Lake Luzerne
Aquatic Plant Survey—2007

Tier III Lake Survey Results

Prepared for

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Introduction

Lake Luzerne has a surface area of ca. 111 acres and sits within a steeply sloped watershed of ca. 14,000 acres. The watershed is primarily woodlands although several homes populate the shores. There is a small boat launch and public beach on the western side of the lake near the effluent. Lake Luzerne drains directly into the Hudson River through a very short stream (less than 1,500 feet in length). The lake is situated in the town of Luzerne at the southern edge of the Adirondak Park in Warren County, NY.

Lake Luzerne has a maximum depth of ca. 52 feet with an average depth of ca. 24 feet (Mikol & Polsinelli, 1985). It is a dimictic lake (i.e., thermally stratified on a seasonal cycle) and mesotrophic.

Lake Luzerne currently supports a scattered population of the invasive non-native nuisance aquatic plant Eurasian watermilfoil (*Myriophyllum spicatum*) with some locally dense beds at the two tributaries and the effluent as well as a healthy native aquatic plant community. Many of the areas that potentially could support dense *M. spicatum* growth currently do not. Thus, an effort is underway to control the current population of *M. spicatum* before it has spread throughout the entire littoral area of the lake.

The abundance and distribution of *M. spicatum* in Lake Luzerne has varied annually. In 2007, individual colonies of *M. spicatum* were not as dense as in previous years (e.g., Eichler & Boylen, 2004), and no new areas of growth were identified. The cause of the reduced abundance of *M. spicatum* in Lake Luzerne is uncertain, but it may have been due at least in part to the possible presence of the milfoil weevil (*Euhrychiopsis lecontei*). Confirmation of this herbivore is pending. However, dense *M. spicatum* beds do vary annually in other nearby lakes (e.g., Lake George) where no *E. lecontei* population exists. These beds can later return to actively growing beds and have even 'migrated' to other areas within the same bays. In short, a single season of reduced density within milfoil beds does not necessarily mean the population is likely to exhibit long-term decline in the absence of more active control strategies.

This study follows the New York Pesticides Program Monitoring Guidelines for a Tier III lake aquatic plant survey and reports the current distribution of *M. spicatum* (target species) as well as all other macrophytes found in our samples.

Methods

An aquatic plant survey was conducted on 29 September 2007. It was noted that most of the macrophyte community in Lake Luzerne was beginning it's annual 'die back' as most plant samples were fragile and in the beginning stages of decay. As such, this survey may underestimate the total number of species and abundance of each relative to a survey conducted at the height of the growing season.

The rake-toss method was used to sample plants from 50 sites, two samples per site. Briefly, two metal rake heads were attached together and secured to a 40-foot nylon line.

The rake was tossed as far as possible, allowed to settle on the bottom and slowly retrieved back into the boat. Plants were sorted, piled and scored using the Cornell Plant Abundance Scale and recorded on field data sheets. GPS coordinates were recorded for each site, however the individual samples were taken from ca. 40 feet (i.e., length of line) from each side of the boat which was centered on the GPS coordinates (i.e., two samples per GPS site).

A grid was superimposed onto a map of the lake prior to conducting field work. The available lake map lacked sufficient shoreline detail, thus the actual sample points (Figure 1) do not align perfectly with the anticipated sample cells.

Plant survey data are summarized in the Table 1 and uses the Cornell Plant Abundance Scale.

Cornell Plant Abundance Scale:

Z= zero plants	= no plants on rake
T = trace plants	= fingerful on rake
S = sparse plants	= handful on rake
M = medium plants	= rake full of plants
D = dense plants	= difficult to bring into boat

Results

Plants listed in Table 1 are *Myriophyllum spicatum* (Msp), *Potemogeton crispis* (Pc), *Myriophyllum sibiricum* (Msi), *Elodea* spp. (El), *Nymphaea* spp. (Nym), *Brasenia spp.* (Br), *Megalodonta spp.* (Mg), *Potemogeton spp.* (Pt), *Chara spp.* (Ch), *Valisnaria spp.* (Va) and *Isoetes spp.* (Is).

Dense milfoil beds which were mapped in 2004 in the shallow southeast bay are no longer present. Scattered milfoil plants do remain in the general areas were beds previously existed based upon visual surveys of the known milfoil beds (in addition to the rake-toss sampling approach). Two beds in the northern section of the lake at the primary inlet and the inlet from a small pond seems to have increased in area and possibly density. The largest bed mapped in 2004 (near the outlet) is still the largest bed in 2007. However, density is significantly reduced particularly toward the northern reaches of this bed site. Part of this bed is being actively managed with benthic barrier panels and this in part explains the reduced density in the middle and northern reaches.

Figure 1. Grid overlay and sample sites for rake-toss samples. Site numbers and plant data listed in Table 1.

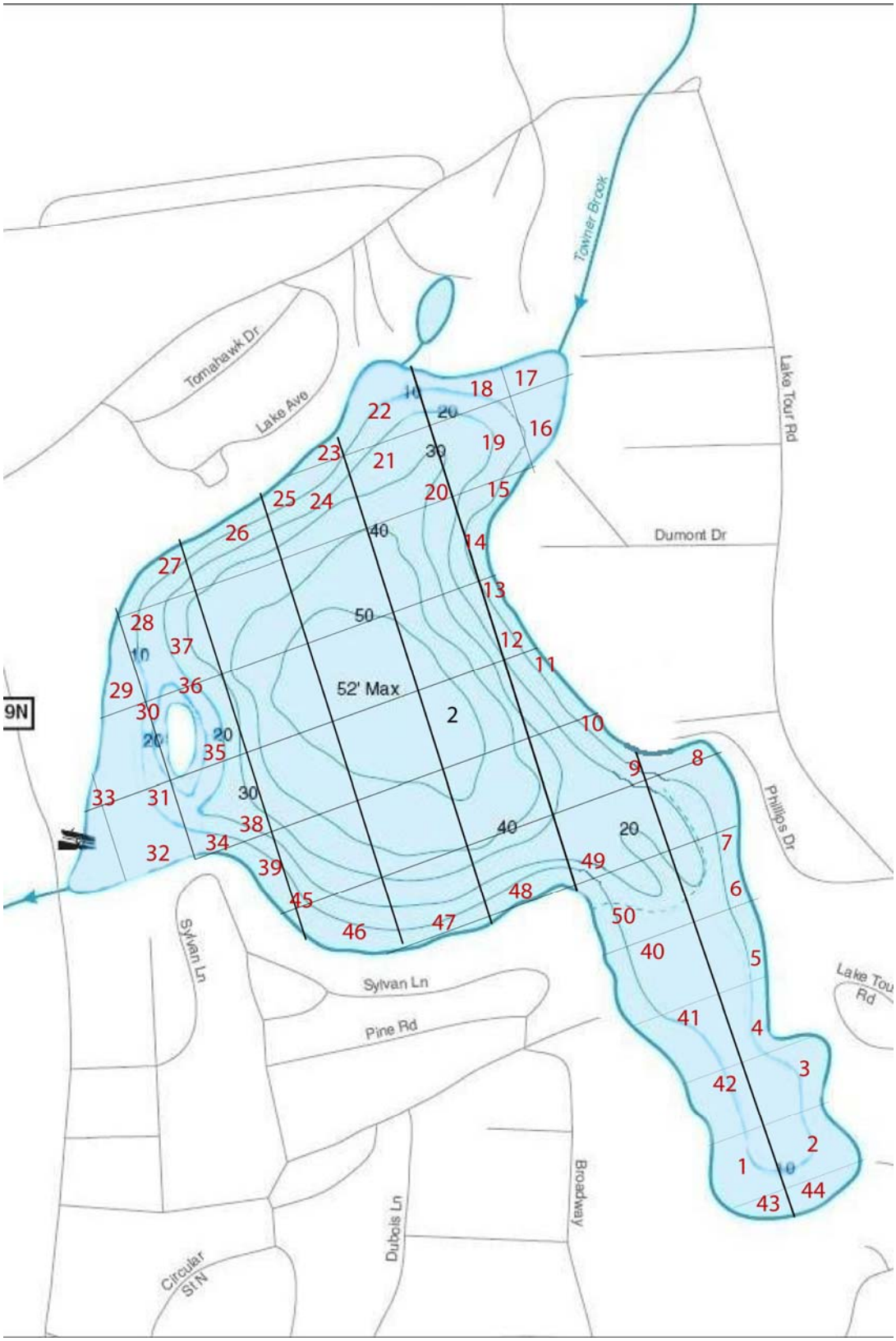

Figure 2. Areas where Eurasian milfoil plants were found using the rake-toss method. Codes from Cornell Plant Abundance Scale; T=trace, S= Sparse, M=medium, D=dense.

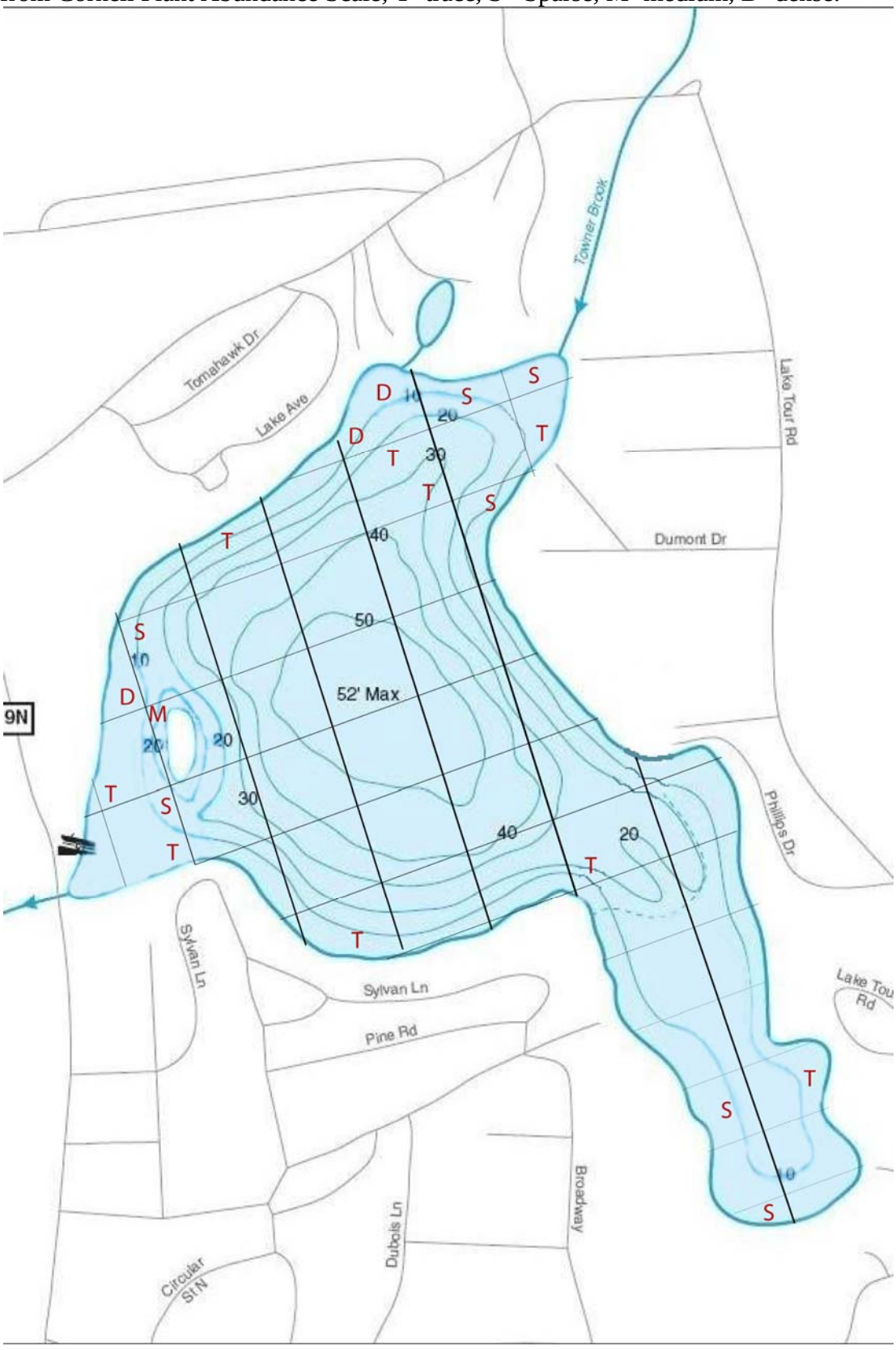

Figure 3. Dense Eurasion milfoil beds (in red), redrawn from Eichler & Boylen 2004.

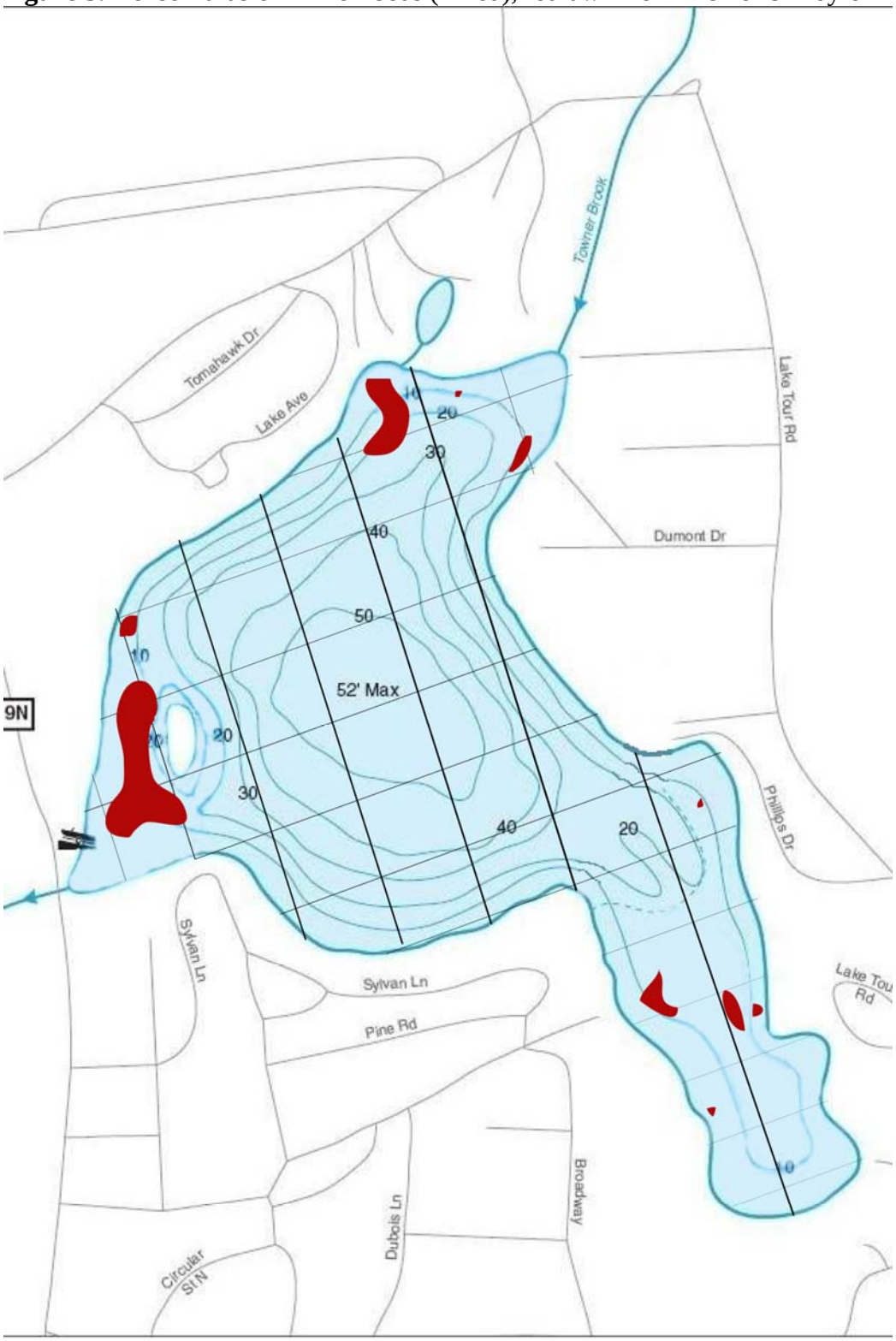

Figure 4. Dense Eurasion milfoil beds (in red) from September 2007 survey.

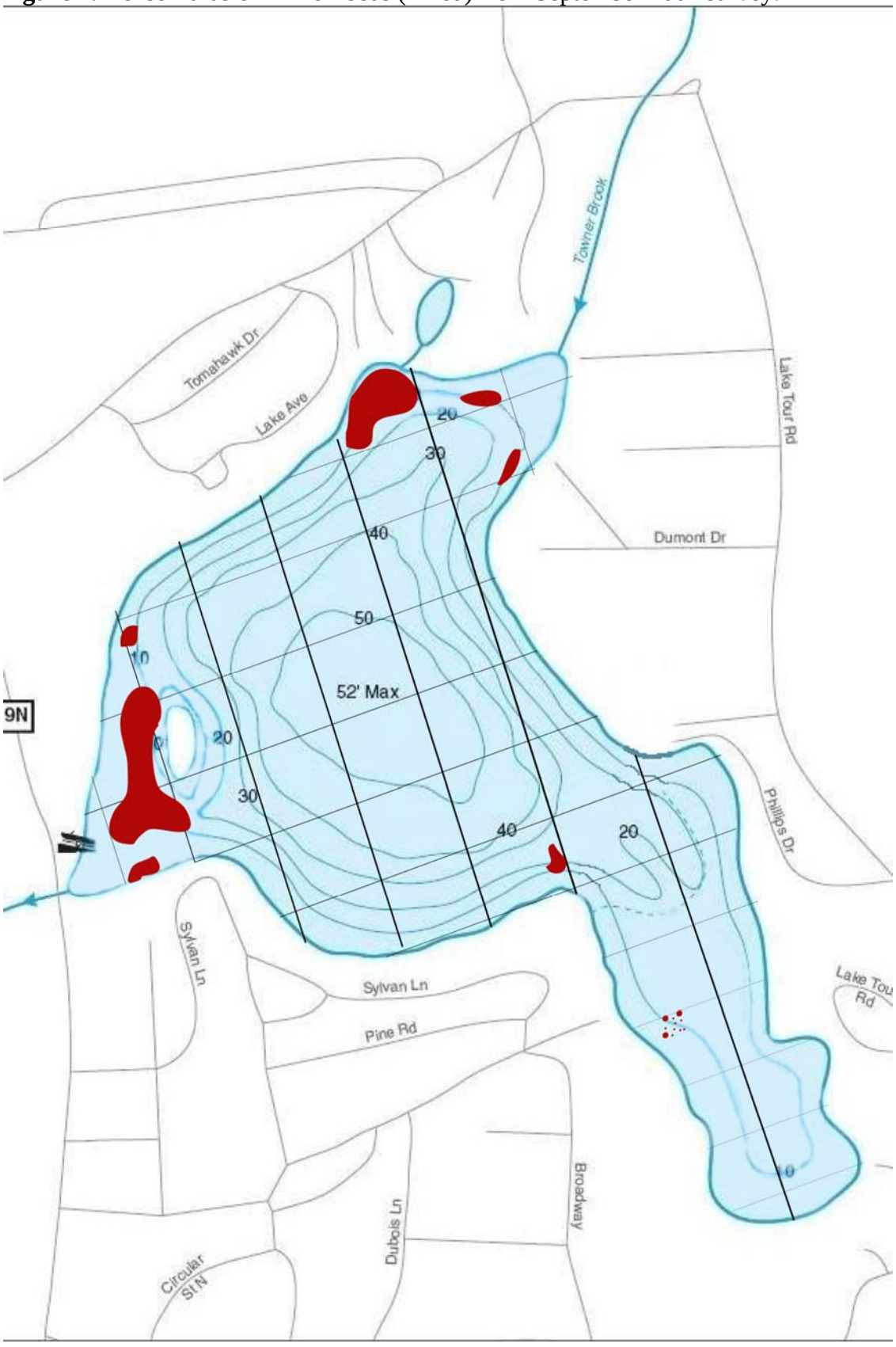

Table 1. Lake Luzerne 2007 Aquatic Plant Survey using the rake-toss method.

Site	Sample	Position	Depth (feet)	Overall Abundance	Msp	Pc	Msi	El	Nym	Br	Mg	Pt	Ch	Va	Is
1	1	N43 19.223 W73 49.794	10	M			T				S	S	S		
1	2		10	S								S	S		
2	1	N43 19.193 W73 49.766	10	M								M			
2	2		10	M								M			
3	1	N43 19.140 W73 49.763	7	M	T		T					S	S		
3	2		7	M	T		T					M	T		
4	1	N43 19.091 W73 49.760	8	M			T					S	M	T	
4	2		8	M			T					S	M		
5	1	N43 19.050 W73 49.749	5	S								T	S		
5	2		5	S								T	S		T
6	1	N43 19.053 W73 49.695	12	Z											
6	2		12	T			T						T		
7	1	N43 19.081 W73 49.687	10	M								M	T		
7	2		10	M								S	S		
8	1	N43 19.125 W73 49.714	9	S								T	S		
8	2		9	S								T	S		
9	1	N43 19.151 W73 49.724	10	T								T	T		
9	2		10	M								T			
10	1	N43 19.206 W73 49.748	12	T				T					T		T
10	2		12	T									T		T
11	1	N43 19.253 W73 49.753	15	T								T			
11	2		15	Z											
12	1	N43 19.303 W73 49.750	15	Z											
12	2		15	M				T				M			
13	1	N43 19.331 W73 49.775	8	M						T		M			
13	2		8	S								S			
14	1	N43 19.367 W73 49.808	8	S			T					S	T		
14	2		8	T			T					T		T	
15	1	N43 19.393 W73 49.841	9	M	S							S			
15	2		9	S	T	T						T	S	T	
16	1	N43 19.419 W73 49.869	8	D								D			
16	2		8	D	T							D			
17	1	N43 19.442 W73 49.915	4	M	S		S							T	
17	2		4	D	T		D			S			T		
18	1	N43 19.478 W73 49.934	9	S	S							T		T	
18	2		9	S	S							T			

19	1	N43 19.517 W73 49.930	15	Z										
19	2		15	Z										
20	1	N43 19.552 W73 49.903	10	M	T						M			
20	2		10	S								T	S	
21	1	N43 19.584 W73 49.886	8	T								T		
21	2		8	S	T						S			
22	1	N43 19.622 W73 49.912	6	D	D						T			
22	2		6	D	D									
23	1	N43 19.615 W73 49.979	7	D	D		T				T			
23	2		7	S			T					S	T	
24	1	N43 19.579 W73 49.962	10	M		T	M							
24	2		10	T								T		
25	1	N43 19.585 W73 50.008	15	S							S		T	
25	2		15	T								T		
26	1	N43 19.588 W73 50.047	15	T								T		
26	2		15	S	T					T	T		T	
27	1	N43 19.607 W73 50.069	12	S								S		
27	2		12	T							T			
28	1	N43 19.588 W73 50.096	12	M			T		S		S			
28	2		12	S	S									
29	1	N43 19.559 W73 50.124	10	D	D		S				D			
29	2		10	D	S						M			
30	1	N43 19.535 W73 50.175	8	D	M						S	T		
30	2		8	D	M		T				M			
31	1	N43 19.508 W73 50.211	10	D	S		T				M	S		
31	2		10	M	T						T			
32	1	N43 19.473 W73 50.227	8	S	T		T				S			
32	2		8	S			T				M			
33	1	N43 19.440 W73 50.248	10	M	T						D	T		
33	2		10	D			T				T	T		
34	1	N43 19.408 W73 50.249	7	T			T	T			S			
34	2		7	S								T		
35	1	N43 19.381 W73 50.229	12	T								T		
35	2		12	S								S		
36	1	N43 19.355 W73 50.209	15	T								T		
36	2		15	T								T		
37	1	N43 19.331 W73 50.229	15	T								T		
37	2		15	T								T		
38	1	N43 19.348 W73 50.236	15	S			S				T	T		
38	2		15	T								T		
39	1	N43 19.336 W73 50.163	15	Z										

39	2		15	Z									
40	1	N43 19.370 W73 50.166	8	M		T	S		T	M			
40	2		8	S		S	S		S	S	T		
41	1	N43 19.405 W73 50.182	7	T			S			T			
41	2		7	M		T				S			
42	1	N43 19.426 W73 50.203	8	M			T		S	S	S		
42	2		8	M	S	T				S	S	S	
43	1	N43 19.333 W73 50.133	9	M						M	T		
43	2		9	M	S	T				S	S		
44	1	N43 19.310 W73 50.100	8	M						M			
44	2		8	M						M	T		
45	1	N43 19.282 W73 50.060	10	S		T				S			
45	2		10	S		T				S	T		
46	1	N43 19.285 W73 50.002	10	S						T	S		
46	2		10	S	T	T				S			T
47	1	N43 19.282 W73 49.952	8	S							T		T
47	2		8	T							T		
48	1	N43 19.298 W73 49.888	10	S									
48	2		10	T						T	T		
49	1	N43 19.313 W73 49.857	12	D	T					D	S		
49	2		12	S						S	T		
50	1	N43 19.292 W73 49.818	15	S							S		S
50	2		15	S						T	T		

Table 2. Species observed from the 2007survey by density. *Weighted density is calculated as Trace=1, Sparse=2, Medium=3, and Dense=4.

	Density Observed				Total	
	Trace of Plants	**Sparse Plants**	**Medium Density**	**Dense Plants**	**Plant Observations**	**Weighted Density(*)**
Myriophyllum spicatum (Msp)	13	9	2	4	28	53
Potemogeton crispis (Pc)	2	0	0	0	2	2
Myriophyllum sibiricum (Msi)	24	4	1	1	30	39
Elodea spp. (El)	4	3	0	0	7	10
Nymphaea spp. (Nym)	0	1	0	0	1	2
Brasenia spp. (Br)	2	1	0	0	3	4
Megalodonta spp. (Mg)	1	3	0	0	4	7
Potemogeton spp. (Pt)	22	24	15	5	66	135
Chara spp. (Ch)	33	19	2	0	54	77
Valisnaria spp. (Va)	8	2	0	0	10	12
Isoetes spp. (Is)	5	1	0	0	6	7
Total Observations by Density Observed	**114**	**67**	**20**	**10**	**211**	

Table 3.Number of observations (i.e., sites) by depth (as a comparison to Eichler & Boyle 2004 which employed a transect method for their survey map).

Plant Observations by Depth of Water in Feet:

Feet	**# Obs.**
4	2
5	2
6	2
7	8
8	22
9	8
10	24
11	0
12	12
15	20
Total:	100