Lake Jennie Aquatic Vegetation Survey

Lake Jennie Improvement Association

Meeker County, MN

Prepared For: **Lake Jennie Improvement Association**

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INTRODUCTION

Wenck Associates, Inc. was contracted by the Lake Jennie Improvement Association to conduct a survey of aquatic vegetation and to delineate the extent of curly leaf pondweed in Lake Jennie in 2014.

Lake Jennie is located south of the City of Dassel in Meeker County. The lake is in the North Fork Crow River Watershed (Figure 1).

Lake Jennie has an approximate surface area of 1,064 acres, with a maximum depth of 15 feet. The entire lake is considered to be littoral, or less than 15 feet deep. The depth contours generated from the surveys conducted in 2014 Lake Jennie are shown in Figure 2.

SURVEY METHODS

A point-intercept survey following the methodology used by the MN DNR was conducted on June 13, 2014 and again in late summer on August 22, 2014. The early summer survey was conducted specifically to estimate the distribution and abundance of curly leaf pondweed, a non-native species known to be detrimental to lake water quality that peaks in growth in early summer. The late summer survey was conducted to assess the native plant community in the lake following the senescence of CLP.

Sample points were established across the the lake on a 130 meter grid using GIS software (See Figure 3). A total of 251 points were sampled for vegetation during each survey date on the lake.

The surveyed grid was then downloaded onto a Lowrance HDS Sonar/GPS unit (See photo) that was used to navigate to each sample point during the survey. One side of the boat was designated as the sampling area. Water depth was recorded at each sample point in increments estimated to the nearest tenth of a foot using a survey range pole and electronic depth finder.

While conducting the survey, the sonar also continuously logged data to be analyzed using CiBioBase software to determine vegetation biovolume and water depth.

Sonar/GPS Unit

Wenck staff identified all plant species found within an assumed one meter squared sample site at each survey point. A weighted sampling hook attached to a rope was used to survey vegetation not visible from the surface (See Photo).

All vegetation species observed were identified to the species level where possible.

Sampling Device

SURVEY RESULTS

Following each survey, the data was entered into a spreadsheet and frequency of occurrence was calculated for each species observed during the survey. The spreadsheet was also integrated into GIS to create maps showing the extent of aquatic vegetation and curly leaf pondweed in the lake.

CiBioBase software was used to analyze the vegetation biovolume and to generate depth contours of the lake. This data is presented in the Figures.

Number of Species Recorded and Frequency of Occurrence

The frequency of occurrence of each species during each survey is summarized in Table 1. During both surveys, vegetation diversity was greatest in nearshore areas shallower than 6 feet. Mats of floating leaved plants (water lily) and emergent species (hardstem bulrush and narrow leaved cattail) were also noted near the shoreline in some locations on the lake.

Table 1: Frequency of Occurrence

Common Name	Scientific Name	Percent Occurrence	
		June 13, 2014	August 22, 2014
Sago Pondweed	*S. pectinata*	0.8%	0.4%
Canada Waterweed	*Elodea canadensis*	3.6%	4.6%
Clasping Leaf Pondweed	*Potamogeton richardsonii*	2.4%	2.1%
Wild Celery*	*Vallisneria americana*	0.4%	1.3%
Narrow Leaf Pondweeds	*Potamogeton sp.*	3.2%	0.4%
Flat Stem Pondweed	*Potamogeton zosteriformis*	2.0%	0.4%
Curly Leaf Pondweed	*Potamogeton crispus*	78.5%	14.7%
Water Stargrass	*Zosterella dubia*	0.0%	0.4%
Chara	*Chara sp*	3.2%	4.2%
Northern Milfoil	*Myriophyllum sibericum*	0.4%	0.0%
Coontail	*Ceratophyllum demersum*	3.2%	2.5%
Hardstem Bulrush*	*Scirpus acutus*	1.6%	0.8%

*Dense stands observed outside of monitoring points

June 13, 2014

Vegetation was found at 85% of the 251 sampling sites during the June 13, 2014 survey (See Figure 4). Twelve species of aquatic vegetation were documented at sample stations during this survey. The maximum depth at which vegetation was found during this survey was 12.5 feet. In general, vegetation occurrence and diversity decreased with depth, and most points shallower than 12 feet were vegetated. Curly leaf pondweed was by far the most common plant observed during the June 2014 survey, as it was observed at 79% of the sampling sites.

Several native submerged aquatic vegetation species were observed in dense stands in areas near shore that were shallower than 6 feet around the lake. The most common native species observed in these areas were Canada waterweed, narrow leaf pondweeds, chara, coontail, clasping leaf pondweed and wild celery.

As demonstrated in Figure 4, the vegetation biovolume analysis from CiBioBase shows that areas vegetated with curly leaf pondweed exhibited nearly 100% biovolume during the June 2014 survey, reflective of the dense stands of curly leaf pondweed observed growing to near the surface in these areas.

August 22, 2014

Vegetation was less abundant during the August 2014 survey as vegetation was observed at only 27% of the 251 sampling sites (See Figure 5). The maximum depth at which vegetation was found was 10 feet.

The frequency of occurrence in the August 2014 survey differed from the June 2014 survey as curly leaf pondweed decreased to 15% occurrence, as expected following the dieoff of the plant in late summer. Canada waterweed, clasping leaf pondweed, chara, coontail, and wild celery were the most common species observed during the August survey (See Photo).

The vegetation biovolume analysis reflects the decrease in vegetation coverage when compared to the June 2014 survey.

Although it has recently become more prevalent and has reached nuisance levels in some nearby lakes, it is notable that the exotic species Eurasian water milfoil was not found at any of the survey points in Lake Jennie during either survey in 2014.

Dense Bed of Wild Celery

Curly leaf Pondweed Distribution

Curly leaf pondweed is a perennial non-native submergent plant that has been noted to be recently becoming more abundant in Minnesota lakes. The presence of dense curly leaf pondweed has been linked to increased nutrient concentrations and periodic poor water quality in lakes due to the plant's unique life cycle.

Curly leaf pondweed is dormant through late summer and begins growing in the fall. The plant grows under the ice and reaches its maximum growth in May and June, when most native plant growth is still hindered by cool water temperatures. Since it has little competition from native species, curly leaf pondweed can form dense stands that incorporate nutrients from the lake sediments. When the plants begin to die back in early summer the nutrients stored in the stems and leaves of the plants are released back into the lake. The timing of the large pulse of nutrients to the lake (typically mid-summer) can cause excess algal blooms or impact water quality negatively in other ways.

Curly leaf pondweed spreads across the lake by forming "turions" at the end of each stem tip in early summer which break off and fall to the lake bottom. The turions are distributed across the lake by currents and wave action and germinate into new plants in the early fall.

During the June 13, 2014 survey, curly leaf pondweed was found throughout nearly the entire lake. As shown in Figure 6, curly leaf pondweed was most prevalent throughout the lake in in depths of 6-12 feet. Curly leaf pondweed was found very dense throughout the lake with few other species interspersed and was observed to form mats near the surface in several locations.

As shown in Figure 6, approximately 920 acres of curly leaf pondweed, or 86% of the lake's surface area was vegetated with curly leaf pondweed in June 2014.

Dense Curly Leaf Pondweed Growing to Surface

Curly Leaf Pondweed Turion and Young Plant

During the August survey, curly leaf pondweed was much less abundant, as expected due to the plant's life cycle. The extent of curly leaf pondweed was limited to young plants reestablishing in portions of the lake. Turions were also abundant throughout the lake and were observed floating on the surface and accumulating on the shorelines.

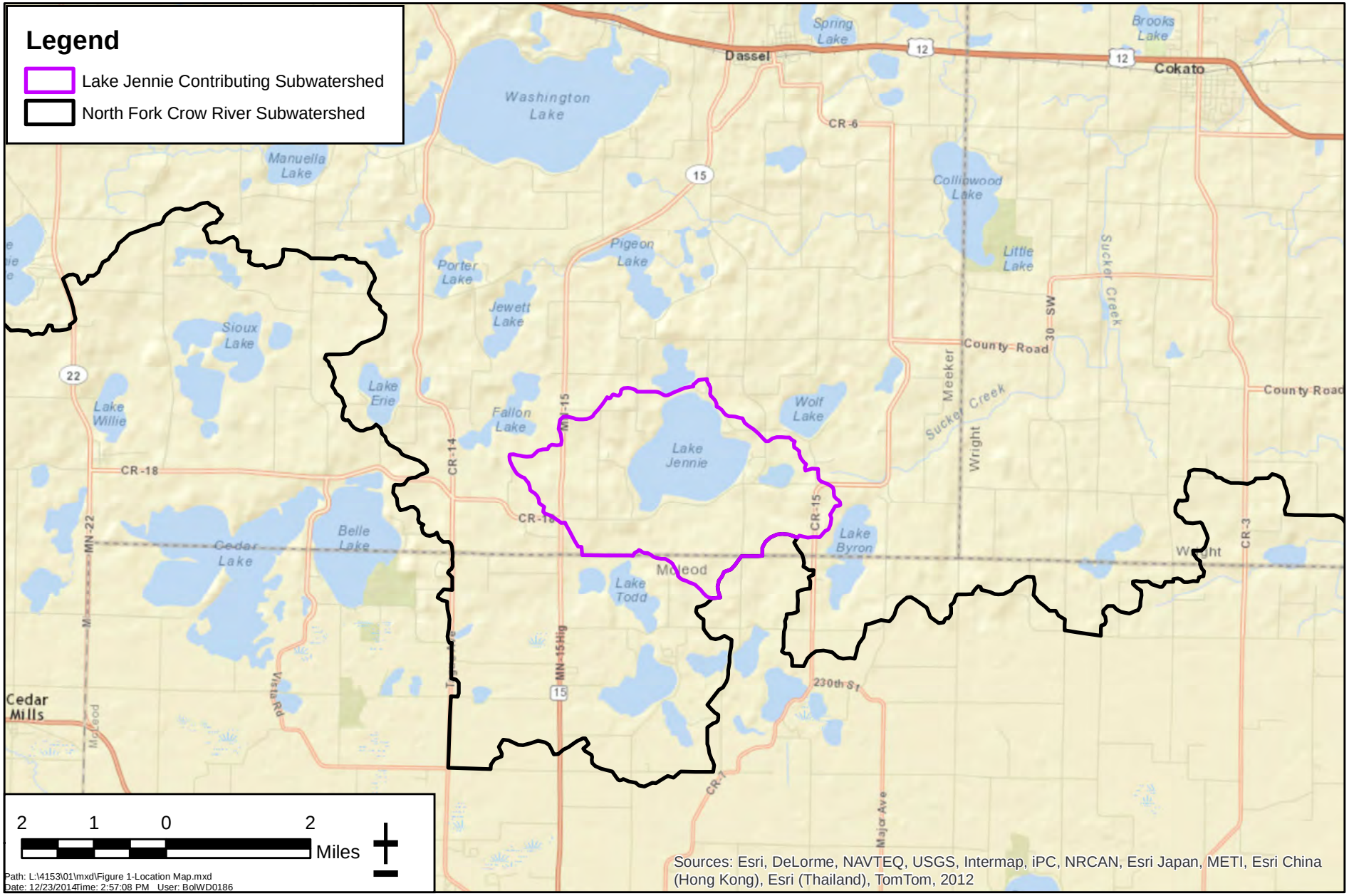
Conclusions

- Submerged aquatic vegetation is very abundant in Lake Jennie during early summer as vegetation was observed at 85% of sample points. Aquatic vegetation coverage declines following the senescence of curly leaf pondweed in late summer as vegetation was observed at only 27% of sample points in late summer.

- The aquatic vegetation community in Lake Jennie is dominated almost exclusively by curly leaf pondweed in early summer.

- Other favorable native species are abundant primarily in areas shallower than 6 feet near shore throughout the lake.

Figures



LAKE JENNIE IMPROVEMENT ASSOCIATION

Lake Jennie Location Map

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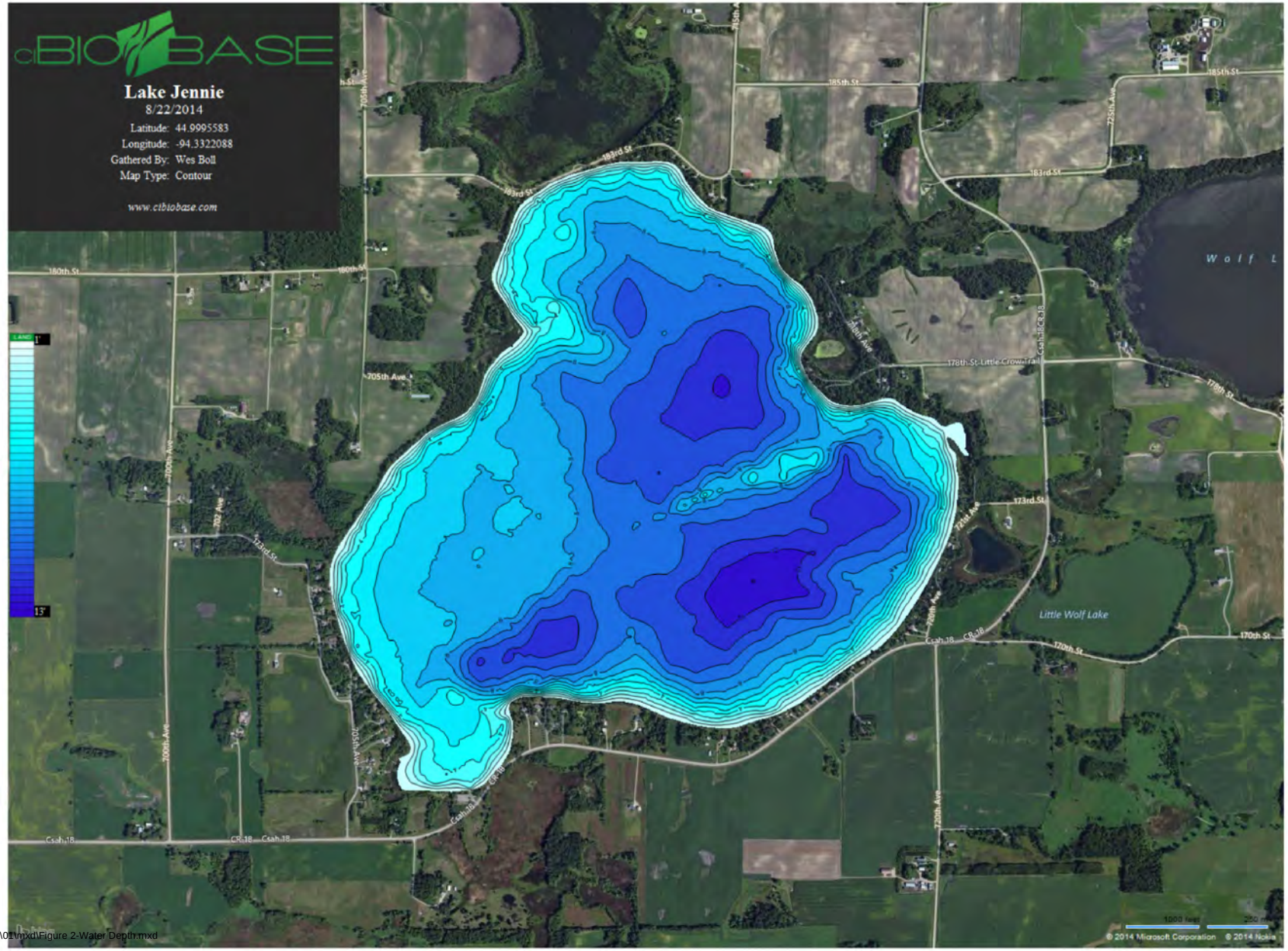
Figure 1



Path: L:\4153\01\mxd\Figure 2-Water Depth.mxd
Date: 12/23/2

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Lake Jennie Depth Contours

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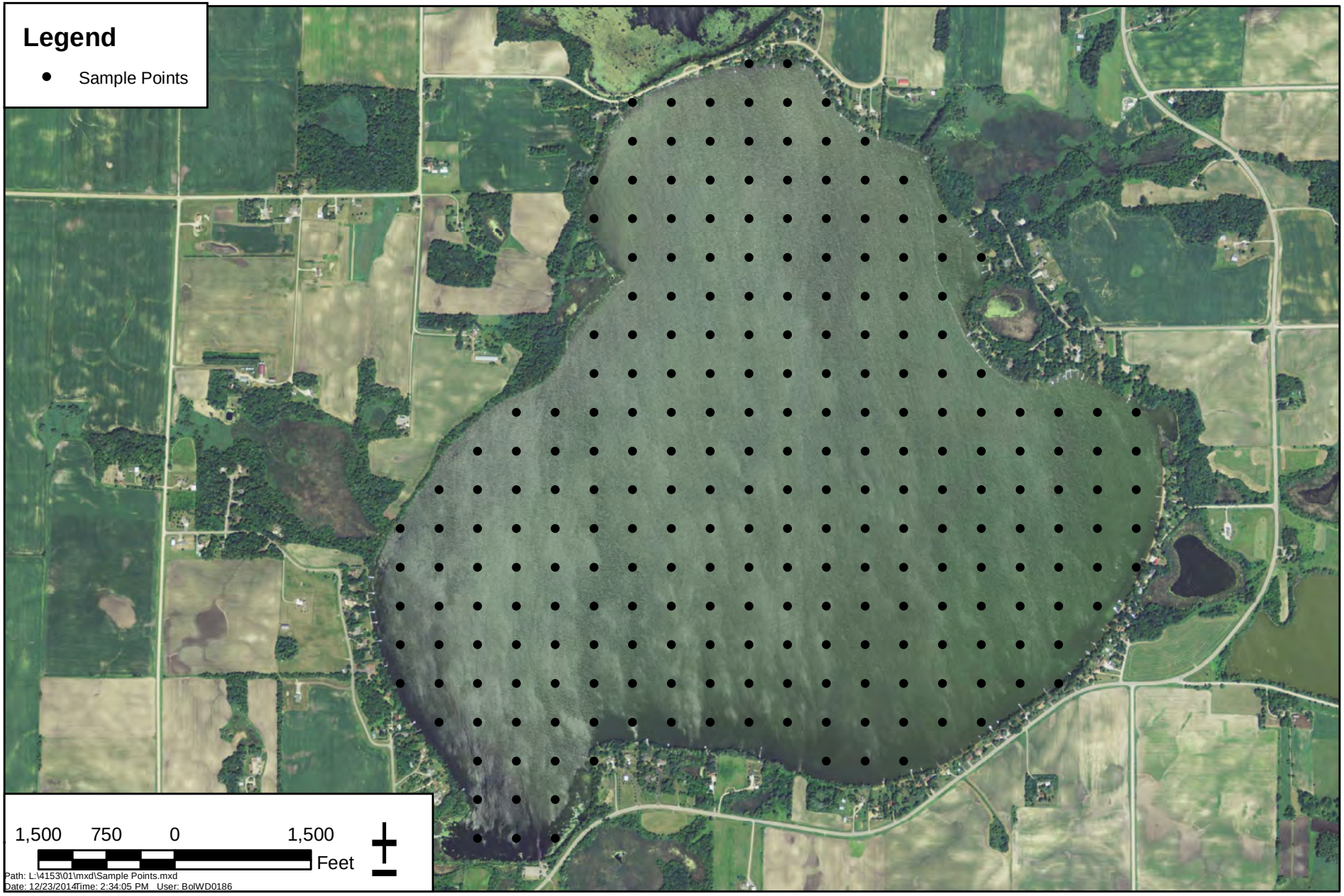
Figure 2



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Aquatic Vegetation Survey Sample Points

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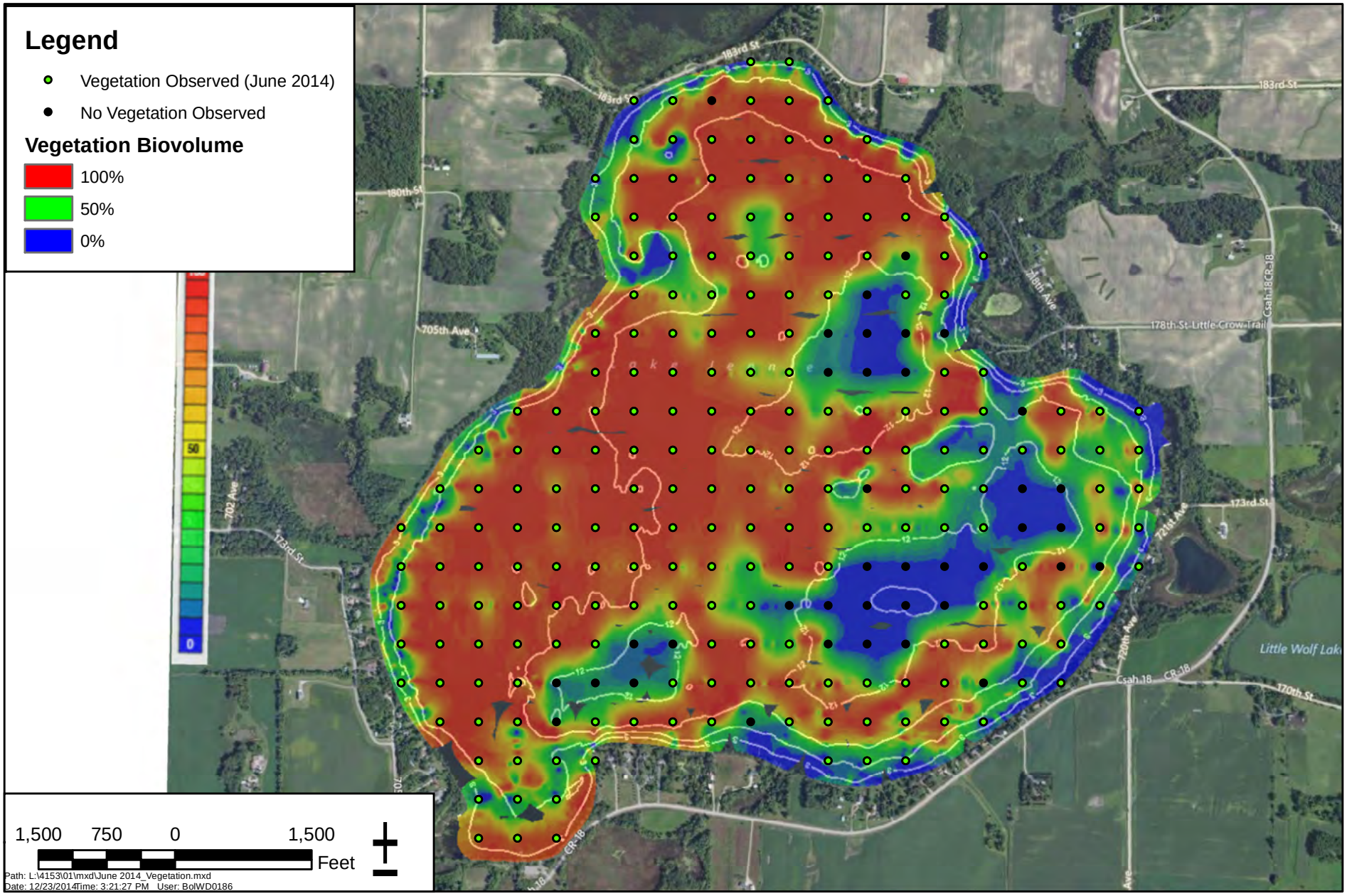
Figure 3



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June 13, 2014 Vegetation Survey Results

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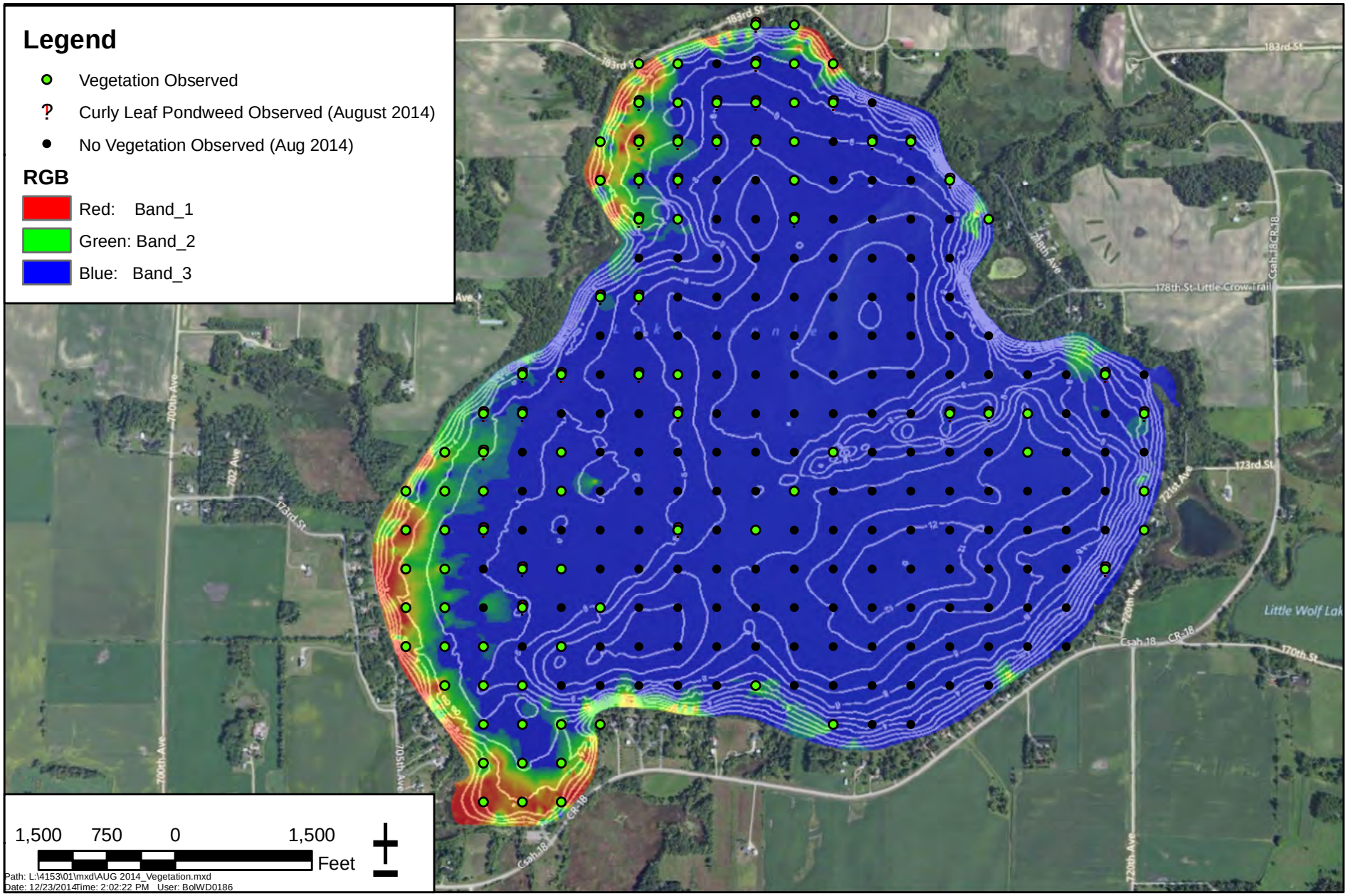
Figure 4



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August 22, 2014 Vegetation Survey Results

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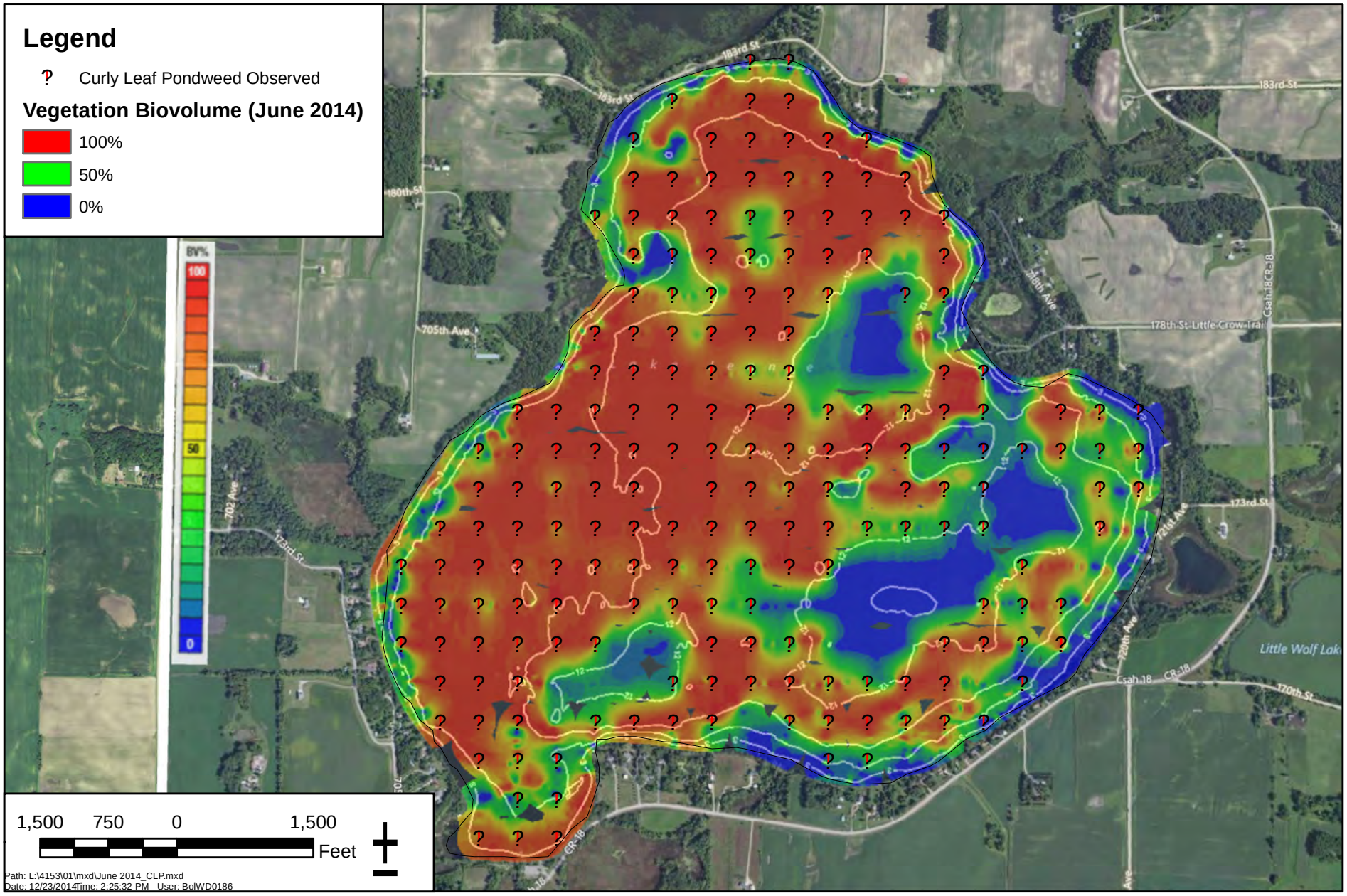
Figure 5



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June 13, 2014 Curly Leaf Pondweed Extent

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Figure 6