

Sucker Lake



Aquatic Macrophyte, Contour, Biovolume and Bottom Composition Survey 6/30/2020

This document contains two reports of data collected on Sucker Lake. The first report details the methods and findings of a point intercept survey of macrophyte vegetation. The second report details the methods and results of a contour, vegetation biovolume, and bottom hardness (composition) survey.

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Aquatic Macrophyte Point-Intercept Survey

June 30, 2020

Methods:

The point-intercept method incorporating aerial photography and a Lowrance HDS-5TM Global Positioning System (GPS) were used to assess the aquatic macrophyte community on Sucker Lake (Figure 1) on June 30, 2020. Samples were taken at 45 evenly spaced (80m) georeferenced points (Figure 2). Data on depth, plant species, and abundance rank were recorded as displayed in Tables 2 and 3 and in the maps of this report. A Secchi disk measurement was also taken in the center of the lake on the shady side of the boat, as displayed in Table 3.

A double-tined metal rake attached to an 8.5-meter rope was used to collect specimens. At each point, the device was thrown out approximately one meter and then dragged across the substrate for approximately one meter. Species were identified and given a ranking based on cover of rake tines (Table 1). Plant species that were floating in the water at the collection points were also counted.

Table 1

<i>Abundance rankings for percent cover of rake tines</i>	
Percent Cover of Tines	Abundance Ranking
41-100	3
21-40	2
1-20	1

Results:

Aquatic macrophytes were found at 42 of 45 points surveyed (Figure 2). The three most common species observed included Coontail (*Ceratophyllum demersum*), Greater Duckweed (*Spirodela polyrhiza*), and Lesser Duckweed (*Lemna minor*). Other moderately common species observed included Flat-stem Pondweed (*Potamogeton zosteriformis*) and Star Duckweed (*Lemna trisulca*). Species observed at lower occurrences included Canada Waterweed (*Elodea canadensis*), Curly-leaf Pondweed (*Potamogeton crispus*), Eurasian Watermilfoil (*Myriophyllum spicatum*), Filamentous Algae (*Spirogyra/Cladophora spp.*), Leafy Pondweed (*Potamogeton foliosus*), Northern Watermilfoil (*Myriophyllum sibiricum*), Spatterdock (*Nuphar advena*), Watermeal (*Wolffia columbiana*), White Water Crowfoot (*Ranunculus aquatilis*), White Water-lily (*Nymphaea odorata*), White-stem Pondweed (*Potamogeton praelongus*), and possible Hybrid Watermilfoil (*Myriophyllum sibiricum x Myriophyllum spicatum*). Floating-leaf Pondweed (*Potamogeton natans*) was spotted along the west side of the lake. Beds of Curly-leaf Pondweed

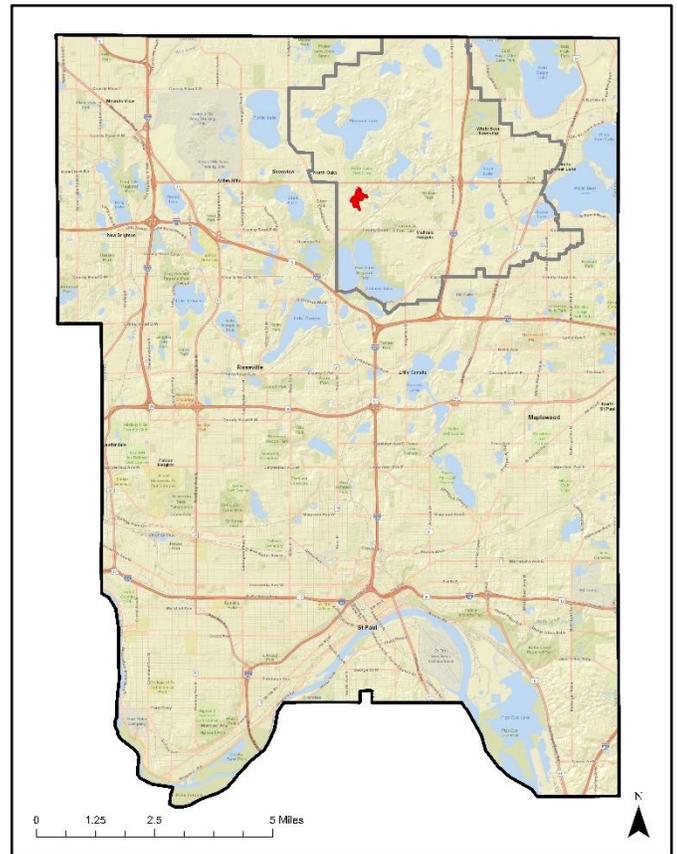


Figure 1. Location of Sucker Lake shown in red within Vadnais Lake Area Water Management Organization and Ramsey County Boundaries.

were present near survey-points 21 and 42, and a turion was observed on the rake at survey-point 38. Spatterdock were also prevalent near survey-point 42. Though not observed on the rake, Claspingleaf Pondweed (*Potamogeton perfoliatus*) was present near survey-point 28. The Secchi disk reading was 2.2m (8ft, 3in).

Since this is the first survey of this type on Sucker Lake, data from surveys conducted in previous years are not available to determine changes in average abundance, percent occurrence, or species composition. Invasive species of concern observed in this survey included Curly-leaf Pondweed, Eurasian Watermilfoil, and Hybrid Watermilfoil. There is a known presence of Zebra Mussel (*Dreissena polymorpha*) (Minnesota DNR). Hybrid Watermilfoil was identified based on having characteristics of both Northern Watermilfoil and Eurasian Watermilfoil. For absolute identification, a genetic analysis is advised.

Table 2. Percent occurrence and average abundance of aquatic plant taxa present during Sucker Lake point-intercept survey.

Species	Common Name	Scientific Name	Average Abundance 6/30/2020	Percent Occurrence 6/30/2020
1	Canada Waterweed	<i>Elodea canadensis</i>	1.00	5%
2	Coontail	<i>Ceratophyllum demersum</i>	1.79	69%
3	Curly-leaf Pondweed	<i>Potamogeton crispus</i>	1.00	21%
4	Eurasian Watermilfoil	<i>Myriophyllum spicatum</i>	1.25	10%
5	Filamentous Algae	<i>Spirogyra/Cladophora spp.</i>	1.00	19%
6	Flat-stem Pondweed	<i>Potamogeton zosteriformis</i>	1.33	43%
7	Greater Duckweed	<i>Spirodela polyrhiza</i>	1.14	83%
8	Leafy Pondweed	<i>Potamogeton foliosus</i>	1.67	7%
9	Lesser Duckweed	<i>Lemna minor</i>	1.14	83%
10	Northern Watermilfoil	<i>Myriophyllum sibiricum</i>	1.00	10%
11	Spatterdock	<i>Nuphar advena</i>	2.00	2%
12	Star Duckweed	<i>Lemna trisulca</i>	1.16	45%
13	Watermeal	<i>Wolffia columbiana</i>	1.18	26%
14	White Water Crowfoot	<i>Ranunculus aquatilis</i>	1.00	7%
15	White Water-lily	<i>Nymphaea odorata</i>	1.43	17%
16	White-stem Pondweed	<i>Potamogeton praelongus</i>	1.00	2%
17	Hybrid Watermilfoil	<i>M. sibiricum x M. spicatum</i>	1.00	10%

Note. Percent occurrence represents the number of times a plant species was observed divided by the number of total sample sites where vegetation was observed. Average abundance is calculated as the average of the abundance ranking for an individual species present.

Table 3. Depth, Secchi disk, water temperature, and vegetation abundance point survey results on June 30, 2020

Point	Depth (m)	Canada Waterweed	Coontail	Curly-leaf Pondweed	Eurasian Watermilfoil	Filamentous Algae	Flat-stem Pondweed	Greater Duckweed	Leafy Pondweed	Lesser Duckweed	Northern Watermilfoil	Spatterdock	Star Duckweed	Watermeal	White Water Crowfoot	White Water-lily	White-stem Pondweed	Hybrid Watermilfoil
1	0.5		2					1		1				1		2		
2	0.2							2		2				1				
3	1.1		2		2		1	1		1			1					
4	0.9		3															
5	1.3						1	2		2							1	1
6	1.9		3				1	1		1								
7	1.5		1	1				1			1							
8	0.7																	
9	2.5							1		1								
10	3.8																	
11	3.6							1		1								
12	0.5		2			1	1	1	1	1			2			1		1
13	0.5		3	1			1	1		1								
14	0.03		1					1		1			1	1				
15	0.8		1	1			1	1		1			1					
16	3.3					1	1	1		1			1					
17	5.4							1		1				1				
18	5.7							1		1								
19	1.1		3				2	1		1	1		1	1				
20	1.1		2	1			1	1	1	1			1	1				
21	0.5		1					2		2			1			2		
22	0.6		1			1	1						1			2		
23	2.3		1					1		1				1				1
24	3.2			1														
25	3.8							1		1								
26	3.9		1					1		1								
27	0.6		3	1			2	1		1			1					
28	0.1		2				3	1		1			2			1		
29	0.2	1	2					3		3				3				
30	0.7	1	3	1	1		1	1		1			1	1		1		
31	5.4									1								
32	6.9																	
33	3.3		2		1		1	1		1			1					
34	0.1		1				1	1	3	1	1		1	1	1			
35	0.8		1			1		1		1								
36	3.6		1					1		1			1	1				
37	7.2							1		1								
38	4.2		1	1														
39	1.9		2					1		1			1					
40	5.6									1								
41	5.0		1															
42	0.2					1	2	1							1			
43	0.3		2	1		1	1	1		1	1							
44	0.5		1		1	1	2	1		1		2	1		1			
45	0.5		3			1		1		1			2			1		1
Total Abundance		2	52	9	5	8	24	40	5	40	4	2	22	13	3	10	1	4
Count		2	29	9	4	8	18	35	3	35	4	1	19	11	3	7	1	4
Avg. Abundance		1.00	1.79	1.00	1.25	1.00	1.33	1.14	1.67	1.14	1.00	2.00	1.16	1.18	1.00	1.43	1.00	1.00
% Occurrence		5%	69%	21%	10%	19%	43%	83%	7%	83%	10%	2%	45%	26%	7%	17%	2%	10%
Secchi Depth (m):	2.2																	
Water Temperature (C):	24.4																	

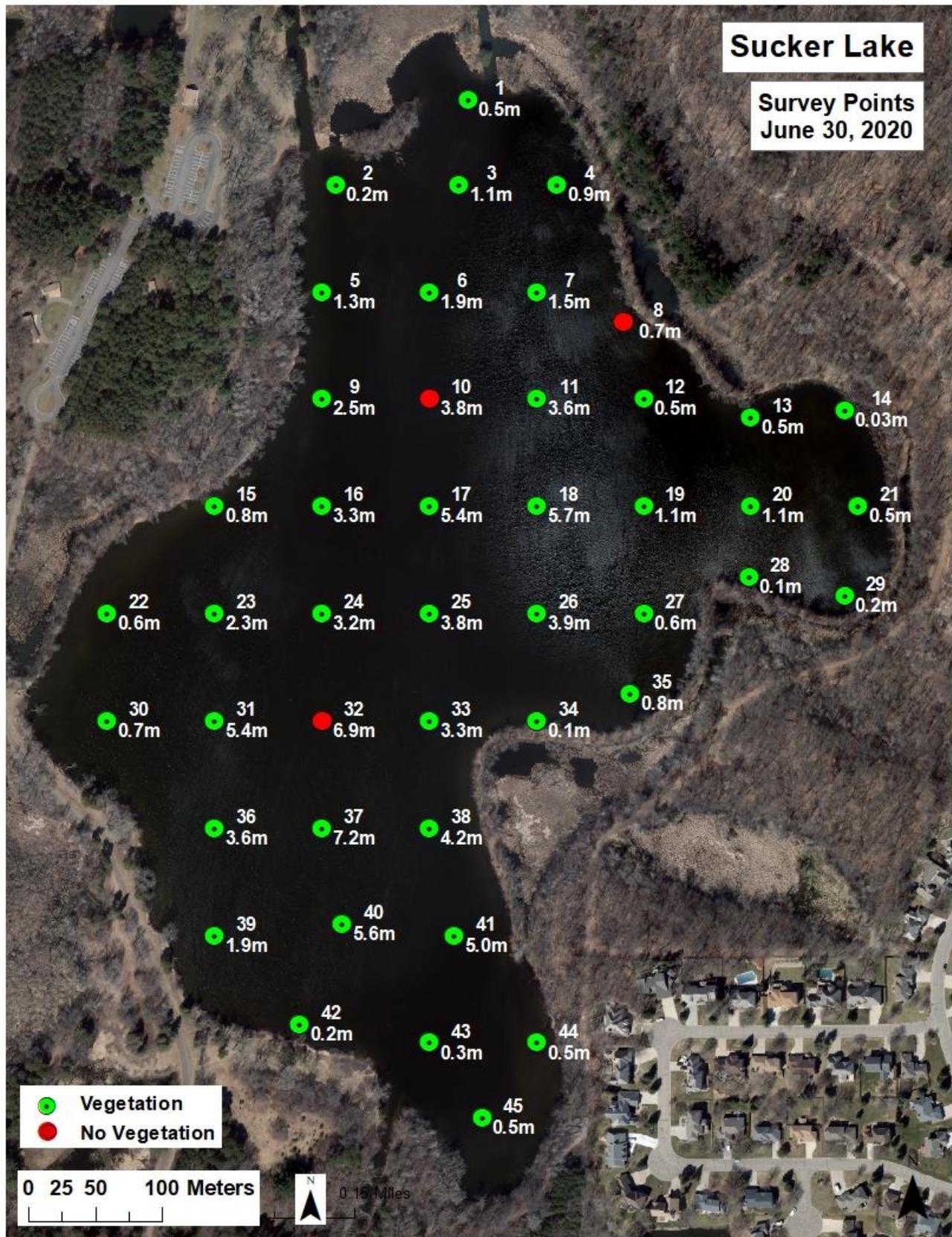


Figure 2. Sucker Lake vegetation point intercept survey locations. N = 45.

Contour, Biovolume and Bottom Composition Survey

June 30, 2020

Methods:

A Lowrance HDS-5TM Global Positioning System (GPS)-enabled depth finder was used to collect submerged aquatic vegetation biovolume, lake depth (bathymetry), and bottom hardness (composition) data on Sucker Lake on June 30, 2020. The lake was transected at a maximum distance of 40 meters between transects at a speed of no more than 5 miles per hour. Sonar log data were recorded using the Lowrance HDS-5TM Global Positioning System (GPS)-enabled depth finder. Transducer data were processed using Contour Innovations, LLC, BioBase software.

Results:

The results below were produced by exporting the processed data from the BioBase system and interpolating spatial data using ArcGIS software. Results include maps as well as statistics of biovolume distribution represented as total percent of water column occupied by plant matter ranging from zero to one hundred. Additional results include contour depth maps at one-meter intervals as well as bottom hardness (composition) maps. Bottom hardness is represented as soft, medium, or hard; with soft bottoms characterized as muck, loose silt or sand and medium to harder bottoms characterized as compacted sand, gravel, or rock. More robust interactive contour and vegetation map data, including sonar log trip replays, can be viewed on the ciBioBase website: www.cibiobase.com.

BIOBASE
VEGETATION ANALYSIS REPORT

Sucker Lake, Ramsey Minnesota
Generated: 7/1/2020 10:26:05 PM (UTC)

Waterbody Size: 26.41 ha
[report link](#)



Data Collector Ramsey County Parks and Recreation Conservation Division	Survey Size Area: 25.12 ha Percent: 95.12% of waterbody Volume: 617763.44 cu. m	Offset Information See Below
Data Collection Date 6/30/2020 7:03:43 PM (UTC)	Est. Waterbody Volume ? 649458.60 cu. m (526.52 acre ft)	
Average Water Temperature 24.57° C	Settings Track Buffer: 25 m Grid Cell Size: 5.0 m Min. BV Detect: 5% Min. Veg Depth Detect: 0.73 m	
Location Start: 45.07279810, -93.09994967 End: 45.07272171, -93.09999474	Quality Control Reviewer: Ian McCormack Comments: We have reviewed this trip. Please use the "ASK THE EXPERTS" button for this trip if you have any questions.	

Survey Summary

	Type ?	PAC ?	Avg BVp ?	SD BVp ?	Avg BVw ?	SD BVw ?	Depth Range	Avg Depth	Distance	No. Points
Full Survey	Point	70.0%	70.0%	±33.2%	49.0%	±32.8%	0.31 - 7.53 m	2.33 m	7.17 km	2697
	Grid	81.8%	67.4%	±30.7%	55.2%	±38.1%	0.03 - 7.27 m	2.46 m	-	16374

Biovolume Analysis by Quantity

AOI	0-5%	5-20%	20-40%	40-60%	60-80%	>80%
1	30.00%	9.36%	8.64%	7.34%	5.71%	38.93%

Biovolume Analysis by Depth

Full Survey	Depth	Type	Count	PAC	Avg BVp	SD BVp	Avg BVw	SD BVw
Point	0-1m		1277	98.6%	90.5%	±15.9%	15.9%	±0.0%
	1-2m		281	98.1%	41.1%	±14.1%	13.9%	±0.0%
	2-3m		265	74.3%	24.5%	±9.6%	9.9%	±0.0%
	3-4m		308	41.2%	13.9%	±6.0%	6.5%	±0.0%
	4-5m		103	31.1%	10.0%	±3.3%	4.3%	±0.0%
	5-6m		265	0.0%	0.0%	±0.0%	0.0%	±0.0%
	6-7m		105	0.0%	0.0%	±0.0%	0.0%	±0.0%
	7-8m		93	0.0%	0.0%	±0.0%	0.0%	±0.0%
	8-9m		0	0.0%	0.0%	±0.0%	0.0%	±0.0%
	9-10m		0	0.0%	0.0%	±0.0%	0.0%	±0.0%
Grid	0-1m		7801	100.0%	88.7%	±12.8%	88.7%	±12.9%
	1-2m		3397	100.0%	78.1%	±14.6%	78.1%	±14.6%
	2-3m		1992	98.9%	45.9%	±21.6%	45.4%	±22.0%
	3-4m		1662	90.6%	28.3%	±16.1%	25.6%	±17.4%
	4-5m		1275	75.4%	16.2%	±8.8%	12.2%	±10.3%
	5-6m		397	21.0%	12.0%	±6.4%	2.5%	±5.7%
	6-7m		50	5.0%	9.6%	±3.5%	0.5%	±2.2%
	7-8m		0	0.0%	0.0%	±0.0%	0.0%	±0.0%

Glossary

AOI
Area of Interest: Defines the individual transects or contiguous data samples as depicted by the color coding of each trip line. Separate areas of interest can be generated through merging of multiple trips, appending data to a single sonar log or lapses in time (greater than five minutes) within a sonar log.

BVp
Biovolume (Plant): Refers to the percentage of the water column taken up by vegetation when vegetation exists. Areas that do not have any vegetation are not taken into consideration for this calculation.

BVw
Biovolume (All water): Refers to the average percentage of the water column taken up by vegetation regardless of whether vegetation exists. In areas where no vegetation exists, a zero value is entered into the calculation, thus reducing the overall biovolume of the entire area covered by the survey.

PAC
Percent Area Covered: Refers to the overall surface area that has vegetation growing.

Grid
Geostatistical Interpolated Grid: Interpolated and evenly spaced values representing kriged (smoothed) output of aggregated data points. The gridded data is most accurate summary of individual survey areas.

Point
Individual Coordinate Point: A single point represents a summary of sonar pings and the derived bottom and canopy depths. Individual point data create an irregularly spaced dataset that may have overlaps and/or gaps in the data resulting in a increased potential for error.

Figure 3. Sucker Lake CiBioBase survey summary statistics.

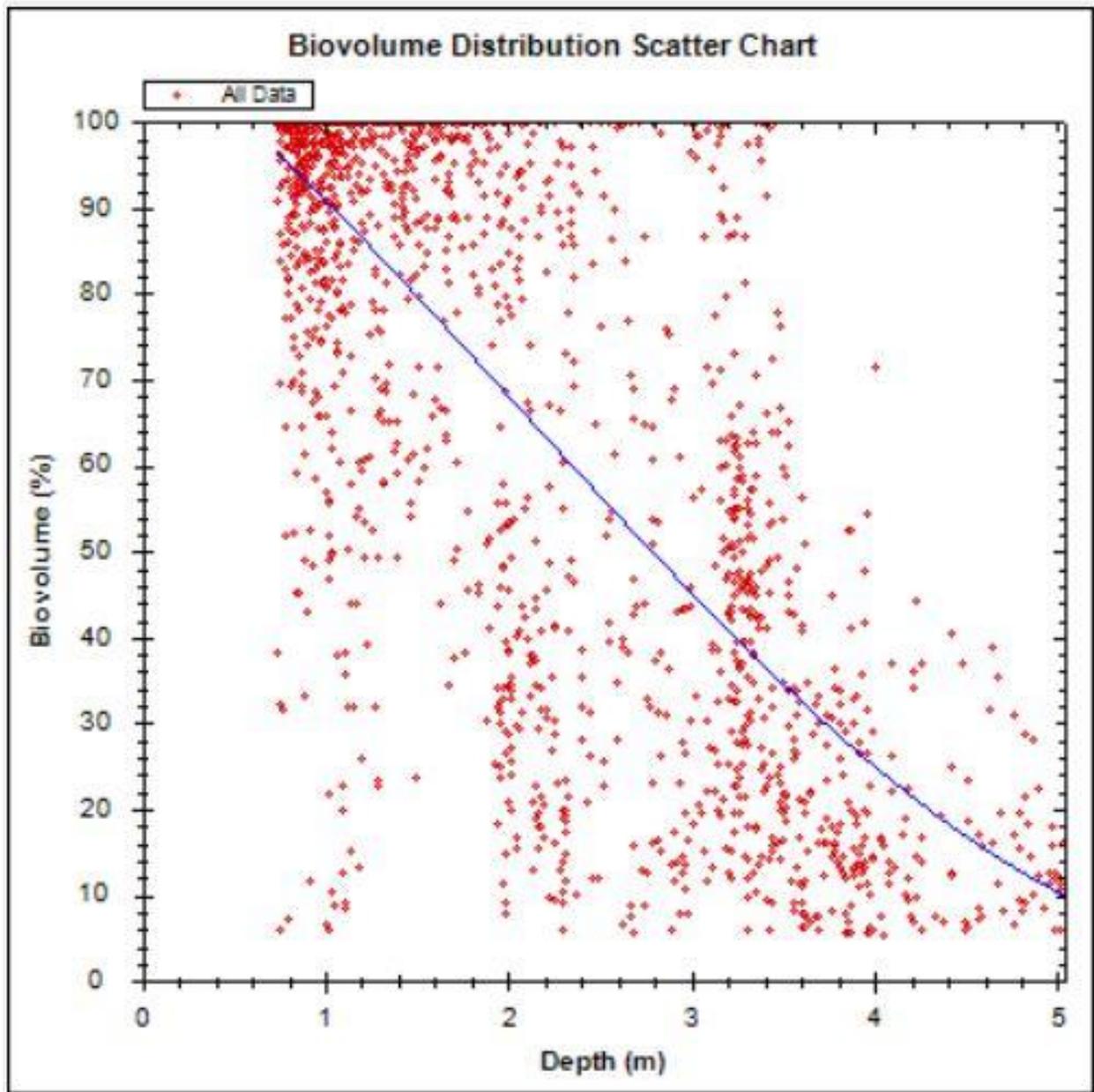


Figure 4. Sucker Lake biovolume distribution scatter chart.

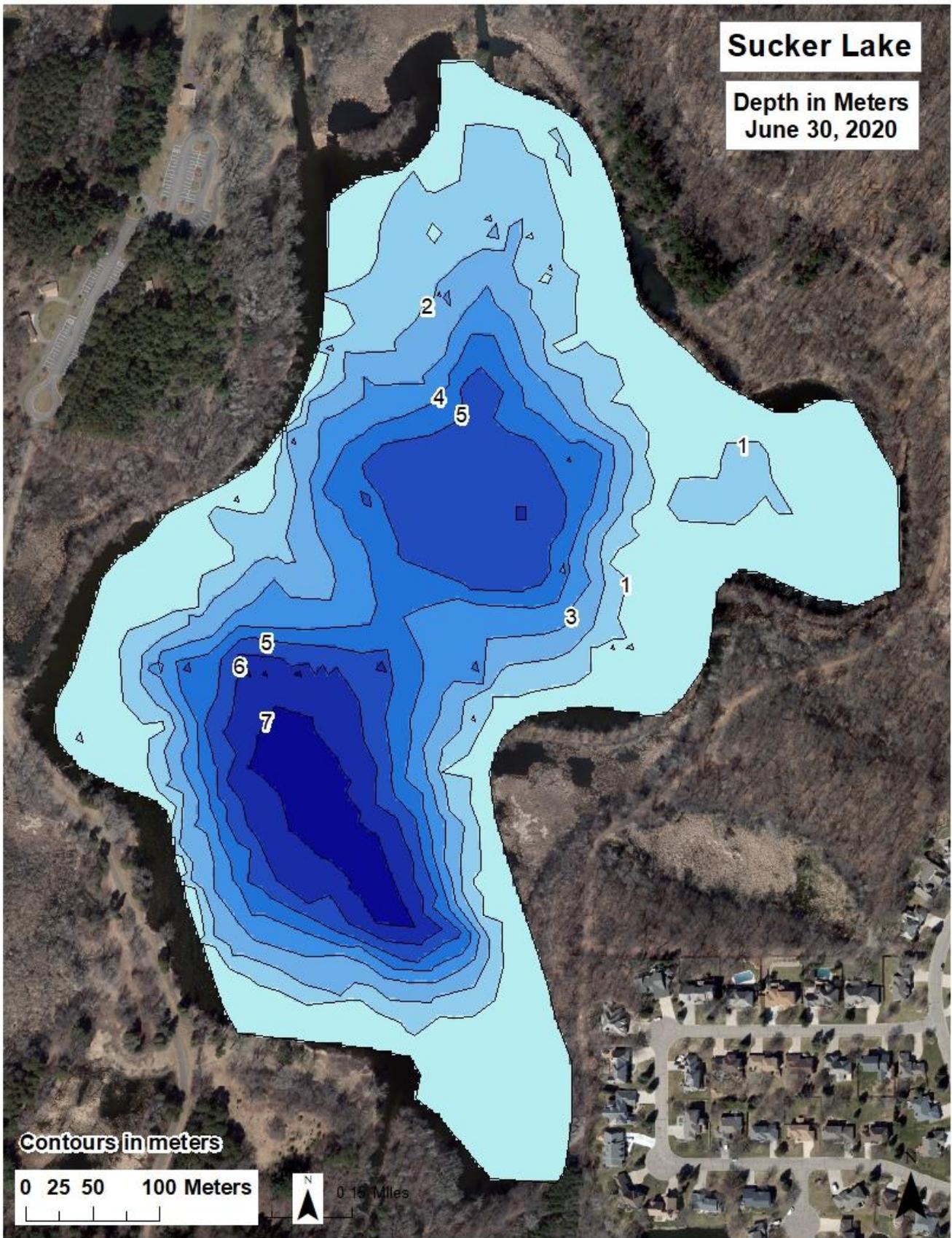


Figure 5. Sucker Lake depth with one-meter contours – June 2020 map used.

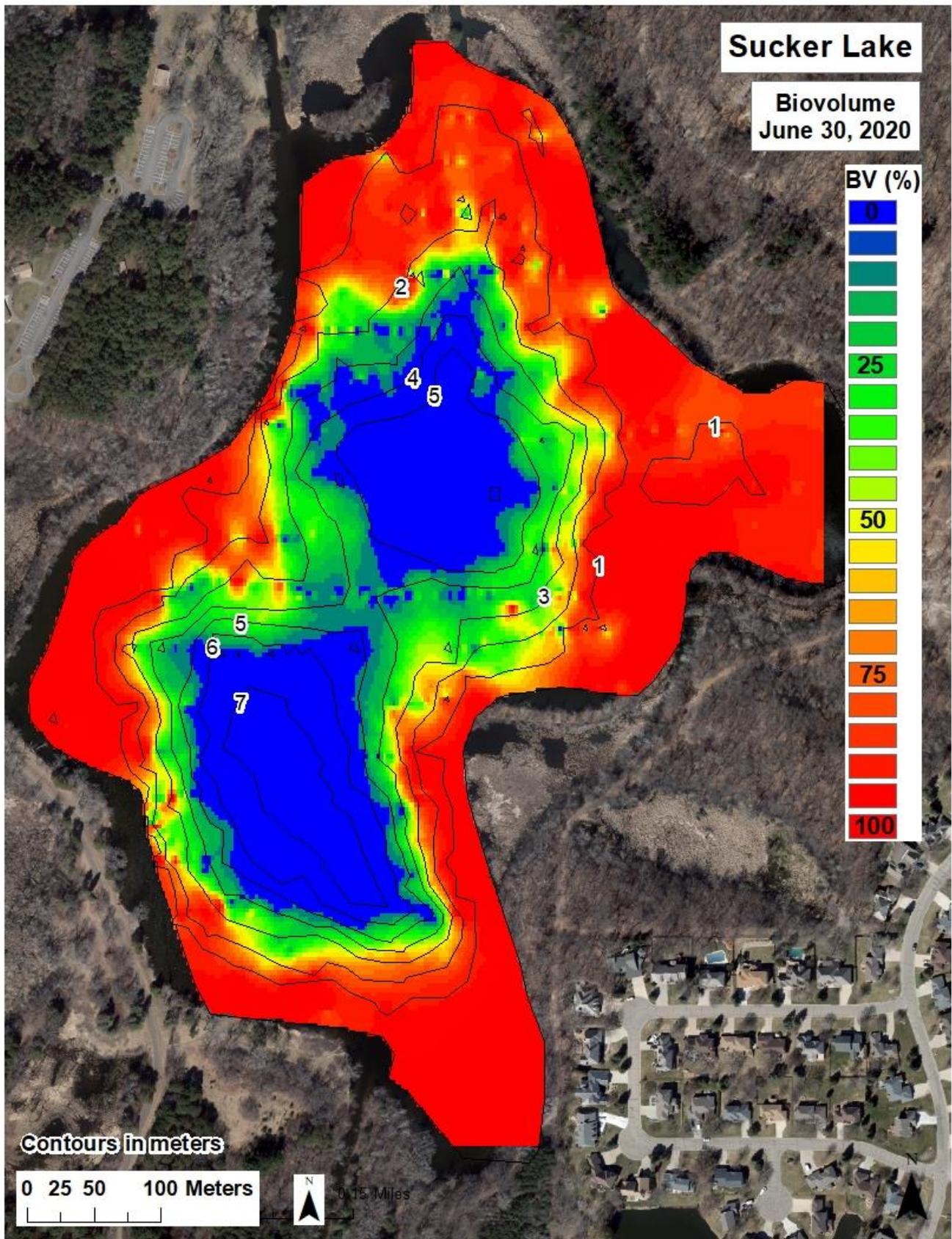


Figure 6. Sucker Lake vegetation biovolume with one-meter contours. Percent values range from zero to one hundred; Blue = 0%, Yellow = 50% and Red = 100%.

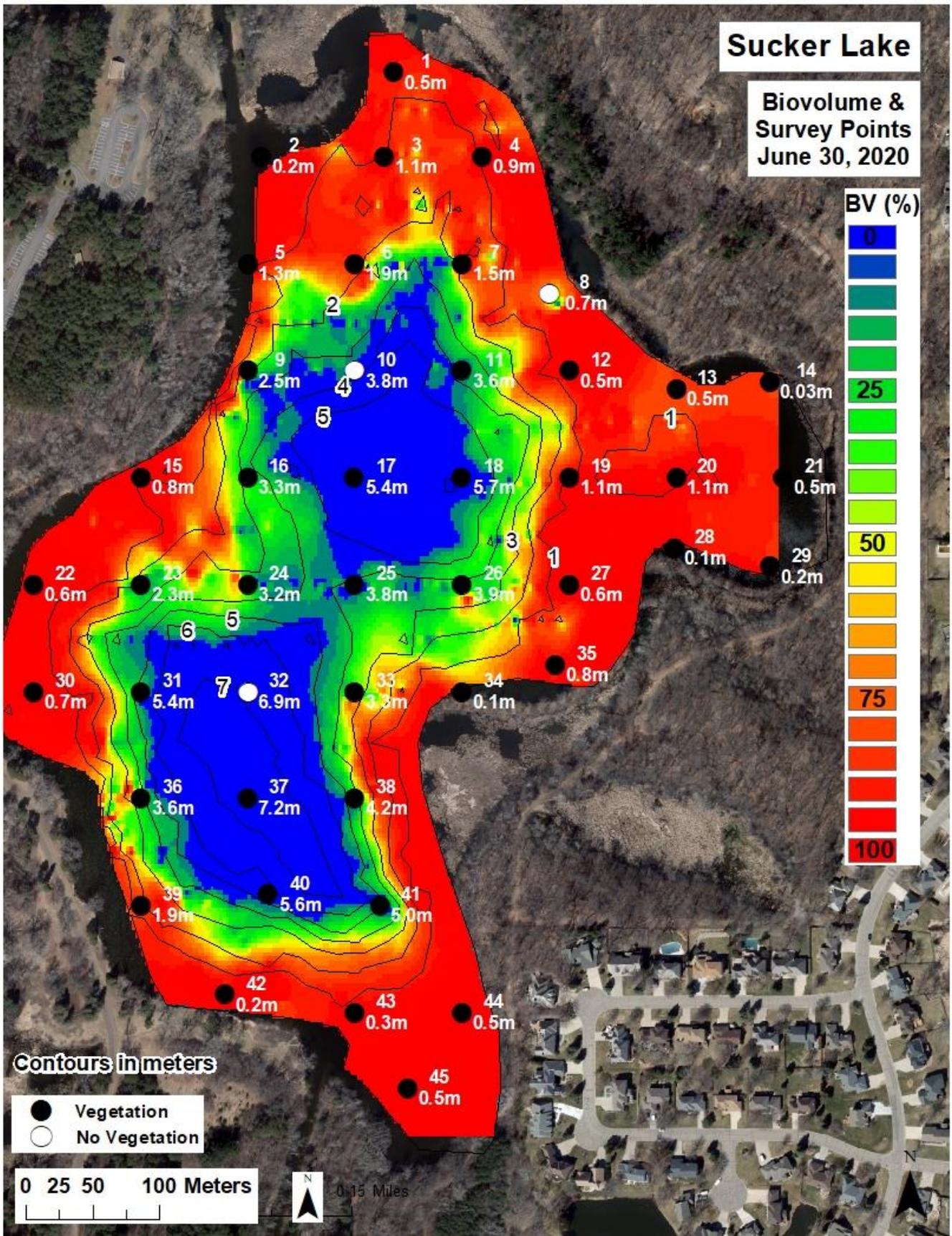


Figure 7. Sucker Lake vegetation biovolume and locations of survey points.

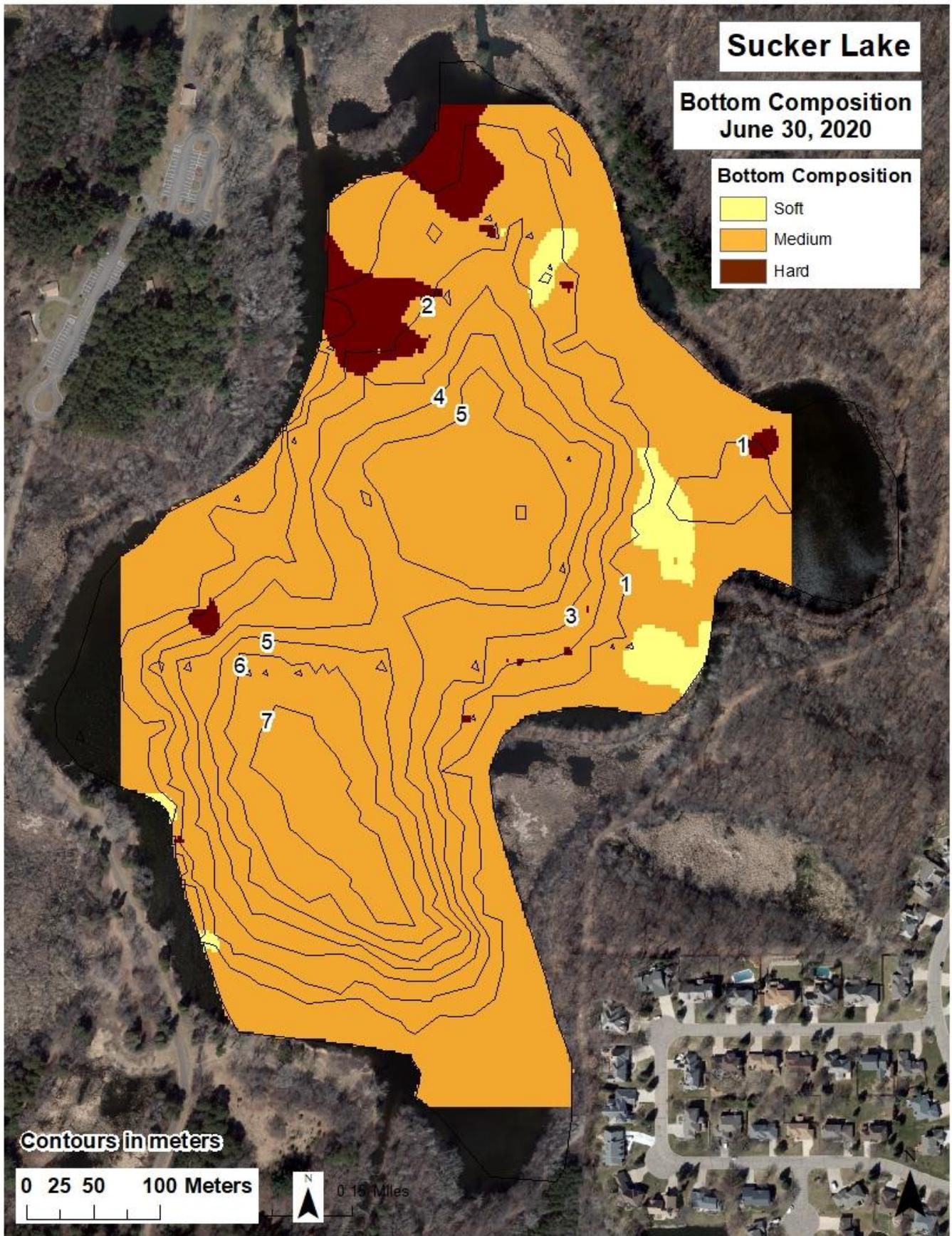


Figure 8. Sucker Lake bottom composition values with one-meter contours.