LAKE ST. CATHERINE

Aquatic Vegetation Management Program

2017 Annual Report

November 2017

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SŌLITUDE
LAKE MANAGEMENT

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF CHARTS

APPENDICES

1 INTRODUCTION

The 2017 season was SŌLitude Lake Management's (formerly Aquatic Control Technology) fourteenth year of involvement in an Integrated Management Plan at Lake St. Catherine developed to control the non-native Eurasian watermilfoil (*Myriophyllum spicatum*) within the lake. Under this plan, Eurasian watermilfoil management efforts have included a whole-lake Sonar (fluridone) herbicide treatment in 2004 followed by annual spot-treatments with Renovate (triclopyr) herbicide, diver assisted suction harvesting (DASH) and hand-pulling.

In 2017, management activities included spot-treatment of six areas, totaling 42 acres with Renovate OTF (triclopyr granular) and Renovate 3 (triclopyr liquid) herbicides as well as diver hand-pulling and diver assisted suction harvesting. These efforts were consistent with the current five-year Integrated Management Plan (2014-2019).

The following report summarizes the results of 2017 Treatment Program and details findings from the late season comprehensive aquatic plant survey that has been performed annually to document in-lake plant conditions and help evaluate and refine management goals. Specific information on the 2017 diver hand-pulling and diver assisted suction harvesting efforts will be provided by the Lake St. Catherine Association (LSCA) under a separate cover.

2 HERBICIDE TREATMENT PROGRAM - 2017

2.1 Program Chronology

A chronology of the 2017 treatment program is provided below:

- Pre-treatment inspection and finalize treatment areas.....May 10
- Treatment of 42 acres with Renovate 3 and Renovate OTF.....June 14
- Herbicide residue monitoring.....June 15, June 22, August 1, August 14
- Comprehensive aquatic plant survey.....September 27 & 28

2.2 Pre-Treatment Inspection

On May 10 the entire shoreline littoral area of Lake St. Catherine (Lily Pond, Main Lake and Little Lake) was surveyed by SŌLitude biologists Amanda Mahaney and Kara Sliwoski to determine the stage of Eurasian watermilfoil (EWM) growth and finalize potential management areas.

EWM plants were generally 3-5 feet tall, depending on water depth, and showing active growth with red apical meristems. Notable growth was observed north of the bridge within the southern channel of Main Basin, within the cove between W Lake Road and Peninsula Drive, south of Ferncliff Road, the northern most cove before Lily Pond, the shoreline along Sandy Beach Drive and Cones Point Road, and around the tip of Cones Point. Results of the survey were communicated to LSCA for their input and final determination on proposed treatment and DASH areas.

2.3 Summary of 2017 Treatment

A total of 42 acres amongst six areas were targeted for treatment (Figure 1). Consistent with previous years, each treatment area was evaluated with regards to EWM cover/distribution as well as several other factors including: potential for increased EWM spread; potential for effective treatment; and the overall benefit of milfoil control with respect to the lake, lake residents and other potential users. A final treatment map was provided to VT DEC for review and approval prior to treatment.

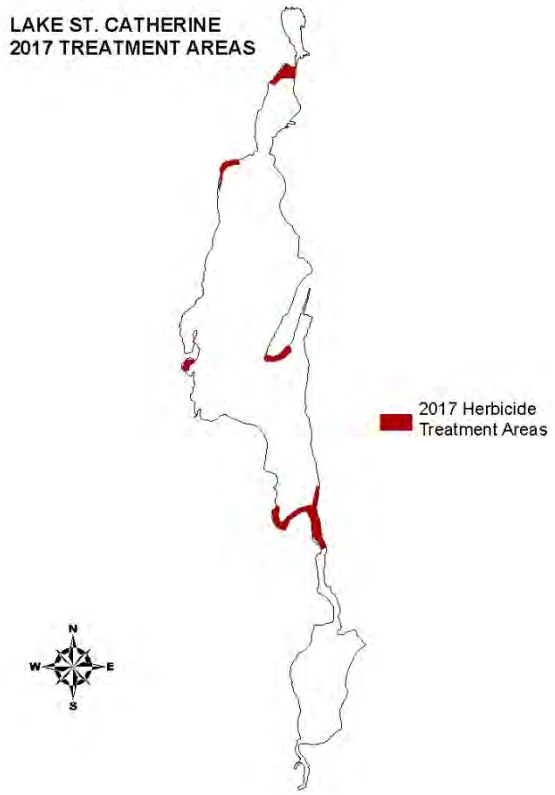


Figure 1. 2017 Treatment Areas

Treatment was conducted on Wednesday, June 14, 2017 to allow enough time to comply with the notification requirements of ANC Permit #2014-C01 and so that the two-day swimming restriction (day of treatment and one additional day) would not be imposed over a weekend.

Weather conditions on the day of treatment were mostly sunny with an air temperature of 71°F; wind was out of the north, estimated at <5-10 mph. Surface water temperature in the main basin was approximately 22.2°C.

The treatment was conducted with a 20-foot aluminum work skiff. The granular Renovate OTF herbicide was applied using a front-mounted calibrated cyclone-spreader system. The liquid Renovate 3 herbicide was injected at depth subsurface using weighted hoses that trailed the spray boat. An onboard GPS unit was used to provide real-time guidance and ensure an even application in each of the treated areas. The State Boat Ramp located on the channel between the Main Lake and Little Lake was used as the base of operations.

Treatment was performed as a split application whereby roughly 70% of the herbicide was applied to each of the designated areas initially and then the remaining 30% was applied several hours later. There was approximately 3-4 hours between each application. This split application approach has been used in recent years to increase concentration-exposure-time and help increase treatment efficacy. Both Renovate 3 (liquid) and Renovate OTF (granular) formulations of triclopyr herbicide were used at Lake St. Catherine in 2017. The granular formulation has proven to be effective for steeply sloped areas, smaller EWM beds and in areas where there is potential for excessive dilution from untreated water. The liquid formulation was used in larger treatment and cove areas that were not subject to as much dilution.

The application rate for Renovate OTF (granular) was 2.25 ppm in bottom 4-6 feet of water, or 240 lbs/ac. The liquid Renovate 3 was applied at 1.5 ppm, assuming a 6 foot average depth in most treatment areas. A total of 2476 pounds of Renovate OTF and 247 gallons of Renovate 3 were applied. The treatment took approximately 7 hours to complete.

2.4 Herbicide Residue Testing

In compliance with conditions of the ANC Permit #2014-C01, water samples were collected from within and immediately downstream of Lake St. Catherine following treatment for analysis of triclopyr concentrations. Sampling was conducted 24 hours following treatment, 8 days after treatment, and approximately 7 and 9 weeks after treatment. Concentrations at all sample locations were below 75 ppb after 8 days, which was the drinking water restriction imposed by DEC.

A map of the sampling locations is attached in Appendix A. Sampling instructions and sample bottles were provided to LSCA representatives by SŌLitude and SePRO. Collected samples were shipped via overnight delivery to SePRO's laboratory in Whittakers, North Carolina.

Samples were collected on June 15, June 22, August 1 and August 14 (Table 1). Consistent with prior years' post-treatment triclopyr sampling, residues dropped quickly with only two in-treatment sample locations above the 75ppb threshold after 24 hrs. One week post-treatment all 8 sample locations were below the 75ppb threshold. All sample locations were "non-detect" (<1 ppb) by August 14, just over eight weeks post-treatment.

Table 1. FasTEST Sampling Results (ppb)

Site	15-June	22-June	1-August	14-August
1/E	164.2	6.1	<1	
2/D	61.2	11.3		<1
3/F	9.3	12.6		<1
4/C	23.1	12.5	<1	
5/A	739.3	13.2		<1
6	1.3	2.2		<1
7	<1	1.3		<1

3 LATE SEASON COMPREHENSIVE AQUATIC VEGETATION SURVEY

3.1 Survey Methods

Using methods employed in previous years of this management program, the late season comprehensive aquatic vegetation survey conducted on September 27 & 28. All three lake basins were systematically toured by boat by SŌLitude biologists Brea Arvidson and Kara Sliwoski. Transect and data point locations established in 2001 were relocated using a Differential GPS system (Appendix B – Figure 1).

Weather conditions the first day were sunny, calm and hot with temperatures in the 90s, while the second day was cloudy, very breezy and cooler with temperatures in the 60s.

Recorded at each data point was the following information: aquatic plants present, dominant species, plant biomass, percent total plant cover and percent EWM cover. Water depths that were recorded during the pre-treatment survey were verified using a high-resolution depth finder. The plant community was assessed through visual inspection, use of a throw-rake and with an Aqua-Vu underwater camera system. Locations where EWM plants were observed were recorded with a GPS unit. Plants were identified to genus and species level when possible. Plant cover was given a percentage rank based on the areal coverage of plants within an approximate 400 square foot area assessed at each data point. Generally, in areas with 100% cover, bottom sediments could not be seen through the vegetation; percentages less than 100% indicated the amount of bottom area covered by plant growth. The percentage of EWM was

also recorded at each data point. In addition to cover percentage, a plant biomass index was assigned at each data point to document the amount of plant growth vertically through the water column. Plant biomass was estimated on a scale of 0-4, as follows:

0 No biomass; plants generally absent
1 Low biomass; plants growing only as a low layer on the sediment
2 Moderate biomass; plants protruding well into the water column but generally not reaching the water surface
3 High biomass; plants filling enough of the water column and/or covering enough of the water surface to be considered a possible recreational nuisance or habitat impairment
4 Extremely high biomass; water column filled and/or surface completely covered, obvious nuisance conditions and habitat impairment severe

Field data recorded at each transect and data point location is provided in the Field Survey Data Table in Appendix B.

3.2 Survey Findings

Quantitative measures of the aquatic plant community documented in 2017 were comparable to some prior years. Lake-wide EWM distribution (FOC - frequency of occurrence) increased significantly from 25% in 2016 to 62% this season (Table 3). However, EWM abundance (% cover) decreased slightly since 2016 from 10% to 8%. Overall vegetative cover has remained similar to prior years, hovering around the ~45% mark.

The composition of the vegetative community has also remained relatively unchanged since 2001 and is dominated by native pondweed species, namely (in decreasing FOC): *Potamogeton robbinsii*, *Potamogeton illinoensis*, *Elodea canadensis*, *and Zosterella dubia*. Slight FOC increases in *Ceratophyllum demersum*, *Najas flexilis*, and *Vallisneria americana* were observed this year in comparison to last year. Diversity has also been maintained throughout the course of management with 25 different aquatic plant species identified this fall and an average of approximately 4 species per point.

Comparative data for all three basins, and overall, collected during late season surveys between 2001 and 2017 is listed below (Table 2).

Table 2. Summary of Annual Survey Data, 2001-2017

LILY POND	2001	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
# of Data Points	24														
Total Plant Cover (%)	90	80	98	88	91	98	94	98	93	94	96	94	90	78	60
Milfoil Cover (%)	9	6	2	0	2	7	<1	<1	<1	1	5	1.5	2.2	7	6
Plant Biomass Index	3.1	2.5	3.3	2.5	2.8	3.3	2.7	2.3	2.9	3.1	3.5	3.4	3.5	3.2	2.9
Average Species Richness	5.67	3.58	5.17	3.59	4.54	5.58	4.83	5.46	4.13	4.21	4.46	5.04	4.8	5.5	5.54

LAKE ST. CATHERINE (Main Basin)	2001	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
# of Data Points	132														
Total Plant Cover (%)	66	46	51	57	58	66	58	63	59	56	63	63	63	37	43
Milfoil Cover (%)	43	16	0	4	11	4	5	2	7	8	16	15	7	6	7
Plant Biomass Index	1.9	1.5	1.6	1.8	2.0	2.0	2.0	1.3	1.8	1.5	2.0	2.0	2.0	2.6	1.6
Average Species Richness	2.96	2.39	2.85	3.50	3.75	4.09	3.68	3.06	2.88	2.88	2.85	2.87	3.2	3.1	3.35

LITTLE LAKE	2001	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
# of Data Points	43														
Total Plant Cover (%)	72	66	78	83	83	77	58	62	76	81	80	86	96	54	49
Milfoil Cover (%)	15	0	0	2	7	10	<1	5	9	14	7	10	42	25	13
Plant Biomass Index	2.3	2.1	2.4	2.9	2.8	2.7	2.2	2.7	3.3	2.5	3.0	3.2	3.8	3.8	2.3
Average Species Richness	5.62	3.23	3.30	3.81	4.58	4.3	4.23	4.65	3.84	4.42	4.63	4.77	4.4	4	5.49

OVERALL	2001	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
# of Data Points	199														
Total Plant Cover (%)	70	54	63	66	67	73	63	67	67	66	70	72	-	45	46
Milfoil Cover (%)	49	0.1	0.5	3	9	5	3	3	7	8	13	12	13	10	8
Plant Biomass Index	2	2	2	2	2	2	2	2	2	2	2	2	-	3	2
Average Species Richness	-	-	-	3.57	4.03	4.32	3.94	3.70	3.23	3.38	3.44	3.56	3.71	3.52	4.08

Table 3. Entire Lake System – Annual Species List and Frequency of Occurrence (%), 2001-2017

Macrophyte Species (Common Name / Scientific Name)	2001	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Water marigold *Bidens beckii*†	3	0	0	0	0	0	0	0	1	0	0	0.5	0	0	0
Watershield *Brasenia schreberi*	4	8	7	7	7	6	5	5	5	3	4	4	3	3	3
Coontail *Ceratophyllum demersum*	20	8	11	12	21	18	17	22	10	21	15	17	15	14	21
Muskgrass / Stonewort *Char asp. / Nitella* sp.	17	6	36	40	14	14	13	2	2	1	0	3	19	5	8
Spikerush *Eleocharis asicularia*	1	1	1	0	0	0	0	0	0	0	0	0	2	<1	0
Common waterweed *Elodea canadensis*	32	1	1	1	5	43	60	30	10	14	23	12	30	38	50
Quillwort *Isoetes sp.*	2	6	2	5	2	3	1	0	1	1	0	0	1	<1	<1
Common duckweed *Lemna minor*	7	1	0	1	0	1	1	0	0	0	0	0	<1	<1	<1
Eurasian watermilfoil *Myriophyllum spicatum*	94	44	17	33	74	65	38	40	43	51	64	54	48	25	62
Whorled watermilfoil *Myriophyllum verticillatum*													1	0	5
Slender naiad *Najas flexilis*	22	0	8	39	34	22	15	16	14	8	4	7	10	9	20
Spiny naiad *Najas minor*	0	0	0	0	0	0	0	0	0	0	0	0	<1	2	0
Yellow waterlily *Nuphar variegata*	5	5	5	2	2	1	2	1	2	1	1	0	2	<1	13
White waterlily *Nymphaea odorata*	16	5	11	10	11	11	10	7	7	12	12	14	13	8	1
Largeleaf pondweed *Potamogeton amplifolius*	33	38	43	49	52	53	51	56	23	35	32	31	13	20	19
Curlyleaf pondweed *Potamogeton crispus*	2	1	7	5	3	1	0	0	1	1	0	1	0	<1	1
Ribbonleaf pondweed *Potamogeton epihydrus*	2	6	7	3	3	5	1	1	1	4	1	2	<1	1	2
Variable leaf pondweed *Potamogeton gramineus*	23	1	6	6	2	4	4	4	11	8	3	3	4	3	4
Illinois pondweed *Potamogeton illinoensis*	4	1	2	9	23	39	29	36	35	53	56	57	44	47	50
Floating leaf pondweed Potamogeton natans	0	0	0	9	0	8	8	13	8	0	0	13	0	0	0
Whitestem pondweed *Potamogeton praelongus*	0	0	0	0	0	0	0	0	0	<1	<1	3	6	10	<1
Thinleaf pondweed *Potamogeton pusillus*	0	0	0	5	12	6	5	12	12	5	4	0	14	2	0
Robbins' pondweed *Potamogeton robbinsii*	52	76	88	74	77	68	84	78	57	76	76	73	57	58	65
Flatstem pondweed *Potamogeton zosteriformis*	28	3	29	29	23	19	16	26	22	20	23	36	15	16	15
White water crowfoot *Ranunculus aquatilis*															2
Humped bladderwort *Utricularia gibba*	2	0	1	5	1	1	4	1	0	0	0	0	2	5	5
Common bladderwort *Utricularia vulgaris*	8	9	2	6	7	7	11	8	2	4	4	7	7	4	10
Tapegrass *Vallisneria americana*	29	13	2	4	9	8	15	15	14	15	18	19	26	21	24
Watermeal *Wolffia* sp.	0	0	0	5	4	0	0	0	0	0	0	0	0	0	0
Water stargrass *Zosterella dubia*	1	1	9	8	23	17	7	13	4	2	4	11	15	19	20

†Formerly listed as *Megalodonta beckii* in previous years' reports.

3.3 Lily Pond

Annual increases in EWM frequency of occurrence in Lily Pond have been observed, as treatment has not been conducted within this basin since 2014. Since last year, there was a 25% increase in EWM FOC within Lily Pond (Chart 1, Figure 2). However, a one percent decrease in EWM cover was observed this year.

Both plant biomass and average species richness values within Lily Pond remained similar to prior years' data, with native species remaining healthy and plentiful.

Potamogeton robbinsii (92%) remained the most abundant plant in the basin followed by *Elodea canadensis* (83%), *Ceratophyllum demersum (67%)*, *Common Bladderwort (50%)*, *Nuphar variegata (42%)*, *Potamogeton amplifolius (38%)*, and *Potamogeton illionoensis* and *Potamogeton zosteriformis* were also abundant and encountered at 33% of the surveyed data points, respectively (Table 4). All other species' FOC was similar to that of previous years, with a few species showing slight increases or decreases.

Figure 2: Lily Pond - Fall 2017 EWM distribution

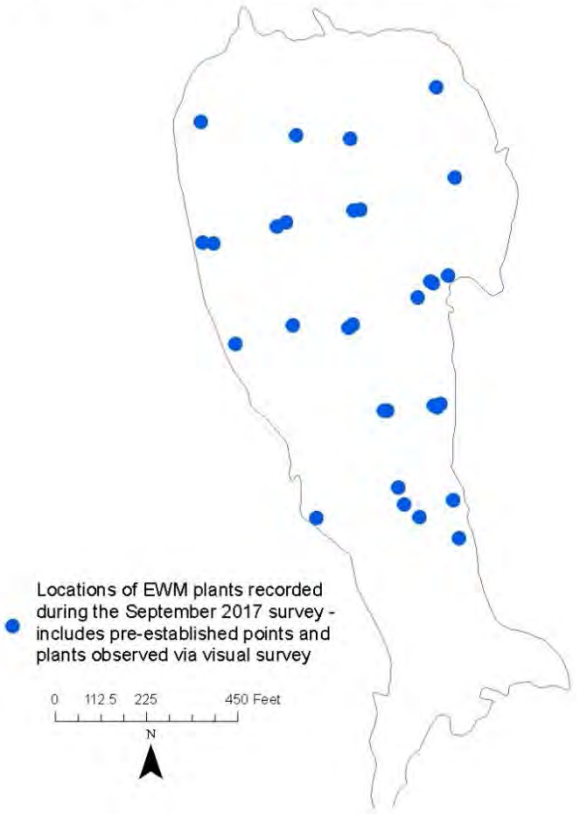


Chart 1: Lily Pond - EWM Frequency of Occurrence and Percent Cover

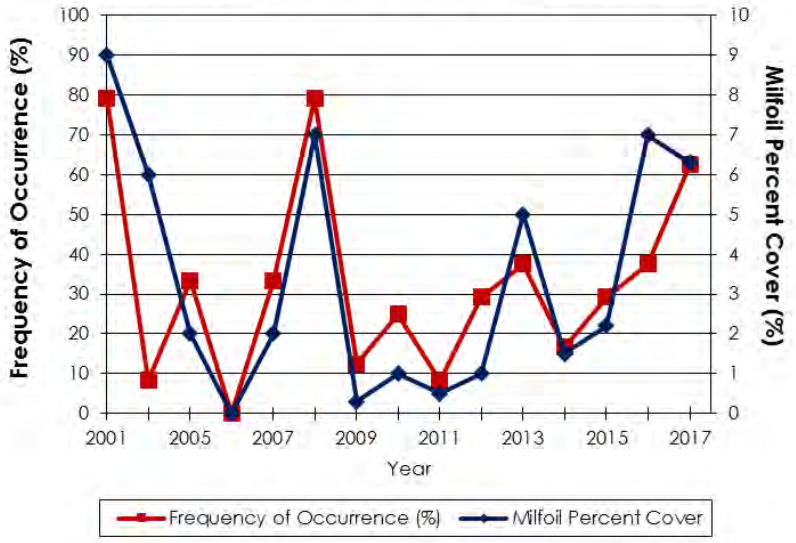


Table 4. Lily Pond – Annual Species List and Frequency of Occurrence (%), 2001-2017

Macrophyte Species (Common Name / Scientific Name)	2001	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Watershield *Brasenia schreberi*	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0
Coontail *Ceratophyllum demersum*	71	4	50	46	83	83	83	79	75	63	67	54	64	67	67
Muskgrass / Stonewort *Chara* sp. / *Nitella* sp.	0	0	0	5	4	0	0	0	0	0	0	0	0	0	4
Common waterweed *Elodea canadensis*	29	0	8	0	8	29	46	79	17	29	17	13	48	63	83
Quillwort *Isoetes* sp.	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0
Common duckweed *Lemna minor*	46	8	0	5	0	0	0	0	0	0	0	0	0	0	0
Eurasian watermilfoil *Myriophyllum spicatum*	79	8	33	0	33	79	13	25	8	29	42	17	28	38	63
Slender naiad *Najas flexilis*	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow waterlily *Nuphar variegatum*	17	17	17	0	0	0	0	4	4	0	0	0	0	0	42
White waterlily *Nymphaea odorata*	63	17	29	9	21	25	33	17	25	29	38	38	28	33	0
Largeleaf pondweed *Potamogeton amplifolius*	33	100	92	77	79	88	92	88	38	46	75	75	24	50	38
Curlyleaf pondweed *Potamogeton crispus*	4	4	4	5	13	0	0	0	4	0	0	0	0	0	0
Ribbonleaf pondweed *Potamogeton epihydrus*	0	13	4	0	4	4	4	0	4	4	0	0	0	4	0
Variable leaf pondweed *Potamogeton gramineus*	17	0	8	0	4	0	8	0	8	8	0	0	0	0	0
Illinois pondweed *Potamogeton illinoensis*	0	4	8	9	46	42	25	17	46	42	46	54	16	46	33
Floating leaf pondweed Potamogeton natans	0	0.	0	9	0	8	8	13	8	0	0	13	0	0	0
Robbins' pondweed *Potamogeton robbinsii*	96	92	96	96	92	88	96	96	86	96	100	100	68	71	92
Flatstem pondweed *Potamogeton zosteriformis*	58	8	63	0	25	46	13	67	46	33	29	67	48	46	33
Humped bladderwort *Utricularia gibba*	0	0	0	41	0	0	4	0	0	0	0	0	12	25	8
Common bladderwort *Utricularia vulgaris*	29	38	0	27	4	13	17	4	17	21	17	29	28	29	50
Tapegrass *Vallisneria americana*	33	46	0	0	0	0	8	4	4	0	0	0	4	38	0
Watermeal *Wolffia* sp.	0	0	0	5	4	0	0	0	0	0	0	0	0	0	0
Water stargrass *Zosterella dubia*	4	0	38	0	25	21	8	50	0	0	0	17	40	58	29

3.4 Lake St. Catherine (Main Basin)

The Main Basin of Lake St. Catherine has shown slight fluctuations in native plant species distribution and composition through the years of management. Observed at 52% of the survey points, *Potamogeton illinoensis* was the most common plant species in the Main Basin. In decreasing FOC, the following species were also prevalent in this basin: *Elodea canadensis*, *Potamogeton robbinsii*, *Najas flexilis*, and *Zosterella dubia*. All other species observed showed FOC values that were similar to last year with <±10% change (Table 5).

Although EWM distribution increased from 34% to 46% over last year's FOC, percent EWM cover only increased by 1, at survey points within the Main Basin. EWM biomass is being kept in-check by ongoing management efforts.

EWM control seen in treated areas was excellent, with only a few viable stems observed. However, EWM growth continued to be observed outside of treatment areas and survey data points, with several dense areas throughout shoreline areas of the Main Basin (Figure 3). Annual spot-treatments and DASH efforts have been effective, but can only provide control to those areas while EWM growth remains well distributed throughout this basin.

Locations of EWM observed during the survey, in addition to those survey points where observed, were recorded with a GPS unit. All EWM points as well as an estimated extent of dense EWM beds observed during the September 2017 survey are depicted in Figure 4.

Chart 2 (below) illustrates the year-to-year change in EWM frequency of occurrence and percent cover in the Main Basin.

Chart 2: Lake St. Catherine (Main Basin) - EWM Frequency of Occurrence and Percent Cover

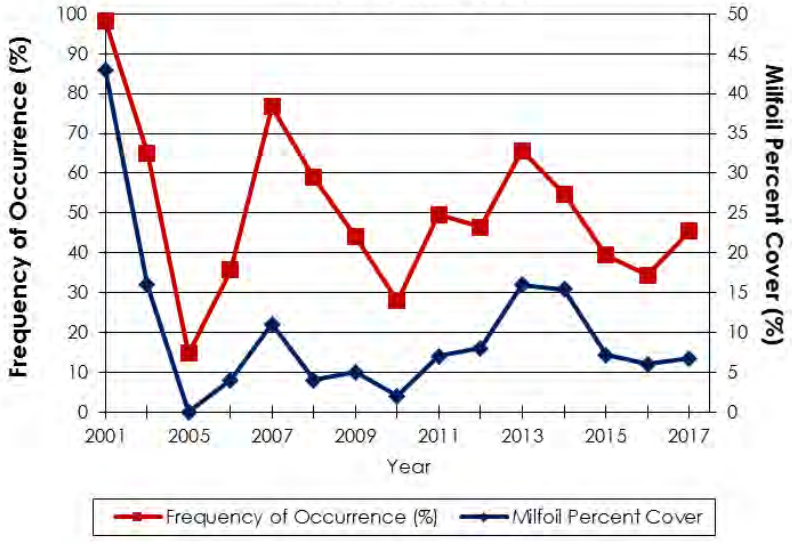


Figure 3: Main Basin - Fall 2017 EWM distribution

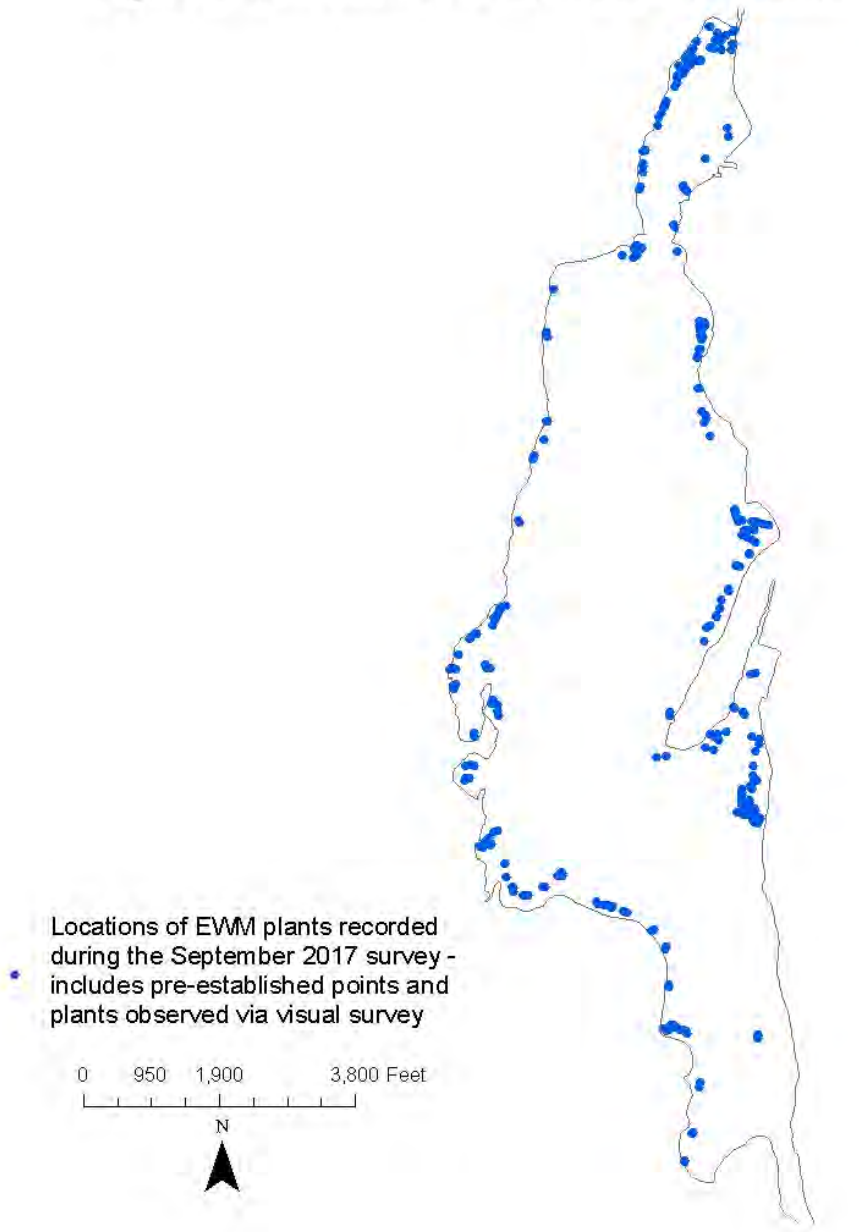


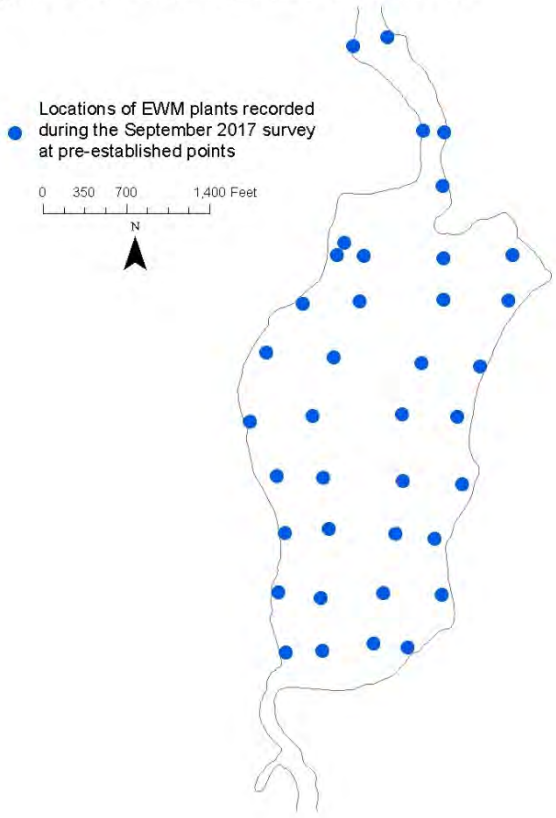
Table 5: Lake St. Catherine (Main Basin) – Annual Species List and Frequency of Occurrence (%), 2001-2017

Macrophyte Species (Common Name / Scientific Name)	2001	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Water marigold *Bidens beckii*†	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Watershield *Brasenia schreberi*	0	<1	<1	2	2	2	2	2	2	<1	<1	2	3	3	2
Coontail *Ceratophyllum demersum*	11	11	6	7	11	10	8	14	6	11	2	5	3	5	5
Muskgrass / Stonewort *Chara* sp. / *Nitella* sp.	2	17	62	57	21	22	19	2	<1	0	0	5	16	9	11
Common waterweed *Elodea canadensis*	28	0	0	<1	5	52	71	15	9	7	19	7	30	37	45
Quillwort *Isoetes* sp.	2	9	<1	6	2	5	0	0	<1	<1	0	0	2	0	<1
Common duckweed *Lemna minor*	2	0	0	0	0	<1	<1	0	0	0	0	0	<1	0	0
Eurasian watermilfoil *Myriophyllum spicatum*	98	65	15	36	77	59	44	28	50	47	66	56	39	34	46
Slender naiad *Najas flexilis*	19	0	12	57	50	34	22	25	20	12	6	6	16	2	28
Yellow waterlily *Nuphar variegatum*	<1	0	0	<1	<1	0	0	<1	<1	0	0	0	0	0	2
White waterlily *Nymphaea odorata*	3	2	2	3	3	3	3	2	2	2	<1	2	5	2	0
Largeleaf pondweed *Potamogeton amplifolius*	29	15	26	34	39	38	41	44	26	35	27	25	12	12	18
Curlyleaf pondweed *Potamogeton crispus*	2	0	9	5	2	<1	0	0	0	0	0	<1	0	0	<1
Ribbonleaf pondweed *Potamogeton epihydrus*	2	3	5	2	<1	4	<1	<1	<1	2	0	2	0	0	<1
Variable leaf pondweed *Potamogeton gramineus*	18	0	5	2	2	6	3	6	15	9	3	4	6	4	5
Illinois pondweed *Potamogeton illinoensis*	6	<1	<1	9	16	34	23	31	33	53	57	56	40	38	52
Thinleaf pondweed *Potamogeton pusillus*	0	0	0	5	12	6	5	12	12	5	4	0	14	2	0
Robbins' pondweed *Potamogeton robbinsii*	31	65	82	62	67	58	78	73	58	67	66	61	49	47	44
Flatstem pondweed *Potamogeton zosteriformis*	24	2	31	42	28	19	19	23	30	20	20	32	10	4	10
Common bladderwort *Utricularia vulgaris*	<1	<1	<1	0	0	2	<1	3	0	<1	0	<1	<1	<1	2
Tapegrass *Vallisneria americana*	14	3	<1	3	9	9	13	13	10	9	15	14	23	20	19
Water stargrass *Zosterella dubia*		<3	5	12	28	22	8	9	5	2	2	13	13	24	21

3.5 Little Lake

Consistent with last year, total plant cover in Little Lake hovered around 50% again this season. Twenty-five (25) species were observed within this basin, including one native species previously not recorded there: *Ranunculus aquatilis* or white water crowfoot. Little Lake's consistent, shallow depth (6 foot average), allows for such a diverse plant community, but also allows for plant growth to dominate the entire water column, likely hindering recreational uses of the basin. Additionally, average species richness increased by 1.5 species per point compared to 2016.

Figure 4: Little Lake - Fall 2017 EWM distribution



EWM distribution also rose to 88% of survey points, which is almost a 20% increase over last year's 74% of points, while EWM cover decreased to ~13% (Figure 4, Table 6, Chart 3). However, as treatment is not conducted within Little Lake, this increase was anticipated.

The most commonly observed species, in decreasing order, were as follows: *Myriophyllum spicatum*, *Potamogeton robbinsii*, *Elodea canadensis*, and *Potamogeton illinoensis*, *Ceratophyllum demersum*, and *Nuphar varigata* (Table 6). *Potamogeton crispus* continues to be found within Little Lake, but at a mere 2% of survey points.

Chart 3: Little Lake - EWM Frequency of Occurrence and Percent Cover

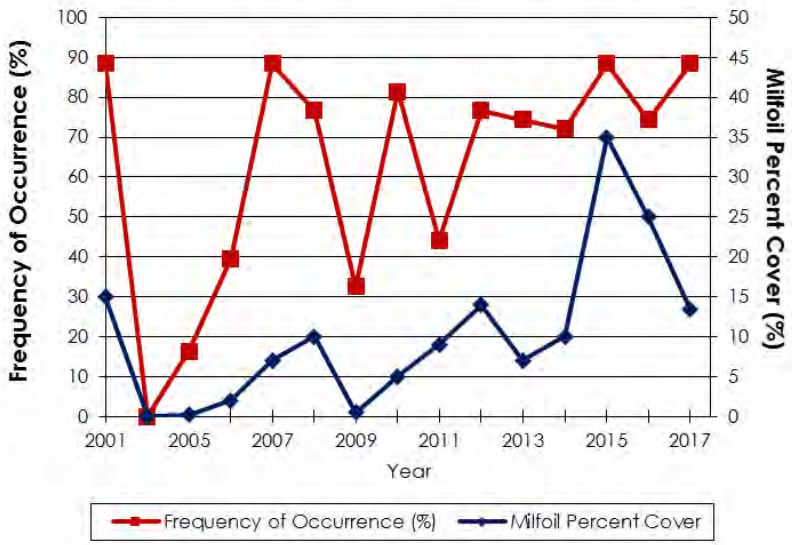


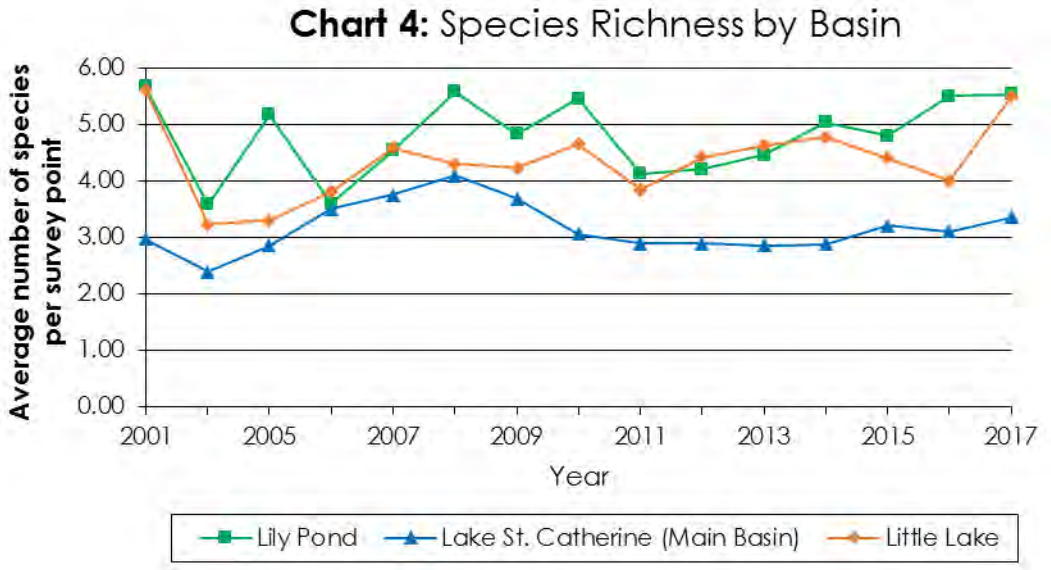
Table 6: Little Lake – Annual Species List and Frequency of Occurrence (%), 2001-2017

Macrophyte Species (Common Name / Scientific Name)	2001	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Water marigold *Bidens beckii*†	7	0	0	0	0	0	0	0	2	0	0	0	0	0	0
Watershield *Brasenia schreberi*	14	30	30	23	26	21	14	12	14	12	14	12	2	2	5
Muskgrass / Stonewort *Chara sp. / Nitella sp.*	7	5	7	12	0	0	2	0	5	2	0	0	2	0	0
Coontail *Ceratophyllum demersum*	21	0	2	9	16	7	9	16	28	28	28	35	23	14	44
Spikerush *Eleocharis sp.*	5	5	5	0	0	0	0	0	0	0	0	0	0		0
Common waterweed *Elodea canadensis*	47	5	0	0	2	23	40	47	21	28	40	26	28	28	74
Quillwort *Isoetes sp.*	0	0	5	2	0	0	2	0	0	2	0	0	0	0	0
Eurasian watermilfoil *Myriophyllum spicatum*	88	0	16	40	88	77	32	81	44	77	74	72	86	74	88
Whorled watermilfoil *Myriophyllum verticillatum*													4	0	5
Slender naiad *Najas flexilis*	40	0	0	5	2	0	5	0	5	0	2	14	0	2	7
Yellow waterlily *Nuphar variegatum*	9	14	12	7	7	2	7	2	5	2	2	0	7	5	42
White waterlily *Nymphaea odorata*	30	9	26	30	28	10	19	19	23	32	30	37	27	12	5
Largeleaf pondweed *Potamogeton amplifolius*	44	72	70	77	74	77	56	72	28	30	21	23	14	28	12
Curlyleaf pondweed *Potamogeton crispus*	0	0	0	2	0	0	0	0	0	2	0	0	0	0	2
Ribbonleaf pondweed *Potamogeton epihydrus*	0	12	14	7	7	7	0	0	2	9	2	2	2	2	5
Variable leaf pondweed *Potamogeton gramineus*	42	5	9	23	0	0	5	0	5	5	2	0	0	0	2
Illinois pondweed *Potamogeton illinoensis*	0	0	0	9	33	47	49	36	62	61	61	65	71	72	51
Thinleaf pondweed *Potamogeton pusillus*	0	0	0	2	7	2	0	0	0	0	0	0	2	0	0
Robbins' pondweed *Potamogeton robbinsii*	88	100	100	100	100	88	95	81	86	91	93	95	73	86	86
Flatstem pondweed *Potamogeton zosteriformis*	23	2	5	5	7	5	7	9	9	14	28	33	11	19	19
White water crowfoot *Ranunculus aquatilis*															2
Humped bladderwort *Utricularia gibba*	7	0	2	0	5	2	14	5	0	0	0	0	2	7	16
Common bladderwort *Utricularia vulgaris*	16	19	7	12	30	19	35	26	5	2	9	14	14	0	11
Tapegrass *Vallisneria americana*	72	26	7	9	14	9	26	26	35	40	40	44	50	35	0
Water stargrass *Zosterella dubia*	2	2	5	0	7	2	5	5	2	5	14	2	9	9	9

†Formerly listed as *Megalodonta beckii* in previous years' reports.

3.6 Species Richness

In all three basins, species richness was consistent with findings from the past six years with an overall average of approximately four species per point (Table 2, Chart 4). An increase of approximately 1.5 species per point was noted in Little Lake this season, which is likely related to the higher number of species and new species observed. Overall, species richness or native plant diversity in any of the basins does not appear to be impacted adversely by the herbicide spot-treatments or other EWM management activities.



4 SUMMARY OF 2017 AQUATIC VEGETATION MANAGEMENT PROGRAM

4.1 Renovate Herbicide Treatments

Results of the 2017 Renovate herbicide treatment program at Lake St. Catherine is consistent with prior treatment efforts performed in recent years. Excellent EWM control was observed in all treatment areas, with slight, scattered low density growth present in a few of the areas. Immediate results show no observable difference in treatment efficacy between areas treated using granular or liquid triclopyr formulations. As with previous years, the full extent of treatment success will not be realized until regrowth can be observed next season.

Triclopyr's high selectivity for EWM and negligible impact to non-target species at Lake St. Catherine validates it's importance as part of an integrated management program. Although species richness and frequency of occurrence indices have fluctuated within each basin over time, no major plant composition changes have been observed as a result of triclopyr treatments. Based on data collected within the Lake St. Catherine system, as well as other large Vermont waterbodies, seasonal variability and limitations of the data point survey methodology are likely the primary factors responsible for changes in the measurable indices that have been observed year over year.

4.2 Spread Prevention and Non-Chemical Control Activities

As required by the DEC Permit, non-chemical milfoil control activities continued at Lake St. Catherine during the 2017 season. Efforts included volunteer monitoring, boat ramp greeter program, diver assisted suction harvesting and other educational efforts. Details of the non-chemical control efforts will be provided by LSCA under separate cover.

5 RECOMMENDATIONS FOR 2018 SEASON

Controlling areas of dense EWM growth and maintaining it at non-nuisance levels has been the focus of recent EWM management efforts at Lake St. Catherine. Triclopyr herbicide treatments have selectively controlled EWM where used, but treatment has typically only provided control for one to two growing seasons. Triclopyr has shown some limitations in open water or small treatment area situations where dilution is increased and concentration-exposure-time (CET) is decreased, resulting in less than optimal control. Annually, treatment areas with the greatest chance of success have been identified and chosen. In an effort to improve CET, treatment has been delayed until mid-June when more active plant tissue is present to maximize herbicide uptake; larger, contiguous areas have been treated; and using the 70%/30% application method to extend the CET. Moving forward, future treatment efforts will continue to focus on CET improvement and ideally longer-term milfoil control.

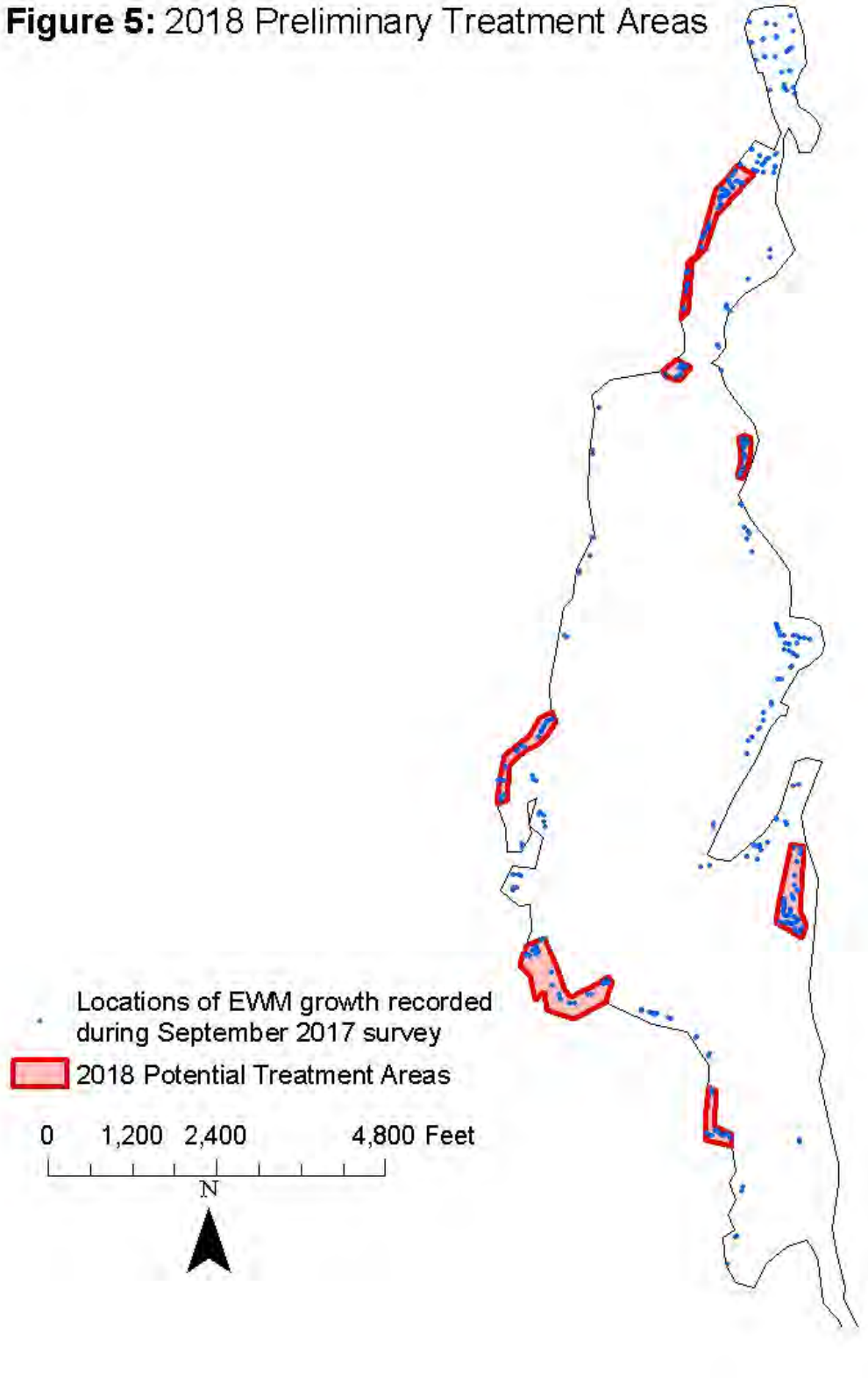
The past three seasons have shown positive results in that plant maturity may have a larger role in CET than previously understood. Although treatment timing is influenced by various factors, we will continue to conduct treatment in mid-June, as results from 2015, 2016 and this year show positive effectiveness on plant growth during that timeframe.

The 2017 Renovate treatment program provided almost complete EWM control within all of the six treatment areas. Similar to last year, the remaining growth was found along the edges of the treatment areas where higher dilution makes the CET more challenging to maintain. Through years of experience at Lake St. Catherine and other large waterbodies where Renovate is used, maintaining the CET is crucial for achieving successful EWM control. As a result, every effort should be made to maximize CET, within reason.

Until alternative herbicides or new products become available, it is likely that the use of Renovate (triclopyr) will remain the most effective herbicide option for EWM control at Lake St. Catherine.

Based on the results of the September 2017 survey, preliminary 2018 treatment areas are illustrated on the following page (Figure 5). Using the EWM distribution and density observed this fall, treatment in 2018 is anticipated to be 50-70 acres within the Main Basin. Consistent with previous years, potential treatment areas will be inspected in the early spring and treatment areas will be finalized in coordination with the LSCA and VT DEP prior to conducting treatment in 2018.

Figure 5: 2018 Preliminary Treatment Areas



APPENDIX A

Herbicide Residue Testing Results

- FasTEST Sampling Location Map
- SePRO Laboratory Report – 06/15/17 sampling round
- SePRO Laboratory Report – 06/22/17 sampling round
- SePRO Laboratory Report – 08/01/17 sampling round
- SePRO Laboratory Report – 08/14/17 sampling round

2017 FasTEST Sampling Locations

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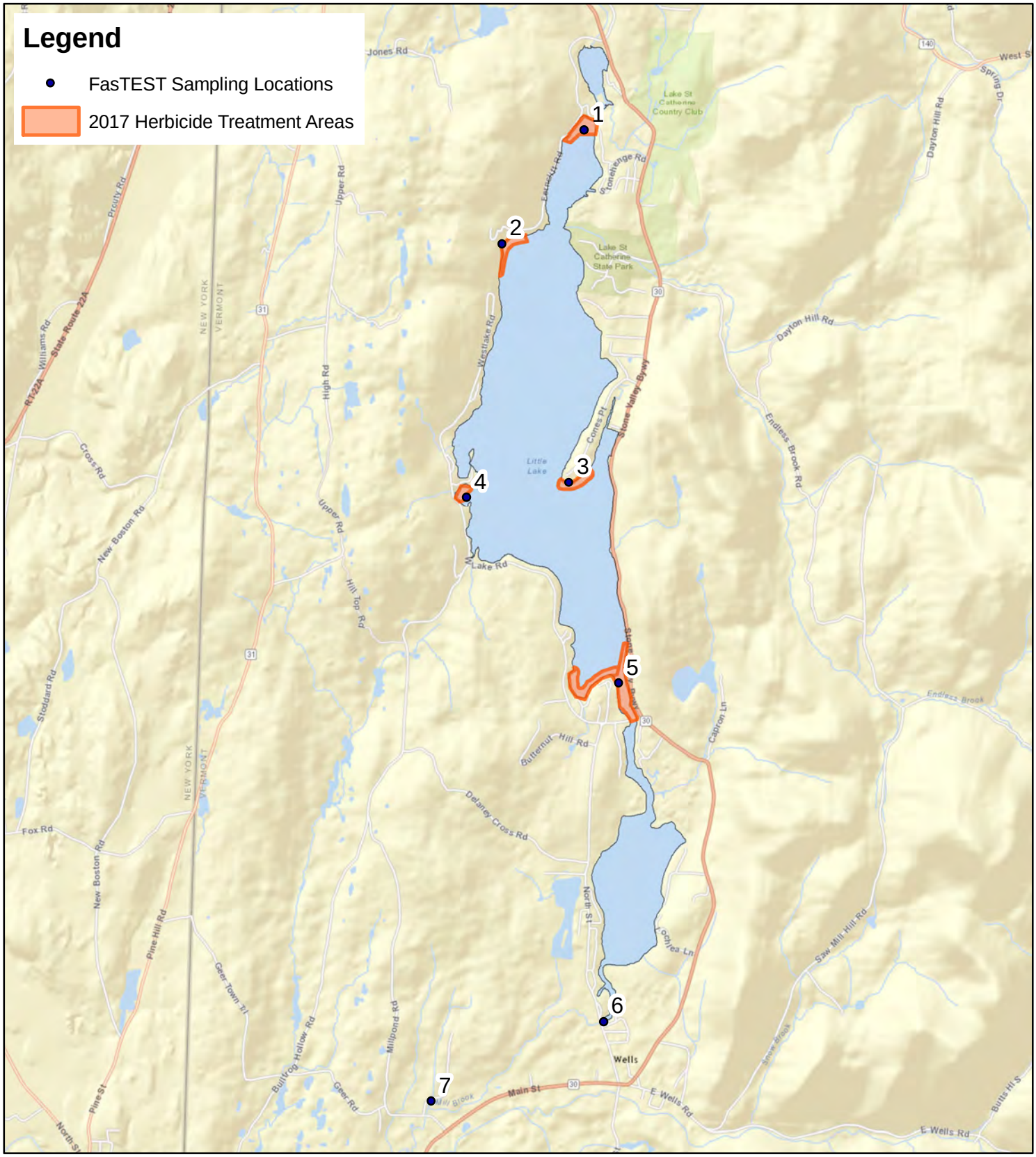
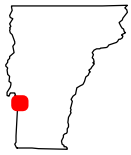
888.480.5253
solitudelakemanagement.com



Lake St. Catherine
Wells / Poultney, VT
Rutland County
43.4657° N, 73.2146° W



Lake St. Catherine

0 3,000 6,000 Feet

1:45,000

N

Map Date: 11/09/17
Prepared by: KS
Office: SHREWSBURY, MA

SePRO Research & Technology Campus

FasTEST*

16013 Watson Seed Farm Road, Whitakers, NC 27891

Chain of Custody: COC1584 **LABORATORY REPORT**

Customer Company **Customer Contact**

Company Name SOLitude Lake Management	Contact Person: Marc Bellaud
Address: 1320 Brookwood Drive, Ste. H Little Rock, AR 72202	E-mail Address: mbellaud@solitude.com
	Phone: 508.885.0101

Waterbody Information

Waterbody:	Lake St. Catherine - VT
Waterbody size:	1100
Depth Average:	25

Sample ID	Sample Location	Test	Method	Results	Sampling Date / Time
CTM5216-1	1	Triclopyr (ug/L)	FAST 02	164.2	06/15/2017
CTM5217-1	2	Triclopyr (ug/L)	FAST 02	61.2	06/15/2017
CTM5218-1	3	Triclopyr (ug/L)	FAST 02	9.3	06/15/2017
CTM5219-1	4	Triclopyr (ug/L)	FAST 02	23.1	06/15/2017
CTM5220-1	5	Triclopyr (ug/L)	FAST 02	739.3	06/15/2017
CTM5221-1	6	Triclopyr (ug/L)	FAST 02	1.3	06/15/2017
CTM5222-1	7	Triclopyr (ug/L)	FAST 02	<1	06/15/2017

ANALYSIS STATEMENTS:
SAMPLE RECEIPT /HOLDING TIMES: All samples arrived in an acceptable condition and were analyzed within prescribed holding times in accordance with the SRTC Laboratory Sample Receipt Policy unless otherwise noted in the report.
PRESERVATION: Samples requiring preservation were verified prior to sample analysis and any qualifiers will be noted
in the report.
QA/QC CRITERIA: All analyses met method criteria, except as noted in the report with data qualifiers.
COMMENTS: No significant observations were made unless noted in the report.
MEASUREMENT UNCERTAINTY: Uncertainty of measurement has been determined and is available upon request.

Laboratory Information
Date / Time Received: 06/16/17 10:30 AM
Date Results Sent: 06/20/2017

Disclaimer: The results listed within this Laboratory Report relate only to the samples tested in the laboratory. The analyses contained in this report were performed in accordance with the applicable certifications as noted. All soil samples are reported on a dry weight basis unless otherwise noted in the report. This Laboratory Report is confidential and is intended for the exclusive use of SRTC Laboratory and its client. This report shall not be reproduced, except in full, without written permission from SRTC Laboratory. The Chain of Custody is included and is an essential component of this report.

This entire report was reviewed and approved for release.

Reviewed By: Quality Assurance Officer

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FasTEST*

16013 Watson Seed Farm Road, Whitakers, NC 27891

Chain of Custody: COC1650 **LABORATORY REPORT**

Customer Company **Customer Contact**

Company Name SOLitude Lake Management	Contact Person: Marc Bellaud
Address: 1320 Brookwood Drive, Ste. H Little Rock, AR 72202	E-mail Address: mbellaud@solitude.com
	Phone: 508.885.0101

Waterbody Information

Waterbody:	Lake St. Catherine - VT
Waterbody size:	1100
Depth Average:	25

Sample ID	Sample Location	Test	Method	Results	Sampling Date / Time
CTM5419-1	1-LSC	Triclopyr (ug/L)	FAST 02	6.1	06/22/2017
CTM5420-1	2-LSC	Triclopyr (ug/L)	FAST 02	11.3	06/22/2017
CTM5421-1	3-LSC	Triclopyr (ug/L)	FAST 02	12.6	06/22/2017
CTM5422-1	4-LSC	Triclopyr (ug/L)	FAST 02	12.5	06/22/2017
CTM5423-1	5-LSC	Triclopyr (ug/L)	FAST 02	13.2	06/22/2017
CTM5424-1	6-LSC	Triclopyr (ug/L)	FAST 02	2.2	06/22/2017
CTM5425-1	7-LSC	Triclopyr (ug/L)	FAST 02	1.3	06/22/2017

ANALYSIS STATEMENTS:
SAMPLE RECEIPT /HOLDING TIMES: All samples arrived in an acceptable condition and were analyzed within prescribed holding times in accordance with the SRTC Laboratory Sample Receipt Policy unless otherwise noted in the report.
PRESERVATION: Samples requiring preservation were verified prior to sample analysis and any qualifiers will be noted
in the report.
QA/QC CRITERIA: All analyses met method criteria, except as noted in the report with data qualifiers.
COMMENTS: No significant observations were made unless noted in the report.
MEASUREMENT UNCERTAINTY: Uncertainty of measurement has been determined and is available upon request.

Laboratory Information
Date / Time Received: 06/23/17 11:00 AM
Date Results Sent: 06/27/2017

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Reviewed By: Quality Assurance Officer

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16013 Watson Seed Farm Road, Whitakers, NC 27891

Chain of Custody: COC2023 **LABORATORY REPORT**

Customer Company **Customer Contact**

Company Name SOLitude Lake Management	Contact Person: Marc Bellaud
Address: 1320 Brookwood Drive, Ste. H Little Rock, AR 72202	E-mail Address: mbellaud@solitude.com
	Phone: 508.885.0101

Waterbody Information

Waterbody:	Lake St. Catherine - VT
Waterbody size:	1100
Depth Average:	25

Sample ID	Sample Location	Test	Method	Results	Sampling Date / Time
CTM6679-1	1-LSC (E-7.4 ac)	Triclopyr (ug/L)	FAST 02	<1	08/01/2017
CTM6680-1	4- LSC (C-2.7 ac)	Triclopyr (ug/L)	FAST 02	<1	08/01/2017

ANALYSIS STATEMENTS:
SAMPLE RECEIPT /HOLDING TIMES: All samples arrived in an acceptable condition and were analyzed within prescribed holding times in accordance with the SRTC Laboratory Sample Receipt Policy unless otherwise noted in the report.
PRESERVATION: Samples requiring preservation were verified prior to sample analysis and any qualifiers will be noted
in the report.
QA/QC CRITERIA: All analyses met method criteria, except as noted in the report with data qualifiers.
COMMENTS: No significant observations were made unless noted in the report.
MEASUREMENT UNCERTAINTY: Uncertainty of measurement has been determined and is available upon request.

Laboratory Information
Date / Time Received: 08/02/17 11:00 AM
Date Results Sent: 08/04/2017

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Reviewed By: Quality Assurance Officer

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FasTEST*

16013 Watson Seed Farm Road, Whitakers, NC 27891

Chain of Custody: COC2100 **LABORATORY REPORT**

Customer Company **Customer Contact**

Company Name SOLitude Lake Management	Contact Person: Marc Bellaud
Address: 1320 Brookwood Drive, Ste. H Little Rock, AR 72202	E-mail Address: mbellaud@solitude.com
	Phone: 508.885.0101

Waterbody Information

Waterbody:	Lake St. Catherine - VT
Waterbody size:	1100
Depth Average:	25

Sample ID	Sample Location	Test	Method	Results	Sampling Date / Time
CTM6906-1	7	Triclopyr (ug/L)	FAST 02	<1	08/14/2017
CTM6905-1	6	Triclopyr (ug/L)	FAST 02	<1	08/14/2017
CTM6904-1	5	Triclopyr (ug/L)	FAST 02	<1	08/14/2017
CTM6903-1	3	Triclopyr (ug/L)	FAST 02	<1	08/14/2017
CTM6902-1	2	Triclopyr (ug/L)	FAST 02	<1	08/14/2017

ANALYSIS STATEMENTS:
SAMPLE RECEIPT /HOLDING TIMES: All samples arrived in an acceptable condition and were analyzed within prescribed holding times in accordance with the SRTC Laboratory Sample Receipt Policy unless otherwise noted in the report.
PRESERVATION: Samples requiring preservation were verified prior to sample analysis and any qualifiers will be noted
in the report.
QA/QC CRITERIA: All analyses met method criteria, except as noted in the report with data qualifiers.
COMMENTS: No significant observations were made unless noted in the report.
MEASUREMENT UNCERTAINTY: Uncertainty of measurement has been determined and is available upon request.

Laboratory Information
Date / Time Received: 08/15/17 11:00 AM
Date Results Sent: Thursday, August 17, 2017

Disclaimer: The results listed within this Laboratory Report relate only to the samples tested in the laboratory. The analyses contained in this report were performed in accordance with the applicable certifications as noted. All soil samples are reported on a dry weight basis unless otherwise noted in the report. This Laboratory Report is confidential and is intended for the exclusive use of SRTC Laboratory and its client. This report shall not be reproduced, except in full, without written permission from SRTC Laboratory. The Chain of Custody is included and is an essential component of this report.

This entire report was reviewed and approved for release.

Reviewed By: Quality Assurance Officer

APPENDIX B

Comprehensive Aquatic Vegetation Survey Information

- Survey Point Location Maps
- 2017 Total Vegetation Biomass
- Fall 2017 Native Vegetation Distribution Maps
- Fall 2017 Eurasian Watermilfoil Distribution Map
- Field Data Tables

Lily Pond - Survey Point Locations

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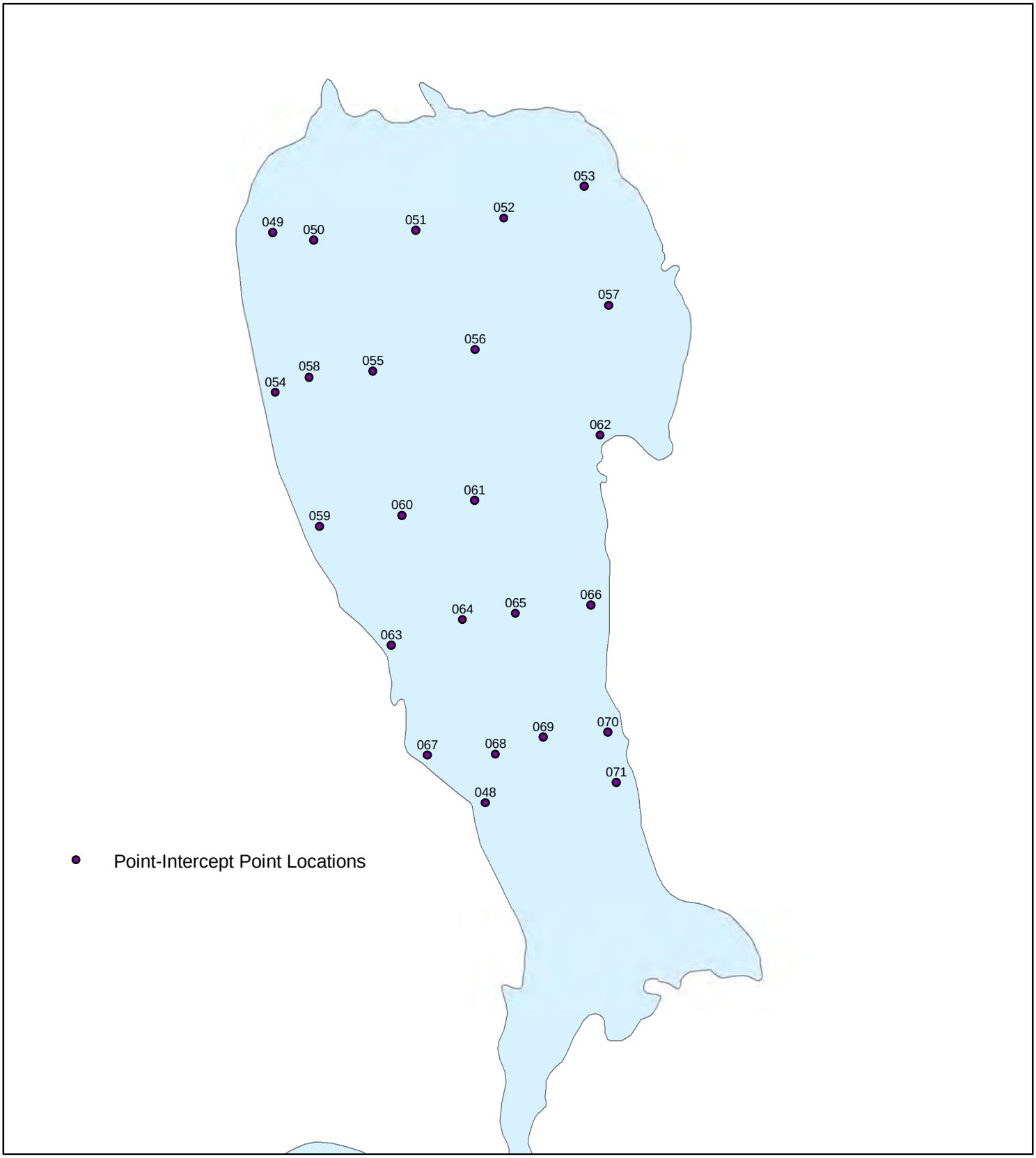
solitudelakemanagement.com



Lake St. Catherine
Wells / Poultney, VT
Rutland County
43.4657° N, 73.2146° W

Lake St. Catherine

0 240 480 Feet

1:3,000

N

Map Date: 11/09/17
Prepared by: KS
Office: SHREWSBURY, MA

Main Basin - Survey Point Locations

SOLITUDE LAKE MANAGEMENT
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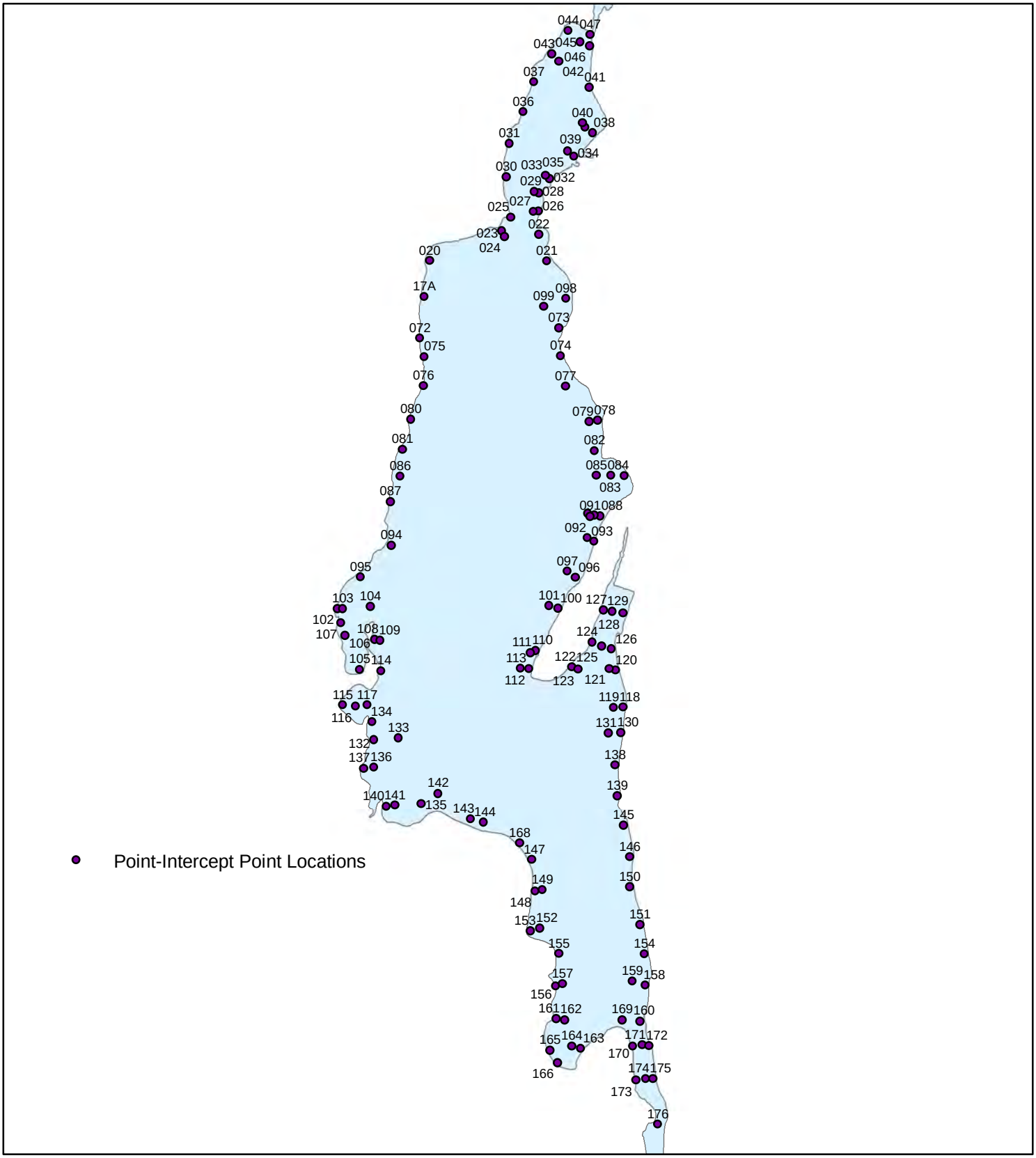
solitudelakemanagement.com



Lake St. Catherine
Wells / Poultney, VT
Rutland County
43.4657° N, 73.2146° W

Lake St. Catherine

0 2,000 4,000 Feet

N

1:25,000

Map Date: 11/09/17
Prepared by: KS
Office: SHREWSBURY, MA

Little Lake - Survey Point Locations

SOLITUDE LAKE MANAGEMENT
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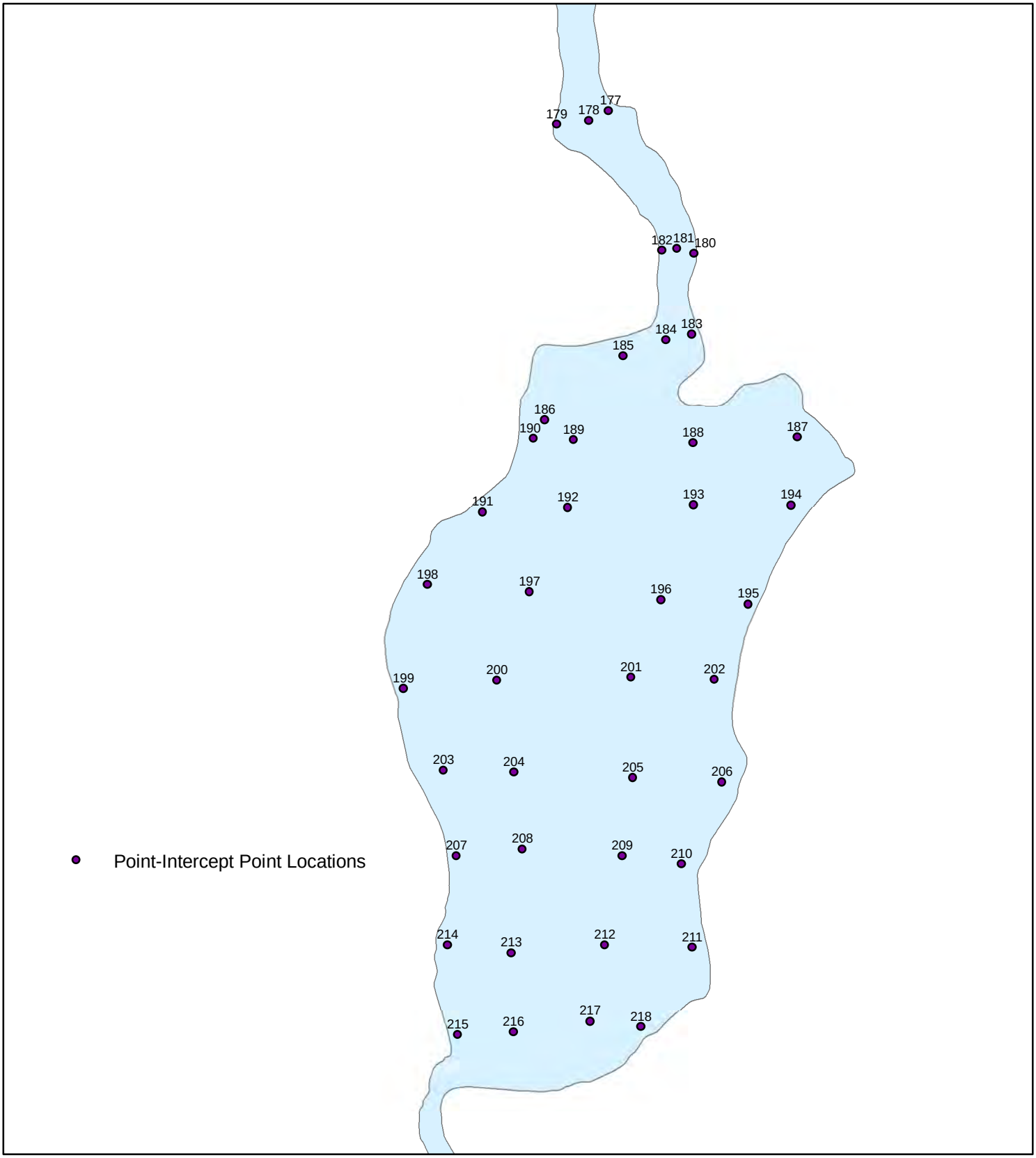
solitudelakemanagement.com



Lake St. Catherine
Wells / Poultney, VT
Rutland County
43.4657° N, 73.2146° W

Lake St. Catherine

0 640 1,280 Feet

1:9,000

N

Map Date: 11/09/17
Prepared by: KS
Office: SHREWSBURY, MA

2017 Total Vegetation Biomass

SOLITUDE LAKE MANAGEMENT
888.480.5253
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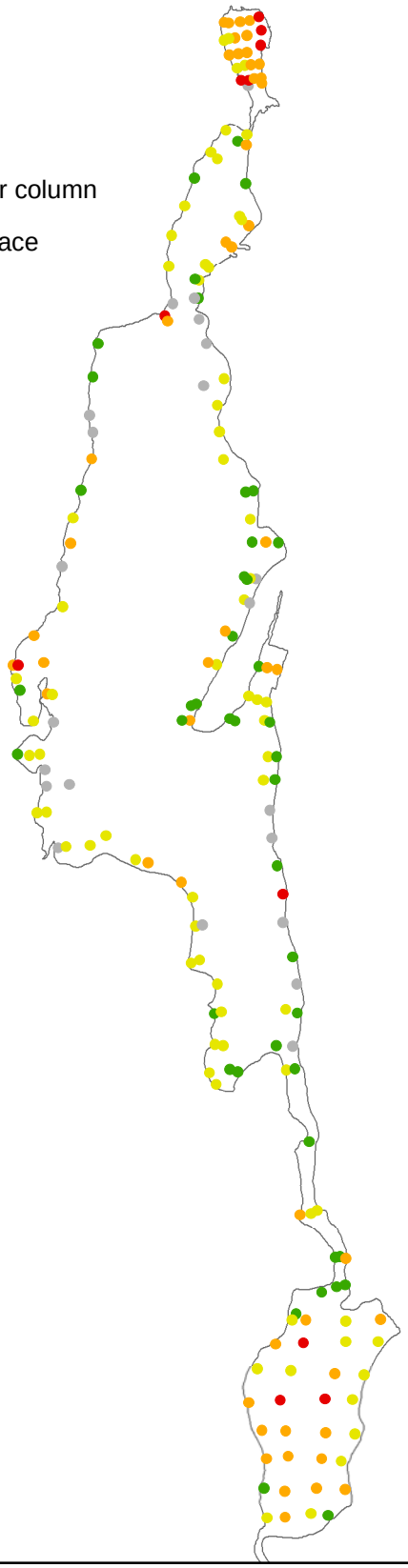
Fall 2017 Biomass Indices

- 0 - No plant growth
- 1 - Very low plant growth
- 2 - Plant growth extending into water column
- 3 - Plant growth extending near surface
- 4 - Plant growth at surface



Lake St. Catherine
Wells / Poultney, VT
Rutland County
43.4657° N, 73.2146° W

Lake St. Catherine

0 2,500 5,000 Feet

1:37,000

N

Map Date: 11/09/17
Prepared by: KS
Office: SHREWSBURY, MA

Fall 2017 Native Vegetation Distribution (1 of 6)

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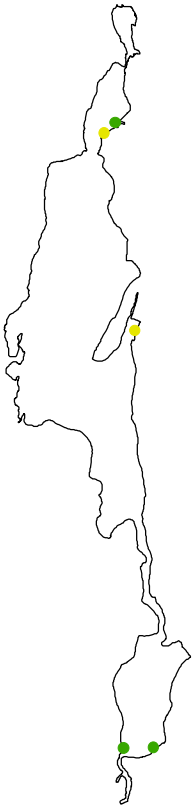
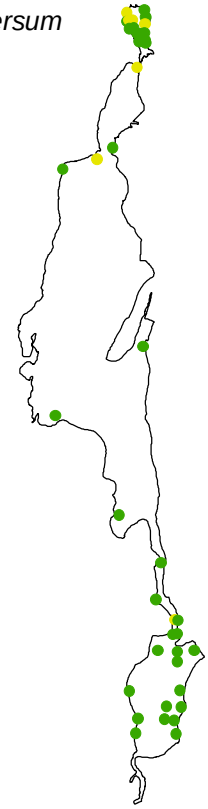
Brasenia schreberi



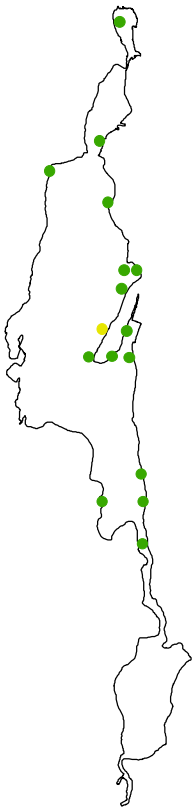
- Trace
- Sparse
- Moderate
- Dense

Ceratophyllum demersum



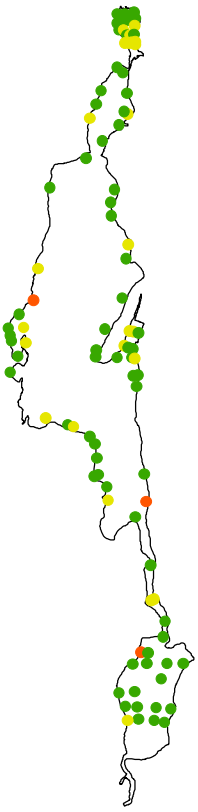
- Trace
- Sparse
- Moderate
- Dense

Chara sp. / Nitella sp.



- Trace
- Sparse
- Moderate
- Dense

Elodea canadensis



- Trace
- Sparse
- Moderate
- Dense

Lake St. Catherine
Wells / Poultney, VT
Rutland County
43.4657° N, 73.2146° W

Lake St. Catherine

0 6,250 12,500 Feet

N

1:79,000

Map Date: 11/09/17
Prepared by: KS
Office: SHREWSBURY, MA

Fall 2017 Native Vegetation Distribution (2 of 6)

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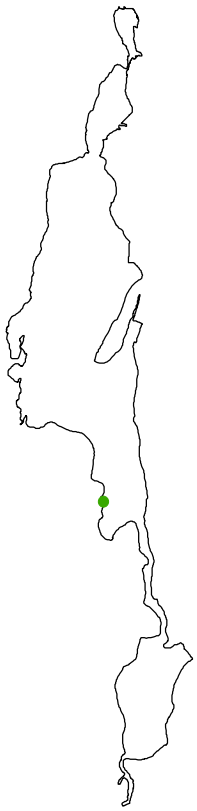
Isoetes sp.

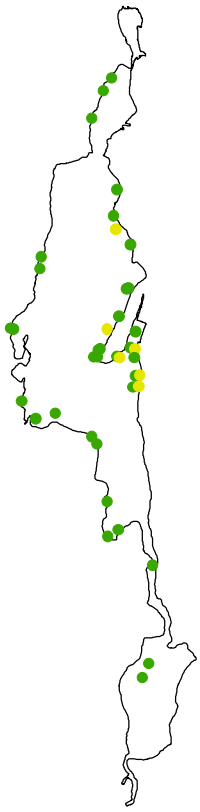


- Trace
- Sparse
- Moderate
- Dense

Myriophyllum verticillatum

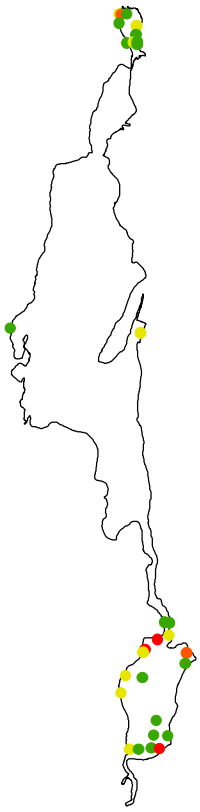
- Trace
- Sparse
- Moderate
- Dense

Najas flexilis



- Trace
- Sparse
- Moderate
- Dense

Nuphar variegata



- Trace
- Sparse
- Moderate
- Dense

Lake St. Catherine
Wells / Poultney, VT
Rutland County
43.4657° N, 73.2146° W

Lake St. Catherine

0 6,100 12,200 Feet

N

1:79,000

Map Date: 11/09/17
Prepared by: KS
Office: SHREWSBURY, MA

Fall 2017 Native Vegetation Distribution (3 of 6)

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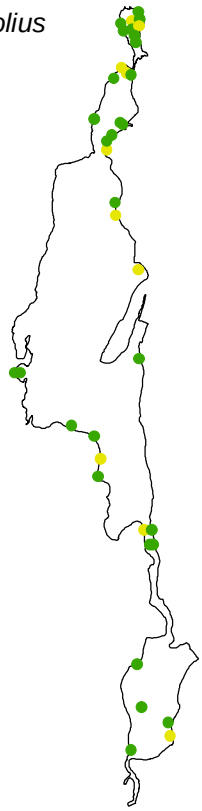
Nymphaea odorata

- Trace
- Sparse
- Moderate
- Dense

Potamogeton amplifolius



- Trace
- Sparse
- Moderate
- Dense

Potamogeton crispus

- Trace
- Sparse
- Moderate
- Dense

Potamogeton epihydrus

- Trace
- Sparse
- Moderate
- Dense

Lake St. Catherine
Wells / Poultney, VT
Rutland County
43.4657° N, 73.2146° W

Lake St. Catherine

0 6,100 12,200 Feet

N

1:79,000

Map Date: 11/09/17
Prepared by: KS
Office: SHREWSBURY, MA

Fall 2017 Native Vegetation Distribution (4 of 6)

SOLITUDE LAKE MANAGEMENT
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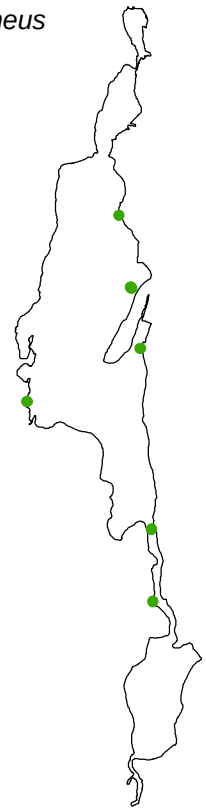
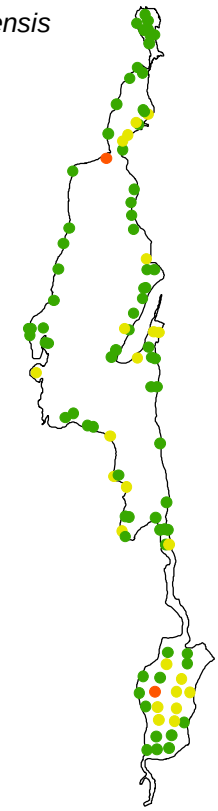
Potamogeton gramineus



- Trace
- Sparse
- Moderate
- Dense

Potamogeton illinoensis

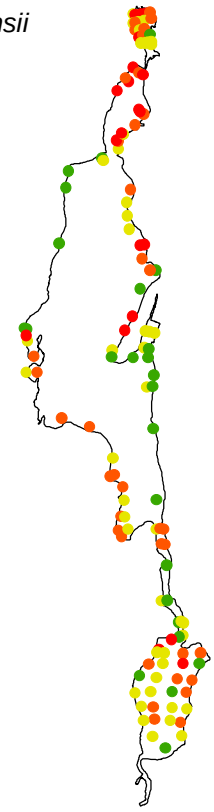


- Trace
- Sparse
- Moderate
- Dense

Potamogeton praelongus

- Trace
- Sparse
- Moderate
- Dense

Potamogeton robbinsii



- Trace
- Sparse
- Moderate
- Dense

Lake St. Catherine
Wells / Poultney, VT
Rutland County
43.4657° N, 73.2146° W

Lake St. Catherine

0 6,100 12,200 Feet

N

1:79,000

Map Date: 11/09/17
Prepared by: KS
Office: SHREWSBURY, MA

Fall 2017 Native Vegetation Distribution (5 of 6)

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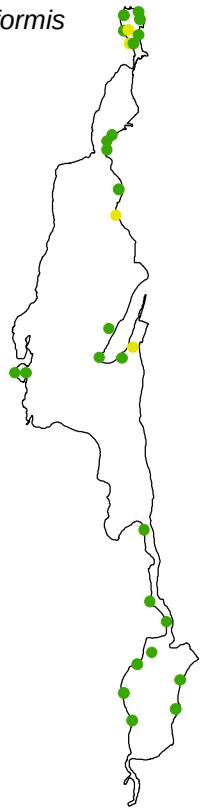
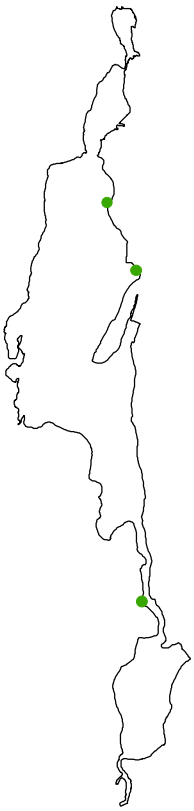
Potamogeton zosteriformis



- Trace
- Sparse
- Moderate
- Dense

Ranunculus aquatilis



- Trace
- Sparse
- Moderate
- Dense

Utricularia gibba

- Trace
- Sparse
- Moderate
- Dense

Utricularia vulgaris

- Trace
- Sparse
- Moderate
- Dense

Lake St. Catherine
Wells / Poultney, VT
Rutland County
43.4657° N, 73.2146° W

Lake St. Catherine

0 6,100 12,200 Feet

N

1:79,000

Map Date: 11/09/17
Prepared by: KS
Office: SHREWSBURY, MA

Fall 2017 Native Vegetation Distribution (6 of 6)

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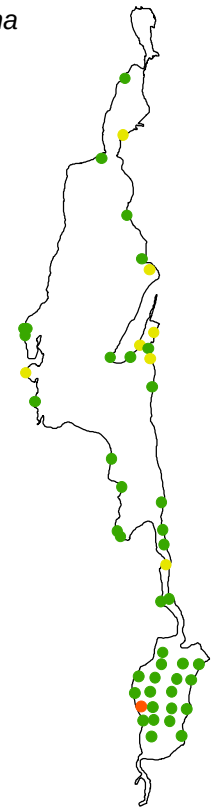
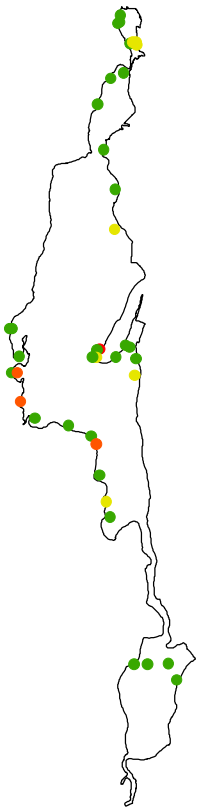
Vallisneria americana



- Trace
- Sparse
- Moderate
- Dense

Zosterella dubia



- Trace
- Sparse
- Moderate
- Dense

Lake St. Catherine
Wells / Poultney, VT
Rutland County
43.4657° N, 73.2146° W

Lake St. Catherine

0 6,000 12,000 Feet

N

1:79,000

Map Date: 11/09/17
Prepared by: KS
Office: SHREWSBURY, MA

Fall 2017 Eurasian Watermilfoil Distribution

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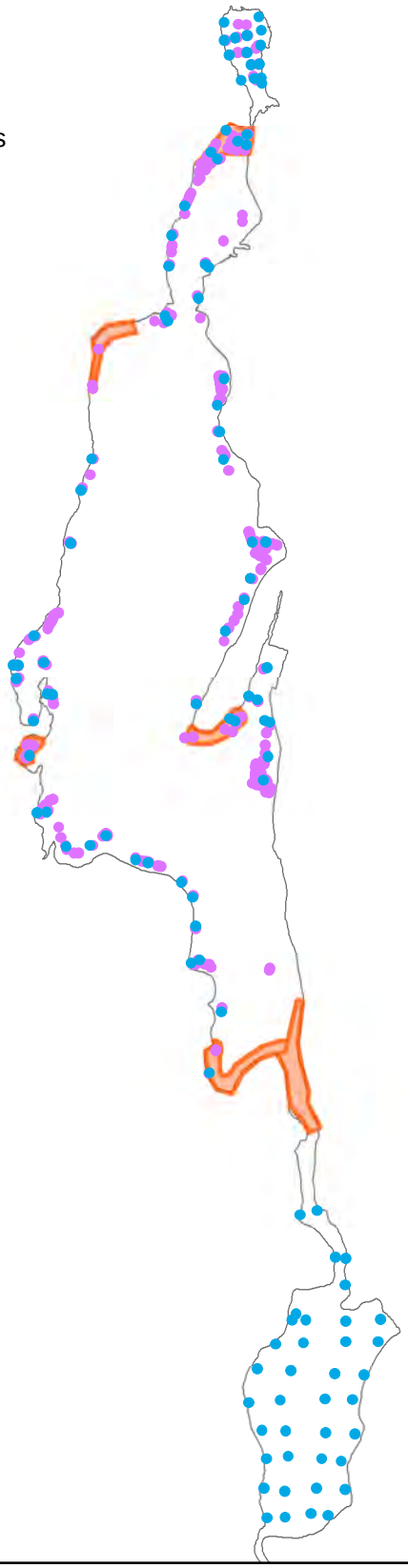
Legend

- Littoral zone EWM locations
- Pre-established point EWM locations
- 2017 Herbicide Treatment Areas



Lake St. Catherine
Wells / Poultney, VT
Rutland County
43.4657° N, 73.2146° W

Lake St. Catherine

0 2,500 5,000 Feet

1:37,000

N

Map Date: 11/09/17
Prepared by: KS
Office: SHREWSBURY, MA

BJECTI	IDENT	SPECIES RICHNESS	BMI	% COV ALL	% COV TRG	MS	PI	PR	PA	PPR	PE	PZ	PG	PC	VA	EN	EC	ZD	CD	CE	NF	NG	NM	NO	NY	BS	UM	UG	UV	NI	PS	PF	BFA	MV	RA	IS
29	048	0	0	0%	0%																															
30	049	5	3	45%	5%	T		S									T		S						S											
31	050	5	3	100%	0%			D				T					T	T							M											
32	051	5	3	100%	0%		T	D									T								T				T							
33	052	2	3	95%	0%			D																					T							
34	053	7	4	50%	20%	S		M	T			T					T		T										T							
35	054	8	2	50%	10%	T	T	S	T								T	T	T						T											
36	055	6	3	75%	5%	T		S									T		S										S	T						
37	056	7	3	45%	15%	T	T	S	S								T												S				S			
38	057	7	4	50%	20%	S		M	T			T					T		T										T							
39	058	4	2	80%	0%			M									T	T	S																	
40	059	7	3	70%	5%	T		M	T			T					T		T										T							
41	060	6	3	65%	0%		T	S				S					S		T										T							
42	061	4	3	55%	5%	T	T	M	T																											
43	062	5	4	50%	20%	S			S								S		S						S											
44	063	1	2	100%	0%			D																												
45	064	5	2	75%	0%			M									T		T								T		T							
46	065	7	3	55%	5%	T	T	M	T								S		T										T							
199	066	9	3	45%	20%	S	T	T				T					T		T						T			T	S							
47	067	5	4	40%	5%	T		S				S					S								T											
48	068	9	4	35%	0%		T	S				T					S	T	T									T	T				S			
49	069	7	3	75%	5%	T		S	T								S	S	T						S											
50	070	6	3	45%	5%	T		S									S	S	T						T											
51	071	6	3	45%	5%	T		S									S	S	T						T											
	24	5.5	2.9	60.2%	6.3%																															
						11	8	1	7	0	0	6	0	0	0	0	12	4	12	0	0	0	0	0	6	0	1	2	9	1	0	0	0	0	0	0
						4	0	10	2	0	0	2	0	0	0	0	8	3	4	0	0	0	0	0	3	0	0	0	3	0	0	0	2	0	0	0
						0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
						0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
					# COUNT	15	8	22	9	0	0	8	0	0	0	0	20	7	16	0	0	0	0	0	10	0	1	2	12	1	0	0	2	0	0	0
					%	62.5	33.3	91.7	37.5	0.0	0.0	33.3	0.0	0.0	0.0	0.0	83.3	29.2	66.7	0.0	0.0	0.0	0.0	0.0	41.7	0.0	4.2	8.3	50.0	4.2	0.0	0.0	8.3	0.0	0.0	0.0

)BJECTI	IDENT	BMI	% COV ALL	% COV TRG		MS	PI	PR	PA	PPR	PE	PZ	PG	PC	VA	EN	EC	ZD	CD	CE	NF	NG	NM	NO	NV	BS	UM	UG	UV	NI	PS	PF	BFA	MV	RA	IS
1	020	1	25%	0%			T	T											T										T							
2	021	0	0%	0%																																
3	022	0	0%	0%																																
4	023	4	65%	5%		T	M	T							T		T																			
5	024	3	70%	20%		S		S											S																	
6	025	0	0%	0%																																
7	026	1	30%	5%		T	T	S	S			T						T	T																	
8	027	0	0%	0%																																
9	028	2	90%	0%			S	M	T			T					T													T		T				
10	029	1	75%	0%				D																												
11	030	2	55%	45%		M	T																													
12	031	2	55%	40%		S			T								S				T														
13	032	2	55%	5%		T	S	S	T			T			S											S									
14	033	2	90%	5%		T		D																												
15	034	3	45%	0%			T	M	T								T									T									
16	035	3	20%	0%			S		T																											
17	036	2	30%	10%		T	T										T	T				T													
18	037	1	80%	0%				D									T				T														
19	038	3	85%	0%			S	M									S																		
20	039	2	100%	0%			T	D									T																		
21	040	2	90%	0%			T	D																												
22	041	1	5%	0%													T																		
23	042	2	90%	10%		T		D																												
24	043	2	100%	5%		T	T	M	T						T		T	T			T														
25	044	2	85%	5%		T	T	D	S								T																		
26	045	1	70%	5%		T	T	M	S								T	T											T						
27	046	3	100%	5%		T		D	T																											
28	047	2	75%	30%		S													S										S						
52	072	0	0%	0%																																
53	073	2	50%	5%		T	T	S	T								T													T				T	
54	074	2	30%	5%		T	T	S	S	S	S	S	T	S	T		T				T														
55	075	0	0%	0%																																
56	076	3	30%	25%		S	T																													
57	077	2	40%	5%		T	T	S										S			S														
58	078	1	80%	0%				D									S				T														
59	079	1	95%	0%				D																												
60	080	1	30%	5%		T	T	T																												
61	081	2	45%	0%																	T										S				
62	082	2	90%	0%			S	M							T		T																		
63	083	1	10%	0%				T																						T				T	
64	084	3	65%	5%		T	T	M	S						S																				
65	085	1	5%	5%		T	T																							T					
66	086	3	60%	45%		M	T										S				T														
67	087	0	0%	0%																																
68	088	0	0%	0%																																
69	089	2	20%	5%		T	T														T														
70	090	1	5%	0%									T																				T			
71	091	1	45%	0%			T	T					T				T				T	S								T						
72	092	2	15%	5%		T	T										T																		
73	093	0	0%	0%																																
74	094	2	60%	0%			T										M																			
75	095	3	55%	45%		M											T																			
76	096	1	85%	0%				D													T														
77	097	3	20%	5%		T	T																													
78	098	2	75%	15%		T	T	M				T					T	T			T														
79	099	0	0%	0%																																
84	100	2	90%	0%			T	D														T														
85	101	3	60%	0%			S					T					T				S									S						
81	102	3	35%	10%		T	T	T							T		T	T			T				T										
82	103	4	75%	60%		M	T	T							T			T			T														

)BJECTI	IDENT	BMI	% COV ALL	% COV TRG		MS	PI	PR	PA	PPR	PE	PZ	PG	PC	VA	EN	EC	ZD	CD	CE	NF	NG	NM	NO	NV	BS	UM	UG	UV	NI	PS	PF	BFA	MV	RA	IS
83	104	3	40%	40%		S	T										S																				
88	105	2	80%	25%		S		M									T	T																			
87	106	1	50%	0%				S									T																				
86	107	2	90%	5%		T	T	D							T		T																				
89	108	3	40%	20%		S	T										S																				
90	109	2	10%	10%		T	T																											T			
92	110	1	25%	5%		T												D			T															
91	111	1	40%	0%			T	S									T	T			T															
95	112	3	55%	0%				T				T			T		T	S			T															
94	113	1	55%	0%			T											T			T	T								T						
93	114	0	0%	0%																																	
96	127	1	50%	0%				S									S													T		T				
97	129	3	55%	5%		T	S	S									S				T															
98	128	3	75%	0%			S	S							S		T								S	S										
99	124	2	40%	10%		T									S		S	T																		
100	125	2	35%	5%		T	T	S				S					T	T			T															
101	126	2	40%	0%				T					T		T		T		T		S															
102	122	1	15%	5%		T									T			T			T									T						
103	123	1	60%	5%		T	S	T				T					T				S															
104	121	2	20%	5%		T	T	T									T				T	T								T		T				
105	120	1	30%	5%		T	T		T						S		S	T																		
106	115	1	45%	0%				S	T			T			S		T	T																		
107	116	2	75%	10%		T	S		T									M																		
108	117	2	45%	0%				M				T																									
109	119	2	55%	5%		T											T	S			T															
110	118	1	35%	0%				T									T				S															
111	132	0	0%	0%																																	
112	134	0	0%	0%																																	
113	133	3	50%	30%		S		S				T					T																				
114	131	2	65%	45%		M	T	S													T											T				
115	130	1	45%	0%			T	T							T		T				S															
116	138	0	0%	0%																																	
117	136	2	60%	60%		M																															
118	137	2	65%	10%		T							T		T			M			T															
119	140	0	0%	0%																																	
120	141	2	15%	5%		T												T			T															
121	135	2	60%	15%		T	T	M									S		T																	
122	142	2	15%	45%		M	T														T															
123	139	0	0%	0%																																	
124	143	2	20%	10%		T	T		T								T	T														T				
125	144	3	50%	10%		T	T	M									S																			
126	145	1	5%	0%				T																													
127	168	3	40%	10%		T	S		T								T	T			T															
128	147	2	60%	5%		T											T	M			T															
129	146	4	5%	0%			T																														
130	148	2	55%	5%		T		S	S						T		T																				
131	149	0	0%	0%																																	
132	153	2	30%	5%		T	S	M	T								T																				
133	152	2	55%	5%		T	T	M									T	T																			
134	155	2	50%	0%			S	M							T		T																				
135	156	1	30%	0%														S			T									T						T
136	157	2	50%	10%		T		S									S																				
137	161	2	80%	0%			T	M																													
138	162	2	40%	0%			T	S										T	T																		
139	165	2	80%	5%		T	S	M							T																						
140	166	2	90%	0%			T	M							T						T															
141	164	1	20%	0%				S																													
142	163	1	5%	0%																	T															
143	169	1	5%	0%			T										T																			
144	160	0	0%	0%																																	

)BJECTI	IDENT	BMI	% COV ALL	% COV TRG		MS	PI	PR	PA	PPR	PE	PZ	PG	PC	VA	EN	EC	ZD	CD	CE	NF	NG	NM	NO	NV	BS	UM	UG	UV	NI	PS	PF	BFA	MV	RA	IS
145	150	0	0%	0%																																
146	151	1	20%	0%													T													T						
147	154	0	0%	0%																																
148	159	2	5%					T																												
149	158	1	75%	0%			T								T		M												T		T				
150	170	2	45%	0%			T	S	S			T																								
151	171	1	80%	0%			T	M					T																		T					
152	172	3	70%	0%			T	M	T						T																					
153	173	0	0%	0%																																
154	174	3	70%	0%			T	M	T																				T							
155	175	3	70%	0%			S	M	T						T																					
80	17A	1	10%	0%				T									T																			
	132	1.6	42.5%	6.7%	**T**	45	53	16	17	0	0	11	6	0	19	0	44	20	5	0	31	4	0	0	1	1	0	0	1	14	0	7	2	0	2	1
					S	8	15	20	7	1	1	2	0	1	6	0	13	4	2	0	6	1	0	0	1	2	0	0	1	1	0	1	0	0	0	0
					M	7	1	22	0	0	0	0	0	0	0	0	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
					D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
				#COUNT		60	69	58	24	1	1	13	6	1	25	0	59	27	7	0	37	5	0	0	2	3	0	0	2	15	0	8	2	0	2	1
				%		45.5	52.3	43.9	18.2	0.8	0.8	9.8	4.5	0.8	18.9	0.0	44.7	20.5	5.3	0.0	28.0	3.8	0.0	0.0	1.5	2.3	0.0	0.0	1.5	11.4	0.0	6.1	1.5	0.0	1.5	0.8

BJECTI	IDENT	BMI	% COV ALL	%COV TRG		MS	PI	PR	PA	PPR	PE	PZ	PG	PC	VA	EN	EC	ZD	CD	CE	NF	NG	NM	NO	NV	BS	UM	UG	UV	NI	PS	PF	BFA	MV	RA	IS
156	176	1	35%	0%				T								S	T		T		T															
157	179	3	35%	5%		T		S				T	T			T	S		T										T						T	
158	178	2	20%	0%				T									S											T							
159	177	2	50%	5%		T					S					T	S											T							
160	182	1	35%	5%		T		T			T	T					T							S	T			S							
161	181	1	25%	0%				S									T		S																
162	180	3	60%	5%		T		S									T		T					T	T			S						T	
163	183	1	60%	5%		T		S									T		T						S				S						
164	184	1	20%	0%				T									T		T																
165	185	1	90%	0%				D																	D			T							
166	186	1	95%	5%		T		D																	D										
167	190	2	70%	5%		T		S									M								S			T				T			
168	189	3	45%	30%		S	T	S				T				T	T		T																
169	188	2	75%	5%		T	T	M									T		T										T						
170	187	3	85%	15%		T		M									T		T						M			T					T		
171	194	2	15%	55%		M		T								T	T								T									T	
172	193	2	90%	10%		T	T	D								T	T	T	T																
173	192	4	50%	10%		T	S	S								T	T	T			T														
174	191	3	20%	15%		T		M	T			T					T	T																T		
175	198	2	25%	25%		S	T	T								T	S								S										
176	197	2	35%	5%		T	T	S								T					T				T										
177	196	3	60%	15%		T	S	M								T	T																		
178	195	2	80%	5%		T		M				T				T	T	T																	
179	202	2	30%	15%		T	S	M									T		T																
180	201	4	35%	15%		T	S	T								T																			
181	200	4	60%	10%		T	M	S								T	T																		
182	199	3	50%	5%		T	T	S				T				T	T		T						S										
183	203	3	55%	5%		T	T	S								M	T																		
184	204	3	45%	20%		S	S	M	T							T	T																		
185	205	3	40%	25%		S	S	S								T	T		T																
186	206	2	50%	30%		S		S				T				T	T		T																
187	210	2	75%	10%		T	T	M	T								T		T																
188	209	3	45%	15%		T	S	S								T	T		T						T										
189	208	3	65%	10%		T	S	M								T	T																		
190	207	3	60%	15%		T		S				T				T	S		T																
191	214	1	20%	10%		T								T					T															M		
192	213	3	40%	10%		T	T	S								T																				
193	212	3	45%	75%		D	T																		T											
194	211	3	55%	15%		T		S	S							T	T		T						T											
195	215	2	40%	15%		T	T		T																S	T										
196	216	3	25%	5%		T	T																		T											
197	217	2	45%	40%		S	T	T																	T				T							
198	218	1	65%	5%		T																			D	T			T							
	43	2.3	49.3%	13.4%	T	30	13	8	4	0	1	8	1	1	0	21	26	4	18	0	165	0	0	1	9	2	0	5	4	0	0	1	2	2	1	0
					S	6	8	17	1	0	1	0	0	0	0	1	5	0	1	0	49	0	0	1	5	0	0	2	1	0	0	0	0	0	0	0
					M	1	1	9	0	0	0	0	0	0	0	1	1	0	0	0	15	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0
					D	1	0	3	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0
				# Count		38	22	37	5	0	2	8	1	1	0	23	32	4	19	0	520.4	0	0	2	18	2	0	7	5	0	0	1	3	2	1	0
				%		88.4	51.2	86.0	11.6	0.0	4.7	18.6	2.3	2.3	0.0	53.5	74.4	9.3	44.2	0.0	114.0	0.0	0.0	4.7	41.9	4.7	0.0	16.3	11.6	0.0	0.0	2.3	7.0	4.7	2.3	0.0