ABSTRACTS AND BIOGRAPHIES FOR PRESENTATIONS

AT THE

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OF THE

20-22 JANUARY 2015

GIDEON PUTNAM RESORT

Saratoga Springs, New York

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

ABSTRACTS
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27	Emily Mayer	Centenary College	POSTER: Preliminary Analysis of Phytoplankton and Zooplankton Populations in Tuxedo Lake for the Determination of the Suitability of Biomanipulation
28	Dominic Meringolo & Matt Salem	Aquatic Control Technology Aquatic Control Technology	POSTER: Ticklenaked Pond Alum Treatment
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31	Bin Zhu, Ph.D.	University of Hartford	POSTER: Effects of Invasive European Frogbit and Its Two Physical Control Methods on Macroinvertebrates
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Hydrilla's "Disappearing Act" in a West Virginia River

Robynn Shannon, Ph.D. Fairmont State University

Abstract: As monoecious *Hydrilla verticillata* continues its northward expansion, questions abound regarding its basic biology and invasion ecology in new localities. Invasive species are not usually expected to go away on their own, but that is what appears to have happened with *Hydrilla* in one river in West Virginia. Field studies were initiated in 2013 to document the spread of this recently arrived invasive species in West Virginia and to locate suitable populations for research on its reproductive biology. In the course of this field work, a locality was identified at which a formerly extensive and vigorous population has [apparently] disappeared, with little or no active management. Possible factors in this unexpected demise are considered, along with generalized implications for population dynamics of *Hydrilla* in flowing water systems. Most of the research on monoecious *Hydrilla* to date has been in lakes and reservoirs, making rivers and streams high priority areas for future research.

Speaker Biography: Robynn K. Shannon earned a Ph.D. in Plant Ecology from the University of Connecticut and a M.S. in Botany from the University of New Hampshire, and has been certified as an Ecologist by the Ecological Society of America. Prior to joining Fairmont State University (in "Wild and Wonderful West Virginia!"), she worked as a research assistant in the Smithsonian Institution's Department of Botany for several years and served as a Peace Corps Volunteer in West Africa. Her research interests focus on ecological and evolutionary aspects of plant reproductive biology. She enjoys trail running, hosting dinner parties, and renovating old houses in her free time.

The Delineation of Hydrilla in the Croton River System

Chris Doyle Allied Biological

Abstract: The main branch of the Croton River system (Westchester County, New York) is approximately 3.25 miles long, beginning at the outlet of the Croton Reservoir and winding its way southwest through rocky gorges and tidal freshwaters, before emptying into the Hudson River. In October of 2013, a team of ecologists studying the inter-tidal waters of the Hudson River for the New York Botanical Garden Project, discovered Hydrilla (Hydrilla verticillata) in the Croton River. At the time of the discovery, both floating plant fragments and rooted individuals were observed, but the extent of the infestation was not delineated. With funding obtained from the newly formed Lower Hudson Partnership for Regional Invasive Species Management (LH PRISM), we delineated the population of hydrilla and other submersed aquatic vegetation using Point Intercept Methodologies. The study design followed protocols established by aquatic consultants used to delineate the Cayuga Inlet hydrilla population. The challenges of conducting the survey in a unique environment consisting of a variety of habitats and the results of our study shall be presented.

Speaker Biography: Mr. Doyle received a BS in Natural Resource Management from Rutgers University, and currently is a Certified Lake Manager. Mr. Doyle is the Senior Aquatic Biologist and Water Quality Program Supervisor at the New Jersey office of Allied Biological, a position he has held since 2005. His responsibilities at Allied Biological are diverse, including project management, fisheries surveys, GPS-referenced aquatic plant surveys, presentations, aquatic taxonomy expertise, and aquatic plant management plan drafting and reporting. Mr. Doyle is a current Northeast Aquatic Plant Management Society Board of Directors member, and the recently appointed Editor of the society's newsletter.

Effectiveness of Long-Term Monoecious Hydrilla Management Plans in North Carolina

Rob Richardson, Ph.D. North Carolina State

Abstract: Hydrilla [Hydrilla verticillata (L.f.) Royle] is the most economically damaging aquatic weed in the United States. Long term hydrilla control is complicated by persistent subterranean turions (tubers) that the plant forms annually. Elimination of the tuber bank is essential for long term control or eradication efforts. Research was conducted on four North Carolina lakes to evaluate monoecious hydrilla tuber dynamics and to determine the effects of specific management techniques on monoecious hydrilla tuber numbers over time. Lake Gaston, Lake Tillery, Shearon Harris Lake, and the Tar River Reservoir were sampled for up to 7 years. Management practices and their effects on tuber density were assessed on each lake. Chemical control sites using fluridone were assessed on Lakes Tillery and Gaston whereas a combination of fluridone use, biological control through sterile grass carp, and physical control through drought induced summer drawdown was assessed on the Tar River Reservoir. Sites on Lake Gaston and Shearon Harris Reservoir with no active management were used as a control. De-watering and fluridone application in 2007 thru 2012 as well as a low density of grass carp stocking in 2013 resulted in an overall decrease in tuber density of 100% in the Tar River Reservoir. Two tubers found on the Tar River Reservoir in fall 2012 were assumed to be 6 years or older and were still viable. Lake Gaston sites subjected to fluridone treatment every other year demonstrated a tuber bank reduction of 26% after 2 years and 60% after 4 years. Sites on Lake Gaston that were treated consecutively for 2 years exhibited a 75% reduction in tuber density. On the unmanaged Shearon Harris Reservoir, average whole lake densities ranged from 838 to 2,050 tubers per m2 from 2008 to 2013. At a single sample site a density of 3,244 tubers was recorded in the fall of 2008, which is higher than previously reported in situ.

Speaker Biography: Rob Richardson is an Associate Professor and Extension Specialist at North Carolina State University with responsibilities in aquatic and non-cropland weed management. He currently oversees a research technician, two graduate students, and an undergraduate employee at NCSU. Rob received a Ph.D. in Weed Science from Virginia Tech and worked as a Research Associate at Michigan State University for three years before moving to North Carolina.

Cayuga Lake Watershed Hydrilla Project

James Balyszak Hydrilla Task Force of the Cayuga Lake Watershed

Abstract: Invasive species, and in particular aquatic invasive species, are a growing problem in New York State and across the country. Their impact to native ecosystems and resources can have profound environmental and economic effects. The Hydrilla Task Force of the Cayuga Lake Watershed has been combatting hydrilla infestations discovered in the Cayuga Inlet and connecting tributaries to Cayuga Lake since 2011. Additional management efforts have been implemented in Fall Creek and the southeast corner of Cayuga Lake following hydrilla discoveries made in 2013. Through a combination of dynamic herbicide treatments, physical controls, extensive monitoring and sampling, and community education and outreach, the Project has made great strides in significantly reducing hydrilla populations. This includes a 95% (+) reduction in hydrilla tuber populations in the inlet when compared to initial levels observed in 2011. The primary objectives of the Project are to eradicate hydrilla from known infestation zones, prevent its spread to un-infested waters (including the whole of Cayuga Lake and beyond), and to monitor for management efficacy and potential new infestations. Detailed information and updates will be provided on Project efforts from 2011-present, including discussion of ongoing management, monitoring observations, and overall progress.

To date, Project initiatives have been very successful. Although the Cayuga Lake Watershed Hydrilla Project is a local effort, there are serious statewide implications should the Project not succeed. New York State's freshwater resources are at stake, and success of the Project will depend on the continued support and collaboration of local, regional, and statewide stakeholders.

Speaker Biography:

James A. Balyszak
Program Manager
Hydrilla Task Force of the Cayuga Lake Watershed

Direction of Monoecious Hydrilla in Deep Creek Lake, Maryland and Initiation of Eradication Effort

Lee Karrh Maryland DNR

Authors: Lee Karrh - Maryland DNR, Mark Lewandowski - Maryland DNR, Mark Heilman - SePRO Corporation

Abstract: Deep Creek Lake (DCL) was formed in 1925 when its namesake creek was impounded for hydroelectric power generation forming the largest inland lake in the state of Maryland (3,900 acres). The lake is an important recreational resource for the region and has seen extensive shoreline and watershed property development in the last 30 years. In early fall 2013, Maryland DNR biologists detected monoecious hydrilla (*Hydrilla verticillata*) of varying patch sizes in 14 discrete locations in the Deep Creek Cove section of the lake. After consulting regional and national experts in aquatic plant management, DNR initiated efforts in 2014 to contain and eradicate hydrilla from DCL. Management zones ranging from 5 to 29 acres (totaling 93.5 acres) were treated utilizing repeated applications of pellet formulations of Sonar® (5% fluridone), an approach shown to be successful for monoecious hydrilla containment and long-term tuber bank attrition in other infested sites nationally. Five individual Sonar pellet applications were made between June 11 and September 3. These applications were complemented by analytical monitoring of herbicide concentrations (FasTEST® HPLC) every 1 to 3 weeks. Results showed very efficient herbicide use with concentrations ranging from 1 to 2.4 ppb near the bottom in treated areas. Monthly diver inspections documented effective bleaching injury to early-stage hydrilla growth at 1 month post treatment and full control by ~2 months post treatment with generally good tolerance of treatment by native SAV. Four small, new areas of hydrilla infestation were detected in late summer outside Sonar-managed areas but were treated with contact herbicides (Clipper®/flumioxazin plus diquat) as part of rapid response strategies defined for 2014. Details of the 2014 management effort will be discussed along with future outlook for eradication efforts.

Speaker Biography:

Lee Karrh
Maryland Department of Natural Resources
580 Taylor Avenue, D-2/TEA
Annapolis, MD 21401

Mr. Karrh is currently Program Chief of Living Resource Assessment with DNR's Resource Assessment Service

Plant Workshop Open Session and Quiz

Chris Doyle, Allied Biological
Tim Pokorny & SUNY Oneonta
Mark Heilman, Ph.D. SePRO Corporation

Back by popular demand! The hands-on plant workshop is always a popular event at NEAPMS meetings. This year's plant workshop will be team-taught by three experts in the field of aquatic plant identification who each provide their own level of expertise based on backgrounds in taxonomy, ecology and management.

A brief slideshow will kick off the workshop to highlight key species and/or issues to be aware of. Plenty of time will be incorporated to allow the workshop attendee to either self-explore plant specimens on display, or to interact with one of the three instructors for first-hand instruction on how to identify species or about the problems they pose.

Live and preserved specimens will be on hand…..and there may just be a quiz to test your skills at plant identification.

Aquatic Plant Survey of Greater Yellowstone Region

C. Barre Hellquist MA College of Liberal Arts (retired)

Authors: C. Barre Hellquist, Ph.D. (Professor Emeritus, Biology – Retired) & C. Eric Hellquist, Ph.D. (State University of New York Oswego)

Abstract: During the summers of 2008, 2010 and 2014 aquatic plant surveys were conducted in Yellowstone, N. P., Grand Teton N. P. and the John D. Rockefeller Memorial Parkway. A total of 264 sites were surveyed with a total of 32 noteworthy species, new to the parks, and/or states. Species of interest are: *M. verticillatum*, *M. quitense*; *Najas flexilis, N. guadalupensis, Utricularia intermedia, U. minor,* and the rare *U. ochroleuca.* The family Potamogetonacae is represented by the rare *P. friesii*, *P. obtusifolius, P. zosteriformis, P. amplifolius*, and *Stuckenia vaginata* and numerous hybrids. Western species include: *Berula erecta, Elatine rubella, Elodea bifoliata, Nuphar polysepala*, *Porterella carnosula,* and *Ranunculus hyperboreus,* Uncommon plants of eastern U.S. from the park include: *Callitriche hermaphroditica, Berula erecta, Limosella aquatica, and Subularia aquatica.* Common eastern plants rare in the park include *Isoetes echinispora, Ceratophyllum demersum, Elodea nuttallii*, *Spirodela polyrhiza*, and many *Potamogeton.*

Speaker Biography: Barre Hellquist received his Ph.D. from the University of New Hampshire, working on the distribution of the Potamogeton as influenced by water chemistry. He taught Biology at Massachusetts College of Liberal Arts, North Adams, Massachusetts and retired two years ago. He continues his writing and research on aquatic plants. He is coauthor of "Aquatic and Wetland Plants of Northeastern North America", has contributed to the treatments of various aquatic families in the "Flora of North America", "Flora of Australia", Flora of the San Juan River Basin (four corners area), the Flora of China, and the Jepson Manual (Flora of California). His present research interest is the water-lilies of tropical Australia, and the taxonomy of the Potamogeton of the world.

Keynote Presentation: Benefits of Controlling Nuisance Aquatic Plants and Algae in the United States

John Rodgers, Ph.D. Clemson University

Authors: John H. Rodgers, Jr. (Clemson University), Kurt Getsinger (US ACE), Eric Dibble (Mississippi State University), and David Spenser (University of California – Davis)

Abstract: Invasive and noxious plants and algae have become major threats to water resources such as lakes, rivers, wetlands and canals. Aquatic plants can harbor disease-causing organisms that adversely affect human health and toxin-producing cyanobacteria are a serious and emerging issue for freshwater resource managers. In the United States, invasive alien species (both plants and animals) cause major ecological damages and economic losses estimated at almost $120 billion per year. The detrimental effects of weeds on human water uses can be ameliorated and in some instances eliminated through proactive and prudent management. We will have to make protection and conservation of freshwater resources a top priority or the future. This presentation is based on a recent CAST publication (July 2014).

Speaker Biography: Dr. Rogers received his Ph.D. from Virginia Polytechnic Institute and State University in 1977. Currently a professor at Clemson University. His research involves risk mitigation of problematic algae.

Early Response, Eradication Decisions, and Other Initial Management Implementation Driving Success or Failure to Contain New Aquatic Plant Invasions

Mark Heilman, Ph.D., SePRO Corporation

Abstract: While certainly not all new invasions of aquatic invasive plants occur in systems or under conditions that easily lend themselves to intensive management efforts, it is a well-recognized principle of invasive species prevention and management that small, early-stage infestations are much easier to address. This makes early detection and rapid response (EDRR) a fundamental starting point for management efforts. Often however, 'early' and 'rapid' criteria are not easily achieved goals with initial stages of management. Technical, regulatory, economic, and/or sociological 'barriers' present themselves and without strong focus, these factors reduce scale and speed of response. Often, the speed and intensity of initial management response predicts success or loss of containment / eradication of problem species with major ecological and economic ramifications. Despite the best of intentions by managers, regulators, legislators, and educated citizens, response to new infestations can always be improved. Along with early response, a cohesive long-term strategy for management must rapidly be adopted and implemented immediately for best results. Numerous criteria ranging from short- and long-term management costs, selectivity to non-target plants and other organisms, etc factor into long-term decision process. In this presentation, various national examples of recent early response and longer-term management strategies including eradication strategies will be compared and contrasted to assist NE managers and regulators assess past and current regional infestations and management responses. It is hoped that this analysis will assist with improving future practices to limit impact of new aquatic plant invasions.

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.

Recommendations on the Utility of Boat Inspection and Decontamination as Components of an Integrated Aquatic Invasive Species Prevention Strategy in the Adirondack Region

Meg Modley & Lake Champlain Basin Program
Eric Holmlund, Ph.D. Paul Smith's College

Abstract: For close to two decades, organizations and communities in the Adirondack region have worked together to address aquatic invasive species (AIS) through coordination, prevention, detection, and management initiatives. Prevention efforts promoting clean recreation practices are underway and include education via brochures, signage, presentations, news releases etc.; inspections by volunteer and paid boat launch stewards; local laws prohibiting the transport of aquatic species; and boat washing, that is, decontamination. An increasing emphasis on inspection and decontamination among lake communities and state environmental resource management agencies highlights the need for clarifying the role of inspection and decontamination in a regionally coordinated, landscape-level AIS spread prevention program. This report summarizes the available scientific literature regarding watercraft inspection and decontamination and applies existing datasets to inform recommendations for the Adirondack region. Data from 25,000 boating parties surveyed by four boat launch steward programs in 2012 shows that boaters are traveling from more than 600 destinations, and 35% are not taking any spread prevention measures. Combining key recommendations from the scientific literature with regional datasets, evaluation of regional AIS distribution, and boater use data suggests that at least three overland transport sub-networks, three linkage waterways, and eight invasion spread hubs may exist in the Adirondack region. The report includes three management recommendations: 1) Stewards deployed at priority uninvaded waterways will reduce the risk that they will become invaded. 2) Steward inspections on those AIS plant-infested waterways with trailered boat access points will help to limit the landscape level spread of aquatic invasive plants. 3) Steward inspections and decontamination stations at 13 high-priority waterways will help to limit the spread of aquatic invasive animals and also limit the spread of new AIS introductions to the region. Of those 13 waterways, seven have aquatic invasive animals, four serve as invasion spread hubs, and two serve as linkage waterways. Various levels of coverage also are presented for consideration based on risk reduction and resource availability.

Speaker Biography: Meg Modley is the Aquatic Invasive Species Management Coordinator at the Lake Champlain Basin Program in Grand Isle, VT where she has worked since 2003. She has a Bachelor of Arts Degree in Environmental Studies and Geology from the University of Vermont and a Master's Degree in Public Administration from the University of Vermont. Her work has focused on invasive species rapid response planning in the states of New York and Vermont and the province of Quebec. She is a member of the National Aquatic Nuisance Species Task Force and is the current Treasurer of the Northeast Aquatic Nuisance Species Panel. Modley supervises the Lake Champlain Boat Launch Steward Program on Lake Champlain, coordinates an invasive species grant program in the basin, and enjoys assisting partners with field management control and rapid response efforts.

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Lake George Mandatory Boat Inspection and Decontamination Program

Dave Wick George Park Commission

Abstract: The Lake George Park Commission began a new aquatic invasive species spread prevention program in May 2015 to prevent the introduction and spread of aquatic hitchhikers on boats, trailers, and other recreational equipment. The new program requires that all boats must arrive at Lake George clean, drained, and dried. All boats entering Lake George are inspected and decontaminated if identified as a high risk before launch. The Lake George Park Commission partnered with local towns, the county, state agencies, and nonprofit organizations to implement this invasive species program. Six regional inspection and decontamination stations have been set up around the lake and all boat access points have inspectors checking to ensure the boats have been inspected.

Speaker Biography: Dave Wick is the Executive Director of the NYS Lake George Park Commission. He has been serving in this role since 2012, after more than 19 years as District Manager of Warren County Soil and Water Conservation. In his role at the Park Commission, Dave has been heavily engaged in invasive species management and prevention efforts to protect Lake George. Dave has a Master's Degree in Hydrology and Water Resources Management from the University of Wyoming, and he lives in the Town of Lake George with his wife and two children.

Algae Awareness and Analysis- Linking Science and Public Outreach to Invoke Change and Solutions

Corina Parpany The FUND for Lake George

Abstract: Lake George NY, a large, deep oligotrophic lake has been experiencing excessive littoral zone algal growth. Although limnetic water quality monitoring indicates that phosphorus levels over the past 30 years have remained stable, and nitrogen levels have declined, the littoral zone is experiencing flushes of excessive nutrients from stormwater runoff, wastewater effluent and near-shore activities, which feed the highly visible benthic algae blooms adjacent to developed areas of the watershed. The utilization of this visible and relatable change in the littoral zone has been strategic in local outreach efforts, through assisting residents and visitors to identify the causes and forms present within the excessive algae growth, and what can be done to control on-site stormwater runoff. By linking science to the solutions, involving and educating the public, we invoke change in perception and practices, and build a strong voice from which changes in policy can occur. Under the Algae Awareness and Analysis program, routine monitoring efforts are coupled with outreach and education. The results have facilitated initiatives including the Buffer Lake George project, (which provides funding to help purchase and plan shoreline buffers), the Partners for Lake Protection initiative, (which builds cohesive partnerships with any group, organization, business, or individual who has a vested interest in the water quality of Lake George and partners with The FUND for Lake George). To date, we have 5 WQAC's and over 60 Partners for Lake Protection groups/organizations/businesses. By facilitating innovative, effective solutions that are sustainable and replicable, The FUND for Lake George and Lake George Waterkeeper have created not only a "ring of Protection" around Lake George, but also created a "Ring of Education" and sustainable water quality management practices.

Speaker Biography: Corrina's professional career spans 13+ years in education and outreach and environmental research. She owned her own environmental consulting firm, Avacal Biological where she conducted algae analysis for local municipalities, not-for-profits, and homeowners. Prior to starting her own company, she worked for the state in the bureau of wildlife, worked for Cornell Cooperative Extension, The Lake George Land Conservancy, The Warren County Fish Hatchery, NYS Parks and Recreation and Historic preservation and the YMCA before joining the FUND for Lake George. Corrina earned her Bachelor's degree in Limnology/Biology from Skidmore College. Her final project: "A Guide to the Freshwater Algae of Lake George" was accepted with distinction. She also earned her Applied Associates of Science in Environmental Studies with a focus in Fisheries from SUNY Cobleskill. Corrina has been a Board of Directors member of the Lake George Fishing Alliance, sat on the Lake George Land Conservancy's, Conservation and Stewardship Committee, is a Director of the Schroon Lake Association and a contributing writer for the Adirondack Almanack. Corrina joined The FUND for Lake George in 2008 conducting her internship, conducting the chemical, physical and biological monitoring of streams tributary to Lake George, within the stream monitoring project. She remained on seasonally and as an environmental consultant, conducting the annual rainbow smelt survey, authoring informational factsheets and conducting algae analysis till 2013 when she joined the FUND fulltime as the Water Quality Outreach Coordinator, conducting outreach and education efforts as well as developing science based services including algae analysis and programs related to fisheries monitoring.

Reducing the Use of Algaecides and Herbicides in Lakes and Ponds

Kevin Ripp Aquafix, Inc.

Abstract: In treating lakes and ponds, we usually focus our time and energy on killing what is growing in the water body. At Aquafix, we try to save some of that effort by teaching applicators how to address growth habits and limiting factors of algaes and cyanobacteria such as Pithophora, *Lyngbya*, *Oscillatoria*, and others. This presentation will focus on the role of ammonia, phosphate, nitrates and nitrites, silica, and calcium in the growth of each plant and based on this information how to best treat them. Like taking Vitamin C during cold season, our approach is all about creating a stronger, healthier water body.

Speaker 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.

Introducing a New But Not So New Aquatic Herbicide To Add To Your Tool Box "AquaSweep"

Bo Burns
Jason Fausey, Ph.D. NuFarm Americas

Abstract: AquaSweep is the first liquid premix with a full terrestrial and aquatic uses label. Controls invasive and noxious weeds from the top of a mountain to the bottom of the river or lake including wetlands as well as rangeland and pasture. AquaSweep contains the active ingredients 2,4-D (34.2%) and Triclopry (15.2%). Recent trial and demonstration work will be reveled to show the effectiveness of this product, while showing the selectivity for grasses, allowing excellent recolonization of native non invasive plants. This product can control emergent, floating and submerged aquatic weeds and has shown excellent control of water primrose.

Speaker Biography: Bo Burns has worked in Aquatic plant management and exotic plant management for the last 29 years. He received a BA in Biology from Hiram College and a MEM (Masters of Environmental Management) in Resource and Wetland Ecology from Duke University. Bo worked for the State of NC for four years as an Environmental Specialist with the Division of Water Resources. Responsibilities included management of field operations for aquatic plant management. He then worked for six years as a Vegetation Specialist for American Cyanamid Company conducting research and sales for vegetation management in aquatics, forestry and utility rights of way management; worked 9 years with SePRO Corporation as an Aquatic Specialist in aquatic plant management; worked 6 years with BASF as an Aquatic Specialist; worked 3 years as the National Sales and Marketing Manager for Aquatic sales with Crop Production Services; and presently is the Aquatic Territory Manager for Valent USA Corporation. Bo is a past president for the South Carolina Aquatic Plant Management Society, & the Northeast Aquatic Plant Management Society; past board member for the Mid West Aquatic Plant Management Society; has served as a board member for the National Aquatic Plant Management society; is currently serving as a board member for the South Carolina Aquatic Plant Management society; has served on the board of directors for the Aquatic Ecosystem Restoration Foundation; and also serves on the aquatics committee for RISE (Responsible Industry for a Sound Environment).

Efficacy of Pre-Turion Diquat Treatment on Curly-Leaf Pondweed and Protection of Listed Species with Limnobarriers

Gregory Bugbee CT Agricultural Experimental Station

Authors: Gregory J. Bugbee, Christina Robb, Jordan A. Gibbons* & Mark June-Wells**

Abstract: Curlyleaf pondweed (*Potamogeton crispus* L.) is an invasive aquatic macrophyte that impairs lakes throughout much of North America. Long-term control and protection of desirable native vegetation are important goals when managing the plant with herbicides. Diquat was applied to Crystal Lake, Middletown, CT, prior to turion production, as a single application in 2007 and as consecutive applications in 2009 and 2010. No herbicides were applied in 2006, 2008 and 2011. Invasive Eurasian watermilfoil (*Myriophyllum spicatum* L.) and minor naiad (*Najas minor* All.) were also present along with 14 native macrophytes. Surveys were performed to assess the efficacy of the treatments on curlyleaf pondweed and associated macrophytes. The frequency and abundance of curlyleaf pondweed was reduced to negligible levels in the treatment years. In the untreated year after a single treatment (2008), the frequency of curlyleaf pondweed was reduced slightly but the abundance was greater than the year prior to treatment. In the untreated year following the consecutive treatments (2011), the frequency and abundance of curlyleaf pondweed decreased by 30% and 55%, respectively. Eurasian watermilfoil was eliminated in 2009. The frequency and abundance of minor naiad showed significant increases in the untreated years. The overall native species richness was greater in years following the single and consecutive diquat treatments. In 2010, limnobarriers were installed around a small island and a stretch of shoreline to protect state listed Vasey's pondweed (*Potamogeton vaseyi* JW Robbins). Surface and bottom water were analyzed for diquat from treated and untreated lake sites, inside and outside limnobarrier sites, and downstream until 24 days after treatment (DAT). Mean diquat concentrations in the treated surface lake sites peaked at 327 µg/L 0.2 DAT (5 hours) and were no longer detectable 13 DAT. Diquat concentrations in the treated lake surface sites gradually declined until they were no longer detectable 13 DAT. Vertical movement of diquat in the treated lake sites was limited. Diquat in the lake's outlet stream followed a pattern similar to the untreated surface water. Inside the limnobarriers, diquat concentrations were significantly reduced but not eliminated. Vasey's pondweed inside the limnobarriers did not appear impacted by the diquat treatment.

Speaker Biography: Greg is a scientist in the Department of Environmental Sciences for over 30 years. He is the principal investigator in the Invasive Aquatic Plant Program. He has lead aquatic plant surveys of nearly 200 Connecticut lakes and ponds and directed research projects on invasive aquatic plant control statewide since 2004. His work can be viewed at www.ct.gov/caes/iapp. In addition to his work on aquatic plants, he oversees the Station's soil testing laboratory and is an expert on soil fertility.

A Tail of Two Lakes- Grass Carp Tales in New York

Scott Kishbaugh NYSDEC

Abstract: Triploid grass carp are stocked in hundreds of New York state lakes each year. Although most of these stockings are for small private ponds, a number of larger New York state lakes are stocked for the control of Eurasian watermilfoil and nuisance plants. The vast majority of these projects have not been evaluated for efficacy, since monitoring is usually not a permit condition. The NYSDEC Division of Water has studied two stocked lakes prior to and after grass carp stocking. Adirondack Lake was stocked on multiple occasions since 1999 to control large leaf pondweed, and Creamery Pond was stocked n 2009 to control hydrilla. Both lakes have been surveyed annually to track changes in aquatic plant populations to assess impacts from the grass carp stockings and determine the need for continuing management. This presentation will discuss the monitoring results from both projects and use standard, modified, and weighted floristic quality indices (FQI) and other metrics as a means to evaluate project efficacy.

Speaker Biography: Scott Kishbaugh is an Environmental Engineer in the Lake Services Section in the Division of Water in the NYS Department of Environmental Conservation. Since 1985 he has been the Director of the NY Citizens Statewide Lake Assessment Program, the state's primary volunteer lake monitoring program. He also direct the Division of Water's lake and aquatic plant monitoring efforts and provides technical advice for lake residents, lake associations, consultants and other government agencies in lake and aquatic plane management. He is the senior author of Diet for a Small Lake: A New Yorkers Guide to Lake Management. Scott serves on advisor panels for the Adirondack Park Invasive Plant Program, the NYS Federation of Lake Associations, and the USEPA Nutrient Criteria Development Program and is a past Board member of this society. He received his bachelors and masters degrees in environmental engineering from Cornell University.

Water Quality and Lake Health: The Role of Proactive Management

Patrick Simmsgeiger Diversified Waterscapes, Inc

Abstract: Problems in lake management are often characterized by one of several key factors – environmental change, nuisance species, agricultural runoff. Yet, many of the most financially and ecologically significant problems have their true roots in lake misdiagnoses made early on, which lack foresight, and are founded upon mere visual observation of surface conditions. In this paper, I show how this classification of lakes based on visual appearance leads to inferior water quality, lake aesthetic, and ultimately, more expensive chemical and physical intervention compared with scheduled maintenance from a licensed professional. Within the paper, I will invoke case studies with scenarios that exemplify the kinds of aquatic issues not revealed by visual observation. In doing so, this analysis will inform an assessment of how proactive management strategies are the most cost-effective, sustainable, and secure method of protecting one's investment in their aquatic environment.

Speaker Biography: When attending business college, Patrick Simmsgeiger realized his heart's desire was research and development of products for use in aquatic environments. For eleven years he was employed by a manufacturing firm that produced chemicals for use in industrial, agricultural and domestic water treatment programs. Then, in 1988 he founded Diversified Waterscapes, Inc., an aquatic environment management firm. Later, after putting his experience and dreams into action, he was able to open a manufacturing facility for production of what he would call the "Formula F- Series Aquatic Treatment Products". What was first started in California is now EPA registered in the majority of the US.

In addition to his extensive "hands-on" experience in the development and restoration of aquatic environments, Pat is a Certified Lake Manager as recognized by the USEPA and North America Lake Management Society NALMS. In addition he possesses a Landscaping Contractor's License, is also licensed by the Department of Agriculture as an Aquatic Pesticide Applicator and an active member of CAPCA, AERF, PAPA, GCSAA, APMS, and NALMS

He has a lovely wife and two beautiful daughters and loves to stay active in every aspect of his life.

Action Threshold on Algae Management for Preserving Drinking Water

West Bishop SePRO Corporation

Abstract: Algae can cause significant impacts to drinking water quality through increased chemical treatment demand as well as precursor to disinfection by-products. Additionally, secondary metabolites like volatile organic compounds (e.g. taste and odor compounds) are of particular concern due to the difficulty/expense in removal in the drinking water process as well as the ability for humans to detect an off flavor at extremely low levels (5-10 ppt). Managing source water to offset nuisance and harmful algal blooms is an effective approach to enhance the quality of finished water. Operational research was conducted in multiple water supply reservoirs throughout the country to evaluate the potential for improved water quality and based on designated algae action thresholds (i.e. decision triggers). These reservoirs had a history of algae influenced taste and odor (Geosmin, MIB, etc.) issues negatively impacting the quality of the water supply. Monitoring assisted in developing action thresholds for the culprit of taste and odor production in the samples. Initial action threshold levels were based on a total average density of potential taste and odor producing algae cells, measured compounds and taste and odor panel results. If an action threshold was exceeded, the appropriate product and amount was strategically applied to the reservoir to control and prevent the expansion of the targeted nuisance algae. Water sample analysis from all reservoirs consistently documented a 78-97% reduction in nuisance algae densities immediately following the application of SeClear® Algaecide and Water Quality Enhancer or PAK® 27 Algaecide, as well as a decrease in geosmin levels and long-term suppression of nuisance algae. This proactive approach to drinking water management can provide significant and rapid relief of nuisance algae, improve source water quality, and decrease in-plant management inputs required to achieve drinking water objectives.

Speaker Biography: West Bishop received his BS from Western Michigan University in 2006 and MS from Clemson University in 2010. His graduate work was with Dr. John Rodgers and focused on aquatic toxicology and efficient management of problematic algae. West has presented at numerous professional conferences and published in esteemed journals. West has been with SePRO Corporation for over three years as Algae and Aquatic Research Scientist with a continued research focus on scientifically defensible solutions for ecologically sound algae management and water quality improvement.

Managing Cape Cod Lakes

Ken Wagner, Ph.D. Water Resources Services

Speaker Biography: The features of most Cape Cod ponds make them susceptible to internal phosphorus (P) loading (limited stream flow, low flushing rates, deep enough to stratify and lose oxygen at the bottom, elevated accumulations of iron-bound P in sediment) and related cyanobacteria blooms. Lack of substantial surface watersheds reduces external influence, with cranberry bogs as a large exception. Internally generated loads of phosphorus (P) occur mainly in summer when water devoid of oxygen is in contact with sediments high in iron-bound phosphorus. This load can represent a major source of phosphorus, tends to depress the ratio of nitrogen to phosphorus in ponds, and favors blooms of cyanobacteria. Yet internally loaded P may not be available and surface blooms may not occur if stratification is deep enough or anoxia does not extend to the thermocline. Inactivating the phosphorus in the surficial sediment or providing enough oxygen to prevent anoxia to a depth of >13 m can reduce internal P loading and limit the frequency and severity of algae blooms. Mixing can also limit cyanobacteria blooms and can lower algae levels if circulation moves surface water to a depth of about 9 m or more. Given the combination of features and costs, aluminum treatments have been the preferred method of control on Cape Cod, although there have been circulation and dredging projects. A total of 9 lakes have been treated so far, with one lake treated twice and two more treatments planned for 2015. Fall treatments have been required in most cases for questionable environmental reasons, but spring treatments would be more immediately effective due to reduced efficiency of P stripping from the water column by aluminum and higher water column P concentrations in the fall. Despite very low alkalinity, treatment without toxicity is completely achievable. Water clarity has increased markedly in all cases to date. Longevity of benefits is roughly predictable and economically favorable. Aluminum treatments do not make a system infertile, but rather shift nutrient levels and ratios to a more moderate and desirable condition for a substantial but not unlimited period of years.

Speaker Biography: Dr. Wagner holds a B.A. in Environmental Biology from Dartmouth College and M.S. and Ph.D. degrees in Natural Resource Management from Cornell University. He had four years of experience with the New Jersey Department of Environmental Protection between his undergraduate and graduate degree programs, working primarily with the Division of Water Resources in lake and stream assessment and management. He has since gained 23 years of experience with northeastern US consulting firms, working on a variety of water assessment and management projects. Many lake assessment and management projects have been completed across the USA and abroad under his direction, including a wide variety of plant and algae management programs, extensive lake rehabilitation efforts, and lake creation projects. Dr. Wagner has presented many lectures on water resources assessment and management, has just completed his term as President of the North American Lake Management Society and is a member of the Aquatic Plant Management Society, American Fisheries Society, the American Water Works Association, and the American Society of Limnology and Oceanography. Dr. Wagner is also a Certified Lake Manager.

Water Chestnut in Pennsylvania

Jean Gomory Warren Country Conservation District

Abstract: Water chestnut is an invasive plant from Eurasia and Africa that has been in the United States since the late 1800's. This plant is typically found in lakes or ponds, but can also be found in slow moving or still areas of streams. Seeds settle in the sediment and sprout a vine to the water's surface where a rosette-like plant develops. Each plant can produce up to 20 seeds and one seed can sprout up to five plants. This plant is not confined to a single watercourse or water body because the hooked barbs of the seeds attach to the feathers of water fowl and are thereby transported. The disposal technique used most in Warren and Bucks Counties, Pennsylvania is to pull the plant and toss it in a dry place nearby where it cannot get washed back into the water. Once the plant dries out it cannot reestablish. Other disposal techniques include burning it, burying it somewhere dry, or composting it. When pulling water chestnut it's best to bring up the whole vine and the seed. The goal, however, is to pull all rosettes before they can produce and drop new seeds in late summer. Water chestnut is very manageable if found in the early stages of infestation. In 2014 at least 75 volunteers donated no less than 523 hours to pulling this invasive plant out of Pennsylvania lakes and waterways. Diligence and volunteer-hours are key to keeping this invasive plant under control. Engaging, encouraging, and inspiring volunteers is also essential.

Speaker Biography: Jean Gomory is a graduate of Pennsylvania State University where she obtained a B.S. degree in Wildlife and Fisheries Sciences. She took part in the Americorps program for a 15 month internship as a Watershed Assistant at the Cayuga County Soil and Water Conservation District in Auburn, NY from 2004 - 2005. Jean has been the Watershed Specialist for the Warren County Conservation District in Warren, PA since 2005.

Modes of Reproduction in Crested Floating Heart (*Nymphoides cristata*)

Erika Haug North Carolina State University

Authors: Erika J. Haug (North Carolina State) & Dr. Robert J. Richardson (North Carolina State)

Abstract: Crested floating heart (*Nyphoides cristata*) has been rapidly spreading northward since it was first observed in Naples, Florida in 1996. Despite the apparent threat to our waterways, little published data on the growth characteristics of this highly invasive plant are currently available. It is widely recognized that crested floating heart can reproduce vegetatively via the production of daughter plants, much like water lettuce and water hyacinth. In 2014 research was initiated at North Carolina State University to document reproductive potential. In particular, studies focused on the production of seed and on vegetative reproduction via leaf and stem fragmentation. On average 10 ovules were observed per crested floating heart fruit. Of mature fruit harvested, an average of 1 or 2 seeds appeared to be mature and the remaining ovules appeared to be aborted. In cut stem fragmentation studies, 100% of the plants cut at the stem approximately one inch below the leaf produced new roots and 83% produced new daughter leaves. In leaf fragment studies in which leaves were cut from the stem and then segmented in half, 87% of the leaf fragments produced mature roots and daughter leaves and only one of the leaves died prior to the production of mature roots. These preliminary findings and their potential impacts to management strategies and concerns will be discussed.

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.

The Importance of Wetlands and the Plants that Inhabit Them

Bianca Pier, Ph.D Darrin Fresh Water Institute

Abstract: Wetlands are considered to be some of the most important and most productive ecosystems in the world. In fact, they have been dubbed "kidneys of the landscape" and "biological supermarkets;" epithets which speak to their astounding potential to remove contaminants, as well as to promote biodiversity. It has been determined that wetlands cover about 6% of the world's surface, or about 8.6 million km^2. However, approximately 53% of wetlands in the United States has been lost since the 1970s. This is a direct result of human population growth and expansion. The result of human impact on wetlands can be in the form of physical, biological, or chemical changes. The plants that inhabit wetlands are equipped to respond to such environmental changes and stressors, even those brought on by human activity. They must adapt to the many changes they are faced with, or perish. This natural ability to adapt so readily is what allows plants to inadvertently serve as cleaning tools in wetlands. Such a capacity for phytoremediation should encourage us to protect wetlands and the plants associated with them so that they can more efficiently mitigate anthropogenic impacts. However, we should also seek to understand their impact-induced adaptations so that we can take advantage of them in order to expedite the clean-up process. Our own studies have demonstrated that plants inhabiting wetlands impacted by humans demonstrate unique morphological and physiological characteristics that subsequently make them better equipped for contaminant removal. These results have encouraged us to pursue plant "pre-conditioning" using *Lemna minor* (duckweed) where plants are exposed to specific contaminants prior to establishment in a phytoremediation system.

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POSTER: Characterization Possible Environmental Causes of Amyotrophic Lateral Sclerosis in New Hampshire and Vermont, USA

Patricia Hehegan Dartmouth College

Authors: Patricia L. Henegan, MS (Dartmouth-Hitchcock Medical Center); Tracie A. Caller, MD, MPH (Dartmouth-Hitchcock Medical Center, The Dartmouth Institute for Health Policy & Clinical Practice, Geisel School of Medicine at Dartmouth); James Haney, PhD (University of New Hampshire); Sandra Anne Banack, PhD (Institute for Ethnomedicine); Nathan Torbick (Applied GeoSoultions); Angeline S. Andrews, PhD (Geisel School of Medicine at Dartmouth); James S. Metcalf, PhD (Institute for Ethnomedicine); Jame T. Powell, MS (Institute for Ethnomedicine); Paul Cox, PhD; Elijah W. Stommel MD, PhD (Dartmouth-Hitchcock Medical Center, Geisel School of Medicine at Dartmouth)

Abstract: Occupational, hobby, and residency related exposures continue to be of major interest, specifically heavy metal, organic solvents, and the cyanobacterial neurotoxin, beta-methylamino-L-alanine (BMAA). Organic solvents, lead, and mercury are a few of the detrimental environmental risk factors associated with the development of ALS. Using a retrospective case-control questionnaire exposures were collected from 140 NH and VT ALS patients. The case-control questionnaire consists of a residential calendar, condensed ALS Consortium of Epidemiologic Studies (ACES) questions, and questions based on fish consumption and water body exposure. Our previous occupation findings hold up, and chemicals increase risk. No relationship has been found with distance to water at residence prior to diagnosis, but algae observed in water are associated with a significant 3-fold increased risk. In addition to the questionnaire, preliminary results show BMAA is detectable from waterbodies in NNE that have known cyanobacterial blooms and documented high rates of ALS, both in fish samples and filtered aerosol samples from the waterbody, providing biologic support for our spatial observations. A grouping of amyotrophic lateral sclerosis (ALS) patients have been previously described bordering Lake Mascoma in Enfield, NH, with an incidence of ALS approximating 25 times that of the baseline incidence of ALS reported throughout most industrialized nations. We hypothesize that the high rate of ALS might be associated with cyanobacterial blooms that have the potential to produce the neurotoxin beta-N-methylamino-L-alanine (BMAA), implicated as the cause of Guam's high rate of ALS. Lake Mascoma has a well-established history of blooms and the cyanobacterial liver toxins, microcystins (MC), have been found in abundance as have species of cyanobacteria capable of producing BMAA.

Presenter Biography:

Patricia Hehegan
Department of Neurology
Dartmouth-Hitchcock Medical Center
Lebanon, NH, USA

POSTER: Evaluation of algaecide applications for treatment of *Lyngbya wollei* in Lay Lake

Alyssa Calomeni, Ph.D. Candidate Clemson University

Authors: Alyssa Calomeni, Ph.D. Candidate (Clemson University) & Dr. John H. Rodgers, Jr. (Clemson University)

Abstract: To make informed decisions regarding management of noxious algal growths, water resource managers require information on responses of target and non-target species to algaecide exposures. After nine years, applications of Phycomycin®-SCP followed by Algimycin®-PWF to control *Lyngbya wollei* growths provided an opportunity for a risk evaluation of treated areas or coves in Lay Lake, AL. Abiotic sediment characteristics (acid soluble copper concentrations, acid volatile sulfides, percent organic matter and cation exchange capacity) and survival of *Hyalella azteca* and *Chironomus tentans* were measured in sediments from treated and untreated coves to assess the bioavailability of copper-residuals. In laboratory studies, six algaecide treatments consisting of combinations of copper-based algaecides (Cutrine®-Ultra, Clearigate® and Algimycin®- PWF), a hydrogen peroxide based algaecide (Phycomycin®-SCP) and an adjuvant (Cide-Kick II) were assessed for their efficacy in controlling *Lyngbya wollei* sampled from Lay Lake. The most efficient algaecide treatment was determined based on post-treatment wet weight, chlorophyll *a* concentrations, and visual observations. To estimate the margin of safety for non-target organisms, *Pimephales promelas* was exposed to the most efficacious treatment and the ongoing treatment of Phycomycin®-SCP followed by Algimycin®- PWF. Results from sediment toxicity testing demonstrated that there were no measureable adverse effects on *Hyalella azteca* and *Chironomus tentans* from copper residuals in sediments following seven years of copper-based algaecide treatments. Based on the laboratory results, an alternative algaecide treatment could be selected to control the growth of *Lyngbya wollei* from Lay Lake, AL and enhance the margin of safety for non-target species (e.g. *Pimephales promelas*).

Presenter Biography: Alyssa attended Lafayette College in Easton, PA for undergraduate. She recently received her Masters from Clemson University in Environmental Toxicology and am now working towards her Ph.D.

POSTER: Evaluation of Drawdown as a Management Tool for controlling Invasive Plants

Taylor Johnson Juniata College

Abstract: This study investigated the effectiveness of drawdown as a means of controlling invasive exotic macrophytes, specifically *Myriophyllum spicatum* (Eurasian water-milfoil) and *Hydrilla verticillata* (Hydrilla) in Raystown Lake, a 28 mile long reservoir in central Pennsylvania. The abundance of native and non-native macrophytes was measured at three separate regions of the reservoir each fall over the span of two years (2013 & 2014), before and after an overwinter drawdown.

Eurasian water-milfoil was present at all three sites in the reservoir, and decreased in abundance after drawdown at each site. Hydrilla was not present at one site, decreased in abundance after drawdown at one site, and increase in abundance at the remaining site. This suggests that an overwinter drawdown could be an effective management tool for controlling Eurasian water-milfoil, but not for Hydrilla.

Presenter Biography: Taylor attends Juniata College in Huntingdon, PA.

POSTER: Evaluation of the I3-Method to Confirm SCP-based Algaecide Exposure

Ciera Kinley, M.S. Candidate Clemson University

Authors: Ciera M. Kinley (Clemson University) & Dr. John H. Rodgers, Jr. (Clemson University)

Abstract: In order to make accurate predictions about target and non-target species responses to algaecide exposures, reliable methods are needed to confirm exposures. The focus of this research was to evaluate the I_3^- method (Klassen et al. 1994) to measure hydrogen peroxide (H_2O_2) exposures associated with applications of a sodium carbonate peroxyhydrate (SCP) based algaecide. To prepare a standard curve, nominal H_2O_2 concentrations were mixed with laboratory (deionized) water. A reagent solution and a buffer solution were added to each of the samples, and triiodide was measured after five minutes. Absorbances of samples were measured with a spectrophotometer at 351nm. The method detection limits (0.2 mg H_2O_2/L for laboratory water and 0.25 mg H_2O_2/L for a field collected water) were calculated as the lowest H_2O_2 concentrations eliciting absorbance significantly different from the method blank (reagent and buffer solutions and laboratory/field waters). The upper detection limit (7.5 mg H_2O_2/L) was the concentration that elicited a measured absorbance of 1.0 for both waters. Measurements of H_2O_2 were taken in a field collected water and in solutions containing a prokaryotic alga (*Microcystis aeruginosa*) and a eukaryotic alga (*Pseudokirchneriella subcapitata*) at cell densities of 10^4, 10^5, and 10^6 cells per mL to discern if interferences due to turbidity and algae would affect the accuracy of exposure measurements. To evaluate the effects of storage conditions on the accuracy of measurements, samples were stored in a range of light and temperature conditions over a period of four days. Measurements of samples stored in dark refrigeration and on ice remained stable over 4 days, while measurements of samples stored in direct sunlight were different after 1 day. The I_3^- method accurately measured H_2O_2 exposures in the laboratory water, field collected water, and planktonic algae used in this experiment within the range of concentrations that would be applied in a field setting. The present study demonstrated that this method has utility in confirming exposures associated with SCP-based algaecide applications.

Presenter Biography: Ciera attended Keystone College in La Plume, Pennsylvania, and graduated in 2012 with a Bachelor of Science degree in Wildlife Biology and a minor in chemistry. Ciera is currently pursuing a Master of Science degree in Environmental Toxicology at Clemson University in Clemson, South Carolina under the guidance of Dr. John Rodgers.

POSTER: Preliminary Analysis of Phytoplankton and Zooplankton Populations in Tuxedo Lake for the Determination of the Suitability of Biomanipulation

Emily Mayer Centenary College

Abstract: Tuxedo Lake is a 288 surface acre lake located in the Village of Tuxedo Park located in Orange County, New York. With a maximum depth of 17 meters (56 ft.), this lake is considered a Class AA(T) water body, meaning it is primarily used as a potable water source and other non-contact recreational activities. The lake is occasionally prone to nuisance blue-green algae blooms which have been controlled by the use of Copper Sulfate in the past. The Village is interested in exploring alternative blue-green algae control methods. According to Shapiro (1975), biomanipulation is a series of manipulations of the biota of lakes and of their habitats to create beneficial results, such as the reduction of blue-green algal biomass. From June through September, phytoplankton and zooplankton sampling was conducted on eight dates throughout 2014 at three different sample sites in the basin. The phytoplankton and zooplankton results will be presented in a variety of formats and reviewed to determine the suitability of biomanipulation for Tuxedo Lake.

Presenter Biography:

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POSTER: Ticklenaked Pond Alum Treatment

Dominic Meringolo Aquatic Control Technology
& Matt Salem Aquatic Control Technology

Abstract: After multiple years of watershed management at Ticklenaked Pond in Ryegate, Vermont, by local stakeholders, Aquatic Control Technology was awarded a contract to perform a sediment inactivation alum treatment to reduce internal phosphorus recycling. The treatment plan was developed by Vermont Department of Environmental Conservation and Dr. Ken Wagner, Water Resources Services, with collaboration from Aquatic Control's experienced staff. Challenges encountered at the beginning of the project were overcome by modifying the treatment approach and the treatment program was successful in improving late-summer water clarity to record depths. This project is an exceptional example of public and private entities working together to accomplish the goals of the project. Continued monitoring in future years will determine the long-term benefit of this treatment.

Presenter Biography: Dominic Meringolo is currently the Senior Environmental Engineer at Aquatic Control Technology and has worked on a number of major alum treatment projects across New England. Dominic received an MS in Environmental Engineering from Worcester Polytechnic Institute (1998) and has been with Aquatic Control for 20 years. In addition to alum treatment work, Dominic serves as project manager for numerous Aquatic Management Programs in Connecticut, Massachusetts and New York. These programs generally include assessment, permitting, monitoring and implementation of both chemical and non-chemical management techniques. Dominic also manages Aquatic Control's IT systems.

Matthew Salem is currently the GIS Specialist at Aquatic Control Technology and has diverse responsibilities within the firm. Matthew received a BS in Geographic Sciences from Arizona State University (2011) and has been with Aquatic Control for 4 years. In addition to his role with ACT's GIS systems, Matthew has assisted with the implementation of Aquatic Management Programs throughout New England with duties ranging from conducting herbicide treatments to post-management vegetation surveys of both chemical and non-chemical techniques.

POSTER: Hybridization in *Myriophyllum spicatum* in its Native Range

Anastasia Mozharova, M.S. Candidate UMASS Boston

Abstract: Invasive aquatic plant control is a daunting task, which may be partially explained by a number of common biological features in this plant group: predominance of vegetative reproduction, morphology that is similar or identical to some native species and the nature of aquatic environment. Hybridization with native species both poses a threat of native species extinction via genetic "swamping" and serves as a source of genetic diversity in invasive populations. Knowledge of invasion history and population genetic processes within the native range of aquatic invasive plants provides information necessary for aquatic plant management decisions, such as routes of introduction and sources of genetic diversity in introduced populations. Yet there is a lack of such studies. We have collected 191 specimen of *Myriophyllum spicatum* from 22 sites throughout Khakassia, the south of Krasnoyarskiy kray and Tomsk region (Central and Western Siberia, Russia) to elucidate hybridization processes in the native range populations of this plant. By assessing DNA sequences in the ITS and trnH-psbA regions so far we did not find evidence of hybridization between *M. spicatum* and its closely related congener, *M.sibiricum*. It has previously been demonstrated that *M.spicatum* and *M.sibiricum* hybridize in North America, where *M.spicatum* is invasive. Some evolutionary mechanisms preventing hybridization in the native range of both these species (Eurasia) might interfere. However, our dataset is not extensive enough to conclude that hybridization does not take place in Eurasia.

Presenter Biography: Anastasia started a PhD program at UMASS Boston in 2010, working in Kesseli lab (genetics lab). He primary interest is invasion biology and evolutionary consequences of invasions for both invasive and native plant species in aquatic environments. The object of her 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.

POSTER: Does Brazialian Waterweed (*Egeria densa*) Survive Under Ice? Results of a 40-Year Experiment

Robynn Shannon, Ph.D. Fairmont State University

Abstract: Numerous claims have been made in a variety of sources, from published books to blogs, about Brazilian Waterweed's inability to survive cold temperatures, particularly under ice. These claims are examined in light of a population that has thrived in a shallow pond in Upshur Co., WV, for more than 40 years, and now covers the bottom of the pond. Monthly and daily temperature records since 1970 demonstrate that the pond has frozen over most years during that time period, some years probably freezing solid some distance out from the edge.

Presenter Biography: Robynn K. Shannon earned a Ph.D. in Plant Ecology from the University of Connecticut and a M.S. in Botany from the University of New Hampshire, and has been certified as an Ecologist by the Ecological Society of America. Prior to joining Fairmont State University (in "Wild and Wonderful West Virginia!"), she worked as a research assistant in the Smithsonian Institution's Department of Botany for several years and served as a Peace Corps Volunteer in West Africa. Her research interests focus on ecological and evolutionary aspects of plant reproductive biology. She enjoys trail running, hosting dinner parties, and renovating old houses in her free time.

POSTER: Effects of Invasive European Frogbit and Its Two Physical Control Methods on Macroinvertebrates

Bin Zhu, Ph.D University of Hartford

Authors: Bin Zhu (*University of Hartford)*, James Kopco (*Cornell University & North Dakota State University*) and Lars G. Rudstam (Cornell University)

Abstract: European frogbit (*Hydrocharis morsus-ranae* L.) is an invasive floating plant that negatively affects native plants in freshwater ecosystems. A field mesocosm experiment was conducted in Oneida Lake, NY, USA to study the impact of European frogbit cover on macroinvertebrates and to test the effects of two physical control methods - hand pulling and shading on macroinvertebrate assemblages. Metrics including density of different types of organisms, total abundance, taxon richness and Simpson's diversity index were compared. Both Hester-Dendy sampler and Ekman grab were used to collect surface/phytophilous and benthic macroinvertebrates. European frogbit cover had significant positive effects on mollusc density, amphipod density, taxon richness, and Simpson's diversity of macroinvertebrates in the Hester-Dendy surface samples. There were significantly fewer benthic worms and more chironomids (Hester-Dendy bottom samples) and possibly higher diversity of benthic macroinvertebrates (Ekman samples) in the sites with European frogbit. These data together suggest that European frogbit had positive effects on surface and phytophilous macroinvertebrates and may change population density and increase diversity of benthic macroinvertebrates. The frogbit control measures hand-pulling and shading had no significant effects on macroinvertebrates with one exception: amphipod density in surface water was significantly lower in the shading sites. This suggests potential negative impacts of shading on macroinvertebrate communities. Therefore, hand pulling is preferable to shading for controlling invasive European frogbit from the perspective of minimizing effects on the macroinvertebrate communities in the lakes.

Presenter Biography: Dr. Bin Zhu is an Assistant Professor of Biology at the University of Hartford in Connecticut, USA. He received his Ph.D. in biology and Master of Public Administration from Syracuse University. Dr. Zhu was a post-doctoral associate at Cornell University and a research scientist at the Finger Lakes Institute of Hobart and William Smith Colleges. His research interests focus on ecology and management of invasive species and water quality. He has published a number of articles in journals including *Aquatic Botany*, *Ecosystems*, *Fisheries*, *Freshwater Science*, *Journal of Aquatic Plant Management*, *Journal of Great Lakes Research* and *Journal of Plant Ecology*. He is an Associate Editor for *Journal of Plant Ecology* and *Journal of Aquatic Plant Management*. Dr. Zhu served on the Board of Directors of Northeast Aquatic Plant Management Society and received the honorable "Outstanding Member" award in 2011.

POSTER: Toxicity of Copper Herbicides Nautique™ and Captain™ to Non-Target Fat Head Minnows at Natural Temperatures

Jacob Wagner Hamilton College

Abstract: This study aims to revise the current DEC recommendation of 0.3 ppm for chelated copper aquatic herbicides as well as determine the effect, if any, of temperature. The hope is to find a concentration of Nautique™and Captain™ that is effective in controlling macrophytes while still being nontoxic to fish, because the current limit of .3 ppm is ineffective in controlling macrophytes.

Presenter Biography: Jacob in an undergraduate at Hamilton College. For his senior thesis in biology Jacob has been collaborating with the Aquatic Toxicant Research Unit at the Rome Fish Hatchery in Rome, NY. Jacob is working with Eric Paul from the Aquatic Toxicant Research Unit and Andrea Townsend, a conservation ecologist at Hamilton College.