

DATE: September 5, 2019

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TO: Spring Lake, Manitowoc County File

FROM: Steve Hogler

SUBJECT: 2018 Spring Lake Fish Survey

Spring Lake is a small eight-acre lake located sixteen miles southwest of Manitowoc in southern Manitowoc County (Figure 1). The lake has a maximum depth of 23 feet and the lake bottom in nearshore areas is dominated by muck. There is an intermittent outlet in the northeast corner of the lake that flows when lake levels are high. The lake is lightly developed with a small number of residences along the shoreline with undeveloped areas mostly forested wetland.

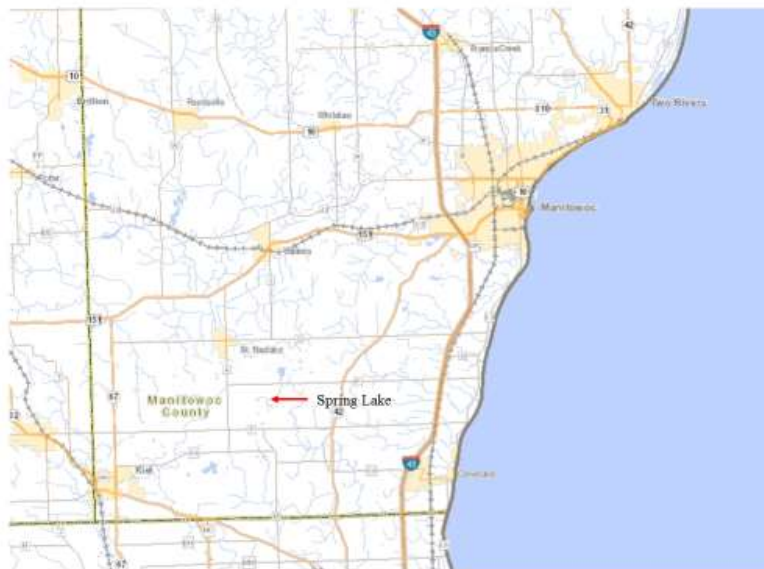


Figure 1. Spring Lake is located in Manitowoc County, southwest of the city of Manitowoc as indicated by the arrow.

Historic management issues on the lake have included: the loss of nearshore habitat because of the placement of sand/gravel blankets for shoreline/lake access because of soft nearshore sediments, the presence of Eurasian Water Milfoil and hybrid Milfoil in the lake and numerous, slow growing panfish. Most of the shoreline alterations occurred in the 1970's with few requests the past 10 years. Plant management during the past 20 years has been minimal without any permitted treatments despite the verified presence of non-native milfoil in the lake. To address slow growing panfish and to add additional fishing opportunities WDNR stocked a variety of fish from 1944 through 1975 (Table 1). Stockings from 1944 through 1950 consisted of fingerling Largemouth Bass and from 1963-1975 yearling Northern Pike stockings were made to increase predation on panfish. Additionally, Trout stockings (1958 through 1961) were initiated to add fishing opportunities in Spring Lake for anglers.

Table 1. State of Wisconsin fish stocking history for Spring Lake 1944-1975.

Year	Species	Number	Size
1944	Largemouth Bass	2,000	Fingerling
1946	Largemouth Bass	1,000	Fingerling
1948	Largemouth Bass	500	Fingerling
1950	Largemouth Bass	300	Fingerling
1958	Rainbow Trout	550	Yearling
1959	Rainbow Trout	1,500	Yearling
1959	Rainbow Trout	1,000	Yearling
1960	Rainbow Trout	1,100	Yearling
1961	Rainbow Trout	600	Yearling
1963	Northern Pike	600	17" average
1965	Northern Pike	150	19" average
1966	Northern Pike	100	14" average
1971	Northern Pike	100	14" average
1972	Northern Pike	150	15" average
1972	Northern Pike	100	13" average
1974	Northern Pike	100	14" average
1974	Northern Pike	100	11" average
1975	Northern Pike	100	12" average

Previous to the 2019 survey, only four fish surveys have been conducted on Spring Lake since 1957. Peeters (1987) summarized the surveys that were conducted in 1957 (spring fyke nets), 1961 (May electroshocking) and 1985 (May electroshocking) that found Largemouth Bass and Bluegill dominated the fishery. Largemouth Bass were abundant for the size of the lake and had a good size structure. Bluegill were very numerous, and most were less than 6 inches (150 mm) in length and other panfish such as Pumpkinseed Sunfish were also less than 6 inches (150 mm) in length. Peeters also indicated that Bluegill were slow growing and that substantial stockings of large Northern Pike had not resulted in the establishment of a pike population or improved panfish growth rates. He also indicated that stocked Rainbow Trout had failed to provide a fishery likely because of low survival rates.

Spring Lake was surveyed in May 2010 following state protocols for Tier 1 Bass lakes (Hogler 2010). During 26 minutes of nighttime electrofishing, the entire shoreline was shocked. All fish were identified, measured and a subsample of Largemouth Bass and Bluegill had scales collected to estimate age and growth. 166 individual fish representing eight species were captured during shocking. The dominant species in the catch were Bluegill and Largemouth Bass. Other species were captured in much lower abundances. Hogler found that Spring Lake continued to be a Bass-Bluegill lake with Largemouth Bass as the dominant gamefish. He found that Bass number were similar to those captured in previous surveys and that they had above average growth. The panfish community was dominated by mostly small, under 6 inch (150 mm) Bluegill, however, length at age analysis indicated improved growth rates compared to previous surveys.

Based on the small size of chiefly Bluegill, Spring Lake was included in the statewide panfish study as a control lake with regulations for panfish following state rules of 25 panfish in total with no minimum size. The 2019 survey followed state protocols for Tier 1 Bass/ Bluegill lake sampling.

RESULTS

Spring Lake was electroshocked on the night of May 22, 2019. Water conditions were clear and the water temperature at the time of the survey was 61 F. The entire shoreline (0.5 miles) was electroshocked in 29 minutes at water depths that ranged from 1 foot to 10 feet. All fish were netted, identified and measured. Aging structures were removed from Largemouth Bass (dorsal spine) and Bluegill (scales).

A total of 213 individual fish, representing eight species were captured during shocking resulting in a total catch per effort (CPE) of 355 fish per mile shocked or 426 fish per hour shocked (Table 2). The dominant species caught were Bluegill and Largemouth Bass. Other species were captured in lower number.

Table 2. The Spring Lake electroshocking catch by species from the night of May 22, 2019.

Species	Number	CPE (fish/mile)	CPE (fish/hour)	Average Length	Length Range
Northern Pike	4	6.7	8	564 mm (22.2")	456- 746 mm (18.6- 29.4")
Largemouth Bass	47	78.3	94	301 mm (11.9")	164- 430 mm (6.5-16.9")
Green Sunfish	4	6.7	8	124 mm (4.9")	121-127 mm (4.8-5.0")
Pumpkinseed Sunfish	1	1.7	2	153 mm (6.0")	153 mm (6.0")
Bluegill	136	226.7	272	111 mm (4.4")	68- 205 mm (2.7- 8.1")
Black Crappie	6	10	12	207 mm (8.1")	168- 305 mm (6.6- 12.0")
Yellow Perch	3	5	6	111 mm (4.4")	70- 127 mm (2.8- 5.0")
Brown Bullhead	12	20	24	246 mm (9.7")	228- 284 mm (9.0- 11.2")
Total	213	355	426		

Largemouth Bass were the most common gamefish that were captured during the survey (Table 2). The 47 Bass ranged in length from 164 mm to 430 mm (6.5” to 16.9”) and had an average length of 301 mm (11.9”) (Table 3). Most captured Bass were less than the minimum size limit of 356 mm (14”), with 11 (23.4%) greater than the size minimum (Figure 2). None of the captured Bass were greater in length than 457 mm (18”).

A dorsal spine was collected from all Largemouth Bass for aging. Spines were cross sectioned, mounted on glass slides and the annular rings were counted to estimate age. Bass ages ranged from age 2 through age 7 and age 9 (Table 4). The most common age Bass was age 4 followed by ages 5 and 6. Few bass were older than age 6.

When compared to statewide average length at age (growth) information, Largemouth Bass in Spring Lake grow at average to near averages rates through age 5, but below statewide averages rates for older fish (Table 5).

Four Northern Pike were captured during electroshocking (Table 2). Captured Pike ranged in length from 456 mm to 746 mm (18.6”-29.4”) and had an average length of 564 mm (22.2”) (Table 3.) Only one Pike was greater in length the minimum size limit of 26” (660 mm).

Table 3. The length frequency of gamefish captured during the May 22, 2019 electroshocking survey of Spring Lake. Note the length scale is discontinuous with bins from 600 mm to 690 mm (24"- 28") dropped. No fish were captured in this range.

Length (in) mm	Northern Pike	Largemouth Bass
(6") 150		
160		1
170		1
180		
190		
(8") 200		1
210		
220		3
230		2
240		4
(10") 250		3
260		1
270		3
280		2
290		4
(12") 300		2
310		1
320		3
330		3
340		1
(14") 350		2
360		3
370		2
380		
390		
(16") 400		3
410		1
420		
430		1
440		
(18") 450	1	
460		
470		
480		
490		
(20") 500	1	
510		
520		
530		
540		
(22") 550	1	
560		
570		
580		
590		
(28") 700		
710		
720		
730		
740	1	
(30") 750		
Number	4	47
Average Length	564 mm (22.2")	301 mm (11.9")
S.D.	127.3 mm (5.1")	64.5 mm (2.5")

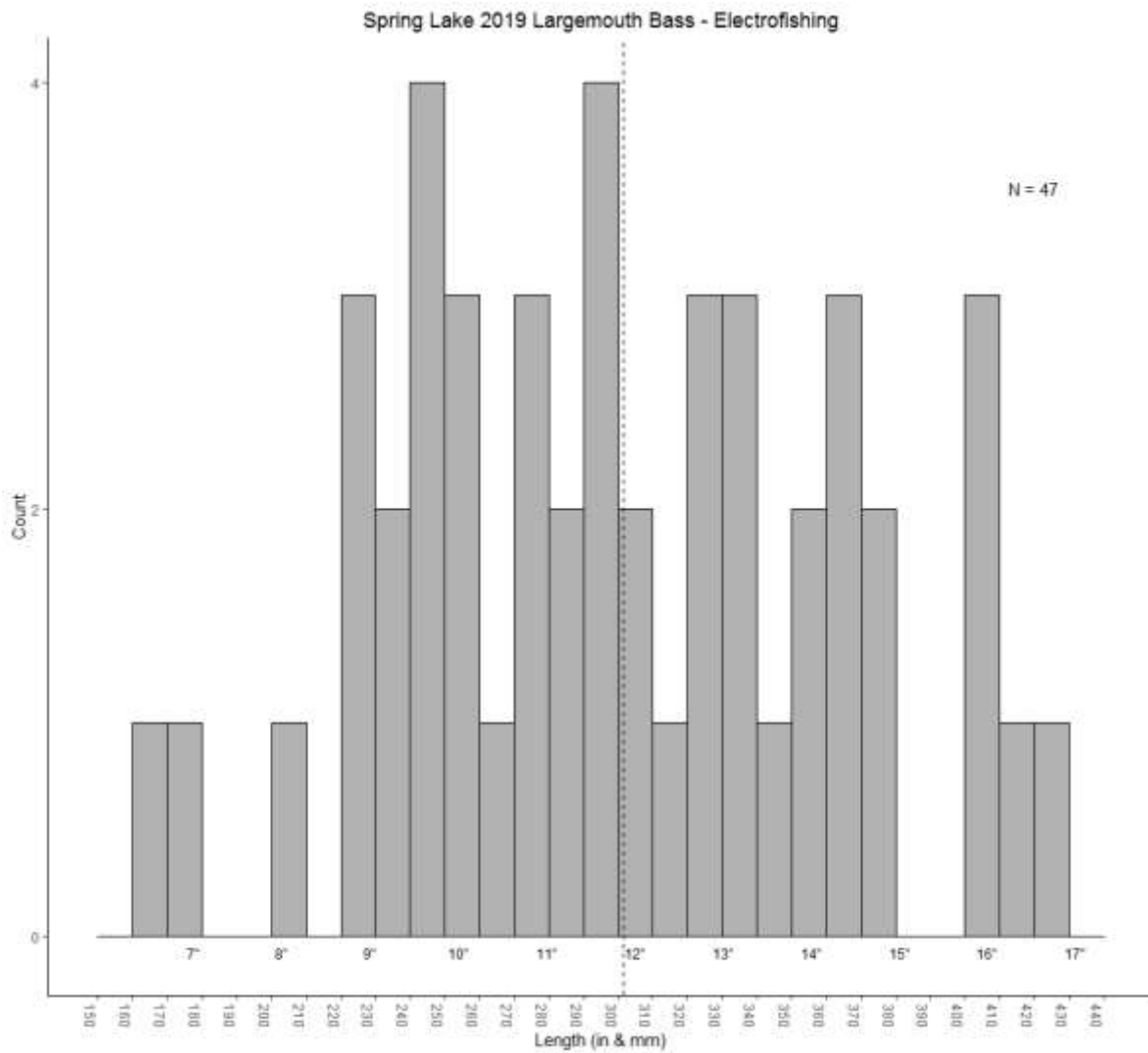


Figure 2. The length distribution of captured Largemouth Bass from Spring Lake. The dashed vertical line indicates the average length of the measured sample.

Table 4. The age distribution of Largemouth Bass captured from Spring Lake by electroshocking, May 2019. Lengths are reported in millimeters (mm) and inches (in).

Length		Age							
		2	3	4	5	6	7	8	9
	160	1							
(7")	170	1							
	180								
	190								
(8")	200			1					
	210								
(9")	220		1	2					
	230		1	1					
	240			4					
(10")	250			3					
	260			1					
(11")	270			2	1				
	280			1	1				
	290			3	1				
(12")	300			1	1				
	310					1			
(13")	320				3				
	330					3			
	340				1				
(14")	350					1	1		
	360				1	1	1		
(15")	370				1	1			
	380								
	390					1			
(16")	400					1			2
	410								
(17")	420								
	430						1		
Total		2	2	19	10	9	3		2
Ave. Length		168 mm (6.6")	230 mm (9.1")	260 mm (10.2")	324 mm (12.8")	359 mm (14.1")	384 mm (15.1")		408 mm (16.1")
S.D.		4.9 mm (0.2")	11.3 mm (0.4")	26.2 mm (1.0")	32.7 mm (1.3")	34.5 mm (1.4")	39.9 mm (1.6")		0.7 mm (0.02")

Table 5. Average length at age for Largemouth Bass and Bluegill captured during electroshocking on Spring Lake. Statewide average length at age from WDNR (1990) and are in mm and inches (in).

Largemouth Bass			
Age	2019	2010	Statewide Average
0			
1			97 mm (3.8")
2	168 mm (6.6")	203 mm (8")	165 mm (6.5")
3	230 mm (9.1")	325 mm (12.8")	229 mm (9.0")
4	260 mm (10.2")	371 mm (14.6")	290 mm (11.4")
5	324 mm (12.8")	382 mm (15")	338 mm (13.3")
6	359 mm (14.1")	365 mm (14.4")	384 mm (15.1")
7	384 mm (15.1")		414 mm (16.3")
8			447 mm (17.6")
9	408 mm (16.1")		470 mm (18.5")
10			485 mm (19.1")

Bluegill			
Age	2019	2010	Statewide Average
0			
1		81 mm (3.2")	64 mm (2.6")
2		103 mm (4.1")	97 mm (3.8")
3	86 mm (3.4")	138 mm (5.4")	122 mm (4.8")
4	114 mm (4.5")	175 mm (6.9")	147 mm (5.9")
5	136 mm (5.4")		167 mm (6.6")
6	142 mm (5.6")		183 mm (7.2")
7	168 mm (6.6")		196 mm (7.8")
8			208 mm (8.2")
9			

Bluegill were the most common caught fish of the survey (Table 2). The 136 Bluegill ranged in length from 68 mm to 205 mm (2.7" to 8.1") and had an average length of 111 mm (4.4") (Table 6). Most captured Bluegill were less than 150 mm (6") in length with only nine (6.6%) greater than 150 mm (6") and one greater than 200 mm (8") in length (Figure 3).

Scales were collected from a subsample (10/cm group) of captured Bluegill and were viewed under a microscope to count annual rings to estimate age. Bluegill ages ranged from age 3 through age 8 with age 3 Bluegill the most common (Table 7). When length at age in 2019 is compared to the 2010 survey and to Statewide averages, Bluegill in Spring Lake are smaller at each age than in 2010 and to Bluegill from lakes across the state.

Table 6. The length frequency of panfish and bullhead caught during electroshocking on Spring Lake on May 22, 2019.

Length (in) mm	Bluegill	Green Sunfish	Pumpkin- Seed	Black Crappie	Yellow Perch	Brown Bullhead
60	1					
(3") 70	14				1	
80	25					
90	16					
(4") 100	14					
110	21					
120	16	2			2	
130	10					
140	10					
(6") 150	1		1			
160				1		
170	2			2		
180	4			1		
190	1					
(8") 200	1					
210						
220						1
230						3
240				1		4
(10") 250						2
260						1
270						
280						1
290						
(12") 300				1		
Number	136	2	1	6	3	12
Average Length	111 mm (4.4")	124 mm (4.9")	153 mm (6.0")	207 mm (8.1")	111 mm (4.4")	246 mm (9.7")
S.D.	28.8 mm (1.1")	4.2 mm (0.2")	--	52.2 mm (2.1")	28.3 mm (1.1")	15.5 mm (0.6")

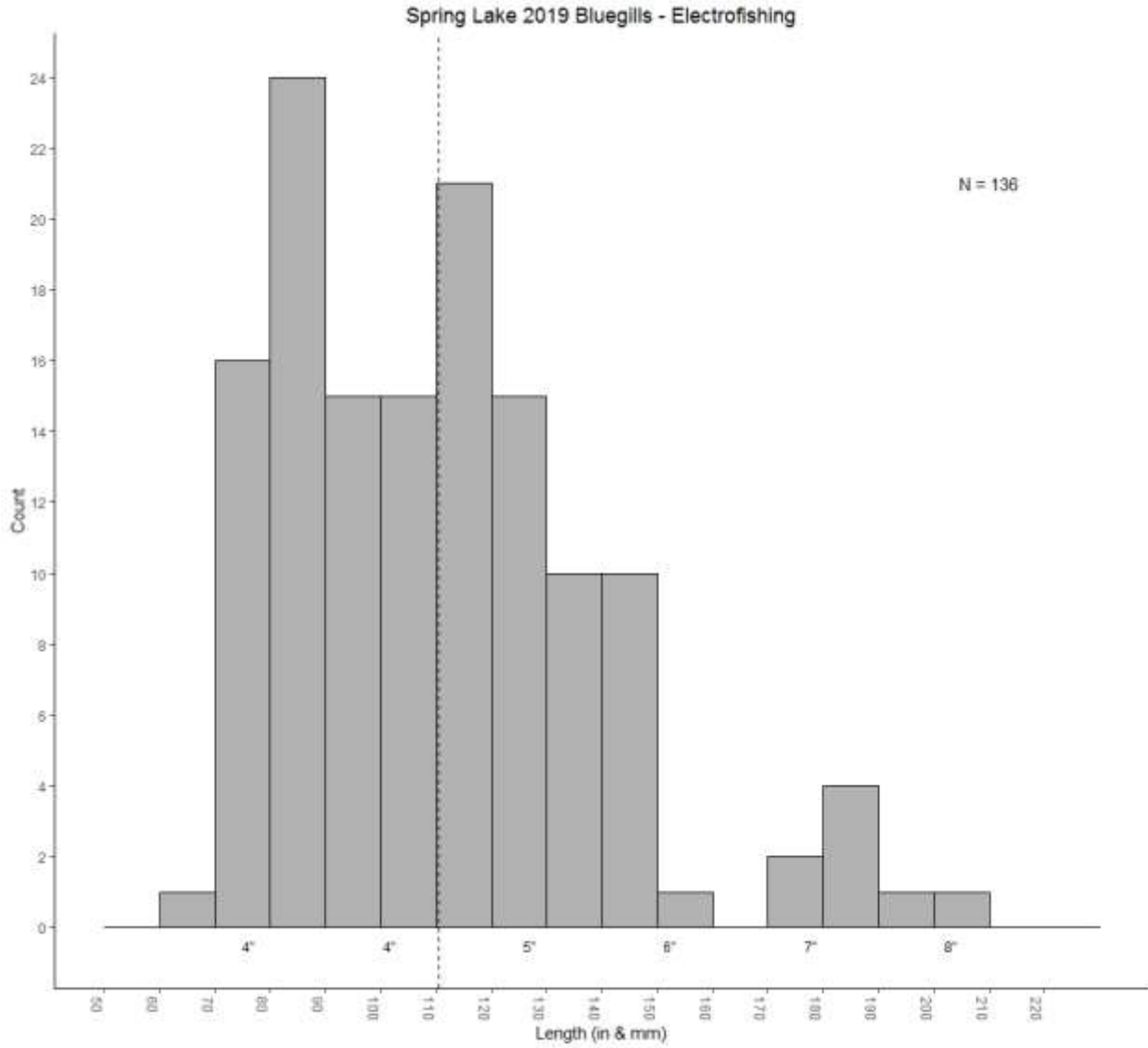


Figure 3. The length distribution of captured Bluegill from Spring Lake. The dashed vertical line indicates the average length of the measured sample.

Table 7. The age distribution of captured Bluegill from Spring Lake, May 2019. Length is listed as millimeters (mm) and inches (in).

Length (in) mm		Age						
		2	3	4	5	6	7	8
2	50							
	60		1					
3	70		15					
	80		25					
	90		10	5				
4	100		2	11		1		
	110		4	15	2			
5	120			15	1			
	130				7	2	1	
	140			1	5	1	3	
6	150					1		
	160							
7	170						2	
	180					1	2	1
	190						1	
8	200						1	
Total			57	47	15	6	10	1
Ave. Length			86 mm (3.4")	114 mm (4.5")	136 mm (5.4")	142 mm (5.6")	168 mm (6.6")	188 mm (7.4")
S.D.			10.8 mm (0.4")	10.4 mm (0.4")	10.4 mm (0.4")	27.5 mm (1.1")	25.4 mm (1.0")	--

Other panfish were captured in lower numbers. The six Black Crappie averaged 207 mm (8.1") in length with the average lengths of other panfish at: Green Sunfish-124 mm (4.9"), Pumpkinseed Sunfish- 153 mm (6") and Yellow Perch- 111 mm (4.4") (Tables 2 and 6).

Brown Bullhead were also captured during the survey (Table 2). The 12 Brown Bullhead ranged in length from 228 mm to 284 mm (9"-11.2") and had an average length of 246 mm (9.7") (Table 6).

DISCUSSION AND CONCLUSION

Spring Lake continues to be a Bass-Bluegill lake with Largemouth Bass the dominant gamefish in the lake. The number of Bass that were captured in 2019 was greater than what was caught in previous surveys, however in 2019, the average length of captured Bass was smaller than in previous surveys. Growth was average to slightly less than average for young Bass with growth rates for older Bass less than average. The lack of older Bass may indicate that the current level of fishing may be harvesting many of the legal size bass in the lake since growth rates are near averages or because recruitment is low and sporadic. If harvest is shown to affect recruitment, more conservative bass limits may be needed to protect the largemouth bass population in the lake.

Northern Pike were captured in 2019 unlike in 2010 when none were collected. It is likely that limited spawning habitat is responsible for the low number Pike seen in the lake since small forage is readily available for consumption.

Panfish continue to dominate the fish community of the lake. In 2019, most panfish that were captured were less than 150 mm (6") in length. Past surveys have indicated that Bluegill were abundant, small and somewhat slow growing (Peeters 1987, Hogler, 2010). Based on the 2019 survey, Bluegill in Spring Lake continue to be present in good number but average length at age data for Bluegill indicates that they continue to exhibit slow growth. It is concerning that younger Bluegill, age 1 and age 2 were not captured in this survey, but is likely that since growth is slow, the small fish observed passing through dip nets during shocking were likely these missing year classes. Although large few Bluegill were captured, several older age classes were identified in our age sample. It appears that harvest may be impacting the number of Bluegill over 150 mm (6").

Yellow Perch number continued to be low in 2019. Fish surveys of Spring Lake before 2010 captured good numbers of yellow perch but in 2010 no Perch were captured. The lack of Yellow Perch in Spring Lake is puzzling. Possible reasons for the lack of Perch include poor recruitment, over harvest or that perhaps the perch were suspended in deeper water that we did not survey.

Brown Bullhead were captured in modest numbers during this survey. Based on this surveys and past surveys, their population appears to be stable (Peeters 1987, Hogler, 2010).

It is recommended that Spring Lake should remain on the lake survey rotation to monitor the fish populations found in the lake. Further, recommendations from the Panfish Study once completed should be considered to improve the size structure of Bluegill in Spring Lake.

REFERENCES

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