



River Wilderness

Standard Lake Assessment and Phosphorous and Clarity Jar Test

Sample date: 7/31/2018

Report date: 8/6/2018

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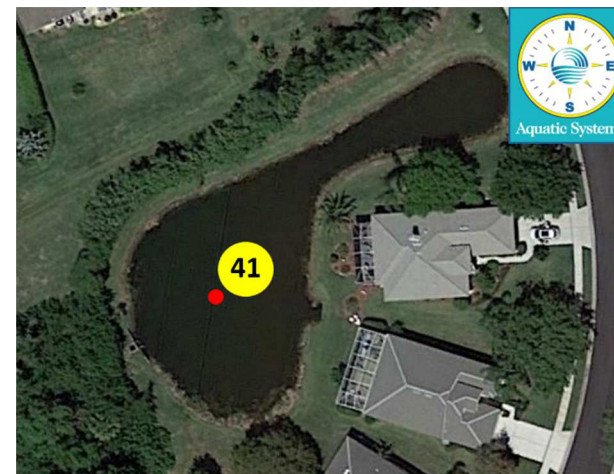
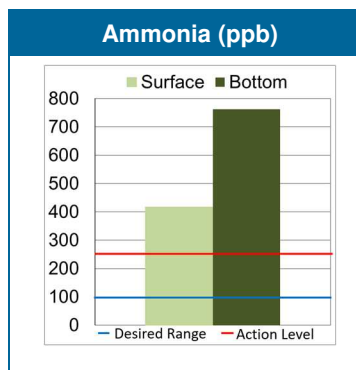
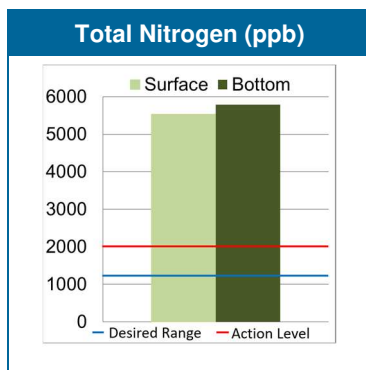
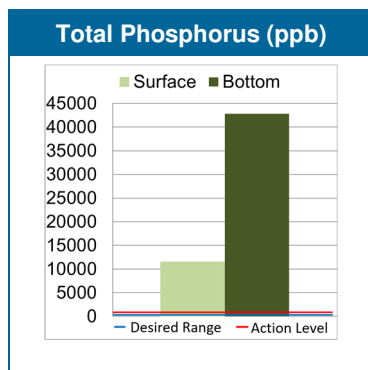
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Water Quality Data: River Wilderness Site 41

Date: 7/31/2018

Test	Desired Range	Action Level	Site Readings		This lake is:
			Lake Readings - Site 41 Surface	Bottom	
Nutrients - Total Phosphorus	< 30 ppb	> 100 ppb	11,520	42,800	Very High*
Nutrients - Total Nitrogen	< 1200 ppb	>2000 ppb	5,530	5,790	High*
Nutrients - Ammonia	< 100 ppb	>250 ppb	417	762	High*
Water Clarity - Secchi Depth	≥ 4 Feet	N/A	0.1		Low*

* Nutrient thresholds depend on your management goals. Please see TSI index description on glossary page for more information



Basic Lake Information	
Measured	Calculated Approximation
Perimeter Ft: 600	Volume-Gal.: 250,600
Surface Acres: 0.3	Total Acre Ft: 0.8
Depth: 8	

Observations

Field observations indicate that construction runoff (sedimentation) has occurred at Site 41 causing disturbances to the lake. Site 41 also appears to be experiencing a planktonic algae bloom. Water chemistry results reveal Site 41 is experiencing extremely elevated nutrient levels. Lakes with high nutrient concentrations are likely to experience algal blooms. Phosphorus is often the limiting nutrient that fuels algal growth. Since algae use these nutrients for fuel, algae abundance is often correlated with nutrient availability.

It is worth noting that the nutrient levels are higher on the bottom of the water column. When oxygen levels are low, phosphorus may leach out of the bottom sediments and ammonia may accumulate to toxic levels. Sedimentation can also add to benthic nutrient levels being elevated.

Recommendations for This Lake

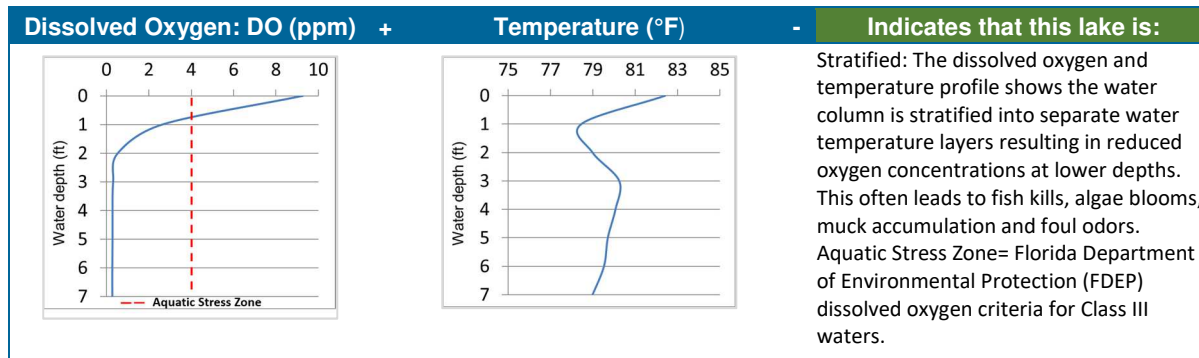
- ☒ Aeration for de-stratification and nitrogen/ammonia reduction
- ☒ Alum for phosphorus reduction and clarity improvement
- ☒ Watershed Management
- ☒ On-going water quality monitoring

The TN/TP Ratio is: 0.31

When the TN/TP ratio is < 75, the chances of having toxin producing cyanobacterial blooms (blue-green algae) as plankton or filamentous mats increase. Water column phosphorus needs to be reduced to promote more desirable algal groups.

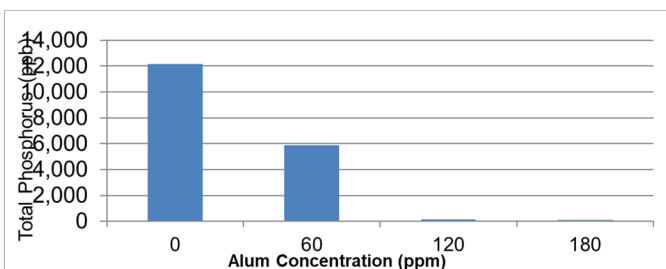
The trophic lake health index is: 158

Hypereutrophic lakes have a TSI index greater than 100 and usually experience heavy plankton algal blooms, dangerously low dissolved oxygen levels, occasional fish kills, poor water clarity, odor, bottom muck and undesirable blue green algae mats dominate.



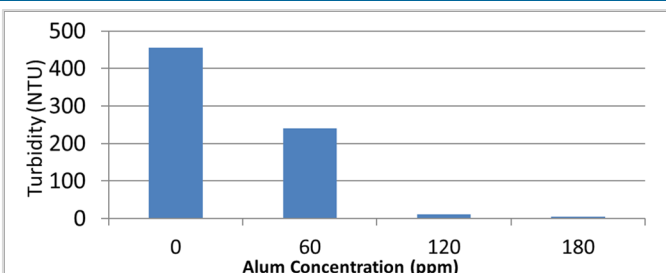
Water analysis revealed elevated phosphorus and turbidity levels in this pond. Phosphorus levels of less than 30 ppb are recommended for freshwater systems. Water testing was performed in order to determine a safe and effective rate for Alum.

Phosphorus Jar Test: Desired range is <30 ppb, Action Level is >100ppb



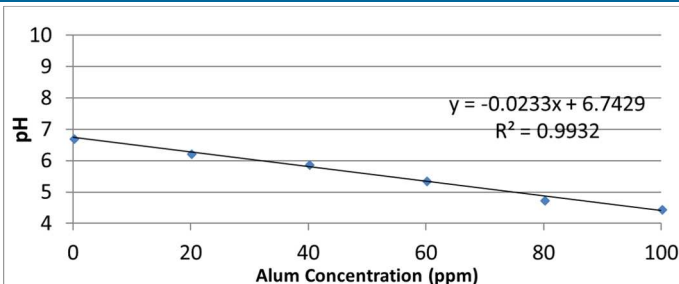
Alum Concentration (ppm)	Total Phosphorus (ppb)
0	12,140
60	5,880
120	123
180	120

Water Clarity Jar Test: Desired Range is < 5 NTU



Alum Concentration (ppm)	Turbidity (NTU)
0	455
60	241
120	10.9
180	5.19

pH Titration: Dosing Limitations



In order to protect aquatic life it is recommended that pH levels do not drop below 6.5.

It is also recommended that pH levels are not altered by more than one pH unit.

It is recommended that Alum dosage does not exceed 20 ppm at any one time or without a buffer since pH levels drop too low.

Measured Alkalinity: 20 mg/L

Alkalinity is the measure of the buffering capacity of the lake. Lakes with low alkalinity (values below 80 mg/L) are susceptible to drastic pH swings.

Recommendations

Based on test results, the following is recommended:

- Alum treatment at the end of the rainy season
 - ☒ Dose: 120 ppm
 - With the use of a buffering agent
- ☒ Follow-up Total Phosphorus & Turbidity testing
 - When: 1 week after treatment

Due to external factors not accounted for in lab tests, phosphorus reduction rates in the field may be lower or higher than are estimated by lab results.

Additional Alum treatments may be required if target is not reached with the scheduled applications.



Nutrient Tested	Desired Range	Action Level	Issues with high levels	Likely causes of high levels
Total Phosphorus	< 30 ppb	> 100 ppb	>100 ppb can cause excessive aquatic weeds and algae	Reclaimed water discharge, landscape fertilizer runoff and agricultural drainage, phosphorus laden bottom sediments
Turbidity	≤ 5 NTU	n/a	>5 NTU's can cause stress to fish, clogging gills and reducing predation	Suspended solids such as silt, clay fine organic or inorganic particles, plankton or other microscopic organisms

Nutrient Thresholds

The desired range is the threshold value recommended for Florida freshwaters in order to limit algae growth and water clarity issues. Keeping nutrients in this range help maintain a balanced ecosystem.

If nutrients are measured above the action level, it is likely that the nutrient levels may have a detrimental effect on aquatic life and long-term lake health. Action needs to be taken at this point to maintain a healthy ecosystem. Nutrients above the action level will require more maintenance.

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.

Due to the dynamic nature of Florida's geology and differing climate zones, regional locations may differ slightly in what is considered a healthy water quality profile.

TSI Values	Trophic Status	Attributes
30-40	Oligotrophic	Clear water, few plants and algae, small bass
40-50	Mesotrophic	Water moderately clear, but increasing probability of anoxia, green algae are likely dominant, balanced fishery with medium sized bass
50-60	Eutrophic	Decreased transparency, occasional light algal blooms, lots of available food making for large bass
60-70	Eutrophic	Dominance of blue-green algae, algal scums possible, extensive macrophyte problems possible, higher probability of anoxia, fishery starting to decline
70-80	Hypereutrophic	Dominance of blue-green algae, frequent algal scums, higher probability of anoxia, stunted fishery
>80	Hypereutrophic	Algal scums, higher probability of anoxia, fish kills, few macrophytes, very poor water clarity

More information on data sources available upon request.