

# Wilkinson Lake



## Macrophyte and Biovolume Survey 8/11/17

This document contains two types of vegetation data collected on Wilkinson Lake. The first section details the methods and findings of a point intercept survey of macrophyte vegetation. The second section details the methods and results of a vegetation bio-volume survey.

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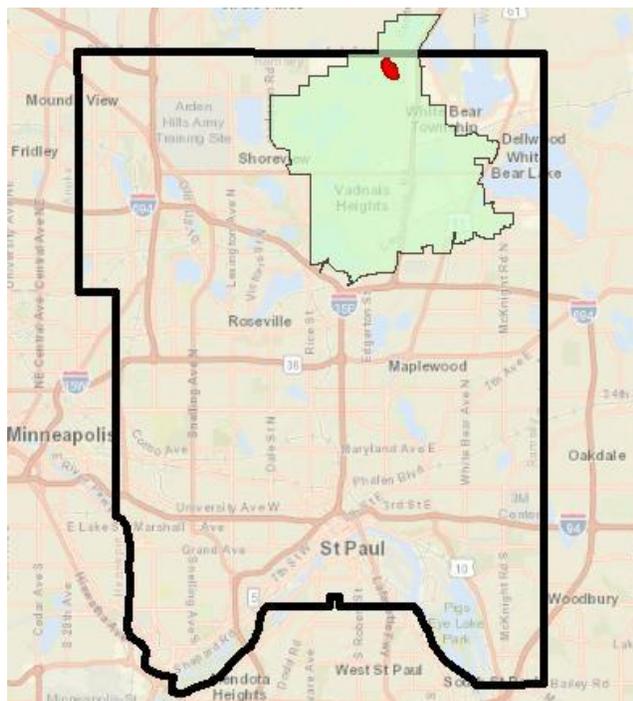


Figure 1. Location of Wilkinson Lake (red) in Ramsey County within VLA WMO borders

# Wilkinson Lake Macrophyte Survey

August 11, 2017

## Methods:

The point intercept method incorporating aerial photography and a Lowrance HDS-5™ Global Positioning System (GPS) was used to assess the aquatic macrophyte community on Wilkinson Lake on August 11, 2017. Samples were taken at sixty evenly spaced (80 m) geo-referenced points (Figure 2). Data on depth, plant species, and abundance rank was 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, with results in Table 3.

A double-tined metal rake attached to an 11-meter 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 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 at the collection points were also counted.

Table 1

<i>Abundance rankings for percent cover of rake tines</i>	
Percent Cover of Tines	Abundance Ranking
81-100	5
61-80	4
41-60	3
21-40	2
1-20	1

## Results:

Aquatic macrophytes were found at all 60 points surveyed (Figure 2). Canada Waterweed (*Elodea canadensis*) and White Water Lily (*Nymphaea odorata*) were the most prominent species present, found at most of the survey points. Flat-stem pondweed (*Potamogeton zosteriformis*), Filamentous Algae (*Spirogyra/Cladophora sp.*), and Coontail (*Ceratophyllum demersum*) were the next most common species. Found in fewer than 15% of the survey points were the following species: Curly Leaf Pondweed (*Potamogeton crispus*); Greater Duckweed (*Spirodela polyriza*); Sago Pondweed (*Potamogeton pectinatus*); Yellow Water Lily (*Nuphar lutea*), Slender Waternymph (*Najas gracillima*); Muskgrass (*Chara spp.*) and Stonewort (*Nitella sp.*). Although the specific species of stonewort was not determined, there was no indication that the plant detected was the invasive starry stonewort – no white bulbils were seen. The secchi disk reading was 0.9m (2.95 ft) (Table 3).

Table 2

*% Occurrence and Avg Abundance of aquatic plant taxa present on Wilkinson Lake - Aug 11, 2017*

Species	Common Name	Scientific Name	Average Abundance 8/11/2017	Percent Occurrence 8/11/2017
1	Canada Waterweed	<i>Elodea canadensis</i>	2.92	98%
2	White Water Lily	<i>Nymphaea odorata</i>	2.06	82%
3	Flat-Stem Pondweed	<i>Potamogeton zosteriformis</i>	2.11	63%
4	Filamentous Algae	<i>Spirogyra/Cladophora sp</i>	2.4	42%
5	Coontail	<i>Ceratophyllum demersum</i>	1.35	28%
6	Curly Leaf Pondweed	<i>Potamogeton crispus</i>	1	13%
7	Greater Duckweed	<i>Spirodela polyrhiza</i>	1	12%
8	Sago Pondweed	<i>Stuckenia pectinata</i>	1.6	8%
9	Yellow Water Lily	<i>Nuphar lutea</i>	2.29	12%
10	Slender Waternymph	<i>Najas gracillima</i>	1.67	5%
11	Muskgrass	<i>Chara spp.</i>	3	7%
12	Stonewort	<i>Nitella sp.</i>	5	2%

*Note.* 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.

Table 3

Depth, secchi disk and vegetation abundance point survey results, August 11, 2017

Point	Canada Waterweed	Flat-Stem Pondweed	White Water Lily	Filamentous Algae	Yellow Water Lily	Sago Pondweed	Coontail	Greater Duckweed	Curly-Leaf Pondweed	Slender Water-nymph	Chara	Stonewort
1	2	4	4				1	1				
2	2	4			2							
3	2	1		1			1		1			
4	3	3	1				1					
5	2				3		1		1			
6	1		2	2		1						
7	1	1	1	2			1					
8	1	2	4				1					
9	4	1	2		4		2	1				
10	2		4				1		1			
11	2		1							1		
12	1											
13	2	2	3									
14	2	2	4									
15	1			2						3		
16	1		1				1					
17	3		1									
18	2		2									
19	3	1	3	5	3		2	1				
20	3	2	2						1			
21	1	2	3	2								
22	3		2									
23	1		1	3								
24	3		1	2								
25	1	1	2						1			
26	4	1	2	3								
27	3	1	3									
28	2		1	2								
29	2		1	2								
30	1		1								1	
31	2		2						1			
32	3	1	4	5			2					
33	5		3									
34	3		3									
35	3		2									
36	2		2						1			
37		1	3								5	
38	3	2	2						1			
39	5	2	1	2								
40	2	4	2	3		2	1					
41	2		1								5	
42	5	2	3				2	1				
43	5	2	3	3			1	1				
44	5	2	1	5							1	
45	5	1		1	1		2	1				
46	5	2			1							
47	4	4		1		1						
48	5	1		1		2						
49	3	2	1	3								
50	3	2	1									
51	5	2	2	4								
52	1	4		1								
53	5	4	1							1		
54	5		1									
55	5	2	2		2							
56	4	1	1	1		2						
57	5	4	2	3				1				
58	2	2	3	1			1					
59	5	3										5
60	4	2	3				2					
Total Abundance	172	80	101	60	16	8	23	7	8	5	12	5
Count	59	38	49	25	7	5	17	7	8	3	4	1
Avg. Abundance	2.92	2.11	2.06	2.40	2.29	1.60	1.35	1.00	1.00	1.67	3.00	5.00
% Occurrence	98%	63%	82%	42%	12%	8%	28%	12%	13%	5%	7%	2%
Secchi Depth:	0.9m											

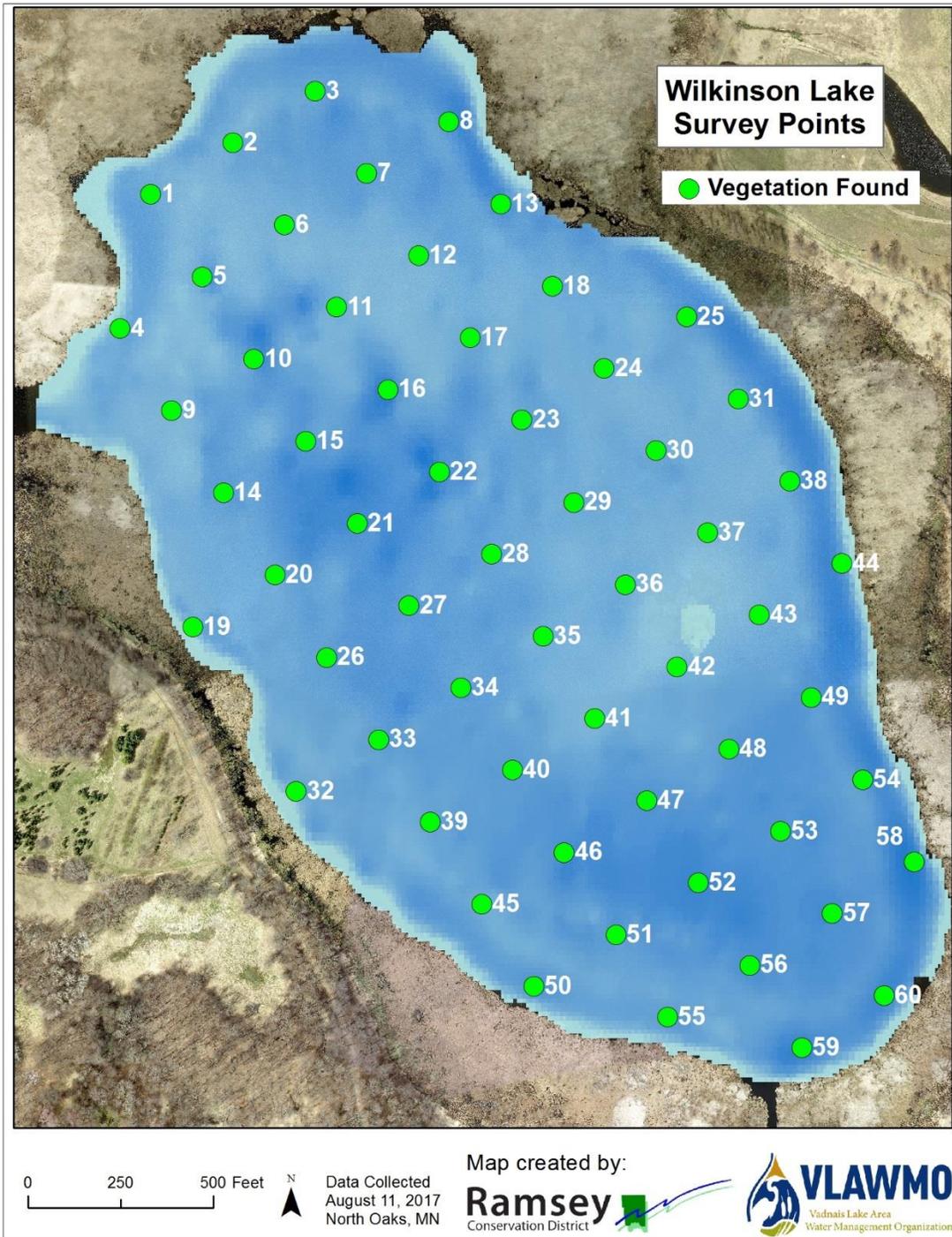


Figure 2. Wilkinson Lake vegetation point intercept survey locations. N=60.

# Wilkinson Lake Biovolume Survey

August 11, 2017

## Methods:

A Lowrance HDS-5™ Global Positioning System (GPS)-enabled depth finder was used to collect submerged aquatic vegetation biovolume data on Wilkinson Lake on August 11, 2017. The lake was transected at a distance of 40 meters between transects at a speed of no more than 6 miles per hour. Sonar log data was recorded using the Lowrance HDS-5™ Global Positioning System (GPS)-enabled depth finder to assess this data. Transducer data was 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. Interactive map data, including sonar log trip replays, can be viewed on the BioBase website: [www.cibiobase.com](http://www.cibiobase.com).

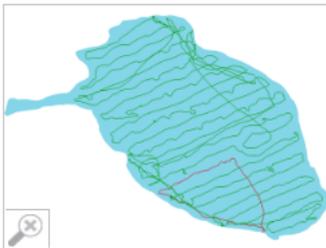
**BIOBASE**
**VEGETATION ANALYSIS REPORT**

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**Wilkinson Lake, Ramsey County Minnesota**
Generated: 8/15/2017 2:59:56 PM (UTC)

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Waterbody Size: 42.36 ha (104.70 acres)
[report link](#)



<b>Data Collector</b> Andrea Prichard	<b>Survey Size</b> Area: 41.00 ha (101.31 acres) Percent: 96.78% of waterbody Volume: 316,092.90 cu. m (256.26 acre ft)	<b>Settings</b> Track Buffer: 25 m Grid Cell Size: 5 m Min. BV Detect: See Individual Trips Min. Veg Depth Detect: See Individual Trips
<b>Data Collection Date</b> 8/11/2017 2:32:02 PM (UTC)	<b>Average Water Temperature</b> 24.62° C (76.31° F)	<b>Est. Waterbody Volume</b> 326,617.00 cu. m (264.79 acre ft)
<b>Location</b> Start: 45.11432266, -93.06245422 End: 45.11425781, -93.06256866		

### Survey Summary

	Type ?	PAC ?	Avg BVp ?	SD BVp ?	Avg BVw ?	SD BVw ?	Depth Range	Avg Depth	Distance	No. Points
<b>Full Survey</b>	Point	99.7%	82.9%	±23.1%	82.6%	±23.5%	0.3-1.29 m	0.55 m	16.81 km	1,137
	Grid	100%	88.1%	±15.9%	88.1%	±15.9%	0-1.2 m	0.7 m	-	9,276

### Area of Interest Summary

AOI ?	Type ?	PAC ?	Avg BVp ?	SD BVp ?	Avg BVw ?	SD BVw ?	Depth Range	Avg Depth	Distance	No. Points
<b>1</b>	Point	100%	97.7%	±10.1%	97.7%	±10.1%	0.31-1.29 m	0.47 m	1.06 km	88
	Grid	100%	98.3%	±2.3%	98.3%	±2.3%	0.05-1.09 m	0.65 m	-	713
<b>2</b>	Point	99.7%	81.6%	±23.5%	81.4%	±23.9%	0.3-1.27 m	0.56 m	15.76 km	1,049
	Grid	100%	88%	±15.9%	88%	±15.9%	0-1.2 m	0.7 m	-	9,195

## ▲ Biovolume Analysis by Quantity

AOI ?	0-5%	5-20%	20-40%	40-60%	60-80%	>80%
1	0%	1.14%	0%	0%	2.27%	96.59%
2	0.29%	2.1%	5.82%	11.34%	14.87%	65.59%

## ▲ Biovolume Analysis by Depth

AOI ?	Depth	Type ?	Count	PAC ?	Avg BVp ?	SD BVp ?	Avg BVw ?	SD BVw ?
1	0-1m	Point	87	100%	97.9%	±10%	97.9%	±10%
	1-2m		1	100%	84.7%	±0%	84.7%	±0%
	2-3m		0	-	-	-	-	-
	3-4m		0	-	-	-	-	-
	4-5m		0	-	-	-	-	-
	5-6m		0	-	-	-	-	-
	6-7m		0	-	-	-	-	-
	7-8m		0	-	-	-	-	-
	8-9m		0	-	-	-	-	-
	>9m	0	-	-	-	-	-	
	0-1m	Grid	712	100%	98.3%	±2.3%	98.3%	±2.3%
	1-2m		1	100%	99%	±0%	99%	±0%
	2-3m		0	-	-	-	-	-
	3-4m		0	-	-	-	-	-
	4-5m		0	-	-	-	-	-
	5-6m		0	-	-	-	-	-
	6-7m		0	-	-	-	-	-
	7-8m		0	-	-	-	-	-
	8-9m		0	-	-	-	-	-
>9m	0	-	-	-	-	-		
2	0-1m	Point	1045	99.7%	81.8%	±23.3%	81.5%	±23.7%
1-2m	4		100%	37.3%	±22.7%	37.3%	±22.7%	
2-3m	0		-	-	-	-	-	
3-4m	0		-	-	-	-	-	
4-5m	0		-	-	-	-	-	
5-6m	0		-	-	-	-	-	
6-7m	0		-	-	-	-	-	
7-8m	0		-	-	-	-	-	
8-9m	0		-	-	-	-	-	
>9m	0	-	-	-	-	-		
0-1m	Grid	9149	100%	88.1%	±15.7%	88.1%	±15.7%	
1-2m		46	100%	58.8%	±16.6%	58.8%	±16.6%	
2-3m		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 an increased potential for error.

Figure 3. Wilkinson Lake BioBase survey summary statistics.

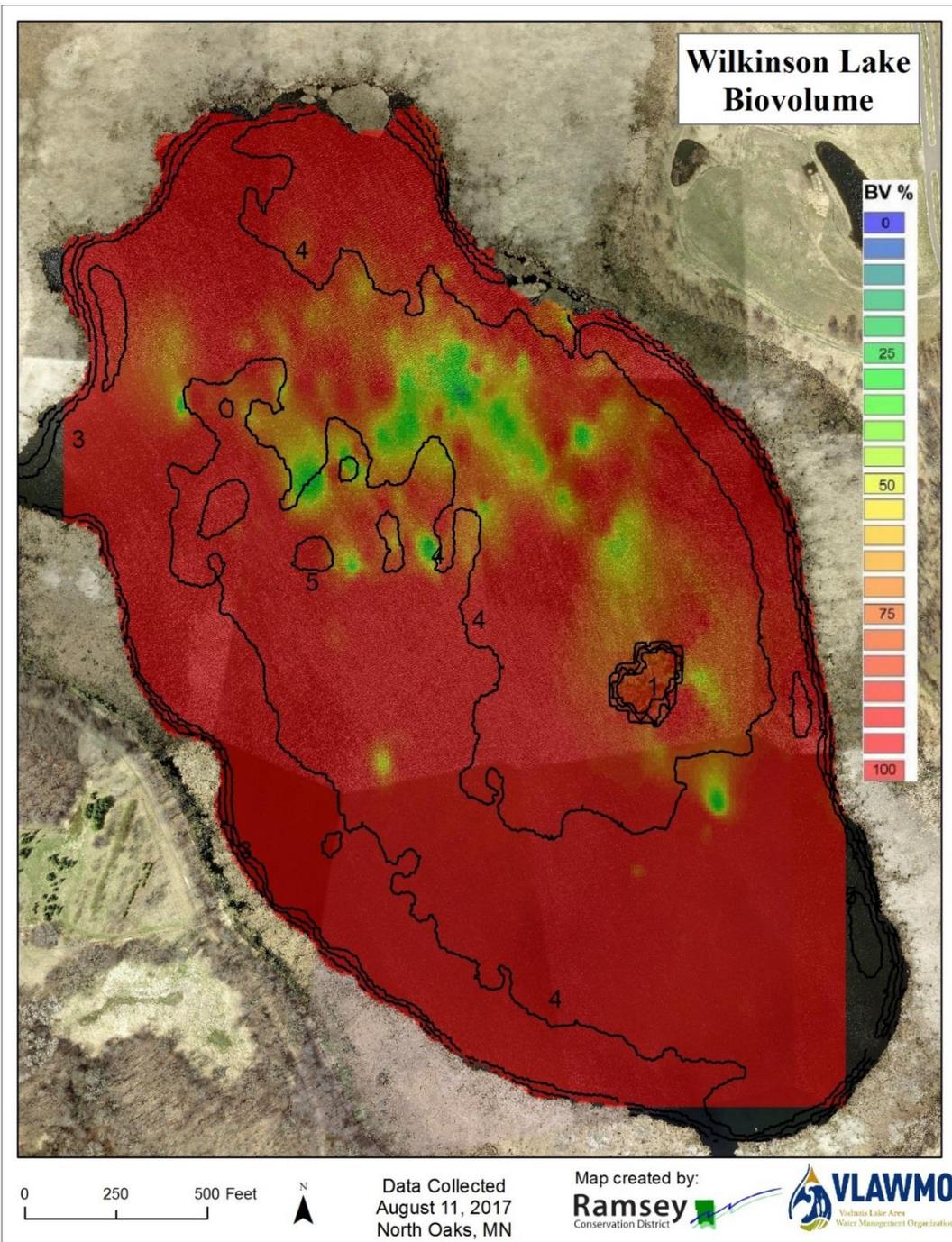


Figure 4. Wilkinson Lake vegetation biovolume with 1ft contours. Blue = 0% and Red = 100%