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

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Addressing anthropogenic impacts on aquatic ecosystems has long been the focus of lake management. Controlling phosphorus and nitrogen can mitigate impacts of eutrophication, but determining management effectiveness requires long-term datasets. Others recently analyzed the LAke multi-scaled GeOSpatial and temporal database (LAGOSNE) and found stable water quality in the Northeastern and Midwestern United States, however, trends at smaller scales may be masked. We address this by analyzing 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. The LAGOSNE and URIWW datasets allow for comparison of water quality trends at regional and state extents. We assess trends with yearly averaged z-scores (i.e. scaled anomalies) calculated on a per-station basis for both the LAGOSNE and URIWW datasets. Temperature and chlorophyll *a* increased from 1993 to 2016. Total nitrogen shows a weak increase driven by 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 not causal, this analysis suggests an association between lake temperature and productivity. Additionally, we demonstrate both the value of long-term monitoring programs, like URIWW, for identifying trends in environmental condition, and the utility of site-specific z-scores for analyzing for long-term trends.