ABSTRACTS AND BIOGRAPHIES FOR PRESENTATIONS AT THE 20th ANNUAL CONFERENCE OF THE

8-10 JANUARY 2019

The Desmond Hotel and Conference Center
Albany, New York

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

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2017-2019
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2017-2019
University of Hartford
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2016-2018
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2018-2020
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Editor

Chris Doyle
2018-2022
Solitude Lake Management
Hackettstown, NJ

Web Administrator

Chris Borek
2018-2019
Black Lagoon
Hamilton, NJ

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 lements 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

of Directors Members

Amy Smagula
(2000-2018)

Ann Bove
(2003-2010, 2016)

Barre Hellquist
(2005-2007)

Bin Zhu
(2008-2010, 2017-2019)

Bo Burns
(2001-2004)

Cathy McGlynn
(2018-2020)

Chris Borek
(2012-2018)

Chris Doyle
(2013-2018)

Chuck Boylen
(2011-2015)

Emily Molden
(2017-2019)

Eric Paul
(2016-2017)

George Knoecklein
(2011-2013)

Gerald Adrian
(2000-2002)

Gerald Smith
(2000-2001)

Glenn Sullivan
2000-2007, 2009-2018)

Greg Bugbee
(2003-2006)

Jacob Meganck
(2016-2017)

Jason Smith
(2002-2004)

Jerry Lewis
(2003-2005)

Jim Sutherland
(2000-2014)

JoAnn Dunlap
(2000-2002, 2011)

Joe Pinkerton
(2015-2017)
John McPhedran
(2006-2008, 2010-2012)

Ken Wagner
(2001-2003)

Kiyoko Yokota
(2018-2020)

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
(2014-2018)

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

2019 Albany, New York

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
2018	Meg Modley

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
2018	Bill Harman

Outstanding Corporate Member

2008	SePro
2019	Cygnet Enterprises

NEAPMS Honorary Member

2009	Charles Gilbert
2010	Gerry Smith
2012	Jim Sutherland
2018	Charles Boylen
2019	Ann Bove

Algae Workshop

Kenneth Wagner, Ph.D. Water Resources, Inc.
West Bishop, Ph.D. SePro Corporation

Abstract: Join Dr. Wagner and Dr. Bishop for two hours of algal presentations and some fun algal-themed activities and games utilizing the information gained in the presentations. Presentations will include:

Lecture 1: Taxonomy –major nuisance groups and what the common types are, working in taxonomic changes (like splitting *Anabaena* into *Anabaena, Dolichospermum*, and several others) as part of it, so it is not straight taxonomy.

Lecture 2: Ecology of Control – The ecological basis of control can be helpful for those doing management. It is the interface between taxonomy and control. Growth processes, loss processes, empirical relationships with P, water clarity, other variables, factors that common control methods address (dyes restrict light, alum/phoslock restricts available P, algaecides directly kill the target algae, etc.).

Lecture 3: New developments –environmental DNA and its use in detecting things like toxic cyanobacteria. Types of toxins and what produces which. 20 min.

Speaker Biographies:

Dr. Wagner holds degrees from Dartmouth College and Cornell University, with his Ph.D. earned in Natural Resource Management in 1985. He has 40 years of experience working on a variety of water resources assessment and management projects, focusing mainly on lakes. 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 Editor in Chief of Lake and Reservoir Management, a peer-reviewed journal. He is a member of APMS and a former director of NEAPMS.

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 eight years as the Algae Scientist and Water Quality Research Manager.

Brazilian Waterweed: Maybe not as Tough as it Looks

Gregory J. Bugbee and Summer E. Stebbins Connecticut Agricultural Experiment Station

Abstract:
Brazilian waterweed (*Egeria densa*) is an aquatic plant native to the temperate regions of South America but is capable of invading lakes and ponds throughout the northeast. It is a rooted submersed monocot that is similar to native waterweeds *(Elodea* species) and invasive hydrilla (*Hydrilla verticillata*). Key differences are the leaves of Brazilian waterweed are usually in whorls of four compared to three for Elodea sp. and five or more for hydrilla. The plant is also generally stockier and unlike hydrilla (monoecious form) it does not produce tubers, turions or seeds. This restricts reproduction to fragmentation and should make the plant easier to control. The Connecticut Agricultural Experiment Station Invasive Aquatic Plant Program (CAES IAPP) has found Brazilian waterweed in four Connecticut lakes and ponds. Most introductions are thought to come from the dumping of unwanted aquariums. The ability of the plant to rapidly colonize a waterbody over a five-year period was documented in Fence Rock Lake, Guilford CT from 2009 to 2013. In 2014 and 2015, CAES IAPP conducted research on control using bottom injected Reward (Diquat dibromide) applied in July at a rate of 1 gallon per acre (average depth 6 feet). One hundred and eight georeferenced grid points were surveyed before and after each application. Prior to the application in 2014, 57 points contained Brazilian waterweed. In 2015, the plant was growing at only one point when another treatment was performed. Surveys in 2016 and 2017 found no Brazilian waterweed and little impact native species. In summary, Brazilian waterweed's lack of tubers and other difficult to control propagules, appears to make the plant susceptible to long term control with contact herbicides such as Reward.

Speaker Biography:
Gregory Bugbee is an Associate scientist at the Connecticut Agricultural Experiment Station, New Haven, in the Department of Environmental Sciences. He is the principal investigator in the Invasive Aquatic Plant Program. He has led aquatic plant surveys of over 250 Connecticut lakes and ponds and directed research projects on invasive aquatic plant control statewide.

Aquatic Plant Workshop

The SOLitude Biology Team SOLitude Lake Management

Abstract:
Join the SOLitude Biology Team for two hours of aquatic plant observations and investigations. Following a short presentation on a featured aquatic plant group, at your own pace come explore dozens (last year we had over 70 different species) of aquatic plant samples collected during the 2018 field season throughout the Northeast. The previously frozen samples will be thawed and on display throughout this session, and (new this year) throughout the Presidential Reception for late-comers to explore. Also on hand will be numerous preserved plant samples and regionally appropriate taxonomic keys. There will be many aquatic plant experts in the room, so this is the perfect opportunity to ask questions and network with other industry folks. Returning this year will be the "unknown samples" table and of course the chance to win "fabulous prizes" by taking the aquatic plant quiz.

Speaker Biographies:
The SOLitude Biology Team is: Chris Doyle, CLM, Amanda Mahaney, Brea Arvidson, and Emily Mayer. All team members are aquatic biologists working for SOLitude Lake Management in the Northeast, focusing on aquatic plant surveys (and other biological surveys) and water quality monitoring programs.

Plenary: 20 Years of Plant Management in New York: Threading the Needle Rush

Scott Kishbaugh New York State Department of Environmental Conservation

Abstract:
The history of aquatic plant management in New York may go back many decades or even centuries, but the era of modern plant management not coincidentally coincides with the inception and development of NEAPMS. From improvements in applicator (and regulator) education, to standardization of aquatic plant surveys, increasing use of boat stewards and wash stations, application of targeted aquatic herbicides, and the shift toward management of invasive species, aquatic plant management in New York has moved steadily into the 21st century. Progress has come in fits and (false) starts, and some practitioners and involved observers remain frustrated by the continuing challenges in AIS control in New York in the continuing struggle to balance weed be gone with environmental protection. But the landscape has changed significantly, and NEAPMS has been instrumental in improving the state of plant management in this state. This talk will highlight some of the most important developments in New York state over the last two or more decades, and how New York is well positioned to tackle the most pressing and emerging plant management issues, from hydrilla to HABs. Listeners could conceivably delight with a casual romp through the slanted retrospective of a life somewhat immersed in green stuff. That's my story, and I am mostly sticking with it.

Speaker Biography:
Scott Kishbaugh is the Chief of the Lake Monitoring and Assessment Section of the Division of Water for the NYS Department of Environmental Conservation in Albany, NY. He recently handed off the directorship of the NY Citizens Statewide Lake Assessment Program and is rapidly shedding other duties in anticipation of a spring retirement from the state. He is a licensed professional engineer with a B.S. and M.S. in Environmental Engineering from Cornell University, and was a two-time Plant Management society board member. He will prove that the best way to be asked to give a keynote talk is to outlast everyone else.

Ongoing Management of an Incipient *Nitellopsis obtusa* (Starry Stonewort) Infestation in Lake Sylvia, Minnesota, Using a Copper-Based Algaecide*

Tyler Geer Clemson University

Abstract:
Nitellopsis obtusa (Starry Stonewort) is an invasive species of Eurasian origin that has spread rapidly among inland lakes in 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 efficient and effective management. In West Lake Sylvia (Wright Co. MN), *N. obtusa* was first confirmed in September of 2016 in the vicinity of the public boat access. In response, algaecide applications to control *N. obtusa* began early in the summer of 2017 and continued throughout the year to control and contain regrowth and any potential recolonization or re-infestation of the area. This situation provided an opportunity to measure the effectiveness of algaecide applications as a tactic for rapidly responding to an infestation of *N. obtusa*. To target growth of *N. obtusa* and regrowth from bulbils, the copper-based algaecide Cutrine®-Plus was applied four times between June and October 2017 in the vicinity of the public boat access. 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. In 2018, management of *N. obtusa* in the immediate vicinity of the boat access was continued: four applications of Cutrine®-Plus targeting growth and regrowth of *N. obtusa* occurred in the infested area between July and October 2018. Results from the ongoing study indicate that algaecide treatments are effective for control of incipient *N. obtusa* infestations.

Speaker Biography:
Tyler Geer is a doctoral student at Clemson University, studying environmental toxicology under Dr. John Rodgers. He received his Master's degree in 2016 from Clemson University, where he researched the fate and effects of an SCP algaecide on nuisance algae and non-target vertebrate and invertebrate organisms. As the recipient of the 2017 APMS Graduate Student Research Grant, Tyler is currently researching effective approaches for management of non-indigenous, invasive Starry Stonewort across its current range in the Midwest and Northeast U.S.

NYS Department of Environmental Conservation Harmful Algal Bloom Program

Anthony Prestigiacomo New York State Department of Environmental Conservation

Abstract:
Harmful Algal Blooms (HABs) in freshwater systems are primarily comprised of cyanobacteria and can occasionally produce toxins. Exposure to any cyanobacteria HABs can cause health effects in people and animals when water with blooms are touched, swallowed, or when airborne droplets are inhaled. This is true regardless of toxin levels; some blue-green algae produce toxins, while others do not. Exposure to blooms and toxins can cause symptoms such as diarrhea, nausea or vomiting; skin, eye or throat irritation and allergic reactions or breathing difficulties. New York State has one of the most comprehensive and extensive HAB monitoring programs in the nation. The Department of Environmental Conservation oversees monitoring, sampling and outreach regarding HABs in hundreds of lakes annually. The program consists of DEC staff within the Lake Monitoring and Assessment Section who work to identify bloom status, oversee HAB monitoring and surveillance activities, communicate public health risks, and conduct outreach, education, and research. The bloom status is a system unique to New York and relies on a combination of visual surveillance, measures of cyanobacteria density and toxin concentrations. Since the program began in 2012, nearly 350 waterbodies throughout the state have had a documented bloom. In 2018, efforts to address bloom causes and solutions have ramped up as a result of a recent Governor's Initiate to address the topic, particularly in waterbodies that serve as drinking water supplies.

Speaker Biography:
Tony is a Research Scientist with the NYSDEC's Finger Lakes Watershed Hub who has a background in water quality monitoring/assessment of lakes and streams in New York State. Tony's interests include: water quality monitoring, watershed nutrient loading and the transport and fate of stream inputs to lakes, and the management of lake water quality.

New York State HABs Program: How do we define a bloom?

Rebecca Gorney, Ph.D. New York State Department of Environmental Conservation

Abstract:
Harmful Algal Blooms (HABs) in freshwater are comprised of cyanobacteria and can occasionally produce toxins. Exposure to cyanobacteria HABs can cause health effects in people and animals when water with blooms are touched, swallowed, or when airborne droplets are inhaled. This is true regardless of toxin levels; some HABs produce toxins, while others do not. New York State has one of the most comprehensive HAB monitoring programs in the nation which focuses on the risks of the blooms themselves, not just toxins. The Department of Environmental Conservation oversees monitoring, sampling and outreach in hundreds of lakes annually. DEC Staff work to identify bloom status using a combination of visual and laboratory data. The use of a Fluoroprobe (bbe Moldaenke) allows for rapid evaluation of many samples and when combined with qualitative microscopy and a threshold chlorophyll value at which a moderate risk of health impacts is more likely, the data can be quickly interpreted and then shared through an email notification system. DEC has been evaluating samples in a consistent manner since 2012. In 2018, the DEC began to transition between two laboratories regarding chlorophyll analysis for most of the state's HAB monitoring efforts. Hundreds of samples were run in parallel for extracted chlorophyll, fluorometric chlorophyll, microscopy, and microcystin concentrations. Presented here is a comparative evaluation of these datasets, the results of which provide insight on the implications of how cyanobacteria blooms are defined and variability related to standard laboratory practices in using fluorometric techniques.

Speaker Biography:
Rebecca M. Gorney is a Research Scientist with the New York State Department of Environmental Conservation, Division of Water, and manages the state's Harmful Algal Bloom Program. Rebecca has been with the department since 2015. She received a PhD in natural resource management from the University of Vermont where she studied HABs in Lake Champlain. Her recent work includes expanding the state's HABs Program to include enhanced volunteer surveillance programs on several Finger Lakes, development of a comprehensive database for management of the state's lakes data, and contributions to the agency's efforts to expand research and outreach efforts on the topic of HABs.

New York State Harmful Algal Bloom Initiative – HABs Mitigation Strategies Pilot

Stephanie June New York State Department of Environmental Conservation

Abstract:
In 2018, New York State (NYS) Governor Andrew Cuomo announced a four-point initiative to address harmful algal blooms (HABs) in Upstate New York. The HABs Initiative aimed to do the following: identify twelve priority waterbodies around the State; organize summit discussions between leading HABs experts, local stakeholders, and State agencies; develop an Action Plan for each priority waterbody, identifying factors contributing to HABs and recommending management projects to reduce HABs; and, implement advanced monitoring techniques to better document HABs and innovative mitigation strategies to prevent or lessen the impact of HABs. The NYS Department of Environmental Conservation (DEC) began the Mitigation Strategies Pilot in the summer of 2018 on small, representative waterbodies, that were not identified as priority waterbodies in the Initiative. Based on the NYS DEC extensive water quality database, waterbodies were selected by their history of documented HABs, nutrient levels, relative size, and supported uses. Strategies that were piloted included hydrogen peroxide, a pesticide registered in NYS, and an ultrasonic device, both with little in-state application history. The use of nutrient inactivants was also evaluated for potential future application on two candidate waterbodies. A summary will be presented of field reports, water quality data, and biological data from sampling sessions preceding, during, and following the in-lake treatments. The data will be used to evaluate the efficacy of these mitigation strategies under the conditions which they were applied, and to provide recommendations for additional work or studies needed to continue assessing the impact of innovative treatments on HABs.

Speaker Biography:
Stephanie June is a Research Scientist in the Lake Monitoring and Assessment Section in the Division of Water in the New York State Department of Environmental Conservation. Stephanie is the new Coordinator of the New York Citizens Statewide Lake Assessment Program, the state's primary volunteer lake monitoring program. She has a Bachelor of Science in biology with a concentration in marine science from Northeastern University and a Master of Public Health in environmental health science from the State University of New York at Albany.

Development of an Autonomous Aquatic Application System

Rob Richardson, Ph.D. Department of Crop and Soil Science at North Carolina State University

Abstract:
Aquatic vegetation surveys and aquatic herbicide applications are integral components of vegetation management programs that protect water resources. However, surveys and herbicide applications can be labor intensive and provide opportunities for introducing cost saving measures. The goal of this project was to design, prototype, and demonstrate a small fleet of autonomous aquatic vehicles (AAVs) capable of detecting, quantifying, and selectively applying herbicide to manage invasive aquatic weed infestations. To date, three AAVs have been developed to evaluate performance, durability, and operational capacity. Field testing of these units has been conducted. Utilization of a trolling motor provided approximately 9x increased thrust over an air propeller and also improved turning radius. Incorporation of a lithium iron phosphate battery significantly reduced weight and increased carrying capacity while also allowing for rapid charging. Autonomous tracking of two AAVs concurrently has been implemented and demonstrated. Successful collection of hydroacoustic data as well as herbicide application through the AAVs has also been verified. Further research is being conducted to optimize the current systems prior to commercialization.

Speaker Biography:
Dr. Richardson has responsibilities for aquatic and non-cropland weed science research and extension at North Carolina State University. Rob has been in his current position at NCSU for 12 years and serves on numerous invasive plant advisory committees across the US. He has served as President of the Aquatic Plant Management Society, North Carolina Vegetation Management Association, South Carolina Aquatic Plant Management Society, and North Carolina Weed Science Society. He also currently serves on the Weed Science Society Board of Directors and in the Plant Work Group for the Council for Agricultural Science and Technology.

AMP® Activator Adjuvant for Aquatic Plant Management

William Ratajczyk Lonza Water Treatment

Abstract:
AMP® Activator is a new patent pending adjuvant that combines proteins and surfactants to improve control of both aquatic vascular plants and algae. The use rate of the adjuvant in combination with aquatic herbicides and algaecides is density dependent and ranges from 0.25 gal/acre to 1 gal/acre. In small scale aquaria trials on Eurasian watermilfoil (*Myriophyllum spicatum*) using an 8 hour exposure it was observed that the LC50 for Eurasian watermilfoil treated with 2,4-D alone was 0.77 mg/L (r2=0.91). When AMP® Activator was added to the 2,4-D treatments the LC50 was decreased to 0.34 mg/L (r2=0.87). AMP® Activator resulted in the reduction in exposure time needed to control hybrid watermilfoil with of 2,4-D. When 2,4-D was applied alone it required at least 24 h of exposure time, however only 12 h was needed when AMP® Activator was added to the treatment. Algal Challenge Test (ACT) results demonstrated that AMP® Activator applied to *Lyngbya* from Lake Gaston, NC first followed 2 days later by Algimycin® PWF elicited the greatest response among algaecide treatments. Additionally, *Anabaena* sp. and *Aphanizomenon* sp. from Morrison Lake, MI subjected to an ACT resulted in the recommendation of 0.5 gal/acre-ft. of AMP® Activator followed 4 days later by 20 lbs./acre-ft of Phycomycin® SCP based on chlorophyll a and cell densities. When Phycomycin® SCP was applied alone it required 60 lbs./acre-ft to achieve the same results. AMP® Activator has shown promise at multiple scales on several plants and algae in enhancing the efficacy of both herbicides and algaecides.

Speaker Biography:
Bill Ratajczyk is the New Business and Technology Manager at Lonza Water Treatment.

The Use of Field GIS Data Collection Tools to Empower Watercraft AIS Inspection Programs – WISPA in New York State

John Marino and Catherine McGlynn, Ph.D. New York State Department of Environmental Conservation

Abstract:
New York Natural Heritage Program (NYNHP), in conjunction with New York State Department of Environmental Conservation (DEC) and Office of Parks, Recreation, and Historic Preservation (Parks), has developed a pilot smartphone application (titled the "Watercraft Inspection Steward Program Application," otherwise known as "WISPA") to capture standardized data for watercraft inspection stewards across New York State and upload that data into a centralized database. In 2018, the program's second season, WISPA was used by approximately 200 boat launch stewards comprising 15 organizations resulting in over 150,000 records. Presenters will discuss strategies used to create WISPA, benefits of the program, and a summary of the 2018 data analysis.

Speaker Biographies:
John Marino is a GIS Applications Developer with the New York Natural Heritage Program iMapInvasives Team, where he is primarily responsible for assisting in the creation and management of field data collection tools for invasive species. He received a bachelor's degree in Geography from Syracuse University.
Cathy McGlynn is the Aquatic Invasive Species Coordinator for the New York State Department of Environment Conservation. She received her Ph.D. in ecology from SUNY Stony Brook. Her job is to help implement the NYS AIS Management Plan, the highest priority of which is the expansion of watercraft inspection steward programs.

Environmental DNA in Aquatic Plant Research: Looking Back, Looking Ahead.

Jose Andrés, Ph.D. Cornell University, Department of Ecology and Evolution

Abstract:
During the last decade, environmental DNA (eDNA) has become a reliable tool for detecting invasive species during early stages of invasion or establishment. However, to date, eDNA surveillance efforts have primarily focused on invasive animal species. In my presentation I will review the achievements gained through analyses of eDNA from aquatic invasive plants in a conservation context, discuss the current limitations, and present potential future applications of eDNA in invasive plant management.

Speaker Biography:
Dr. Jose Andrés is an evolutionary geneticist the Department of Ecology and Evolution at Cornell University. As the Co-Director of the environmental DNA laboratory at Cornell, Dr. Andrés utilizes cutting edge genetics techniques to advance population to advance eDNA as a tool to monitor biodiversity. Dr. Andrés received his PhD in Ecological Genetics for the Universidade de Vigo (Spain) in 1998. He has received Marie Curie and Ramon y Cajal Awards from the European Union and the Spanish Government. In 2014, Dr. Andrés became a tenured faculty member at the University of Saskatchewan (Canada).

Invasive Ability of *Trapa natans* L. and *Trapa bispinosa* Roxb. var*. iinumai* Nakano Grown in Mixed Cultures of *Vallisneria americana* Michx. and Monoecious *Hydrilla verticillata* (L. f.) Royle

Lynde Dodd, Ph.D. U.S. Army Corps of Engineers' Engineer Research and Development Center

Abstract:
Plant diversity is known to be an indicator of healthy ecosystems, so understanding the interspecific relationships that structure plant communities is critical for invasive species management. A cryptic introduction of water chestnut (Myrtales: Lythraceae: *Trapa bispinosa* Roxb. var. *iinumai* Nakano) into the Northeastern US prompted investigation into potential competitive interactions between water chestnut and two common submersed species in the Chesapeake Bay watershed, the ecologically important *Vallisneria americana* Michx. and invasive *Hydrilla verticillata* (L. f.) Royle. Additionally, because the congeneric *Trapa natans* co-occurs in the same watershed with a documented history of negative impacts, it was included in the study for comparison. Reciprocal competitive effects were determined by growing plants in monoculture and biculture (*T. bispinosa* - *V. americana*, *T. bispinosa* - *H. verticillata*, *T. natans* - *V. americana*, and *T. natans* - *H. verticillata*) under controlled greenhouse conditions. At harvest, differences in total, aboveground, belowground, tuber, fruit biomass, relative growth rate, and relative interaction indices were evaluated. Results suggest that *T. bispinosa* and *T. natans* are not strong competitors. Biomass of *Trapa* spp. was significantly reduced by presence of a competitor, but neither *H. verticillata* or *V. americana* were as negatively impacted by competition. Although both *Trapa* species have the potential to cause problems, they are unlikely to invade healthy, established submersed aquatic communities.

Speaker Biography:
Lynde Dodd is a Research Biologist with the U.S. Army Corps of Engineers' Engineer Research and Development Center. Her work includes researching invasion and restoration ecology, invasive species management and aquatic ecosystem restoration with emphasis in native aquatic and riparian species suitability and restoration implementation techniques.

Hand Pulling Water Chestnut (*Trapa natans*) on Long Island: Successes and Failures

Luke Gervase Long Island Invasive Species Management Area Partnership for Regional Invasive Species Management

Abstract:
The Long Island Invasive Species Management Area (LIISMA) is one of 8 Partnerships for Regional Invasive Species Management (PRISM) in New York State. Within LIISMA, water chestnut (*Trapa natans*) has populated 4 waterbodies in Wantagh, Massaapequa, Oyster Bay and Calverton all within 66 km of each other. Two of the systems (Wantagh and Calverton), are actively managed by the New York State Department of Environmental Conservation (NYSDEC) and LIISMA through techniques like hand pulling, harvesting, and education & outreach. The remaining two locations are managed by the U.S. Fish and Wildlife Service (Oyster Bay) and Nassau County (Massapequa) with similar techniques used to attempt control. Water chestnut was first documented in Wantagh in 2004 and went unmanaged until 2018. Over this 14-year period the water-chestnut population grew uncontrolled and came to be the dominant rooted, floating macrophyte. During the summer of 2018, LIISMA, NYSDEC and volunteers hand pulled approximately 4,535 kg (5 tons) of water-chestnut from Wantagh and plan to continue management in the coming years. In contrast to the inaction at the early stages of the Wantagh infestation, Calverton had a rapid response after water-chestnut was documented in low abundance, at 11 locations in Calverton. All documented plants were removed in June 2008 before seeds were mature. Annual surveys and removals occurred between 2009 and 2015. No water chestnut has been documented in Calverton since 2015. Management of persisting water chestnut populations within LIISMA is ongoing and eradication remains a goal. These case studies indicate that rapid response to new infestations of water-chestnut can be effective at eliminating this species.

Speaker Biography:
Luke has been a part of the Long Island Invasive Species Management Area PRISM (Partnership for Regional Invasive Species Management) since April 2018 and is beyond excited to work on Long Island where he grew up. Luke earned his B.S. in aquatics and fisheries science with a marine ecology minor from SUNY E.S.F. and is working towards completing his M.S. in lake management from SUNY Oneonta. He has worked all throughout the northeast and has spent time as an aquatic biologist in the private sector, has spent time out at sea studying marine biodiversity and conservation, and is a provisional Certified Lake Manager (CLM). Luke organizes and leads outreach events, trains and supervises volunteers, and conducts a wide range of field activities involving invasive species.

Water Quality Features Useful in Plant and Algae Management

George Knoecklein, Ph.D. Northeast Aquatic Research

Abstract:
There are many water quality variables that can be measured by field and laboratory techniques and have utility in assessing rooted plant and algae problems that we often seek to manage. Some of the most useful include temperature, oxygen, light penetration, pH, alkalinity, forms of phosphorus, forms of nitrogen, and phytopigments. Measurement of some, like N and P concentrations, requires collecting representative water samples and having a properly equipped lab conduct tests by standard procedures. Getting useful results depends on proper sample collection and both detection limits and quality assurance in the lab. Features that can be assessed in the field often depend on instruments that must be maintained and calibrated, then properly deployed. Attention to detail is important to later interpretation of results and use in management planning. Light penetration can be assessed by several means, including light meters, turbidity, or simple Secchi transparency, each of which can be related to many other variables and has a major influence on rooted plants and algae. Understanding water quality in a lake can help explain the presence and distribution of aquatic plants, can account for the types and abundance of algae, and can influence the choice of management techniques.

Speaker Biography:
George W. Knoecklein stated his limnological education at Unity College in Unity Maine, where he took part in one of the first studies of Unity Pond. George continued his education at Michigan State University where he earned a Master of Science in limnology while working on US EPA Clean Lakes projects at Lake Lansing, Michigan, and Skinner Lake, Indiana. After finishing his MS degree, George moved to the desolation of the Upper Peninsula of Michigan in January of 1982 where he was involved in quantifying impacts to St. Mary's River ecosystem due to ice breaking winter shipping lanes. George moved back to Connecticut in 1985 to pursue a career in lake management. In 1997, George earned a PhD in limnology from Peter Rich at the University of Connecticut. That year he founded Northeast Aquatic Research, a consulting firm specializing in assisting lake stakeholders understand and manage the threats of invasive aquatic plants and cyanobacteria.

Use of Water Quality Data in Evaluating Plant and Algae Problems

Kenneth Wagner, Ph.D. Water Resource Services

Abstract:
Algae and rooted plants have specific needs and preferences for survival and maximum growth, many relating to water quality features. Having water quality data can therefore facilitate an understanding of the types of algae and plants present and the limits to their growth. That understanding can then be used in management planning. Examples include: Determination of the compensation point, below which light is insufficient to support enough photosynthesis to allow survival. Oxygen profiles and demand calculation, which indicate where sediment is likely to release P and how much oxygen will be needed to counter demand. Alkalinity and pH, which are major determinants of which algae and rooted plants will be present by their effect on factors like carbon forms, nutrient uptake, and cell wall integrity. Concentrations of N and P, each of which is critical to support of growth and the ratio of which usually determines what kind of algae will be present. Temperature, which determines metabolic rates, and can be very influential in oxygen regime and nutrient dynamics, and feeds into climate change issues. Understanding water quality in a lake with a plant or algae problem will provide insights that may guide management planning. In some cases water quality considerations will impact what control techniques can be applied without undesirable side effects, and in some cases alteration of water quality may provide effective control of nuisance growths, especially for algae.

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 40 years of experience working on a variety of water resources assessment and management projects, focusing mainly on lakes. 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 Editor in Chief of Lake and Reservoir Management, a peer-reviewed journal. He is a member of APMS and a former director of NEAPMS.

Water Quality Management to Control Algae

Dominic Meringolo SOLitude Lake Management

Abstract:
Two common methods for altering lake water quality to provide algae control are oxygenation and phosphorus inactivation. There are 7 ways to oxygenate a lake, 3 forms of circulation (compressed air, upward pumping, downward pumping) and 4 ways to add oxygen without destratifying the lake (pure oxygen diffusion, hypolimnetic aeration chambers, Speece cones, and sidestream supersaturation). Compressed air has offered the greatest flexibility and track record among circulation methods, while diffused oxygen and sidestream supersaturation are becoming the go-to methods for non-destratifying oxygenation. Mixing can improve water quality, mainly by distributing oxygen vertically, and also can disrupt many algae forms by both physical and chemical effects. Phosphorus inactivation can involve aluminum, calcium, iron or lanthanum, depending on background water quality, but aluminum has the longest and most successful track record. Aluminum can be used to inactivate phosphorus in surficial sediment, in the water column, or in inflows to the lake. Lowered concentrations of available phosphorus will usually limit algae growth and shift dominance from cyanobacteria to other less objectionable forms. Additional treatments are available to manage pond pH where needed. Managing water quality can be challenging but represents a desirable way to control algae and improve other aspects of lakes. Example projects illustrate the benefits.

Speaker Biography:
Dominic Meringolo is currently a Senior Environmental Engineer and Regional Leader at Solitude Lake Management and has worked on a number of major alum treatment and aeration projects across New England. Dominic received an MS in Environmental Engineering from Worcester Polytechnic Institute (1998) and has been with Solitude for over 23 years. In addition to alum treatment work, Dominic serves as Regional Leader for numerous Aquatic Management Programs in Connecticut, Massachusetts and Rhode Island. These programs generally include assessment, permitting, monitoring and implementation of both chemical and non-chemical management techniques.

Cyanotoxins in Drinking Water: A Summary of Information on Treatment and Management for Public Water Systems

Karen Sklenar, Ph.D.

Abstract:
Toxin-producing cyanobacteria blooms are a growing concern for water utilities using surface water supplies across the country. To make informed decisions about how to limit exposure to cyanotoxins, water utilities need to understand:

- How, when, and why cyanotoxins occur;
- How to determine if they are present in a water source;
- What management strategies are available to reduce cyanotoxin production in source waters; and
- What treatment can effectively prevent cyanotoxins from reaching consumers.

Information will be presented addressing each of these topics. In addition, the speaker will also briefly discuss measurement techniques for cyanobacteria, cyanotoxins, and their indicators; challenges related to full-scale treatment for cyanotoxins; and possible unintended consequences that may be encountered when managing and treating a water supply for cyanotoxins.

Speaker Biography:
Karen Sklenar has worked for nearly 30 years with water systems to address their water quality issues and has visited many water supplies and treatment plants. She recently led an effort to prepare two AWWA/Water Research Foundation guides on managing cyanobacterial toxins in drinking water and has also worked closely with U.S. EPA and volunteer water utilities to develop sample cyanotoxin management plans as well as a template utilities can use to develop such a plan for themselves. Dr. Sklenar received her B.A. from Yale University and Ph.D. in Applied Limnology from the University of California at Berkeley.

Evaluation of Improved Herbicidal Techniques for Crested Floating Heart (*Nymphoides cristata*) Management*

Kara Foley North Carolina State University

Abstract:
Crested floating heart (*Nymphoides cristata*) is a floating-leaf aquatic plant species native to Asia (Burks 2002) but was recently introduced to the southeastern United States where its population is rapidly expanding (Willey 2012). Biological and mechanical control practices have been unsuccessful in controlling *N. cristata*, so effective chemical treatments are important for the future of *N. cristata* management in the United States (Willey and Langeland 2011). A concentration exposure time experimental trial (CET) was conducted on *N. cristata* using florpyrauxifen-benzyl, dipotassium salt of endothall, mono(N,N-dimethylalkylamine) salt of endothall and a combination of dipotassium salt of endothall and mono(N,N-dimethylalkylamine) salt of endothall. Based on morphological assessments 4 weeks after treatment, it was determined that all dipotassium salt of endothall treatments with 72 hour or static exposure provided 73% or greater control on *N. cristata*. Additionally, all florpyrauxifen-benzyl treatments with 72 hour or static exposure provided 89% or greater control on *N. cristata*. Results from this trial informed a field trial on *N. cristata* at Lake Moultrie, SC in 2018. Additional results from the greenhouse-based CET and field experiments will be discussed.

Speaker Biography:
Kara earned a B.S. in Environmental Science from the University of New Hampshire in 2016. As an undergrad, she studied bioaccumulation of cyanotoxins in freshwater ecosystems with Dr. James Haney at the UNH Center for Freshwater Biology. In May 2016, she began an internship with the New Hampshire Department of Environmental Services' Exotic Species Program where she fell in love with the aquatic plant management field. She is currently working on her master's degree at North Carolina State University under the direction of Dr. Rob Richardson.

The Impact of Varying Temperature and Salinity Exposures on Monoecious Hydrilla Propagules*

Emily Vulgamore North Carolina State University

Abstract:
Hydrilla verticillata has been named the perfect aquatic weed in the United States. The distribution of monoecious hydrilla in northern latitudes has increased dramatically in the last several years. Two studies were conducted at North Carolina State University to determine the differences in sprouting frequencies, growth rates and survivability for hydrilla propagules under varying temperature and salinity exposures. In the first study, hydrilla propagules were exposed to temperatures ranging from 12.3°C to 41°C for 12 days, with shoot length and sprouting frequency assessed every other day for the duration of the experiment. The results of this experiment indicated maximum shoot growth for propagules occurs at 29.3°C and no sprouting occurred below 17.6°C or above 41.0°C. In the second study, sprouted monoecious hydrilla tubers were exposed to salinities ranging from 0 to 24 ppt for 2 to 8 weeks. The tubers were assessed weekly for shoot length and lateral branching. Dry weight values were collected at the termination of the experiment. During this experiment, low levels of salinity lead to increased lateral branching as compared to controls. Hydrilla exposed to salinities of up to 9ppt for as long as 4 weeks was able to recover after being returned to freshwater conditions. These results indicate that once established a tuber bank should be able to with stand temporary salt water intrusions and as such, estuaries may also be at risk for invasion.

Speaker Biography:
Emily received her Bachelor of Science degree in Biology from the University of New Hampshire in May of 2017. She interned with the New Hampshire Department of Environmental Services from May 2016-February 2018. Emily began work on her Master's degree in Crop and Soil Science at North Carolina State University in August of 2018 under the direction of Dr. Rob Richardson.

Absorption and Translocation of Florpyrauxifen-benzyl (ProcellaCOR®) in Selected Aquatic Plant Species

Erika Haug North Carolina State University

Abstract:
Florpyrauxifen-benzyl is a newly registered aquatic herbicide, which acts as a synthetic auxin. In 2017, a study was conducted at North Carolina State University, to elucidate absorption and translocation patterns in ten different aquatic plant species. A 10 µg L-1 in-water application of radiolabeled florpyrauxifen-benzyl was applied to the isolated shoot tissue of replicate plants. Extremely high levels of shoot absorption were observed for all species tested and the uptake observed was rapid. Highest shoot absorptions were observed for crested floating heart (A192 =20 µg g-1), dioecious hydrilla (A192 =25.3 µg g-1), variable watermilfoil (A192 =40.1 µg g-1) and Eurasian watermilfoil (A192 =25.3 µg g-1). Evidence of translocation was observed in all rooted species tested. The highest amount of herbicide translocated was observed for crested floating heart with a predicted translocation of 1.28 µg g-1 at 192 hours after treatments. This high level of absorption, rapid uptake and evidence of translocation will be useful in better understanding the required exposure times for sensitive species.

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 aquatic plant management. Most recently, Erika completed her PhD in Fisheries, Wildlife and Conservation Biology at North Carolina State University under the direction of Dr. Robert Richardson.

Northern US Demonstrations of Selective Control of Invasive Watermilfoils Utilizing ProcellaCOR®

Mark Heilman, Ph.D. SePRO Corporation

Abstract:
ProcellaCOR® Aquatic Herbicide (a.i. florpyrauxifen-benzyl) received its USEPA registration as a reduced risk aquatic herbicide in February 2018. Previous mesocosm and small-scale field research documented novel, low-rate (≥200X lower than older technology), selective, short-exposure systemic activity on a number of major US aquatic invasive weeds including all forms of invasive watermilfoils (Eurasian, hybrid Eurasian, variable, parrotfeather). During the summer of 2018 as part of early operational use, collaborative management and assessment efforts with ProcellaCOR were conducted on a number of invasive watermilfoil sites across the northern US. For select projects, the new herbicide's efficacy on Eurasian and variable watermilfoil and selectivity relative to non-target aquatic plant impact was quantitatively determined utilizing pre- and post-treatment, point-intercept vegetation assessment. FasTEST® analysis of water samples to confirm herbicide dissipation was conducted to link control outcomes to achieved concentration-exposure times. This presentation will highlight results of these partnership efforts in multiple northern US states to further document ProcellaCOR's use characteristics for invasive watermilfoil management. The collaboration between private and public research teams on these projects is expected to assist the future permitting and incorporation of ProcellaCOR into future invasive watermilfoil control programs.

Speaker Biography:
As Senior Aquatic Technology Leader for SePRO, Dr. Heilman leads the company's research and development efforts to bring forward new technologies for managing water resources. He also directly assists many public and private natural resource managers in the US and some international colleagues with challenging projects managing aquatic invasive species with an emphasis on aquatic plants. Dr. Heilman received his Ph.D. in Aquatic Ecology from the University of Notre Dame in 1998 where he was a NASA Global Change Research Fellow for his work examining changes in methane cycling associated with submersed aquatic plants. He received the NEAPMS Aquatic Plant Science Award in 2011 and the APMS Outstanding Research and Technical Contributor Award in 2013. He is Immediate Past President of NEAPMS and President Elect of the national APMS.

POSTER: Exploration of Secondary Metabolites of Several Invasive Plants and Their Anti-Cancer Effects

Bin Zhu, Ph.D. and Xiaojun Wu University of Hartford

Abstract:
Release of secondary metabolites into the surrounding environment from some invasive plants has been detected and some secondary metabolites of invasive plants such as Eurasian watermilfoil and hydrilla have been reported to show anti-cancer effects. This study investigated the anti-cancer effects of invasive aquatic plants Eurasian watermilfoil and European frogbit and invasive terrestrial plants garlic mustard and Japanese knotweed. We used the CCK-8 Protocol to test their anti-cancer effects on five types of human cancer cells: human breast adenocarcinoma cells (MDA-MB-231 and MCF-7), human gastric cancer cells (MGC 803 and SGC 7901), and human colon carcinoma cell (HCT-8). Our results showed the inhibition rates to different cancer cells varied among different species. Some plants had effects only at the high concentrations (e.g. Eurasian milfoil to MDA-MB-231). Some plants had effects at lower concentrations and the effects leveled off at higher concentrations (e.g. garlic mustard to MGC 803). Others had gradual effects as concentration increased (e.g. Japanese knotweed and European frogbit). A general trend was observed that the inhibition rate increased with plant extract concentrations. Based on the inhibition rate, IC50 values were calculated (the lower IC50 value, the stronger the anti-cancer effects). Eurasian milfoil was found to have very low value (0.009) to HCT-8 cell, Garlic mustard had an IC50 value of 9.3*10-5 to HCT-8 cell and Japanese knotweed has a value of 6.1*10-4 to MCF-7. These extreme low values suggest that these plants may have strong anti-cancer effects. We did not find European frogbit have effects on any of the cancer cells. For those plants that may have anti-cancer effects, their specific metabolites should be further studied."

Speaker Biography:
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 MPA from Syracuse University. Dr. Zhu was a post-doctoral associate at Cornell University and a research scientist at the Finger Lakes Institute. His research focuses on ecology and management of invasive species and assessment of water quality using physical, chemical and biological parameters. He has published a number of articles in scientific journals such as Aquatic Botany, Ecosystems, Fisheries, Freshwater Science, Journal of Aquatic Plant Management, Journal of Great Lakes Research and Journal of Plant Ecology. Currently he is also an Associate Editor for Journal of Aquatic Plant Management and Journal of Plant Ecology. He serves at the NEAPMS board as chair of the scholarship committee.

POSTER: 2017-2018 Study of Phragmites Management Effects at the Esplanade

Brea Arvidson SOLitude Lake Management

Abstract:
As a primary greenspace of Boston, MA, The Esplanade is a public park that supports thousands of visitors, programs, events, and wildlife. The park is relatively young, having been constructed in the 1930's, creating a prime environment for non-native species such as common reed (*Phragmites australis*) and false indigo (*Amorpha fruticosa*) despite park maintenance and native-based landscaping. During this study, we documented the short-term effects of multiple management techniques on Phragmites and established a foundation for future management at The Esplanade. Seven 600 square-foot plots of contiguous Phragmites growth were established for multiple management strategies: cutting-tarping (1), cutting (1), herbicide-surfactant pairings (4), and non-management/control (1). Two herbicides (active ingredients imazapyr and imazamox) were selected for four herbicide-surfactant plots, each paired with two different surfactants – a methylated seed oil (MSO) and Tactic. Monitoring for native and non-native plant species was performed before and after management, where multiple post-management monitoring sessions were completed to document regrowth or immediate changes in plant assemblages up to one year post-management. Through this study, we can determine appropriate site-specific management techniques for the Esplanade based on short-term management efficacy, site characteristics, and public relation.

Speaker Biography:
Brea is an Aquatic Biologist at SOLitude Lake Management, where she is involved in many of SOLitude's largest monitoring and management projects throughout New England, New York, and New Jersey. She received her BS in Marine, Estuarine, and Freshwater Biology from University of New Hampshire (2015) and has been with SOLitude for 3 years. SOLitude is an environmental firm specializing in full-service lake, pond, wetland, and fisheries management solutions.

POSTER: Long-term Impacts by Applications of Fluridone and Triclopyr to Target and Non-target Aquatic Vegetation over a Fourteen-year Period

Amanda Mahaney and Emily Mayer SOLitude Lake Management

Abstract:
In 2005, the three basins of Lake Saint Catherine, Lily Pond, Little Lake, and the main basin, underwent a whole-lake fluridone treatment for Eurasian water milfoil (*Myriophyllum spicatum*). Since then, annual spot-treatments with triclopyr have been conducted. In support of the herbicide applications, late-season modified point-intercept surveys have been carried out for the purpose of documenting the presence of native aquatic vegetation and frequency of occurrence of the non-native Eurasian water milfoil. Fourteen years of cataloged species data allows us to examine trends and patterns over time between the long-term impacts of fluridone and triclopyr to emergent and submersed aquatic vegetation in a 950-acre northern lake.

Speaker Biography:
Amanda Mahaney is an aquatic biologist working for SOLitude Lake Management out of the Shrewsbury Massachusetts office. She conducts biological surveys and water quality monitoring programs throughout the Northeast.

Emily Mayer is an aquatic biologist working for SOLitude Lake Management out of the Washington, New Jersey Office. She conducts biological surveys and water quality monitoring programs throughout the Northeast. Ms. Mayer is currently pursuing her online Master's degree in Aquatic Sciences at the University of Florida.

POSTER: Investigating Vegetative Propagule Success of Dioecious *Hydrilla verticillata* in Northern Climates*

Kara Foley North Carolina State University

Abstract:
Hydrilla (*Hydrilla verticillata* (L.f.) Royle) is a submerged aquatic plant species native to Asia but was introduced to the United States in the 1960's where it has negatively impacted freshwater systems due to its invasive nature (Langeland, 1996). Today, the dioecious biotype hydrilla has persists in Florida and in the nearby southern states which include Georgia, Alabama, South Carolina, Louisiana and Texas (USGS, 2017). These observations agree with the literature that states that dioecious hydrilla is more reproductively successful in southern climates due to longer growing seasons and more time to form reproductive propagules (Spencer and Anderson, 1986; Netherland, 1997). A population of dioecious hydrilla exists in Philpott Lake (Martinsville, VA) making this the most northern known find of the biotype in an Atlantic state. The spouting rate of tubers produced by this northern population of dioecious hydrilla will be compared to the sprouting rate of tubers produced by southern populations of dioecious hydrilla. Results of this study will help to reevaluate the limits on the population range of dioecious hydrilla in the United States and could ultimately have implications for the Northeast U.S. and other cool climate regions where it may be realized that dioecious hydrilla could invade in the future.

Speaker Biography:
Kara earned a B.S. in Environmental Science from the University of New Hampshire in 2016. As an undergrad, she studied bioaccumulation of cyanotoxins in freshwater ecosystems with Dr. James Haney at the UNH Center for Freshwater Biology. In May 2016, she began an internship with the New Hampshire Department of Environmental Services' Exotic Species Program where she fell in love with the aquatic plant management field. She is currently working on her master's degree at North Carolina State University under the direction of Dr. Rob Richardson.

POSTER: 1.25 acre Patch of Sacred lotus (*Nelumbo nucifera*) Found in Suburban Pond in Meshanticut State Park, Cranston, Rhode Island

Katie DeGoosh-DiMarzio Rhode Island Department of Environmental Management

Abstract:
On Saturday, July 21, 2018, Rhode Island Environmental Police Officer, Wendy Knowlton, reported observation of "a gigantic water lily of some type…very aromatic… spreading across ¼ of the lake" in Meshanticut Pond. Meshanticut Pond (12.8 acres) is located in the suburban setting of Meshanticut State Park (30.6 acres) in Cranston, Rhode Island. Part of the Pawtuxet River Watershed (231 mi2), Meshanticut Pond empties into Meshanticut Brook, a tributary to the mainstem of the Pawtuxet River. Officer Knowlton alerted the Department of Environmental Management (DEM) Regional State Park staff who requested information from the DEM Water Resources (OWR). OWR Seasonal Technicians took pictures and specimens for identification and surveyed the pond by boat to document the current size of the patch. Review of aerial photos taken over the past few years shows it appears to have become established since 2014 and has grown substantially from approximately 0.25 acres in 2016, to 1.25 acres as of this year. This is the first incidence that DEM has identified this plant in a lake or pond in Rhode Island, as it is typically an ornamental, sold at least at one local nursery and featured in water gardens at a historic arboretum. Given heavy use of Meshanticut State Park by neighbors (evidenced by a well-worn walking path around the pond with observed dog-walking and jogging activities) in such a heavily settled area, its suspected that the plant may have been purchased by a local resident and planted near the shoreline. Currently, no New England state lists *Nelumbo nucifera* on their list of prohibited plants, and it is not currently listed in the USDA NRCS Plants database nor on GoBotany (New England Wild Flower Society) as occurring in New England. In consultation with the DEM Parks Department, DEM Fish and Wildlife is looking into treatment options (although there is no boat ramp, anglers fish from shore).

Speaker Biography:
Katie DeGoosh-DiMarzio is an Environmental Analyst with the New England Interstate Water Pollution Control Commission on assignment to the Rhode Island Department of Environmental Management, Office of Water Resources. Katie coordinates surface water monitoring in streams of Rhode Island (sampling water quality and macroinvertebrates), working on biological criteria development and database management. During the summer, she also directs seasonal interns in the quest to document and map where there are aquatic invasive plants in lakes and rivers in the state. Continued effort is needed to document the extent of the problem and to provide evidence to request increased funding for an ever-growing issue http://www.dem.ri.gov/programs/water/quality/surface-water/aquatic-invasive-species.php.

POSTER: Consumer Available sUAS (Small Unmanned Aircraft Systems) for Macrophyte Mapping and Management*

Andrew Howell North Carolina State University

Abstract:
Invasive exotic macrophytes, such as *Hydrilla verticillata* and *Salvinia molesta*, often have undesirable effects on native aquatic ecology and the associated local economy within invaded regions. It is well accepted that timely monitoring and efficient mapping strategies are essential for evaluating native and exotic aquatic vegetation, and also provide management direction for rapid response or gauge management effort success. While many aquatic plant survey techniques are well-established, most assessments require a skilled workforce and there is often subjectivity among surveyors which can lower survey accuracy and efficiency. Likewise, these methods require considerable labor and time inputs, as the extent of waterway evaluations are correlated with the precision, spatial coverage, and duration spent evaluating each monitoring location. The recent popularity of low-cost off-the-shelf sUAS platforms generate multiple paths for aquatic plant researchers and managers to explore. In addition to providing a platform for small optical imagers, sUAS potentially provide opportunities to remotely deliver herbicide applications. This research describes the use of consumer available sUAS to summarize varying macrophyte components among waterways in North Carolina and New Zealand and discuss how unmanned equipment may be incorporated in treatment programs and post-treatment monitoring.

Speaker Biography:
Andrew Howell is a PhD student and graduate research assistant at North Carolina State University in the Department of Crop and Soil Sciences, under the direction of Dr. Rob Richardson. He received his BS in Crop Production, and MS in Crop Science at NC State where he focused on the early detection, mapping, and monitoring of invasive submersed vegetation using traditional sampling regimes, and boat-based remote sensing technologies. For his PhD research, Andrew is currently investigating the utilization of unmanned systems in aquatic and non-cropland vegetation management and how these platforms will contribute in making prompt and informed management decisions. Andrew's passion is for the outdoors and spends most of his free time in the field or wading trout streams.

POSTER: Mapping *Hydrilla verticillata* in the Massachusetts Portion of the Connecticut River

Seth Taylor, CIPM, Kasie Collins, PWS, and Paul G Davis, Ph.D., PWS GZA GeoEnvironmental, Inc.

Abstract:
Hydrilla verticillata is an Aquatic Invasive Species (AIS) making rapid incursions into the New England freshwater environments. Introduced into North America as an aquarium plant in the 1950s, it has been reported in MA and CT for nearly a decade. Having been observed within the eastern portion of MA, it had yet to be identified within the western portion of the state. However, its observation within the Connecticut River near Hartford, CT suggests either an upgradient source or a threat for future transmissions northward within the Connecticut River valley. In collaboration with MA Dept. of Conservation and Recreation, aquatic biologists from GZA conducted a study in late summer 2018 within the entire length of the MA segment of the Connecticut River. Forty 40 site locations with 449 distributed individual plots were examined along 55± miles of the river, focusing on areas of observed aquatic macrophyte beds, appropriate depth ranges, marinas, boat launches, as well as oxbows and selected tributary sections, collecting presence/absence data for AIS, identifying macrophytes by species, and recording prevalence data by species, with a specific focus on *H. verticillata* and *Trapa natans*.

Speaker Biography:
Mr. Taylor is an Environmental Scientist/Planner with GZA who has worked on aquatic projects in New England over the past decade. He is a certified invasive plant manager and typical projects have included aquatic plant survey and management for lakes and ponds for various waterbodies, including the City of Springfield, MA where he is based.

POSTER: Line Vs. Point Aeration Designs: A Cost-Benefit Analysis

Patrick Goodwin Vertex Water Features

Abstract:
In this study, a cost-benefit analysis is presented for line and point aeration designs. The metrics compared include % water moved or turnover per day, oxygen transfer efficiency's, chlorophyll a (chl. a) reduction, labor, capital costs, and operation costs. Published equations for calculating turnover and oxygen transfer were used to compare the efficacy of line and point aeration diffusers at varying depths and densities. Current aeration models were used to assess the efficacy of line and point aeration designs concerning lake chl. a. Case studies were used to compare labor, capital, and operational costs. Results indicate that both line and point aeration designs can meet desired aeration objectives. Turnover and oxygen transfer were superior with line diffusers at shallow depths (< 3 m), while point diffusers were superior at deeper depths (> 3 m). Point aeration designs provided greater reductions in chl. a at lesser airflow than line aeration designs. Initial capital savings may be provided using line aeration, but long-term maintenance and electrical costs are likely greater. Both line and point aeration designs should be considered on a site by site basis and should account for lakes physical attributes and the aeration objectives at hand. Multiple designs should be presented to stakeholders such that best management practices can be fostered.

Speaker Biography:
Patrick is a research scientist for Aquatic Systems Inc., a Florida based lake management company with 11 offices throughout the state. He also works for Vertex Water Features Inc., an international aeration company that designs and manufactures aeration systems for variously sized waterbodies. Patrick has over 6 years experience directly with aeration systems two of which were part of his M.S. thesis. Patrick has a B.S. from the University of North Florida in biology and M.S. in lake management from the State University of New York. Patrick is a certified lake manager.

POSTER: Education as a Management Tool

Sonja Wixom State University of New York College at Oneonta, Biology Department

Abstract:
Koinonia is a Lutheran campground located in Sullivan County, New York. The camp was settled in the early 1960s, shortly after a small dam was constructed to deepen the bodies of water on site; collectively known as Koinonia Lake (surface area = 0.341 km^2, mean depth ~ 1 m, maximum depth ~ 2 m). Stakeholders consider this freshwater resource to be a lake; however intensive monitoring of Koinonia Lake is actually a deep marsh. This reclassification is based on the *Ecological Communities of New York*, which identifies a deep marsh as having high abundance of submergent, emergent, and floating vegetation (Edinger 2014). Excessive plant growth is the main concern for the wetland management plan, focusing mostly on educational efforts but will include physical, chemical, and mechanical options as well.

Speaker Biography:
In 2016 Ms. Wixom earned her BS in Conservation Biology at SUNY School of Environmental Science and Forestry in Syracuse, NY. During her undergraduate work Ms. Wixom began teaching as an undergrad assistant and discovered that teaching is her passion. She went on teach lake ecology on Lake Champlain for AmeriCorps, and later on Otsego Lake while working on her MS in Lake Management. Currently she is employed by Broome County Cornell Cooperative Extension teaching agriculture in middle schools and proudly serves on the board of directors for Women of Aquatics.