Tamarack Lake

VLAWMO
Vadnais Lake Area
Water Management Organization

Macrophyte, Contour, Biovolume and Bottom Composition Survey 7/22/25

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. Vegetation observed in Tamarack Lake includes coontail (*Ceratophyllum demersum*), sago pondweed (*Stuckenia pectinata*), slender naiad (*Najas flexilis*), southern naiad (*Najas guadalupensis*), white water-lily (*Nymphaea odorata*), and yellow water-lily (*Nuphar variegata*) Despite being situated in county parkland, the lake is impaired for nutrients, likely due to internal loading[1].

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

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[1] VLAWMO. (2021, June 22). *Tamarack Lake Fact Sheet 2021*. VLAWMO. Retrieved November 15, 2022, from https://www.vlawmo.org/waterbodies/tamarack-lake/

Aquatic Macrophyte Point-Intercept Survey

7/22/25

Methods:

The point-intercept method incorporating aerial photography and a Lowrance Elite-7 TI2 Global Positioning System (GPS) were used to assess the aquatic macrophyte community on Tamarack Lake on July 22, 2025. 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 11 of 21 points surveyed (Figure 2). The five species found on Tamarack Lake were coontail (*Ceratophyllum demersum*), greater and lesser duckweed (*Spirodela polyrhiza & Lemna minor*), naiad (*Najas spp.),* sago pondweed (*Stuckenia pectinata),* and white water-lily (*Nymphaea odorata*). Yellow water-lily (*Nuphar variegata*) was observed visually in the lake but was not collected on the rake at any survey point. Frequency of occurrence and average abundance of each species can be found in Table 2. The Secchi disk reading was 0.8m (2.62ft).

A previous macrophyte survey of Tamarack Lake was conducted on August 2, 2022, using the

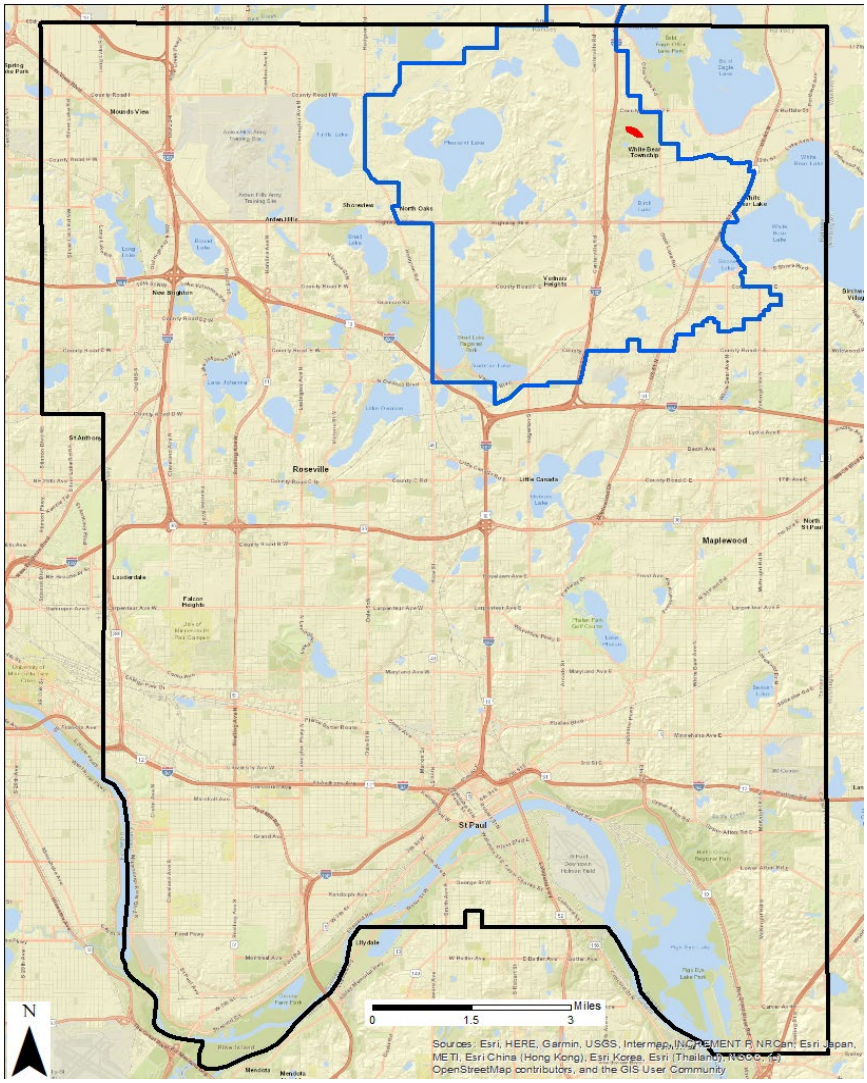

Figure 1. Location of Tamarack Lake shown in red within Vadnais Lakes Watershed Management Organization and Ramsey County Boundaries.

same methodology. One species that was observed during the August 2022 survey, but not during the July 2025 survey, was flat-stem pondweed (*Potamogeton zosteriformis*). Two species that were observed during the July 2025 survey, but not during the August 2022 survey, included greater and lesser duckweed (*Spirodela polyrhiza & Lemna minor*) and white water-lily (*Nymphaea odorata*).

Overall, the frequencies of occurrence for species observed during the July 2025 survey compared to the August 2022 survey, were similar or greater for most species. Percent frequency of occurrence for flat-stem pondweed (*Potamogeton zosteriformis*) decreased from 2022 (14%) to 2025 (0%). Percent frequency of occurrence for greater and lesser duckweed (*Spirodela polyrhiza & Lemna minor*) increased from 2022 (0%) to 2025 (14%). Percent frequency of occurrence for naiad (*Najas spp*.) increased from 2022 (10%) to 2025 (38%). Percent occurrences for coontail (*Ceratophyllum demersum*), sago pondweed (*Stuckenia pectinata*), and white water-lily (*Nymphaea odorata*) all remained mostly unchaged (<=10% change) from 2022 to 2025.

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

Species	Common Name	Scientific Name	Average Abundance 7/22/2025	Frequency of Occurrence 7/22/2025	Average Abundance 8/2/2022	Frequency of Occurrence 8/2/2022
1	Coontail	*Ceratophyllum demersum*	1	5%	1	10%
2	Flat-stem Pondweed	*Potamogeton zosteriformis*	0	0%	1	14%
3	Greater and Lesser Duckweed	*Spirodela polyrhiza & Lemna minor*	1	14%	0	0%
4	Naiad	*Najas spp.*	2	38%	1	10%
5	Sago Pondweed	*Stuckenia pectinata*	1	29%	1	29%
6	White Water-lily	*Nymphaea odorata*	1	5%	0	0%

Note: Frequency of Occurrence is the number of times a plant species was observed within the littoral zone divided by the total number of sample points within the littoral zone. 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 July 22, 2025

Sample ID	Depth (meters)	*Ceratophyllum demersum*	*Najas spp.*	*Stuckenia pectinata*	*Nymphaea odorata*	*Spirodela polyrhiza & Lemna minor*
1	0.9		2	1		
2	0.6	v	3	2	1	1
3	1.9					
4	1.7					1
5	1.0					1
6	2.0					
7	0.7	1	1	2		
8	1.8					
9	1.4			v		
10	1.8		1	v		
11	2.9					
12	2.2			v		
13	1.3		1	v		
14	1.8					
15	1.4			v		
16	1.4		1	1		
17	3.7					
18	1.5			1		
19	1.7					
20	1.1		2	v		
21	1.0		3	1		
Total Abundance		1	8	6	1	3
Count in Littoral Zone		1	8	6	1	3
Avg. Abundance		1	2	1	1	1
Frequency of Occurrence		5	38	29	5	14
Secchi Depth (m)	1.4					
Water Temperature	25.1					

Note: Points where the species was noted visually in the water but was not found on the rake are marked with "v".

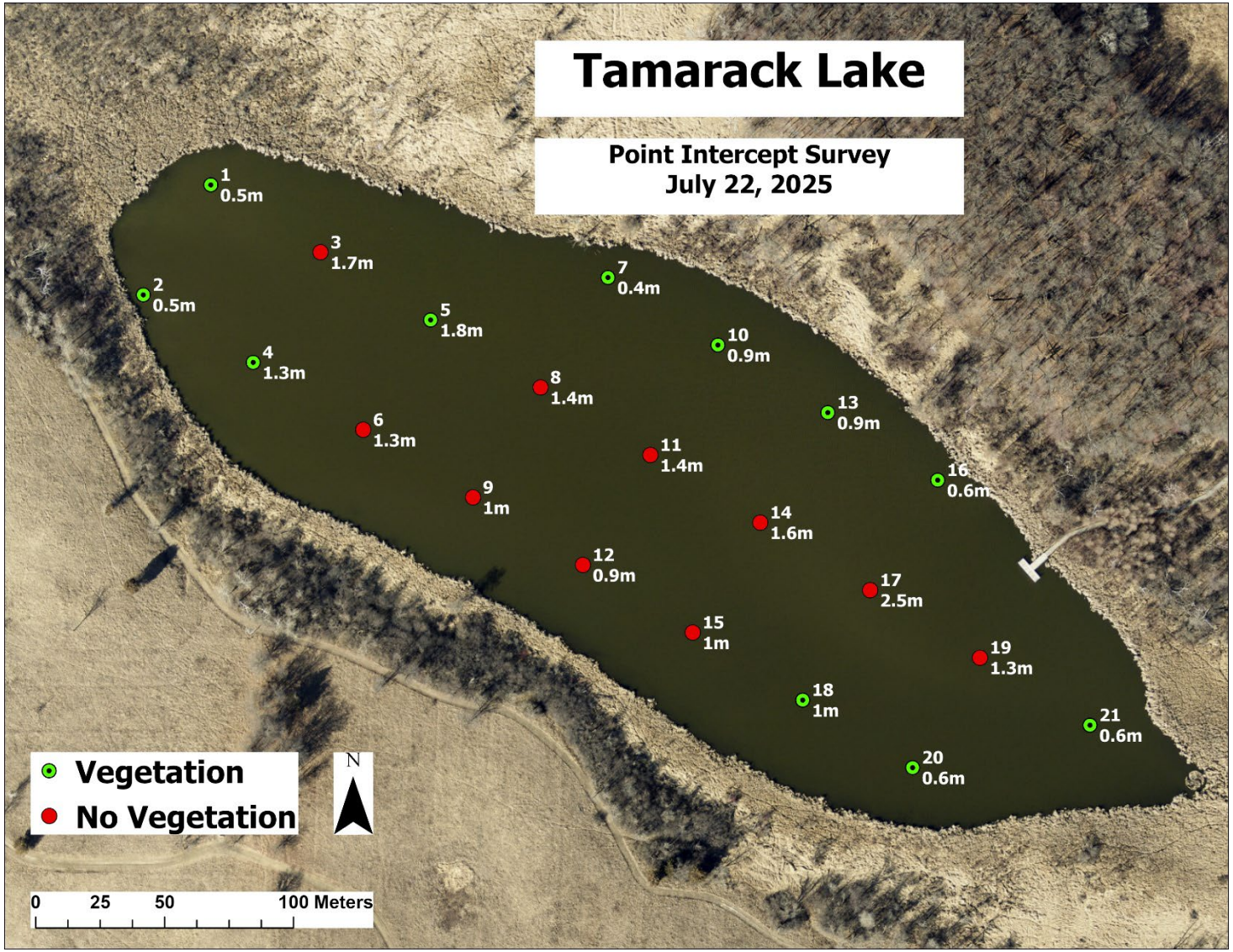

Figure 2. Tamarack Lake vegetation point intercept survey locations. N=21.

Contour, Biovolume and Bottom Composition Survey

7/22/25

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 July 22, 2025. 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.

Tamarack Lake, Ramsey County Minnesota — Report Time Stamp: 2025 July 23 - 15:13 (UTC) ... REPORT LINK

Survey Metadata	
Data Collector:	Ramsey Conservation District
Survey Time Stamp (UTC):	2025 July 22 - 14:35
Starting Location:	45.099614, -93.042226
Ending Location:	45.100966, -93.046212
Distance	2.001 km

Survey Statistics	
Average Water Temperature:	25.1 °C
Survey Area:	5.743 ha
Survey Volume:	92333.852 cu. m
Percent of Waterbody Surveyed:	99.2%
Waterbody Area:	5.791 ha
Estimated Waterbody Volume ?	93110.142 cu. m

Survey Settings	
Includes Edited Data:	No
Track Buffer:	35 m
BV Grid Cell Size:	5 m
BV Minimum Detection - Percent:	5.0%
BV Minimum Detection - Depth:	0.700 m
BV Maximum Detection - Depth:	6.100 m
BV Sonar Channel:	Primary

Quality Control	
Reviewer:	Ray Valley
Comments:	Transducer severely tilted while collecting data. Depths may be inaccurate. This blog is a helpful guide for transducer installation - https://blog.biobasemaps.com/2021/12/10/properly-install-your-lowrance-simrad-transducer-and-mapping-is-easy-with-biobase/

Biovolume Summary

Type ?	PAC ?	Avg BVp ?	SD BVp ?	Avg BVw ?	SD BVw ?	Depth Range	Depth Avg	No. Depth Records
Point	97.9%	36.1%	± 24.7%	35.4%	± 24.6%	0.50 - 5.36 m	1.933 m	1603
Grid	99.9%	42.9%	± 21.4%	42.9%	± 21.4%	0.05 - 4.95 m	1.608 m	4580

Biovolume Analysis by Quintiles

Type ?	0 - 20%	20 - 40%	40 - 60%	60 - 80%	80 - 100%
Point	27.0%	45.4%	16.8%	1.4%	9.4%
Grid	8.2%	50.2%	18.8%	14.1%	8.8%

Biovolume Analysis by Depth

Type ?	Depth	Count	PAC ?	Avg BVp ?	SD BVp ?	Avg BVw ?	SD BVw ?
Point	0 - 1 m	156	92.3%	71.4%	± 40.7%	65.9%	± 40.3%
	1 - 2 m	749	97.7%	32.2%	± 22.5%	31.5%	± 22.5%
	2 - 3 m	465	99.8%	33.5%	± 12.9%	33.5%	± 12.9%
	3 - 4 m	145	100%	26.5%	± 11.1%	26.5%	± 11.1%
	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	1446	99.9%	65.1%	± 20.3%	65.0%	± 20.4%
	1 - 2 m	1559	99.9%	35.2%	± 15.1%	35.1%	± 15.1%
	2 - 3 m	1185	100%	31.5%	± 7.9%	31.5%	± 7.9%
	3 - 4 m	333	100%	26.7%	± 6.0%	26.7%	± 6.0%
	4 - 5 m	57	100%	27.6%	± 3.7%	27.6%	± 3.7%
	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 transects or contiguous data samples as depicted by the colored trip line. Seperate 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.

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.

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 survey areas.

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.

Figure 3. Tamarack Lake BioBase survey summary statistics.

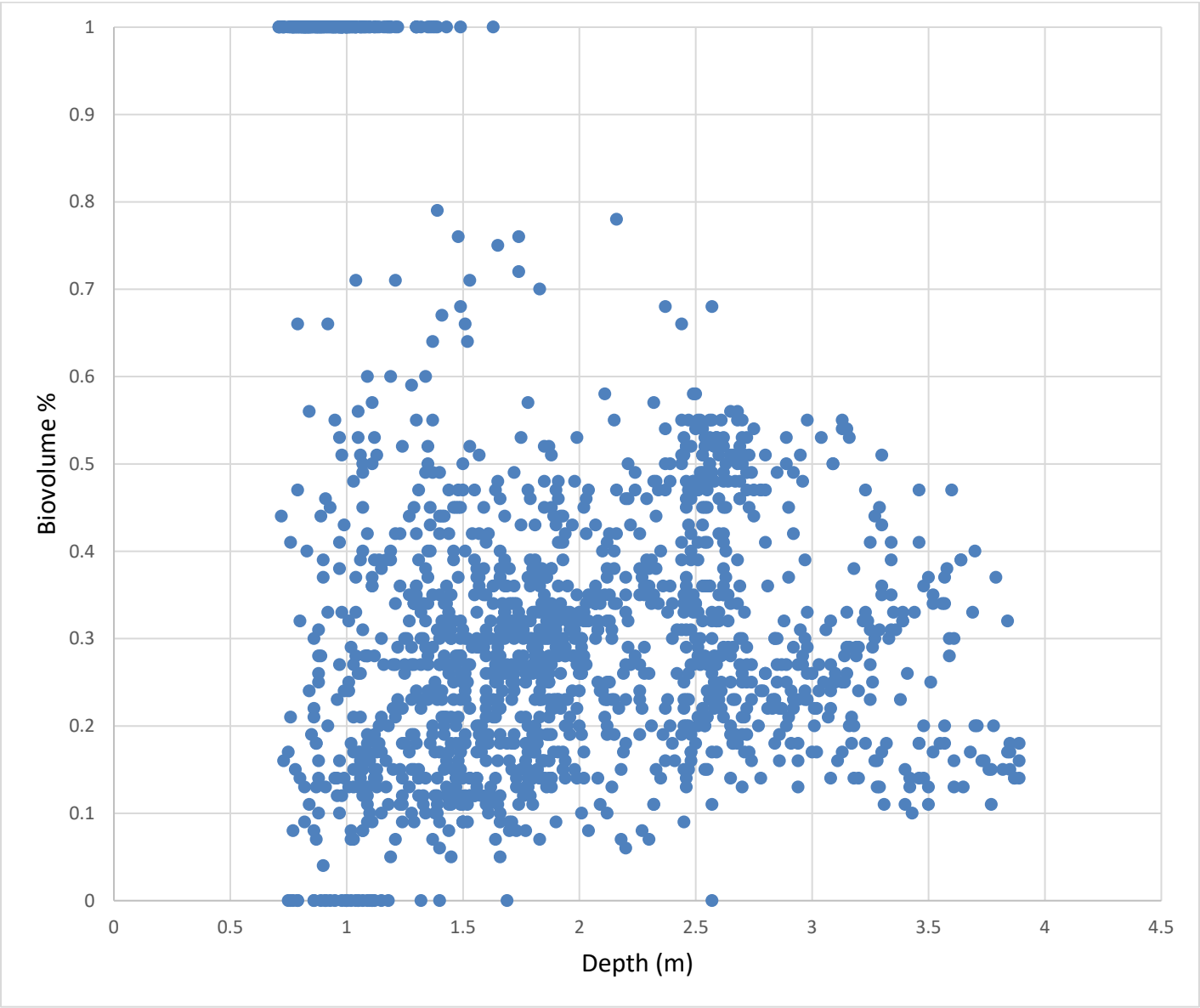

Figure 4. Tamarack Lake biovolume distribution scatter chart.

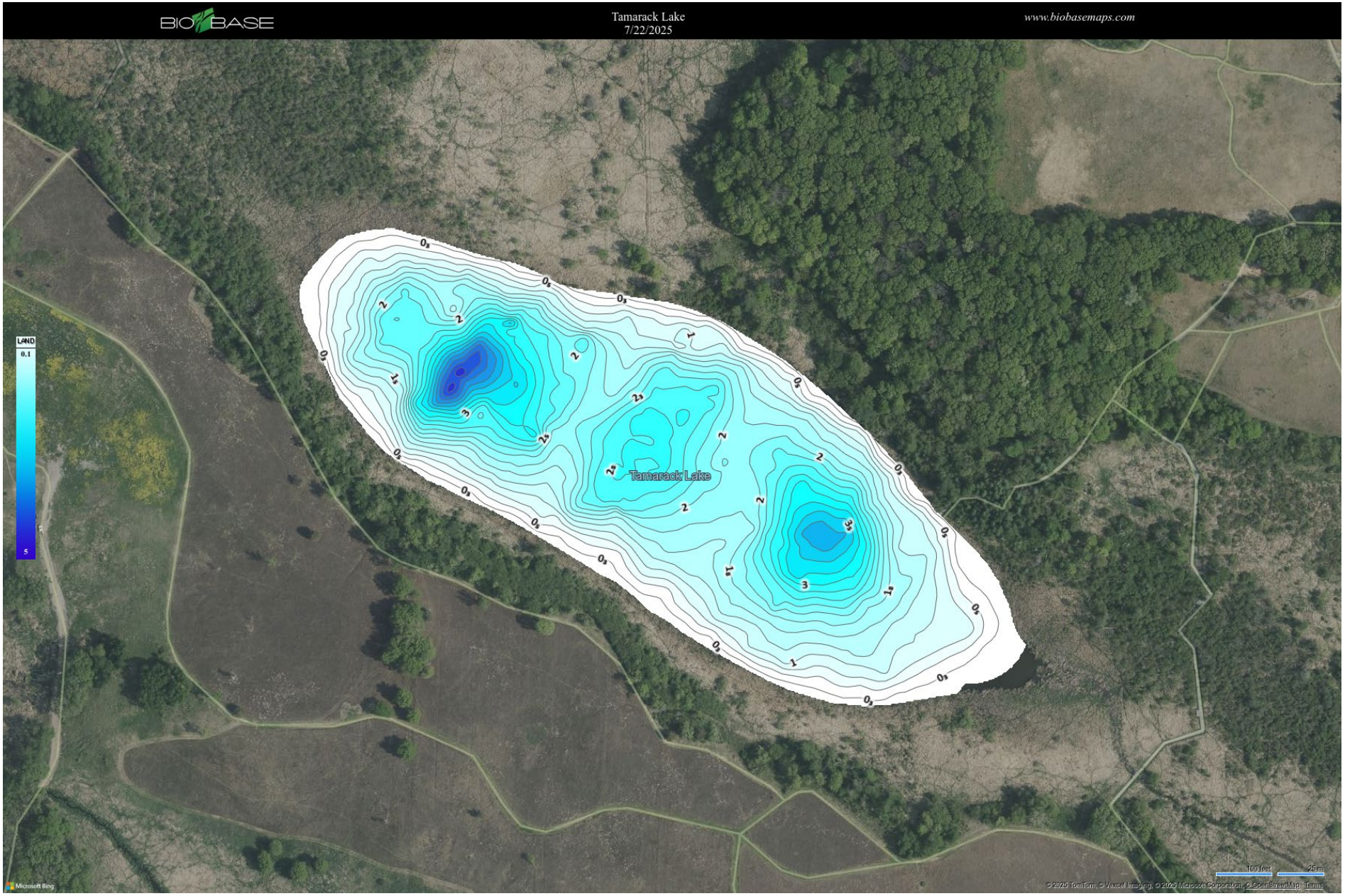

Figure 5. Tamarack Lake 0.3-m contours with depth in meters taken on July 22, 2025.

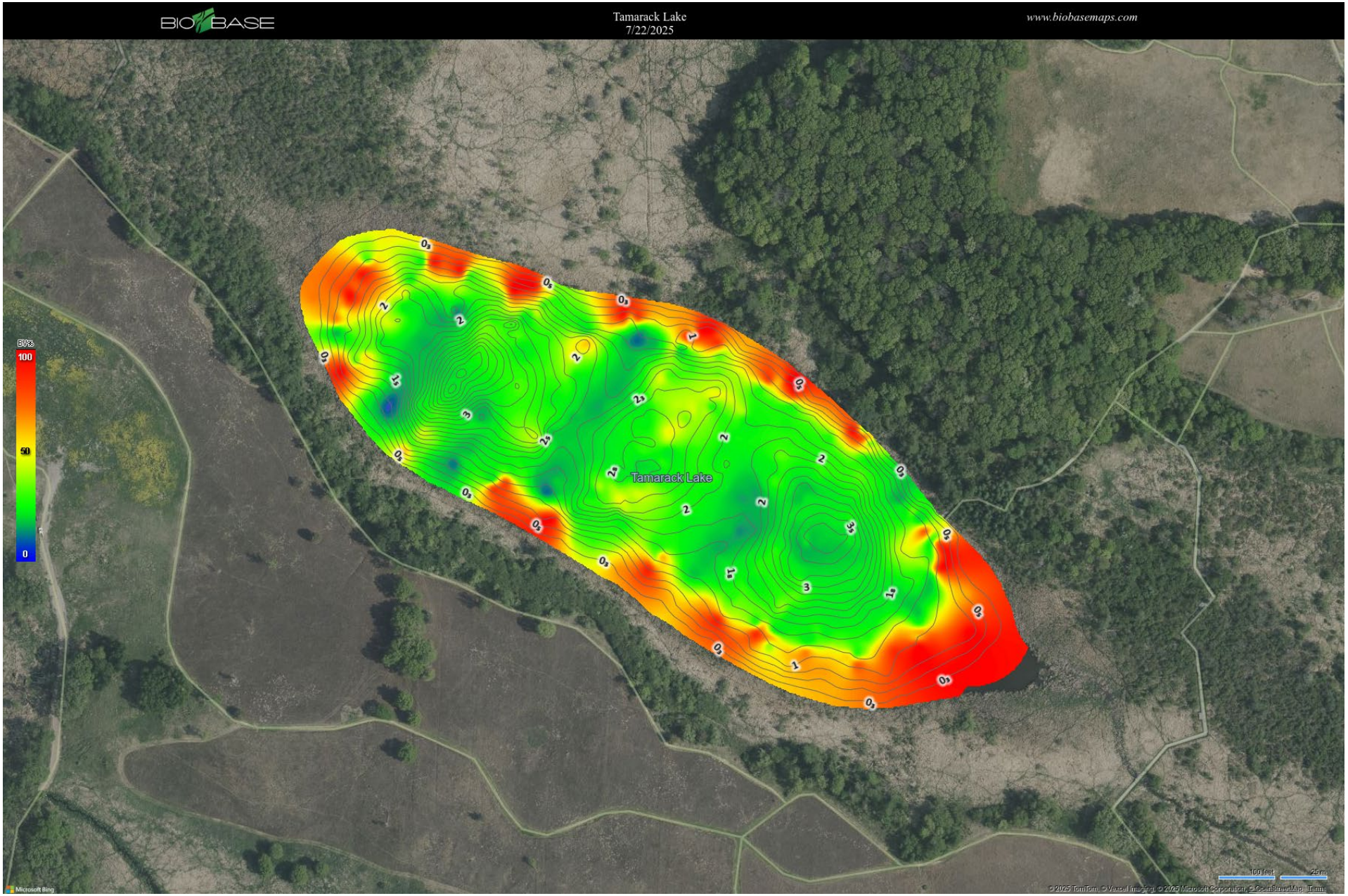

Figure 6. Tamarack Lake vegetation biovolume with 0.3-m contours taken on July 22, 2025. Percent values range from zero to one hundred; Blue = 0%, Yellow = 50% and Red = 100%.

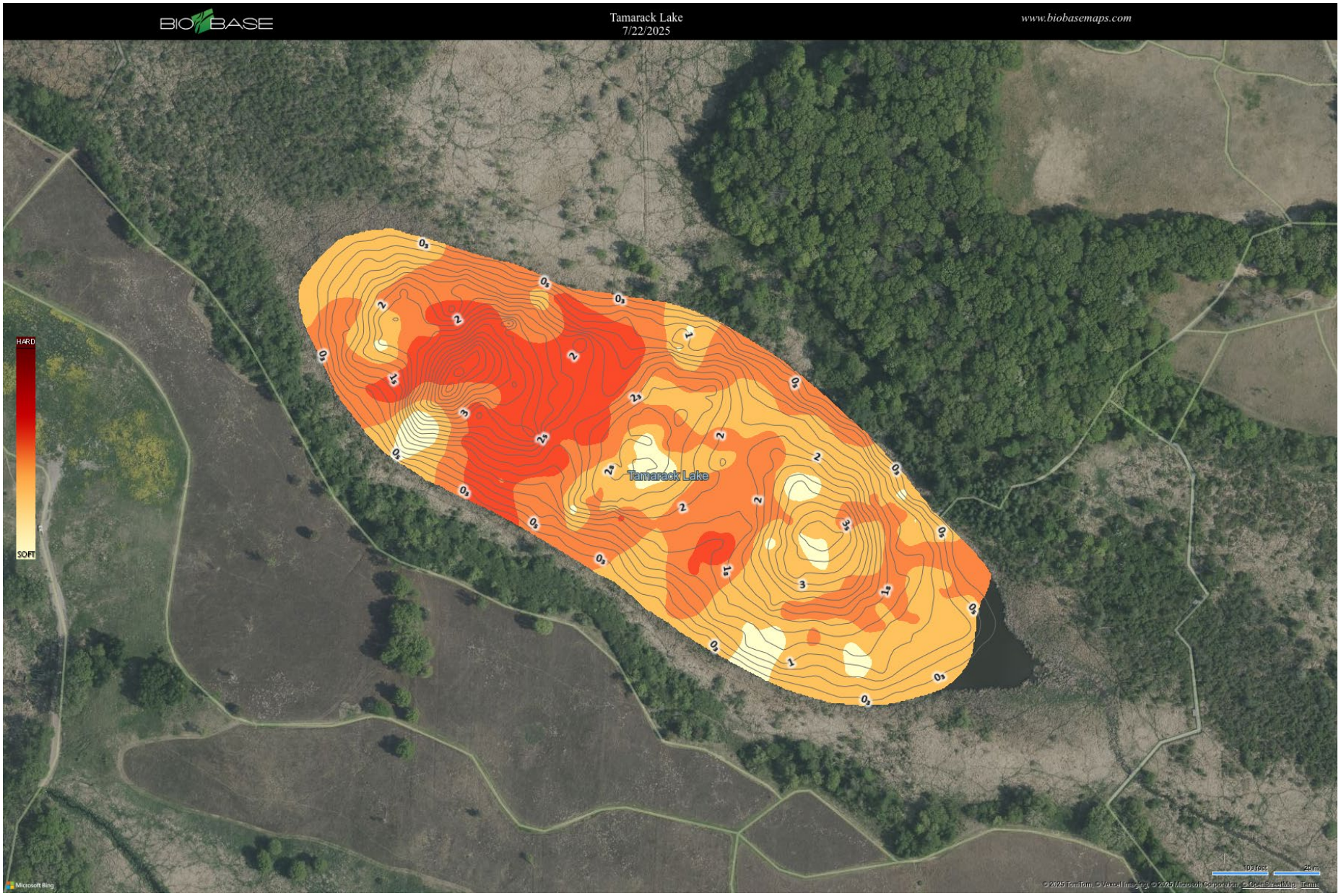

Figure 7. Tamarack Lake bottom composition values with 0.3-m contours taken on July 22, 2025.