Black Lake

VLAWMO
Vadnais Lake Area
Water Management Organization

Macrophyte & Biovolume Analysis Survey 7/24/14

This document contains two reports of information collected on Black Lake. The first report details the methods and findings of a point intercept survey of macrophyte vegetation and the second report details the methods and results of an aquatic vegetation biovolume data survey.

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

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Black Lake Macrophyte Survey

July 24, 2014

Methods:

The point intercept method incorporating a Global Positioning System (GPS) was used to assess the aquatic macrophyte community on Black Lake on July 24, 2014. Samples were taken at evenly spaced (70 m) geo-referenced points. Data on depth, plant species, and abundance rank was recorded.

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

Percent Cover of Tines	Abundance Ranking
81-100	5
61-80	4
41-60	3
21-40	2
1-20	1

Results:

Data was collected at 8 points. Aquatic macrophytes were found at 7 points. Coontail (*Ceratophyllum demersum*), White waterlilly (*Nymphaea odorata*), Muskgrass (*Chara sp.*), and Sago pondweed (*Potamogeton pectinatus*) were the most common species. Also present was Filamentous algae (*Spirogyra spp*) and Flatstem pondweed (*Myriophyllum spicatum*).

The Secchi disk reading was 2.45 m (8.04 ft). A bathymetry was created at 1 ft and 3 ft intervals and is included in this report. The bathymetry, while generally reliable, included areas where Lowrance accoustics were not penetrating the vegetation layer. It is recommended that a more conclusive bathymetry be performed under less dense vegetative conditions in the early spring.

Depth measurements were taken at the 7 survey points where aquatic vegetation was found. Point number, depth, plant species and abundance ranking data is reported in the map and table included in this file.

Percent Occurrence and Average Abundance of Taxa at Black Lake on 07/24/2014

Species	Common Name	Scientific Name	% Occurrence 7/24/2014	Avg Abundance 7/24/2014
1	Coontail	*Ceratophyllum demersum*	85.71%	2.17
2	White waterlilly	*Nymphaea odorata*	42.86%	2.00
3	Muskgrass	*Chara sp.*	42.86%	1.33
4	Sago pondweed	*Potamogeton pectinatus*	42.86%	1.00
5	Filamentous algae	*Spirogyra spp*	14.29%	1.00
6	Flatstem pondweed	*Myriophyllum spicatum*	14.29%	1.00

Table 1. Summary of percent occurrence and average abundance for aquatic plant taxa encountered during a point-intercept survey conducted on Black Lake.

- 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

- The seasonal timing and water temperature on survey dates have an influence on biodiversity as well as abundance and occurrence. Biovolume and visual observation revealed a higher Coontail abundance than likely what was actually observed with the rake throw survey.

- Water was clear at the time of vegetative survey and followed an early summer period of above average rainfall. Black Lake temperature average was 25.03° C (77.05° F) on the July 24, 2014 survey date.

- No vegetation was sampled at point 8. The recorded depth at point 8 was 13.1 feet. Point 8 was the location of the Secchi disk reading.

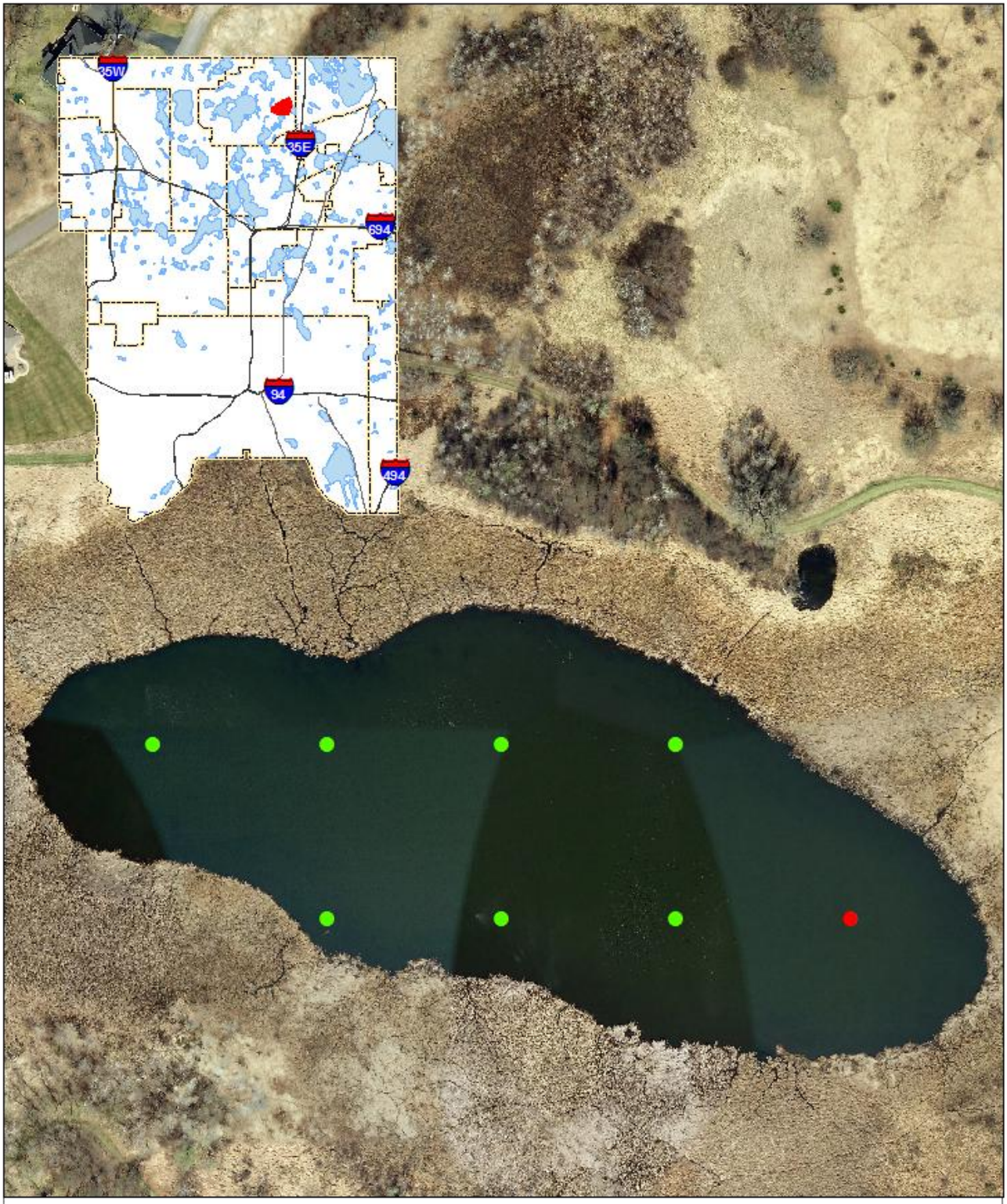
- Purple loosestrife (Lythrum salicaria) was noted in greater abundance on the western end of Black Lake. There was lesser abundant presence of Purple loosestrife mid-lake and on the eastern side of Black Lake. Black Lake has an extensive and dense littoral zone that could be further surveyed to reveal the extent of the Purple loosestrife and native emergent abundance.

Point Survey - Vegetation and Depth (07/24/2014)

Point #	Depth (ft)	Coontail	White waterlilly	Chara	Sago pondweed	Filamentous algae	Flat stem pondweed
1	3.9	2	2	2	1		1
2	4.1	2			1		
3	4.9	3					
4	3	2	2	1			
5	3.3			1	1	1	
6	4.9	3	2				
7	7.5	1					

Total Abundance		13	6	4	3	1	1
Count	7	6	3	3	3	1	1
Avg Abundance		2.17	2.00	1.33	1.00	1.00	1.00
% Occurrence		85.71%	42.86%	42.86%	42.86%	14.29%	14.29%

Secchi Depth	8.04 ft (2.45m)



Ramsey County Aquatic Vegetation Survey

Black Lake 7/24/2014

Vegetation

No Vegetation

N

Black Lake Biovolume Analysis Survey

July 24, 2014

Methods:

A Lowrance HDS-5™ Global Positioning System (GPS) enabled depth finder was used to collect submerged aquatic vegetation and lake bottom data on Black Lake on July 24, 2014. The lake was transected at a minimum distance of 40 meters at a speed of no more than 6 miles per hour. Sonar log data was recorded to assess data on depth (bathymetric) and biovolume.

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 include a map and statistics of biovolume information. More robust interactive contour and vegetation map data, including sonar log trip replays, can be viewed on the ciBioBase website: www.cibiobase.com

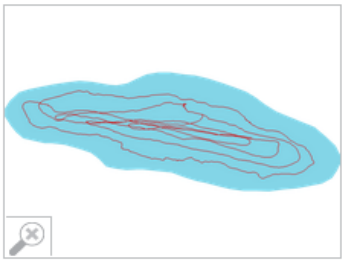
cBIOBASE VEGETATION ANALYSIS REPORT

Black Lake, Ramsey County Minnesota

Generated: 9/10/2014 4:34:52 PM (UTC)

Waterbody Size: 5.27 ha *(13.00 acres)*

report link



Data Collector
Ann WhiteEagle

Data Collection Date
7/24/2014 1:50:37 PM (UTC)

Average Water Temperature
25.03° C (77.05° F)

Location
Start: 45.09723663, -93.06816101
End: 45.09685898, -93.0674057

Survey Size
Area: 4.83 ha (11.93 acres)
Percent: 91.66% of waterbody
Volume: 50,087.70 cu. m (40.61 acre ft)

Est. Waterbody Volume ?
54,658.00 cu. m
(44.31 acre ft)

Settings

Track Buffer:	25 m
Grid Cell Size:	5 m
Min. BV Detect:	5%
Min. Veg Depth Detect:	0.73152 m

Quality Control
Reviewer: Valley, Ray
Status: Has Issues
Bathymetry and water volume is not reliable due to the dense vegeation. However, given the topped out nature of plant growth, biovolume map is robust. Use manual veg coordinates (right-click on map, add coordinate, reprocess veg and report) to fill in unmapped areas.

Area of Interest Summary

AOI ?	Type ?	PAC ?	Avg BVp ?	SD BVp ?	Avg BVw ?	SD BVw ?	Depth Range	Avg Depth	Distance	No. Points
1	Point	95.6%	98.1%	±6.7%	93.8%	±21.1%	0.31-3.59 m	1.13 m	2.96 km	1,526
	Grid	99.4%	94.7%	±14.1%	94.1%	±16%	0.01-3.58 m	0.9 m	-	1,434

Biovolume Analysis by Quantity

AOI ?	0-5%	5-20%	20-40%	40-60%	60-80%	>80%
1	4.39%	0.07%	0.07%	0.59%	2.03%	92.86%

Biovolume Analysis by Depth

AOI ?	Depth	Type ?	Count	PAC ?	Avg BVp ?	SD BVp ?	Avg BVw ?	SD BVw ?
1	0-1m	Point	554	100%	99.4%	±2%	99.4%	±2%
	1-2m		466	100%	98.4%	±4.7%	98.4%	±4.7%
	2-3m		473	92.8%	96%	±10.7%	89.1%	±26.9%
	3-4m		33	0%	-	-	0%	±0%
	4-5m		0	-	-	-	-	-
	5-6m		0	-	-	-	-	-
	6-7m		0	-	-	-	-	-
	7-8m		0	-	-	-	-	-
	8-9m		0	-	-	-	-	-
	>9m		0	-	-	-	-	-
	0-1m	Grid	1017	100%	97.7%	±3.8%	97.7%	±3.8%
	1-2m		218	100%	96.9%	±9.2%	96.9%	±9.2%
	2-3m		163	99.4%	81.8%	±26%	81.3%	±26.7%
	3-4m		36	77.8%	40.3%	±27.6%	31.4%	±29.6%
	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.

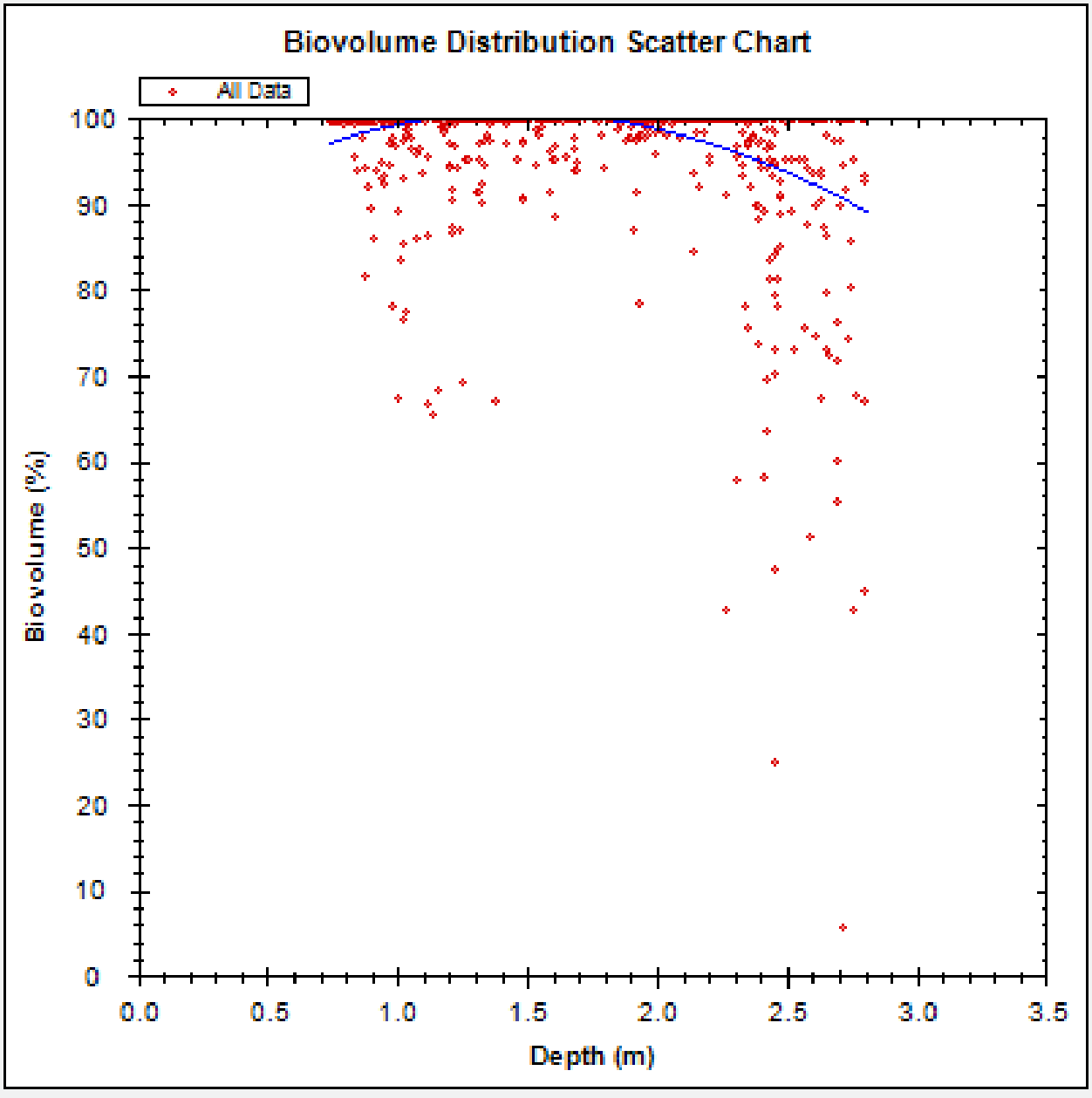
Grid

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 irregularly spaced dataset that may have overlaps and/or gaps in the data resulting in a increased potential for error.

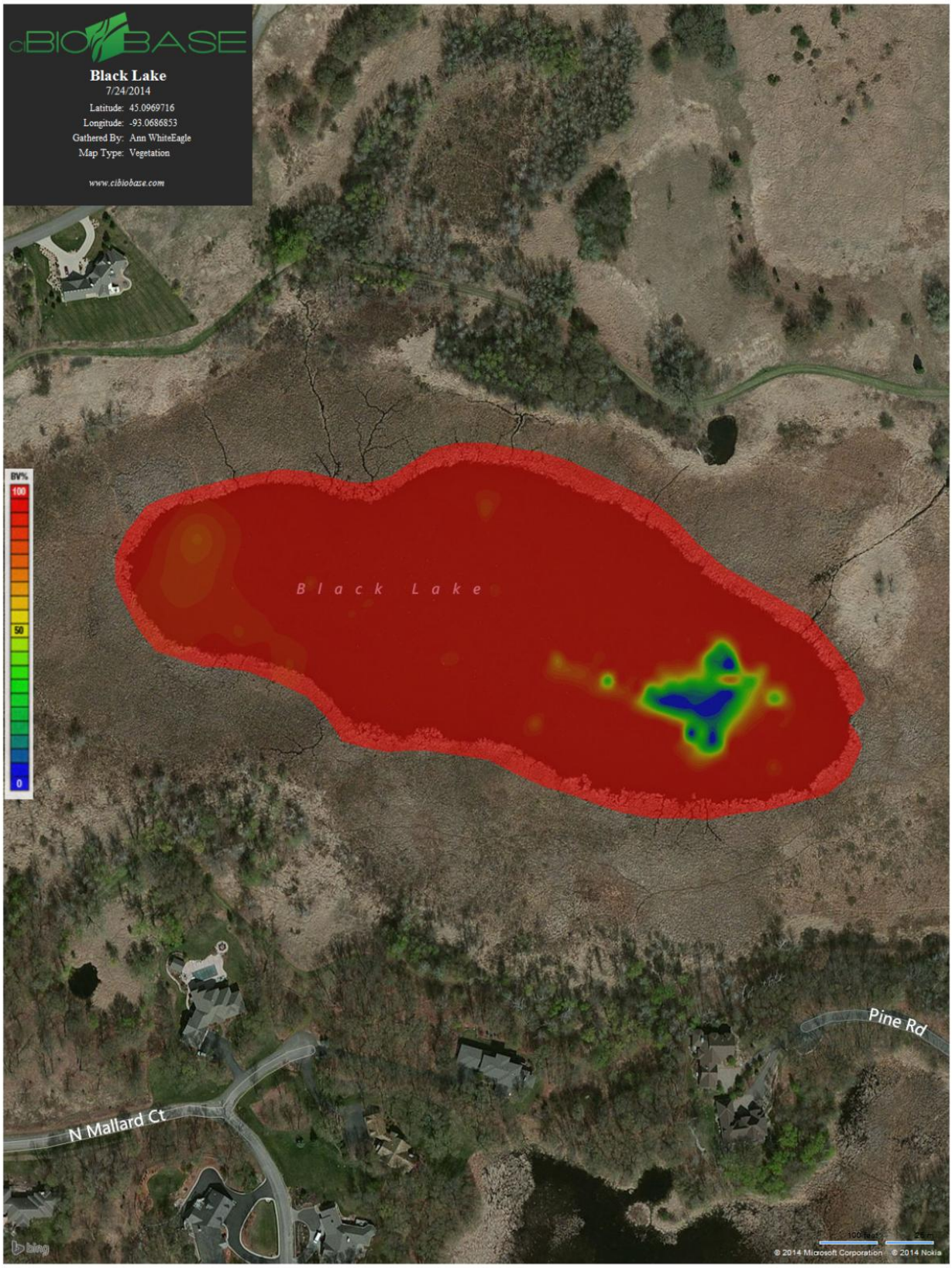
Biovolume Distribution Scatter Chart



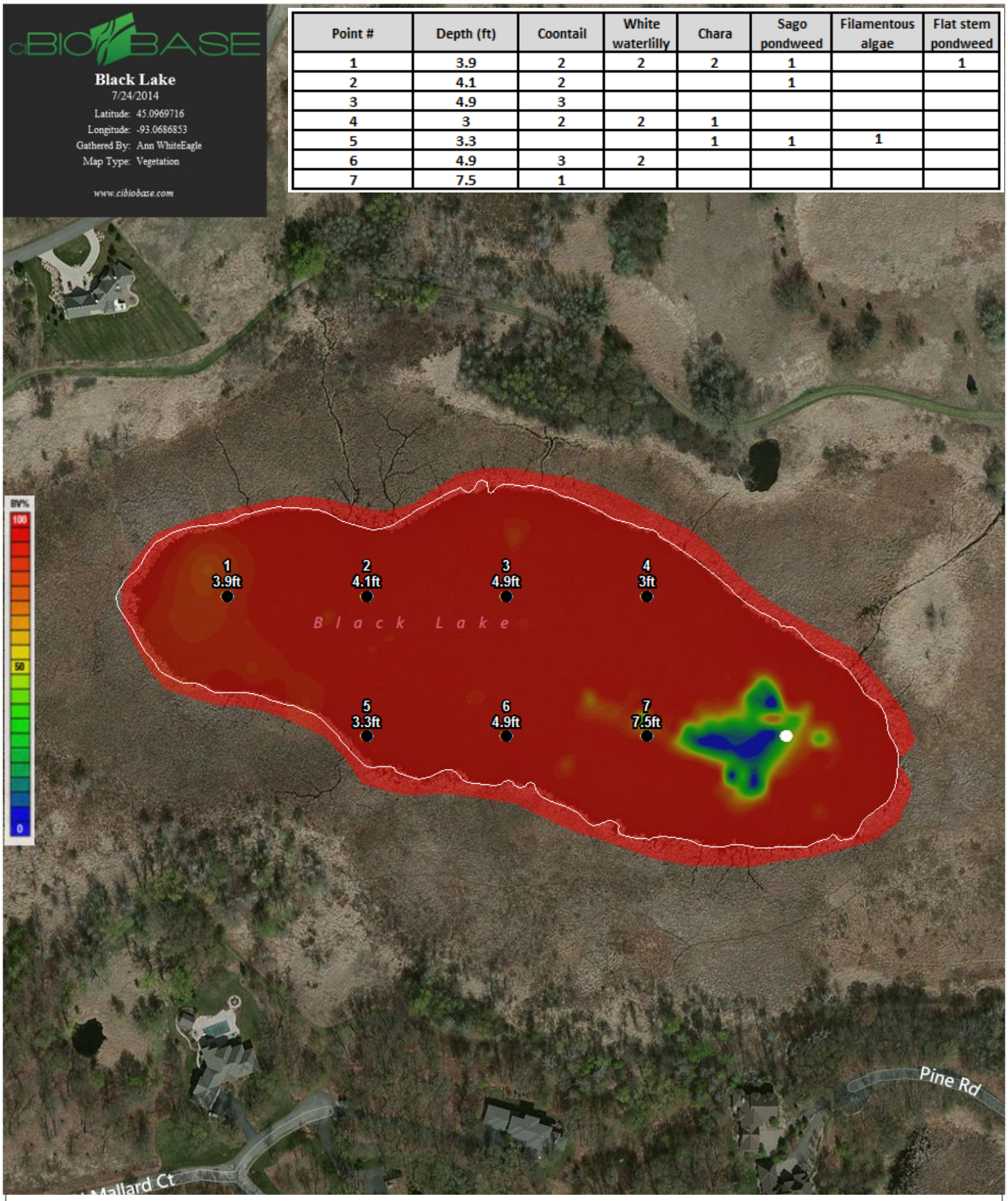
Black Lake Contour Map (3 foot intervals)

Black Lake Contour Map (1 foot intervals)

Black Lake Biovolume Map



Macrophyte Survey Points Overlaid on Biovolume Map



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5	3.3			1	1	1	
6	4.9	3	2				
7	7.5	1					

Ramsey County Aquatic Vegetation Survey

Black Lake 7/24/2014

● Vegetation

○ No Vegetation

N