ABSTRACTS AND BIOGRAPHIES FOR PRESENTATIONS

AT THE

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OF THE

12-14 JANUARY 2016

GIDEON PUTNAM RESORT

Saratoga Springs, New York

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

Wednesday, January 13, 2016

Comprehensive Management

Hydrilla Biology, Ecology and Control

Starry Stonewort

Thursday, January 14, 2016

Chemical Control

Non-Chemical Control

Posters (alphabetically by author)

Boat ownership as a model for lake management

Kenneth J. Wagner, Ph.D. Water Resource Services

Abstract: Preventive maintenance, rapid response and rehabilitation are all necessary components of boat management. Lake management has very similar components, is also governed by economics, but has the added burden of institutional acceptability, including social and regulatory acceptance. Current water management programs of most states and the US federal government do not effectively support lake management, and are counterproductive in many cases. One cannot solve an in-lake problem with watershed management any better than putting a cover on a boat after a storm will make the boat useable. Permitting systems are not set up to move quickly enough to facilitate rapid responses. Rehabilitation is often in the public interest, but can be very expensive and funds have not been available under Section 314 of the Clean Water Act for nearly two decades. The legal "trick" of making non-point sources into point sources for regulation now makes NPDES-regulated systems ineligible for Section 319 funds. Maintenance is a legitimate aspect of lake management, just as it is for boat ownership, but somehow is a dirty word in funding and permitting circles. We need a new Clean Water Act and we need to avoid laws and regulations that deal with only pieces of ecosystems. Faster solutions include making our institutions more responsible for actual lake management, especially if they own the lakes, revising permitting systems for consistency and logic, putting money back into programs that were well conceived but defunded over time, and requiring training in lake management for anyone regulating it.

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 38 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 former Editor in Chief of Lake and Reservoir Management, a peer-reviewed journal.

Regional Collaboration for Successful Aquatic Invasive Plant Management in the Northeastern US: Past History and Future Outlook

Mark Heilman, Ph.D. SePRO Corporation

Abstract: Aquatic invasive species (AIS) certainly have no respect for state lines or other jurisdictional boundaries. However, such boundaries present economic, political, and social factors that impact how AIS management efforts can be planned, funded, and implemented. Relative to aquatic invasive plant management in the Northeast US, regional collaboration is occurring to assist education, prevention, monitoring, and control efforts. The Northeast, Mid-Atlantic and Great Lakes Panels on Aquatic Nuisance Species provide coordination of management activities in their respective areas across the broader NE region. Several federal agencies including the US Army Corps of Engineers and US Fish and Wildlife Service—as part of such panels and through their individual agency efforts—help focus and implement management of aquatic invasive plants in cooperation with state agencies and other partners. The Lake Champlain Basin Program leads efforts to restore and Lake Champlain and its surrounding watershed including parts of New York, Vermont, and Quebec from threats such as water chestnut. In a state-specific example of regional collaboration, New York's Partnerships for Regional Invasive Species Management (PRISM) coordinate invasive species management functions including harnessing efforts of citizen volunteers, identifying and delivering education and outreach, establishing early detection and monitoring networks and implementing direct eradication and control efforts. NEAPMS provides a critical forum for public and private partners belonging to such regional collaborations to focus on aquatic invasive plants in the context of their other AIS/IS responsibilities. With the intention of stimulating further dialogue during and after the conference, the objectives of the presentation are review of how regional partnerships are operating effectively today and commentary on how such partnerships might be expanded/altered to improve future success of aquatic invasive plant management in the region.

Speaker Biography: Dr. Mark Heilman is currently the Senior Aquatic Technology Leader for SePRO Corporation. Dr. Heilman received both his BS in Biology (1992) and his Ph.D. in Aquatic Ecology (1998) from the University of Notre Dame. Dr. Heilman has been a research scientist with SePRO Corporation since 2002 and now leads SePRO's development of new technical solutions for management of aquatic invasive species, with an emphasis on aquatic invasive plants. Dr. Heilman received the NEAPMS Aquatic Plant Science Award in 2011.

New York State's New Aquatic Invasive Species Management Plan

Catherine A. McGlynn NYSDEC Aquatic Invasive Species Coordinator

Abstract: In July 2015 New York State released its new Aquatic Invasive Species (AIS) Management Plan. The plan focuses on priority actions to reduce the introduction and spread of nonindigenous aquatic species into New York waters, to minimize impacts from existing AIS, and to engage the public in prevention and early detection efforts. The AIS Coordinator will provide updates on some of the work done to date: an aquatic plant survey on the Hudson and Croton Rivers, research to test inexpensive boat decontamination alternatives, plans to increase rapid response capacity, and development of a strategic plan for expanding watercraft inspection and boat stewardship programs statewide while increasing overall education and outreach capacity.

Speaker Biography: Cathy has been AIS coordinator for the New York State Department of Environmental Conservation since July 2015. Prior to working with the DEC, Cathy worked as the coordinator for the Northeast Illinois Invasive Plant Partnership where she co-coordinated the Illinois Hydrilla Task Force, co-coordinated the New Invaders Watch Program (regional early detection-rapid response), provided outreach and education about invasive ornamental plants to green industry and its consumers, served on the Illinois Invasive Plant Species Council and Illinois State Pest Analysis of Risk Committee, and led several invasive plant control and management projects. Cathy has also coordinated volunteer monitors for the Hudson River Submerged Aquatic Vegetation Project and was program manager for the NYS Department of State's Significant Coastal Fish and Wildlife Habitat Program. 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.

Emerging Risk: Water soldier (*Stratiotes aloides*) in Ontario – Preventing its Spread to the Great Lakes

Holly Simpson Ontario Ministry of Natural Resources & Forestry

Abstract: Water soldier (*Stratiotes aloides*) is an invasive aquatic plant, native to Eurasia, that was first observed in the Trent River, in Ontario in the fall of 2008, and is the only known wild occurrence in North America. It forms dense mats of floating and submerged vegetation that can aggressively out-compete other aquatic plants and negatively impact the biodiversity of aquatic ecosystems. Water soldier also poses a threat to navigation and recreation.

The population at the original infestation area is approximately 160ha, with small satellite populations in three areas, extending approximately 30km downstream. Recognizing the potential negative impacts posed by this invasive plant, the Conference of Great Lakes and St. Lawrence River Governors and Premiers identified water soldier on their "least wanted" aquatic invasive species list in 2013 as a priority species for prevention and response.

An inter-agency working group (Ontario Ministry of Natural Resources and Forestry (MNRF), Ontario Federation of Anglers and Hunters (OFAH), Ontario Ministry of Environment and Climate Change, Trent University, Lower Trent Conservation, United States Army Engineer Research and Development Center, Parks Canada, Ontario Invasive Plant Council, and Invasive Species Centre) was formed to help coordinate research, monitoring, eradication and prevention strategies, culminating in the development of an Integrated Management Plan for Water Soldier in 2014 which outlines a combination of control approaches including both physical removal and herbicide treatments. Based on this plan, eradication measures were initiated in fall 2014, and are anticipated to occur over several years, with an initial focus on preventing further downstream dispersal of the plants, and addressing the source populations.

In tandem, with these control measures, the MNRF has been working to address the policy and legislative gaps for water soldier (and other aquatic invasive plants) that currently exist in the province, including the introduction of new legislation that would prohibit the possession, sale, transport, and/or release of high risk invasive species and prevent new infestations.

This presentation will provide an overview of the suite of actions that have been undertaken to address the threat of water soldier to Ontario, and the Great Lakes basin.

Speaker Biography: I am a Management Biologist at the Peterborough District of the Ontario MNRF. I graduated with Honours from Trent University (BSc. Biology) in 2000 and I have worked for the MNRF in various positions and locations for the past 15 years. Since 2011, I have been the operational lead of the water soldier monitoring and eradication efforts in Ontario.

Monoecious *Hydrilla verticillata* Competition in Cool and Warm Climates

Amy Henry (Master's Candidate) NC State University

Abstract: Monecious hydrilla has been proposed to be more suited to temperate climates, but the amount of published data on monecious hydrilla is less than that of diecious hydrilla. A competition study including hydrilla and four other submersed cool season plants was conducted in two dissimilar climates, located in mesocosms in Laurel Springs, NC, and Raleigh, NC. One of each species of *Elodea canadensis, Potamogeton crispus, Myriophyllum spicatum*, and *Vallisneria americana* was planted in a pot with either zero, two, or four hydrilla plants. Biweekly growth was estimates were conducted consisting of the measurement of the longest stem of each plant, an estimate of the surface percent coverage and physiological stages noted. Results and conclusions will be discussed.

Speaker Biography: Amy Henry is a first year Master's Student in the Crop Science Department with a specialization in Aquatic Weed Science at North Carolina State University. She is working on comparing the growth and physiological stages of monoecious *Hydrilla verticillata* in a warm climate and a cool climate. Amy graduated from The Ohio State University with a Bachelor's Degree in Sustainable Plant Systems with a Specialization in Horticulture. She interned at C. Raker and Son's as a greenhouse grower, and worked full time at a perennial plant producer.

Monoecious *Hydrilla verticillata* in North Carolina Lotic Systems

Erika Haug (Ph.D. Candidate) NC State University

Abstract: Monoecious hydrilla (*Hydrilla verticillata*) was first reported in North Carolina in 1980. Originally infesting small lakes and ponds near Raleigh, it quickly spread into Piedmont reservoirs including Lake Gaston, an approximately 20,000 acre hydroelectric reservoir with heavy residential shoreline development. In recent years, hydrilla has become much more prominent in lotic systems. Rivers including the Cape Fear, Chowan, Deep, Eno, and Roanoke have all been impacted by increasing hydrilla growth. The Eno river in particular has been heavily impacted. The Eno River is an important State Park attraction, serving over 420,000 visitors each year. It also serves as the source water for Falls Lake, the drinking water reservoir for Wake County, NC. Hydrilla now occupies up to 100% of the surface area in some stretches of the river and at least 13 miles of the Eno river have been invaded by some level of hydrilla infestation. Due to the increasing impacts of hydrilla on the river and potential negative impacts to rare species such as the Panhandle Pebblesnail (*Somatogyrus virginicus*), the Carolina madtom (*Noturus furiosus*), the Roanoke bass (*Ambloplites* cavifrons), and the Atlantic pigtoe (*Fusconaia masoni*) the Eno River Task Force was formed. This task force was a joint effort by the North Carolina natural resource agencies, municipalities, NCSU, and others. Following 3 to 4 years of meetings a multi-pronged demonstration, outreach, monitoring, and research project was initiated. Research efforts included riffleweed (*Podostemum ceratophyllum*) sensitivity to herbicides, tagging and monitoring of low numbers of triploid grass carp (*Ctenopharyngodon idella*) released into the system, and panhandle pebblesnail sensitivity to herbicides. A demonstration herbicide treatment was conducted in 2015 along with simultaneous monitoring programs for hydrilla, the panhandle pebblesnail, riffleweed and other species. The demonstration treatment of fluridone effectively reduced hydrilla density in the treated area while no significant impact to riffleweed was observed in comparison to non-treated areas. Likewise, panhandle pebblesnail densities did not differ between treated and untreated areas. Injury was observed on water willow (*Justicia americana*), however, plants showed signs of recovery soon after conclusion of the treatment. The demonstration treatment is scheduled to be repeated in 2016 and it is expected that the Eno River Task Force will soon begin deliberations on planning for 2017.

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.

Multi-Year Hydrilla Control Program at Deep Creek Lake

Mark Lewandowski Maryland DNR

Abstract: The Maryland Department of Natural Resources (DNR) completed year two of a muliti-year Hydrilla control program at Deep Creek Lake. Hydrilla was first discovered in nine distinct areas of the lake in fall 2013 and the control program began in May 2014. The control program consists of population monitoring, chemical control, outreach and education. The 2015 control areas expanded on the 2014 coverage and included new patches discovered in late 2014. Divers surveyed the treatment areas to monitor the emergence of new Hydrilla and treatment began in June. With guidance from SePRO representatives, DNR contracted a licensed contractor to apply four different Sonar® formulations. Five treatments were scheduled, but the new formulations allowed for consistent dosage rate throughout the summer and enabled DNR to eliminate the final treatment. Follow-up monitoring with divers and bioassays were conducted after each treatment. No new Hydrilla patches were found in 2015 and only one Hydrilla plant was observed in subsequent monitoring.

In its first full year, the Launch Steward program allowed DNR to conduct voluntary surveys and provide education opportunities to nearly 3,000 vessels. DNR partnered with a local community college to hire environmental science majors to work as stewards. There was a 99% compliance rate with the inspections, which allowed stewards the chance to promote the Clean, Drain and Dry message while intercepting boaters with aquatic invasives. DNR will continue to offer inspections and will increase outreach efforts to keep Deep Creek Lake free from aquatic invaders.

Speaker Biography: Mark Lewandowski is a biologist for the Maryland Department of Natural Resources in Annapolis, Maryland. He has a B.S. from the University of Maryland, College Park, and has worked in restoration of submerged aquatic vegetation and invasive species control for 15 years. He is the program lead on the Deep Creek Lake Hydrilla Control project and supervises DNR's dive program. He is a member of the Mid-Atlantic Panel on Invasive Species, the Maryland Invasive Species Council and represents the Chesapeake region to the Aquatic Nuisance Species Task Force.

The Distribution and Ecology of Nitellopsis obtusa in New York, U.S.A.

Robin Sleith The New York Botanical Garden

Abstract: The freshwater green alga Nitellopsis obtusa (*Characeae: Charophyta*) was first reported in the New World in the St. Lawrence River in 1978. Since that time, *N. obtusa* has been reported from inland lakes in Michigan, Minnesota, Indiana, New York, Wisconsin and Vermont and has been listed as an aggressive invasive species by the United States Geological Survey. We studied the distribution and habitat of *N. obtusa* by surveying 390 waterbodies throughout New York State, recording *Characeae* species presence and water chemistry parameters. In total, *N. obtusa* was found in 17 counties at 31 sites, including 16 inland lakes, 7 sites in the St. Lawrence River, and 8 sites in Lake Ontario. This included new reports from five counties (Franklin, Ontario, Seneca, Wayne, and Yates). Much of the distribution pattern of *N. obtusa* in New York was correlated with human activity and water chemistry data. For example, nutrient levels (Nitrogen and Phosphorous) as well as conductivity and pH described much of the variation between sites with *N. obtusa* and those without. Although often co-occuring with native species, an analysis of habitats across New York revealed that *N. obtusa* inhabits a unique range of conditions when compared to native *Characeae*.

Speaker Biography:

Robin Sleith
Graduate Fellow
The New York Botanical Garden
2900 Southern Boulevard
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Sixteen Years with Starry Stonewort?

G. Douglas Pullman, Ph.D. Aquest Corporation

Abstract: Goal directed lake management programs are challenged when lake ecosystems are disturbed by invasive and opportunistic species that compromise biological diversity, habitat complexity, and ecosystem stability. Starry stonewort has a profound effect on the lakes where it is found and presents a very significant challenge to northern lake managers. The most predictable characteristic of starry stonewort (*Nitellopsis obtusa*) is that it is incredibly unpredictable. As an opportunistic invasive species, it is known to bloom and crash but it is nearly impossible to predict when this might happen. This unpredictability seems to be related to the reasons that this nuisance alga can become so weedy and why it can be so difficult to control. It is critical to understand how a non-vascular plant can grow 8 feet tall or more? Why do starry stonewort meadows boom and crash? And, when they do crash, why is all other plant growth frequently eliminated from the crash zone? Is it possible to predict when and where starry stonewort will grow to nuisance levels? Why is it so easy to kill but so difficult to treat. Is it possible to selectively control starry stonewort and what are realistic expectations for the outcomes associated with selective control strategies? Data and videos will be presented that provide a strong argument to support the role of temperature gradients in the support and collapse of starry stonewort populations. It will also become clear why it may be so difficult to control starry stonewort in some situations.

Speaker Biography: Dr. Pullman attended DePauw University, Indiana University, University of Minnesota, Central Michigan University, and Michigan State University. He is a former director and president of the Midwest Aquatic Plant Management Society and currently serves as vice president of the Michigan Aquatic Managers Association. Doug resides in sunny Saint Petersburg, FL with most of his family, but continues to maintain a very active practice in Michigan – a great place to be in the summer. His current interests include:

- The development of lake monitoring methods and tools as a part of the LakeScan™ method,
- Selective phytoplankton community management,
- Mechanisms of herbicide tolerance in aquatic weed species, and
- Submersed aquatic vegetation management strategy and technology development.

Managing Hydrilla in Stormwater Retention Ponds

Eric Schutman Syngenta Professional Products

Abstract: Purpose: Managing hydrilla in community stormwater retention ponds. During any storm event, turnover rate is extremely high. Hydrilla was most likely imported by bird deposits or water garden plants from the community. These ponds are also part of a scenic area in the neighborhood; playgrounds, swimming pools, soccer fields and walking trails. Herbicides with a short contact time were needed to control hydrilla and other invasive weeds. Traditional methods of control requiring extended periods of contact time would not be effective in this situation. The trial combination herbicides chosen were, Reward® and Stringray®. Rates were selected based on trials conducted by NC State University.

Approach: Hydrilla typically appears around early to mid-June. Water temperatures at this time are around 80¬0F. Treatments are planned during a 24 hour window with no rain events. Rates of Reward are 0.5 gal/A-ft and Stringray 100 ppb and were applied as a combination. The application was a subsurface spray. The two ponds are respectively 0.35 acres and 0.2 acres. No copper products were added, as Reward's algicidal properties managed the existing algae growing on the hydrilla.

Results: Two weeks after the initial application the hydrilla was 100% controlled. The combination of Reward and Stringray resulted in a fast acting control method with a rapid decomposition rate. The one treatment controlled hydrilla in the two retention ponds for the entire season. This is the second successful season with this combination in controlling hydrilla in these water bodies.

Speaker Biography:

Eric Schutman
Territory Manager
Syngenta Professional Products

Endothall Case Study Evaluations for Eurasian Watermilfoil, Hybrid Watermilfoil and Curlyleaf Pondweed

Cody Gray, Ph.D. UPI

Abstract: Eurasian watermilfoil and curlyleaf pondweed have long been problematic invasive aquatic species across the northern tier of the United States. Water managers have battled these species for multiple years using a variety of techniques including herbicide applications, mechanical techniques, and biological control. Recently, a new species has started to become extremely problematic, hybrid watermilfoil. Hybrid watermilfoil is a hybrid cross between the non-native Eurasian watermilfoil and the native Northern watermilfoil. The hybrid species takes on characteristics of both parent species. Research has found many traditional applications using auxin herbicides has not been effective in controlling hybrid watermilfoil. This presentation will outline multiple lake management strategies targeting Eurasian watermilfoil, hybrid watermilfoil and curlyleaf pondweed.

Speaker Biography: Cody was raised on his grandfather's dairy farm near Ralston, OK. He received his Bachelor's degree in chemistry at Southwestern Oklahoma State University in 1998. He received his M.S. at Oklahoma State University in Weed Science in 2001. In 2005, Cody completed his graduate education with a Ph.D. in Weed Science at Mississippi State University. After completing his graduate education he accepted an Assistant Professor position with the University of Florida at the Fort Lauderdale Research and Education Center located in Fort Lauderdale, FL where his appointment included research on invasive aquatic plants, aquatic extension specialist for the southern half of Florida and taught a pesticide application course. Cody is currently employed by United Phosphorus, Inc. (UPI) as a Field Development Representative, in which, he oversees all aquatic herbicide and algaecide market development and research trials conducted in the United States, Canada, Australia, and New Zealand. Additionally, Cody is responsible for all UPI product development, including herbicides, insecticides, fungicides, and fumigants, for the following states: Oklahoma, Texas, New Mexico, Colorado, Kansas, and Nebraska. Cody is the Immediate Past President of the Aquatic Plant Management Society, a Past President of the Western Aquatic Plant Management Society and the Aquatic Plant Management Society liaison to the Weed Science Society of America.

Ecotoxicology and its role in aquatic plant management

Ashlee Kirkwood Smithers Viscient

Abstract: Ecotoxicology is the study of how chemicals in the environment affect various organisms. Any chemical registered for sale in the US and most countries around the world, requires environmental toxicity information be submitted to the EPA or other regulatory agencies such as Environment Canada, the OECD (EU) or JMAFF (Japan). Most ecotoxicology labs will have a biological department that performs the assays with a wide variety of organisms, an analytical department that provides confirmation of assay testing dosages, and an environmental fate department that determines the metabolism of compounds in various soils, sediments and sludges.

Many of the standard aquatic ecotoxicology tests such as algae, daphnid, and fish assays have been around for 30+ years. The *Myriophyllum* assay was developed approximately 5 years ago when several regulatory groups in the EU became concerned that phytotoxic effects to wetland and aquatic plants from agricultural overspray and runoff were not properly represented for certain classes of compounds; the risk assessments for these chemicals had typically been based only on toxicity data for green algae and *Lemna*.

Smithers Viscient, in parallel with a dozen other international labs, was involved in the ring-testing performed to validate the *Myriophyllum* test method. The OECD guideline which details the assay, the design of which must be followed for acceptable compound registration, was approved in September 2014. The test design is often modified to meet the needs of various clients for different risk assessment scenarios, including different exposure lengths, test durations, and solution renewal schemes. The presentation will include an overview of various ecotoxicity tests, as well as detailed descriptions of the procedures for the *Myriophyllum* assay.

Speaker Biography: Ashlee Kirkwood is a study director and leader of the Plant Toxicology group at Smithers Viscient, located in Wareham, MA. She earned her BS in Earth Science from Bridgewater State University, and her MESM with a specialization in Wetland, Watershed and Ecosystem Science from the University of Rhode Island. In her role as leader of the Plant Toxicology group at Smithers Viscient, she directs a small team of researchers on a variety of terrestrial and aquatic plant exposures, and takes pride in developing and refining unique exposures designed to meet the needs of each client. In her spare time she serves as the Vice President of the Fairhaven-Acushnet Land Preservation Trust, along with many other pursuits.

Combinations of Copper and Auxin Herbicides for Control of Variable-Leaf Milfoil in New Hampshire Ponds: A Small Plot Demonstration Project

Bill Ratajczyk Applied Biochemists

Authors: Ryan Wersal[1], Amy Smagula[2], John Cortell1, and Bill Ratajczyk[1]
[1]Applied Biochemists (A Lonza Business)
[2]New Hampshire Department of Environmental Services

Abstract: Variable-leaf milfoil is a canopy forming submersed aquatic plant much like its congeneric relative Eurasian watermilfoil (*Myriophyllum spicatum*). Canopy formation reduces light penetration, thereby reducing the growth of native submersed plants, altering ecosystem services, and interfering with recreational activities of infested waters. The butoxyethyl ester (BEE) formulation of 2,4-D has been utilized most often for variable-leaf milfoil control, and in most cases adequate control is achieved. However there are still instances when failures have been reported. To address failed applications with other species, combinations of contact herbicides with systemic herbicides have been utilized to improve efficacy. The objective of this study was to combine copper ethylenediamine with 2,4-D (BEE) or triclopyr to see if greater efficacy could be achieved in small plots in New Hampshire. Two five acre plots were established in Brindle Pond (untreated reference), Turtle Pond (2,4-D BEE and copper plots), and Goodwin Pond (triclopyr and copper plots). Pretreatment biomass was harvested in August 2014 at 15 pre-determined locations within each of the 6 plots using the spinning rake method. Post treatment biomass was harvested 6 weeks after treatment at all sample locations visited during the pretreatment sampling event. Biomass in the untreated reference plots did not change between sampling events which indicates that differences detected in biomass in treated locations were due to the herbicide applications. Biomass was reduced by 99% in Turtle Pond Plot 1 when 2,4-D BEE was applied alone (2 mg/L) and was reduced by 97% when copper was applied in combination with 2,4-D BEE 0.75 + 1.0 mg/L copper:2,4-D BEE). Biomass in Goodwin Pond Plot 1 (copper 0.75 mg/L + triclopyr 1.0 mg/L) was reduced 79% at 6 WAT. Biomass in Goodwin Pond Plot 2 (liquid triclopyr 2.0 mg/L) was reduced by 85% at 6 WAT. All field plots were evaluated again 1 year after treatment, additional plots were also treated in 2015 to further assess granular copper and 2,4-D combinations. Preliminary results indicate that lower auxin herbicide rates can be used if herbicides are combined with copper ethylenediamine, though 2,4-D BEE performed better than triclopyr on variable-leaf milfoil.

Speaker Biography: Bill Ratajczyk is the New Product and Technoloty Development Manager for Applied Biochemists a Lonza Business. He has a degree from the University of Wisconsin Stevens Point. Experience: 6 Years New Product and Technology Development Manager, 19 Years Technical Sales Mgr. Applied Biochemists, 3 Years Field Tech./Applicator/ Marine Biochemists, 2 times President Midwest A.P.M.S. (99) & (05), 18 Years Board of Directors Midwest A.P.M.S.

Effectiveness and Yield of Hand Harvesting

Kenneth J. Wagner, Ph.D. Water Resource Services
Mercedes Gallagher Center Pond Weed Project

Abstract: Center Pond became infested with Eurasian watermilfoil (*Myriophyllum spicatum)* over a decade ago, and nearly all of the 125-acre lake is susceptible to its growth, with very clear water and a maximum depth of about 18 feet. A contact herbicide was applied as a whole-lake treatment in 2000, and twice subsequently for spot treatment in selected areas. A hand pulling project was developed early on and adjusted over many years, employing surveys of plant location, volunteer and professional divers, and surface support that includes fragment skimming and shallow water plant removal. Milfoil has been reduced to a minor component of the plant community lake wide. Tracking of harvested plants, hours of effort, and costs facilitates program analysis. Plants harvested declined substantially over the years. Necessary effort has declined as well, but not as sharply; while harvesting time has decreased, search time has increased, putting a floor on cost that can only be lowered by greater efficiency. A number of techniques for improved effectiveness and efficiency have been developed and additional measures are being tried. Eradication is illusive, but a healthy native plant community exists and milfoil does not impair lake use at this time. In more recent years, European naiad (*Najas minor)* and curly leaf pondweed (*Potamogeton crispus)* have also been addressed by hand harvesting. Populations of these invasive plants have been kept low by the program.

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 38 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 former Editor in Chief of Lake and Reservoir Management, a peer-reviewed journal.

Mercedes Gallagher initiated, expanded and has continued to manage the Center Pond Weed Project. She has volunteered countless hours helping to protect and preserve Center Pond.

Triploid Grass Carp - A biological tool for nuisance aquatic vegetation management in Connecticut

Mindy M. Barnett State of Connecticut, Department of Energy & Environmental Protection

Abstract: Nuisance levels of aquatic vegetation are found in many Connecticut lakes and ponds impacting recreational use. Private pond owners often contact the Inland Fisheries Division (IFD) seeking technical guidance regarding their pond management needs, including possible options for control of nuisance aquatic vegetation. Among the many services provided by the IFD is the administration of the State's permitting program for triploid grass carp *Ctenopharyngodon idella*. Before permits are issued, every site is visited and inspected by staff from the IFD Habitat Conservation and Enhancement (HCE) program. Since 1988, the beginning of the State's triploid grass carp permitting program, biologists have issued over 3,000 permits (including re-issues) for private ponds across the state, averaging 80 new inspections per year, totaling more than 60,000 triploid grass carp being stocked. The majority of ponds (70%) that have been permitted for the use of triploid grass carp are less than 0.50 acres in size. The program continues to expand to include public waterbodies. As of this year the largest lake in the State, Candlewood Lake (5,086 acres), was permitted and stocked with triploid grass carp for the management of Eurasian Milfoil (*Myriophyllum spicatum*). Connecticut is the only state in New England that allows the use of triploid grass carp. Stringent regulations that require screening at inlets/outlets help achieve "ecological isolation" a requirement that has prevented excessive emigration of fish to public waters.

Speaker Biography: Mindy M. Barnett is a Fisheries Resource Technician for the CT Department of Energy and Environmental Protection (DEEP), Inland Fisheries Division (IFD), Habitat Conservation & Enhancement Program (HCE). Mindy grew up in the Midwest and relocated to CT where she attended Eastern CT State University and obtained a BS in Biology. She enjoys anything on or near water and hiking with her two dogs. She began her career in biology as a microbiologist for the University of Connecticut on Plum Island looking for virulence genes and genome sequencing. She joined CT DEEP, IFD, HCE in 2010 and has been running the triploid grass carp permitting program since that time. She has been a member of NEAPMS for six years and is known to most as the "Grass Carp Girl". She has also began a new habitat project in collaboration with the North Atlantic Aquatic Connectivity Collaborative (NAACC) to assess the road/stream crossing across the state for potential barriers to fish and wildlife passage and/or high risk of failure. Her passion for the job enables her to reach new strides and take on more challenging tasks including obtaining a grant to fund her work with the NAACC. She looks forward to continuing her career in aquatic plant management and becoming more involved in NEAPMS in future years.

Aeration's Effect on Algae: a review of success and failures

Patrick Goodwin Vertex Water Features

Abstract: Bottom aeration is a restoration tool commonly used for improving multiple aspects of lake health, including the occurrence of algal blooms and the quality of algal assemblages.

The intense mixing brought about by artificially aerating a lake can affect an algal community by: (i) increasing dissolved oxygen concentrations and changing the lake's water chemistry (pH, carbon dioxide and alkalinity), which can lead to a more desirable shift in an algal community; (ii) reducing levels of internal nutrient cycling within a lake, which reduces the large amount of nutrients used to sustain algal blooms; (iii) decreasing the amount of solar energy available for photosynthesis; (iv) favoring algal species that tend to sink quickly and need mixing currents to remain suspended in the upper water column (e.g. diatoms); and (v) mixing algae-eating zooplankton into deeper, darker waters, thereby reducing their predation by sight-feeding fish, and increasing their ability to graze on algae cells.

This presentation discusses the current literature regarding aeration's effect on lake algal communities and outlines successes and failures associated with this lake management approach, along with the major factors that tend to influence the outcome of any aeration based management strategy.

Speaker Biography: Patrick Goodwin holds a B.S. in Coastal Biology from the University of North Florida and is currently perusing a M.S. degree in lake management at SUNY Oneonta. Before going back to school Patrick worked as researcher for the UNF Environmental Center and for Vertex Water Features. One of his main topics of research during that time was looking at aeration's effect on lake ecology, with an emphasis on aeration design.

Posters

(alphabetically by author)

Recreational boat use and lake disturbance in relation to non-native macrophyte biomass and native macrophyte communities in New York State

Andrew S. Brainard (Ph.D. Candidate) SUNY College of Environmental Science and Forestry

Abstract: In freshwater ecosystems, a leading vector for overland transport of non-native species is from recreational boats while anthropogenic lake disturbance alters natural freshwater ecosystems, potentially creating novel environments in which non-natives can invade. This study investigated how propagule pressure and disturbance influenced macrophyte communities in a kettle lake district in central New York and the Adirondack Park region.

In the central NY kettle lake district, questionnaires were administered to boaters at public launches and homeowner questionnaires were given to property owners to estimate propagule pressure and quantify disturbance (e.g., maintenance of septic systems). Macrophyte communities were sampled with quadrats via scuba to determine macrophyte abundance (g m-2). A significant relation between propagule pressure and non-native macrophyte biomass ($p < 0.01$; $R2 = 0.93$) was observed. Lake disturbance was not significantly related to non-native macrophyte abundance.

The relation between recreational boat traffic and non-native macrophyte biomass was then tested in fourteen lakes of the Adirondacks to examine if a similar pattern held on a regional scale. Results indicated that non-native macrophyte biomass increased with the number of recreational boats utilizing public boat launches ($p < 0.01$; $R2 = 0.65$). However, the slopes of the linear regressions between the two regions differed, suggesting increased propagule pressure is needed in the Adirondacks before non-native macrophytes become dominant.

This study highlights the importance of propagule pressure in aquatic plant invasion ecology, and offers evidence that management of recreational boating is warranted to limit macrophyte invasions. In addition, results of this study provide empirical data to test previously developed theoretical models on propagule pressure and invasion success.

Presenter Biography: Andrew Brainard is a Ph.D. Candidate in the Department of Environmental and Forest Biology at the SUNY College of Environmental Science and Forestry (SUNY ESF). His research focuses on aquatic invasion ecology, with an emphasis on macrophytes and benthic macroinvertebrates. In particular, his research attempts to address the role of anthropogenic activities as a driver of ecosystem change that may facilitate or influence the impact of invasions. His work encompasses lakes across New York State and the western basin of Lake Erie. While finishing up his graduate work at SUNY ESF, Andrew currently works at OBG in Syracuse, NY.

Identifying the Effects of Eutrophication and Disturbance in the *Nitella* and Macrophyte Communities in Lake George

Jeremy Farrell RPI Darrin Fresh Water Institute

Charlotte Caldwell
David Winkler
Lawrence Eichler
Charles Boylen
Sandra Nierzwicki-Bauer

Abstract: In the summer of 2015 a multi-pronged approach was initiated to understand the degree in which eutrophication can be measured through studying the plant community in Lake George, New York. First, Nitella sp. biomass abundance estimates were calculated in an identical location and with the same procedures used in 1970s and 1980s studies. Biomass estimates will be presented in reference to these historical biomass data. This information has been placed in the context of a long-term chemical monitoring program that has documented the slight, but observable, eutrophication of the lake. Second, Northwest Bay of Lake George has two differing shorelines and watersheds. The east side of the bay is state land and "Forever Wild" whereas the west side of the bay has a state road and modest development. We hypothesized that the plant community would be disturbed on the more developed west side of the bay with greater plant biomass and an altered plant community. To test this hypothesis we conducted a hydroacoustic survey with greater than 18000 points spread evenly between the East and west shorelines. We also performed a point intercept rake toss survey with macrophyte biomass estimates from both sides of the bay. The point intercept and hydroacoustic datasets are being merged to define the plant community in an analysis that will be spatially explicit, data dense and ecotype specific.

Presenter Biography:

Jeremy Farrell
RPI Darrin Fresh Water Institute

Pelagic algal data collection and analysis

Claire Garfield (High School Senior) SUNY Oneonta Biological Field Station Summer Intern and Volunteer

Abstract: Pelagic algal data collection and analysis are essential to effectively managing an aquatic system both in the present and future. This is further necessitated by the introduction of zebra mussels (Dreissena polymorpha), an exotic and aggressive filter-feeder now commonly considered to promote cyanobacterial dominance. Specific strains of cyanobacteria produce various cyanotoxins that are harmful to humans and domestic animals. The purpose of this study was to evaluate the possible effects of zebra mussel introduction and colonization on the algal composition of Otsego Lake, a mesotrophic glacial lake in Otsego County, NY. Utility of the current biweekly sampling was also assessed. Samples were collected on a bi-weekly basis from April 2015 to November 2016. Samples were analyzed using 10 mL Utermöhl chambers and an inverted microscope. Cell counts were taken for all identifiable dominant genera in Otsego Lake. Otsego Lake was found to have a low density of cyanobacteria and low diversity: only two genera, Anabaena and Microcystis were found. While cyanobacteria are not yet a concern for human health or ecosystem functioning in Otsego Lake, the introduction of zebra mussels may be slowly altering its algal composition. This warrants continued monitoring of seasonal succession as well as inter-annual variation in the algal community. On Otsego Lake, biweekly sampling has been effective in appropriately capturing seasonal phytoplankton succession; however, on a more eutrophic lake with algal blooms, more frequent data collections may be necessary.

Presenter Biography: Claire Garfield is a senior at Oneonta High School and was an intern at the SUNY Biological Field Station for the summer of 2015.

Interaction between Eurasian watermilfoil and the specialist milfoil weevil, Eurychiopsis Lecontei

Christine Goodrich (Ph.D. Candidate) RPI

Abstract: Many models seek to describe the relationship between the spread of an invasive species and its new habitat, but very few models describe the control of these species and rarely do they depict any spatial dimensions. I present a mechanistic mathematical model, driven by the lake chemical, physical, and biological dynamics that drives the spread of *Myriophyllum spicatum*, coupled with an agent based model of the biological control agent, *Eurychiopsis lecontei*. By including spatial dynamics, I hope to uncover some rules about the spread of *Myriophyllum spicatum* that will help managers to better assuage a non-native invasion.

Presenter Biography: I am in the Multidisciplinary Science Department at RPI, on track to obtain my Ph.D.

The Flora of Yellowstone

Eric Hellquist, Ph.D. SUNY Oswego

Spreading the word, not the species: Expanding watercraft inspection and boat stewardship programs throughout New York

Catherine A. McGlynn NYSDEC Aquatic Invasive Species Coordinator

Abstract: One of the top priorities of New York State's new Aquatic Invasive Species Management Plan is expanding the boat steward program and ensuring consistency of these programs statewide. The AIS Coordinator has conducted informational interviews with programs throughout the state. These data were used to inform a strategic plan that focuses on increasing capacity through training, staffing, funding, and network building with multiple partners. Current details for these efforts will be provided.

Presenter Biography: Cathy has been AIS coordinator for the New York State Department of Environmental Conservation since July 2015. Prior to working with the DEC, Cathy worked as the coordinator for the Northeast Illinois Invasive Plant Partnership where she co-coordinated the Illinois Hydrilla Task Force, co-coordinated the New Invaders Watch Program (regional early detection-rapid response), provided outreach and education about invasive ornamental plants to green industry and its consumers, served on the Illinois Invasive Plant Species Council and Illinois State Pest Analysis of Risk Committee, and led several invasive plant control and management projects. Cathy has also coordinated volunteer monitors for the Hudson River Submerged Aquatic Vegetation Project and was program manager for the NYS Department of State's Significant Coastal Fish and Wildlife Habitat Program. 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.

Reducing the Use of Algaecides and Herbicides in Lakes and Ponds

Kevin Ripp Aquafix, Inc.

Abstract:

- Protein Scums

Following treatment in lakes and ponds with a water temperature above 75 degrees, it's not uncommon to see a residual "protein scum," which can consist of plants, algae, protozoa etc. Although named proteins scums, they often contain large amounts of polysaccharides and will look either milky white, green, or brown. We will show you how to identify each type of protein scum and how to resolve this issue to the customer's satisfaction.

- Oscillatoria and benthic algae

In the New England states Oscillatoria and other benthic mats dominate in ponds that contain sandy or rock bottoms and are relatively clear. We will talk about what we've learned this year about Oscillatoria, methods of controlling it, things not to do, and how to use your algaecide wisely.

- The role of Akinete in algae Survival.

What is an akinete? What does it do? How does it interfere with my algaecide? A complete guide on why applicators need to understand what an akinete is and how to make their treatments better by killing and degrading it.

Presenter Biography: Kevin works for Aquafix in Madison, WI. Aquafix is a laboratory that studies aquatic weeds and algae, what the limiting factors are for each species, and how to treat them smarter and use less herbicides and algaecides. Aquafix produces adjuvants that create thorough plant degradation.

The relative frequency of sexual and asexual reproduction in populations of *Myriophyllum spicatum* in Massachusetts

Anastasia Mozharova (Ph.D. candidate) UMass Boston

Abstract: Many invasive plant species are capable of vegetative reproduction and it is often assumed that this clonal reproduction is the key factor in the invasion success of a species. Although, it has been explicitly demonstrated that Eurasian watermilfoil (*M. spicatum*) reproduces sexually and hybridizes with the native North American congener, *M. sibiricum*, it is mostly thought of and treated as a species that reproduces clonally. More details about this life history trait of *M. spicatum* are required for better management of the species: if sexual reproduction plays a significant role in sustaining its populations, control of seed set might be just as important as prevention of the spread of vegetative fragments. Moreover, it might be even more important to prevent the seed set, because sexual reproduction creates genetically diverse populations in which the appearance of novel genetic lineages is possible. The appearance of those lineages might require drastic changes to management strategies (in case this novelty involves herbicide resistance, for instance).

The purpose of the current research project is to quantify the relative frequency of sexual and asexual reproduction in populations of *M. spicatum* in Massachusetts using microsatellite markers. Four populations of *M. spicatum* were thoroughly sampled along transects for genetic analysis. Seven microsatellite markers were used to amplify corresponding regions. Preliminary data analysis suggests that clonal reproduction is a major factor in the spread of local populations, but a complete analysis of the full dataset is forthcoming and will be required to estimate the relative frequency of sexual reproduction within sites and its importance in the founding of new sites.

Speaker Biography: I started a Ph.D. program at UMASS Boston in 2010, working in Kesseli lab (genetics lab). My primary interest is invasion biology and evolutionary consequences of invasions for both invasive and native plant species in aquatic environments. The object of my research has been the *Myriophyllum* genus in New England. Because there are 2 invasive and several rare and endangered species of this genus in the North -east of the US, this system presents an opportunity to find insights into several evolutionary and ecological questions related to biology of invasions.

Managing Eurasian Watermilfoil, Can Pulling Weeds Produce Results?

Alejandro Reyes (Graduate Student) SUNY Oneonta

Utilizing an Aquatic Invasive Species Response Team for Landscape Level Management in the Adirondack Park

Erin Vennie-Vollrath
Adirondack Park Invasive Plant Program and the
Adirondack Chapter of The Nature Conservancy

Abstract: The Adirondack Park in upstate New York is comprised of 2.4 million hectares of public and private lands that hold some of the most ecologically intact ecosystems in the United States. Since the early 2000s, the Adirondack Park Invasive Plant Program's (APIPP) volunteers and partners have been conducting early detection surveys for aquatic invasive plants. From this effort we have learned that 2/3rds of the lakes and ponds surveyed in the park remain free of aquatic invasive species, which presents an exciting opportunity in conservation at a scale rarely seen anywhere else in the country. In 2015, APIPP formalized its regional response team approach to deploy an AIS response team to conduct early detection surveys and carry out rapid response to newly found pioneer infestations. A summary of strategies used, work accomplished, and lessons learned will be presented.

Speaker Biography: Erin Vennie-Vollrath leads APIPP's early detection and monitoring programs for aquatic invasive species, manages volunteer groups and surveys, coordinates with partners in the region, and provides trainings and presentations to various stakeholder groups on aquatic invasive species issues. Relatively new to New York, Erin moved to the Adirondacks in 2014 from Wisconsin where she received a B.S. in Zoology and an M.S. in Water Resource Management from the University of Wisconsin – Madison and then worked for the Department of Natural Resources on a variety of projects focused on aquatic invasive species.

Microscopic plastic particles emerging pollutants

Kiyoko Yokota, Ph.D. SUNY Oneonta

Abstract: Microscopic plastic particles or microplastics are one of the emerging pollutants of waterbodies. Direct negative impacts of these microplastics on zooplankton and larger invertebrates have been reported, while similar data on plants and algae not yet widely available. To help fill in the knowledge gap we established a standard protocol to harvest microplastics from six widely marketed face and body wash products and characterized and quantified the harvested particles. This is being followed up by a series of laboratory experiments where these particles were added to common HAB-forming cyanobacteria. The most frequent particles sizes across products were 50 to 200 µm in equivalent spherical diameter, with typical concentrations of 1.2 to 1.7 mg microplastics per 1 g of product. Most particles detected were non-spherical with highly variable morphologies, despite being called "microbeads". Based on these findings we hypothesized that these microplastics have a measurable influence on colony formation and maintenance in HAB-forming cyanobacteria. A laboratory culture experiment showed that Dolichospermum (formerly Anabaena) and Microcystis had different patterns of interaction with microplastics, one resulting in greater attachment and entanglement. This finding supports the need to consider direct influence of microplastic pollution on primary producers in aquatic food webs in addition to that on consumers.

Speaker Biography: Kiyoko Yokota, Ph.D., CLM, has been an Assistant Professor of Biology at State University of New York College at Oneonta (SUNY Oneonta) since 2013 after teaching at University of Tampa in Florida for 5 years. She teaches limnology, management of aquatic biota, and phytoplankton ecology for the Lake Management MS program at the SUNY Oneonta Biological Field Station in Cooperstown, NY, as well as undergraduates on the main campus. She earned 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.