

LONG LAKE
Porter County
2009 Fish Management Report

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2009

EXECUTIVE SUMMARY

- Long Lake is a 65 ac natural lake with a maximum depth of 27.0 ft and a mean depth of 8.0 ft.
- A standard fisheries survey was conducted from July 1-2, 2009. Fish were collected using three sampling gears. Pulsed DC, shoreline electrofishing was conducted for 0.5 h at night with two dippers. Two trap nets and four standard gill nets were also fished overnight.
- A total of 305 fish was collected from all sampling gears representing 13 species with an estimated total weight of 127 lbs. The five most abundant species by number were bluegill (35%), largemouth bass (28%), lake chubsucker (15%), golden shiner (6%), and redear sunfish (5%). The most abundant species by weight were largemouth bass (42%), bowfin (16%), bluegill (11%), lake chubsucker (10%), and northern pike (4%).
- Bluegills were the most abundant species collected by number (108 fish), weighing an estimated 14 lbs. Average length of collected bluegills was 5.0 in and ranged from 1.5 to 8.6 in total length (TL). Bluegill PSD was 21. Harvestable bluegills (TL > 6.0 in) represented 27% of the collected fish. Age-3 bluegill averaged 4.8 in and represented 41% of the bluegill sample, while ages ranged from 1 to 6 years old.
- A total of 86 bass were collected for an estimated total weight of 53 lbs. Average length of largemouth bass was 7.9 in and ranged from 1.5 to 20.5 in TL. There were nine bass that were legal-size bass (TL ≥ 14.0 in) collected during the survey. Largemouth bass PSD was 36. Largemouth bass ages 2 and 3 represented 33% of the sample and were 8.6 and 10.9 in, respectively. Long Lake largemouth bass reached 14.0 in between age 5 and 6.
- Other catches in the Long Lake survey included warmouth up to 9.0 inches. Yellow perch ranging in TL from 4.1 to 7.9 in. One northern pike (TL = 28.8 in) and one walleye (TL = 15.0 in) were also collected during the survey.
- Eleven species of submersed aquatic vegetation were collected on July 7, 2009. The most prevalent submersed aquatic species were coontail, common bladderwort, and flat-stem pondweed. Curly-leaf pondweed was the only non-native species identified and occurred at three of the 40 sample sites. The maximum depth of submersed vegetation was 17 ft. The mean rake score for all sampling locations was 2.70 and the maximum number of species found per site was eight. There were 11 additional emergent vegetation species identified during the survey.
- Overall, the standard survey of Long Lake indicated that there is little, if any, fish management needed at this time.

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INTRODUCTION

Long Lake is a 65 acre natural lake with a maximum depth of 27.0 ft and a mean depth of 8.0 ft. Long Lake is one lake of several in a chain of lakes located in Porter County, north of Valparaiso, Indiana. Other lakes in this (interconnected marsh) chain include: Flint, Canada, Wauhob, and Mink (Figure 1). Two other lakes, Loomis and Spectacle Lakes are artificially connected via a pipe to Flint Lake. Long Lake can be accessed from a public access site on Long Lake Drive on the west shore. The area surrounding the lake is a mix of residential and wetland areas.

Long Lake has historically had good water quality, abundant aquatic vegetation, and satisfactory fishing opportunities. Previous fisheries surveys have indicated average secchi disk depth were 10.6 ft and sufficient levels of dissolved oxygen down to 15.0 feet (Brindza 2002). Aquatic vegetation in Long Lake is extremely diverse with 22 different species being identified and an estimated 50% of the lake bottom being vegetated. Previous fisheries reports have indicated satisfactory fish populations with little need for management actions. In the early 1980's, the Porter County Conservation Club stocked numerous 2-3 inch walleye fingerlings into Long Lake, but no walleyes were collected in fish surveys in 1982 and 1986. Another evaluation of private walleye stocking was conducted in 2005 after Long Lake was stocked in 2002 and 2003 again no walleye were collected, but one approximately 20 in total length (TL) was observed (Robertson 2006).

Overall, the 2001 fisheries survey was similar to the 1986 survey with respect to relative abundance, growth, and size structure (Dexter 1987). In the last standard fisheries survey conducted in June 2001, a total of 434 fish were collected representing 13 species (Brindza 2002). Relative abundance by number was bluegill (29%), largemouth bass (19%), lake chubsucker (13%), yellow perch (12%), and redear sunfish (10%). In 2001, species abundance by weight was dominated by northern pike (28%) and largemouth bass (27%). Bluegill averaged 4.8 in and ranged from 1.0 to 8.5 in TL and nearly 30% of bluegills were 6.0 in or larger. Largemouth bass averaged 9.7 in TL and ranged from 3.9 to 21.5 in and 8.5 % were 14.0 in and longer.

The goal of the 2009 fisheries survey was to evaluate the fish community at Long Lake under work plan 300FW1F10D41621.

METHODS

A standard fisheries survey was conducted from July 1-2, 2009. Physical and chemical characteristics were collected in the deepest area of the lake according to the Division of Fish and Wildlife (DFW) sampling guidelines (Shipman et al. 2001). Aquatic vegetation was sampled on July 7, 2009 using the DFW Tier II Aquatic Vegetation Survey Protocol (IDNR 2007). Unidentified and voucher specimens were refrigerated in a zip top bag with water until species identification could be made by C. Lembi (Professor, Department of Botany and Plant Pathology, Purdue University) on July 9, 2009.

Fish were collected using three sampling gears. Pulsed DC, shoreline electrofishing was conducted for 0.5 h at night with two dippers. Two trap nets and four standard gill nets were also fished overnight. All fish collected were measured to the nearest 0.1 in total length (TL) and separated into half-inch groups (X.0-X.4 for inch group and X.5-X.9 for half-inch group). A length-weight regression was used to estimate the weight of each fish species collected. Five scale samples, if possible, were taken per half-inch group from the dominant sportfish for age and growth analysis. Catch per unit effort (CPUE) was calculated for the dominant sportfish collected as total catch divided by effort for each sampling gear. Proportional stock density (PSD) was calculated for largemouth bass and bluegill (Anderson and Neumann 1996).

RESULTS

Standard Fisheries Survey

A total of 305 fish was collected from all sampling gears representing 13 species with an estimated total weight of 127 lbs. The five most abundant species by number were bluegill (35%), largemouth bass (28%), lake chubsucker (15%), golden shiner (6%), and redear sunfish (5%). The most abundant species by weight were largemouth bass (42%), bowfin (16%), bluegill (11%), lake chubsucker (10%), and northern pike (4%).

There were 108 bluegills collected that weighted an estimated 14 lbs. Bluegill CPUE was the highest for electrofishing at 166.0 /h followed by trap nets (11.5 /lift) and gill nets (0.5 /lift). Average length of collected bluegills was 5.0 in and ranged from 1.5 to 8.6 in TL. The majority of the fish collected (34%) were between 4.0 and 5.0 in TL. Bluegill PSD was 21. Harvestable bluegills (TL > 6.0 in) represented 27% of the collected fish. Age-3 bluegills represented 41% of the sample averaging 4.8 in, while ages ranged from 1 to 6 years old.

Largemouth bass were the second most abundant species by number (28%; 86 fish) and the most abundant by weight (42%; 53 lbs). Largemouth bass CPUE was highest for electrofishing 164.0 /h, gill net CPUE was 1.0 /lift, and no bass were captured in trap nets. Average length of largemouth bass was 7.9 in and ranged from 1.5 to 20.5 in TL. There were nine legal size and larger bass (TL \geq 14.0 in) collected during the survey. Largemouth bass PSD was 36. Largemouth bass ages 2 and 3 represented 33% of the sample and were 8.6 and 10.9 in, respectively. Long Lake largemouth bass reached 14.0 in between age 5 and 6. Largemouth bass ages ranged from 1 to 10 years old.

Redear sunfish were the fifth most abundant species (14 fish) collected from Long Lake. Redear sunfish averaged 7.4 in TL and ranged from 5.3 to 9.4 in. Redear larger than 7.0 inches represented 64% of the sample. Ages of redear ranged from 2 to 7 years old.

Other catches in the Long Lake standard fishery survey included warmouth up to 9.0 inches and yellow perch ranging in TL from 4.1 to 7.9 in. Five bowfins collected for an estimated total weight of 21 lbs with TL ranging from 22.5 to 28.5 in. There was one northern pike (TL = 28.8 in) and one walleye (TL = 15.0 in) collected during the survey.

Submersed Aquatic Vegetation Survey

Overall, 11 species of submersed aquatic vegetation were collected. The most prevalent submersed aquatic species were coontail, common bladderwort, and flat-stem pondweed. Curly-leaf pondweed was the only non-native species identified and occurred at three of the 40 sample sites. The maximum depth of submersed vegetation was 17 ft. The mean rake score for all sampling locations was 2.70 and the maximum number of species found per site was eight. There were 11 additional emergent vegetation species identified during the survey.

DISCUSSION

Similar to the 1986 and 2001 standard fisheries surveys, the fish population has changed little and is in need of minimal management action (Table 1). Bluegills remain the most abundant species in the lake by number. There was a similar size range in bluegill across sampling years; however, PSD declined from 29 (2001) to 21 (2009). The range of bluegill ages were similar from 2001 to 2009; however, average length at age for 2009 was higher than 2001. This could be due to the comparison of back-calculated lengths in 2001 with length at capture in 2009. Additionally, electrofishing catch rate nearly doubled from 2001 to 2009. The increase in

bluegill relative abundance did not decrease the size structure or growth and has resulted in a quality bluegill fishery.

Largemouth bass remained the second most abundant species by number in 2001 and 2009, while bass were third in abundance in 1986. In 2009, smaller largemouth bass (TL < 3.9) were captured than 2001 and these were likely age-0 bass that were recruited to electrofishing in the later sampling in July 2009 rather than June 2001. The maximum length of largemouth bass collected was similar in both 2001 (TL = 21.5) and 2009 (TL = 20.5). In 2009, legal sized largemouth bass (TL > 14.0 in) were assigned older ages than similar sized bass in 2001. Growth of older fish in 2001 was considered above average, but growth may have slowed by 2009. Bass appear to be more abundant but growth has slowed in the 2009 survey. Size structure indexed as PSD has increased from 22 in 2001 to 36 in 2009, but still below the ideal range of 40 to 70. Overall, the largemouth bass population has increased in relative abundance from previous surveys and there are angling opportunities to catch large bass (TL > 20 in). Anglers are encouraged to practice catch and release of largemouth bass to provide high bass catch rates and predation on small bluegill to prevent stunting. Previous reports speculated that the panfish population could become stunted by small fish taking refuge in the abundant aquatic vegetation, but with the high predator population, stunting is unlikely to occur (Brinzda 2002).

Even though, bluegill and largemouth bass relative abundance increased from previous surveys there was a decline in the abundances of other sportfish populations. Redear sunfish declined in abundance from a total catch in 2001 of 43 fish to a catch of 14 fish in 2009, this is potentially due to sampling gear bias. In 2009, only 2 trap nets were used whereas in 2001 four trap nets were used. Trap nets are an effective sampling gear for structure oriented species like redear sunfish compared other gear used. Therefore, the redear sunfish population may not be decreasing, but the change in effort or sampling month (June 2001 vs. July 2009) could have affected capture. Even though, the abundance of redear sunfish has declined quality opportunities exist to catch large (TL > 8.0 in) fish.

Yellow perch have also dramatically declined in abundance from the 1986 and 2001 surveys. The decline in yellow perch could be due to a seasonal sampling effect but likely not due to gear bias. Perch are effectively captured in gill nets where the same sampling effort and location were used in both the 2001 and 2009 surveys. Historically, only a few northern pike have been collected in the standard surveys. In 2009, only one northern pike was collected

which is the lowest number of individuals collected; however, it was a large fish (TL = 28.8 in) and similar to previous surveys pike collected were large individuals. The most surprising capture was the collection of one walleye in a gill net. Walleye had not been previously been collected in other standard and targeted surveys, in spite of numerous private advanced walleye stockings that have regularly occurred in the chain of lakes since 2001 (Robertson 2005). It is not surprising that black crappie were not collected in 2009 as there has been a steady decline from 1986 to 2001 in the crappie population.

Overall, the standard survey of Long Lake indicated that there is little management needed. The 65 acre lake has developed a quality largemouth bass and bluegill fishery which provides good fishing opportunities near the Valparaiso urban center. There are opportunities to catch a diversity of quality-sized fish. There is no need to supplement any game fish population at this time since it could upset the balance in existing populations in Long Lake.

Since the 2001 standard fisheries survey, Long Lake has received Lake and River Enhancement (LARE) funding to create aquatic vegetation management plans for controlling exotic species. Long Lake management plan was prepared in 2007 and focused on control of Eurasian water milfoil and curly-leaf pondweed. The first treatment of Eurasian water milfoil was initiated with spot treatments in 2008. Another invasive species that the Long Lake management plan identified was purple loosestrife which is located sporadically around the lake and landowners are encouraged to adopt control strategies for this species. No Eurasian water milfoil was collected during the 2009 Tier II survey. Similar species composition and occurrence were observed with the 2007 LARE funded Tier II survey and 2009 Tier II survey (Aquatic Control, 2008). The primary differences between 2007 and 2009 were that large-leaf pondweed, chara, and water buttercup were identified in low abundance in 2009, but there was a decline in northern water milfoil occupying 20% of sites in 2007 to only 7.5% of sites in 2009. It is recommended to continue the public education and vegetation treatment of exotic species in Long Lake.

RECOMMENDATIONS

- Develop the public access to include a fishing pier for shore anglers and boat users.
- Encourage landowners to become familiar with purple loosestrife and adopt control measures.
- Encourage lake users to clean boats and trailers before entering or leaving the lake to prevent the spread of aquatic vegetation.

LITERATURE CITED

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- Approved by: Stu Shipman, Fisheries Supervisor

Table 1. Relative abundance of species by number and weight (lbs) collected during 1986 (Dexter 1987), 2001 (Brindza 2002), and 2009 standard fisheries surveys at Long Lake, Porter Co., Indiana. Blank spaces indicate species was not collected during corresponding year.

Species	<u>2009</u>		<u>2001</u>		<u>1986</u>	
	No. (%)	Wt. (%)	No. (%)	Wt. (%)	No. (%)	Wt. (%)
Bluegill	108 (35.4)	14.2 (11.2)	126 (29.0)	16.4 (8.7)	172 (28.6)	18.0 (8.8)
Largemouth bass	86 (28.2)	53.3 (42.1)	82 (18.9)	51.3 (27.4)	98 (16.3)	36.9 (18.1)
Lake chubsucker	47 (15.4)	12.7 (10.0)	57 (13.1)	13.2 (7.1)	101 (16.8)	25.8 (12.7)
Golden shiner	17 (5.6)	4.5 (3.5)	20 (4.6)	4.7 (2.5)	41 (6.8)	5.5 (2.7)
Redear sunfish	14 (4.6)	4.7 (3.7)	43 (9.9)	7.9 (4.2)	28 (4.7)	8.7 (4.3)
Warmouth	7 (2.3)	2.5 (2.0)	11 (2.5)	3.1 (1.7)	41 (6.8)	5.4 (2.6)
Yellow perch	6 (2.0)	0.8 (0.6)	53 (12.2)	6.7 (3.6)	47 (7.8)	5.0 (2.5)
Grass pickerel	6 (2.0)	0.8 (0.7)	1 (0.2)	0.4 (0.2)	23 (3.8)	3.9 (1.9)
Bowfin	5 (1.6)	20.6 (16.2)	2 (0.5)	10.2 (5.4)	9 (1.5)	36.6 (18.0)
Brown bullhead	5 (1.6)	4.2 (3.3)	21 (4.8)	18.6 (9.9)	7 (1.2)	6.5 (3.2)
Yellow bullhead	2 (0.7)	2.0 (1.5)	1 (0.2)	0.1 (0.1)	8 (1.3)	3.2 (1.6)
Northern pike	1 (0.3)	5.5 (4.3)	9 (2.1)	51.8 (27.6)	6 (1.0)	43.9 (21.6)
Walleye	1 (0.3)	1.1 (0.8)				
Black crappie			8 (1.8)	3.0 (1.6)	19 (3.2)	3.5 (1.7)
Black bullhead					2 (0.3)	0.8 (0.4)
Total	305	126.8	434	187.4	602	203.5

Sampling effort

2009: 0.5 h electrofishing, 2 trap nets, 4 gill nets

2001: 1.0 h electrofishing, 4 trap nets, 4 gill nets

1986: 1.0 h electrofishing, 6 trap nets, 6 gill nets

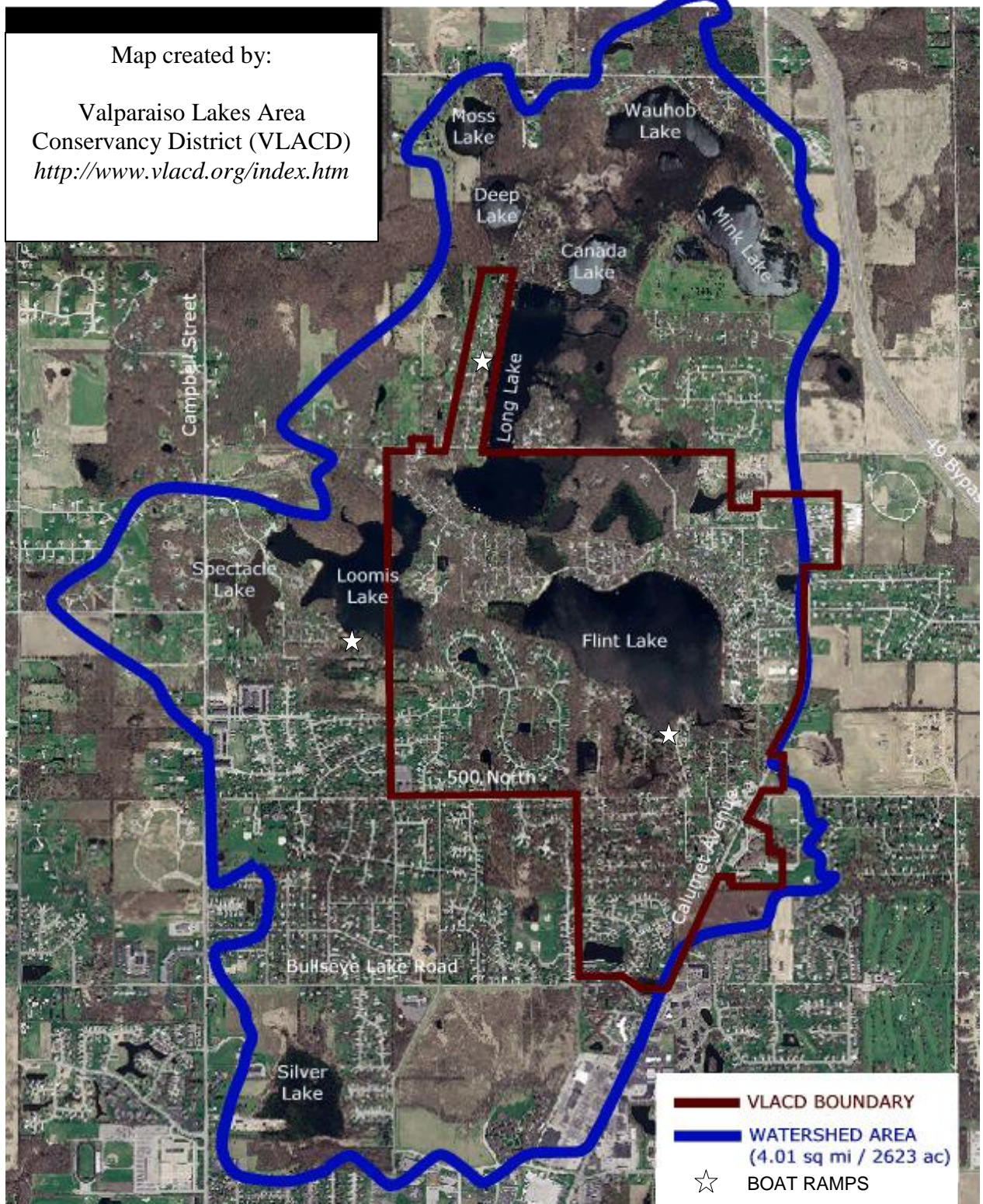


Figure 1. A map of the chain of lakes north of Valparaiso, IN including the Valparaiso Lakes Area Conservancy District (VLACD), watershed area, and boat ramps.

APPENDIX I

LAKE SURVEY REPORT

Type of Survey	
<input type="checkbox"/> Initial Survey	<input checked="" type="checkbox"/> Re-Survey

Lake Name Long Lake	County Porter	Date of survey (Month, day, year) 7/1/09-7/2/09
Biologist's name Thomas Bacula and Christopher Long		Date of approval (Month, day, year)

LOCATION		
Quadrangle Name Chesterton	Range 6W	Section 1, 36
Township Name 36 N	Nearest Town Valparaiso	

ACCESSIBILITY					
State owned public access site West side of lake		Privately owned public access site		Other access site	
Surface acres 65	Maximum depth 27 ft	Average depth 8 ft	Acre feet 521	Water level 797.66	Extreme fluctuations 1 ft
Location of benchmark West side of lake					

INLETS		
Name Canada Lake outlet	Location N. E. Shore	Origin Canada Lake

OUTLETS			
Name Outlet to Flint Lake		Location S. E. Shore	
Water level control None			
POOL	ELEVATION (Feet MSL)	ACRES	Bottom type <input type="checkbox"/> Bolder <input type="checkbox"/> Gravel <input checked="" type="checkbox"/> Sand <input checked="" type="checkbox"/> Muck <input type="checkbox"/> Clay <input type="checkbox"/> Marl
TOP OF DAM			
TOP OF FLOOD CONTROL POOL			
TOP OF CONSERVATION POOL			
TOP OF MINIMUM POOL			
STREAMBED			

Watershed use Primarily residential with considerable marsh areas
Development of shoreline 65% Residential, 35% Undeveloped
Previous surveys and investigations Fisheries Surveys: 1965, 1972, 1986, 2001 Walleye Survey: 1982, 2005

Occurrence and Abundance of Submersed Aquatic Plants - Overall

Lake: Long Lake Secchi(ft): 9.0 SE Mean species / site: 0.28
 Date: 7/7/2009 Littoral sites with plants: 35 Mean natives / site: 2.63
 Littoral Depth (ft): 17.0 Number of species: 11 SE Mean natives / site: 0.26
 Littoral Sites: 36 Maximum species / site: 8 Species diversity: 0.81
 Total Sites: 40 Mean species / site: 2.70 Native diversity: 0.80

Species	Frequency of Occurrence	Score Frequency					Dominance
		0	1	3	5		
Coontail	87.5	12.5	15.0	25.0	47.5	65.5	
Common bladderwort	52.5	47.5	32.5	20.0	0	18.5	
Flat-stem pondweed	50.0	50.0	40.0	10.0	0	14.0	
Eelgrass	17.5	82.5	17.5	0	0	3.5	
Richardson pondweed	17.5	82.5	15.0	2.5	0	4.5	
Elodea	15.0	85.0	12.5	2.5	0	4.0	
Water buttercup	10.0	90.0	7.5	0	2.5	4.0	
Curly-leaf pondweed	7.5	92.5	7.5	0	0	1.5	
Northern water milfoil	7.5	92.5	7.5	0	0	1.5	
Chara	2.5	97.5	2.5	0	0	0.5	
Large-leaf pondweed	2.5	97.5	0	2.5	0	1.5	
Filamentous algae	0						

Other species noted: Watershield, button bush, swamp loosestrife, swamp rose mallow, purple loosestrife, spatterdock, white water lily, arrow arum, water smartweed, pickerel weed

SAMPLING EFFORT					
ELECTROFISHING	Day hours		Night hours		Total hours
			0.5		0.5
TRAP NETS	Number of traps		Number of Lifts		Total effort
	2		1		2
GILL NETS	Number of nets		Number of Lifts		Total effort
	4		1		4
ROTENONE	Gallons	ppm	Acre Feet Treated	SHORELINE SEINING	Number of 100 Foot Seine Hauls

PHYSICAL AND CHEMICAL CHARACTERISTICS			
Color		Turbidity	
Clear		9 Feet 0 Inches (SECCHI DISK)	
Alkalinity (ppm)*		pH	
Surface: 40 Bottom: 80		Surface: 9.5 Bottom: 9.0	
Conductivity: 237 micromhos		Air temperature: 70 °F	
Water chemistry GPS coordinates: N 41.52534 W 87.04879			

TEMPERATURE AND DISSOLVED OXYGEN (D.O.)								
DEPTH (FEET)	Degrees (°F)	D.O. (ppm)	DEPTH (FEET)	DEGREES (°F)	D.O. (ppm)	DEPTH (FEET)	DEGREES (°F)	D.O. (ppm)
SURFACE	78.1	7.5	36			72		
2	78.1	7.5	38			74		
4	78.1	7.5	40			76		
6	77.1	6.6	42			78		
8	75.8	4.4	44			80		
10	74.6	1.5	46			82		
12	73.3	0.4	48			84		
14	70.5	0.1	50			86		
16	66.0	0.07	52			88		
18	62.2	0.07	54			90		
20	58.2	0.08	56			92		
22	54.9	0.09	58			94		
24	52.6	0.09	60			96		
26	51.0	0.09	62			98		
28	50.3	0.09	64			100		
30			66					
32			68					
34			70					

COMMENTS
TDS= 788

*ppm-parts per million

NUMBER, PERCENTAGE, WEIGHT, AND AGE OF Bluegill									
TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH	TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH
1.0					19.0				
1.5	1	0.9	0.01	not aged	19.5				
2.0	5	4.6	0.01	1	20.0				
2.5	6	5.6	0.02	1	20.5				
3.0	10	9.3	0.03	1	21.0				
3.5	4	3.7	0.05	1, 2	21.5				
4.0	13	12.0	0.07	2, 3	22.0				
4.5	24	22.2	0.09	3	22.5				
5.0	8	7.4	0.12	3, 4	23.0				
5.5	7	6.5	0.15	3, 4	23.5				
6.0	10	9.3	0.19	3, 4	24.0				
6.5	3	2.8	0.23	4	24.5				
7.0	5	4.6	0.28	5	25.0				
7.5	5	4.6	0.34	5	25.5				
8.0	6	5.6	0.40	5, 6	26.0				
8.5	1	0.9	0.47	not aged	TOTAL	108			
9.0									
9.5									
10.0									
10.5									
11.0									
11.5									
12.0									
12.5									
13.0									
13.5									
14.0									
14.5									
15.0									
15.5									
16.0									
16.5									
17.0									
17.5									
18.0									
18.5									

ELECTROFISHING CATCH	166.0 /h	GILL NET CATCH	0.5 /lift	TRAP NET CATCH	11.5 /lift
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NUMBER, PERCENTAGE, WEIGHT, AND AGE OF Largemouth bass									
TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH	TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH
1.0					19.0				
1.5	21	24.4	0.00	not aged	19.5				
2.0	8	9.3	0.01	not aged	20.0				
2.5					20.5	1	1.2	4.47	9
3.0					21.0	1	1.2	4.79	10
3.5					21.5				
4.0	1	1.2	0.04	1	22.0				
4.5	1	1.2	0.06	1	22.5				
5.0	1	1.2	0.08	1	23.0				
5.5	1	1.2	0.10	1	23.5				
6.0	1	1.2	0.13	1	24.0				
6.5					24.5				
7.0					25.0				
7.5	1	1.2	0.25	2	25.5				
8.0	4	4.7	0.30	2	26.0				
8.5	7	8.1	0.36	2	TOTAL	86			
9.0	1	1.2	0.42	2					
9.5									
10.0	5	5.8	0.57	3					
10.5	5	5.8	0.65	3					
11.0	3	3.5	0.74	3					
11.5	7	8.1	0.84	3, 4					
12.0	4	4.7	0.95	3, 4, 5					
12.5	2	2.3	1.07	4, 5					
13.0	2	2.3	1.20	5					
13.5	1	1.2	1.34	5					
14.0	1	1.2	1.49	5					
14.5	3	3.5	1.65	6					
15.0	1	1.2	1.81	6					
15.5	1	1.2	1.99	7					
16.0	1	1.2	2.18	6					
16.5									
17.0									
17.5	1	1.2	2.83	8					
18.0									
18.5									

ELECTROFISHING CATCH	164.0 /h	GILL NET CATCH	1.0 /lift	TRAP NET CATCH	0 /lift
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NUMBER, PERCENTAGE, WEIGHT, AND AGE OF Redear sunfish

TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH	TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH
1.0					19.0				
1.5					19.5				
2.0					20.0				
2.5					20.5				
3.0					21.0				
3.5					21.5				
4.0					22.0				
4.5					22.5				
5.0	1	7.1	0.12	2	23.0				
5.5					23.5				
6.0	1	7.1	0.20		24.0				
6.5	3	21.4	0.24	3	24.5				
7.0	4	28.6	0.30	3, 4, 5	25.0				
7.5	2	14.3	0.36	4, 5	25.5				
8.0					26.0				
8.5	1	7.1	0.51	6	TOTAL	14			
9.0	2	14.3	0.59	7					
9.5									
10.0									
10.5									
11.0									
11.5									
12.0									
12.5									
13.0									
13.5									
14.0									
14.5									
15.0									
15.5									
16.0									
16.5									
17.0									
17.5									
18.0									
18.5									

ELECTROFISHING CATCH	4.0 /h	GILL NET CATCH	0 /lift	TRAP NET CATCH	6.0 /lift
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AGE-LENGTH KEY FOR Bluegill														
LENGTH GROUP (inches)	NUMBER COLLECTED	NUMBER AGED	AGE											
			1	2	3	4	5	6	7	8	9	10	11	12
1.0														
1.5	1	0												
2.0	5	2	5											
2.5	6	5	6											
3.0	10	5	10											
3.5	4	4	1	3										
4.0	13	5		3	10									
4.5	24	4			24									
5.0	8	5			6	2								
5.5	7	5			1	6								
6.0	10	5			2	8								
6.5	3	3				3								
7.0	5	3					5							
7.5	5	4					5							
8.0	6	4					1	5						
8.5	1	0												
9.0														
9.5														
Total	108	54	22	6	44	18	11	5						
Mean TL			2.9	4.0	4.8	6.1	7.6	8.3						
SE			0.10	0.12	0.07	0.10	0.11							

AGE-LENGTH KEY FOR Largemouth bass														
LENGTH GROUP (inches)	NUMBER COLLECTED	NUMBER AGED	AGE											
			1	2	3	4	5	6	7	8	9	10	11	12
1.0														
1.5	21	0												
2.0	8	0												
2.5														
3.0														
3.5														
4.0	1	1	1											
4.5	1	1	1											
5.0	1	1	1											
5.5	1	1	1											
6.0	1	1	1											
6.5														
7.0														
7.5	1	1		1										
8.0	4	4		4										
8.5	7	5		7										
9.0	1	1		1										
9.5														
10.0	5	5			5									
10.5	5	5			5									
11.0	3	3			3									
11.5	7	5			1	6								
12.0	4	4			1	2	1							
12.5	2	2				1	1							
13.0	2	2					2							
13.5	1	1					1							
14.0	1	1					1							
14.5	3	2						3						
15.0	1	1						1						
15.5	1	1							1					
16.0	1	1						1						
16.5														
17.0														
17.5	1	1								1				
18.0														
18.5														
19.0														
19.5														
20.0	1	1									1			
20.5	1	1										1		
21.0														
21.5														
Total	86	52	5	13	15	9	6	5	1	1	1	1		
Mean TL			5.3	8.6	10.9	12.0	13.3	15.2	15.8	17.8	20.3	20.8		
SE			0.35	0.11	0.16	0.13	0.29	0.29						

AGE-LENGTH KEY FOR Redear sunfish														
LENGTH GROUP (inches)	NUMBER COLLECTED	NUMBER AGED	AGE											
			1	2	3	4	5	6	7	8	9	10	11	12
1.0														
1.5														
2.0														
2.5														
3.0														
3.5														
4.0														
4.5														
5.0	1	1		1										
5.5														
6.0	1													
6.5	3	2			3									
7.0	4	4			1	2	1							
7.5	2	2				1	1							
8.0														
8.5	1	1						1						
9.0	2	2							2					
9.5														
10.0														
Total	14	12		1	4	3	2	1	2					
Mean TL				5.3	6.9	7.4	7.5	8.8	9.3					
SE					0.06	0.08	0.13							

GILL NETS				TRAP NETS				ELECTROFISHING			
1	N	41.51912	W 87.05171	1	N	41.52052	W 87.05117	1	N	41.52502	W 87.04806
	N	41.51904	W 87.05085	2	N	41.52621	W 87.05005		N	41.52636	W 87.04774
2	N	41.52320	W 87.04990					2	N	41.52621	W 87.05005
	N	41.52245	W 87.05009						N	41.52452	W 87.05113
3	N	41.52509	W 87.05016					3	N	41.51902	W 87.05254
	N	41.52430	W 87.05031						N	41.51823	W 87.04990
4	N	41.52029	W 87.05037								
	N	41.51979	W 87.04971								