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Blue-green algae in Midwestern reservoirs: tools for management and understanding

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Nuisance blue-green algal blooms are occurring at increasing rates in the Indiana lakes that receive recreational use and in some cases are part of the drinking water supply network. These blooms have led to aesthetic degradation of water resources (e.g., surface scums on the water and taste and odor in drinking water). Furthermore, some blue-green algae are known to produce toxins, which can have serious adverse human health effects. Though strains of blue-green algae seen in the Indiana lakes have been documented as toxin producers, the conditions in which they produce toxins are highly variable, causing health officials to close lakes without fully understanding the level of toxicity. Current methods for detecting blooms are costly and time consuming, delaying management decisions. Ongoing work to document reservoir conditions, distribution of algae, and level of toxin production is necessary.

Remote sensing techniques, which utilize the optical properties of blue-green algal pigments (chlorophyll *a* and phycocyanin) can provide a rapid assessment of the spatial distribution and relative concentration of blue-green algae and can inform sampling campaigns and ultimately management decisions. Coupled with physical and chemical data from lakes, remote sensing can help in understanding bloom formation and prediction and toxin production potential. Likewise, the use of remote sensing can provide an efficient method for tracking blue-green bloom occurrence over time relative to long-term management strategies. Semi-empirical remote sensing algorithms applied to two Indianapolis reservoirs, Morse and Geist, have proven robust in predicting phycocyanin concentration with a root mean square error of 24.61 pbb (n=48, p<0.0001), however algorithm transferability needs to be analyzed further through application to additional test lakes in Indiana.

This presentation will provide an overview of the distribution of blue-green algae in Illinois and Indiana reservoirs and the associated toxin production and provide a discussion of the applicability of new remote sensing tools for reservoir management.