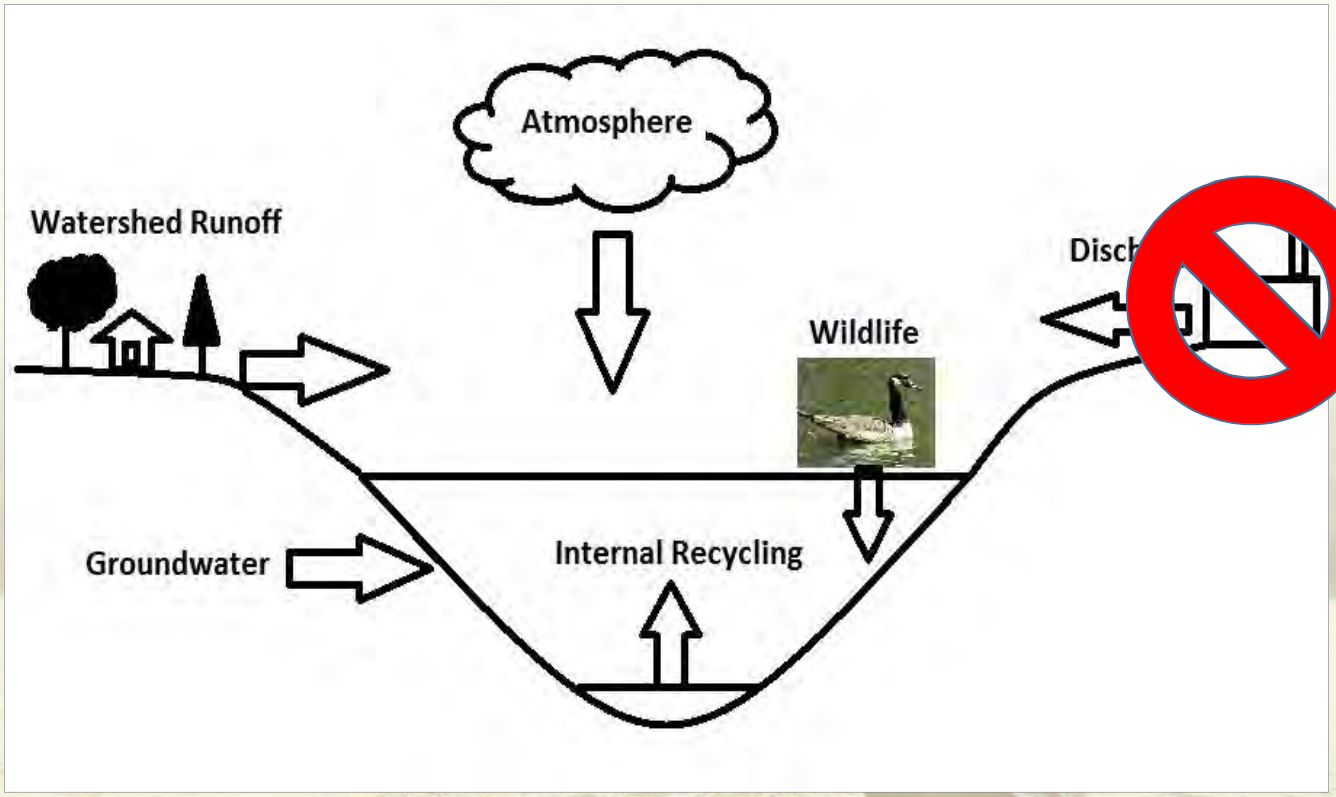
Crystal Lake Management Plan

Objective: Complement existing studies with additional evaluations to develop a comprehensive management plan to reduce the likelihood of algal blooms.

Nutrient Cycle 101

https://www.youtube.com/watch?v=2e60gGBssf0



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What We Did?

- Review Existing Information
  - Water Quality-Lake and Stormwater, Watershed Boundary, Existing and Planned Stormwater Controls, Existing Non-structural Source Controls
- Additional Evaluations
  - Bathymetry and Sediment Coverage on Pond Bottom, Sediment Phosphorus Concentrations/Availability, Dissolved Oxygen, Total Phosphorus (In-lake and stormwater), Phytoplankton, Zooplankton
  - Additional Opportunities for Stormwater Controls (Structural and Non-Structural)
  - Watershed Nutrient Modeling – Predicting Loads and Lake Response
- Alternatives Review and Recommendations

Sediment Sampling Locations (2020)

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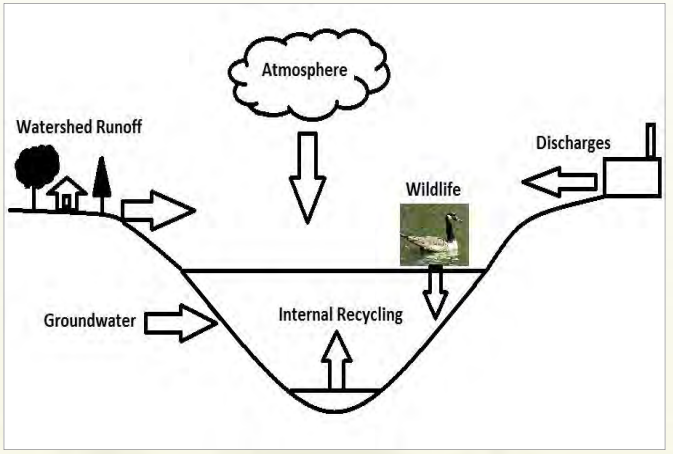
What We Found?

- Low watershed to lake size ratio
- Pond lake sediments contain sufficient “available” phosphorus for annual recycling
- Internal concentrations of TP ~17-20 micrograms/l in summer – sufficient to support blooms
- Internal loading of TP (nutrient recycling) largely responsible for summer TP concentrations and cyanobacteria blooms (34% of annual nutrient load)
- Watershed load is important too and represents 54% of annual load but is distributed through the year, i.e. not immediately available in the summer
- Management of both internal and external load is necessary to achieve long-term objective… <u>but internal load is critical in near term</u>



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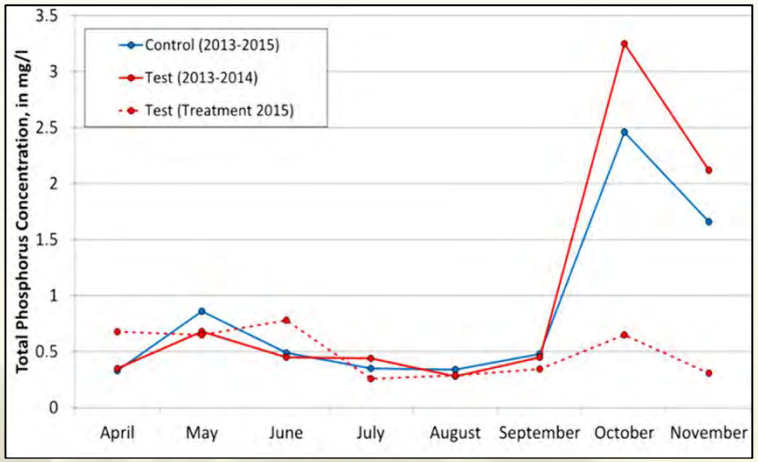
Alternatives Evaluated

- Internal Nutrient Management
  - Dredging, Oxygenation, Phosphorus Inactivation
- External Nutrient Management
  - Watershed Structural Options – Both planned and best retrofit options
  - Watershed Non-Structural Options – Increasing or modified sweeping and leaf litter collection



Courtesy of William Selbig, USGS – Wisconsin Water Science Center wrselbig@usgs.gov Selbig, W.R., 2016, Evaluation of leaf removal as a means to reduce nutrient concentrations and loads in urban stormwater, Science of the Total Environment, 571, pp. 124 - 133

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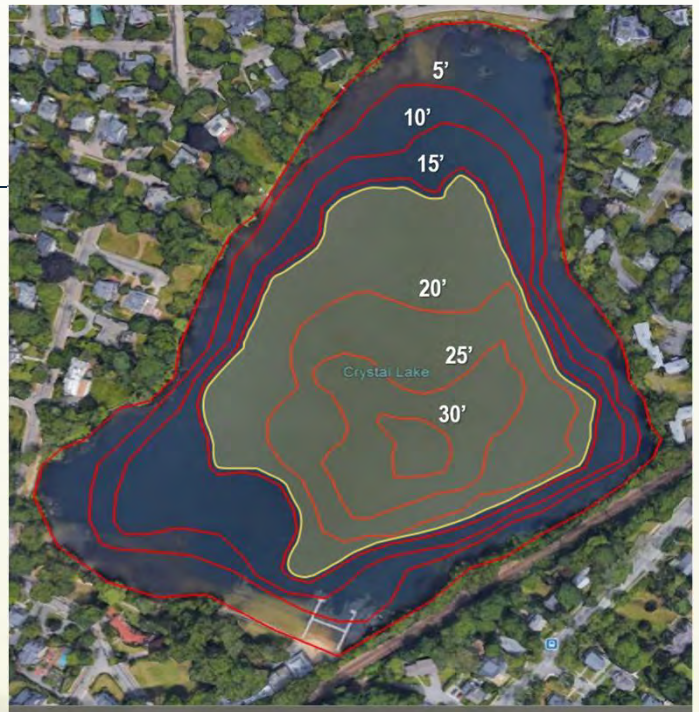
Recommendations

- Phosphorus Inactivation
  - Implement Nutrient Inactivation
    - Å (Late spring 2020 with benefits by Summer 2020)
  - Reduce internal load by 90%
- Watershed Management
  - Continue Aggressive Source Control – Focus on Leaves
  - Complete Planned Retrofits (Trowbridge Street and Levingston Cove)
  - Two New Infiltration Based Retrofits (Cronin's Cove and Crystal St/Lake Avenue Intersection)
  - Reduce external load by ~30%



Crystal Lake Bathymetry and Approximate Nutrient Inactivation Control Area (in yellow)

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