

# Tamarack Lake



# VLA WMO

Vadnais Lake Area  
Water Management Organization

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## Macrophyte, Contour, Biovolume and Bottom Composition Survey 8/2/22

Tamarack Lake, located in Tamarack Nature Center in White Bear Township, has a surface area of 15 acres and an average depth of 5 feet. Tamarack Lake is classified as a shallow lake. Tamarack Lake is surrounded by a 320 acre preserve and is located to the east of Interstate 35E. Common fish found in Tamarack Lake include Minnow and Bullhead. Predominant vegetation in Tamarack Lake includes Coontail, Sago pondweed, Leafy pondweed, and Canada waterweed. Despite being situated in county parkland, the lake is impaired for nutrients, likely due to internal loading<sup>1</sup>.

This document contains two reports of data collected on Tamarack 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 bio-volume and bottom hardness (composition) survey.

Data collected and prepared by **Ramsey County – Parks & Recreation, Soil and Water Conservation Division** for

**Vadnais Lakes Watershed Management Organization**  
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[1] VLA WMO. (2021, June 22). *Tamarack Lake Fact Sheet 2021*. VLA WMO. Retrieved November 15, 2022, from <https://www.vlawmo.org/waterbodies/tamarack-lake/>

# Aquatic Macrophyte Point-Intercept Survey

8/2/22

## Methods:

The point-intercept method incorporating aerial photography and a Lowrance Elite-7 T12 Global Positioning System (GPS) were used to assess the aquatic macrophyte community on Tamarack Lake on August 2, 2022. Samples were taken at 21 evenly spaced (50m) geo-referenced 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 a 11-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 within one square meter of each collection point were also counted.

Table 1

*Abundance rankings for percent cover of rake tines*

Percent Cover of Tines	Abundance Ranking
41-100	3
21-40	2
1-20	1

## Results:

Aquatic macrophytes were found at 6 of 21 points surveyed (Figure 2). The four species found on Tamarack Lake were coontail (*Ceratophyllum demersum*), Flat-stem Pondweed (*Potamogeton zosterformis*), naiad (*Najas spp.*), and sago pondweed (*Stuckenia pectinata*). Frequency of occurrence and average abundance of each species can be found in table 2. The Secchi disk reading was 0.1m (0.32ft).

No previous macrophyte survey of Tamarack Lake has been conducted so no comparative data are available.

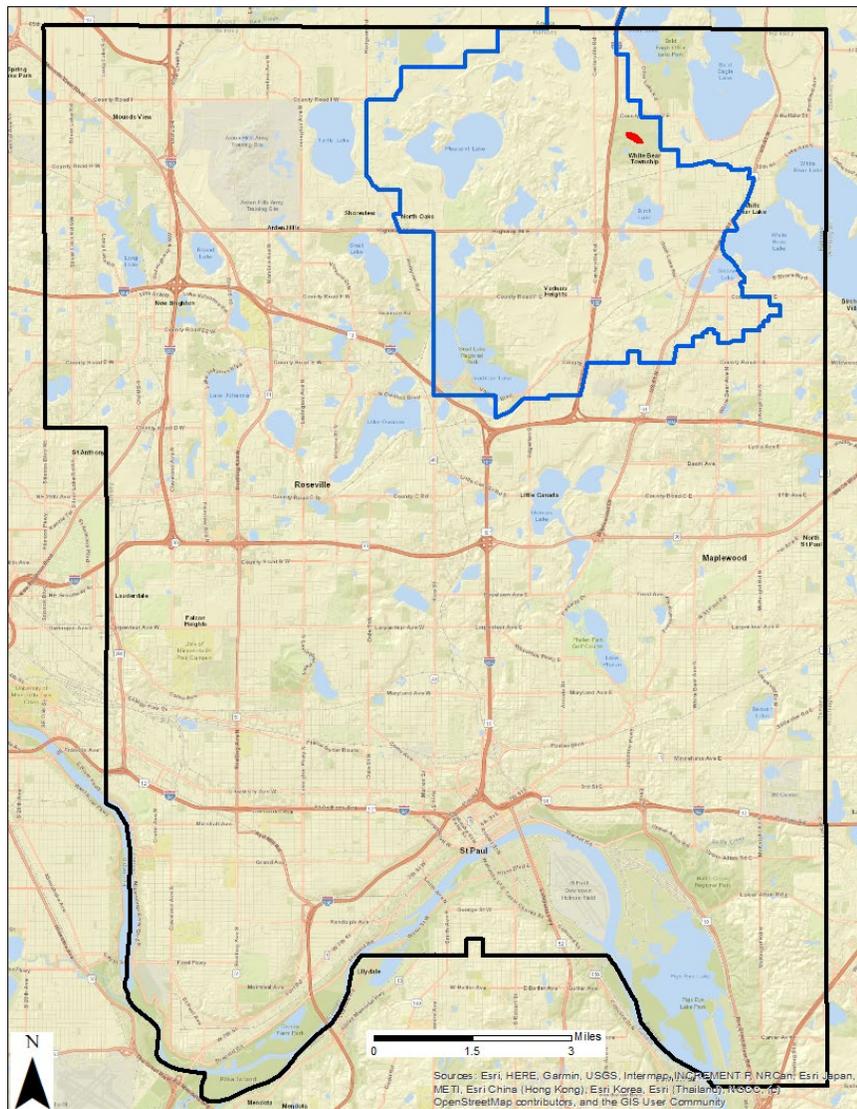


Figure 1. Location of Tamarack Lake shown in red within Vadnais Lakes Watershed Management Organization and Ramsey County Boundaries.

Table 2. Frequency of occurrence & avg. abundance of aquatic plant taxa present during Tamarack Lake point-intercept survey.

Species	Common Name	Scientific Name	Average Abundance 8/2/2022	Frequency of Occurrence 8/2/2022
1	Coontail	<i>Ceratophyllum demersum</i>	1	10
2	Flat-stem Pondweed	<i>Potamogeton zosteriformis</i>	1	14
3	Naiad	<i>Najas spp.</i>	1	10
4	Sago pondweed	<i>Stuckenia pectinata</i>	1	29

Table 3. Depth, Secchi disk, water temperature, and vegetation abundance point survey results on August 2, 2022

Sample ID	Depth (meters)	Coontail <i>Ceratophyllum demersum</i>	Naiad <i>Najas spp.</i>	Flat-stem pondweed <i>Potamogeton zosteriformis</i>	Sago pondweed <i>Stuckenia pectinata</i>
1	0.5	1			1
2	0.5		1		1
3	1.7				
4	1.3				
5	1.8				
6	1.3				
7	0.4		1	1	1
8	1.4				
9	1.0				
10	0.9				
11	1.4				
12	0.9				1
13	0.9				
14	1.6				
15	1.0				
16	0.6	1		1	1
17	2.5				
18	1.0				
19	1.3				
20	0.6		1		2
21	0.6				
Total Abundance		2	3	2	6
Count in Littoral zone (0-15ft)		2	3	2	6
Avg. Abundance		1	1	1	1
Frequency of Occurrence		10	14	10	29
Secchi Depth (m):	0.1				
Water Temperature (C):	24.4				

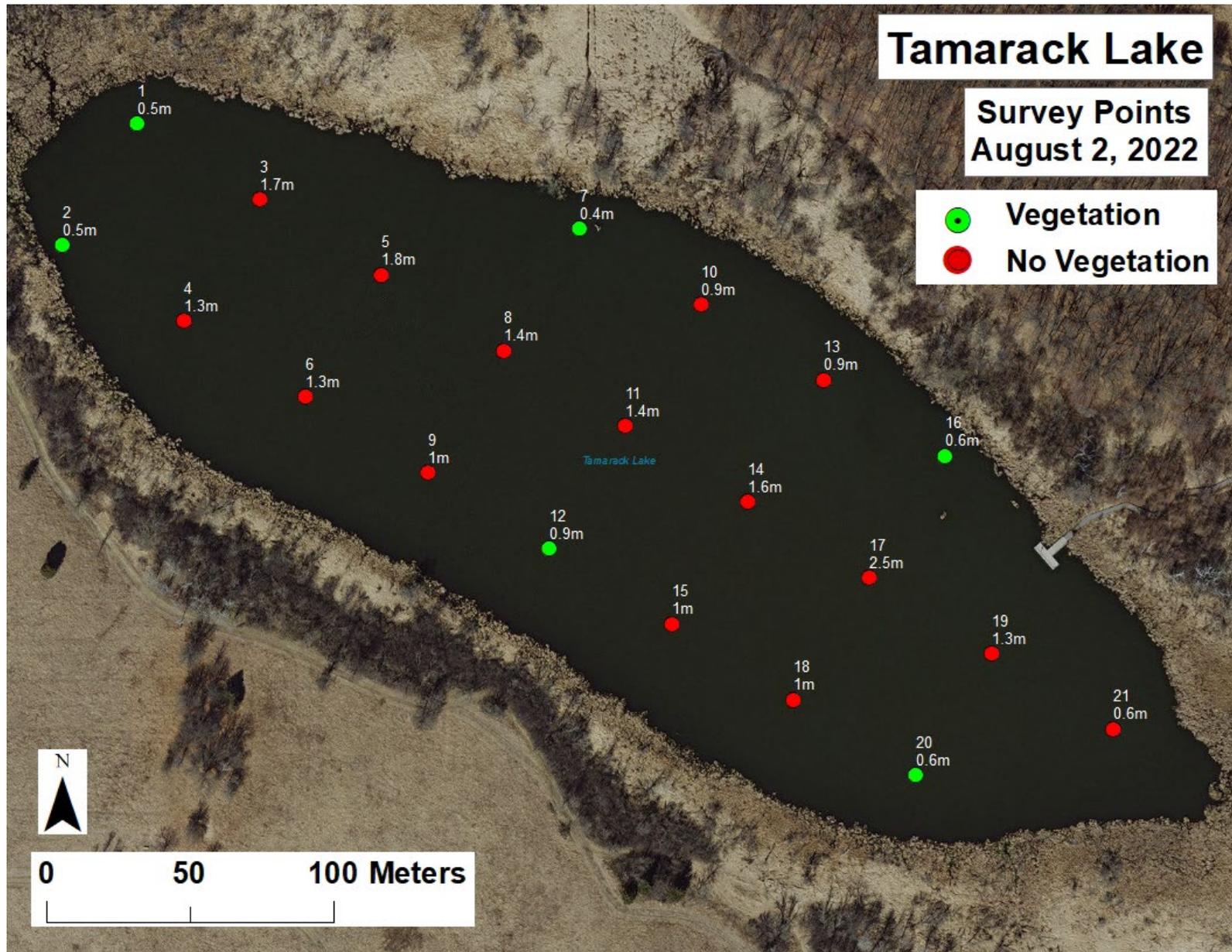


Figure 2. Tamarack Lake vegetation point intercept survey locations. N=21.

# Contour, Biovolume and Bottom Composition Survey

8/2/22

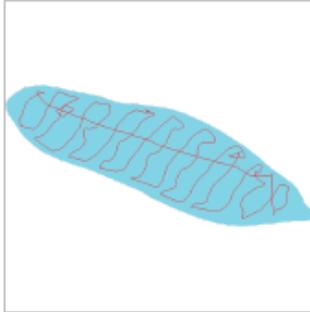
## Methods:

A Lowrance Elite-7 Ti2 Global Positioning System (GPS)-enabled depth finder was used to collect submerged aquatic vegetation biovolume, lake depth (bathymetry), and bottom hardness (composition) data on Tamarack Lake on August 2, 2022. 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 Elite-7 Ti2 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 0.3-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 BioBase website: [www.biobasemaps.com](http://www.biobasemaps.com).

Tamarack Lake, Ramsey Minnesota

 Report Time Stamp: 2022 August 02 - 21:52 (UTC) ... [REPORT LINK](#)  
 (/https://noxreportprod.s3.amazonaws.com/40f19aa2-a7d3-48d4-9d12-ab1ceabdafef/Report.html)


Survey Metadata		Survey Settings	
Data Collector:	Justin Townsend	Includes Edited Data:	No
Survey Time	2022 August	Track Buffer:	25 m
Stamp (UTC):	02 - 13:38	BV Grid Cell Size:	5 m
Starting	45.099549,	BV Minimum	5.0%
Location:	-93.042212	Detection - Percent:	
Ending	45.099582,	BV Minimum	0.701
Location:	-93.042195	Detection - Depth:	m
Distance	2.419 km	BV Maximum	6.096
		Detection - Depth:	m
		BV Sonar Channel:	Primary
Survey Statistics		Quality Control	
Average Water	24.4 °C	Reviewer:	McCormack, Ian
Temperature:		Comments:	We have reviewed this trip. Please use the "ASK THE EXPERTS" button for this trip if you have any questions.
Survey Area:	5.731 ha		
Survey Volume:	59105.162 cu. m		
Percent of Waterbody Surveyed:	99.0%		
Waterbody Area:	5.791 ha		
Estimated Waterbody Volume	59728.864 cu. m		

## Survey Summary

Type	PAC	Avg BVp	SD BVp	Avg BVw	SD BVw	Depth Range	Depth Avg	No. Depth Records
Point	41.6%	12.0%	± 13.2%	5.0%	± 11.2%	0.13 - 0.78 m	0.392 m	2020
Grid	63.2%	17.7%	± 16.5%	11.2%	± 15.6%	0.04 - 2.54 m	1.031 m	4570

Bathymetric Contour Map

Vegetation Biovolume Heat Map

## Biovolume Analysis by Quintiles

Type	0 - 20%	20 - 40%	40 - 60%	60 - 80%	80 - 100%
Point	96.9%	2.0%	0.1%	0%	1.0%
Grid	81.6%	11.8%	3.9%	2.4%	0.3%

## Biovolume Analysis by Depth

Type	Depth	Count	PAC	Avg BVp	SD BVp	Avg BVw	SD BVw
Point	0 - 1 m	702	41.6%	12.0%	± 13.2%	5.0%	± 11.2%
	1 - 2 m	0	0%	0%	± 0%	0%	± 0%
	2 - 3 m	0	0%	0%	± 0%	0%	± 0%
	3 - 4 m	0	0%	0%	± 0%	0%	± 0%
	4 - 5 m	0	0%	0%	± 0%	0%	± 0%
	5 - 6 m	0	0%	0%	± 0%	0%	± 0%
	6 - 7 m	0	0%	0%	± 0%	0%	± 0%
	7 - 8 m	0	0%	0%	± 0%	0%	± 0%
	8 - 9 m	0	0%	0%	± 0%	0%	± 0%
	9 m +	0	0%	0%	± 0%	0%	± 0%
Grid	0 - 1 m	2239	91.0%	22.0%	± 17.9%	20.0%	± 18.2%
	1 - 2 m	1942	44.0%	7.6%	± 2.6%	3.3%	± 4.1%
	2 - 3 m	389	0%	0%	± 0%	0%	± 0%
	3 - 4 m	0	0%	0%	± 0%	0%	± 0%
	4 - 5 m	0	0%	0%	± 0%	0%	± 0%
	5 - 6 m	0	0%	0%	± 0%	0%	± 0%
	6 - 7 m	0	0%	0%	± 0%	0%	± 0%
	7 - 8 m	0	0%	0%	± 0%	0%	± 0%
	8 - 9 m	0	0%	0%	± 0%	0%	± 0%
	9 m +	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. Tamarack Lake BioBase survey summary statistics.

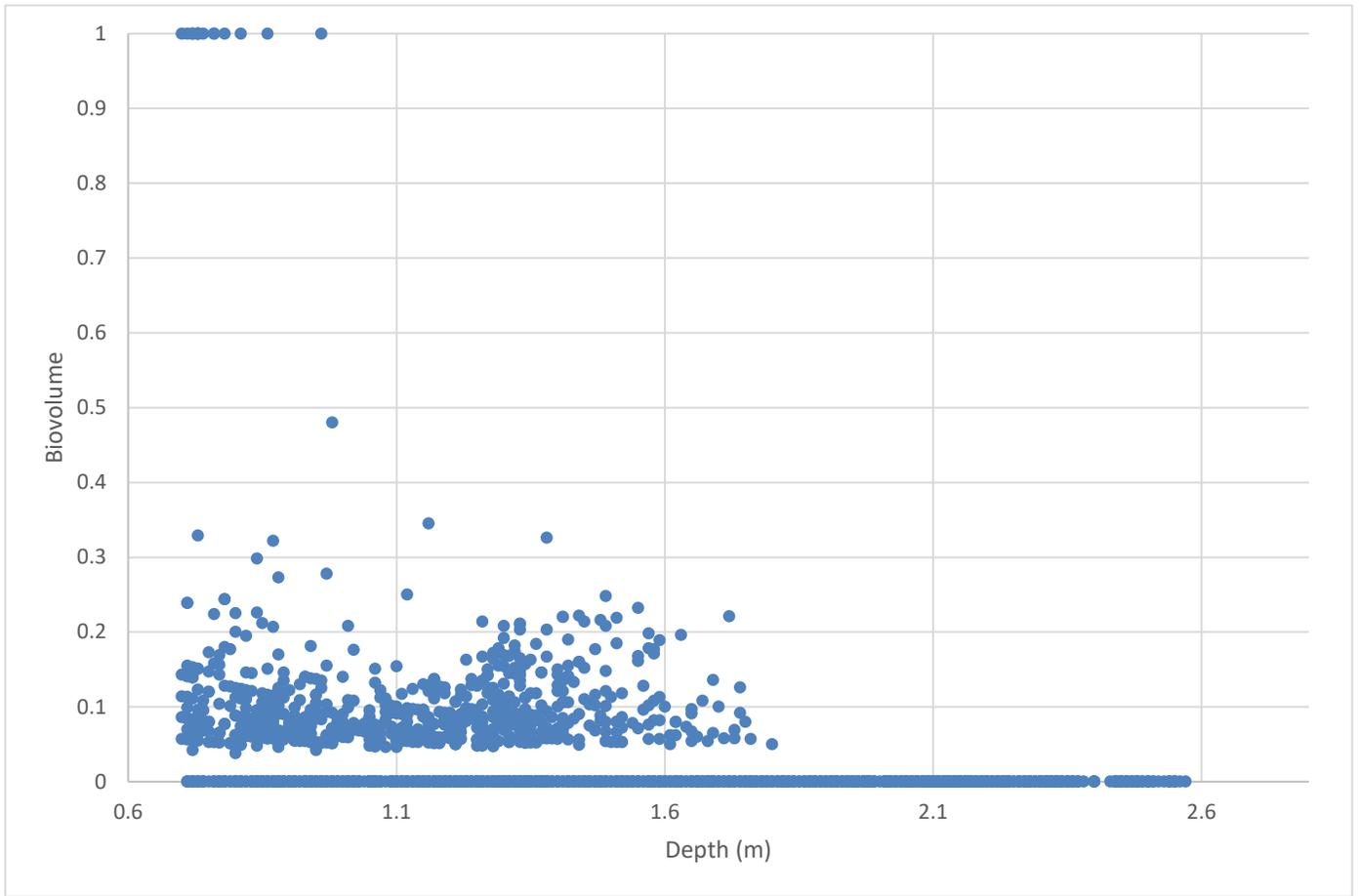


Figure 4. Tamarack Lake biovolume distribution scatter chart.

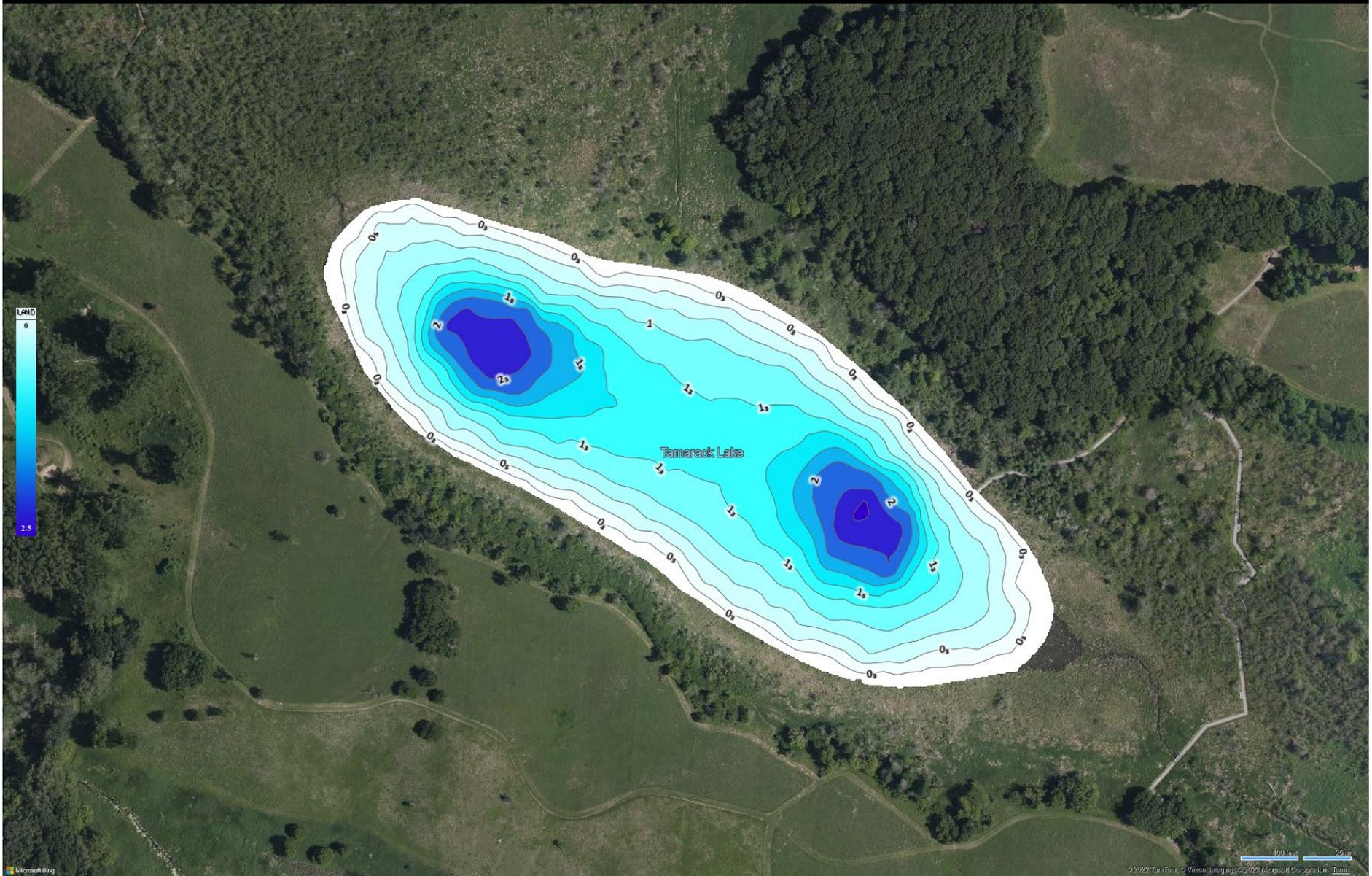


Figure 5. Tamarack Lake 0.3-m contours with depth in meters taken on August 2, 2022.

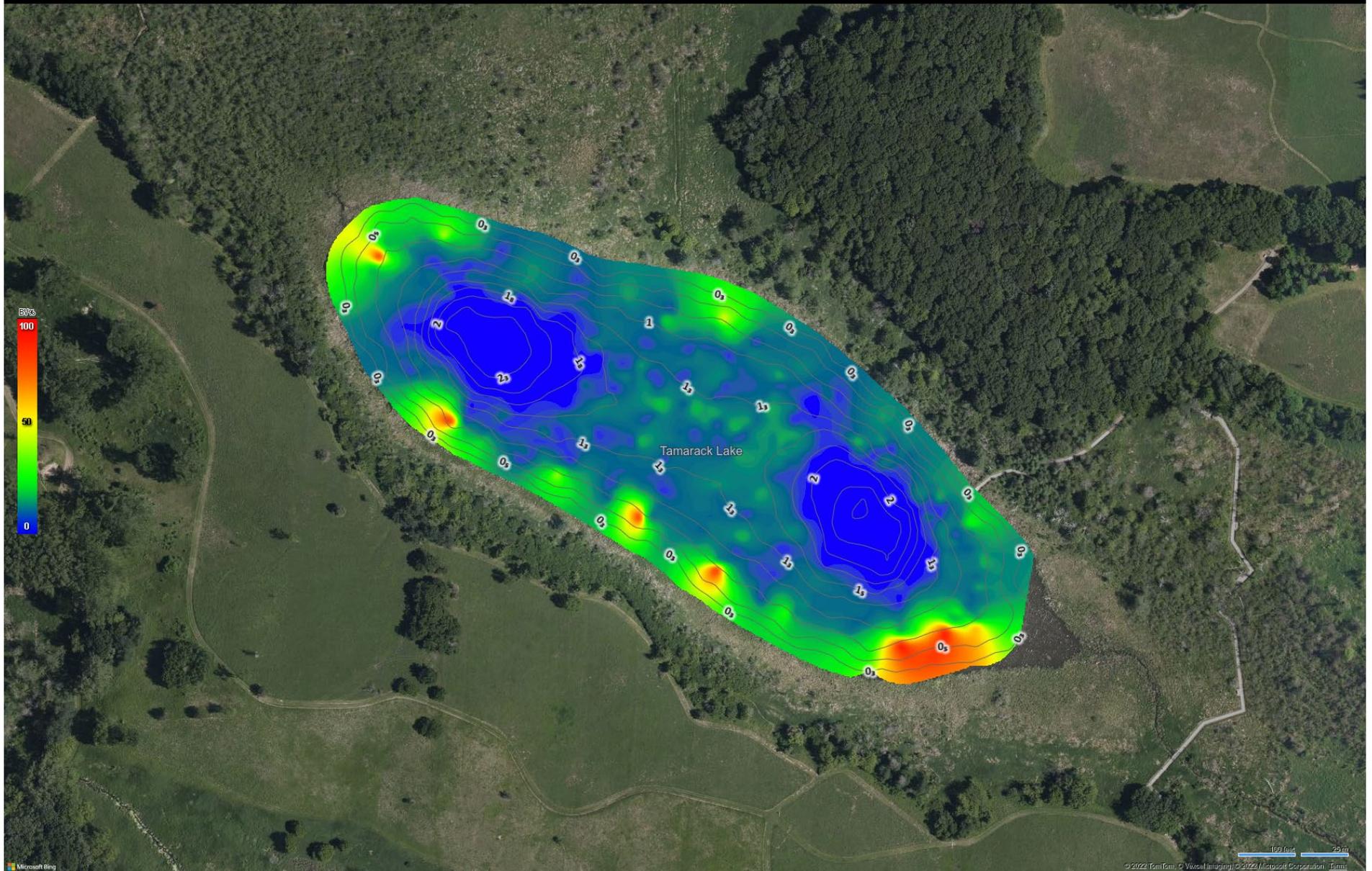


Figure 6. Tamarack Lake vegetation biovolume with 0.3-m contours taken on August 2, 2022. Percent values range from zero to one hundred; Blue = 0%, Yellow = 50% and Red = 100%.

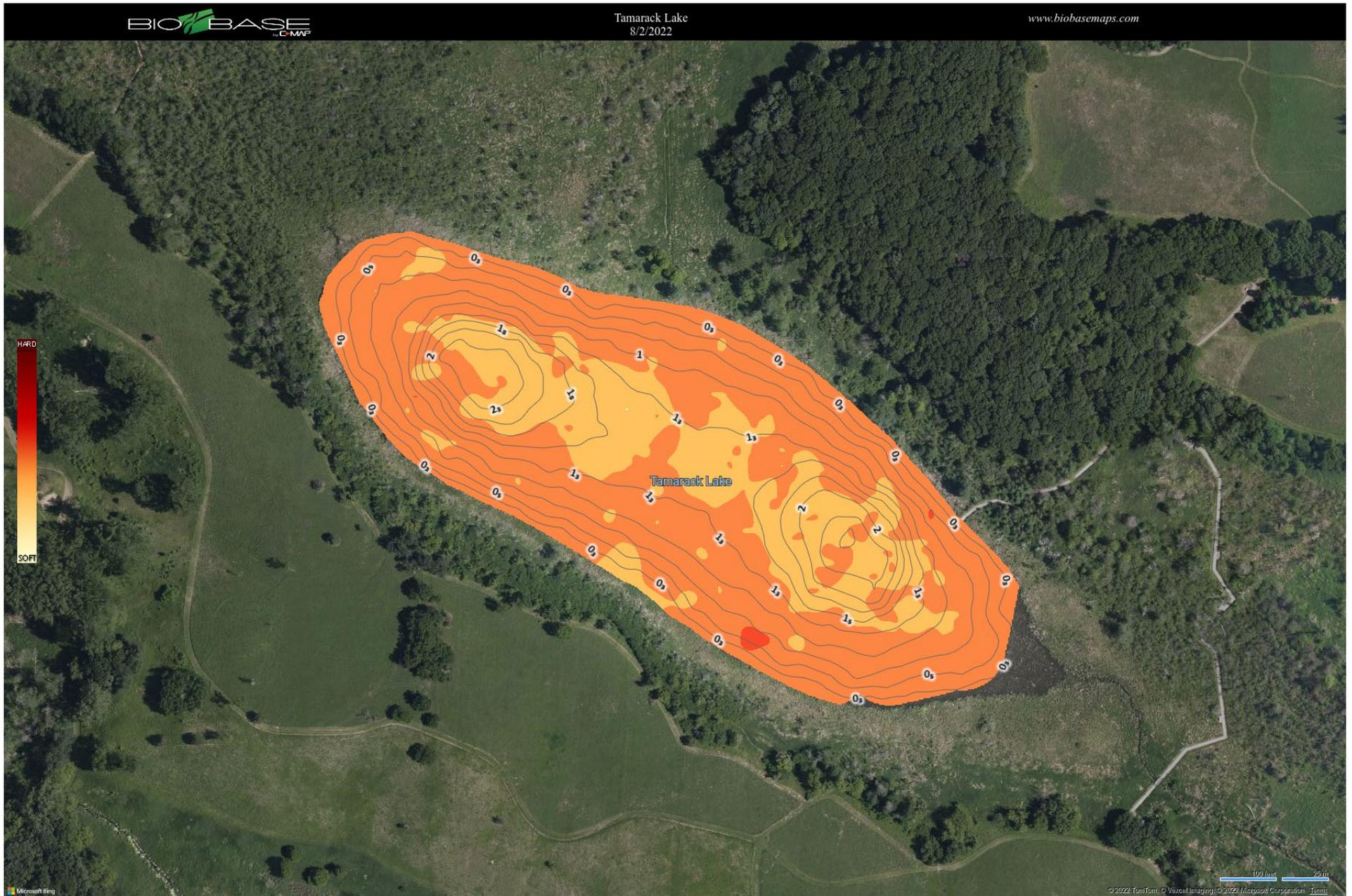


Figure 7. Tamarack Lake bottom composition values with 0.3-m contours taken on August 2, 2022.