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 is a focus of lake management. Controlling phosphorus and nitrogen can mitigate these impacts, but determining management effectiveness requires long-term datasets. Recent analysis of the LAke multi-scaled GeOSpatial and temporal database (LAGOSNE) found stable water quality in the Northeastern and Midwestern United States, however, sub-regional trends may be masked. We analyze a sub-regional trend with 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, respectively. We assess regional (LAGOSNE) and state (URIWW) trends with yearly averaged z-scores (i.e. scaled anomalies) calculated on a per-station basis. In Rhode Island, 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. At the regional scale, the LAGOSNE dataset shows similar trends to prior studies of the LAGOSNE 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.