Increasing Productivity Amid Stable Nutrient Regimes in Rhode Island Lakes and Reservoirs

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The control of anthropogenic nutrients has been a central focus of lake management efforts for several decades. It is generally accepted that nitrogen and phosphorus levels are increasing in lakes leading to acceleration of eutrophication. A recent analysis of the LAGOSNE (<https://lagoslakes.org/products/data-products/>) dataset (a long-term database of lake water quality in the northeast USA) found stable water quality at regional spatial scales, however, these studies may mask trends at finer scales. To address this, we analyze a subset of the LAGOSNE dataset collected by the University of Rhode Island’s Watershed Watch Volunteer Monitoring Program (URIWW) and then compare these to the full dataset. URIWW has monitored Rhode Island lakes and reservoirs for over 25 years. To facilitate comparison and assess trends all monitoring data were converted to z-scores (i.e. scaled anomalies) and then used to calculate yearly averages at local (RI) and regional scales. URIWW data indicate that temperature and chlorophyll *a* are increasing strongly, total nitrogen may be increasing (driven by two low years in the early 1990s), and total phosphorus and the N:P ratio are stable. Applying the site-specific z-score approach to LAGOSNE found similar trends to prior studies with chlorophyll *a*, total nitrogen, total phosphorus, and N:P all stable over time. In short, productivity in Rhode Island lakes and reservoirs is increasing, in spite of stable nutrient regimes. Although this analysis cannot discern causation, it suggests an association between lake temperature and productivity. This analysis also demonstrates 1) the value of long-term monitoring programs, like URIWW, for identifying trends in environmental condition, and 2) the utility of site-specific z-scores for analysing for long-term trends.