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SUBJECT: 2015 Tuma Lake Spring Electroshocking Survey

Tuma Lake is a 14 acre lake located in northern Manitowoc County. The lake has a maximum depth of 36 feet and a mean depth of 11 feet. The shoreline of the lake is lightly developed with the remaining shoreline classified as wooded wetland. There is a small public access/boat ramp on the north side of the lake. Tuma Lake is a popular fishing location for anglers with small boats.

Fish surveys in the 1950's and 1960's found that the lake was dominated by Walleye, Northern Pike and a mixture of panfish species. Bullhead were also commonly captured. Walleye, despite the lack of spawning habitat, were found to be self-sustaining. However, by the mid-1970's, fish surveys found that Walleye were no longer reproducing causing a sharp decline in walleye abundance. Largemouth Bass, Yellow Perch and Bullhead dominated the fishery in these surveys. A 2003 survey found that the fishery was dominated by Largemouth Bass, Bluegill and Green Sunfish (Hogler 2003). The growth of bass and Bluegill were judged to be slightly less than State averages. After reports of poor ice fishing during the 2008-2009 winter, a survey was conducted in June 2009 to assess the fishery (Hogler 2009). During 45 minutes of electroshocking seven Yellow Perch and one Green Sunfish were captured. Since there was not an obvious reason for the kill, it was assumed that a late fall algae bloom followed by a harsh winter caused dissolved oxygen to plummet killing the fish. Following the kill, restocking was instituted by Wisconsin DNR (Table 1). The species of fish stocked included Largemouth Bass, Northern Pike, Bluegill and Yellow Perch.

Table 1. The species, number and size of fish stocked into Tuma Lake following the 2009 fish kill.

Year	Species	Number Stocked	Average Length (in)
2010	NORTHERN PIKE	605	3
2010	LARGEMOUTH BASS	350	3
2010	BLUEGILL	2098	2
2010	YELLOW PERCH	4083	4
2011	NORTHERN PIKE	1539	4
2011	LARGEMOUTH BASS	699	3
2012	NORTHERN PIKE	995	3
2012	LARGEMOUTH BASS	700	3
2012	BLUEGILL	1200	2
2013	NORTHERN PIKE	1000	3
2013	LARGEMOUTH BASS	345	2
2013	BLUEGILL	1395	1
2014	LARGEMOUTH BASS	340	3
2014	BLUEGILL	1400	1

During the night of May 11, 2015 the entire shoreline of Tuma Lake was electroshocked to determine the status of the fish populations of the lake. The survey was conducted following State monitoring protocols for bass/panfish lakes.

Results:

During the 40 minutes of electroshocking, we captured 199 individual fish representing six species (Table 2). Black Bullhead, Bluegill and Yellow Perch dominated the catch with other species captured in lower numbers. In addition to the species netted, several small Northern Pike were observed and many small Yellow Perch passed through our nets. Total CPE of captured fish was 338.3 fish per mile shocked or 298.5 fish per hour.

Table 2. The catch of fish and catch per effort (CPE) of fish caught during electroshocking on May 11, 2015 from Tuma Lake.

Species	Number	CPE (Fish/Mile)	CPE (Fish/Hour)
Largemouth Bass	4	6.8	6.0
Green Sunfish	2	3.4	3.0
Bluegill	57	96.9	85.5
Black Crappie	4	6.8	6.0
Yellow Perch	34	57.8	51.0
Black Bullhead	98	166.6	147.0
Total	199	338.3	298.5

Gamefish

The four Largemouth Bass that were captured ranged in length from 124 mm to 385 mm (4.9" to 15.2") and had an average length of 275 mm (10.8") (Table 3). Only one bass was greater in length than the 356 mm (14") minimum length for harvest.

During the collection of biological data, the second dorsal spine was taken for age analysis. The 124 mm (4.9") bass was aged at Age 1 and other three bass were Age 4. Based on these ages, the captured Bass were from stocking in 2014 (Age 1) and 2011 (Age 4). Growth, as measured by age at length from the limited sample appears to be average (Table 4).

Panfish

Bluegill were the most common panfish that was captured. The 57 bluegill ranged in length from 98 mm to 142 mm (4" to 5.6") and had an average length of 117 mm (4.6") (Table 3). All captured bluegill were less than 150 mm (6") in length.

Age was determined for bluegill using a dorsal spine. The age of bluegill from captured fish ranged from Age 2 through Age 6 and Age 8 (Table 5). Most of the bluegill were Age 3 and Age 5 with lower numbers of other aged fish observed. Growth measured as length at age was above State average for ages 1 through 3, then was below average for older fish (Table 4).

Yellow Perch were also commonly caught during the survey. The 34 Yellow Perch ranged in length from 83 mm to 177 mm (3.3" to 7") and had an average length of 114 mm (4.5") (Table 3). Only 5 of 34 (14.7%) Yellow Perch were greater in length than 150 mm (6") and none were greater than 200 mm (8").

Age was determined for Yellow Perch by the use of scales with Age 1 through Age 3 identified in the aged sample of fish (Table 6). Age 1 were the most common aged perch followed by Age 2. Based on length at age from scales collected during this survey, Yellow Perch in Tuma Lake grew faster than Yellow Perch in other lakes across the state (Table 4).

Table 3. The length distribution of fish captured during electroshocking on Tuma Lake.

Length mm (in)	Largemouth Bass	Green Sunfish	Bluegill	Black Crappie	Yellow Perch	Black Bullhead
80					4	
90		1	1		14	
(4") 100			17		3	
110			18		1	
120	1		10		1	
130		1	9	1	2	
140			2	3	4	
(6") 150					1	1
160					2	4
170					2	14
180						4
190						1
(8") 200						1
210						
220						
230						
240						
(10") 250						
260						
270						
280	1					
290						
(12") 300	1					
310						
320						
330						
340						
(14") 350						
360						
370						
380	1					
390						
(16") 400						
Total	4	2	57	4	34	25
Ave. Length	275 (10.8")	114 (4.5")	116 (4.6")	142 (5.6")	114 (4.5")	175 (6.9")
S.D.	109.6	24.0	11.6	14.1	28.9	10.3

Table 4. Length at age comparison by species from captured during Tuma Lake surveys in 2003 and 2015 and Statewide averages. Lengths are in millimeters or inches (in).

Species		AGE 1	AGE 2	AGE 3	AGE 4	AGE 5	AGE 6	AGE 7
Bluegill	2015	109 (4.3")	109 (4.3")	117(4.6")	130 (5.1")	129 (5.1")		136 (5.4")
	2003	66 (2.6")	120 (4.7")	187 (7.4")				
	(State Average)	64 (2.6")	97 (3.8")	122 (4.8")	147 (5.8")	167 (6.7")	183(7.2")	196 (7.7")
Yellow Perch	2015	93 (3.7")	135 (5.3")	169 (6.7")				
	2003							
	(State Average)	74 (3")	119 (4.7")	152 (6")	180 (7.1")	208 (8.2")		
Largemouth Bass	2015	124 (4.9")			325 (12.8")			
	2003	60 (2.4")	126 (5")	180 (7.1")	241(9.5")	281(11.1)	274 (10.8")	
	(State Average)	97 (3.8")	165 (6.5")	229 (9")	290 (11.4")	338 (13.3")	383 (15")	

Table 5. The age distribution of Bluegill captured from Tuma Lake by electroshocking.

Length mm (in)	Number	Age						
		2	3	4	5	6	7	8
(2'') 50								
60								
70								
80								
90	1		1					
(4'') 100	17	2	15					
110	18		14	2	2			
120	10		1	1	5	3		
130	9				5	3		1
140	2				2			
(6'') 150								
Total	57	2	31	3	14	6	0	1
Ave. Length	116.9	109.0	108.6	117.0	129.8	129.2		136.0
S.D.	11.6	--	6.3	4.2	7.5	5.3		--

Table 6. The age distribution of Yellow Perch captured from Tuma Lake by electroshocking.

Length mm (in)	Number	Age		
		1	2	3
(2'') 50				
60				
70				
80	4	4		
90	14	14		
(4'') 100	3	2	1	
110	1		1	
120	1		1	
130	2		2	
140	4		4	
(6'') 150	1		1	
160	2			2
170	2			2
180				
190				
(8'') 200				
Total	34	20	10	4
Ave. Length	114.3	93	135	169
S.D.	28.9	5.5	15.1	9

Other species of fish captured during this survey included Green Sunfish, Black Crappie and Black Bullhead. Black Bullhead were the third most commonly captured fish and they had an average length of 175 mm (6.9'') (Table 3). Most bullhead were between 160 mm and 180 mm in length (6.3'' to 7.1''). The two captured Green Sunfish averaged 114 mm (4.5'') in length and the four Black Crappie averaged 142 mm (5.6'') in length.

Discussion and Conclusions:

Gamefish

Despite stocking good numbers of Largemouth Bass and Northern Pike since 2010, survival appears to be low. Although it is possible that these fish were not vulnerable to our electroshocking gear, there is concern that poor water quality, predation on newly stocked fish or illegal harvest may limit how fast these populations return to pre-2009 levels.

Panfish

Bluegill are surviving after stocking based on the age distribution, but growth is slow after Age 3 likely due to the lack of appropriate forage. Although our 2009 survey did not capture any Bluegill, our 2015 age distribution identified fish older than Age 5. Either these fish were missed in 2009, or there was aging error in 2015. Since more effort, including transects across the lake were conducted in 2009, it is more likely that the difficulty in interpreting spine age was responsible for the aging abnormality.

Yellow Perch are doing well in Tuma Lake although only small fish were observed or captured. Age 1 and Age 2 Yellow Perch are naturally produced since no perch were stocked in 2013 or 2014. It is likely that small perch are being utilized as forage by gamefish and larger (older) perch are being harvested by anglers.

The other panfish species were not stocked by DNR and it is unknown how they made it into the lake although transport by birds or from illegal stocking are both likely.

Black Bullhead were commonly caught during the survey. Although they were not restocked into the lake following the 2009 fish kill, it is likely that these fish either survived the kill or were progeny from survivors.

Recommendations:

It is recommended that Tuma Lake be resurveyed in the next five years to assess the status of the fish populations of the lake. Further it is recommended to continue stocking Largemouth Bass and Northern Pike for two additional years.

References:

Hogler, Steve. 2003. October 28, 2003 Tuma Lake Survey Report. WDNR-Green Bay. Unpublished Report. 5 pages.

Hogler, Steve. 2009. Fish Kill Investigation of Tuma Lake-2009. WDNR-Green Bay. Unpublished Report. 6 pages.