



# On-Site Lake Evaluation Record

Lake Name: Duck and Green Lakes

County: Grand Traverse

Evaluated by: Bre Grabill, Jim Chatel

Reviewed by: Bre Grabill

Date: September 2015

Purpose of evaluation: Biobase Mapping; AVAS Survey

## Evaluations Performed

### Aquatic Vegetation Evaluation

- Aquatic vegetation survey
- Aquatic vegetation brief check

### Water quality sampling

- On-site (Temperature, DO, Secchi disk)
- Water samples collected for \_\_\_\_\_ analysis

### Vegetation evaluation methods

- Visual evaluation
- Sample collection with rake
- Sonar profiling
- GPS-mapped sample locations

### GPS data collection

- Depth survey
- Shoreline mapping
- Reference point location

### Other \_\_\_\_\_

## Overall Condition of Lake

- excellent (no problems or developing problems noted)
- very good (no immediate action required)
- fair (management required soon)
- poor (management needed as soon as possible)
- very poor (management action past due—IMMEDIATE response required)

## Problems Noted

- Growth of exotic plants (mark locations on map)
  - Eurasian watermilfoil - Duck Lake
  - Curlyleaf pondweed
  - Starry stonewort
- Excessive growth of native plants (note plant species and mark locations on map)
- Excessive filamentous algae growth (mark location on map)
- Poor water clarity
- Blue-green algal blooms



RECOMMENDATIONS

- X Monitoring Program: Continue monitoring program next season: x Yes, [ ] No
- X Herbicide application: Continue Program Next Season Need for herbicide treatments next season: [ ] urgent, x serious, [ ] moderate, [ ] slight
- [ ] Algaecide application: Continue Program Next Season Need for algae treatments next season: [ ] urgent, [ ] serious, [ ] moderate, [ ] slight

SUMMARY

Duck and Green Lakes was surveyed in September and October 2015 in order to collect new bathymetric and vegetation data of the waterbodies. Using the Biobase technology; over 120 hours of data was collected in order to produce precise depth data of both lakes. In addition to the bathymetric map, bottom composition and vegetation composition data was collected. These maps and survey results are attached.

For a complete Biobase report for Duck Lake, please follow this link: <http://files3.digitalmarine.com/s5/ReportOutput/ecff6a2a-dff3-438b-b8c5-d35358a1dec3/report.htm>

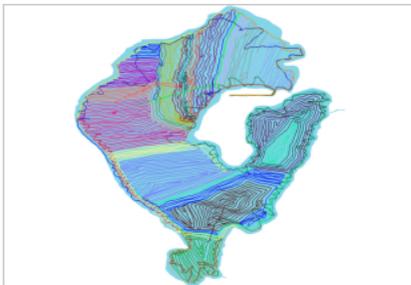


VEGETATION ANALYSIS REPORT

Generated: 10/19/2015 9:04:25 PM (UTC)

Duck Lake, Grand Traverse County Michigan

Waterbody Size: 800.08 ha (1,977.00 acres)



<b>Data Collector</b> Bre Grabill	<b>Survey Size</b> Area: 797.93 ha (1,971.72 acres) Percent: 99.73% of waterbody Volume: 57,414,991.40 cu. m (46,547.09 acre ft)	<b>Settings</b> Track Buffer: 100 m Grid Cell Size: 20 m Min, BV Detect: 5% Min, Veg Depth Detect: 0,73152 m
<b>Data Collection Date</b> 9/14/2015 11:10:39 AM (UTC)	<b>Average Water Temperature</b> 17.39° C (63.3° F)	<b>Est. Waterbody Volume</b> 57,569,959.40 cu. m (46,672.73 acre ft)
<b>Location</b> Start: 44.63002396, -85.76066589 End: 44.6109314, -85.73978424		



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For a complete Biobase report for Green Lake, please follow this link:

<http://files3.digitalmarine.com/s5/ReportOutput/797052ed-0ac4-436b-89f6-837993ab53d4/report.htm>

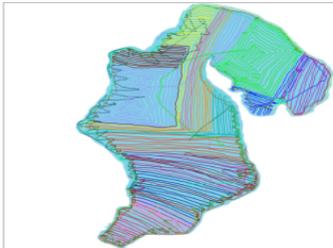


## VEGETATION ANALYSIS REPORT

### Green Lake, Grand Traverse County Michigan

Generated: 10/23/2015 12:58:46 PM (UTC)

Waterbody Size: 822.20 ha (2,031.70 acres)



<b>Data Collector</b> Bre Grabill	<b>Survey Size</b> Area: 821.59 ha (2,030.20 acres)	<b>Settings</b> Track Buffer: 65 m Grid Cell Size: 13 m
<b>Data Collection Date</b> 9/14/2015 2:09:01 PM (UTC)	Percent: 99.93% of waterbody Volume: 89,970,054.20 cu. m (72,939.91 acre ft)	Min. BV Detect: 5% Min. Veg Depth: 0.73152 m Detect:
<b>Average Water Temperature</b> 19.04° C (66.28° F)	<b>Est. Waterbody Volume</b> 90,036,908.00 cu. m (72,994.11 acre ft)	
<b>Location</b> Start: 44.59846878, -85.79206085 End: 44.59136581, -85.78238678		

### Summary of Maps/Survey:

**Bathymetric Map:** Blue 10' Contour Map. Green Lake shows a lake area of 2,030.20 acres and a volume of 72,939.71 acre feet including a depth of 100'. Duck Lake shows a lake area of 1,971.72 acres and a volume of 43,672.73 acre feet including a depth of 95'. Light blue is shallow water; dark blue is deep water. Map available in 1', 3', 5', 10' intervals; however the 10' demonstrates the areas well and is attached.

**Bottom hardness/composition Map:** Red/Brown Maps showing the hardness of the bottom of Green & Duck Lakes. Red indicates hard bottom (sand, rock and/or gravel) while light brown indicates soft bottom (muck). Lighter red/darker brown colors are indicative of medium values including clay or a thin layer of muck over hard bottom. Green & Duck Lakes have mostly a hard outside perimeter with a soft bottom in the deeper water, which is typical of deep water. There are a few softer areas along the outside, but a majority of the littoral zone is hard bottom.

**Vegetation Map:** Blue/Green to Red Maps showing vegetation density of Green & Duck Lakes. The blue area is indicative of little to no plant coverage. On Green & Duck Lakes, a majority of both waterbodies show very little vegetation. The green color is shaded from dark (few plants) to light green (plants dominate in this area) to yellow and then orange, light red and dark red being 100% density in entire water column (bottom to top). Both lakes have a few shoreline areas of high volume plants. On Duck Lake, some of these areas contain exotic plant beds (EWM), but not all. On Green Lake, these areas are indicative of mixed native plant beds. See AVAS Survey results for full plant species breakdown.

**AVAS Survey:** The AVAS Survey shows a similar plant make up on Green & Duck Lakes that is dominated with a diverse native plant community. Phragmites, an exotic terrestrial plant was found on both lakes. As a separate program is underway for the management of Phragmites, it was not the focus of this survey. Reviewing the submersed plant community, one exotic species, Eurasian watermilfoil (EWM) was found growing in Duck Lake. Although both lakes are capable of growing EWM and have native milfoil strands present, EWM was not currently found in Green Lake. A close eye needs to be kept on Green Lake for early detection and rapid response. On Duck Lake, the milfoil is currently found in a few areas of the lake and treatment is recommended for the 2016 season to prevent further spread. Once an exotic plant is found, eradication is difficult; however, proper management can keep infestation levels very low. EWM is best controlled with chemical applications. Once an exotic plant enters a lake, it is common for it to outcompete native plants and often times the loss of native plant diversity occurs. The infestation on Duck Lake is low and so far no loss of native plants is evident. Maintaining the plant diversity on



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Green & Duck Lakes is vital to the long term health of the lake. Performing regular surveys and AVAS Surveys can document the success of a management program and track the impacts of an exotic species in a waterbody. It is recommended that both lakes be surveyed annually for treatment and exotic plant identification and have a seasonal AVAS Survey done to document all plants and any changes in the water column.

Please feel free to contact me with questions on your maps and survey results of Green & Duck Lakes. Thank you for choosing to work with PLM on this project!

Respectfully,

A handwritten signature in cursive script that reads "BreAnne Grabill".

BreAnne Grabill, Environmental Scientist  
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