

Detecting phosphorus release from stormwater ponds to guide management and design

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The primary goal of this project is to better understand and predict risk factors for stormwater ponds that can lead to degradation of pond function for phosphorus (P) retention. Study efforts over the past year have included several field, laboratory, data analysis and synthesis tasks:

- **Continuous monitoring** in 15 ponds of water temperatures, depth, salinity, and wind speed above the water surface during summer and fall 2019;
- **Collection of water samples** (surface and hypolimnion) for phosphorus analysis and vertical profile measurements of dissolved oxygen, salinity, and temperature every 2-3 weeks in the 15 study ponds, as well at two times during the 2019 field season in a larger set of ponds (n = ~50) chosen to include a broader range of pond characteristics (age, depth, size, sheltering, land use, etc.);
- **Measurement of P release from pond sediment cores** under simulated oxic and anoxic conditions in the laboratory for 5 ponds, and sediment chemistry analyzed in detail to characterize the P fractions and organic matter composition that directly influence the potential for P to release from the sediments.
- **Identification and quantification of risk factors**, including season, mixing events and stratification dynamics (from temperature data), fraction of pond sediments exposed to low-oxygen conditions, tree canopy/wind sheltering (from LiDAR data), duckweed cover (site visits and aerial photos), and sediment composition (phosphorus, organic matter);
- **Synthesis of pond data** from this and previous projects to predict TP concentrations as a function of pond characteristics, dissolved oxygen, season, and watershed factors;
- **Developing predictive equations for sediment P release** and pond P levels as a function of sediment P composition (a risk factor), with data from the five laboratory-studied ponds being combined with data previously collected to develop the regression equations.