650		1		
660				
670				
680				
690		1	1	
700				
710				
720				
730		1		
740		1		
750				
760				
770		1		
780		1		
790		1		
800				
Total	25	24	39	21
Average Length	373	567	482	293
S.D.	59.9	134.4	79.1	31.2

Table 3. The age distribution of Walleye captured during the fyke survey on Pigeon Lake in April, 2014.

Length (mm)	Number	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10	Age 11	Age 12
210												
220												
230												
240												
250												
260												
270												
280												
290												
300												
310												
320												
330												
340												
350	2	1	1									
360	1	1										
370												
380												
390												
400	3		3									
410	2		2									
420	6		5	1								
430	1		1									
440	3		3									
450	1			1								
460												
470	1			1								
480	1			1								
490	2			1			1					
500	2							1		1		
510	1					1						
520	1					1						
530	2			1				1				
540	1						1					
550	2							1			1	
560												
570	1										1	
580	2					1		1				
590	2							1		1		
600												
610	1							1				
620												
630												
640												
650												
660												
670												
680												
690	1											1
Total	39	2	15	6	0	3	2	6	0	2	2	1
Ave. Length	482	360	418	475		539	520	563		549	562	691
S.D.	79.1	3.5	22.2	37.8		40.5	35.4	40.4		26.2	11.3	--

Table 4. The average length at age for Pigeon Lake fish aged from fyke net surveys in 2014 and 1984 compared to state wide averages. The lengths are in mm.

Species	Survey Year	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10
Largemouth Bass	2014		155	206	284	331	350	359	403	--	--
	1984	49	106	164	223	272	314	353	391	417	432
	State Average	97	165	229	290	338	384	414	447	470	485
Walleye	2014		360	418	475		539	520	563		549
	1984	150	263	358	434	489	529	560	585	604	624
	State Average	152	254	324	381	432	457	508	521	554	574
Northern Pike	2014		280	427	478	581	718	611	609	630	753
	1984	200	374	523	623	691	794				
	State Average	356	406	470	546	610	650				
Rock Bass	2014		111	129	174	211	233	233	252	252	250
	1984	33	56	86	109	113	152	171	184	199	211
	State Average	53	91	127	155	175	193	213	226	239	244
Bluegill	2014			116	149	159	177	170		187	
	1984	45	72	97	120	140	158	169	182	181	201
	State Average	64	97	122	147	168	183	196	208	211	218

Largemouth Bass

A total of 25 Largemouth Bass were captured during the fyke net survey (Table 1). These Bass ranged in length from 190 mm to 500 mm and had an average length of 373 mm (Table 2). Most of the captured Bass were between 330 mm and 400 mm in length with 72% (18 of 25) greater than 356 mm (14") size minimum and 4% greater than 457 mm (18").

To determine the age distribution of Bass in Pigeon Lake, we collected a combination of scales (fish less than 300 mm) and spines (fish greater than 300 mm) from all the Bass handled during the spring surveys (netting and shocking). The ages of Bass captured in these surveys ranged from age 2 to age 12 and age 18. Age 6 was the most common age Bass we captured and these fish averaged 350 mm in length (Table 5).

The growth of captured Bass in 2014 was greater than what was measured during the 1984 survey, but slightly less than Statewide averages (Table 4). Based on the 2014 age

sample, it takes a Largemouth Bass in Pigeon Lake five to six years to reach the minimum harvest length.

Table 5. The age distribution of Largemouth Bass from Pigeon Lake collected during spring fyke net and electroshocking surveys in 2014. Note that this table does not include ages 13 through 17 in which no fish were identified as being these ages.

Length (mm)	Number	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10	Age 11	Age 12	Age 18
100														
110														
120														
130	1		1											
140														
150	1		1											
160	3		2	1										
170														
180														
190	2			2										
200														
210														
220	2			2										
230	1			1										
240														
250														
260	1				1									
270														
280														
290	2				2									
300	1					1								
310														
320	2						2							
330	4					3	1							
340	2						2							
350	6					1	2	3						
360	7						4	2				1		
370	4							1		1		2		
380	1									1				
390	5						1		1	3				
400	4								2		1		1	
410	2								2					
420	1											1		
430														
440	3									1			2	
450	1									1				
460														
470	1												1	
480														
490														
500	1													1
Total	58	0	4	6	3	5	12	6	5	7	1	4	4	1
Average Length			155	206	284	331	350	359	403	404	406	386	442	500
SD			15.7	27.6	17.4	17.5	20.0	6.9	8.5	30.8	--	27.9	25.5	--

Northern Pike

The 25 Northern Pike captured during netting ranged in length from 280 mm to 792 mm and had an average length of 567 mm (Table 1). The fyke nets captured a wide size range of Northern Pike with most fish between 460 mm and 570 mm in length (Table 2). Only six fish (24%) were greater than 660 mm (Table 2).

Anal rays and scales were collected from 24 Northern Pike to aid in age determination. When the rays and scales were analyzed, age 2 through age 10 Pike were in our sample (Table 6). Age 7 Pike were the most common, but other age groups were also well represented.

Unlike results from 1984 which indicated that Northern Pike grew faster at all ages compared to state averages, results from 2014 indicate that growth was below state averages through age 5 (Table 4). This difference could be the result of using anal rays instead of scales for aging fish.

Table 6. The age distribution of Northern Pike captured in fyke nets set in Pigeon Lake in April 2014.

Length (mm)	Number	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10
280	1	1								
290										
300										
310										
320										
330										
340										
350										
360										
370	1		1							
380										
390										
400	1		1							
410										
420										
430										
440										
450										
460	1			1						
470	1			1						
480										
490	1			1						
500	3		1		1		1			
510	2						1	1		
520										
530	1						1			
540	1							1		
550										
560	1				1					
570	2				1			1		
580										
590										
600										
610										
620										
630	1								1	
640										
650	1					1				
660										
670										
680										
690	1				1					
700										
710										
720										
730	1									1
740	1						1			
750										
760										
770	1						1			
780	1					1				
790	1							1		
800										
Total	24	1	3	3	4	2	5	4	1	1
Ave. Length	567	280	427	478	581	718	611	609	630	733
S.D.	134.4	--	68.5	17.5	79.6	94.8	133.3	125.1	--	--

Panfish

Rock Bass

Rock Bass were the most common panfish captured during fyke netting (Table 1). The 174 Rock Bass captured ranged in length from 102 mm to 289 mm and had an average length of 169 mm. Although most Rock Bass were less than 200 mm in length, many (60.9%) were greater than 150 mm in length (Table 7).

Table 7. The length distribution of panfish captured during April fyke netting in Pigeon Lake.

Length (mm)	Black Crappie	Bluegill	Bluegill Hybrid	Green Sunfish	Pumpkinseed	Rock Bass	Yellow Perch
50							
60							
70							
80		2					
90		5			1		
100		18	2	1	2	7	
110		25	1	2	1	20	
120		10	3		3	21	
130		5		2		11	1
140		14	4	3	1	9	5
150		18	1	1	1	7	11
160		17	2			18	19
170		12	1			18	18
180	1	14				7	14
190	1	8		1		11	7
200		6				5	4
210		1				10	5
220	1					9	2
230						7	5
240						6	4
250						5	3
260	1					1	2
270	1					1	
280	1					1	
290							
300	1						
310							
320	1						
Total	8	155	14	10	9	174	100
Average Length	255	145	137	137	121	169	185
S.D.	51.0	32.1	23.1	27.2	19.6	44.7	30.1

When Rock bass scales were analyzed, age classes 2 through 10 were identified in our sample (Table 8). Age 4 Rock Bass were the most common followed by age 3 fish. Based on the age samples it appears that Rock Bass take nearly 4 years to become 150 mm in length and 5 years to be 200 mm in length.

The 2014 age samples indicate that Rock Bass in Pigeon Lake were longer at each age than in other lakes across the state (Table 4). 2014 growth data also showed improved growth to 1984 data when growth was below state averages at each age.

Table 8. The age distribution of Rock Bass captured in fyke nets in Pigeon Lake.

Length (mm)	Number	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10
100	7	7								
110	20	8	12							
120	21	3	18							
130	11		11							
140	9		6	3						
150	7		1	6						
160	18			18						
170	18			18						
180	7			6	1					
190	11			9	2					
200	5			1	2	1	1			
210	10				8		1		1	
220	9				2	5	2			
230	7				1	5		1		
240	6					2	2	2		
250	5					2	2			1
260	1							1		
270	1							1		
280	1								1	
290										
300										
Total	174	18	48	61	16	15	8	5	2	1
Ave. Length	169	111	129	174	211	233	233	252	252	250
S.D.	44.7	6.0	9.7	14.8	12.5	12.1	17.9	15.9	53.0	--

Bluegill

Bluegill were the second most common panfish captured during fyke netting (Table 1). The 155 Bluegill handled ranged in length from 88 mm to 210 mm and had an average length of 145 mm (Table 7). Nearly half (49%) of the Bluegill were greater than 150 mm in length, but only 4.5% were greater than 200 mm in length.

When Bluegill scales were analyzed, age 3 through age 7 and age 9 fish were identified in our sample (Table 9). Age 5 and age 3 Bluegill were the most common ages, with few fish representing ages greater than age 6.

Similar to Rock Bass growth, Bluegill growth showed marked improvement over what was measured in 1984 and was very near state average growth at each age in 2014 (Table 4).

Table 9. The age distribution of Bluegill captured with fyke nets from Pigeon Lake in 2014.

Length (mm)	Number	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9
60								
70								
80	2	2						
90	5	5						
100	18	14	4					
110	25	15	7	3				
120	10	1	7	1	1			
130	5		2	2		1		
140	14	3		10	1			
150	18	3	1	10	3	1		
160	17	1	7	7	2			
170	12		2	7	3			
180	14	1	1	5	5	1		1
190	8		4	3	1			
200	6		1	1	3	1		
210	1				1			
Total	155	45	36	49	20	4	0	1
Ave. Length	145	116	149	159	177	170		187
S.D.	32.0	22.8	31.2	21.9	21.4	27.7		--

During netting additional fish species were captured. In decreasing order of abundance, we handled Yellow perch, Bullhead Sp., Hybrid Bluegill, Green Sunfish, Pumpkinseed Sunfish and Black Crappie (Table 1). Their average lengths were 185 mm, 293 mm, 137 mm, 137 mm, 121 mm and 255 mm, respectively.

A small subsample of Yellow Perch (13 of 100) had a dorsal spine removed for age analysis. Age 3 through Age 6 were present in the sample, with age 3 Yellow Perch being the most common age class.

Spring Electroshocking

On the night of May 5 the entire shoreline of Pigeon Lake was shocked twice to look for fish marked during fyke netting. During 83 minutes of shocking, we captured 56 fish representing eleven species (Table 10). Total CPE was 21.4 fish per mile or 40.6 fish per hour shocked. Largemouth Bass and Bluegill dominated the catch with fewer individuals of other species captured.

Table 10. Fish captured by species from Pigeon Lake during night time electroshocking on May 5, 2014.

Species	Number	Fish Per Mile (CPE)	Fish Per Hour (CPE)	Average Length (mm)	Size Range (mm)	Peterson Population Estimate	Population Range
Largemouth Bass	22	8.4	15.9	358	271-439		
Northern Pike	1	0.4	0.7	641			
Walleye	1	0.4	0.7	458			
Bullhead Spp.	1	0.4	0.7	265			
Black Crappie	3	1.1	2.2	232	201-274		
Bluegill	16	6.1	11.6	138	80-195	2,190	457-86,573
Bluegill Hybrid							
Green Sunfish							
Pumpkinseed	1	0.4	0.7	147			
Rock Bass	5	1.9	3.6	217	171-253	744	231-29,480
Yellow Perch	1	0.4	0.7	145			
Alewife	4	1.5	2.9	129	100-143		
Bluntnose Minnow							
White Sucker	1	0.4	0.7	--			
Total	56	21.4	40.6				

Gamefish

Largemouth Bass dominated the gamefish catch. The 22 Bass captured ranged in length from 271 mm to 439 mm and had an average length of 3?58 mm (Table 10). Most of the Bass (54.5%) were greater in length than the 356 mm (14”) minimum harvest size limit (Table 11).

Only a single Walleye and Northern Pike were captured during shocking. The average lengths of these fish were 458 mm and 641 mm, respectively (Table 1).

No gamefish were recaptured with marks given during fyke netting during electroshocking so Peterson Population estimates could not be calculated for these species.

Panfish

Bluegill were the most common panfish that were captured followed by Rock Bass and Black Crappie (Table 10). Nearly half the panfish were greater than 150 mm in length but few were greater than 200 mm in length (Table 11).

During electroshocking, we captured four panfish that had a fin clip from the fyke survey. This included three Rock Bass and one Bluegill. Peterson population estimates calculated that between 457 and 86,753 Bluegill and between 231 and 29,480 Rock Bass were in Pigeon Lake. These estimates should be viewed cautiously because the limited number of fish marked during netting and few recaptures can lead to poor estimates of true population number.

Table 11. The length distribution of fish captured during night electroshocking of Pigeon Lake on May 5.

Length (mm)	Largemouth Bass	Walleye	Bullhead Spp.	Black Crappie	Bluegill	Pumpkinseed	Rock Bass	Yellow Perch
80					1			
90								
100					2			
110					4			
120								
130					2			
140					2	1		1
150								
160								
170					2		1	
180					1			
190					2			
200				1			1	
210								
220				1			1	
230							1	
240								
250						1		
260			1					
270	2							
280								
290								
300	1							
310								
320	1							
330	1							
340	2							
350	3							
360	3							
370	1							
380	5							
390	1							
400	1							
410								
420								
430	1							
440								
450		1						
Total	22	1	1	3	16	1	5	1
Average Length	358	458	265	232	138	147	217	145
S.D.	40.0	--	--	37.7	35.7	--	31.8	--

Other Species

During electroshocking, a number of Alewife were collected (Table 10). Although they have not been seen recently in the lake during surveys, they have been found sporadically in the lake since the early 1970's in low number.

Centrarchid Electrofishing

During the night of May 28, the entire shoreline of Pigeon Lake was electroshocked to evaluate the Bass and panfish populations of the lake. During the 45 minutes shocking, we captured 123 individual fish representing seven species (Table 12). Total CPE was 93.9 fish per mile or 164.0 fish hour. Bluegill and Largemouth Bass dominated the catch with other species captured less frequently.

Table 12. Fish captured by species from Pigeon Lake during night time electroshocking on May 28, 2014.

	Number	Fish Per Mile (CPE)	Fish Per Hour (CPE)	Average Length (mm)	Size Range (mm)
Largemouth Bass	33	25.2	44.0	317	133-471
Northern Pike					
Walleye					
Bullhead Spp.	14	10.7	18.7	289	252-330
Black Crappie	1	0.8	1.3	190	
Bluegill	59	45.0	78.7	118	74-180
Bluegill Hybrid	3	2.3	4.0	143	110-177
Green Sunfish					
Pumpkinseed					
Rock Bass	9	6.9	12.0	177	83-250
Yellow Perch	4	3.1	5.3	192	182-204
Total	123	93.9	164.0		

Gamefish

Largemouth Bass was the only gamefish captured during this portion of the survey. The 33 Bass ranged in length from 133 mm to 471 mm and had an average length of 317 mm (Table 13). Twelve of the captured Bass (36.4%) were greater than the 356 mm (14") minimum size limit for Bass on Pigeon Lake but only one was greater than 457 mm (Table 13).

Table 13. The length distribution of fish captured during night electroshocking of Pigeon Lake on May 28.

Length (mm)	Largemouth Bass	Bullhead Spp.	Black Crappie	Bluegill	Bluegill Hybrid	Rock Bass	Yellow Perch
70				2			
80				9		1	
90				5			
100				10			
110				12	1		
120				1		1	
130	1			5			
140				5	1		
150	1			2		2	
160	3			2			
170				5	1	1	
180				1			1
190	1		1				2
200						1	1
210						1	
220	2						
230	1						
240							
250		2				2	
260		2					
270		3					
280							
290	2	2					
300	1	1					
310							
320	2	3					
330	2	1					
340	1						
350	4						
360	2						
370	1						
380	1						
390	1						
400	2						
410	2						
420	1						
430							
440	1						
450							
460							
470	1						
480							
490							
500							
Total	33	14	1	59	3	9	4
Average Length	317	289	190	118	143	177	192
S.D.	92.8	26.7	--	29.0	33.5	56.8	9.1

Panfish

Bluegill dominated the catch during this portion of the survey. The 59 Bluegill ranged in length from 74 mm to 180 mm and had an average length of 118 mm (Table 12). Many of the captured Bluegill were clustered around the 100 mm to 120 mm length range with very few larger Bluegill captured (Table 13). Only 10 (16.9%) were longer in length than 150 mm and none were longer than 200 mm in length (Table 13).

Other panfish captured included Yellow Perch, Rock Bass, Black Crappie and Hybrid Bluegill but in much lower number than Bluegill (Table 12).

Other Species

During that electroshocking survey, we also captured 14 Bullhead Sp. (Table 12). The Bullhead ranged in length from 252 mm to 330 mm and had an average length of 289 mm (Table 13).

Fall Recruitment and CPE Sampling

During the night of September 30, the entire shoreline of Pigeon Lake was shocked to evaluate Walleye young of year (YOY) production as well as the spawning success of other species and to generate additional CPE information. During the 45 minutes of shocking, we captured ten species which were comprised of 157 individual fish (Table 14). Total CPE was 119.8 fish per mile or 209.3 fish per hour shocked. Bluegill and Largemouth Bass were the dominant species in the catch.

Table 14. Fish captured by species from Pigeon Lake during night time electroshocking on September 30, 2014.

	Number	Fish Per Mile (CPE)	Fish Per Hour (CPE)	Average Length (mm)	Size Range (mm)
Largemouth Bass	27	20.6	36.0	270	119-422
Northern Pike	5	3.8	6.7	480	352-622
Walleye	1	0.8	1.3	400	
Bullhead Spp.	4	3.1	5.3	286	250-319
Black Crappie	5	3.8	6.7	203	118-247
Bluegill	102	77.9	136.0	108	70-221
Bluegill Hybrid					
Green Sunfish					
Pumpkinseed					
Rock Bass	5	3.8	6.7	174	110-262
Yellow Perch	6	4.6	8.0	197	101-276
Alewife					
Bluntnose Minnow	1	0.8	1.3	--	
White Sucker	1	0.8	1.3	--	
Total	157	119.8	209.3		

Gamefish

Largemouth Bass dominated the gamefish catch (Table 14). The 27 bass ranged in length from 119 mm to 422 mm and had an average length of 270 mm. Most captured bass were small in size and only 5 (18.5%) were greater in length than the 356 minimum harvest size limit (Table 15). Based on state wide average length at age data and our spring aging data, it is possible the smallest captured Bass were YOY based on their length.

During the fall survey, we also captured five Northern Pike and one Walleye. The Pike had an average length of 480 mm (Table 14). None of the Pike or Walleye appeared to be YOY based on their length.

Panfish

Bluegill dominated our panfish collection during fall electroshocking. The 102 Bluegill ranged in length from 70 mm to 221 mm and had an average length of 108 mm (Table 14). Few Bluegill were greater than 150 mm in length (Table 16).

Other panfish were captured in substantially lower number. In declining abundance we caught Yellow perch, Rock Bass and Black Crappie.

Other Species

During fall electroshocking we also captured four Bullhead Sp. and one White Sucker during the circuit of the lake (Table 15).

Table 15. Gamefish captured by species from Pigeon Lake during night time electroshocking on September 30, 2014.

Length (mm)	Largemouth Bass	Northern Pike	Walleye	Bullhead Spp.
100				
110	1			
120	1			
130	1			
140				
150				
160				
170				
180	1			
190				
200				
210				
220	2			
230	2			
240	4			
250	1			1
260	2			
270				
280	4			1
290				1
300	2			
310				1
320				
330				
340	1			
350		1		
360	2			
370				
380				
390	1	1		
400			1	
410	1			
420	1			
430				
440				
450				
460				
470		1		
480				
490				
500				
510				
520				
530				
540				
550				
560		1		
570				
580				
590				
600				
610				
620		1		
630				
640				
650				
Total	27	5	1	4
Average Length	270	480	400	286
S.D.	79.8	113.2	--	28.8

Table 16. Panfish captured by species from Pigeon Lake during night time electroshocking on September 30, 2014.

Length (mm)	Black Crappie	Bluegill	Rock Bass	Yellow Perch
50				
60				
70		19		
80		8		
90		16		
100		21		1
110	1	13	2	
120		6		
130		4		
140		3	1	
150		2		
160		3		
170		4		
180		2		2
190	1			
200				1
210				
220	1	1		
230	1		1	1
240	1			
250				
260			1	
270				1
280				
290				
300				
Total	5	102	5	6
Average Length	203	108	174	197
S.D.	51.1	29.9	69.6	59.5

Discussion and Conclusions

The 2014 fisheries survey on Pigeon Lake characterized the fish populations of the lake using multiple fisheries assessment gear during multiple seasons. Each gear type was efficient in capturing certain fish species and fish sizes. The use of multiple gears during different sampling seasons provided a clearer picture of the entire fish community and fish population characteristics of individual species within the lake. However, in 2014 the late spring and quick melt likely caused our spring surveys to miss a significant portion of the spring spawning period and the fish that we usually capture with fyke nets or electroshocking gear.

A total of 915 fish were collected during the fisheries surveys of Pigeon Lake with Bluegill, Rock Bass and Largemouth Bass the most common species (Tables 1, 10, 12 and 14). Other species were captured in lower numbers.

Gamefish

Largemouth Bass were the most common gamefish that we captured during this survey (Tables 1, 10, 12 and 14). Based on the comparison of CPE data from 1984 and 2014, the Largemouth Bass population appears to be increasing in Pigeon Lake (Table 17). Recruitment of Bass based on the age data (Table 5) indicates that Bass have been producing consistent year classes and the growth of Bass despite increasing numbers, has improved since 1984 to near State Averages in 2014 (Table 4). Although angler harvest currently does not appear to affect the Bass population, the sharp decline in number after age 9 may indicate whatever harvest is occurring is focused on the largest Largemouth Bass.

Table 17. A comparison of 1984 CPE per survey type with similar surveys conducted in 2014 for Pigeon Lake.

	1984			2014		
Species	Fyke net CPE	Spring Shocking CPE	Fall Shocking CPE	Fyke net CPE	Spring Shocking CPE	Fall Shocking CPE
Northern Pike	0.0	0.9	1.9	0.4	0.0	3.8
Rock Bass	2.0	20.0	17.5	3.1	6.9	3.8
Bluegill	10.4	186.9	320.6	2.8	45.0	77.9
Largemouth Bass	0.0	7.5	9.4	0.4	25.2	20.6
Walleye	0.6	0.3	0.6	0.7	0.0	0.8
Total (all Species)	14.8	252.8	370.0	10.3	93.9	119.8
Effort	129 night nights	3.2 miles	1.6 miles	56 net nights	1.6 miles	1.6 miles

Walleye were the second most commonly captured gamefish during the survey (Tables 1, 10, 12 and 14). Comparison of 1984 and 2014 CPE data indicates that the Walleye population has changed little since 1984 (Table 17). The average length at age (growth) in 2014 is similar to what was measured in 1984 with growth in both years greater than Statewide average growth at most ages (Table 4). Fall electroshocking did not produce any evidence of Walleye natural reproduction in 2014 (Table 15). It is likely as determined by past surveys, that Walleye do not reproduce well in Pigeon Lake. Continued stocking will be needed to maintain a low abundance, fishable population of Walleye in Pigeon Lake.

Northern Pike were captured in modest number in 2014. CPE trends are not clear for Pike with increases noted in some survey types while declines were noted in others between 1984 and 2104. It is likely the population of Pike in Pigeon Lake is steady based on these results. Growth appears to be slower in 2014 than in 1984 although much of the change may be due to changes in aging technique moving from scales to anal spines, however the decline in panfish number may also be contributing to the decline in growth.

Panfish

Based on 1984 and 2014 CPE data, panfish numbers appear to be sharply down with large declines in Bluegill and Rock Bass numbers noted (Table 1). With the decline in number, the growth of panfish has improved. Length at age (growth) is now near or above State averages for Bluegill and Rock Bass (Table 4) and the average length of Bluegill captured during fyke netting was close to 150 mm (6”). Despite the improvement in growth, few bluegill greater than 200 mm in length were captured during this survey. The decline in overall number is likely due to a combination of factors including increased predation by Bass, Walleye and Pike, harvest of larger size panfish by anglers reducing spawning densities, and a slow recovery from the larger than thought 2000 fish kill.

Other Species

Other species including Bullhead, White Sucker and Alewife were captured during this survey. None of these species appear to be causing any issues in the lake. No new species of fish were captured in 2014.

Recommendations

- Continue Walleye stocking to maintain a fishable population in Pigeon Lake since natural reproduction with current lake conditions is unlikely. Review of the continuation of State stocked Walleye should be evaluated following the next fish survey.

- Support the State Panfish Initiative on Pigeon Lake that evaluates the impacts of changes in individual panfish daily bag limits on bluegill size structure and conduct follow-up surveys to determine the effect of changes on bluegill in Pigeon Lake. Finally, use angler input and survey results to manage panfish in Pigeon Lake.

- Encourage shoreline owners to reestablish natural shorelines to help reestablish shallow water aquatic plants needed by fish for spawning, as nursery areas for small fish, and by adult fish for feeding. Temporary no wake zones and placement of wave and turbidity barriers may be needed to get plants started. Reestablishment of aquatic plants is necessary to have a healthy stable fish community in the lake.

- Monitor the movement and abundance of invasive species in Pigeon Lake. If new species get firmly established in the lake, changes in the fish community are likely.

References

Hogler, S. 2000. Pigeon Lake Fish Kill Memo. WDNR unpublished. 2 pages

Hogler, S. and P. Peeters. 1998. 1984 Comprehensive Survey of Pigeon Lake, Manitowoc County. WDNR unpublished. 15 pages.

Hogler, S. and S. Surendonk. 2006. Fall 2006 Electroshocking Survey Report for Pigeon Lake. WDNR unpublished. 5 pages.