

Chlorophyll α and Primary Productivity Dynamics in Kentucky Lake Mainstem and Embayment Habitats.

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Chlorophyll α (Chl α) has been used as a proxy for phytoplankton biomass, while primary productivity (PP), the rate at which carbon is fixed into phytoplankton cells, is an indicator of how quickly carbon is turned over within the phytoplankton community. The purpose of this research was to examine the spatial distribution of and the relationship between Chl α and PP seasonally in the main channel of Kentucky Lake reservoir and two embayments of contrasting land use. Correlation coefficients (r) for Chl α versus PP were 0.45 in Ledbetter embayment, 0.55 in Panther embayment, and 0.57 in the main channel. ANOVA indicated that seasonal effects drove dynamics at all three sites with stronger correlations occurring during winter, spring, and fall; correlations were weakest or broke down completely during summer. We conclude that during times of high Chl α standing stock (e.g., summer and fall), the Chl α -PP relationship may be disrupted or decoupled by lower nutrient inputs later in the growing season as suggested by analyses of annual patterns of total nitrogen (TN) and total phosphorus (TP) at the sites. Chl α and PP are positively correlated, in general, but the relationship may be confounded or disrupted at times by strong seasonal environmental effects such as nutrient inputs, light, and temperature. Further, predicting PP from Chl α for the management purposes of identifying areas of vulnerability for future algal blooms, hypoxia, and habitat degradation should be viewed with caution; the predictive power between the two variables deserves further refinement.