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

Hollister. J. W., Kellogg, D. Q., Kreakie, B. J., Shivers, S., Herron, E., Green, L., Milstead, W. Bryan., Gold, A.

Addressing anthropogenic impacts on aquatic ecosystems has long been the focus of lake management. Methods to control phosphorus and nitrogen can mitigate the impacts of eutrophication, but requires long-term datasets to determine their effectiveness. The “LAke multi-scaled GeOSpatial and temporal database”, or LAGOSNE (<https://lagoslakes.org/products/data-products/>) is one such dataset. Studies using LAGOSNE found stable water quality at regional spatial scales, however, these studies may mask trends at smaller scales. To address this, we analysed the University of Rhode Island’s Watershed Watch Volunteer Monitoring Program (URIWW) dataset. URIWW has collected water quality data on Rhode Island lakes and reservoirs for over 25 years; these data are included in LAGOSNE,. To assess the data for trends, we calculated annual z-scores (i.e. scaled anomalies) on a per-station basis. URIWW data show increasing temperature and chlorophyll *a*. Total nitrogen showed a weak increasing trend driven by two low years in the early 1990s. Total phosphorus and the Nitrogen:Phosphorus ratio (N:P) were 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.