
Lakes Environmental Association

Lake Science Advisory Board

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1. Introduction

The Mission of the Lakes Environmental Association is to preserve and restore the high water quality and traditional character of Maine's lakes, watersheds, and related natural resources. The long-term survival of Maine's lakes is critical to present and future generations.

The Vision for the LEA Lake Science Center is to provide the leadership, resources and knowledge necessary to better understand and address the factors causing the degradation of Maine's lakes and watersheds. The process of developing the campus will be incremental, starting with the basics and building up to the more complex components. This approach will allow for flexibility of design, field testing of ideas and a reasonably long fundraising horizon.

To realize this vision, the LEA board of directors, staff, and its membership seek to develop a Lake Science Advisory Board. The objective of this board will be to work with researchers throughout Maine, New England and the world who are conducting research at the frontier of lake science, watershed management, invasive species prevention, environmental education and others in a range of disciplines. We seek guidance on advancing the Lake Science Center research agenda and collaborative opportunities to advance mutual capacity-related goals.

2. Advisory Board Goals and Objectives

a. Summary of Desired Expertise

The Lakes Science Center is an interdisciplinary research institute that advances key research agendas in the fields of limnology, environmental sciences, coupled with natural human systems and, in particular, areas of the social sciences such as education, economics and communication. To that end, we intend to invite advisory board members with expertise in both natural and social sciences. We are also interested in working with board members who are familiar with the process of interdisciplinary research and have demonstrated experience in securing grants from a range of funding institutions, such as national science funders like the National Science Foundation and the National Institute of Health, as well as private philanthropic groups.

3. Collaborative Agreement

LEA seeks to develop a collaborative agreement with potential Lake Science Advisory Board members to ensure that needs on both sides of this research partnership are met.

LEA Roles and Resources

In this collaboration, LEA commits to provide the following roles and resources:

- Lab capacity
- Data, including historic datasets
- Basic lab equipment and sample storage capacity
- Support staff

- Housing as it becomes available
- Office space
- Boat (Motor and canoe)
- Hub for collaboration to advance lake research capacity in the State
- Communication infrastructure including access to the appropriate distance technology
- Capacity to collaborate on grant development—administrative support, philanthropic

Advisory Board Roles and Resources

In this collaboration, the Advisory Board members commit to provide the following roles and resources:

- Identify research needs
- Serve as conduit for identifying researcher candidates, staff needs
- Collaborate on grant development—concept development support, major national funders
- Advice on research equipment needs and technology development

4. Advisory Board Governance

RESOLVED, that the president is authorized to appoint advisory boards, the members of which need not be members of LEA or members of its board of directors and all of whom shall serve without compensation unless the board of directors authorizes compensation to any member contracting to provide special or exceptional services to LEA.

RESOLVED, that each advisory board appointed shall advise and aid the board of directors and officers of LEA in all matters designated by the board of directors and shall make such recommendations to the board of directors as it determines appropriate.

RESOLVED, that each advisory board appointed shall prescribe rules and regulations for the call and conduct of its meetings and for other matters relating to its procedure.

Note: This section will include a summary of the resolution and eventual changes to the bylaws when available.

5. Proposed Research Questions

1) What are the key factors that determine whether a lake will bloom or not (beyond phosphorus concentrations)?

Sub-questions:

- What is the connection between Al/Fe and algae blooms?
- How much does lake morphology and flushing rate affect nutrient levels and potential blooms?
- How does stratification form and break down within each lake and will that allow high phosphorus concentrations at depth to come to the surface during the growing season?
- Are there algae or other biological or chemical factors that may be indicative of a bloom prior to its onset?
- Which lakes are likely to bloom in the next 25 years?
- How could we best focus our efforts on these lakes?
Prevention/treatment/public education?

2) How can we get landowners to factor in lake and water quality health when making small or large land use decisions on their property?

- What are the most effective ways to change ingrained behavior?
- How much behavior change can we honestly expect?
- Does land preservation need to be factored in to offset common behaviors?
- Are there effective strategies and Best Management Practices(BMPs) that can be used on a small scale to offset behavior that cannot be changed?

3) How can we get regular long-term maintenance of stormwater structures?

- Are regulatory approaches necessary at the state/town level to monitor individual BMPs?
- Are there “no-maintenance” or “low-maintenance” BMPs that should become the norm or at least incentivized?
- Is there a way that BMP maintenance could be tied in with some other critical component of development so that it is regularly addressed?

4) How will our lakes adjust to climate change and how can we better monitor to pick up on these changes?

- What kind of temperature monitoring is the best to pick up on changes?
- How can we best use our existing dataset to tie in with future data?
- Are there broader tools or observations such as ice out, phenology or air temperature that can be tied to individual lake problems?

5) What are the socio-behavioral and environmental outcomes of LEA's education and outreach programs?

- What is the impact of LEA's education programs on environmental attitudes and behavior change in the Lakes Region? What is the impact of LEA's education programs on science literacy and acceptance of science in various decision making contexts?

- What is the extent of LEA's social network and how could ties in this network be strengthened to enhance information flow to promote learning about lake protection?
- How does LEA engage "stakeholders" in its programs, like Clean Lake Check Ups and Decision Making Training, and what are the impacts of this engagement in terms of stakeholder identity, environmental learning, and behavior change for lake protection?

6) Milfoil related research questions

- Are there methods other than the conventional DASH and benthic barrier techniques that might be utilized in Maine waters?
- Are there biodegradable materials that might be utilized for benthic barriers to eliminate the need for removal?
- What is the optimum deployment time for benthic barriers and are there associated variables?
- How does the effectiveness of particular control techniques vary with infestation characteristics?
- What collateral impact to water quality and native species results from varying control techniques?
- What methods exist for restoration of native species and what is their effectiveness?

6. Prospective Advisory Board Members

Emmanuel Boss, Ph.D.
School of Marine Sciences
University of Maine
Limnology—acoustics and optical
sensing

Jackey Bailey, Ph.D. candidate,
St. Joseph's College
Invasive species, milfoil expertise

Mark Greene, Ph.D.
St. Joseph's College,
environmental scientist, received
multiple NSF grants to study the effect
of ocean acidification on clam flats.

Orrin Shane, Ph.D.
Principal, Downeast Museum
Services
Environmental Anthropology; Human
Impacts on the Environment.
Past NSF Program Director for
Informal Science Education

Sean Smith, Ph.D.,
Department of Earth Sciences,
University of Maine
Watershed modeler

Aria Amirbahman, Ph.D.,
Civil and Environmental Engineering
University of Maine
Mapping the relationship of aluminum
release

Firooza Pavri, Ph.D.,
Associate Professor of Geography,
University of Southern Maine,
GIS mapping expertise

Whitney King, Ph.D.,
Colby College
aquatic chemist

Maggie Shannon,
Congress of Lake Associations
Informal Science Education
Lake Policy

Amy Smagula,
Board of Directors for NALMS,
Limnologist/Exotic Species Program
Coordinator

Geoff Schladow, Ph.D.
Research Director at Tahoe
Environmental Research Center

Research Assistant: Job Announcement

The Lakes Environmental Association (LEA) is seeking to award a research fellowship to a candidate to work with LEA staff to conduct independent research for lakes within LEA's service area and to carry out, monitor and help analyze three new water quality testing programs. Preferred research projects will focus on physical or chemical lake characteristics and their relationship to lake health or other monitored characteristics. The goals of the fellowship are to expand LEA's lake science program and provide valuable research experience to young lake science professionals. The objectives are to conduct independent lake research projects and refine LEA's ongoing water quality monitoring program through a combination of field, laboratory, database administration and quality control.

We seek applicants across levels of academic standing and will accept applications from postdoctoral researchers, Ph.D. and Master's students. At a minimum, this position requires a B.S. and demonstrated research experience in Biology, Ecology, Limnology, Environmental Science or related fields. Further, preferred candidates will have an affiliation to a university, college or research institution. The roles, responsibilities and compensation will be negotiated depending on applicant. Office and laboratory space is located in Bridgton, Maine. Field work will be conducted primarily in the Lakes Region of western Maine. Work is to be completed in 2013. Position renewal contingent upon funding and successful job performance. Work beyond regular hours (to include evenings and weekends) may be required. Appropriate background checks will be conducted. To apply, send an e-mail to lakes@leamaine.org with a letter of interest addressing the specific job requirements, current resume with three references indicating relationship to applicant, and transcripts. If you have any questions, call Peter Lowell at (207) 647-8580. Stipend is \$15,000-\$20,000.

Job Description

TITLE: Lakes Environmental Research Assistant

DATE: January 2nd, 2013

Purpose: The Research Fellow will work independently and with LEA staff to carry-out, monitor and help analyze three new water testing programs, as well as conduct independent lake-related research.

Preferred Research Areas:

- Spatial analysis of Iron/Aluminum concentrations in sediment
- Water circulation patterns or hydrodynamic analysis within selected lakes
- Algae or zooplankton assessments
- Nutrient sources and sinks within individual lake watersheds
- Current, past and future lake temperature analysis and monitoring

Essential Duties & Responsibilities:

- Conduct active research in an identified focal area including but not limited to those listed above
- Plan and implement shallow lake bottom sediment cores on lakes in western Maine

- Perform algae monitoring for Gloeotrichia, nutrient and chlorophyll sampling
- Conduct algae counts for Gloeotrichia from samples
- Support the installation and data analysis from in-lake HOBO temperature sensors
- Analyze multiple datasets, including queries across sets
- Collaborate with organizations, universities or colleges to review current research
- Assist in relating collected data to GIS maps

Knowledge & Skill Qualifications:

- B.S. in Biology, Ecology, Environmental Science or related field
- Completion of or enrollment in Master's or Ph.D. program
- Demonstrated field-based and laboratory research experience, including active communication of results in publication, thesis, and/or technical reports.
- Basic knowledge and experience with Word processing, Excel and Internet
- A high level of efficiency, self-direction and competency in managing a diverse and large work load and demonstrated ability to work independently as well as part of a team
- Previous success in understanding and adapting to the needs of a diverse audience
- Strong oral and written communication skills
- Strong organization, attention to detail and time management skills
- Ability to travel, requiring a driver's license and transportation

Preferred Qualifications:

- Master's or Ph.D. in Biology, Limnology, Ecology, Environmental Studies or related field
- Proficient in MS Excel and Word, ArcView, and statistical analytic packages software such as R or JMP.
- Prior sampling experience for freshwater or marine ecosystems
- Experience working with diverse audiences

Work Environment: Office and laboratory space located in Bridgton, Maine. Field work conducted primarily in Bridgton, Denmark, Waterford, Sweden, Harrison and Naples, Maine. Travel to the University of Maine's Sawyer Environmental Laboratory may be required and other duties may be assigned as needed.

Work Year: Position beginning May 1 through December 31, 2013, with renewal contingent upon funding and successful job performance.

Work Schedule: Normal LEA business hours are Monday through Friday 8:00 a.m. to 4:00 p.m. Due to the nature of the position, work beyond regular hours (to include evenings and weekends) may be necessary to meet the requirements of the position. The employee shall establish regular office hours and in consultation with the supervisor, adjust the work schedule as appropriate. Work hours and location are negotiable.

7. Knowledge↔Action Priorities

Lakes Environmental Association serves as a hub for building lake association capacity throughout the Maine. In this section, we describe identified project opportunities linked with regional organizations for potential and actual collaborative opportunities throughout Maine and the Northeast.

LEA and the Maine Congress of Lake Associations (COLA) have created a group known as the Lake Leaders, comprised of the staff of regional lake associations. The group shares resources and ideas and has collaborated with Colby College on an NSF grant directed at lake research.

Maine Milfoil Initiative

LEA was a prime mover for the creation of this initiative that brought federal earmark funds to support plant control work in Maine. The MMI is based at Saint Joseph's College (SJC) and continues to work on invasive aquatic plant research issues and management.

North American Lake Management Society Conference

LEA, COLA and SJC proposed the College as the site for the spring meeting of the Northeast chapter of NALMS. This initiative will result in contacts and collaborations with scientists and field workers throughout New England, New York and nearby Canadian Provinces.

Maine's Invasive Aquatic Plant Program

LEA played a crucial role in the establishment of Maine's IAP program, working to pass enabling legislation and creating the Courtesy Boat Inspection Program and the annual Maine Milfoil Summit. LEA has extensive collaboration with lake associations, state agencies, sportsman's groups and other NGOs.

LEA's Service Area

LEA works with local organizations like the Moose Pond Association and landowner groups on Woods Pond, Brandy Pond and Highland Lake to develop research opportunities related to water quality and land use.

Partnership with Businesses

Much of our work on plant control has been significantly aided by support from the business community and LEA works closely with several chambers of commerce and community economic development staff to promote lake issues.

8. Innovation and Research at LEA

Lakes Environmental Association has a rich history of innovation and research in its own service area dating back to the first studies on Long Lake and its tributaries conducted in 1970. The following provides some examples of ways in which this organization seeks to produce knowledge and find ways to innovate for enhanced sustainability.

Phosphorus Sources

LEA staff developed a GIS mapping system that estimates phosphorus export from land polygons based on slope, soil type, land use and proximity to a water body. This “Phosphorus Hot Spots” analysis has been applied to LEA’s service area and the entire Sebago Lake watershed by the Portland Water District. It has been used to target and evaluate remediation work and to estimate lake vulnerability.

Municipal Standards

LEA evaluates local land use ordinances to determine their adequacy for water quality protection and works with local planning boards and code enforcement officers to improve safeguards. A comprehensive study of projects approved over the past ten years in three towns was conducted in 2012-2013 to determine compliance with conditions of approval. It was found that approximately 40% of the best management practices required for lake protection were not installed leading to a new initiative to advance the use of third party inspectors.

Invasive Aquatic Plant Surveys

Using electrofishing techniques and equipment, LEA built and deployed a night survey boat. High-intensity LED lighting provides a remarkable perspective on lake water columns and vegetation.

9. References

In this section, we provide references to relevant lake science conducted in Maine and New England and publications in other places that have potential relevance to work in the Upper Sebago Lake Watershed. We will continue to develop this section to both inform our research agenda and seek additional partners working in identified areas of interest.

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