

Lost Lake

Lost Lake is a 137 acre lake located on the north side of West Pine Drive, south of Hwy 2 in St. Louis County. Lost Lake is a relatively shallow mucky lake with a 7.5 foot maximum depth (Figure 1). It is a moderately productive or mesotrophic lake, with a calculated Carlson's Trophic State Index of 48.7, based upon total phosphorus, chlorophyll a and secchi depth. It is clear (mean filtered color = 29.9 PtCo units) and relatively soft (total hardness = 12.47 mg/l as CaCO₃).

Trap net and gill net locations (Figure 1) were established in 2008. Nine trap nets (TN) and two gill nets (GN) were set July 28-30. The purpose of this survey was to collect base line data of fish communities, and to use this data for future management decisions. Fish species observed in the 2008 survey included bluegill (BLG), largemouth bass (LMB), northern pike (NOP), walleye (WAE), white sucker (WTS), and yellow perch (YEP) (Table 1).

Bluegills were observed from 107 mm to 250 mm (Figure 2). Catch rates for BLG were 2.0 / GN and 4.2 / TN (Table 1). The BLG length-at-age estimates suggest that bluegills grow slightly faster in Lost Lake compared to the Duluth area average established by the Minnesota Department of Natural Resources (MNDNR) (Table 2). The age distribution ranged from 3 to 10 years old (Table 3). Stock density indices, e.g. PSD (proportional stock density) and RSD-P (relative stock density), are used as a quality index for a fish population, and describe fish in terms of specific length categories. The PSD value for this BLG population was 85.7 ± 10.6 , suggesting that this population may be dominated by larger, older individuals. The typical range of PSD values for a balanced population is between 30 – 60. The RSD-P value of this population is 61.9 ± 14.7 , clearly larger than the objective range of 5 – 10. It is definitely worth returning to Lost Lake using another gear type to try to sample younger, smaller BLG, e.g. electrofishing, prior to assuming that recruitment is low.

Largemouth bass were observed in small numbers, sizes ranging from 140 mm to 493 mm (Figure 3). Catch rates for LMB were 0.0 / GN and 0.7 / TN (Table 1). Although only 6 LMB were collected and sampled, growth rates seem comparable to the Duluth area average (Table 4).

Northern pike lengths ranged from 499 mm to 1058 mm (Figure 4). The average 5 year old NOP was 21.7 inches (Table 5). Catch rates for NOP were 7.0 / GN and 0.8 / TN (Table 1). The PSD of this NOP population was 76.2 ± 18.2 . RSD Q-P value was 71.4 ± 19.3 , indicating that the majority of the NOP sampled were in the same length category, between 20.8 inches and

27.9 inches. RSD S-Q value was 23.8 ± 18.2 , indicating that the remaining portion of the population was between 13.7 and 20.8 inches. Without age or creel data, it is impossible to determine if NOP are being overharvested and culled from the population as soon as they reach a certain, desirable size, e.g. 28 inches, or if food resources are limited within Lost Lake and growth slows down. The next survey of Lost Lake should combine mercury sampling and otolith collection so that age and growth of NOP can be analyzed within this lake.

Walleye lengths were observed between 215 mm and 524 mm (Figure 5). WAE catch rates were 6.5 / GN and 0.7 / TN (Table 1). The age distribution ranged from 1 to 10 years old (Table 6). 25% of the total sampled WAE were 5 years old. Growth rates for WAE in Lost Lake show slow growth compared to the MNDNR area average (Table 7). The age frequency distribution suggests consistent, but low recruitment (Table 6). No year classes were missing up to age-10. However, no year classes were particularly strong, either, with the possible exception of the 2003 cohort (age-5). The PSD value for walleye in Lost Lake was 94.1 ± 11.2 , clearly too high for a balanced population. Our sample size was only 19 individuals, so some care needs to be exercised with the interpretation of this PSD. FDL will plan on future fall surveys to monitor age-0 production and to monitor recruitment of walleyes in Lost Lake to determine if recruitment is limited in this lake, thus explaining the lack of smaller individuals.

Twelve yellow perch were observed between 147 mm and 280 mm (Figure 6). Catch rates were 5.5 / GN and 0.1 / TN (Table 1). Growth rates were comparable to the Duluth area average (Table 8). Ages for YEP were between 3 and 7 years old (Table 9).

Some of the fish sampled from the gill nets were used for mercury analysis; all other fish collected from the gill nets were released when possible. Nine walleye and one northern pike were analyzed for mercury, with wet weight concentrations ranging from 0.180 – 0.934 $\mu\text{g/g}$ for the walleye, and 1.23 $\mu\text{g/g}$ for the northern pike. These concentrations would generally suggest a safe consumption advisory of one meal/week for the general population, and one meal/month for the sensitive population, but a 'do not eat' for the large northern pike. (Table 10).

Table 1. Number of fish sampled in Lost Lake, 28 – 30 July 2008, by gear type and by gear ID. Catch per effort, reported as the # fish / net type, is reported at the bottom of the table.

Gear I D	Species Code						Grand Total
	BLG	LMB	NOP	WAE	WTS	YEP	
GN 1	2		8	6		3	19
GN 2	2		6	7		8	23
TN 1	11						11
TN 2	1		1				2
TN 3	1	1		1		1	4
TN 4	2		1	2			5
TN 5	8	4	1	2			15
TN 6	7		1				8
TN 7	7	1		1			9
TN 8	1		1				2
TN 9			2		1		3
Grand Total	42	6	21	19	1	12	101
Unknown Gear Type	2		1	1			105
# Fish / GN	2.0	0.0	7.0	6.5	0.0	5.5	
# Fish / TN	4.2	0.7	0.8	0.7	0.1	0.1	

Table 2. Length at age estimates for bluegill sampled from Lost Lake in 2008, compared to the area averages established by the Minnesota Department of Natural Resources. N is the sample size used for the estimates.

Age Class	N	Length (mm)	Length (in)	Area Average Length (mm)	Area Average Length (in)
1	33	44	1.7	36	1.4
2	33	57	2.2	64	2.5
3	33	96	3.8	97	3.8
4	33	133	5.2	127	5.0
5	27	164	6.5	152	6.0
6	21	187	7.4	170	6.7
7	18	208	8.2	181	7.1
8	11	221	8.7	191	7.5
9	8	223	8.8		
10	5	230	9.1		
11	4	233	9.2		

Table 3. Age frequency distribution for bluegills observed in Lost Lake 2008.

Length (mm)	Length (in)	# Observed	3	4	5	6	7	8	9	10	11
100	3.9	1	1								
110	4.3	2		2							
120	4.7										
130	5.1	2			2						
140	5.5	1		1							
150	5.9	2		1		1					
160	6.3	4		4							
170	6.7	3			3						
180	7.1	1			1						
190	7.5										
200	7.9										
210	8.3	1					1				
220	8.7	9				1.5	6				1.5
230	9.1	12					2		7		2
240	9.4	4						3			1
250	9.8	2								1	1
Total		44	1	8	6	2.5	9	3	7	1	5.5

Table 4. Length at age estimates for largemouth bass sampled from Lost Lake in 2008, compared to the area averages established by the Minnesota Department of Natural Resources. N is the sample size used for the estimates.

Age Class	N	Length (mm)	Length (in)	Area Average Length (mm)	Area Average Length (in)
1	6	83	3.3	72.5	2.9
2	4	162	6.4	160.9	6.3
3	2	274	10.8	234.6	9.2
4	2	320	12.6	294.8	11.6
5	2	355	14.0	336.0	13.2
6	2	395	15.5	367.0	14.4
7	2	412	16.2	396.5	15.6
8	1	436	17.2	423.8	16.7

Table 5. Age frequency distribution for northern pike in Lost Lake 2008.

Length (mm)	Length (in)	# Observed	4	5	6
490	19.3	1		1	
500	19.7	2		2	
510	20.1	1		1	
520	20.5	1		1	
530	20.9	1		1	
540	21.3	5		5	
550	21.7	1		1	
560	22.0	1		1	
570	22.4	2		1	1
580	22.8	1			1
590	23.2	1		1	
600	23.6	2			2
610	24.0	1	1		
Total		20	1	15	4

Table 6. Age frequency distribution for walleye observed in Lost Lake in 2008.

Length (mm)	Length (in)	# Observed	1	2	3	4	5	6	7	8	9	10
210	8.3	1	1									
220	8.7	1		1								
310	12.2	1			1							
410	16.1	2				1		1				
420	16.5	2					1	1				
430	16.9	1							1			
450	17.7	1					1					
460	18.1	4					3				1	
470	18.5	2						1	1			
480	18.9	3							1		1	1
490	19.3	1									1	
520	20.5	1								1		
Total		20	1	1	1	1	5	3	3	1	3	1

Table 7. Length at age estimates for walleye sampled from Lost Lake in 2008, compared to the area averages established by the Minnesota Department of Natural Resources. N is the sample size used for the estimates.

Age Class	N	Length (mm)	Length (in)	Area Average Length (mm)	Area Average Length (in)
1	19	107	4.2	127	5.0
2	18	205	8.1	229	9.0
3	17	292	11.5	312	12.3
4	16	350	13.8	383	15.0
5	14	390	15.3	441	17.4
6	11	418	16.5	482	19.0
7	8	440	17.3	514	20.2
8	5	457	18.0	537	21.1
9	4	465	18.3		
10	1	478	18.8		

Table 8. Length at age estimates for yellow perch sampled from Lost Lake in 2008, compared to the area averages established by the Minnesota Department of Natural Resources. N is the sample size used for the estimates.

Age Class	N	Length (mm)	Length (in)	Area Average Length (mm)	Area Average Length (in)
1	11	61	2.4	60	2.4
2	11	97	3.8	100	3.9
3	11	130	5.1	136	5.4
4	9	145	5.7	166	6.5
5	2	168	6.6	192	7.6

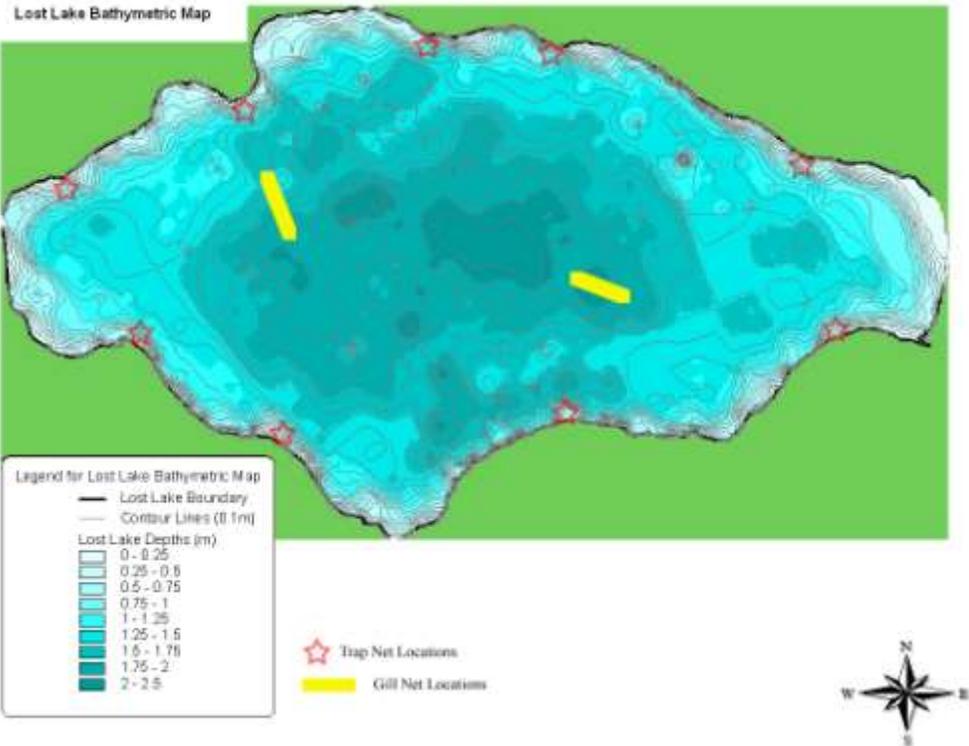
Table 9. Age frequency distribution for yellow perch observed in Lost Lake in 2008.

Length (mm)	Length (in)	# Observed	3	4	5	6	7
140	5.5	3	1	2			
150	5.9	5		5			
160	6.3						
170	6.7	3	1		2		
280	11.0	1					1
	Total	12	2	7	2		1

Table 10. Mercury analysis results for walleye and northern pike, measured in micrograms of mercury per gram of fish tissue ($\mu\text{g/g}$), for Lost Lake 2008.

Species	Length (mm)	Length (in)	$\mu\text{g/g}$ Tissue
WAE	482	19.0	0.716
WAE	420	16.5	0.233
WAE	465	18.3	0.186
WAE	475	18.7	0.255
WAE	426	16.8	0.245
WAE	325	12.8	0.18
WAE	450	17.7	0.463
WAE	460	18.1	0.934
WAE	317	12.5	0.222
NOP	1058	41.7	1.23

Figure 1. Lost Lake, St. Louis County. The top map presents depth data along with locations of trap nets and gill nets set in 2008. The bottom map presents bottom substrate data.



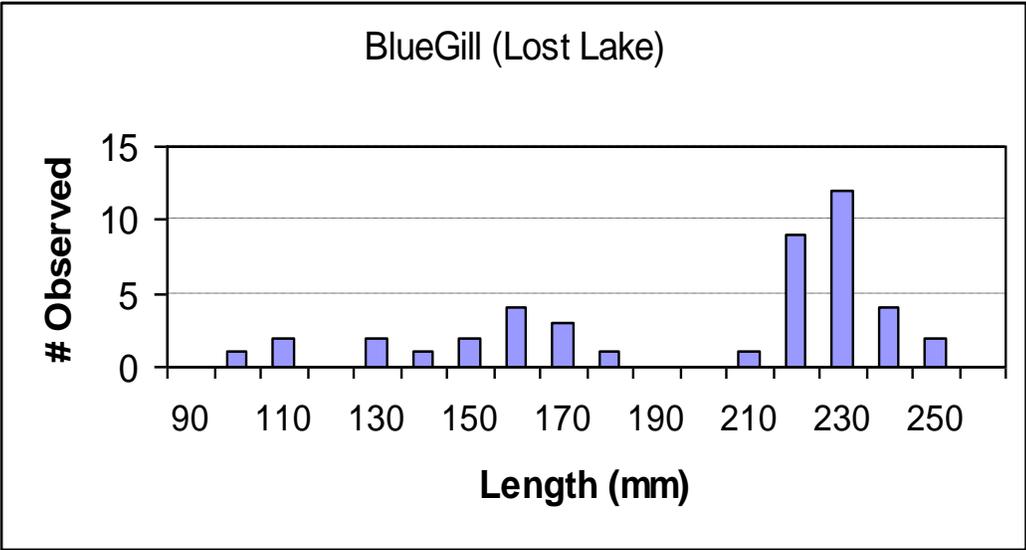


Figure 2. Length frequency distribution of bluegill observed in Lost Lake 2008.

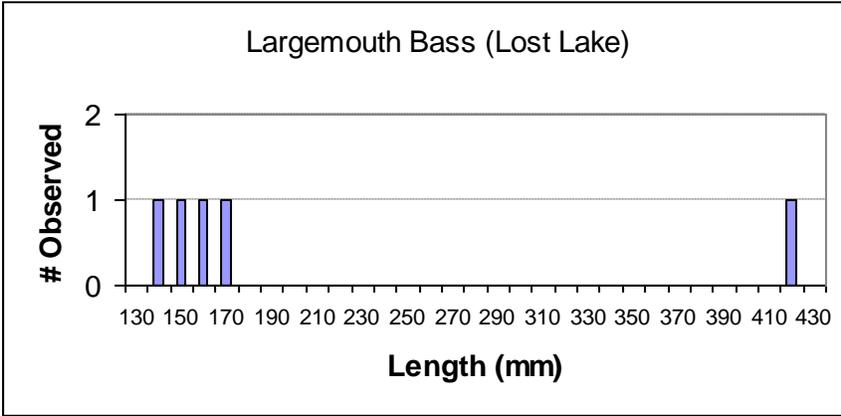


Figure 3. Length frequency distribution of largemouth bass observed in Lost Lake 2008.

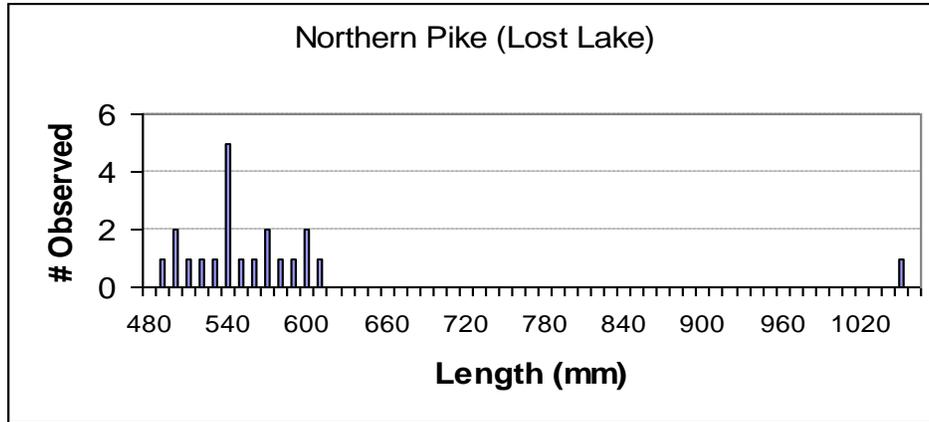


Figure 4. Length frequency distribution of northern pike observed in Lost Lake 2008.

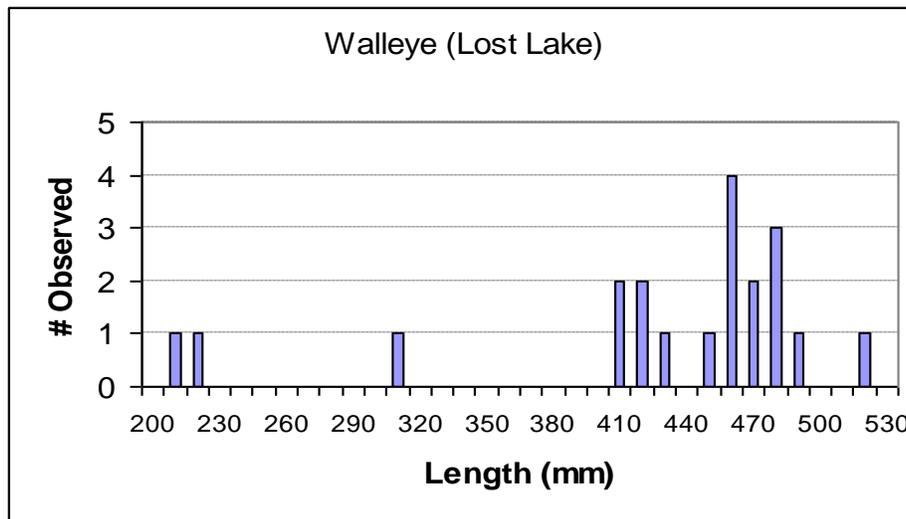


Figure 5. Length frequency distribution of walleye observed in Lost Lake 2008.

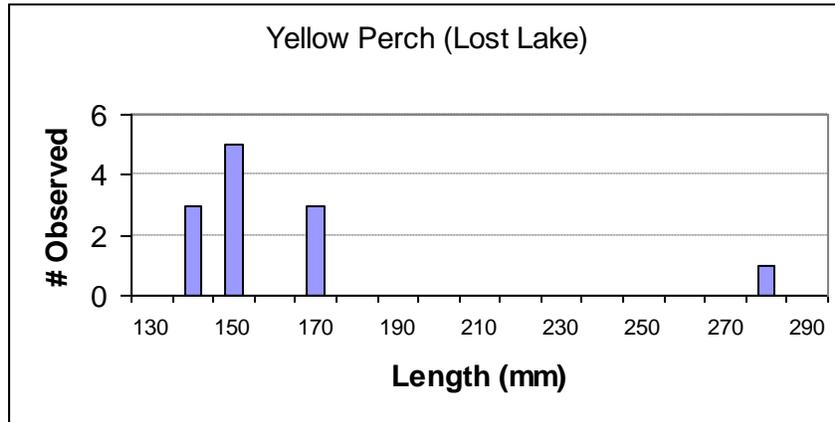


Figure 6. Length frequency distribution of yellow perch observed in Lost Lake 2008.