Aqua Link, Inc.
Pond, Lake & Stream Management & Supplies

Lake Carey
2025 Lake Mapping Report

ALI Project No. 1876-02

Project Summary: Aqua Link, Inc. performed a lake bathymetric survey for **Lake Carey in July 2024** and this document represents the results of this survey.

Methods: Aqua Link field staff collected thousands of electronic acoustic (echo) soundings and their corresponding GPS locations throughout the entire lake basin. These data were acquired by Aqua Link field staff using a boat equipped with a Lowrance Elite marine chart plotter with GPS. Electronic acoustic sounding data points and their corresponding GPS locations that were collected and recorded along established lake transects and the entire perimeter of the lake. All of the above acoustic sounding data points and their GPS locations were automatically saved to a micro SD data card that was installed in the Lowrance unit.

Table 1: Lake Mapping Survey Equipment

Mapping Date(s)	*Boat Description*	*Chart Plotter*
11/13/25	16 Ft Skiff	Lowrance Elite FS 9

At a later date, all collected Lowrance lake data that were saved to a micro SD data card were uploaded to Aqua Link's computer server for safe storage and future analysis. Thereafter, Aqua Link uploaded all of the stored lake data to the BioBase^{tm} server where our technical staff then analyzed these data using BioBase^{tm} EcoSound^{tm} cloud-based lake mapping software. A copy of the full BioBase lake mapping report for the study lake is included as Attachment A

Summary of Lake Mapping: A summary of the lake mapping data is presented in Table 2. A copy of the BioBase mapping report is included in in Attachment A. **A total of 13,667 data points (electronic acoustic soundings with GPS location data)** were recorded on the study date(s).

Based upon BioBase report, the **surface area of lake is 249.6 acres** as shown in Table 2. The estimated **lake water volume was 3,753.4 acres-feet**. The estimated **mean (average) and maximum water depths for the lake were 15.0 and 33.6 feet**, respectively.

Table 2: Lake Mapping Report Data*

Parameter	*Value*
No. of Recorded Soundings	13,667 data points
Lake Surface Area	249.6 acres
Lake Volume	3,753.4 acre-feet
Average Water Depth (mean)	15.0 feet
Maximum Water Depth	33.6 feet
Percent Area Covered (PAC)	26.1 % or 65.1 acres
Average Plant Biovolume (Avg BVp)	21.4 %

***Notes**: (*) All values are based upon lake data collected on the study date(s) in Table 1*

***PAC** refers to the overall surface area that has vegetation growing.*

***BVP** refers to the percentage of the water column taken up by vegetation when vegetation exists. Areas that do not have any vegetation (non PAC zones of the lake) are not taken into consideration for this calculation.*

The **Percent Area Covered by aquatic vegetation is 26.1 % of the lake surface area, which is about 65.1 acres**. The **Average Plant Biovolume is 21.4 % of the lake water column** where aquatic plants were growing in the lake on the study date(s).

A hypsographic curve and chart were also created for the lake using BioBase^{tm} EcoSound^{tm} software – refer to the BioBase report in Attachment A. The hypsographic curve and chart show how the lake surface area and water volume changes with regards to changes in lake water elevation – lake water depth.

In addition to the BioBase report, Aqua Link also prepared higher quality water depth, aquatic plant biovolume, and lake sediment density maps for the lake. All of these maps are included in Attachment B.

Attachment A: BioBase Lake Mapping Report
Attachment B: Lake Maps

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ATTACHMENT A

BioBase Lake Mapping Report

ANALYSIS REPORT

Lake Carey, Wyoming County Pennsylvania

Report Time Stamp: 2026 February 07 - 12:40 (UTC) ... REPORT LINK (https://s3-bb-prd-po-snr-rpt-use1.s3.amazonaws.com/73ee587f-617f-46a5-b53c-fc92371c11cc/Report.html)

Survey Metadata

Data Collector:	Ed Molesky
Survey Time Stamp (UTC):	2025 November 05 - 16:23
Starting Location:	41.588271, -75.925041
Ending Location:	41.578127, -75.922692
Distance	16.060 miles

Survey Statistics

Average Water Temperature:	48.4 °F
Survey Area:	249.282 acres
Survey Volume:	3747.928 acre ft
Percent of Waterbody Surveyed:	99.9%
Waterbody Area:	249.646 acres
Estimated Waterbody Volume	3753.399 acre ft

Survey Settings

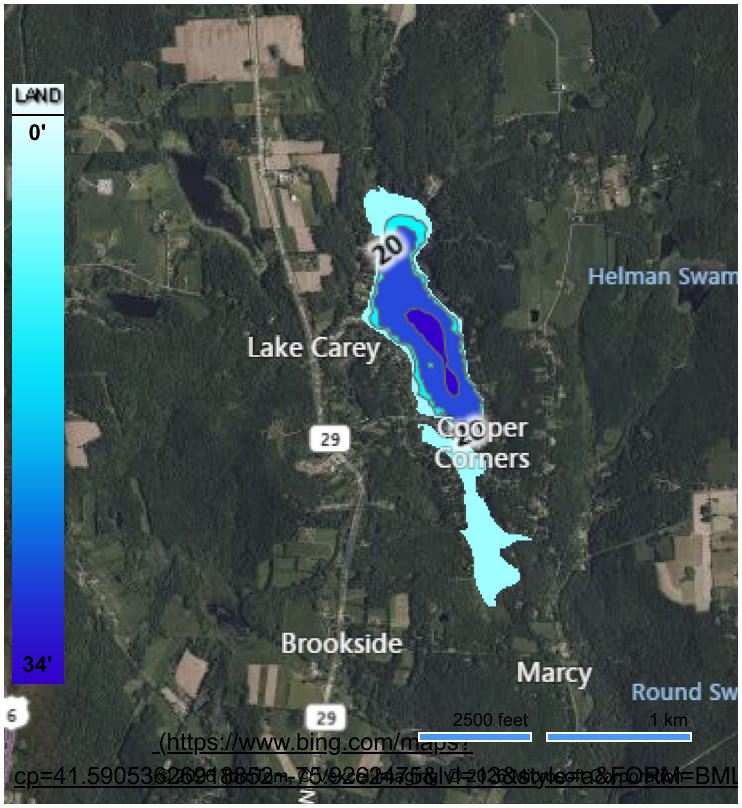
Includes Edited Data:	Yes
Track Buffer:	150 m
BV Grid Cell Size:	5 m
BV Minimum Detection - Percent:	5.0%
BV Minimum Detection - Depth:	2.400 ft
BV Maximum Detection - Depth:	20.000 ft
BV Sonar Channel:	NA

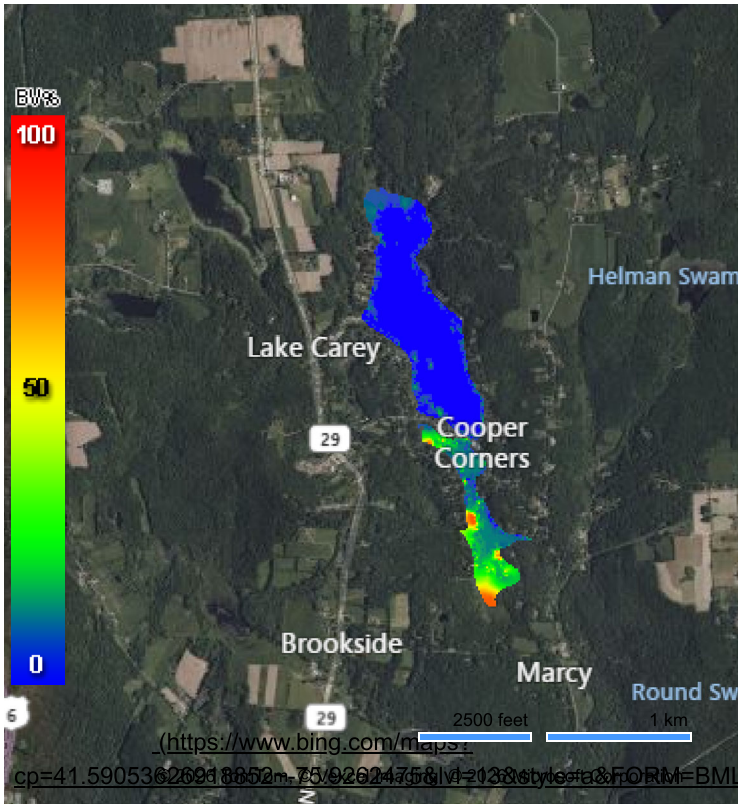
Biovolume Summary

Type	PAC	Avg BVp	SD BVp	Avg BVw	SD BVw	Depth Range	Depth Avg	No. Depth Records
Point	33.8%	13.1%	± 14.0%	4.4%	± 10.5%	0.50 - 33.56 ft	11.536 ft	13667
Grid	26.1%	21.4%	± 18.1%	5.6%	± 13.2%	0.05 - 33.53 ft	15.035 ft	71720

Bathymetric Contour Map

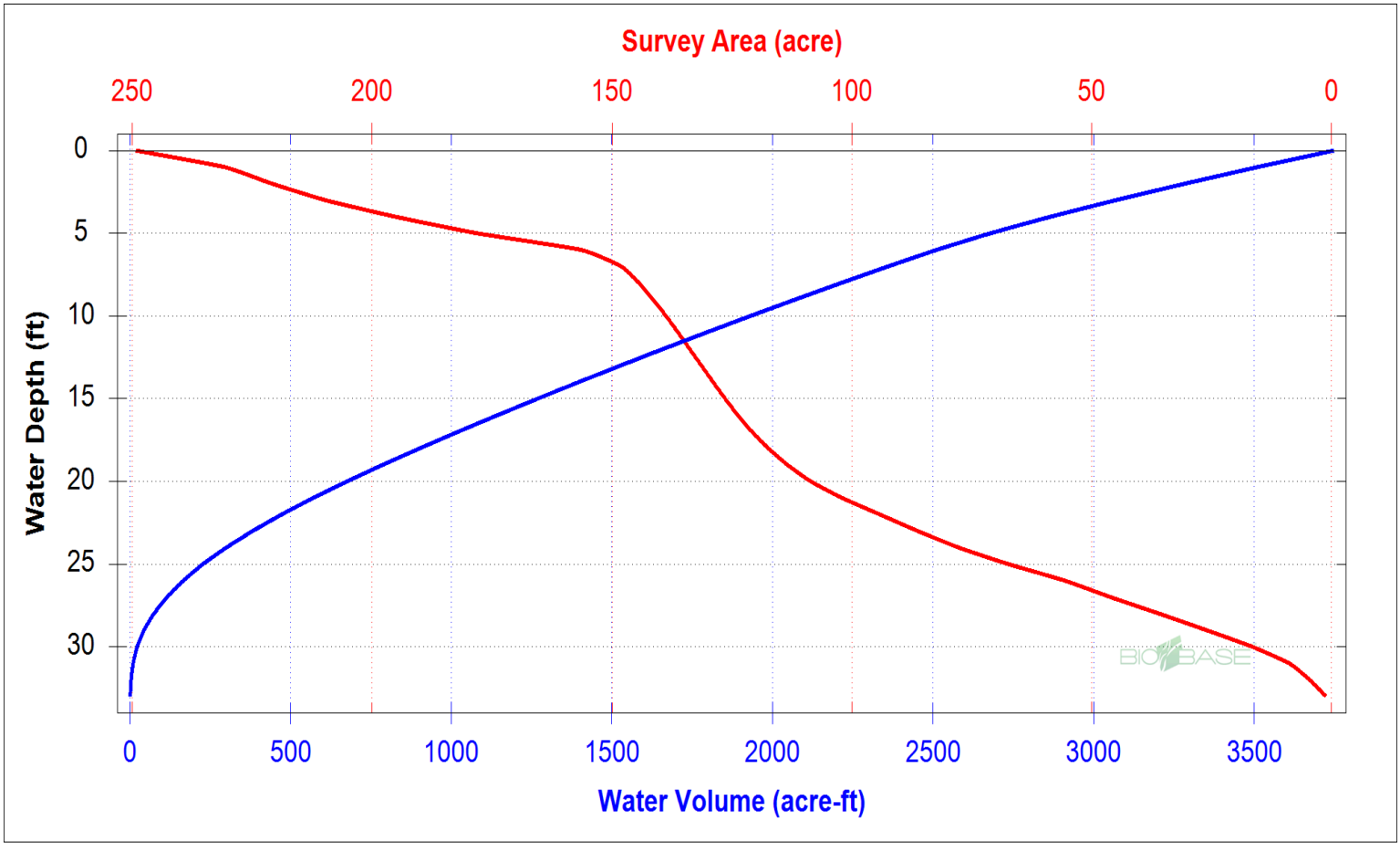
Vegetation Biovolume Heat Map





Hypsographic Summary

Hypsographic Chart



Depth	Area	AreaP	Volume	VolumeC	VolumeP
0 - 1 ft	249.282 acres	100%	237.603 acre ft	3747.928 acre ft	100%
1 - 2 ft	230.780 acres	92.6%	225.748 acre ft	3510.325 acre ft	93.7%
2 - 3 ft	220.903 acres	88.6%	215.514 acre ft	3284.577 acre ft	87.6%
3 - 4 ft	209.750 acres	84.1%	203.105 acre ft	3069.063 acre ft	81.9%
4 - 5 ft	195.198 acres	78.3%	186.821 acre ft	2865.959 acre ft	76.5%
5 - 6 ft	178.190 acres	71.5%	167.542 acre ft	2679.138 acre ft	71.5%
6 - 7 ft	156.529 acres	62.8%	151.075 acre ft	2511.596 acre ft	67.0%
7 - 8 ft	148.125 acres	59.4%	146.241 acre ft	2360.521 acre ft	63.0%
8 - 9 ft	144.439 acres	57.9%	142.916 acre ft	2214.280 acre ft	59.1%
9 - 10 ft	141.473 acres	56.8%	140.115 acre ft	2071.365 acre ft	55.3%
10 - 11 ft	138.774 acres	55.7%	137.488 acre ft	1931.250 acre ft	51.5%
11 - 12 ft	136.237 acres	54.7%	135.022 acre ft	1793.763 acre ft	47.9%
12 - 13 ft	133.826 acres	53.7%	132.602 acre ft	1658.741 acre ft	44.3%
13 - 14 ft	131.374 acres	52.7%	130.154 acre ft	1526.138 acre ft	40.7%
14 - 15 ft	128.936 acres	51.7%	127.686 acre ft	1395.984 acre ft	37.2%
15 - 16 ft	126.433 acres	50.7%	125.140 acre ft	1268.298 acre ft	33.8%
16 - 17 ft	123.794 acres	49.7%	122.350 acre ft	1143.159 acre ft	30.5%
17 - 18 ft	120.832 acres	48.5%	119.140 acre ft	1020.808 acre ft	27.2%
18 - 19 ft	117.433 acres	47.1%	115.516 acre ft	901.668 acre ft	24.1%
19 - 20 ft	113.449 acres	45.5%	111.089 acre ft	786.153 acre ft	21.0%
20 - 21 ft	108.602 acres	43.6%	105.492 acre ft	675.063 acre ft	18.0%
21 - 22 ft	102.043 acres	40.9%	98.178 acre ft	569.572 acre ft	15.2%
22 - 23 ft	94.161 acres	37.8%	90.250 acre ft	471.394 acre ft	12.6%
23 - 24 ft	86.257 acres	34.6%	82.094 acre ft	381.144 acre ft	10.2%
24 - 25 ft	77.750 acres	31.2%	72.710 acre ft	299.050 acre ft	8.0%
25 - 26 ft	67.351 acres	27.0%	60.991 acre ft	226.340 acre ft	6.0%
26 - 27 ft	55.596 acres	22.3%	50.795 acre ft	165.348 acre ft	4.4%
27 - 28 ft	46.021 acres	18.5%	41.015 acre ft	114.554 acre ft	3.1%
28 - 29 ft	35.858 acres	14.4%	30.705 acre ft	73.538 acre ft	2.0%
29 - 30 ft	25.987 acres	10.4%	21.119 acre ft	42.834 acre ft	1.1%
30 - 31 ft	16.470 acres	6.6%	12.279 acre ft	21.715 acre ft	0.6%
31 - 32 ft	8.817 acres	3.5%	6.348 acre ft	9.436 acre ft	0.3%
32 - 33 ft	4.569 acres	1.8%	2.836 acre ft	3.088 acre ft	0.1%
33 ft +	1.196 acres	0.5%	0.252 acre ft	0.252 acre ft	0.0%

Biovolume Analysis by Quintiles

Type	0 - 20%	20 - 40%	40 - 60%	60 - 80%	80 - 100%
	95.9%	2.5%	0.5%	0.3%	0.9%
	90.2%	5.8%	2.3%	1.7%	0.0%

Biovolume Analysis by Depth

Type	Depth	Count	PAC	Avg BVp	SD BVp	Avg BVw	SD BVw

Point	**0 - 1 ft**	170	88.5%	24.9%	± 25.2%	22.0%	± 25.0%
	1 - 2 ft	3426	52.9%	13.3%	± 14.4%	7.0%	± 12.9%
	2 - 3 ft	281	31.7%	7.9%	± 6.8%	2.5%	± 4.2%
	3 - 4 ft	157	39.7%	9.9%	± 8.2%	3.9%	± 5.7%
	4 - 5 ft	111	29.7%	10.2%	± 9.0%	3.0%	± 5.5%
	5 - 6 ft	78	15.4%	8.4%	± 7.8%	1.3%	± 3.3%
	6 - 7 ft	12	1.3%	8.2%	± 8.2%	0.1%	± 1.0%
	7 - 8 ft	0	0%	0%	± 0%	0%	± 0%
	8 - 9 ft	0	0%	0%	± 0%	0%	± 0%
	9 ft +	0	0%	0%	± 0%	0%	± 0%
Grid	**0 - 1 ft**	12339	64.2%	32.0%	± 20.5%	20.5%	± 22.4%
	1 - 2 ft	16236	62.4%	14.1%	± 11.2%	8.8%	± 11.2%
	2 - 3 ft	3094	6.1%	7.3%	± 2.2%	0.4%	± 1.8%
	3 - 4 ft	2336	7.8%	8.5%	± 3.7%	0.7%	± 2.5%
	4 - 5 ft	2426	8.1%	8.3%	± 3.2%	0.7%	± 2.4%
	5 - 6 ft	3583	3.2%	7.2%	± 2.0%	0.2%	± 1.3%
	6 - 7 ft	6808	0.0%	5.6%	± 0.4%	0.0%	± 0.1%
	7 - 8 ft	9578	0%	0%	± 0%	0%	± 0%
	8 - 9 ft	9353	0%	0%	± 0%	0%	± 0%
	9 ft +	0	0%	0%	± 0%	0%	± 0%

Manual Data

Latitude	Longitude	Depth	Biovolume
41.578323	-75.923047	0.5 ft	75 %
41.578187	-75.922451	0.5 ft	75 %
41.578015	-75.922945	0.5 ft	75 %
41.577890	-75.922601	0.5 ft	75 %
41.577762	-75.922242	0.5 ft	75 %
41.577734	-75.922671	0.5 ft	75 %
41.578127	-75.922692	0.5 ft	75 %

Offsets

Trip Name	Trip Date (UTC)	Manual Offset (ft)	Tide Station Name	Avg Tide (ft)	Min Tide (ft)	Max Tide (ft)	Start Tide (ft)	End Tide (ft)
Sonar_LC9.sl3	2025 November 05 - 16:23	0.670	NA	NA	NA	NA	NA	NA
Sonar_LC10.sl3	2025 November 05 - 17:04	0.670	NA	NA	NA	NA	NA	NA
Sonar_LC11.sl3	2025 November 05 - 17:13	0.670	NA	NA	NA	NA	NA	NA
Sonar_LC12.sl3	2025 November 05 - 17:36	0.670	NA	NA	NA	NA	NA	NA
Sonar_LC1.sl3	2025 November 13 - 15:04	0.920	NA	NA	NA	NA	NA	NA

Sonar_LC2.sl3	2025 November 13 - 15:27	0.920	NA	NA	NA	NA	NA	NA
Sonar_LC3.sl3	2025 November 13 - 15:44	0.920	NA	NA	NA	NA	NA	NA
Sonar_LC4.sl3	2025 November 13 - 16:07	0.920	NA	NA	NA	NA	NA	NA
Sonar_LC5.sl3	2025 November 13 - 16:37	0.920	NA	NA	NA	NA	NA	NA
Sonar_LC6.sl3	2025 November 13 - 17:02	0.920	NA	NA	NA	NA	NA	NA

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 irregularily 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.

Area

Area: Surface area of corresponding depth range and deeper.

AreaP

Area Percent: Percent of total surface area of the corresponding depth range and deeper.

Volume

Volume: Water volume of the corresponding depth range.

VolumeC

Volume Cumulative: Cumulative water volume of the corresponding depth range and deeper.

VolumeP

Volume Percent: Percent of total water volume of the corresponding depth range and deeper.

Report URL: https://s3-bb-prd-po-snr-rpt-use1.s3.amazonaws.com/73ee587f-617f-46a5-b53c-fc92371c11cc/Report.html (https://s3-bb-prd-po-snr-rpt-use1.s3.amazonaws.com/73ee587f-617f-46a5-b53c-fc92371c11cc/Report.html)

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ATTACHMENT B

Lake Survey Maps

Aqua Link, Inc.

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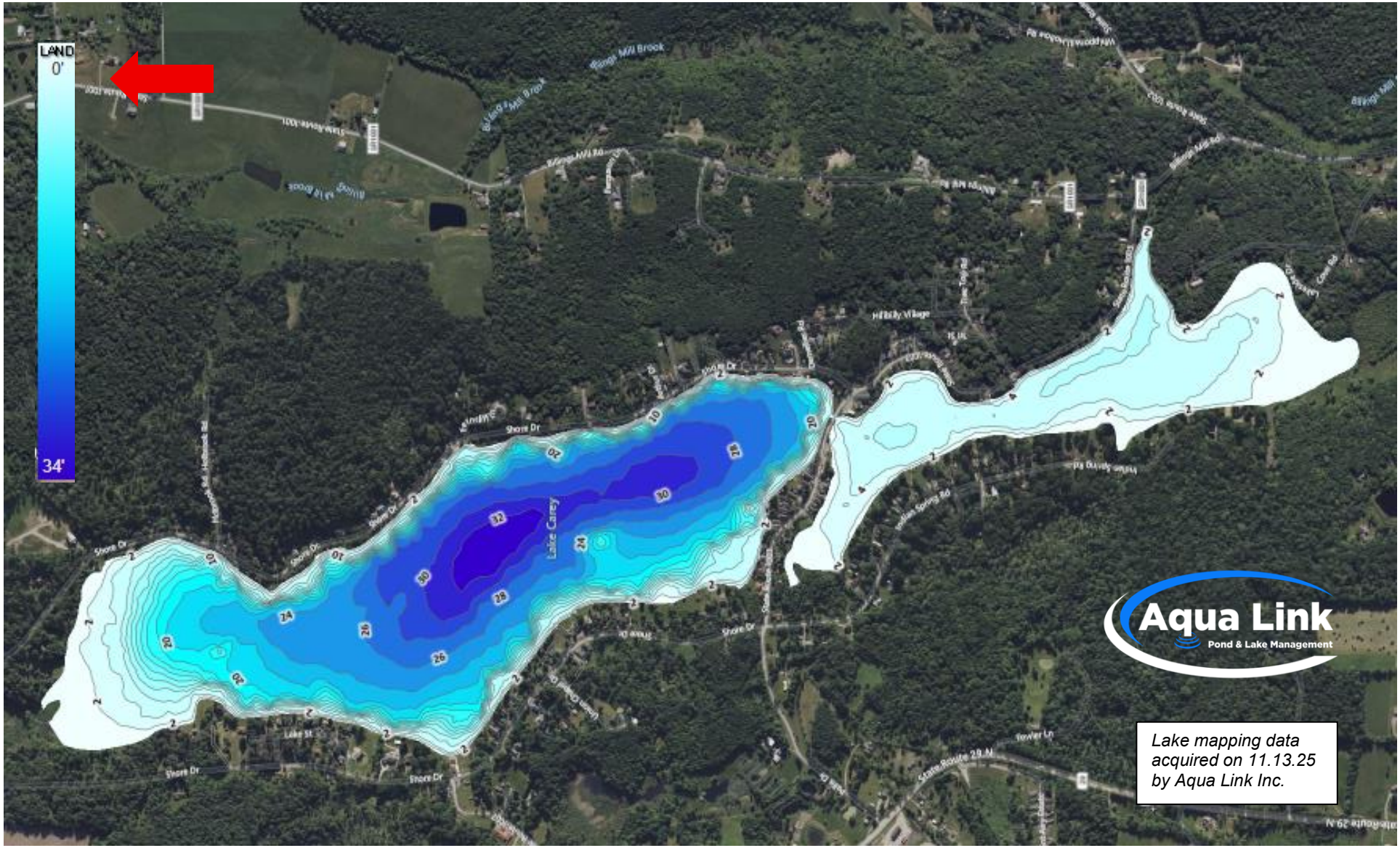

Figure 1: Lake Carey Water Depth Map

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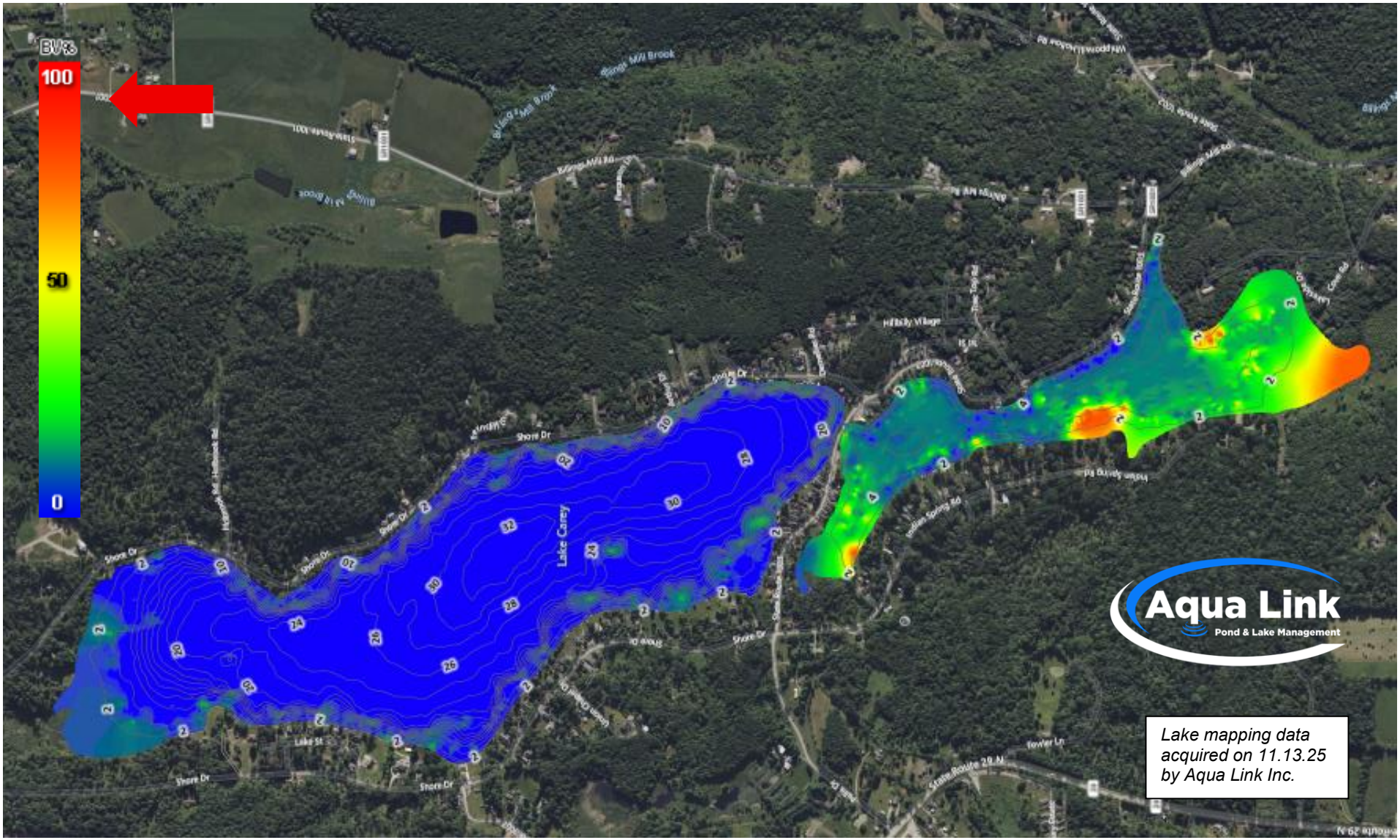

Figure 2: Lake Carey Aquatic Plant Biovolume Map

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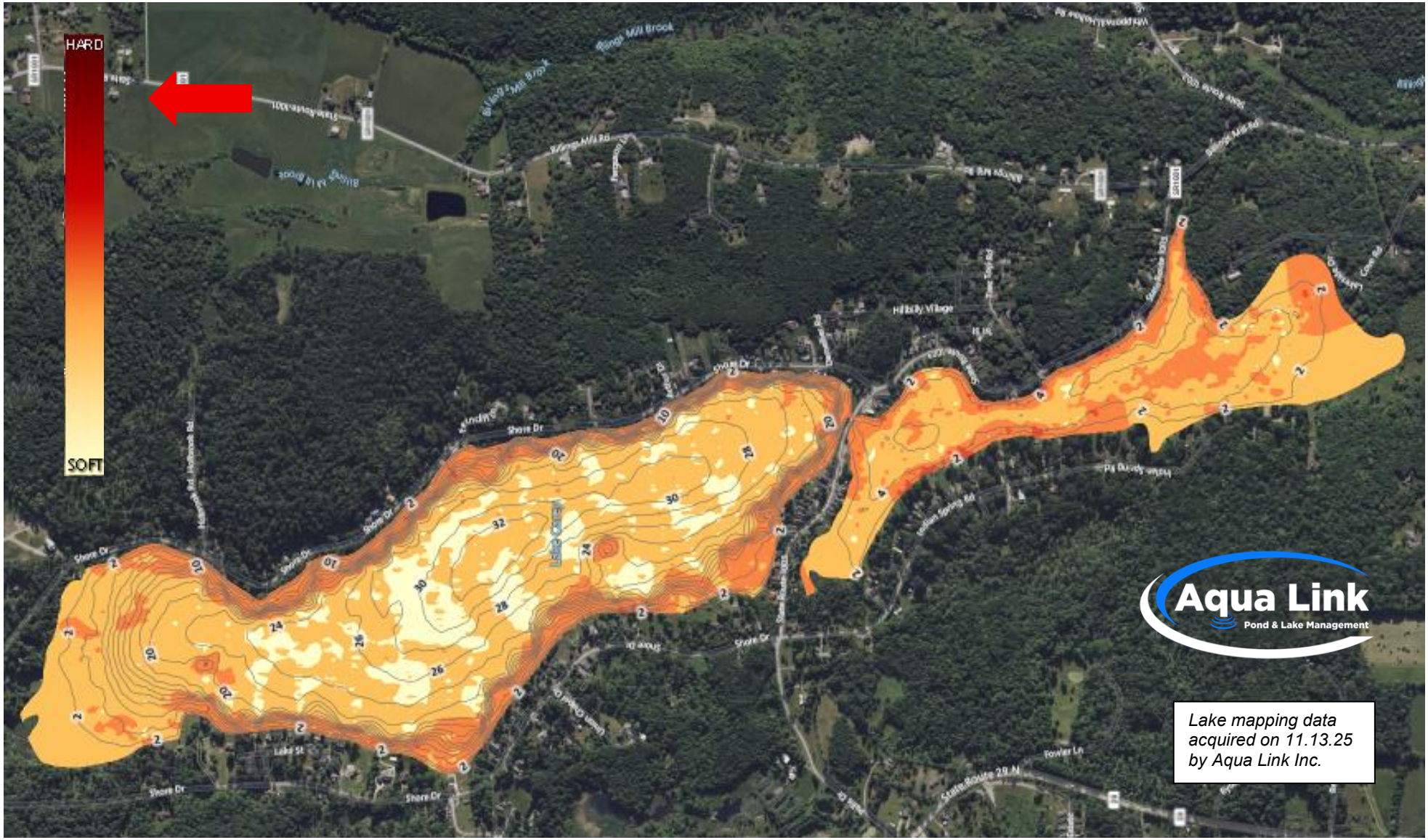

Figure 3: Lake Carey Sediment Density Map

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