

River Wilderness

Phosphorus and Clarity Jar Test

Sample date: 9/11/2018

Report date: 9/14/2018

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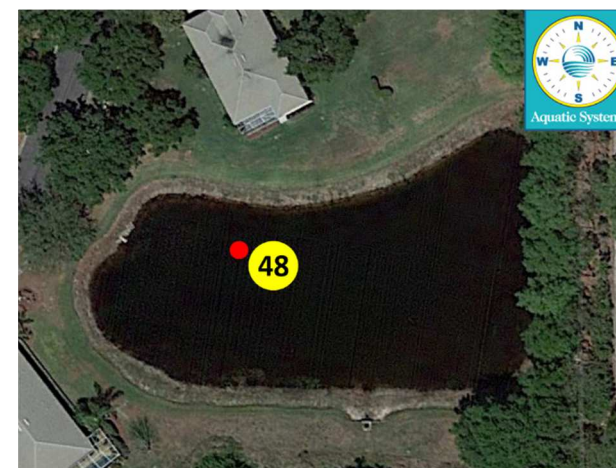
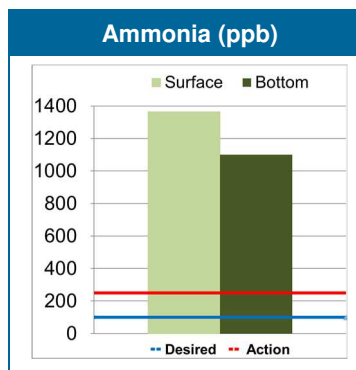
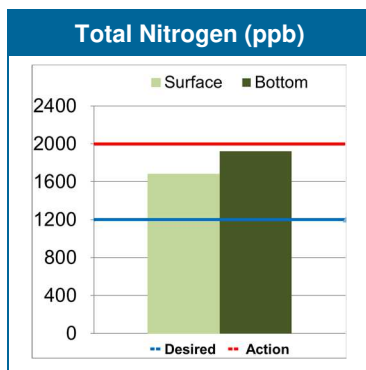
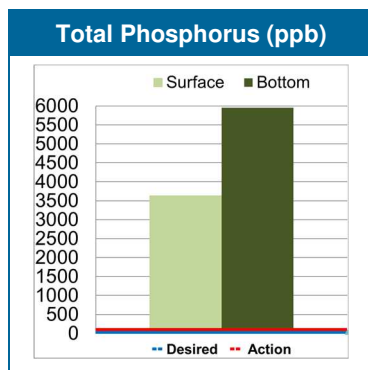
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Water Quality Data: River Wilderness, Site 48

Date: 9/11/2018

Test	Desired Range	Action Level	Site Readings		This lake is:
			Surface	Bottom	
Nutrients - Total Phosphorus	< 30 ppb	> 100 ppb	3630	5950	Very High
Nutrients - Total Nitrogen	< 1200 ppb	>2000 ppb	1680	1920	Borderline
Nutrients - Ammonia	< 100 ppb	>250 ppb	1365	1101	High
Water Clarity - Secchi Depth	≥ 4 Feet	N/A	3 inches		Low*

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

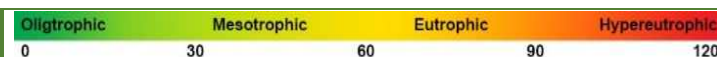


Basic Lake Information	
Measured	Calculated Approximation
Perimeter Ft: 789	Volume-Gal.: 1,715,000
Surface Acres: 0.98	Total Acre Ft: 5
Depth: 8.1	

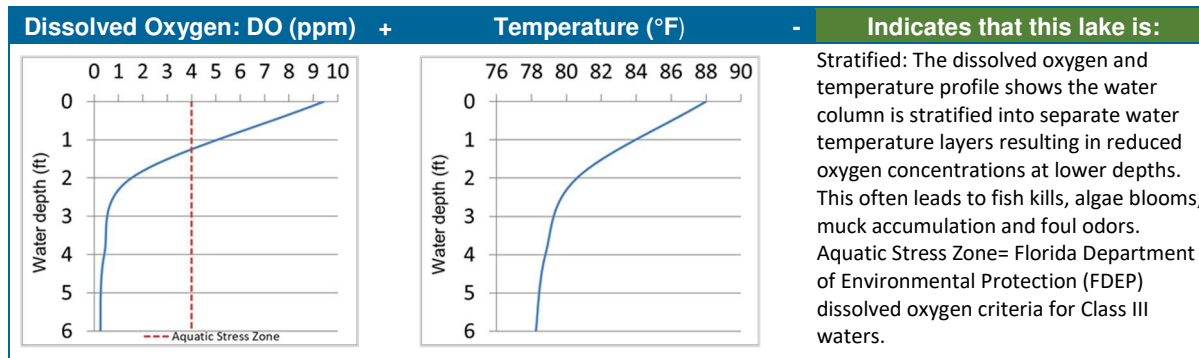
The TN/TP Ratio is: 1.5

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: 108



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.



Observations

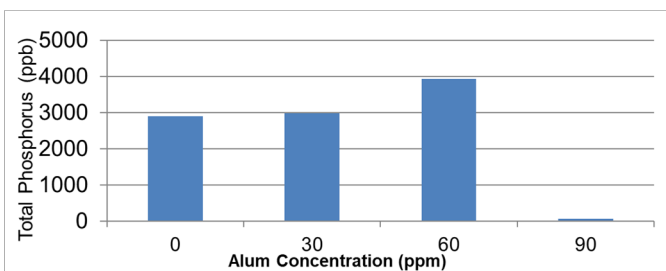
Field observations indicate that construction runoff (sedimentation) has occurred at Site 48 causing disturbances to the lake. Site 48 also appears to be experiencing a planktonic algae bloom. Water chemistry results reveal Site 48 is experiencing extremely elevated nutrient levels. Lakes with high nutrient 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 stratification at this site may be contributing to nutrient accumulation. 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 nutrient reduction
- ☒ Alum for Phosphorus Reduction
- ☒ Watershed Management
- ☒ On-going water quality monitoring

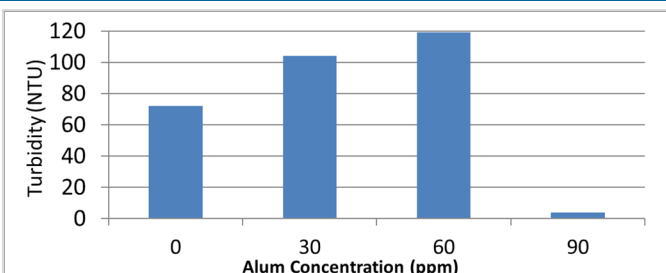
Water analysis revealed elevated phosphorus and turbidity levels in this pond. Phosphorus levels of less than 30 ppb are recommended for freshwater systems. Water testing was performed in order to determine a safe and effective rate for Alum.

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



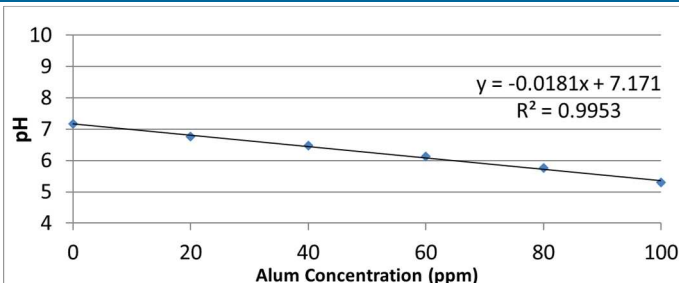
Alum Concentration (ppm)	Total Phosphorus (ppb)
0	2905
60	2990
90	3935
120	63

Water Clarity Jar Test: Desired Range is < 5 NTU



Alum Concentration (ppm)	Turbidity (NTU)
0	72.0
60	104.2
90	119.0
120	3.82

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 60 ppm at any one time since pH levels drop too low.

Measured Alkalinity: 45 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.

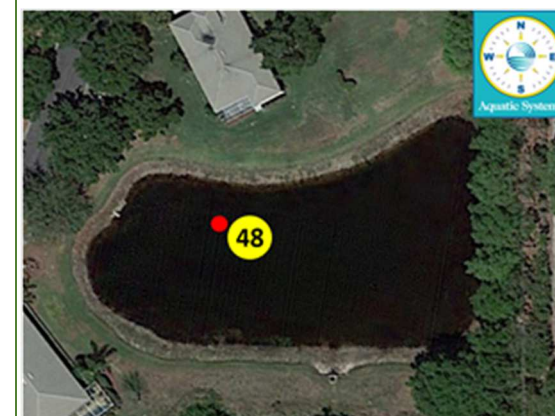
Recommendations

Based on test results, the following is recommended:

- ☒ Alum Treatment
 - Dose: 120 ppm
 - With the use of a buffering agent
 - After construction is completed
- ☒ 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.