

Title: A Northeastern US Lakes Database to Support Ecosystem Services Research

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Abstract: Northeastern lakes provide valuable ecosystem services that benefit residents and visitors and are increasingly important for provisioning of recreational opportunities and amenities. Concurrently, however, population growth threatens lakes by, for instance, increasing nutrient loads. We are developing a database to explore the association between lake condition and the provisioning of ecosystem services. This database provides unique identification numbers for over 28,000 geographically referenced lakes. This allows us to combine data from the National Lake Survey, the New England Lakes and Ponds Survey, the USGS SPARROW model, aircraft based hyperspectral data of select lakes, as well as other datasets. These data include standard physical-chemical measures of water quality and subjective assessments of, for example, the appeal and integrity of lakes. We describe the database development and provide examples of how we plan to utilize the database. We plan to provide access to: 1) lakes monitoring data; 2) modeled nutrient fluxes; 3) state specific data sets; 4) analytical tools and scripts for exploring associations between nutrients and lake ecosystem services, 5) tools for mapping lake ecosystem services, and 6) prototype ecosystem service production functions, sensitive to variations in predicted nitrogen and phosphorus loading. These efforts will provide managers and researchers a better understanding of links between management decisions affecting nutrient fluxes and selected ecosystem services; support other novel research questions such as examining the link between ecological condition and human health; and provide the means for others to replicate our results and adapt our approaches and analyses in novel ways.

Keywords: New England Lakes and Ponds Survey; National Lakes Assessment, Database Development; ArcGIS Server; reproducible research

Purpose of research: This research is a proof of concept that focuses on providing tools, data, and research results supported by online access to data, GIS, and analysis. When completed the database and associated tools will allow our partners to include ecosystem services, supported by state of the art technologies and rich environmental data, in their management decisions.