ABSTRACTS AND BIOGRAPHIES FOR PRESENTATIONS AT THE 19th ANNUAL CONFERENCE OF THE

9-11 JANUARY 2018

Wentworth by the Sea
New Castle, New Hampshire

Abstracts and biographies are listed in order of presentation at the conference

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NEAPMS Committees

The NEAPMS Bylaws specify nine standing committees of the BOD allow for establishing special committees as needed and specify the minimum number of members for each standing committee. Other committees can be added as needed to carry out Society business. Following is the list of standing committees. Each committee is represented by NEAPMS Directors but NEAPMS welcomes *all* members, whether on the BOD or not, to become active with a committee that suits their interest. Any member interested in participating on a committee is encouraged to contact one of the NEAPMS Board members for more information.

Committees

Membership
The Membership Committee seeks to expand the Society's membership by identifying and contacting individuals in the region that may have an interest in joining and/or supporting the Society. Bylaws require at least 3 members, one being Secretary.

Editorial
The Editorial Committee gathers and develops content for the semi-annual production and publication of the *Nor'Easter*, the Society's newsletter. Bylaws require at least 2 members.

Program
The Program Committee works to develop content for the Annual Meetings, including identifying topics, presenters, and workshops for the meetings and preparing an abstract and bio packet for the conference. Bylaws state that Program Committee includes members of BOD with VP as chair. In practice, another BOD member (i.e., not the VP) has chaired this committee most years and has reported to the VP and entire BOD on committee progress.

Nominating
The Nominating Committee is generally comprised of the Society's President and immediate Past President. Their mission is to identify nominees for board positions and formally recommend to the Society candidates for election to vacant positions on the BOD. Bylaws require at least 3 members, one being immediate Past President.

Bylaws
The Bylaws Committee seeks to ensure that the Board is operating under the guidelines of the Society's Bylaws, and recommends appropriate Bylaws changes as may be needed to conduct the business of the Society. Bylaws require at least 3 members.

Internal Audit & Budget
The Internal Audit and Budget Committee seeks to evaluate and make budget predictions and recommendations for the Society, and to aid in fiscal planning, conference planning, and preparation for the annual accounting activities. Bylaws require at least 2 members.

Local Arrangements
The Local Arrangements Committee identifies venues for upcoming Annual Meetings, visits those venues to ensure they meet Society needs, and negotiates contracts for upcoming meetings and plans food, conference space layout and other related elements of on-site conference planning. Bylaws require at least 3 members.

A/V Sub-Committee
This sub-committee of Local Arrangements is responsible for planning and implementing the A/V plans for the conference, including set up and operation of the laptops and projectors for the conferences and loading of presentations onto the equipment. Special committee; no membership requirement in Bylaws.

Government Affairs
The Government Affairs Committee serves as a liaison to keep the Society informed of regional and federal initiatives as they relate to aquatic plant management issues. This committee is also responsible for receiving state/affiliate updates for inclusion in the Nor'Easter newsletters. Bylaws require at least 2 members

Scholarship
The Scholarship Committee is responsible for soliciting, reviewing, and selecting scholarship recipients for the Society. Bylaws require at least 3 members.

Website
The Website Committee is responsible for reviewing and updating the Society's website to keep members informed and content updated. Special committee; no membership requirement in Bylaws.

Awards
The Awards Committee is responsible for identifying members who have gone above and beyond in their efforts to promote the Society's mission, or who have finished their term as an officer or director for the Society. Special committee; no membership requirement in Bylaws. The BOD voted that President and immediate Past President serve on this committee.

NEAPMS History

Past Presidents

2017-18 **Mark Heilman**

2016-17 **Chris Doyle**

2015-16 **Chuck Boylen**

2014-15 **JoAnn Dunlap**

2013-14 **Paul Lord**

2012-13 **John McPhedran**

2011-12 **John McPhedran**

2010-11 **Ann Bove**

2009-10 **Robert Johnson**

2008-09 **Marc Bellaud**

2007-08 **Glenn Sullivan**

2006-07 **Larry Eichler**

2005-06 **Amy Smagula**

2004-05 **Bo Burns**

2003-04 **Jim Sutherland**

2002-03 **Gerald Adrian**

2001-02 **Gerry Smith**

2000-01 **Charles Gilbert**

NEAPMS Past Board of Directors Members

Amy Smagula
(2000-2017)

Ann Bove
(2003-2010, 2016)

Barre Hellquist
(2005-2007)

Bin Zhu
(2008-2010, 2017)

Bo Burns
(2001-2004)

Chris Borek
(2012-2017)

Chris Doyle
(2013-2017)

Chuck Boylen
(2011-2015)

Emily Molden
(2017)

Eric Paul
(2016-2017)

George Knoecklein
(2011-2013)

Gerald Adrian
(2000-2002)

Gerald Smith
(2000-2001)

Glenn Sullivan
2000-2007, 2009-2017)

Greg Bugbee
(2003-2006)

Jacob Meganck
(2016-2017)

Jason Smith
(2002-2004)

Jerry Lewis
(2003-2005)

Jim Sutherland
(2000-2014)

JoAnn Bianco
(2000-2002)

JoAnn Dunlap
(2011)

Joe Pinkerton
(2015-2017)

John McPhedran
(2006-2008, 2010-2012)

Ken Wagner
(2001-2003)

Larry Eichler
(2002-2009)

Larry Kovar
(2000)

Lee Lyman
(2007-2009)

Marc Bellaud
(2004-2008, 2010-2012)

Mark Heilman
(2013-2017)

Mark Lewandowski
(2016-2017)

Meg Modley
(2014-2017)

Melissa Gugliotti
(2007)

Michael Flemming
(2009-2011)

Nancy Murray
(2009-2011)

Paul Lord
(2005-2007, 2012-2013)

Rally Bartholomew
(2000-2002)

Robert Johnson
(2000-2009)

Robynn Shannon
(2012-2013)

Ron Lemin
(2010-2012)

Scott Kishbaugh
(2000-2001, 2008-2010)

Shaun Hyde
(2006-2008)

Will Stevenson
(2014-2017)

NEAPMS Conference Locations

2000 Suffern, New York

2001 Suffern, New York

2002 Saratoga Springs, New York

2003 Saratoga Springs, New York

2004 Sturbridge, Massachusetts

2005 Sturbridge, Massachusetts

2006 Providence, Rhode Island

2007 West Dover, Vermont

2008 West Dover, Vermont

2009 Saratoga Springs, New York

2010 Saratoga Springs, New York

2011 New Castle, New Hampshire

2012 New Castle, New Hampshire

2013 Westbrook, Connecticut

2014 Westbrook, Connecticut

2015 Saratoga Springs, New York

2016 Saratoga Springs, New York

2017 New Castle, New Hampshire

2018 New Castle, New Hampshire

NEAPMS Award Recipients

Outstanding Member Award

2002	Amy Smagula
2004	Glenn Sullivan
2005	Paul Lord
2006	Jim Sutherland
2007	Ken Wagner
2008	Marc Bellaud
2009	Ann Bove
2010	Greg Bugbee
2011	JoAnn Dunlap
2012	Carlton Layne
2013	Frank Maier
2014	Chris Borek
2015	John McPhedran
2016	Chris Doyle
2017	Charles Boylen

Aquatic Plant Science Award

2002	Barre Hellquist
2003	Bill Haller
2004	Ken Wagner
2005	Bob Johnson
2006	Scott Kishbaugh
2007	Mike Netherland
2008	Larry Eichler
2009	Amy Smagula
2010	Charles Boylen
2011	Mark Heilman
2012	Kurt Getsinger
2013	Rob Richardson
2014	Ryan Thum
2015	John Rodgers
2016	Mike Netherland
2017	Bob Johnson

Outstanding Corporate Member

2008	SePRO

NEAPMS Honorary Member

2009	Charles Gilbert
2010	Gerry Smith
2012	Jim Sutherland
2018	*To Be Announced*

Tuesday, January 9, 2018

Harmful Algal Blooms

Wednesday, January 10, 2018

Hydrilla Management

Herbicides

Aquatic Vegetation Management

Thursday, January 11, 2018

Targeted Control

Non-chemical Control

Scientific Posters

Examining the Role for Aerosolized Cyanobacteria in Amyotrophic Lateral Sclerosis

Dr. Elijah W. Stommel, Ph.D. Dartmouth-Hitchcock Medical Center

Abstract: The objective of this study is to investigate the exposure route of β-N-methylamino-L-alanine (BMAA) via cyanobacteria (CB) aerosol as a risk factor possibly associated with neurodegenerative diseases, namely amyotrophic lateral sclerosis (ALS). This intent is three-fold. First, to quantitatively assess risk of explore to CB associated with proximity to a waterbody by monitoring water quality and collecting CB aerosol. Second, to examine if aerosolized CB is identifiable in the human respiratory track via the collection of bronchoalveolar lavage and nasal swab specimens. Third, to determine if CB exposure in post-mortem lung tissue correlates quantitatively with neurodegeneration as seen on neuropathological evaluation. Our approach is the first attempt to evaluate neurodegenerative risk associated with aerosolized CB.

Speaker Biography: Positions:
1988-1991 Resident in Neurology, Dartmouth-Hitchcock Medical Center, Lebanon, NH
1990-1991 Chief Resident in Neurology, Dartmouth Hitchcock Medical Center, Lebanon, NH
1990-1991 Instructor in Medicine, Dartmouth Medical School, Hanover, NH
1991-2001 Assistant Professor of Medicine, Dartmouth Medical School, Hanover, NH
2001-2012 Associate Professor of Medicine, Dartmouth Medical School, Hanover, NH
2013- Professor of Neurology, Geisel School of Medicine at Dartmouth, Hanover, NH
Other Experience and Professional Memberships
1991-present New Hampshire Medical Society
1992-present American Association for the Study of Headache
2000-present American Association of Electrodiagnostic Medicine
2008-present Motor Neuron Disease Association
2008-present The Northeast Amyotrophic Lateral Sclerosis Consortium
1989-present American Academy of Neurology (Fellow since 2003)
1984-present Corporation Member: Marine Biological Laboratory, Woods Hole, MA"

Beyond the Bloom: Bioaccumulation and Transport of cyanobacteria Toxins within and Outside the Lake Ecosystem

Dr. James F. Haney, Ph.D University of New Hampshire

Abstract: Studies were conducted on bioaccumulation of microcystins (liver toxins) and β-methylamino-L-alanine or BMAA (neuro toxins) at different trophic levels in aquatic food webs including phytoplankton, zooplankton, fish, common loons (blood and feathers) and the American Bald Eagle (blood). Although both microcystins and BMAA bioaccumulate, they differ in their tendencies to biomagnify. Cyanobacteria cells and dissolved toxins may also escape the boundaries of a lake as toxic lake aerosols leading to both local and large scale contamination and exposure of soils, plants, wildlife and humans. Potential non-boom impacts of cyanobacteria are discussed.

Speaker Biography: Professor, Department of Biological Sciences, Marine, Estuarine and Freshwater Biology, Zoology, Neuroscience and Behavior. I am interested in the food web relationships of freshwater communities, the role of diel rhythms, and comparative limnology of temperate, tropical and arctic regions. Currently, I have research projects in three areas of freshwater ecology.

1.Cyanobacteria and biotoxins in lakes

2.Trophic interactions and diel behaviors of aquatic invertebrates

3.Lake management and the factors regulating water quality in New Hampshire lakes

Cyanobacteria Monitoring Program in the State of New Hampshire

Amanda McQuaid New Hampshire Department of Environmental Services

Abstract: Harmful Cyanobacteria Blooms are a public health concern due to their ability to produce a range of toxic compounds. Cyanotoxins are dermal, liver, nerve and neuro- toxic which can affect water quality used for both recreational and drinking purposes. The Beach Program of the New Hampshire Department of Environmental Services looks for, and responds to, visible signs of these blue-green blooms as part of an effort to monitor water quality at public beaches and waterbodies used for recreating and drinking. Reported blooms were sampled from several New Hampshire lakes in the 2017 swim season. The majority of the samples contained some form of cyanobacteria, with Anabaena (Dolichospermum) as the most common type observed. Lake warnings were issued for over a dozen lakes. The Beach Program sets out to inform the public of potential harmful cyanobacteria blooms and tests emerging methods and monitoring tools used for such blooms. NHDES continues to participate with EPA Region 1 and in an on-going effort to monitor cyanobacteria blooms in New England.

Speaker Biography: Amanda studied at the University of New Hampshire, earning her B.S. in Marine and Freshwater Biology (2006), M.S. in Zoology (2009) and is a Ph.D. candidate with Dr. Jim Haney. Her research interests include ecology, zoology, limnology, cyanobacteria, toxicology, biotoxins, water quality, foodwebs and public health. She is currently the program coordinator for the Beach Program at the New Hampshire Department of Environmental Services, monitoring New Hampshire waterbodies for fecal bacteria and cyanobacteria contaminants in public waters.

A Risk-Based Decision Matrix for Managing Noxious Cyanobacteria

West Bishop, Ph.D. SePRO Corporation

Abstract: Cyanobacteria are increasing threats to freshwater resources. Better understanding of cyanobacterial toxins and exposure routes reinforces the need for effective management. Recreational contact, inhalation, fish/crop consumption are toxin exposure routes that are difficult to mitigate through monitoring. Fish and wildlife impacts from toxins cannot be offset by closing affected systems. Allowing cyanobacteria to exist allows for a chronic toxin exposure, potential hot spot accumulations and can alter the system to promote continued blooms. This presentation comparatively assesses risks of allowing cyanobacterial infestations to persist verses risks of implementing management programs. Effective control options to mitigate cyanobacterial blooms and restore designated water uses will be discussed. Allowing blooms to continue unabated is not without risk; effectively controlling blooms is needed to ensure safety and usability of water resources.

Speaker Biography: West Bishop received a BS from Western Michigan University in 2006, MS from Clemson University in 2010, and Ph.D. from North Carolina State University in 2016. The focus of his research has been on efficient management of noxious algae and water quality improvement. West is a certified lake professional through NALMS and has presented at numerous professional conferences and contributed many articles to peer-review and other literature. West has been with SePRO Corporation over six years as the Algae Scientist and Water Quality Research Manager.

Nine Years of Herbicide (Fluridone) Treatment in Pickerel Pond (Maine): *Hydrilla verticillata* Control and Native Plant Response

John McPhedran Maine Department of Environmental Protection

Abstract: Maine confirmed the state's first known infestation of hydrilla (Hydrilla verticillata) in 2002 in Pickerel Pond, Limerick, Maine (52 acres, maximum depth 16 feet). When discovered the infestation was well-established, in many areas exceeding 60-70% cover and estimated by Maine Department of Environmental Protection (MDEP) to be at least four years old. The initial objective of MDEP's response was to prevent infestation of other waters. MDEP's response measures included outlet screens to limit downstream migration, restrictions on boat access, public outreach to landowners, tuber bank and plant monitoring, herbicide treatments with fluridone, and annual dive surveys.

After two years of herbicide treatment, MDEP determined to attempt eradication and continued annual treatments for a total of nine consecutive years (2003-2011). No hydrilla was found during the last two years of herbicide treatment (2010 and 2011). In 2012, the first year without herbicide treatment, one plant was found during the dive survey. Annual dive surveys in 2013-2017 resulted in no hydrilla found.

Plant monitoring by point intercept rake throws was conducted at grid points 40 meters apart. Plant data were collected 2002 through 2007, in 2012 and finally in 2017. This presentation will summarize effects of herbicide treatment on hydrilla and native plants in Pickerel Pond from 2002-2017.

Speaker Biography: John grew up and has worked around Maine lakes most of his life, first working on water quality and watershed management in the Cobbossee Watershed District just west of Augusta. A subsequent graduate degree in botany led to his current position coordinating Maine Department of Environmental Protection's (DEP) Invasive Aquatic Species Program, a position he's held since 2001 when the program formally launched. DEP's program is funded by users of motorized watercraft on inland waters and focuses on invasive aquatic plants. John oversees statewide efforts to prevent spread of, monitor for and control invasive aquatic plants.

Population Dynamics of Largemouth Bass and Black Crappie under Various Levels of Monoecious Hydrilla Coverage

Alejandro Reyes North Carolina State University

Abstract: Large lakes and reservoirs support multiple uses such as swimming, fishing, boating, hydroelectric generation and flood control. Stakeholders within each group may have a different perspective on how submersed aquatic vegetation (hereafter SAV) should be managed, in order to maximize their use of the system. Fisherman are one group of stakeholders who for the most part, favor SAV growth. This can be a point of contention when this view conflicts with other lake uses such as swimming and boating. The phrase “Grass = Bass” has been popularized throughout fishing circles and has been the underpinning of many complaints to state and local entities concerning SAV control. Lake Gaston, a 20,300 acre lake has been managing monoecious hydrilla since the early 1990’s. Since 2013, hydrilla lakewide has been on the decline, with the most recent acreage estimate being 120 acres. The goal of this study is to investigate if the decline of hydrilla within Lake Gaston has had any impacts on the populations of largemouth bass and black crappie. We will present abundance, size structure, condition age and growth data of both populations pre and post the hydrilla decline.

Speaker Biography: Alejandro received his bachelors of science in ecology from SUNY Plattsburgh and is finishing up his Master's in Lake Management at SUNY Oneonta. Currently he is employed as an Extension Associate at North Carolina State University.

Managing Aquatic Plant Densities in the Proverbial Goldfish Bowl: A Growing Problem for a New Jersey Water Supply Agency

Ken Klipstein Director of Watershed Protection: New Jersey Water Supply Authority

Abstract: New Jersey's Delaware and Raritan Canal is a 60-mile long historic barge canal completed in 1834 that was rehabilitated in the 1950's to serve as a water supply source. In 1973, the canal and its structures were entered on the National and State Register of Historic Places, and in 1974, over 60 miles of the canal and a narrow strip of land on both banks were made a state park. While the New Jersey Water Supply Authority has jurisdiction over the water transmission complex, the Canal has many engaged stakeholders and interest groups including water users, historians and recreational users. Aquatic plant management in a historic and popular linear state park, crossing through 16 municipalities in 4 counties, that supplies drinking water to more than 1 million people presents many challenges. In 2016, the Authority was faced with managing an emerging threat from hydrilla and other aquatic plants choking off flow through the canal while balancing the requirements, demands and desires of a diverse range of interested parties. This presentation will address the history and function of the Canal, and the complexity of stakeholder involvement during this early detection, rapid response aquatic plant management program.

Speaker Biography: Ken Klipstein is Director of Watershed Protection for the New Jersey Water Supply Authority, having managed that program since March 2008. He holds a B.S. in Environmental Planning from Cook College, Rutgers University, and an A.A.S. in Civil Technology from the University of New Hampshire. Prior to joining the Authority, Ken worked for 20 years at the New Jersey Department of Environmental Protection, where he last served as Bureau Chief for Watershed Planning. His non-profit interests include board positions with the Pinchot Institute for Conservation, the New Jersey Conservation Foundation, the New Jersey Invasive Species Strike Team and the Tewksbury Land Trust.

Deep in the Weeds of Aquatic Plant Management in New Jersey's Delaware and Raritan Canal

Heather Desko New Jersey Water Supply Authority

Abstract: Dense aquatic vegetation growth affects the ability of New Jersey's Delaware and Raritan Canal to transfer 100 Million Gallons of Water a Day (100 MGD) from the Delaware River to meet the demands of drinking water treatment facilities and golf courses on its way to the Raritan River. In 2016, the vegetation was so dense, the Authority contracted for conventional mechanical harvesting, only to discover several miles of dense *Hydrilla verticillata*. This finding led to the development of an Aquatic Plant Management Plan, 60 miles of submersed aquatic vegetation mapping, a low-dose herbicide application, and an intensive monitoring plan. This presentation will cover the treatment, mapping, and monitoring response that the New Jersey Water Supply Authority initiated in 2017. The Authority's management efforts focus on invasive and native plants, including *Hydrilla verticillata*, *Heteranthera dubia*, *Cabomba caroliniana*, and *Vallisneria americana*.

Speaker Biography: Heather Desko is a Senior Watershed Protection Specialist for the New Jersey Water Supply Authority. She joined the Authority in 2009, after serving as an AmeriCorps NJ Watershed Ambassador for the Lower Raritan Watershed. Heather manages the Authority's water monitoring programs, aquatic invasive species projects, community rain barrel and rain garden programs, and River-Friendly Business and School certification programs. She is a member of the New Jersey Water Monitoring Council, a Project WET Facilitator, and Aquatics Station Coordinator for the New Jersey Envirothon. Heather received both her BA in Environmental Science and MA in Energy and Environmental Analysis from Boston University in 2008.

Technical Update on PROCELLACOR™ Aquatic Herbicide and Future Uses for Aquatic Plant Management in the Northeast

Dr. Mark Heilman, Ph.D SePRO Corporation

Abstract: PROCELLACOR™ is a novel reduced-risk herbicide technology representing the first new active ingredient approved with aquatic weed control as an initial registered use since Sonar® in 1986. PROCELLACOR is anticipated to have its initial federal aquatic label by early 2018 with operational uses beginning soon after in spring 2018. PROCELLACOR (a.i. florpyrauxifen-benzyl) has unique, low-rate, short-exposure (hours to days), systemic activity for selective control of major US submersed weeds including hydrilla (*Hydrilla verticillata*) and all varieties of invasive watermilfoils including Eurasian watermilfoil (*Myriophyllum spicatum* or EWM), hybrid EWM lineages, parrotfeather (*M. aquaticum*), and variable milfoil (*M. heterophyllum*). It is also in development for selective control of water chestnut (Trapa spp.) and several other problematic northern weed species. Along with much-reduced use rates compared to older herbicides with similar spot/partial use patterns, PROCELLACOR does not have drinking water use restrictions along with no restrictions on swimming and fishing due to its strong human health profile. This presentation will review the general properties of PROCELLACOR and summarize past mesocosm and field trial results relevant to future use in the Northeast. These results will document excellent activity on targeted invasive plants with exposures as short as several hours and selectivity to common native submersed plants such as tapegrass (*Vallisneria americana*), bladderworts (*Utricularia* spp.), common waterweed (*Elodea canadensis*), and pondweeds (*Potamogeton* spp.) as well as most common native emergent plants.

Speaker Biography: Dr. Heilman is Senior Aquatic Technology Leader for SePRO Corporation and directs the company's research and development of new innovative solutions for aquatic resource management. He holds his B.S. and Ph.D. degree in Aquatic Ecology from the University of Notre Dame. He is a past recipient of the NEAPMS Aquatic Plant Science Award as well as the Outstanding Research and Technical Contributor Award of the national APMS. He currently serves as APMS Vice President and as President of NEAPMS.

Evaluating the Sensitivity of Seven Aquatic Plants to PROCELLACOR™ Herbicide

Erika Haug North Carolina State University

Abstract: The herbicide PROCELLACOR is a new arylpicolinate herbicide currently under development for weed management in rice (*Oryza sativa* L.) production, aquatic weed management and other uses. Greenhouse research at NC State University was conducted to evaluate the effect of the parent compound and an acid metabolite of Procellacor on seven aquatic plant species: alligatorweed [*Alternanthera philoxeroides* (Mart.) Griseb.], Carolina waterhyssop [*Bacopa monnieri* (L.) Pennell], fanwort (*Cabomba caroliniana* Gray), monoecious hydrilla [*Hydrilla verticillata* (L. f.) Royle], parrotfeather [*Myriophyllum aquaticum* (Vell.) Verdc.], variable watermilfoil (*Myriophyllum heterophyllum* Michx.), and American waterwillow [*Justicia americana* (L.) Vahl]. In-water applications of the two compounds were applied at rates of 0 to 81 µgL-1. Fanwort was not controlled by the parent compound at the rates tested, in contrast to the other species evaluated. Dry weight 50% effective concentration (EC50) values were < 1 µgL-1 of the parent compound for alligatorweed, monoecious hydrilla, parrotfeather, and variable watermilfoil. Carolina water hyssop and American waterwillow EC50 values for the parent compound were 5.0 µgL-1 and 5.2 µgL-1 respectively. These six species were less sensitive to the acid metabolite with dry weight EC50 values of 1.6 µgL-1 to 77.1 µgL-1. Plant control ratings also indicated that response of the sensitive species increased from 2 to 4 weeks after treatment. Overall this new product to the aquatics market appears to provide highly effective control of some of the most troublesome invasive aquatic plants in the US.

Speaker Biography: Erika completed a Bachelor of Science degree in Biology at McGill University in Montreal, QC. She has worked in the public, private, non-profit and academic sectors of water resource management. Currently, Erika is pursuing a PhD in Fisheries, Wildlife and Conservation Biology at North Carolina State University under the direction of Dr. Robert Richardson.

Endothall Behavior in Several Aquatic Weeds

Mirella Ortiz Colorado State University

Abstract: Endothall was first labeled for aquatic weed control in 1960, and the endothall label was expanded to include aquatic weed control in flowing water in 2010. Endothall is generally considered a contact herbicide; however, many field observations suggest that it could have systemic activity. The objective of this experiment was to determine maximum absorption, absorption rate, translocation and desorption of endothall in Eurasian watermilfoil (EWM) and two hydrilla biotypes. For herbicide absorption plants of each species with developed roots and 10 cm of shoot growth were transferred to test tubes sealed at the top with eicosane wax to isolate the root system from the water column. Mesocosms were treated with 3 µg mL-1 endothall plus 14C-endothall. Plants were exposed to the herbicide over a time course of 192 hours. At predetermined time points three plants of each species were harvested, divided into shoot and root tissue, dried at 60C for 48 h, and oxidized. Radioactivity was determined by liquid scintillation spectroscopy. Herbicide desorption was evaluated over a time course of 72 hours using the same treatments as described before, but with higher concentration of radiolabeled endothall and 10 cm apical meristems shoots of each species. Hydrilla showed a linear increase in herbicide absorption, while herbicide absorption in EWM best fit a hyperbolic function. Translocation to EWM roots was limited, reaching a maximum translocation of 11% of total absorbed radioactivity. The distribution of radioactivity was 72% shoot:28% root for monoecious hydrilla and 75% shoot:25% root for dioecious hydrilla. Herbicide desorption was less than 30% for all the three species. These data provide strong evidence that endothall is systemic.

Speaker Biography:

Circling the Wagons: Implementing the NYS AIS Management Plan

Cathy McGlynn, Ph.D. New York State Department of Environmental Conservation

Abstract: The implementation of the updated New York State Aquatic Invasive Species Management Plan began in July 2015. We review its top priorities and look at what has been accomplished in 2.5 years. The focus has been on preventive measures (outreach and education, regulatory efforts, early detection and response) and regional control and management efforts. Details of future efforts will be provided.

Speaker Biography: Cathy McGlynn is the Aquatic Invasive Species Coordinator for the New York State Department of Environmental Conservation (NYSDEC). She is responsible for coordinating the implementation of the statewide AIS Management Plan. This includes assisting with and supporting the expansion of boat steward programs and standardization of messaging and data management throughout the state, development and distribution of education and outreach products, co-leading the Croton River Hydrilla Control Project and the Tioga County Hydrilla Control Project, providing technical expertise for other regional projects, administering a summer internship program, and administering federal funds for select research and management projects. Cathy received her Ph.D. from the Department of Ecology and Evolution at SUNY Stony Brook, her M.E.M. from Duke University Nicholas School of the Environment, and her B.A from Rutgers College.

Aquatic Plant Management in the United States Army Corps of Engineers Wilmington District Lakes

Kara Foley North Carolina State University

Abstract: Aquatic invasive species monitoring and management practices are important for the maintenance of high-functioning and sustainable aquatic ecosystems. This project aims to identify and manage aquatic invasive plant populations as well as promote the establishment of native aquatic plant communities in four of the United States Army Corps of Engineers Wilmington District Lakes which include: Philpott Lake (Bassett, VA), Falls Lake (Wake Forest, NC), B. Everett Jordan Lake (Raleigh, NC), and W. Kerr Scott Lake (Wilkesboro, NC). The results of preliminary point-intercept and bio-volume surveys, aquatic invasive species control methods, and the establishment of native plant populations at these geologically young water bodies will be discussed. At Philpott Lake, the northernmost reservoir in this group of study sites, dioecious hydrilla (Hydrilla verticillata (L.f.) Royle) was positively identified at 38% of the surveyed points. The tuber bank dynamics and management strategies of this uncharacteristic population of dioecious hydrilla will also be addressed. With this work, we hope to achieve efficient management techniques and long-term monitoring methods that can be applied to other water bodies within the region that face similar challenges.

Speaker Biography: Kara is currently a pursuing a Master's Degree at North Carolina State University where she is working under the direction of Dr. Rob Richardson. In 2016, Kara earned her Bachelor's Degree in Environmental Science at the University of New Hampshire. Post-graduation, Kara interned for the Exotic Species Program at the New Hampshire Department of Environmental Services which inspired her to continue her education in the field of aquatic plant management.

Cyanobacterial Management in California with Liquid Activated Peroxygen algaecide/cyanobacteriacide

Thomas Warmuth BioSafe Systems

Abstract: Effective copper alternative treatments for cyanobacterial management are emerging as a needed option as the threat to our waters by these organisms becomes more realized and understood. The development of effective treatments for the "Bad Players", or what are identified as cyanobacteria that are known to produce harmful toxins or even taste and odor compounds, has never been more imperative. Both San Francisco Public Utilities and Santa Cruz Water, through their programs of monitoring, sampling and algal enumeration, developed an algaecide treatment regime with Clean Lakes, Inc. (contracted California Certified Pest Control Advisor and licensed aquatic applicator) and delivered effective control of various cyanobacteria throughout the season using GreenClean Liquid, a NSF/ANSI 60 Certified, liquid activated peroxygen algaecide, in their reservoirs. Peroxide based algaecides have been identified as effective in selective treatments for cyanobacteria, where it is not greatly effecting the population of beneficial green algae/phytoplankton. The use and delivery of "granular peroxide", SCP – Sodium Carbonate Peroxyhydrate, can have challenges not only in the delivery of the treatment to the water, but also in effectively controlling the target organism depending on where it may be in the water strata. The chemistry of GreenClean Liquid has shown to be effective, while also being easier to apply than SCP and having the ability to be more effectively applied. This all leading to a better potable water source through better control of target cyanobacteria while preserving most of the green phytoplankton; an overall healthier and productive algal population while limiting the input of copper based algaecides to the system.

Speaker Biography: Tom Warmuth is the National Aquatics Technical Representative for BioSafe Systems. Tom grew up in Fairport Harbor, on the Northeast Ohio shores of Lake Erie. He is a graduate of East Carolina University with a Bachelor of Science in Biology. Starting his career in Florida, Tom's experience began while working in mosquito and public health pest control, structural pest control, environmental consulting and permitting, and aquatic weed management. More recently, Tom has worked in lake management as well as in aquatic herbicide distribution. For the past 9 years, he has lived in North Carolina with his wife, Sara.

Management of *Nitellopsis obtusa* (Starry Stonewort) in a Recently Infested Minnesota Lake Using a Copper-Based Algaecide

Tyler Geer Clemson University

Abstract: *Nitellopsis obtusa* (starry stonewort) is an invasive species of Eurasian origin that was likely transported and introduced to the United States in ballast water. Since it was first identified along the St. Lawrence River, *N. obtusa* has spread rapidly among inland lakes across the Great Lakes region of the United States. Initiating an aggressive control plan as soon as possible after discovery of *N. obtusa* is important for an efficient and effective management program. In West Lake Sylvia (Wright Co. MN), *N. obtusa* was first confirmed in September of 2016 in the vicinity of the public boat access. Management of *N. obtusa* in the immediate vicinity of the boat access in West Lake Sylvia began early in the summer of 2017. The goal of these efforts was to control *N. obtusa* throughout the year and contain regrowth and any potential recolonization or re-infestation of the area. This situation provided an opportunity to measure the responses of *N. obtusa* to algaecide exposure. To target growth and regrowth of *N. obtusa*, the copper-based algaecide Cutrine®-Plus was applied four times between June and October 2017 in the vicinity of the public boat access. Weighted drop hoses were used in each treatment to target an initial concentration of 1000 µg Cu/L in the bottom two feet of the water column. Samples collected after each treatment confirmed that >90% of the targeted initial exposure was achieved. Aqueous copper concentrations dissipated to background concentrations (i.e. pre-treatment aqueous copper concentrations) within 4-days following each treatment. Post-treatment *N. obtusa* surveys by an independent auditor confirmed that the spatial extent of *N. obtusa* and the frequency of *N. obtusa* at sample sites declined in the treated area from June to December. These preliminary results indicate that algaecide treatments can be used control and contain infestations of *N. obtusa* in recently infested lakes.

Speaker Biography:

Lessons from a Decade of Lake Management: Effects of Herbicides on Eurasian Watermilfoil and Native Plant Communities

Ellen Kujawa Lake Champlain Basin Program

Abstract: Eurasian watermilfoil (Myriophyllum spicatum) is a non-native and invasive aquatic macrophyte with a broad North American distribution. It can have significant negative effects on invaded water- bodies, including decreased native macrophyte diversity, formation of recreational nuisances, and lowered lakefront property values. Previous research suggests that M. spicatum decreases in response to herbicide treatment, but most studies are spatially and temporally limited, usually focusing on a single waterbody for a single year. The long-term effects of herbicides remain relatively unknown. Here, we share the results of an 11-yr observational study of aquatic macrophyte diversity, dynamics, and response to herbicide treatment on 28 Wisconsin lakes (15 of which were adaptively managed with herbicide for M. spicatum and 13 of which acted as unmanaged reference lakes). We found that overall, adaptive management decreases M. spicatum abundance over time, but that the efficacy of individual herbicide treatments can vary. We also found that lakes with relatively new M. spicatum populations (discovered within the last decade) treated smaller areas with lower frequency than lakes with established populations, and were able to maintain lower M. spicatum abundance. This suggests that using adaptive, science-based aquatic plant management strategies, including early detection and response, may increase invasive species management success. Finally, we show that the effect of herbicide treatment on native macrophytes is variable and can be significant. Overall, our results suggest that while herbicide treatment can be an effective adaptive management tool, particularly in lakes with relatively recent M. spicatum invasions, the specific effects of individual treatments can be unpredictable. This study allows lake stakeholders to better understand the efficacy of herbicide treatment, in addition to the possible non-target effects on native macrophyte species.

Speaker Biography: Ellen joined the Lake Champlain Basin Program in 2017, and helps to facilitate water resources research and implementation projects in the basin. She holds an M.S. in conservation biology and sustainable development from the University of Wisconsin-Madison, and a B.A. in environmental studies from Mount Holyoke College. Her past experience includes paleoecology and invasive species research, statistical analysis and climate change modelling, and fieldwork in lakes, prairies, and forests. Most recently, she worked for the Wisconsin Department of Natural Resources, studying long term aquatic plant population dynamics and helping to develop statewide lake management guidelines. Ellen is an avid gardener and cook, and lives in Burlington with her boyfriend and many plants.

Detailed Review of an Example of Aquatic Plant Harvesting in Lake Management

Dr. Kenneth Wagner, Ph.D Water Resource Services

Abstract: Mechanical harvesting of aquatic plants has been practiced for more than half a century, with a variety of technological and operational advances and a range of experience that should provide a fairly reliable assessment of potential benefits and limitations. Yet there are few peer reviewed papers and much speculation in presentations about the role of this technique in lake management. Here we examine the control of rooted aquatic plants and removal of nutrients with mechanical harvesting in the context of a decade of experience at Morses Pond in Wellesley, Massachusetts. Morses Pond has a littoral zone of about 45 acres that suffer from dense infestations of multiple invasive species, including both Eurasian and variable leaf milfoil, fanwort, curly leaf pondweed, and spiny naiad, plus nuisance growths of white and yellow water lilies. The Town of Wellesley, however, does not allow herbicide treatments on public property, so mechanical harvesting has been applied for many years to control weed growths. In 2005 a comprehensive management plan was developed that led to purchase of a new harvester in 2007 and increased emphasis on harvesting and related record keeping. This decade long record allows a data based review of results and performance.

Speaker Biography: Dr. Wagner holds degrees from Dartmouth College and Cornell University, with his Ph.D. earned in Natural Resource Management in 1985. He has over 40 years of experience working on a variety of water resources assessment and management projects, including lake, reservoir, river and watershed assessment, rehabilitation, and management, regulatory processes, and educational programs. In 2010 he started Water Resource Services, a small company with a focus on water supply protection and lake management consulting. He is a former President of the North American Lake Management Society and is beginning his second stint as Editor in Chief of Lake and Reservoir Management, a peer-reviewed journal.

Manual removal of *Typha* (cattails) in spring and fall to maintain habitat structure for sensitive biota

C. Eric Hellquist, Ph.D. Department of Biological Sciences, State University of New York Oswego

Abstract: Management of native and invasive cattails (*Typha* spp.) can be important for maintaining wetland habitat structure. Dead *Typha* biomass decomposes slowly and accumulates in wetlands creating mulch that inhibits native flora. We worked in a peatland that is a critical site for the New York State endangered Bog Buckmoth (*Hemileuca* sp. 1) whose primary larval food source is *Menyanthes trifoliata* (Bog Buckbean). *Menyanthes* habitat is being colonized by *Typha angustifolia* and *T. x glauca*. Due to the spread of *Typha* at our site, land managers decided *Typha* should be controlled to help preserve habitat for the Bog Buckmoth and its primary forage. Our objective was to determine the most effective time of year to reduce *Typha* colonization by manual removal. In 2016 and 2017, an experiment was established to determine how cutting in Spring (n=12) and Fall (n=12) may influence the success of *Typha* management. In 2016, removing living and dead *Typha* resulted in a significant reduction in cattail on the fen mat ($p < 0.0001$). Compared to uncut control plots, dead *Typha* stems were 19 times less abundant and living stems were 3 times less abundant after harvest. Removing dead biomass from the fen was effective ($p = 0.002$) in reducing the amount of potential *Typha* mulch on the mat. Seasonality is an important consideration as living *Typha* removed in the Spring regrew rapidly by the Fall, but seldom produced inflorescences. Combined with data from the 2017 field season, our initial results indicate that vigilant management of *Typha* biomass can help maintain habitat structure for conservation purposes.

Speaker Biography: Eric Hellquist is a plant ecologist and an Associate Professor of Biological Sciences at the State University of New York Oswego. His research interests focus on plant community ecology of aquatic and wetland habitats in the Great Lakes watershed, New England, and the Greater Yellowstone Ecosystem.

Aeration of a Shallow Eutrophic Lake: What to Expect

Patrick Goodwin Vertex Water Features

Abstract: Aeration is a commonly recommended management technique used to meet a variety of lake management goals including: (i) habitat improvement by eliminating thermal gradients and improving water chemistry, which allows for a more diverse and robust food web, and/or (ii) reducing symptoms associated with eutrophication, especially in regards to Harmful Algal Blooms (HAB), taste and odor issues, and water clarity. An evaluation of this technique was conducted on Lake Mohegan, a shallow ($\bar{x}$= 3.7m) 100-acre lake, located in the suburbs of northern Westchester County, New York. Even with the operation of an aeration system, Lake Mohegan exhibited weak to strong (episodic) stratification and anoxia at the sediment-water interface, HAB's, poor zooplankton community composition, and poor transparency. Some of these results were possibly caused and exacerbated by inadequate mixing/design of the system. Other, more explainable factors were due to lake characteristics (i.e., iron deficiencies and mixing depth). However, the aeration approach did result in some benefits. Increased zooplankton abundance, improved fish habitat, Nitrate to Ammonium ratios, and changes in phytoplankton species composition suggested direct benefits of aeration. Modifications of the aeration approach, maximizing benefits while minimizing impacts, offer substantial improvement potential. This presentation will discuss aeration as a management approach and its applicability to Lake Mohegan and other problematic lakes.

Speaker Biography: Patrick holds a biology degree from the University of North Florida and is currently finishing his masters up at the State University of New York, Oneonta, where he studied lake management. Patrick is a research biologist for Vertex Water Features Inc. out of the Jacksonville, FL office. There he works through Vertex's international dealer network to obtain data on lakes that have received aeration in order to improve aeration design throughout different eco-regions.

Implementing Monitoring Techniques of Hydrilla verticillata in the New Jersey Delaware and Raritan Canal

Amanda Mahaney and Emily Mayer SOLitude Lake Management

Abstract: The Delaware and Raritan Canal serves as a potable water resource, in addition to being utilized for irrigation and cooling water. Managed by the New Jersey Water Supply Authority, the 60-mile canal also serves as a registered historical site, New Jersey state park, and is a navigable waterway, heavily used for recreational purposes. As a raw water transmission system, thick growth of submersed aquatic vegetation (SAV) is detrimental to the water quality and velocity of delivering water on a daily basis. In 2016, Hydrilla (Hydrilla verticillata) was discovered in the canal. In response to the discovery, this prompted the New Jersey Water Supply Authority to retain an aquatic consultant to conduct SAV monitoring, using modified Point Intercept Methods (PIM), in order to support the Hydrilla control program. The three year Hydrilla control program includes a low dose herbicide injection system up to 120 days. Extensive SAV monitoring and mapping of the entire canal will be conducted, in addition to the 2016 monitored areas. Herbicide residue analysis and Hydrilla tuber monitoring are being utilized for the management of hydrilla and nuisance vegetation.

Presenter Biography:

Amanda Mahaney is a biologist with Solitude Lake Management in the Massachusetts office. Amanda has a strong passion for botany and spending time outdoors which led her to the lake management industry. She has lived in New England her whole life and loves it's abundance of lakes and ponds, seasonal destinations, and extensive history.

Emily Mayer is an aquatic biologist out of Solitude Lake Management's NJ office and has been in the lake management industry for the last six years. She graduated from Centenary University where she earned her Bachelor's degree in Biology and is currently pursuing her graduate degree in Fisheries and Aquatic Sciences from the University of Florida. She's an active partner with the Lower Hudson Partnership for Regional Invasive Species Management (LH PRISM). Ms. Mayer has presented project findings via poster presentations at annual conferences for NALMS and NEAPMS. Born and raised in Northern New Jersey, Emily likes to spend her free time at the beach.

A Study on Macrophyte Diversity and Water Quality in six Finger Lakes of New York

Bin Zhu, Ph.D. and Lyla O'Brien University of Hartford

Abstract: Aquatic plants are required for a healthy ecosystem by providing many necessary functions such as preventing shoreline erosion, producing dissolved oxygen and providing habitat for many aquatic organisms. As an indicator of water quality, assessing aquatic plant diversity can help assess ecosystem health. In 2007-2009, various surveys of submerged aquatic plants were conducted on six Finger Lakes in New York, which are oligotrophic lakes with low nutrient levels. This research project aimed to compare the aquatic plant diversity and abundance across the six Finger Lakes and test possible relationships between aquatic plant diversity and water quality. Plant species in the lakes varied from 13-19 species, with common species being elodea, Eurasian milfoil, curly-leaf pondweed and slender naiad. Eurasian milfoil, an invasive species, was the most abundant across the lakes, which may reduce growth and abundance of native plants. Trophic state index (TSI) was calculated using chlorophyll a, total phosphorus, and Secchi depth data from 2006-2008. The range of TSI was from 26.8 to 42.7, which further suggests that most of these lakes are oligotrophic. When correlations were studied between TSI and plant diversity measured as total species richness, average species richness per site, Shannon-weaver diversity index, and evenness, no significant correlation was found. This is likely due to the narrow range of TSI and a small sample size. However, the average species richness tended to increase while TSI increased. This is consistent with the common finding that more plant species is present in mesotrophic lakes.

Presenter Biography: Dr. Bin Zhu is an Associate Professor of Biology and Director of Environmental Studies Program at the University of Hartford in Connecticut. He received his Ph.D. in Biology and Master of Public Administration from Syracuse University. He was also a post-doctoral associate at Cornell University and a research scientist at the Finger Lakes Institute of Hobart and Williams Smith Colleges. Bin's research focuses on ecology and management of invasive plants and assessment of water quality using physical, chemical and biological parameters. He has published more than 20 scientific articles in journals like Aquatic Botany, Ecosystems, Fisheries, Freshwater Science, Journal of Aquatic Plant Management, Journal of Great Lakes Research, Journal of Plant Ecology and PLOS ONE. Bin is an Associate Editor for Journal of Plant Ecology and Journal of Aquatic Plant Management. He is also a current NEAPMS Board member and Chair of the Scholarship Committee.

Mapping Water Chestnut Using Drone Technology

Michael Lew-Smith Arrowwood Environmental

Abstract: Using field work to map water chestnut in large wetlands is often hindered by the difficulty of accessing many parts of the wetland. While control measures can take place in some areas, without accessing the entire wetland, it is unknown if other source populations exist. The advance of drone technology in recent years has led to their incorporation into mapping various natural resources. Experiments using drones to map water chestnut have been conducted in the Great Lakes by researchers at SUNY Buffalo as well as by the US Fish and Wildlife Service on the Silvio O. Conte Wildlife Refuge. The Lake Champlain Committee and Arrowwood Environmental received funding from the Lake Champlain Basin Program to test this procedure for mapping water chestnut in the Lake Champlain basin. Three test sites were chosen based on wetland characteristic and varying levels of water chestnut infestation. Using a consumer grade DJI Phantom 4 Professional drone with a 20 megapixel camera we flew a pre-determined flight pattern over the site and took geo-referenced photographs. The photographs were post-processed into a single orthorectified image and imported into GIS software, where they were viewed and analyzed. Preliminary results indicate that flights at 200' or below are sufficient to detect and map water chestnut in both open water situations and when mixed with other floating-leaved aquatic vegetation. With the development of this technology, the use of drones may offer an efficient and cost-effective method for detection and mapping of water chestnut.

Presenter Biography: For over fifty years the Lake Champlain Committee (LCC) has worked towards a healthy lake ecosystem. LCC helped draft the Rapid Response Protocols for Aquatic Invasive Species (AIS), was a charter member of the Lake Champlain Basin Program's Aquatic Invasive Species Task Force and has extensive experience working to control AIS in the lake. Arrowwood Environmental (AE) has 15 years of experience performing natural community inventories for many towns across the state including natural community mapping and classification and invasive species control. AE's GIS Analyst is an FAA certified UAV pilot with a growing base of experience in this emerging technology as well as strong foundations in other remote sensing platforms and ecological image analysis. The LCC/AE team has been working for the past 6 years on AIS mapping and control in the Lake Champlain Basin.

Cyanobacterial Management in California with Liquid Activated Peroxygen Algaecide/Cyanobacteriacide

Thomas Warmuth BioSafe Systems

Abstract: Effective copper alternative treatments for cyanobacterial management are emerging as a needed option as the threat to our waters by these organisms becomes more realized and understood. The development of effective treatments for the "Bad Players", or what are identified as cyanobacteria that are known to produce harmful toxins or even taste and odor compounds, has never been more imperative. Both San Francisco Public Utilities and Santa Cruz Water, through their programs of monitoring, sampling and algal enumeration, developed an algaecide treatment regime with Clean Lakes, Inc. (contracted California Certified Pest Control Advisor and licensed aquatic applicator) and delivered effective control of various cyanobacteria throughout the season using GreenClean Liquid, a NSF/ANSI 60 Certified, liquid activated peroxygen algaecide, in their reservoirs. Peroxide based algaecides have been identified as effective in selective treatments for cyanobacteria, where it is not greatly effecting the population of beneficial green algae/phytoplankton. The use and delivery of "granular peroxide", SCP – Sodium Carbonate Peroxyhydrate, can have challenges not only in the delivery of the treatment to the water, but also in effectively controlling the target organism depending on where it may be in the water strata. The chemistry of GreenClean Liquid has shown to be effective, while also being easier to apply than SCP and having the ability to be more effectively applied. This all leading to a better potable water source through better control of target cyanobacteria while preserving most of the green phytoplankton; an overall healthier and productive algal population while limiting the input of copper based algaecides to the system.

Presenter Biography: Tom Warmuth is the National Aquatics Technical Representative for BioSafe Systems. Tom grew up in Fairport Harbor, on the Northeast Ohio shores of Lake Erie. He is a graduate of East Carolina University with a Bachelor of Science in Biology. Starting his career in Florida, Tom's experience began while working in mosquito and public health pest control, structural pest control, environmental consulting and permitting, and aquatic weed management. More recently, Tom has worked in lake management as well as in aquatic herbicide distribution. For the past 9 years, he has lived in North Carolina with his wife, Sara.

Emergent Redefinition of a Wetland

Sonja Wixom State University of New York College at Oneonta

Abstract: Effective copper alternative treatments for cyanobacterial management are emerging as a needed option as the threat to our waters by these organisms becomes more realized and understood. The development of effective treatments for the "Bad Players", or what are identified as cyanobacteria that are known to produce harmful toxins or even taste and odor compounds, has never been more imperative. Both San Francisco Public Utilities and Santa Cruz Water, through their programs of monitoring, sampling and algal enumeration, developed an algaecide treatment regime with Clean Lakes, Inc. (contracted California Certified Pest Control Advisor and licensed aquatic applicator) and delivered effective control of various cyanobacteria throughout the season using GreenClean Liquid, a NSF/ANSI 60 Certified, liquid activated peroxygen algaecide, in their reservoirs. Peroxide based algaecides have been identified as effective in selective treatments for cyanobacteria, where it is not greatly effecting the population of beneficial green algae/phytoplankton. The use and delivery of "granular peroxide", SCP – Sodium Carbonate Peroxyhydrate, can have challenges not only in the delivery of the treatment to the water, but also in effectively controlling the target organism depending on where it may be in the water strata. The chemistry of GreenClean Liquid has shown to be effective, while also being easier to apply than SCP and having the ability to be more effectively applied. This all leading to a better potable water source through better control of target cyanobacteria while preserving most of the green phytoplankton; an overall healthier and productive algal population while limiting the input of copper based algaecides to the system.

Presenter Biography: I am a Masters student at the State University of New York College at Oneonta for Lake Management. Currently, I am preparing a state of the lake report and a comprehensive management plan for a privately owned wetland, with a primary focus on ecological services and educational aspects.

Parametrizing a Model for Intralake Transport of Eurasian Watermilfoil Fragments

Christine Goodrich Rensselaer Polytechnic Institute

Abstract: In order to extend current growth models of Eurasian watermilfoil to intra-lake spread, we need to learn more about the development processes of the watermilfoil fragments. Understanding both fragment buoyancy dynamics and disturbance events that produce these fragments, can offer useful insight for parametrizing a computational intra-lake model. Developing such a model could uncover interesting emergent properties of invasive spread and may also suggest optimal management techniques.

Current models of this system do not include surface transport of fragments. By combining the current literature with experimentation, analysis, and a model for the transport of fragments, we hope to offer a valuable tool for predicting spatial Eurasian watermilfoil spread dynamics.

Presenter Biography: I am a Ph.D student in the Multidisciplinary Science department at Rensselaer Polytechnic Institute in Troy, NY. My interest is primarily in the feedback loops between the natural environment and human well-being. I enjoy working outdoors, and want to help society find a balance between appreciating and appropriating nature.

Efficacy of Endothall and Endothall+2,4-D for Curlyleaf Pondweed (Potamogeton crispus) Control Under Simulated Fall Conditions

Mirella Ortiz University of Colorado

Abstract: Invasions of non-native aquatic plants such as curlyleaf pondweed (Potamogeton crispus) (CLP) can have wide-ranging negative effects on whole lake ecosystems. Herbicide treatments have been shown to successfully control invasive aquatic plants during treatment years. Endothall and 2,4-D have been used in combination to control CLP for over 10 years. The objective of this research was to determine the efficacy of endothall (Aquathol® K) alone and endothall+2,4-D (Chinook®) for CLP control under simulated fall conditions. CLP plants were grown from turions in 50ml falcon tubes containing field soil, slow release fertilizer and fine, unwashed sand at the top. When the plants reached 15cm, they were treated with either endothall or endothall+2,4-D. Five-gallon mesocosms filled with 4 gallon of tap water were treated with one of the five treatments (non-treated, endothall 1.5ppm and 0.75ppm, or endothall+2,4-D 1.5+0.6ppm and 0.75ppm+0.3ppm, respectively). Three plants were exposed for 3, 6 or 12 hours to each treatment, triple rinsed in clean water and transferred to five-gallon mesocosms containing non-treated water. The plants were kept in growth chamber, at 14C with 12 hour day length. Visual control ratings were taken at 7, 14, 21 and 28 days after treatment. All the endothall+2,4-D treatments provided over 95% of CLP control, while treatments with only endothall did not. In addition, plants treated with endothall+2,4-D had more rapid symptom development than those treated with endothall alone.

Presenter Biography:

Two Continuous High Frequency Water Quality Data Acquisition Systems on Otsego Lake

Kiyoko Yokota State University of New York College at Oneonta

Abstract: Continuous high-frequency monitoring of water quality parameter is a powerful tool to detect and predict changes in the water column that could affect aquatic primary production. Two types of high frequency lake monitoring buoys have been deployed in Otsego Lake, NY, USA, and their system composition, approximate cost, and sample data are presented for possible adaptation to other systems.

Presenter Biography: Kiyoko is an Associate Professor of Biology at State University of New York College at Oneonta. She teaches limnology, management of aquatic biota, and phytoplankton ecology for the Lake Management MS program, as well as various undergraduate biology courses. She earned a BS in biology with ecology emphasis and a minor in environmental studies from St. Cloud State University and Ph.D. in Ecology, Evolution and Behavior from University of Minnesota. She was awarded the Croasdale Fellowship by the Phycological Society of America while working on her Ph.D. thesis on phytoplankton-grazer dynamics and pursued postdoctoral training at the Netherland Institute for Ecology (NIOO-KNAW). Her primary research interest is phytoplankton community dynamics. Along with her collaborators, Kiyoko has recently been studying interaction between microplastics and aquatic primary producers, patterns of nitrogen and phosphorus limitation of primary production in lakes and ponds across the northeastern North America, and effects of earlier ice-out on lake primary productivity across the northern USA and Europe. Kiyoko shares her limnological expertise with her local community by volunteering for Otsego Lake Association as the Technical Advisor.

New Hampshire Variable Leaf Milfoil (*Myriophyllum heterophyllum*) Response to Florpyrauxifen-benzyl Concentration Exposure Times

Kara Foley, Erika Haug, Dr. Robert Richardson North Carolina State University

Abstract: Variable leaf milfoil (*Myriophyllum heterophyllum*) is a submersed aquatic weed that is a major concern for freshwater ecosystems in the northeastern United States. Herbicide treatments are commonly used as a method for controlling the growth and spread of this invasive species. Concentration exposure time experimental trials were conducted on *M. heterophyllum* collected from Turtle Pond (Concord, NH) using auxin-mimic herbicide florpyrauxifen-benzyl (Procellacor©) at rates of 5, 10 and 20 ppb at pH 6.84 ± 0.05, 7.98 ± 0.09 mg/L D.O. and 23.46 ± 0.36 °C. Exposure times to the product were 1, 3 and 9 hours. Plants were rated weekly for % control and were harvested 4 weeks after treatment. At 4 weeks after treatment, aboveground growth of *M. heterophyllum* was effectively controlled (91.7 ± 6.8%) with rates of florpyrauxifen-benzyl as low as 5 ppb with at least a 3-hour exposure time.

Speaker Biography: Kara is currently a pursuing a Master's Degree at North Carolina State University where she is working under the direction of Dr. Rob Richardson. In 2016, Kara earned her Bachelor's Degree in Environmental Science at the University of New Hampshire. Post-graduation, Kara interned for the Exotic Species Program at the New Hampshire Department of Environmental Services which inspired her to continue her education in the field of aquatic plant management.