Inventory # 9-036

Perch Lake

Perch Lake is a double-basin lake. The southern, shallow portion of the lake is 414 acres, making it the largest wild rice lake on the Reservation. The fish communities sampled in the 2008 survey came from the 262 acres in the north basin, which has a maximum depth of 15 feet. The water chemistry is different in the two basins, specifically the color, conductivity and total hardness. The south end has lower mean specific conductance (106 μS/cm) and total hardness (56.2 mg/l as $CaCO_3$), but more color (147.3 PtCo units) than the northern basin (mean specific conductance = 140 μS/cm; total hardness = 74.1 mg/l $CaCO_3$; filtered color = 32 PtCo units). The north basin is monitored as a fisheries lake in the Fond du Lac water quality monitoring program, while the south basin is monitored as a wild rice lake. The north basin has a substantial submerged aquatic vegetation community, since it is relatively clear with summer secchi transparency of 6-8 feet.

Trap net and gill net locations were established in 2008 (Figure 1). Nine trap nets (TN) and two gill nets (GN) were set June 16-19. 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 black bullhead (BLB), black crappie (BLC), bluegill (BLG), largemouth bass (LMB), northern pike (NOP), pumpkinseed sunfish (PMK), and yellow perch (YEP) (Table 1).

Black crappies were observed between 127 mm and 300 mm (Figure 2). Catch rates were 14.0 / GN and 4.7 / TN (Table 1). Age distribution for BLC ranged from 5 to 7 years old; 50% of the sampled population was aged at 5-years (Table 2). BLC in Perch Lake show average growth when compared to the Duluth area average established by the Minnesota Department of Natural Resources (MNDNR) (Table 3).). Stock density indices, e.g. PSD (proportional 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 population was 87.0 ± 8.0, suggesting that the population may be characterized by too many large individuals, and not enough smaller ones. The RSD-P value of 21.7 ± 9.7 is also much higher than a normal value of 5 – 10. We failed to collect any individuals younger than 5 years or smaller than 127 mm (5.0 inches). Without additional work, it is premature to speculate as to whether the lack of younger, smaller individuals is due to sampling bias with our gear, or whether there have been several years of failed year-classes and a lack of recruitment within this population. This lake may be a good candidate for additional survey work to investigate this.

Bluegills were observed from 85 mm to 250 mm (Figure 3). Catch rates were 2.0 / GN and 21.2 / TN (Table 1). Age distribution was represented from 2 to 10 years old (Table 4), and show much faster growth when compared to the MNDNR area average (Table 5). The PSD for this bluegill population was 62.6 ± 6.9, which is high, but in the range of normal, balanced populations. The RSD-P value of 41.6 ± 7.0 is higher than "normal". However, we did sample plenty of smaller, younger individuals. This suggests that recruitment has been steady, and that angling overharvest is not influencing the size or age structure of this population. This bluegill population is probably an example of a population that is worth examining for harvest restrictions so that anglers don't take advantage of this population in the near future.

Largemouth bass were observed form 197 mm to 337 mm (Figure 4). Catch rates were 2.0 / GN and 0.3 / TN (Table 1). Largemouth bass were aged between 2 and 4 years old (Table 6), and show average growth compared to the MNDNR area average (Table 7).

Northern pike were observed from 270 mm to 714 mm (Figure 5). Catch rates were 14.5 / GN and 1.4 / TN (Table 1). Northern pike collected from the gill nets that had already died were used for mercury analysis (Table 8); all other NOP were released. Northern pike were aged between 1 and 8 (Table 9). The PSD value for this population was 63.4 ± 14.7, a little high but still suggesting a well-balanced population. The RSD-P value of 4.9 ± 6.6 is within the "normal" range for fish populations. This population appears to be characterized by a good mix of small and larger individuals, and probably is not suffering from overharvest.

Mercury concentrations in the ten individual NOP analyzed were, on average, lower than expected for this area, ranging from 0.096 – 0.269 μg/g wet weight, but none of the fish were larger than 712 mm (28 inches) total length. These concentrations would suggest a safe consumption advisory of one meal/week for the general population, and one meal/month for the sensitive population.

Pumpkinseed sunfish were observed from 90 mm to 289 mm (Figure 6). Catch rates were 3.0 / GN and 37.0 / TN (Table 1). Age distribution was 3 to 8 years old (Table 10). The PMK sampled from Perch Lake show slow growth when compared to MNDNR area average (Table 11). The PSD value of 31.0 ± 4.9 suggests a population that would be considered balanced, but is on the smaller side of "normal". Age classes seemed to be well represented out to age-8, suggesting that recruitment failure is not occurring as might be in the black crappies in Perch Lake. Preferred food resources of pumpkinseeds may be somewhat limited in Perch Lake, thus leading to slight stunting of possibly an overly-abundant population. Further studies and surveys can address this possibility.

Yellow perch were observed from 134 mm to 307 mm (Figure 7). Catch rates were 10.0 / GN and 0.6 / TN (Table 1). Age distribution for YEP ranged from 3 to 7 years old (Table 12) and shows faster growth than the MNDNR area average (Table 13). PSD value of 40.0 ± 19.2 suggests a well balanced population.

Four hundred thirty black bullheads were sampled from both gear types in extraordinary numbers (Table 1).

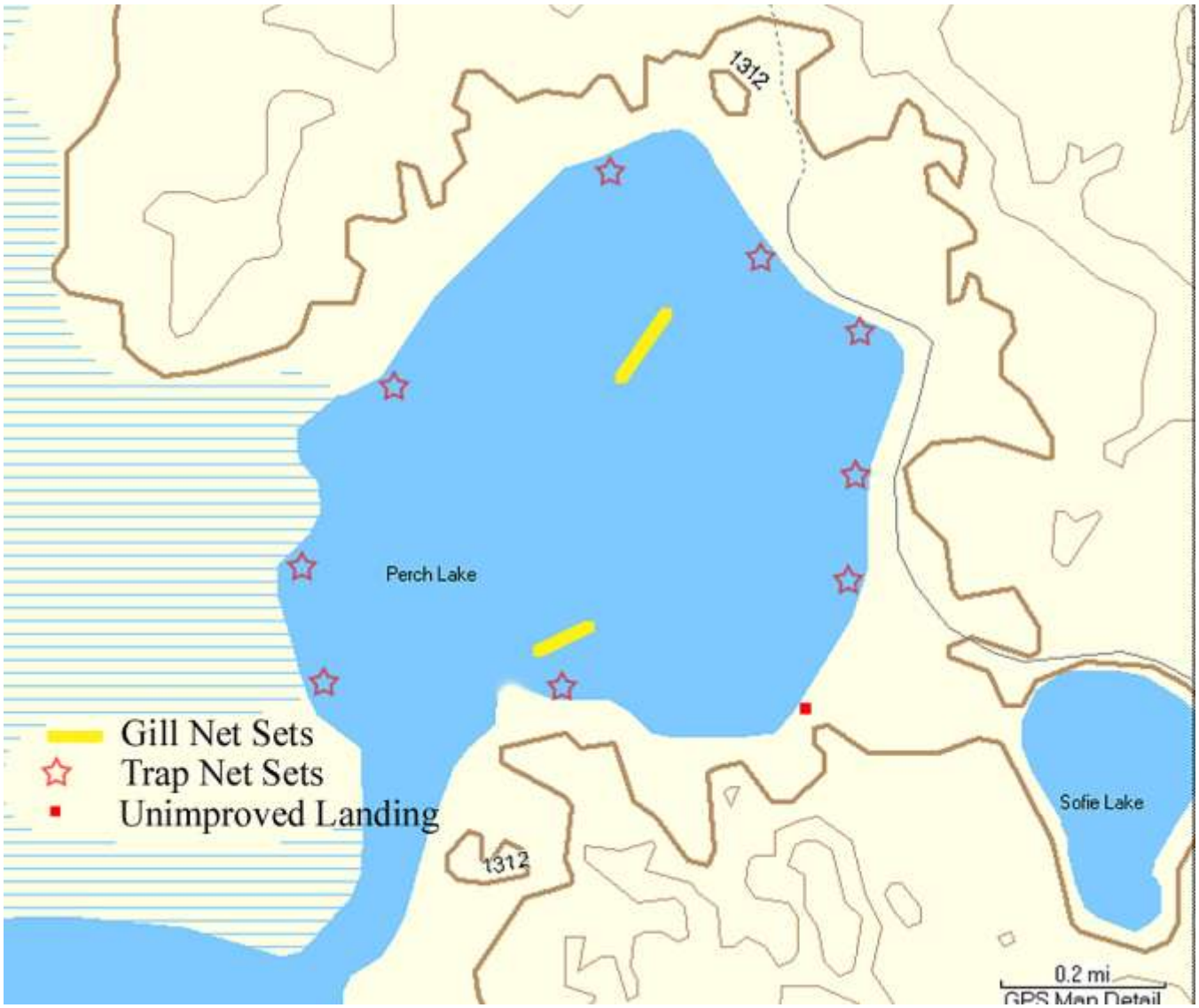

Figure 1. Map of the north basin of Perch Lake, Carlton County, indicating trap net and gill net locations set 2008.

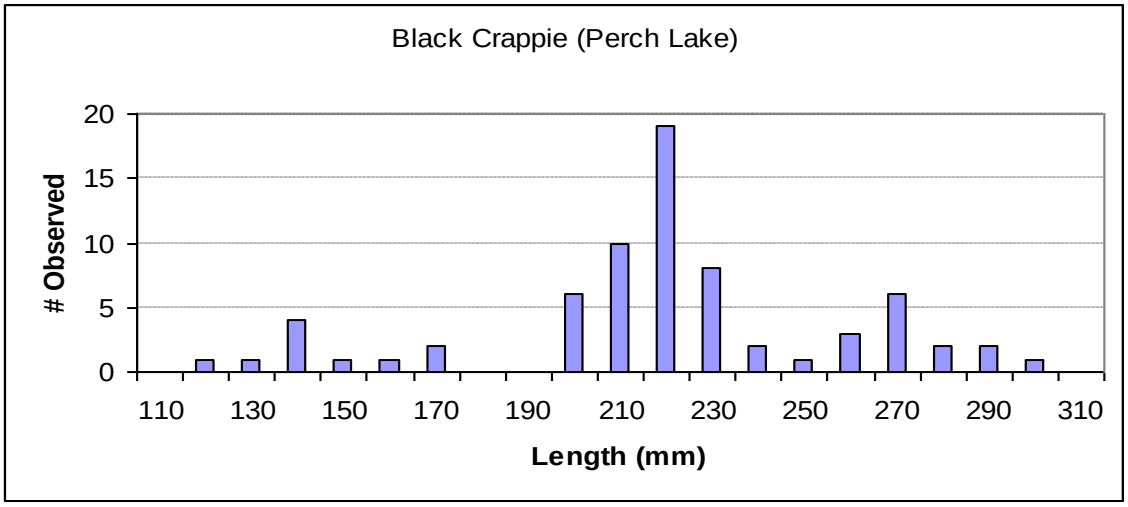

Figure 2. Length frequency distribution of black crappie observed in Perch Lake 2008.

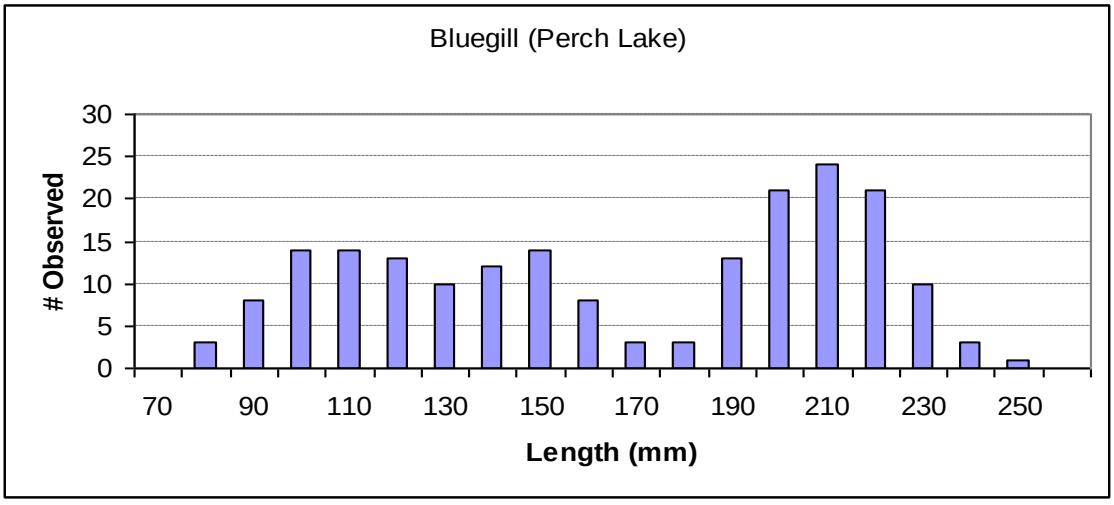

Figure 3. Length frequency distribution of bluegill observed in Perch Lake 2008.

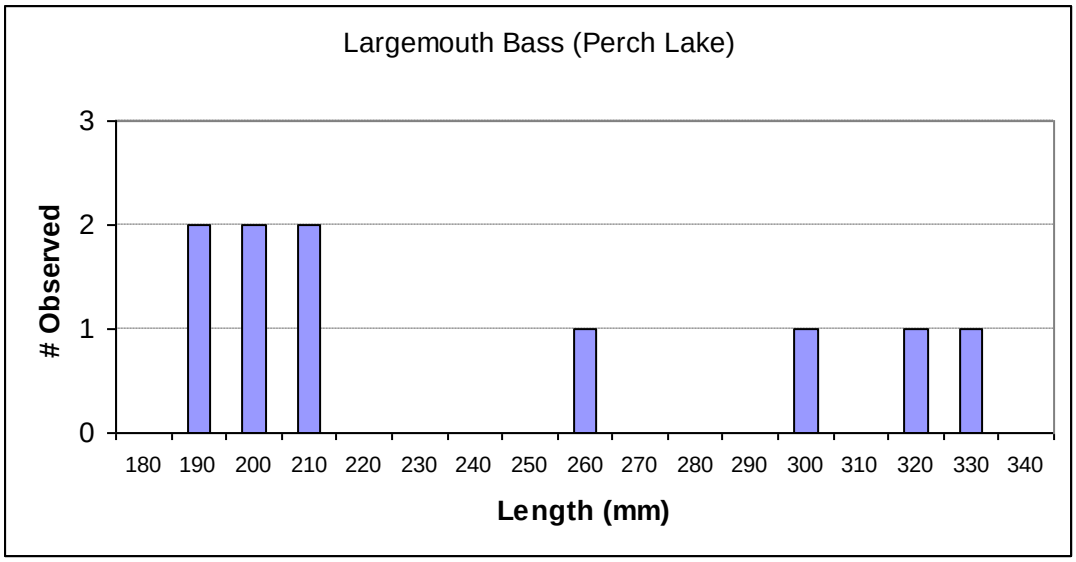

Figure 4. Length frequency distribution of largemouth bass observed in Perch Lake 2008.

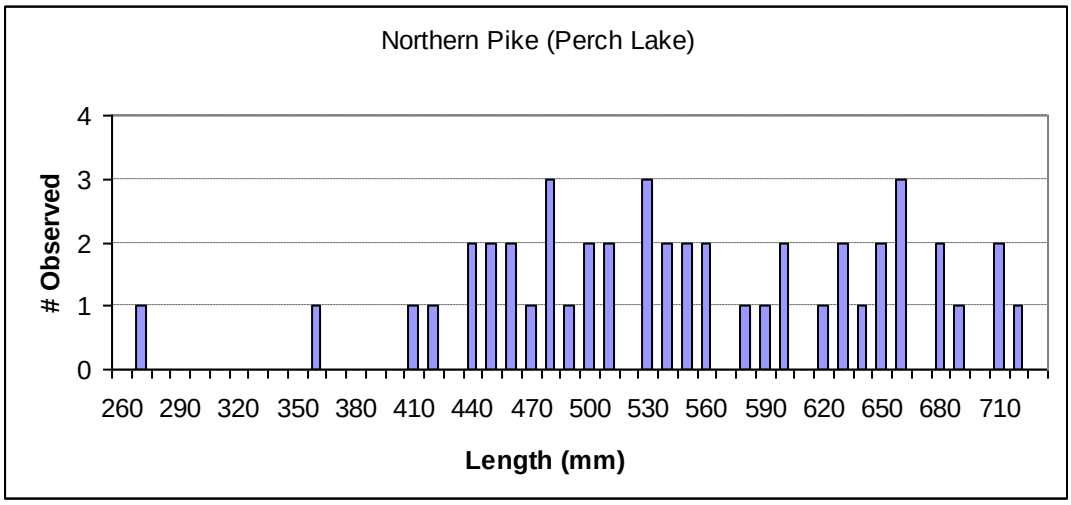

Figure 5. Length frequency distribution of northern pike observed in Perch Lake 2008.

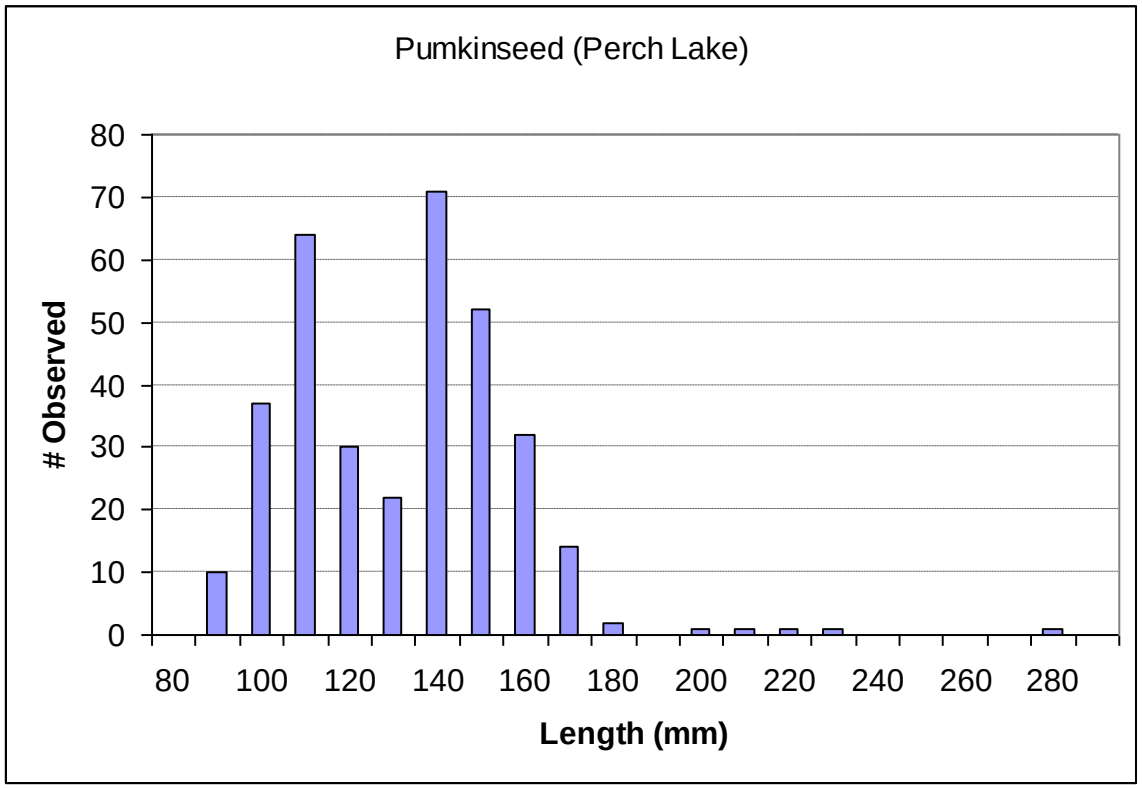

Figure 6. Length frequency distribution of pumpkinseed sunfish observed in Perch Lake 2008.

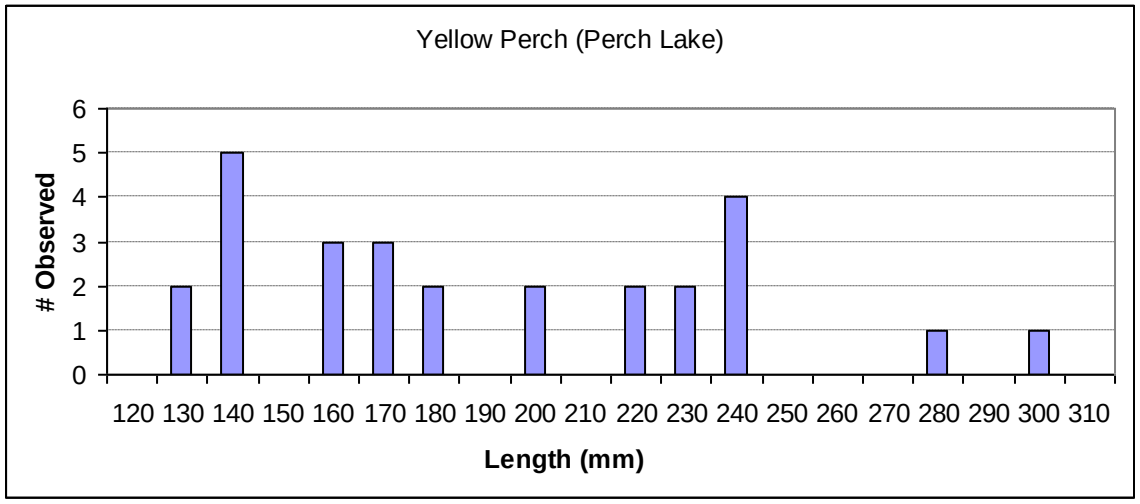

Figure 7. Length frequency distribution of yellow perch observed in Perch Lake 2008.

Table 1. Number of fish sampled in Perch Lake June 16-19, 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.

	Species Code							
Gear I D	BLB	BLC	BLG	LMB	NOP	PMK	YEP	Grand Total
GN 1	110	5	2	3	15	4	9	148
GN 2	258	23	2	1	14	2	11	311
TN 1		10	38		4	5		57
TN 2	6		6			58		70
TN 3			3		1	40		44
TN 4			4		3	11		18
TN 5			3			16		19
TN 6			13		3	53		69
TN 7	55	2	51		1	102	2	213
TN 8		22	29	3	1	10	1	66
TN 9	1	8	39			37	2	87
Grand Total	430	70	195	7	42	339	25	
Unknown Gear Type			5	4	5	1	2	
# Fish / GN	184.0	14.0	2.0	2.0	14.5	3.0	10.0	
# Fish / TN	6.9	4.7	21.2	0.3	1.4	37.0	0.6	

Table 2. Age frequency distribution for black crappie observed in Perch Lake 2008.

Length (mm)	Length (in)	# Observed	4	5	6	7
120	4.7	1				
130	5.1	1				
140	5.5	4				
150	5.9	1				
160	6.3	1				
170	6.7	2				
180	7.1					
190	7.5					
200	7.9	4		4		
210	8.3	7		7		
220	8.7	8		8		
230	9.1	7		6	1	
240	9.4	2			2	
250	9.8	1				1
260	10.2	3				3
270	10.6	6				6
280	11.0	2				2
290	11.4	1				1
	Total	51	0	25	3	13

Table 3. Length at age estimates for black crappie sampled from Perch 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	41	57	2.2	48	1.9
2	41	102	4.0	100	3.9
3	41	158	6.2	155	6.1
4	41	199	7.8	196	7.7
5	41	227	9.0	227	8.9
6	16	258	10.1	242	9.5
7	13	277	10.9	247	9.7

Table 4. Age frequency distribution for bluegill observed in Perch Lake 2008.

Length (mm)	Length (in)	# Observed	1	2	3	4	5	6	7	8	9	10
80	3.1	3										
90	3.5	8										
100	3.9	14		7	7							
110	4.3	14		2	9	3						
120	4.7	13		7	4	2						
130	5.1	10		3	7							
140	5.5	12		2	10							
150	5.9	14			13	1						
160	6.3	8			5	2	1					
170	6.7	3			1	1		1				
180	7.1	3					2	1				
190	7.5	13				3	8	1	1			
200	7.9	21					8	13				
210	8.3	24						11	11	2		
220	8.7	21						2	19			
230	9.1	10						1	8	1		
240	9.4	3							1		1	1
250	9.8	1										1
	Total	195		21	56	12	19	30	40	3	1	2

Table 5. Length at age estimates for bluegill sampled from Perch 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	117	51	2.0	36	1.4
2	117	91	3.6	64	2.5
3	103	132	5.2	97	3.8
4	63	163	6.4	127	5.0
5	54	190	7.5	152	6.0
6	42	208	8.2	170	6.7
7	27	223	8.8	181	7.1
8	5	230	9.0	191	7.5
9	3	241	9.5		
10	2	247	9.7		

Table 6. Age frequency distribution for largemouth bass observed in Perch Lake 2008.

Length (mm)	Length (in)	# Observed	2	3	4
190	7.5	2	1	1	
200	7.9	2	1	1	
210	8.3	2	1	1	
260	10.2	1			
300	11.8	1			
320	12.6	1		1	
330	13.0	1			1
380	15.0	1			1
	Total	11	3	4	2

Table 7. Length at age estimates for largemouth bass sampled from Perch 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	9	86	3.4	72.5	2.9
2	9	168	6.6	160.9	6.3
3	6	233	9.2	234.6	9.2
4	2	339	13.3	294.8	11.6

Table 8. Mercury analysis results for northern pike, measured in micrograms of mercury per gram of fish tissue (µg/g), for Perch Lake 2008.

Species	Length (mm)	Length (in)	µg/g Tissue
NOP	690	27.2	0.173
NOP	562	22.1	0.088
NOP	568	22.4	0.173
NOP	652	25.7	0.184
NOP	683	26.9	0.216
NOP	630	24.8	0.185
NOP	686	27.0	0.13
NOP	662	26.1	0.212
NOP	712	28.0	0.269
NOP	554	21.8	0.096

Table 9. Age frequency distribution for northern pike observed in Perch Lake 2008.

Length (mm)	Length (in)	# Observed	1	2	3	4	5	6	7	8
270	10.6	1								
360	14.2	1	1							
400	15.7	1			1					
420	16.5	1								
440	17.3	2								
450	17.7	2		1				1		
460	18.1	2			2					
470	18.5	1								
480	18.9	3			2	1				
490	19.3	1			1					
500	19.7	2			2					
510	20.1	2			2					
530	20.9	3			1		1			
540	21.3	2			2					
550	21.7	2								
560	22.0	2			1	1				
570	22.4	1								
590	23.2	1								
600	23.6	2							1	1
620	24.4	1					1			
630	24.8	2				2				
640	25.2	1								
650	25.6	3					2		1	
660	26.0	2								1
680	26.8	2					2			
690	27.2	1					1			
710	28.0	1							1	
720	28.3	1						1		
	Total	46	1	1	14	4	7	2	3	2

Table 10. Age frequency distribution for pumpkinseed sunfish observed in Perch Lake 2008.

Length (mm)	Length (in)	# Observed	2	3	4	5	6	7	8
90	3.5	10		10					
100	3.9	37		30	7				
110	4.3	64		38	26				
120	4.7	30		3	15	12			
130	5.1	22		5	7	7	3		
140	5.5	71			36	28	7		
150	5.9	52		10	26	16			
160	6.3	32			6	14	12		
170	6.7	14				3	8	3	
180	7.1	2					1		1
200	7.9	1						1	
210	8.3	2							
220	8.7	1							
230	9.1	1							1
280	11.0	1					1		
	Totals	340		96	123	80	32	4	2

Table 11. Length at age estimates for pumpkinseed sunfish sampled from Perch 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	86	52	2.0	46	1.8
2	86	83	3.3	104	4.1
3	86	110	4.3	130	5.1
4	66	133	5.2	165	6.5
5	41	153	6.0	196	7.7
6	19	174	6.9	244	9.6
7	5	187	7.4		
8	2	205	8.1		

Table 12. Age frequency distribution for yellow perch observed in Perch Lake 2008.

Length (mm)	Length (in)	# Observed	3	4	5	6	7
130	5.1	2	2				
140	5.5	5	5				
150	5.9						
160	6.3	3		3			
170	6.7	3					
180	7.1	2					
190	7.5						
200	7.9	2	1	1			
210	8.3						
220	8.7	2		1	1		
230	9.1	2		2			
240	9.4	4			4		
250	9.8						
260	10.2						
270	10.6						
280	11.0	1					1
290	11.4						
300	11.8	1					1
	Total	27	8	7	5		2

Table 13. Length at age estimates for yellow perch sampled from Perch 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	15	67	2.7	60	2.4
2	15	114	4.5	100	3.9
3	15	156	6.1	136	5.4
4	11	199	7.8	166	6.5
5	6	229	9.0	192	7.6
6	2	264	10.4	214	8.4
7	2	285	11.2	234	9.2