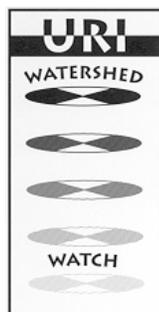




**Our New England Waters:
Real World Watershed Monitoring and
Management Options**
*Annual New England Lakes and Watershed
Conference*

June 9 – 10, 2017

**Center for Biotechnology and Life Sciences
University of Rhode Island,
Kingston, RI**





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Conference Overview

This unique and timely regional conference brings together professionals, educators, lay persons and students who share a deep interest in lake and watershed protection. *Our New England Waters: Real World Watershed Monitoring and Management Options* will inform and stimulate discussions about New England waters and watershed issues. It will focus on the role of individuals, organizations and communities in protecting and enhancing water quality throughout the region. The conference includes sessions devoted to the role of citizen scientists and the tools available to them, as well as the perspective of water quality and watershed professionals. Sessions are intended to inform participants about the value of community based watershed and resource protection efforts by presenting successful local projects and programs. Participants will learn new concepts and techniques for monitoring and protecting their watersheds. Panel discussion will stimulate interaction and collaboration between citizens, professionals and agencies.

The conference offers an exciting selection of concurrent sessions on Saturday. Workshops on Friday will provide more intensive interaction and include “hands-on” training. Throughout, there will be numerous opportunities to meet with vendors, association members, academics, volunteer monitors and others to share experiences, ideas, successes, and yes, failures.

WELCOME TO THE UNIVERSITY OF RHODE ISLAND!

The University of Rhode Island (URI) is a medium-sized state university in the southern part of Rhode Island, in the village of Kingston. In part because of its unique location near the ocean, Narragansett Bay, and the State’s largest freshwater pond, the University has developed strong marine and freshwater programs. It has been designated one of the national Sea Grant colleges. The University enrolls about 14,800 undergraduate and 3,050 graduate students, and has a full-time teaching faculty of approximately 600. URI offers 94 undergraduate programs, 83 graduate programs, and 16 certificate, non-degree programs.

The University of Rhode Island is firmly rooted in the tradition of America’s unique land-grant institutions – universities that exist to expand and transmit knowledge, and to foster its application in the daily life of the nation. This mission makes URI an ideal location for a conference like “Our New England Waters” which is dedicated to sharing and expanding the knowledge and understanding of watershed processes and environmental education.

We hope you find time to explore the campus, and enjoy the many gardens and unique specimens found throughout its 1200 acres. Restaurants and shopping are within walking distance, just north of campus in the Kingston Emporium. The communities of Wakefield and Narragansett, offering numerous entertainment and dining options are just minutes away by car, as are our many miles of beautiful beaches.

The Bike MS: Ride the Rhode 2017 will be taking off from URI’s Keaney Parking Lot, so please be aware that there might be bicycles on many local roads, and share the roadway. First-year student orientation will also be happening – so be on the look-out of groups of students and their parents, wandering around campus.

Friday at a Glance		
Time	Event	Location
12:00 p.m.- 4:00 p.m.	Registration	CBLS Atrium
1:00 p.m. - 2:45 p.m.	Workshop 1A: Aquatic Plant ID Workshop 1B: Harmful Algae Blooms Workshop 1C: Low Impact Landscaping for Lakefront Homeowners Workshop 1D: Useful Online Mapping Resources for Watershed Visualization	CBLS 330 CBLS 340 CBLS 252 CBLS 452
2:45 p.m. - 3:15 p.m.	Refreshments	CBLS Atrium
3:15 p.m. – 5:00 p.m.	Workshop 2A: Aquatic Plant ID Workshop 2B: Harmful Algae Blooms Workshop 2C: Low Impact Landscaping for Lakefront Homeowners Workshop 2D: Useful Online Mapping Resources for Watershed Visualization	CBLS 330 CBLS 340 CBLS 252 CBLS 452
5:15 p.m. – 6:15 p.m.	NEC-NALMS Annual Meeting	CBLS 252
6:30 p.m.	Dinner (optional)	95 Club
7:30 p.m. – 9:30 p.m.	Paint A Lake session (optional)	95 Club

Workshops will be repeated so attendees can attend two. The dinner and Paint a lake are optional, and require additional registration, a limited number of which may be available

THANK YOU TO OUR EXHIBITORS – STOP BY AND THANK THEM

SOLitude Lake Management (<http://www.solitudelakemanagement.com>)

Aquacleaner Environmental, Inc. (<http://www.aquacleaner.com>)

NOTES:

Workshops

Workshop 1

TIME: 1 – 2:45 pm, repeated 3:15 – 5 pm
PLACE: CBLS Room 330

Aquatic Plant ID

George Knoecklein (Northeast Aquatic Research)

This hands-on workshop will introduce you to the aquatic plants commonly found in the New England area. We will provide you with a basic overview of the ecology of these species, and teach you how to identify them. We will also share some of our favorite guides and identification keys.

Workshop 2

TIME: 1 – 2:45 pm, repeated 3:15 – 5 pm
PLACE: CBLS Room 340

Harmful Algae Ecology and Control

Ken Wagner (Water Resource Services, Inc.)

Algae are found in virtually all water, but unless they get very abundant, we don't notice them. Yet when they are abundant, they can interfere with multiple uses of that water. This workshop will illustrate the common nuisance forms and discuss options for identifying algae. A framework for understanding algal ecology and why algae sometimes become too abundant will be provided. We will then discuss methods of control of algae, including techniques for nutrient limitation, biological controls, algaecides, and physical approaches. Participants do not need prior training in algae and will receive materials to help with information retention. The focus of this workshop will be on improving familiarity with the types of algae that can cause problems in lakes and the methods that can be used to control those algae. Possible monitoring approaches, algal bloom prevention, and contingency planning for addressing algal problems will be covered.

NOTES:

Workshop 3

TIME: 1 – 2:45 pm, repeated 3:15 – 5 pm
PLACE: CBLS Room 252

Low Impact Landscaping for Lakefront Homeowners

Robert Hartzel (Geosyntec Consultants)

This session will present ways that homeowners can beautify their property while protecting the water quality of our lakes, ponds and streams. The session will focus on “low impact development” (LID) stormwater management practices that use hardy (and attractive!) native plants and promote soil infiltration and evaporation. Bob Hartzel of Geosyntec Consultants will provide an overview of LID and Green Infrastructure (GI) concepts and a step-by step guide to building rain gardens, “bioretention cells”, porous pavers, rain barrels, and other LID landscaping techniques that use native shrubs, annuals and perennial flowers. The session will also discuss techniques for erosion control and restoration of eroded shoreline and near-shore areas. This presentation will also demonstrate how new web-based watershed planning tools can be used to help plan, model, and obtain cost estimates for LID stormwater improvements.

Workshop 4

TIME: 1 – 2:45 pm, repeated 3:15 – 5 pm
PLACE: CBLS Room 452

Useful Online Mapping Resources for Watershed Visualization

Greg Bonyng (URI Environmental Data Center)

Learn how to use free ArcGIS Online resources for building useful and interesting web-based maps of your local watershed. We'll pay special attention on how to tap into current and historical sources for satellite and aerial imagery. This is a bring-your-own-laptop workshop! Your laptop will need to have an up-to-date web browser (e.g. Firefox or Chrome are preferred), and be capable of connecting to a wifi network.

Saturday at a Glance		
Time	Event	Location
8:00 a.m.-12:00 p.m.	Registration	CBLS Atrium
8:00 a.m.-9:00 a.m.	Continental Breakfast	CBLS Atrium
9:00 a.m.-9:20 a.m.	Welcome: Elizabeth Herron, URI Watershed Watch Dr Perry Thomas, NALMS Region 1 Director	CBLS 100
9:30 a.m.-10:30 a.m.	Session 1A: Citizen Science – what can volunteers do to help our waters?	CBLS 100
	Session 1B: Changing Climate, How might it affect my lake?	CBLS 252
10:30 a.m.-11:00 a.m.	Break	CBLS Atrium
11:00 a.m.-12:00 p.m.	Session 2: Aquatic Herbicides – Panel Discussion	CBLS 100
12:00 p.m.-1:00 p.m.	Lunch Topical discussion groups will be available - or just relax	CBLS Atrium
9:00 a.m.-2:25 p.m.	Bid on Silent Auction Items	CBLS Atrium
1:00 p.m.-2:00 p.m.	Session 3A: In-lake algae control	CBLS 100
	Session 3B: Fisheries	CBLS 252
	Session 3C: Restoring Lakes	CBLS 452
2:00 p.m.-2:30 p.m.	Break- Final bids for silent auction items	CBLS Atrium
3:00 p.m.-4:00 p.m.	Session 4: The Cyanobacteria Monitoring Collaborative – An Approach to Educating, Monitoring, and Managing for Cyanobacteria	CBLS 100 – tour of mobile lab
4:5 p.m.	Adjourn and pick-up and pay for silent auction items	CBLS Atrium

Next year’s conference is planned for New Hampshire – keep up with conference details, our lake and watershed blog and more at <http://nec-nalms.org>. For national and international lakes and watershed news check out <https://www.nalms.org>!

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SOLitude Lake Management (<http://www.solitudelakemanagement.com>)

NOTES:

Concurrent Sessions

Session 1A:

Citizen Science – what can volunteers do to help our waters?

TIME: 9:30-10:30 AM

PLACE: CBLS 100

MODERATOR:

Assessing Lakes: What Tools are Most Useful?: Ken Wagner (Water Resources Services, LLC; Wilbraham, MA)

Assessing lakes properly is critical to informing management decisions and implementing successful projects. Crafting a monitoring program can be challenging, with interfaces between features to be assessed, available techniques, and budgets. It helps to have a clear vision of lake use goals and possible impediments, and to relate each lake feature that can be assessed to goals and possible impediments. If rooted plant growths interfere with swimming and boating, there is little value in water column nutrient assessment for those goals and that impediment. If algae blooms are causing taste and odor in a water supply or swimming lake, however, understanding nutrient dynamics is essential. Once features we can assess are matched with goals and possible impediments, we can then consider possible ways to assess those features.

Lessons Learned (& a Few Trends) from Thirty Years of Volunteer Monitoring: Linda T. Green and Elizabeth Herron (URI Department of Natural Resources Science)

URI Watershed Watch shares lessons learned over three decades running a large statewide volunteer water quality monitoring program for not only lakes and ponds but rivers & streams and salty sites. How did we figure out the what, where, when, how and who? Who to partner with? How to fund a cost-effective program that many think should be free? How to figure out and meet data quality objectives? If there's time we'll examine monitoring results from our long-term lakes and ponds.

NOTES:

Session 1B:

Changing Climate, How might it affect lakes?

TIME: 9:30-10:30 AM

PLACE: CBLS 252

MODERATOR:

Projections of coupled terrestrial and aquatic ecosystem change relevant to ecosystem service valuation at regional scales (Nihar Samal, Wilfred Wollheim, Shan Zuidema, Robert Stewart, Zaixing Zhou, Madeleine Mineau, Mark Borsuk, Kevin Gardner, Stanley Glidden, Tao Huang, David Lutz, Georgia Mavrommati, Alexandra Thorn, Cameron Wake - University of New Hampshire and Dartmouth College)

Accurate valuation of Ecosystem Services (ES) at regional scales is increasingly important for making informed decisions in the face of environmental change. To inform such valuation, we linked terrestrial and aquatic ecosystem process models to simulate hydrologic and water quality characteristics related to ecosystem services at regional scales. The linked model is spatially distributed, accounts for terrestrial-aquatic and upstream-downstream linkages and operates on a daily time step, all characteristics needed to understand regional responses. The model was applied to the diverse landscapes of the Upper Merrimack River watershed, New Hampshire, USA to evaluate changes in ecosystem services using statistically downscaled global climate model simulations coupled with scenarios of changing land cover for the time period of 1980-2099. Climate scenarios, land use scenarios, and biogeophysical model results were translated into a suite of environmental indicators that represent conditions of the climate, land, and water domains relevant to important ecosystem services. This work highlights the importance of having process-based models that dynamically account for the interactions among atmospheric, terrestrial, and aquatic processes. Our results suggest that climate will be a more important influence than plausible land use scenarios, but that certain land uses will exacerbate change.

OASIS reservoir operation model application to optimize water availability in the Scituate reservoir: Supria Paul (URI Department of Engineering)

The Scituate Reservoir is RI's largest fresh water body and the state's primary drinking water source. The main objective of our study is to calculate safe-yield water availability and optimize reservoir operations through

weighted linear programming on daily scales. Generally, the reservoir operations are monitored by the reservoir operator on monthly scale. However, in case of extreme events, such as strong storms, optimizing the water availability on a daily scale is needed. Such data can be utilized for formulating operating rules that minimize flooding of areas down-gradient from the reservoir during times of emergency water release. In this context, OASIS, a weighted linear optimization model developed by Hydrologic Inc., was evaluated for its usefulness in operating the reservoir during flood seasons. Based on (1) reservoir volume-elevation curve; (2) reservoir inflow (daily); (3) precipitation (daily); (4) spillway flow; and (5) evaporation from the reservoir, we set up the OASIS model and calibrated it for existing operational rules. In support of the model, we assessed inflows from ungauged streams using probabilistic methods. The precipitation data was extracted from PRISM datasets and the evaporation loss was calculated based on the Penman-Monteith method. The resultant inflows and hydro-meteorological parameters were then used to evaluate alternative operating rules in the OASIS model. Our preliminary results indicate that in order to maintain a specific capacity that reservoir operators put restrictions on summer releases.

Refreshment Break

TIME: 10:30-11:00 AM

PLACE: CBLS Atrium

Session 2:

Group Discussion - Herbicides

TIME: 11:00 AM -12:00 PM

PLACE: CBLS 100

This wide ranging panel discussion on aquatic plant management and when herbicides are appropriate and effective will provide opportunities for questions from attendees to be answered.

MODERATOR & PANELIST: Carl Nielsen, ESS Group, Inc.

PANELISTS:

Marc Bellaud,
President – SOLitude Lake Management

Tom Flannery,
Massachusetts Department of Conservation and
Recreation

Hotze Wijnja,
Massachusetts Department of Agricultural Resources

Sue Kiernan,
Deputy Chief - DEM Office of Water Resources, Rhode
Island Department of Environmental Management

Luncheon

TIME: 12:00-1:00 PM

PLACE: CBLS Atrium

Boxes lunches will provide opportunities to not only nourish your body, but your mind as well. Enjoy discussing common concerns with individuals from throughout this diverse region. Seating is scattered throughout the first and second floors, as well as outside.

Topical Break Out Sessions

TIME: 12:00-1:00 PM

PLACE: Multiple Rooms

Two main areas of discussion will be focused on citizen science, and cyanobacteria. Others can be added if attendees are interested.

NOTES:

Session 3A:**In-lake algae control**

TIME: 1:00 – 2:00 PM

PLACE: CBLS 100

MODERATOR:

Phosphorus control in Morses Pond through an aluminum dosing system (Toni Stewart, Water Resources Services, LLC; Wilbraham, MA)

Morses Pond is a valued resource in the suburbs outside Boston, MA, that provides swimming, boating and fishing to area residents, habitat to water dependent wildlife, and is linked to water supply through adjacent town wells. With an urban watershed 50 times the size of the pond, phosphorus loading is high during storms, and cyanobacteria blooms were common in mid- to late summer. The town controls only 22% of the watershed, so there are institutional limits to watershed management. Climate change is expected to result in more intense storms producing more runoff, further threatening the lake. A comprehensive plan was developed, and as one key element a dosing station was constructed to deliver aluminum compounds to two tributaries which represent >75% of the water load to the pond and >90% of P inputs. A more complicated system was gradually simplified and ultimately automated for cost effective application. Use of polyaluminum chloride currently provides major reductions in P concentration in the pond. Water clarity used to average about 2 m during summer and sometimes dipped below 1.2 m, forcing beach closures and/or copper treatments, but has been >4 m since 2014 with values as high as 6 m. The improved clarity has greatly enhanced beach use and fishing success, and the town is now looking at management options for other ponds in town. Such a system can be used to address difficult watershed situations and as a buffer against climate change induced problems.

Proactive management of HABs (harmful algal blooms) using in-lake phosphorus inactivation technology, (Domenic Meringola, SOLitude Lake Management)

With heightened awareness about the potential adverse effects of cyanobacterial (blue-green algae) toxins and harmful algae blooms (HAB's), the concern and need to manage nuisance algae in our lakes and ponds has probably never been greater. The historically "reactive" approach of treating blooms is also giving way to the need for a more preventative and "proactive" approach to algae management.

Nuisance algae blooms in surface waters are a result of excess nutrients, usually limited by water column

phosphorus concentrations. Phosphorus loading to lakes and ponds can originate both in the watershed and from the lake bottom sediments (internal loading). In lakes where watershed management is slow to produce results or for lakes where internal loading is prevalent, treatment with alum or the use of other emerging technologies like Phoslock and SeClear, to reduce phosphorus concentrations may be a viable option to prevent or limit the type, frequency & severity nuisance algae blooms.

In addition to providing a general overview of phosphorus reduction treatment methodologies, the presentation will also include case studies for projects performed at several lakes in Massachusetts.

Session 3B:**Fisheries**

TIME: 1:00 – 2:00 PM

PLACE: CBLS 252

MODERATOR:

Fisheries – How do we make sure The Big Ones will there for our kids? (Melissa Lenker, ESS Group, Inc.)

Lake trout (*Salvelinus namaycush*) spawning supports valuable fisheries throughout the Northeast, but has an unclear relationship with climate. We use lake trout spawning records spanning over 50 years (1961-2014) for an Adirondack lake to test for warming-induced spawning delays. Mean monthly air temperature increased at rates between 0.14 and 0.34°C/yr and warmer autumn temperatures were correlated with later spawning. However, while temperatures warmed through time and later spawning was associated with warmer temperatures, spawning timing was not delayed. Rather, the beginning of spawning shifted earlier at a rate of 0.75 days/decade, while the midpoint and end of spawning did not change. We propose several hypotheses to explain this counterintuitive result, perhaps the most plausible being that artificial selection for early-spawning fish by hatchery practices counteracted the effects of warming. This study highlights a potential threat to hatchery-supported, coldwater fisheries and emphasizes a need to preserve population-level variation in spawning timing traits.

Improvement of Fish Habitat at DelCarte Ponds, Franklin, MA (Carl Nielsen, ESS Group, Inc.)

A thorough evaluation of the flora and fauna at the DelCarte Ponds in Franklin, MA was conducted with the goal of identifying opportunities for enhancing fish and

wildlife habitat within the resource. The study found a number of habitat impacts to the resource due to invasive species, primarily water chestnut and grass carp. Water chestnut was found to be threatening the open water habitat at this once popular fishing spot at the expense of more desirable bottom-growing species of vegetation. Carp were found to be impacting water quality by suspending sediments and nutrients during their foraging which contributed to algal blooms. The poor water quality and lack of gravel or sandy spawning habitat resulted in a fish community that was not well suited to bass or sunfish species that would normally help to manage the carp population through egg predation. Recommendations were made to enhance the habitat of the pond to reduce non-native species, improve water quality, and augment the substrate to create suitable spawning bed for bass and sunfish species. The first phase of this restoration is now underway.

Session 3C: Restoring Lakes

TIME: 1:00 – 2:00 PM
PLACE: CBLS 452
MODERATOR:

“Septic socials” - how to talk about waste disposal issues
(Grahame Bradley, Vermont Department of Environmental Conservation)

There are over 800 lakes and ponds in Vermont and most have seasonal camps. Many camps have existed for decades, some are being converted to permanent homes, and the demand for lakeshore property is increasing. There are inherent challenges associated with the need to dispose of wastewater on often small lots next to the surface water amenity that residents have come to enjoy. Most lakeshore properties rely on soil-based wastewater systems in locations where the water table is shallow and the soil may be thin or low permeability.

Inadequately treated wastewater can contribute to eutrophication and transport pathogens into swimming and fishing waters. Fortunately, property owners have an interest in maintaining water quality from a health, amenity, and investment perspective. The idea of Septic Socials was pioneered in Washington state over 20 years ago. Lake associations work with property owners to host socials, attended by their neighbors, wastewater professionals, and water scientists. The goal is to provide the knowledge and practical information necessary to enable stakeholders to be pro-active in protecting their

common resource. This presentation begins by considering the significance of near-lake septic systems on lake-water quality before going on to discuss our experiences of Septic Socials in Vermont.

The Dynamics of Dredging (Jerry Davis, AquaCleaner Environmental)

When one first hears the word "Dredging", many cringe thinking it's a nasty eight letter word, in part due to the stigma that is associated with the process. Others fear navigating the administrative requirements from the jurisdictional agencies they will have to work with, to seeing a project come to fruition.

The dynamics of dredging are as vast, as its history is long. The methods have remained the same over time as has the array of emotions associated with the process, and yet the need for the removal of material from our lakes, streams and waterways continues.

Initially implemented for the removal of sand, silt and clay, dredging is a process that was borne from necessity to facilitate the deepening of water ways for navigability of shipping and recreational boating.

More recently the removal of accumulated organic sediments (AOS), has been demonstrated to suppress invasive plant growth, thus dredging is a process that can solve problems in our waterways.

There is a vast amount of negativity and nervousness associated with obtaining a dredging permit from the corresponding jurisdictional agencies because the information they are seeking seems tenuous and confusing. Some in the scientific community also have a distain for the activity due in part to the perceived types of disruption both in the water and upland.

This presentation will discuss the dynamics of dredging including:

- History
- Types of equipment
- Reasons for dredging
- Components to a project
- Navigating the Permit Process

Pictures and video's will be presented to illustrate an interesting, energetic and informative discussion.

Refreshment Break

TIME: 2:00-2:30 PM
PLACE: CBLS Atrium

Final bidding on the silent auction items – don't miss out!

Session 4:

Cyanobacteria

TIME: 2:30 – 4:00 PM

PLACE: CBLS 452

The Cyanobacteria Monitoring Collaborative – An Approach to Educating, Monitoring, and Managing for Cyanobacteria; (Hilary Snook, US EPA Regional Laboratory – offering tours of the EPA Mobile lab)

Cyanobacteria and their associated toxins are a looming issue in New England and elsewhere, and are of particular concern from a human and ecological health perspective. Increasing intensity and duration of precipitation events and development/land use pressures within watersheds are resulting in increasing nutrient loads to aquatic systems. These inputs set the stage for recurring algal blooms which can have significant social and economic impacts.

Despite these risks, monitoring and understanding these algae has been elusive and often overlooked. Cyanobacteria concentrations can vary enormously in space and time, and their level of toxicity can be equally as variable. Regional monitoring efforts have been equally inconsistent, with entities utilizing different sampling approaches and methodologies, or opting out of monitoring altogether. These inconsistencies make it extremely difficult to aggregate data that will help in understanding the characteristics and behavior of cyanobacteria within a water body as well as across the landscape, or to share information across the region that can help to optimize water supply operations.

Over the past few years, the New England Regional Laboratory has convened a region-wide cyanobacteria monitoring and “bloom watch” workgroup that consists of public water suppliers, state environmental water quality and beach monitoring programs and departments of public health, tribes, NGOs, citizen monitoring groups, and academics, to collaboratively establish a uniform and consistent regional approach to monitoring cyanobacteria. This program has been developed to encompass all levels of expertise and budget capabilities from the most basic to advanced. Program architecture is designed so that participants can proceed from the most basic level to the most advanced depending on human and budget resources as well as program needs. Due to its design, the program can provide useful information to a broad range of entities; from lake associations to large drinking water suppliers.

This presentation will discuss the methods, tools, and data produced from the workgroups efforts to date and how others may become involved to fit their individual needs if desired. The presentation will cover monitoring of fluorescent pigments and tracking waterbody biovolumes using inexpensive field fluorometers, the use of smartphone technology in conjunction with on-site field microscopy and “bloom-watch” kits, and the development and utilization of smartphone apps to enable on-site data submissions and spot identifications of bloom cyanobacteria. Examples of how it is presently being utilized by water suppliers in the region to assist in managing their resources will also be highlighted. The presentation will also showcase the on-line “dirty dozen” cyanobacteria key developed by workgroup participants and key techniques for separating cyanobacteria from the myriad of other phytoplankton often found co-existing within a waterbody.

Following his presentation, Hilary will be providing tours of the mobile lab which features microscopes, and educational materials to help people better understand what algae might be in their lakes.

NOTES:

Next year in New Hampshire! Stay in touch through <http://nec-nalms.org>.