

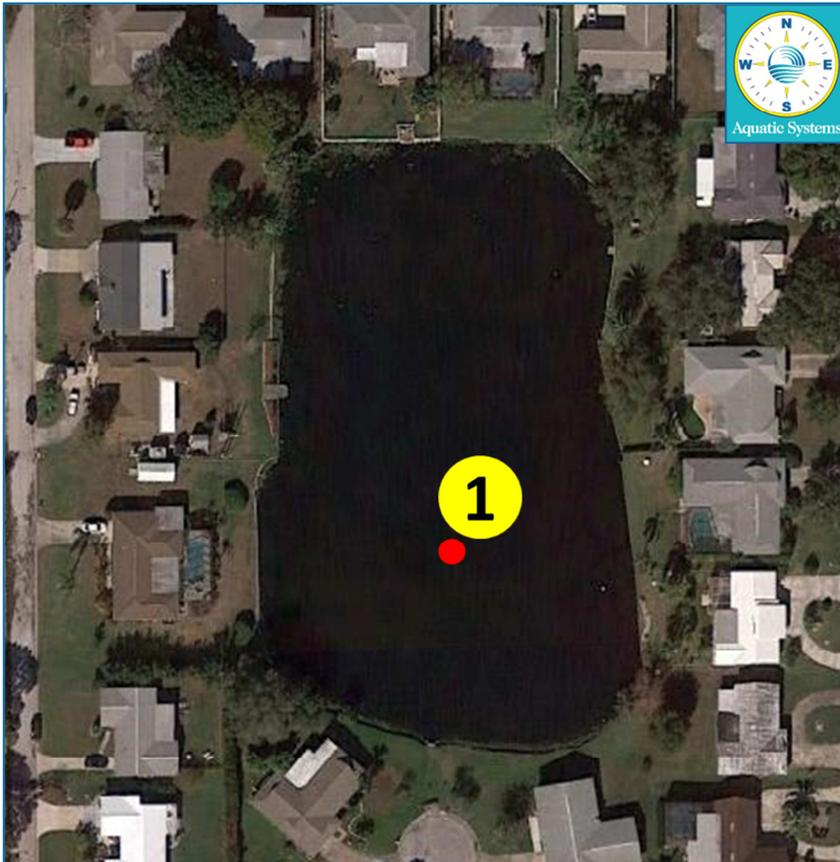
Grove Lake Manor

Standard Lake Assessment

Sample date: 10/12/2017

Report date: 10/31/2017

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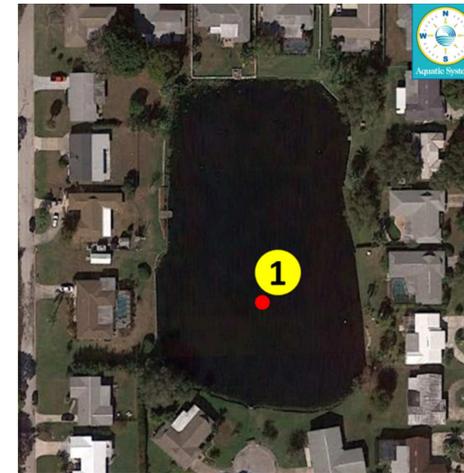
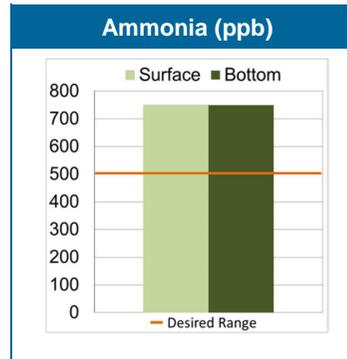
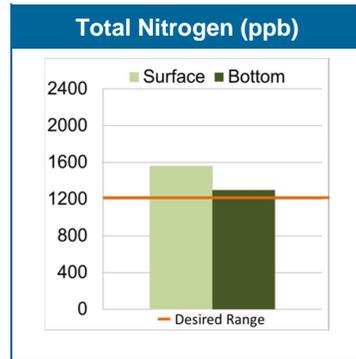
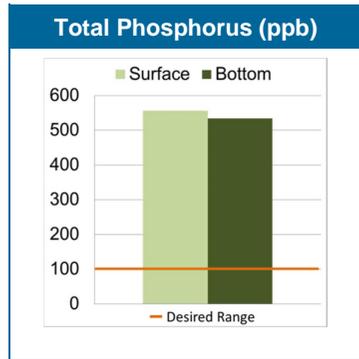


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Water Quality Data: Grove Lake Manor, Site 1

Test	Desired Range	Site 1		This lake is:
		Surface	Bottom	
Nutrients - Total Phosphorus	< 100 ppb	555	534	High
Nutrients - Total Nitrogen	400-1200 ppb	1560	1300	High
Nutrients - Ammonia	< 500 ppb	750	750	High
Water Clarity - Secchi Depth	≥ 4 Feet	4		Normal

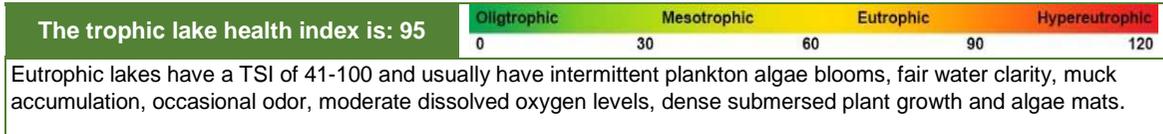


Basic Lake Information

Measured	Calculated Approximation
Perimeter Ft: 1170	Volume-Gal.: 2,597,100
Surface Acres: 2.1	Total Acre Ft: 8.0
Depth: 4	

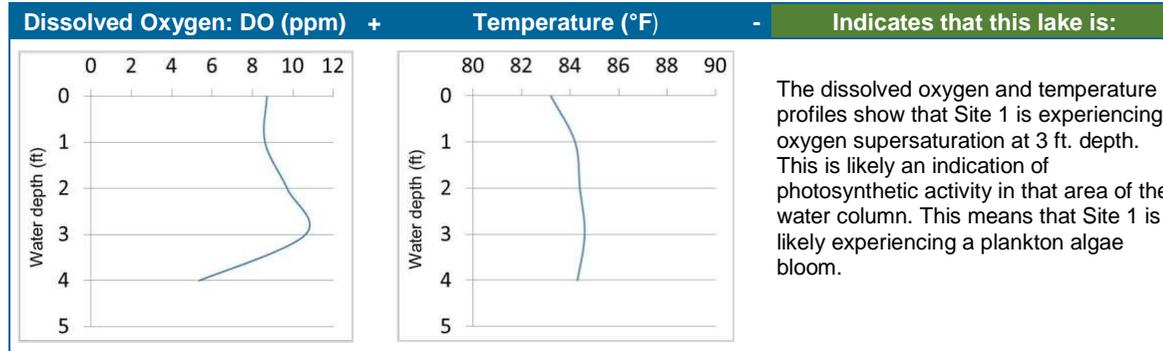
The TN/TP Ratio is: 2.6

When the TN/TP ratio is less than 10 the lake strongly favors growth of cyanobacteria algae blooms that may produce toxins and display a pea soup appearance and/or forms surface mats. Water column phosphorus needs to be reduced.



Observations

Water quality analysis suggests that Site 1 is experiencing elevated nutrient levels. It is evident that all nutrient levels are above the desired range. It is possible that the elevated ammonia levels may explain past fish kills. Although ammonia levels measured high, it is possible that the present aeration system has lowered ammonia levels since being installed. Further monitoring would be necessary to confirm. Field observation suggests that Site 1 is a fairly shallow, productive system. Alum may help to reduce nutrients that are causing algae growth.



- ### Recommendations for This Lake
- Alum for Phosphorus Reduction
 - Muck Measurement and Analysis
 - On-going water quality monitoring

Trophic State Index (TSI)

A Trophic State Index (TSI) provides a single quantitative result for the purpose of classifying and ranking lakes in terms of water quality.

Nutrients such as phosphorus are usually the limiting resource for algae and plant abundance and therefore are used in creating a TSI reference number. Generally, the higher the lakes TSI the greater the likelihood of elevated nutrient levels, increased algae problems and decreased water clarity.

Most of Florida's geology provides for very nutrient rich sediments which cause lakes to have naturally high primary productivity and be naturally eutrophic.

Oligotrophic (<30): Very low biological productivity - Clear Water, bottom, well oxygenated, few plants and animals

Mesotrophic (30-40): Low to medium biological productivity - moderately clear water, abundant plant growth

Eutrophic (50-70): High biological productivity - fair water clarity, muck accumulation, dense plant growth and algae mats

Hypereutrophic (>70): Very high productivity - plankton algae blooms, low oxygen, fish kills, poor water clarity and quality, limited submersed plant growth, muck accumulation, bottom and surface algae mats dominate

TN/TP Ratio

The TN/TP ratio can provide a useful clue as to the relative importance of nitrogen or phosphorus toward the abundance of algae in a waterbody.

In general, the lower the TN/TP ratio the more cyanobacteria bacteria will be present (i.e., Microcystis) and the higher the TN/TP ratio the more desirable green algae will be present.

Studies done on TN/TP ratios have found good agreement in predicting the type of algae present (Schindler et al., 2008; Yoshimasa Amano et al., 2008).

Nutrient Tested	Desired Range	Issues with high levels	Likely causes of high levels
Total Phosphorus	<100 ppb	>100 ppb can cause excessive aquatic weeds and algae	Reclaimed water discharge, landscape fertilizer runoff and agricultural drainage, phosphorus laden bottom sediments
Total Nitrogen	400-1200 ppb	>1200 ppb can cause excessive aquatic weeds and algae	Landscape fertilizer runoff
Ammonia	<500 ppb	>500 ppb can be toxic to fish and animals	Organic decomposition, landscape/fertilizer runoff, and anoxic conditions (low oxygen)

Dissolved Oxygen

The most critical indicator of a lake's health and water quality.

- Oxygen is added to aquatic ecosystems by aquatic plants and algae through photosynthesis and by diffusion at the water's surface and atmosphere interface.
- Oxygen is required for fast oxidation of organic wastes including bottom muck.
- When the oxygen is used up in the bottom of the lake, anaerobic bacteria continue to breakdown organic materials, creating toxic gasses such as hydrogen sulfide.
- For a healthy game-fish population, oxygen levels should not go below 4.0 ppb

Secchi depth

A mechanical test to judge water clarity, accomplished by lowering a black and white disk into the water and recording the point at which it can no longer be seen.

- Higher values indicate greater water clarity.
- Nutrient rich lakes tend to have Secchi depths less than 9 feet and highly enriched sites less than 3 feet.