Title: Combined influence of landscape composition and nutrient inputs on lake trophic structure

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The concentration of chlorophyll *a* is a measure of the biological productivity of a lake and is largely (but not exclusively) determined by available nutrients. As nutrient inputs increase, productivity increases and lakes transition from low trophic state (e.g. oligotrophic) to higher trophic states (e.g. eutrophic). These broad trophic state classifications are good predictors of ecosystem health and the potential for ecosystem services/disservices (e.g. recreation, aesthetics, fisheries, and harmful algal blooms). Thus, a common goal of lake managers is to control the factors that drive chlorophyll *a* and trophic state. Typically, nutrient levels alone have been used to model chlorophyll *a* and trophic state; however, the surrounding landscape structure may also impact chlorophyll *a* concentration and could be used to improve predictions. In this presentation, we discuss preliminary results by comparing prediction of trophic state (based on chlorophyll *a*) with models of nutrients alone to models of nutrients plus landscape composition. We use random forest modeling to determine the out of bag (OOB) error for both sets of variables. The random forest models also provide a comparison of the additional error accounted for by each variable. Our preliminary results suggest that nutrients alone have an OOB error rate of 42.0%. Adding landscape variables improve that to 36.1%. Of the landscape variables percent agriculture, percent developed, and percent forest explained the most additional variation. These results suggest that predictive models of lake trophic state may be improved with additional information on the landscape surrounding lakes.