

ORD CLEARANCE FORM

Initiator Information		Product Category	
First Name:	Jeffrey	<input type="checkbox"/> HISA (Highly Influential Scientific Assessment) <input type="checkbox"/> ISI (Influential Scientific Information) <input checked="" type="checkbox"/> Not HISA or ISI <div style="margin-left: 20px;"> <input type="checkbox"/> Requires Advance Notification <input checked="" type="checkbox"/> Does not Require Advance Notification </div>	
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Increasing Productivity Amid Stable Nutrient Regimes in Rhode Island Lakes and Reservoirs			
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Note: The Impact / Purpose Statement information for this work product will be displayed on the additional pages.			
Product Description / Abstract			
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Tracking and Planning

Task ID: SSWR4.01C

Task: A Data Intensive Investigation of Temperature Impacts and Bloom Modeling

Product Title: N/A - Not Applicable

Product Description: N/A - Not Applicable

Project: Harmful Algal Blooms

Topic: Nutrients

Research Program Area: Safe and Sustainable Water Resources

Impact / Purpose Statement

It is well known that the quality of aquatic ecosystems has degraded and that in extreme cases this can reduce property values, impact human health, and reduce recreational uses. Managers of these ecosystems have many tools at their disposal to help mitigate these impacts. To understand how effective these efforts are requires long-term data, such as the University of Rhode Island's Watershed Watch Volunteer Monitoring program data. We used this data to examine trends in water quality in Rhode Island lake and reservoirs. Since 1993, nutrients (e.g., nitrogen and phosphorus) have been relatively stable. Lake temperature and chlorophyll, a potential indicator of harmful algal blooms, have both increased overtime. This work highlights the role that physical parameters (i.e., temperature) may play in controlling algal growth in lakes, indicates that efforts to control nutrients in Rhode Island have prevented an unwanted increase, and shows that to reduce chlorophyll and related impacts will require additional management efforts. Furthermore, this study is one of the first to utilize the rich, long-term data collected by colleagues and volunteers at the URI Watershed Watch program.

Product Description / Abstract

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.

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Does this journal article have EPA-generated data associated with it?

Yes

Comments

Author: Timothy Gleason Date: 12/19/2019 4:45 PM

Nice Job, Jeff!
There were two typos on line 152.
Best, Tim

Author: Wayne Munns Date: 01/07/2020 2:54 PM

Please make corrections indicated on hard copy.

Author: Jeff Hollister Date: 01/28/2020 1:48 PM

All edits on manuscript accepted!