Black Lake

Biovolume, Depth, and Composition Analysis Survey - 4/29/2015

This document contains the report of information collected on Black Lake. The report details the methods and results of a data survey including vegetation biovolume distribution, lake depth (bathymetry), and bottom hardness (composition).

Data collected and prepared by **Ramsey Conservation District** for

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Black Lake Biovolume Analysis Survey

<p align="center">**April 29, 2015**</p>

Methods:

A Lowrance HDS-5™ Global Positioning System (GPS) enabled depth finder was used to collect submerged aquatic vegetation biovolume, lake depth (bathymetry), and bottom hardness (composition) data on Black Lake on April 29, 2015. The lake was transected at a maximum distance of 25 meters between transects at a speed of no more than 5 miles per hour. Sonar log data was recorded using the Lowrance HDS-5™ Global Positioning System (GPS) enabled depth finder to assess this data.

Data was reprocessed using Contour Innovations, LLC, ciBioBase system to include areas of aquatic vegetation that were topped out at the surface within Black Lake.

Results:

The results below were exported from Contour Innovations, LLC, ciBioBase system and processed using ArcGIS software. Results include maps and statistics of biovolume distribution represented as total percent of water column occupied by plant matter. Additional results include contour depth maps at both one and three foot intervals as well as bottom hardness (composition) maps. Bottom hardness is represented as soft, medium, or hard; with soft bottoms characterized as muck or 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.
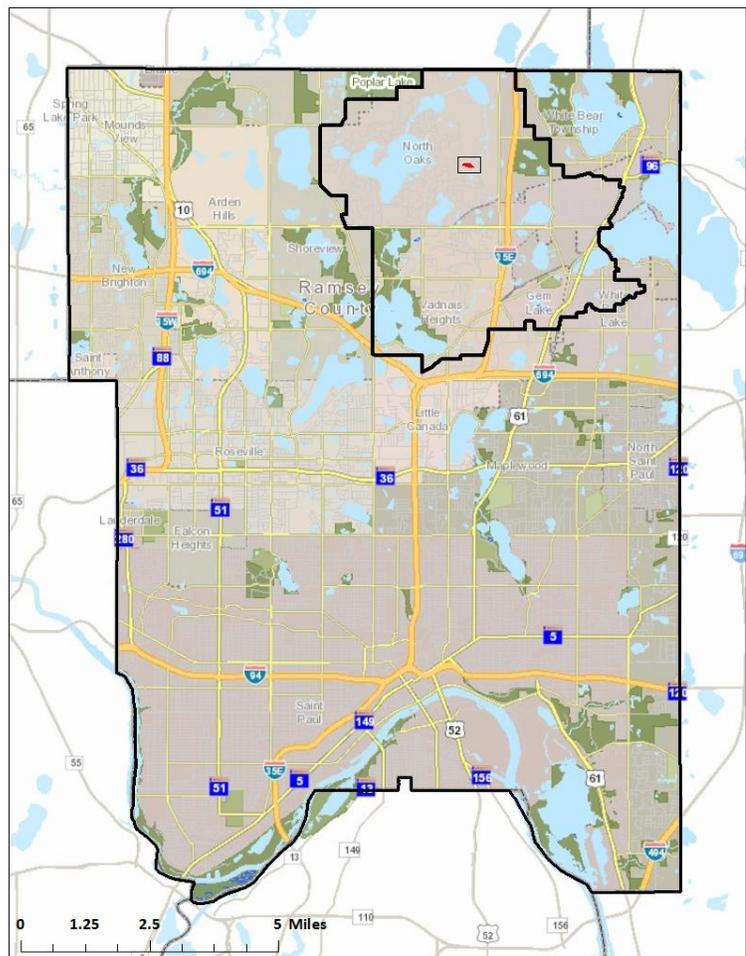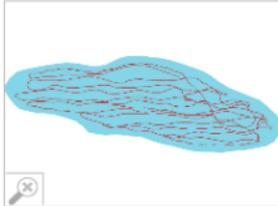

Figure 1. Location of Black Lake shown in red within VLAWMO and Ramsey County Boundaries.

Black Lake, Ramsey County Minnesota

Generated: 4/30/2015 6:05:54 PM (UTC)

Waterbody Size: 5.27 ha *(13.00 acres)*

report link

Data Collector
Laura Triplett

Data Collection Date
4/29/2015 2:47:01 PM (UTC)

Average Water Temperature
13.76° C (56.77° F)

Location
Start: 45.09693527, -93.06926727
End: 45.09745789, -93.06782532

Survey Size
Area:	5.11 ha
	(12.64 acres)
Percent:	97.06% of waterbody
Volume:	59,048.20 cu. m
	(47.87 acre ft)

Est. Waterbody Volume ?
60,848.60 cu. m
(49.33 acre ft)

Settings
Track Buffer:	15 m
Grid Cell Size:	5 m
Min. BV Detect:	5%
Min. Veg Depth Detect:	0.73152 m

Quality Control
Reviewer:	McCormack, Ian
Status:	Passed

▲ Area of Interest Summary

AOI ?	Type ?	PAC ?	Avg BVp ?	SD BVp ?	Avg BVw ?	SD BVw ?	Depth Range	Avg Depth	Distance	No. Points
1	Point	88.9%	21.1%	±17.1%	18.7%	±17.4%	0.3-3.83 m	1.18 m	4.58 km	1,503
	Grid	94.4%	30.9%	±22.3%	29.2%	±22.8%	0.12-3.78 m	1.28 m	-	1,004

▲ Biovolume Analysis by Quantity

AOI ?	0-5%	5-20%	20-40%	40-60%	60-80%	>80%
1	11.11%	57.68%	21.69%	4.79%	2.79%	1.93%

▲ Biovolume Analysis by Depth

AOI ?	Depth	Type ?	Count	PAC ?	Avg BVp ?	SD BVp ?	Avg BVw ?	SD BVw ?
1	0-1m	Point	308	97.1%	41%	±23.8%	39.8%	±24.4%
	1-2m		705	97.6%	18.4%	±8.1%	18%	±8.4%
	2-3m		364	88.5%	9.4%	±2.8%	8.4%	±4%
	3-4m		126	21.4%	7.3%	±1.1%	1.6%	±3%
	4-5m		0	-	-	-	-	-
	5-6m		0	-	-	-	-	-
	6-7m		0	-	-	-	-	-
	7-8m		0	-	-	-	-	-
	8-9m		0	-	-	-	-	-
	>9m		0	-	-	-	-	-
	0-1m	Grid	470	99.6%	46.1%	±21.9%	45.9%	±22%
	1-2m		333	98.5%	19.3%	±8.5%	19%	±8.7%
	2-3m		161	88.8%	9.2%	±2.9%	8.2%	±4%
	3-4m		40	22.5%	7.1%	±0.8%	1.6%	±3%
	4-5m		0	-	-	-	-	-
	5-6m		0	-	-	-	-	-
	6-7m		0	-	-	-	-	-
	7-8m		0	-	-	-	-	-
	8-9m		0	-	-	-	-	-
	>9m		0	-	-	-	-	-

▲ Glossary

AOI
Area of Interest: Defines the individual transects or contiguous data samples as depicted by the color coding of each 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.

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.
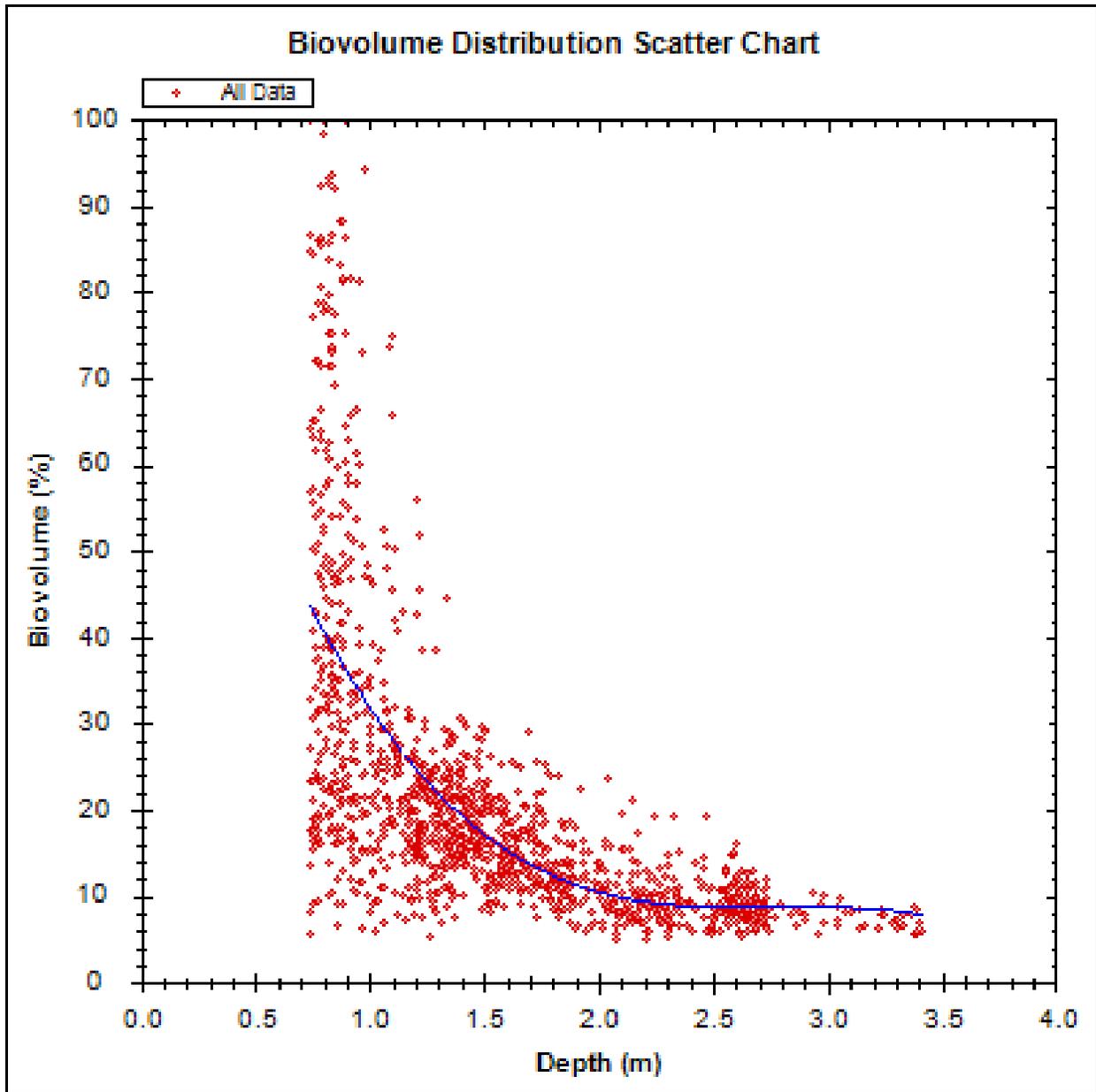
Grid
Geostatistical Interpolated Grid: Interpolated and evenly spaced values representing kriged (smoothed) output of aggregated data points. The gridded data is most accurate summary of individual survey areas.
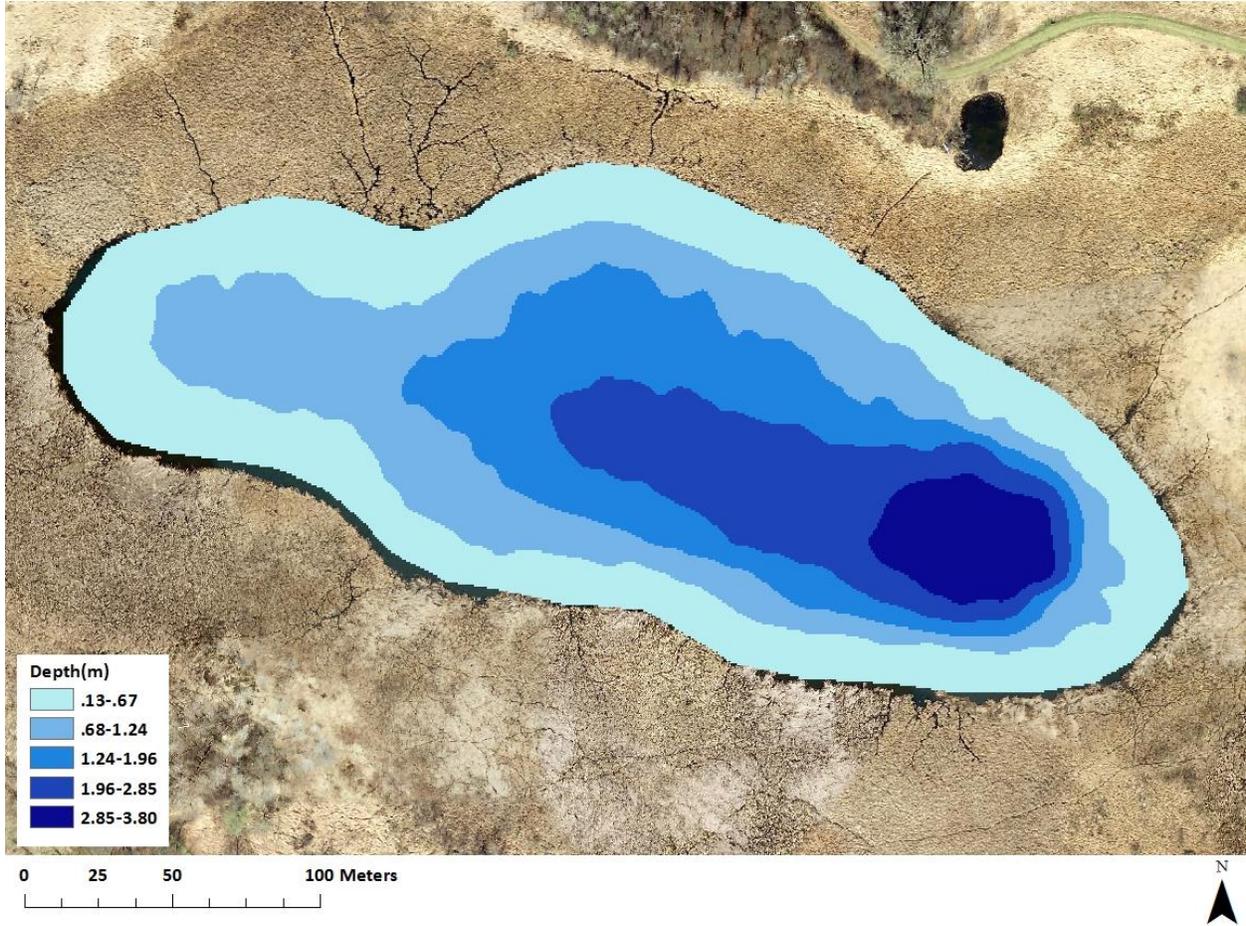
Point
Individual Coordinate Point: A single point represents a summary of sonar pings and the derived bottom and canopy depths. Individual point data create an irregularily spaced dataset that may have overlaps and/or gaps in the data resulting in a increased potential for error.
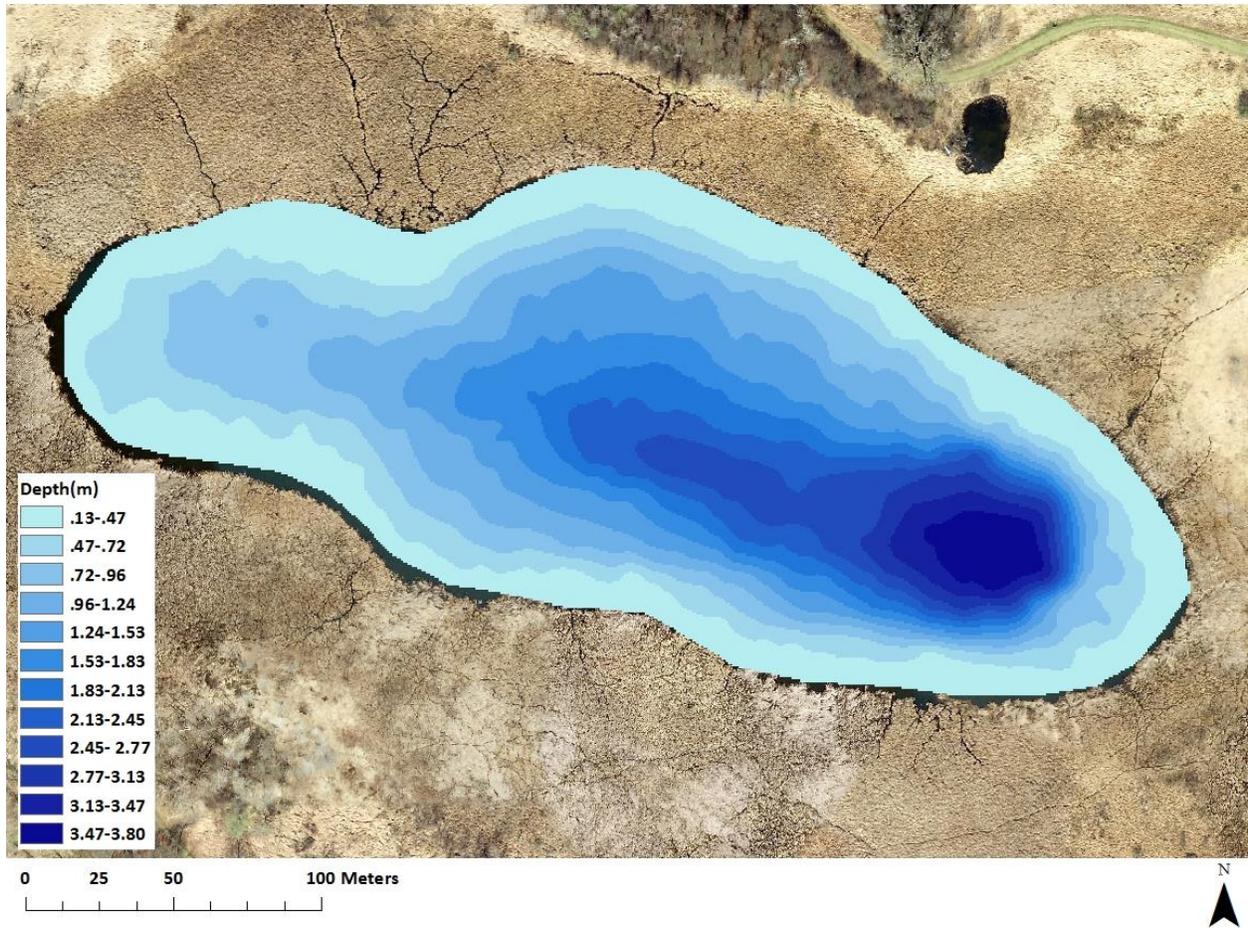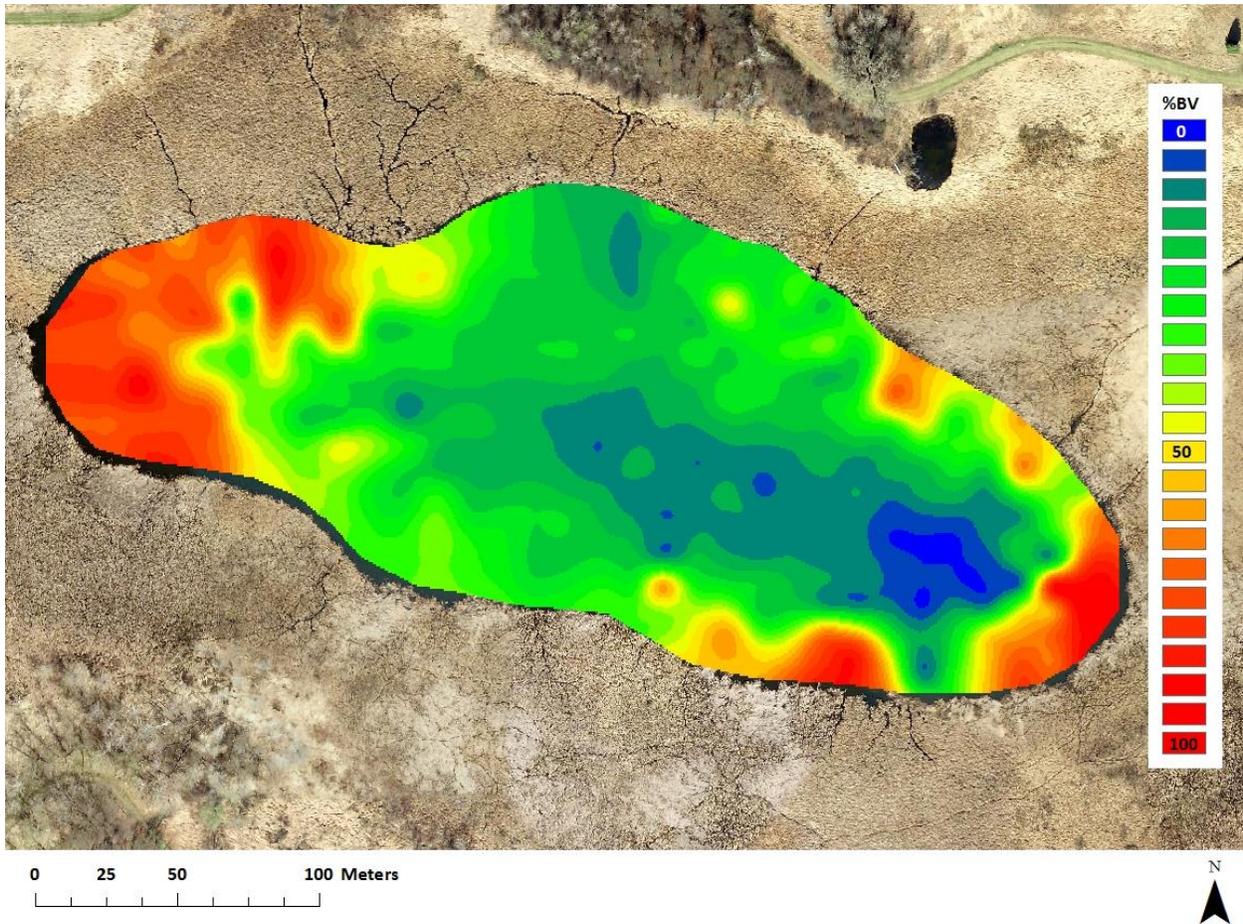
▲ Additional Information

Biovolume Distribution Scatter Chart

Biovolume (%) vs Depth (m)

Black Lake Biovolume Analysis Survey 4

Black Lake Contour Map (3 foot intervals)

Depth(m)
- .13-.67
- .68-1.24
- 1.24-1.96
- 1.96-2.85
- 2.85-3.80

0   25   50   100 Meters

N

Black Lake Contour Map (1 foot intervals)

Depth(m)

- .13-.47
- .47-.72
- .72-.96
- .96-1.24
- 1.24-1.53
- 1.53-1.83
- 1.83-2.13
- 2.13-2.45
- 2.45- 2.77
- 2.77-3.13
- 3.13-3.47
- 3.47-3.80

0   25   50   100 Meters

N

Black Lake Biovolume Map

0   25   50   100 Meters

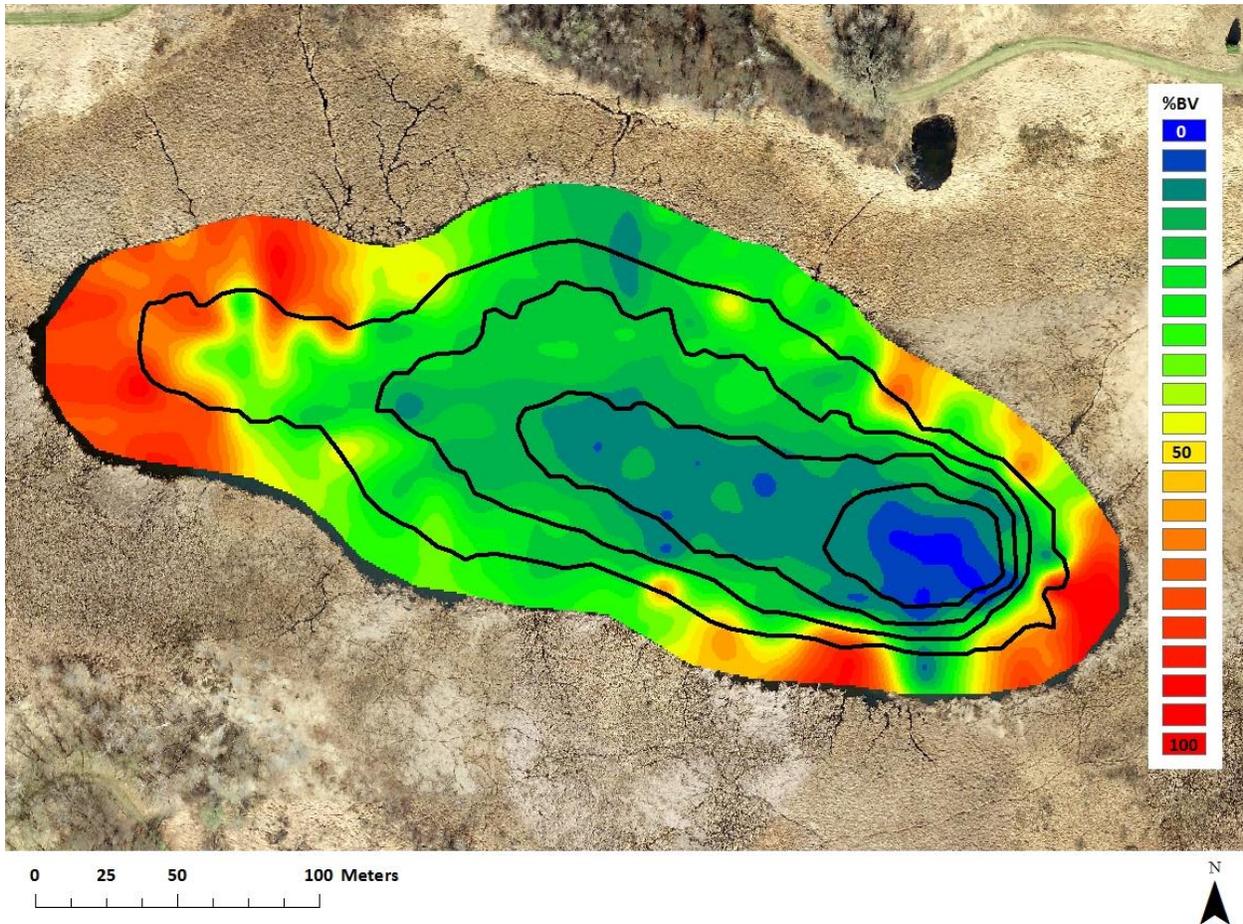*Note.*   Red = 100% vegetation biovolume in water column
Yellow = 50% vegetation biovolume in water column
Blue = 0% vegetation biovolume in water column

Black Lake Biovolume Map with 3ft Contours

0   25   50   100 Meters

N

Note.   Red = 100% vegetation biovolume in water column
           Yellow = 50% vegetation biovolume in water column
           Blue = 0% vegetation biovolume in water column

Black Lake Bottom Hardness (Composition) Map

Bottom Hardness
- Soft
- Medium
- Hard

0   25   50   100 **Meters**

N
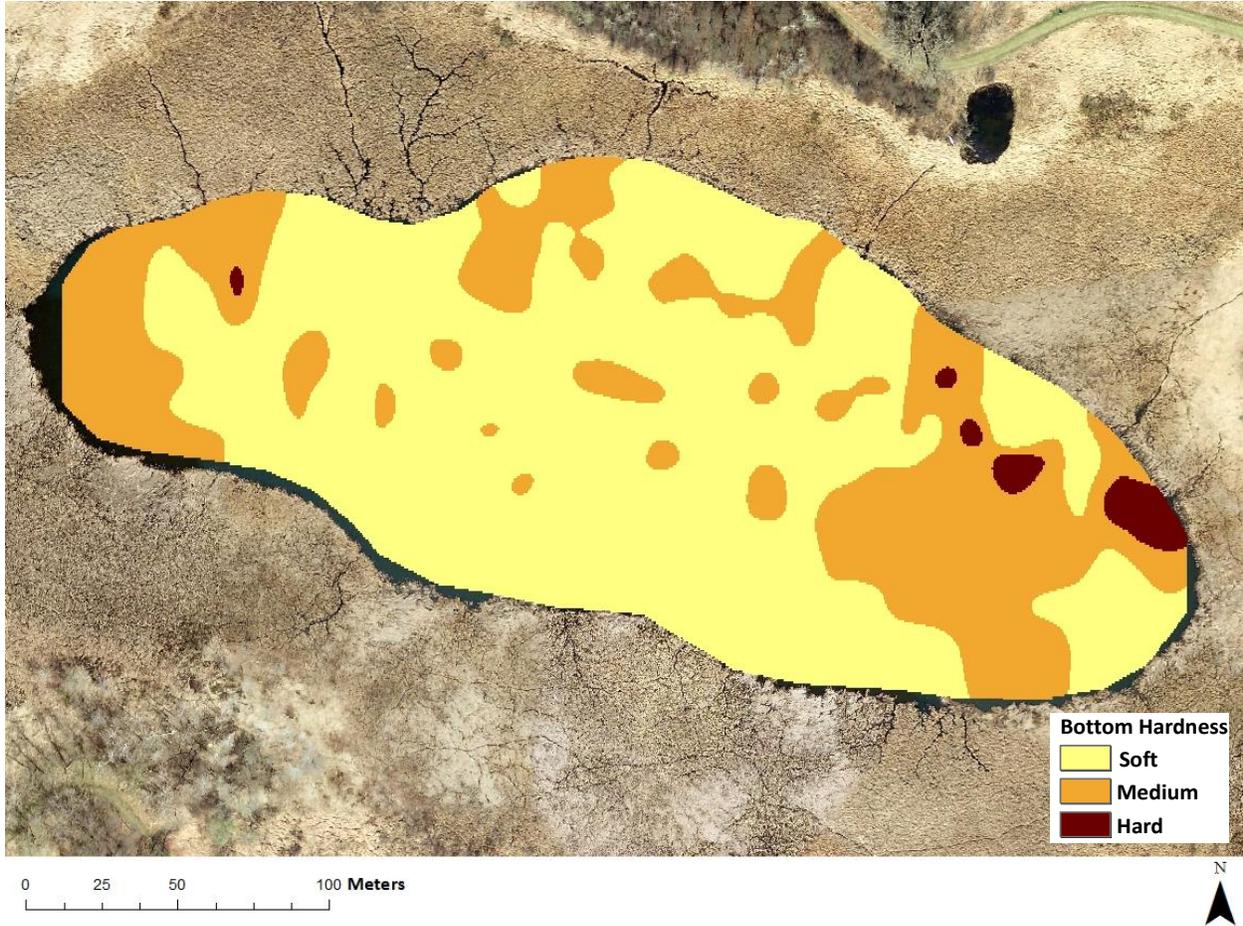
Black Lake Bottom Hardness (Composition) Map with 3ft Contours

Bottom Hardness
- Soft
- Medium
- Hard

0 25 50 100 **Meters**

N