

Benjamin Harris

Student Corner

Outcomes of a “Lake School” education program for residents and association members of lakes in Pennsylvania

Lakes are changing across the globe. Whether they are turning over at lower rates from warmer air temperatures, salinizing from intense road salt usage, or getting browner from inflows of dissolved organic matter, each lake faces its own unique assemblage of natural and anthropogenic stressors.

Since you are reading this article, you might have received an education in lake science, or you have access to materials or contacts that help you make management decisions for your lake. There are a multitude of people who live on any of the thousands of lakes across North America who are tasked with managing lakes with little to no training in lake science or access to informative materials, and they need support.

This is where my studies come in. As a current M.Ed. in Environmental Education student at Bard College, I am interested in furthering our understanding of how communities are responding to changing lakes, and how lake science educational programming can improve management decisions for lake residents and association members.

In this article, I will describe my research on one such program: a “Lake School” weekend educational intensive developed for lake residents and managers across the Pocono Mountains region of Pennsylvania. I will also discuss the broader context of this type of programming, as well as how you may be able to get involved in your community.

The Lake School, developed by the Pocono Lake Ecological Observatory Network (PLEON), and funded by the PA Department of Environmental Protection Environmental Education Grant program, was initiated to improve access to lake science information in the Poconos for a generally lay audience. The school, which

took place in May of 2023, was headed by Dr. Beth Norman, Director of Science and Research at Lacawac Sanctuary Field Station and Environmental Education Center, with funding for my associated research coming from the National Science Foundation (DEB #1754271). The school was developed by lake scientists and professors across the Northeast and Great Lakes regions.

This educational program combined classroom, laboratory, and field-based modules covering a wide swath of lake science topics, from water quality to algae blooms, trophic cascades, field-based monitoring, and beyond. Its goal was to improve participants’ understanding of lake science topics, their ability to interpret typical lake monitoring data, and to empower lake communities to begin a monitoring program.

Before they arrived at the Lake School, attendees answered a survey that asked them general information about their lakes (size, watershed characteristics, etc.), as well as questions to gauge their current monitoring efforts, their perception of changes in their lakes (eutrophication, salinization, climate change impacts, algae blooms, etc.), and their current efforts to engage community members in monitoring and management. I will utilize the data from this survey in my master’s thesis to paint a broad picture of the state of PA lakes, with a focus on attendees’ perceptions of change and community engagement efforts.

I am particularly interested in theorizing the level to which perceived lake changes match actual changes. While I will not be quantifying in my thesis the actual state of each lake represented in these surveys, the comparison of actual to perceived changes is an important discussion.

Perceived changes may be less than actual changes if the observer is not educated in lake science. On the other hand, perceived changes may be greater than actual changes if the observer is experiencing *ecophobia*, or a fear of the environment. Ecophobia can result from frightening lake changes like toxic algae blooms, bioaccumulation of pollution in fish, or the impacts of climate change. One way to potentially lessen ecophobia is by improving science literacy in lake communities through programming like the PLEON Lake School.

Immediately before the Lake School began, I asked attendees to participate in a second survey – this one quizzed them on their pre-Lake School knowledge of lake science topics and their ability to interpret lake monitoring data. Following the school, participants completed the same survey. This pre-/post-survey format is a typical approach in the education field, and the results will allow me to assess the knowledge and skills participants gained from attending the school.

My preliminary analysis of the pre-/post-survey (Figure 1) indicates that participants answered more questions correctly after attending Lake School. Interestingly, they also answered more questions incorrectly, perhaps because they actually attempted more questions in the post-survey than in the pre-survey – there was a far lower proportion of “I don’t know” answers in the post-survey. These preliminary findings point to the effectiveness of the PLEON Lake School curriculum.

In the early fall of 2023, I plan to send out one final survey to the Lake School participants, which I will use to gauge how well they have retained the content and skills they learned after a roughly six-month hiatus from the school. I will also ask a

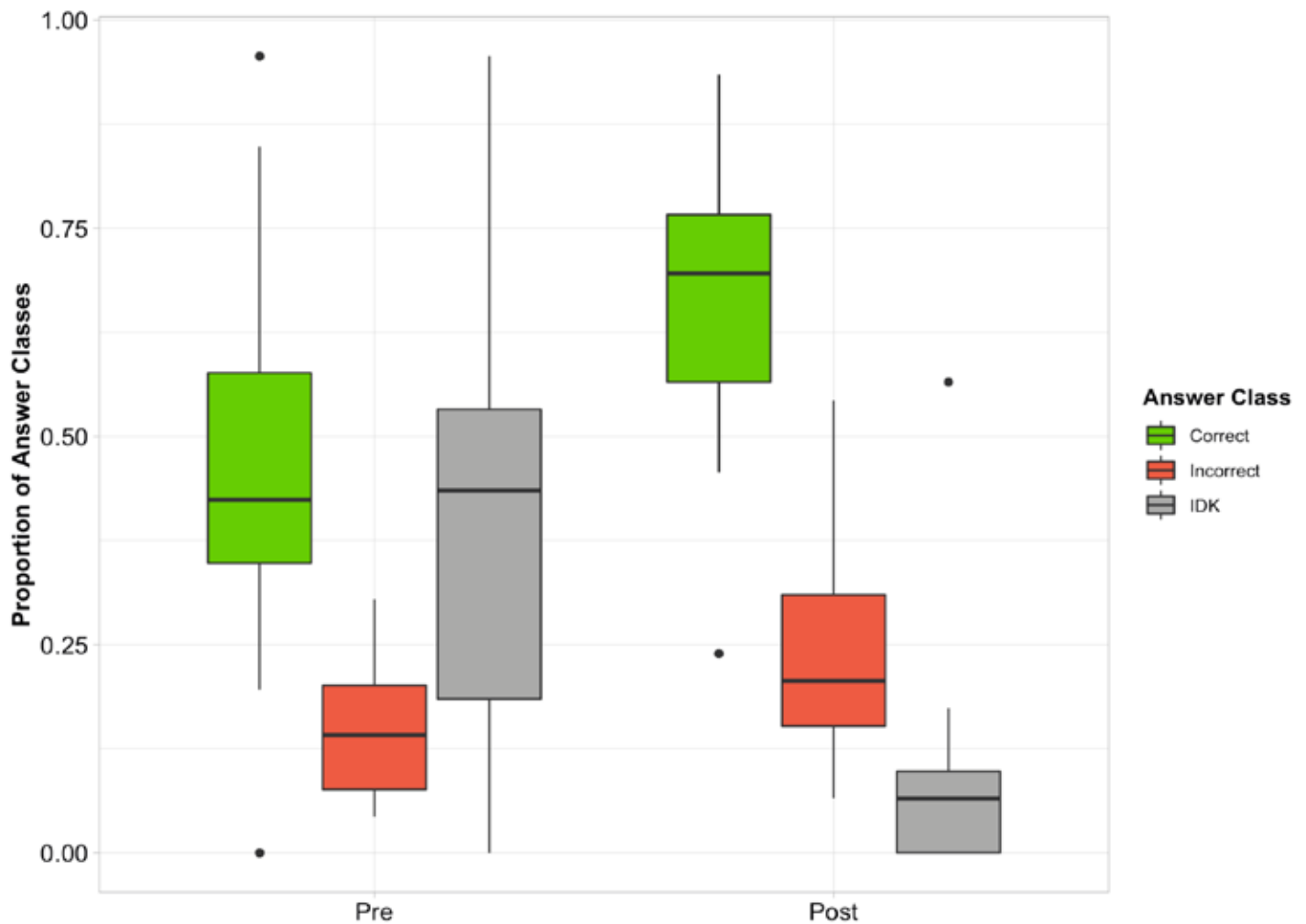


Figure 1. Proportion of correct, incorrect, and “I don’t know” (IDK) responses from participants to the pre- and post-Lake School surveys. Boxplot (in the style of Tukey) made in RStudio (Version 1.2.5033) using ggplot2 (Version 3.3.5).

series of questions related to the participants’ implementation of their Lake School learning back at their home lakes, including:

- What is one concept from Lake School that has informed you of an issue affecting your lake?
- What concepts from Lake School have you shared with your community members and how did the community react?
- Did you implement a monitoring program following Lake School, or are you planning to implement a program next year?
- Have you used the information you learned at Lake School to attain funding for monitoring or management of your lake?
- Have you used information you learned at Lake School to advocate for land and/or water management policy changes

around your community?

I am excited to see the level to which attendees have put the concepts they learned in Lake School into practice. Often, we assume that our educational efforts are impactful without putting in the work to actually document outcomes and impact.

It is also important, however, to consider equity and access when planning lake science programs like the Lake School. Many communities, especially those at smaller lakes without endowed associations, are on their own when it comes to lake monitoring and management. While the Lake School served several participants with no experience in lake science and very little funding at their lake groups (or no lake group whatsoever), it did cost money and target a region that has historically seen its fair share of privilege.

So, when we evaluate the scale and

impact of these lake science programs for lake residents and associations, we must consider access for low-income communities.

If you have the knowledge and resources, one way that you can create change in your community is by holding a lake education program. Even a presentation about a topic you are passionate about or study at a local lake – like eutrophication for a visibly greening lake or road salt impacts in a heavily urbanized watershed – can start an important community conversation. You could also consider holding a community lake science day, where community members or a local school come together to learn about your research or monitoring data at a local lake.

The important aspect is that communities are involved – that their questions and concerns are raised (even if there is not a direct solution in the moment), and their voices are heard.

We, the lake science community of North America, must work together to lessen gatekeeping in science. Communicating research and translating it into approachable language is action. The only way we can begin solving the environmental issues that lakes are facing is by creating informed and active communities. And we can do this through communication, education, and facilitating conservation.

Benjamin Harris is currently finishing his M.Ed. in environmental education at the Center for Environmental Policy of Bard College and is also an educator with the Hudson River Sloop Clearwater. His current research explores the impacts of adult educational programming on lake monitoring and management. His previous research has covered water quality and algae studies in lakes of NY, PA, and IA, as well as fish population and migration studies within the Hudson River Estuary of NY.



UPCOMING IN LAKELINE

FALL 2023: Shoreline Stabilization – The fall issue will focus on topics related to shoreline stabilization.

Topics related to impacts of shoreline erosion on water quality and aquatic life, methods for shoreline restoration and stabilization, case studies on restoration projects, and other topics related to shoreline stabilization are welcome.

Articles for fall 2023 are due by September 15, 2023.

The issue will be published in October 2023.

Winter 2023/2024: Declining Lake Volumes – Whether a reservoir for water supply or recreation, or a lakes across a region that are multi-use, declining lake volume is a concern that is widespread as we face changing weather patterns and prolonged periods of drought. Case studies, impacts of declining volume (water quality/supply), or long-term models of lake volume change, remote sensing, as well as other topics related to this issue are welcome.

Draft articles for winter are due by December 15, 2023.

The issue will be published in January 2024.



Please contact Amy Smagula, *LakeLine* Editor, with any questions, or to propose an article for one of the above-listed themes.

Do you have a topic that doesn't match a theme? That's okay, we can include the article in any of these issues,

or use it to build a themed issue. Amy can be reached at lakeline@nalms.org.



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