

**ABSTRACTS AND BIOGRAPHIES FOR PRESENTATIONS
AT THE
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OF THE**



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**WATER'S EDGE RESORT
Westbrook, Connecticut**

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

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Algal Workshop

Presented by NEAPMS Experts:

**Ken Wagner, Ph.D., Water Resource Services, kjwagner@charter.net
West Bishop, SePRO Corporation, westb@sepro.com**

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

Microscopes will be available to look at prepared slides. Live and preserved specimens will be on hand.

Pat Rector

Rutgers

Spotlight on Species 1: Research on the fruit (nuts) of *Trapa natans* : Drawdowns and herbicide applications

Abstract: Water Chestnut is a highly aggressive aquatic invasive species that has only been found in New Jersey within the past several years. Prior to recent infestations NJ had remained relatively water chestnut free, despite infestation in neighboring states. Several options for treatment and management have been utilized with varying success. The fruit (nuts) of water chestnut are known to last in lake sediments for 5-10 years, providing greater rebound for this species. This presentation provides research results on seed viability in laboratory and mesocosm studies.

Speaker Biography:

Pat Rector
County Agent III
Environmental Resource Management Agent

Rutgers Cooperative Extension of Morris/Somerset Counties
P.O. Box 900
Morristown, NJ 07963-0900

Chris Doyle,
CLM

Allied Biological

**Spotlight on Species 2: The Five W's (and one H) of the
Waterwheel Plant, *Aldrovanda vesiculosa***

Abstract: *Aldrovanda vesiculosa*, the waterwheel plant, is a fascinating free-floating carnivorous aquatic plant, discovered in the Northeast in 2012. This oral presentation will utilize the time-honored tradition of applying the five W's and one H (Who, What, Why, When, Where and How) to the ecology of this aquatic plant and its unlikely inhabitation in the Northeast. Topics include: *What* is waterwheel, and *Where* is it established globally? *When* did it become established in the Northeast and *How* did it become established in the Northeast. What possible vectors of spread could it use to expand its range? Although waterwheel is certainly exotic to the Northeast, it's still to be determined if it will become invasive and the possible target of control measures.

Speaker Biography: Chris graduated from Cook College, Rutgers University with a BS in Natural Resource Management with a focus on Fishery Science. Since graduating, he has over 18 years experience as an aquatic biologist, including 10 years experience working in an aquaculture laboratory. In 2005, Mr. Doyle joined Allied Biological, Inc., a full service lake management firm serving New Jersey, New York, and Pennsylvania. As the Senior Aquatic Biologist and Supervisor of Water Quality Programs, Mr. Doyle oversees a staff of field technicians conducting water quality assessments and serves as Project Manager for all fisheries studies, aquatic plant mapping, phytoplankton/zooplankton assessment studies, and is the author of numerous Aquatic Plant Management Plans. Chris is currently serving on the Board of Directors of NEAPMS.

Hands-On Plant Workshop

Presented by NEAPMS Experts:

Robynn K. Shannon, Ph.D., West Virginia Wesleyan College
Mark Heilman, Ph.D., SePRO Corporation
Chris Doyle, Allied Biological, Inc.

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.

**Michael D.
Netherland,
Ph.D.**

US Army ERDC

Factors Influencing Monoecious Hydrilla Growth and Response to Herbicides

Abstract: As monoecious hydrilla (*Hydrilla verticillata*) continues to expand in northern tier waters, many questions remain regarding factors that influence growth of this plant. Studies conducted over the past year have evaluated the impact of tuber density on biomass, comparative growth rates of monoecious and dioecious hydrilla under similar mesocosm conditions, and sprouting dynamics of tubers. In addition to growth studies, we have focused on response of monoecious hydrilla tubers to low rates of fluridone, and response of mature plants to intermittent exposures of fluridone and endothall. Our results suggest that tuber density (2, 4, 8, or 16 per 0.1 m²) was not significant in determining hydrilla biomass by 40 days after initiation of the study. Monoecious hydrilla shows a rapid growth response to warming waters and the results challenge the observation that monoecious hydrilla is a “cold-adapted plant”. Tuber sprouting dynamics were influenced by the Florida climate and results suggest that additional trials should be conducted in a northern tier environment. Fluridone at rates as low as 1.5 ppb had a strong negative impact on the ability of sprouting tubers to become established. While the intermittent exposure trials may seem esoteric at first glance, these data can provide useful insight on treatment of linear flow systems (e.g. Cayuga inlet and Erie canal). Observations from the various studies will be discussed in the context of improving our overall knowledge of monoecious hydrilla.

Speaker Biography: Dr. Michael Netherland is a Research Biologist for the U.S. Army Engineer Research and Development Center (ERDC) in Gainesville, Florida. He researched impacts of plant growth regulators on hydrilla and Eurasian watermilfoil while pursuing a Master’s degree at Purdue University. Upon graduation in 1989, Mike took a research position with ERDC in Vicksburg, MS, and worked on improving the linkage between the biology of invasive submersed plants and various herbicide management strategies. In 1999 Mike earned a Ph.D. from the University of Florida with research focusing on the biology and management of hydrilla with an emphasis on how ecology of the turions can influence management outcomes. Mike went to work in private industry for the SePRO Corporation in Carmel, IN and managed aquatic research projects from 1999 to 2003. In December 2003, he returned to the ERDC and was stationed at the University of Florida Center for Aquatic and Invasive Plants in Gainesville, FL. His current research focuses on factors that influence hydrilla growth, improved understanding of monoecious hydrilla biology and phenology, and development of novel management strategies for both the dioecious and monoecious biotypes of hydrilla. Mike was Editor of the Journal of Aquatic Plant Management from 2004 through 2010 and he is currently President of the Aquatic Plant Management Society.

Mark Heilman, **SePRO Corporation**
Ph.D.

Monoecious Hydrilla Eradication: Past Successes and Challenges that inform Future Herbicide Management in the Northeastern US

Abstract: Since the mid 1990's, multiple efforts have been made at various spatial scales to eradicate the monoecious biotype of hydrilla from newly infested, multi-use water bodies in several different US regions. Most of these efforts have involved the use of Sonar® (fluridone) in repeated annual cycles of treatment to prevent further hydrilla spread and gradually deplete hydrilla tuber banks in sediments of infested sites. In some locations, additional herbicides and other integrated control measures such as intensive hand removal by divers and low-dose grass carp stocking have been implemented with Sonar to meet site-specific management criteria. A careful analysis of recent data from eradication projects provides improved insight into how new and future hydrilla infestations in the northeastern US sites might be eradicated under different conditions through use of Sonar alone or in combination with other integrated management solutions. In this presentation, patterns of vegetative hydrilla elimination and tuber depletion / recovery under past management at a variety of US sites will be reviewed to suggest ways in which eradication efforts could be optimized in the future. This analysis will consider management efficacy on hydrilla and also selectivity patterns as well as quantitative assessment of management at several stages to document progress towards eradication.

Speaker Biography: Dr. Mark Heilman is currently the 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.

**Cody J. Gray,
Ph.D**

United Phosphorus, Inc.

Challenges of Monoecious Hydrilla Control in the Northeast

Abstract: Hydrilla [*Hydrilla verticillata* (L.F.) Royle] is a troublesome non-native aquatic plant that commonly forms dense surface canopies in many types of water bodies. Hydrilla infestations minimize recreational activities such as boating, water skiing, fishing, hunting, etc. Therefore, controlling hydrilla in these waters is of extreme importance. In recent years, the use of endothall has been used extensively in Florida waters where fluridone-resistant hydrilla has become the dominant hydrilla strain. In recent years, monoecious hydrilla has begun to become more of a problematic species and spread into many water bodies in the northeastern U.S. Endothall-based programs have been implemented in recent years targeting monoecious hydrilla control. The presentation will outline endothall-based applications for monoecious hydrilla control.

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 currently the Vice President of the Aquatic Plant Management Society, Vice President of the Western Aquatic Plant Management Society and the Aquatic Plant Management Society liaison to the Weed Science Society of America.

Robert J. Richardson, Ph.D. **North Carolina State University** **Survey, Decision Making, and Management Related to Monoecious Hydrilla in a Natural Carolina Bay Lake, Lake Waccamaw**

Abstract: Lake Waccamaw is a natural, shallow lake in southeastern North Carolina with many endemic species, including several considered rare. Monoecious hydrilla was first confirmed in Lake Waccamaw in early fall 2012. A technical advisory committee (TAC) was formed and a lake wide vegetation survey conducted in late fall 2012. The hybrid SONAR/point intercept survey indicated that the 9,000A lake contained 608A of hydrilla and 3,600A of native vegetation. With maximum depth of the lake being 11 ft, it was estimated that hydrilla could cover 100% of the lake area and that 2/3 of the lake would be infested within 5 years. The TAC considered all possible management options and recommended herbicide application as the initial control strategy. Fluridone was applied to approximately 950A in 2013. Very few hydrilla fragments were detected in 2013 likely due to a combination of the herbicide treatment and high water levels from abnormal precipitation levels.

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.

Robert L. Johnson **Racine-Johnson Aquatic Ecologists** **Chasing Monoecious Hydrilla from the Cayuga Inlet, Ithaca, NY**

Abstract: Since August 2011 with the discovery of the monoecious biotype of *Hydrilla verticillata* growing in the Cayuga Inlet, a major tributary to Cayuga Lake in upstate New York, eradication remains our focus. Our local and State Hydrilla Task Force with a lot of help continue to treat with herbicides and intensively monitor to halt the spread to other Finger Lakes and to the wider Great Lakes region. In 2013 a similar pattern to the 2012 treatment, shorten slightly, was conducted with an early summer Endothall application followed a few weeks later by applications of Fluridone that continued into fall. Rapid depletion from the sediment of hydrilla tubers produced in 2011 and before continued into the fall of 2013 in the Cayuga Inlet highlighting two successful treatment years. However, to our surprise on August 8 we found robust hydrilla growth in Fall Creek a lake tributary adjacent to the Inlet. That night an intense storm hit the Ithaca area causing Fall Creek, which normally has 2X the flow of the Cayuga Inlet push 10's of thousands of hydrilla fragments out into Cayuga Lake. On September 26, an Endothall treatment was applied to the Fall Creek hydrilla. However, in the month leading up to treatment new tuber production increased by about a factor of ten and turion initiation began. To top it all off on August 21 we found three growing patches of hydrilla in the lake proper during our rake-toss plant survey of the lake. We removed the patches by hand harvesting and covered the area with benthic barriers by August 30.

Speaker Biography: Bob retired from Cornell University in 2008 after managing the Cornell Research Ponds for 44 years where he provided outreach on aquatic plant growth in New York State. Bob's research interests are ecology of aquatic plant communities and in particular control of the non-native Eurasian watermilfoil by insect herbivores. As a member of the Northeast Aquatic Plant Management Society since its beginning, he presents research information on aquatic plant management regularly at their meetings and other venues. Presently as a private consultant, he continues similar survey and research interests and is a member of the Hydrilla Task Force working on the invasion of hydrilla into the Cayuga Inlet in Ithaca, NY.

**Robynn K.
Shannon, Ph.D.**

West Virginia Wesleyan College

Hydrilla's "Disappearing Act" in a West Virginia River

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 the faculty at West Virginia Wesleyan College, she served as a Peace Corps Volunteer in West Africa, and worked as a research assistant in the Smithsonian Institution's Department of Botany for several years. Her research interests focus on ecological and evolutionary aspects of plant reproductive biology. She enjoys trail running and hosting dinner parties in her free time.

Brett M. Hartis, North Carolina State University
Ph.D. candidate

Modeling the Potential Geographic Distribution of *Hydrilla verticillata* in North America and Beyond

Abstract: Hydrilla (*Hydrilla verticillata*) is a highly invasive submersed aquatic weed. In North America, the troublesome invader has rapidly spread as far North as Maine and as far west as Washington State since the original introduction into Florida during the 1950s. The establishment of Hydrilla in such cool environments has recently raised questions about the plants ability to spread even further north on the continent. Recent discoveries of monoecious hydrilla in Lake Cayuga, NY, the Erie Canal, and the Ohio River have further highlighted the need for addressing the potential establishment of this submersed macrophyte. In our study, we attempt to model the establishment potential of hydrilla using a modified version of the climate envelope method, based on the plants known geographic distribution in the Northern Hemisphere, particularly along its northernmost limits. The objectives of this study were to model the potential establishment of hydrilla in the United States and Canada based on known occurrence sites worldwide and to determine if the establishment potential of hydrilla in various states/ provinces differs based on the size of water bodies present. Our model predicted that nearly the entire U.S. including various provinces in Canada were at high risk. More importantly, states and provinces that may have been thought to be far beyond the previously modeled northern limits of hydrilla's establishment threshold were well within climate suitable for establishment. Furthermore, differences in risk were apparent between water bodies of varying size. Results from this study should inform researchers and resource managers alike of the establishment potential of hydrilla along norther tier states and provinces in North America. Water body types identified within each state of higher risk should aid managers in appropriately allocating prevention, monitoring and management resources to prevent the spread of hydrilla into previously uninfested water bodies.

Speaker Biography: : I received an M.S. in Fisheries, Wildlife and Conservation Biology from NC State University and am currently in final year of the doctoral program in the same program. I received a degree in Biology from East Carolina University in Greenville, NC with a concentration in coastal resources management. I recently took the position serving as the Aquatics Extension Associate for Lake Gaston and surrounding areas in NC and VA. Prior to accepting this position, I worked as a Research Assistant quantifying aquatic vegetation in the Currituck Sound of North Carolina. I have various skills in geospatial technology including remote sensing, global navigation satellite systems, and geographic information systems.

Northeast Hydrilla Update and Panel Discussion

Maine Update – John McPhedran, Maine DEP

Massachusetts Update – Keith Gazaille, Aquatic Control Technology

Updates of hydrilla infestations in Maine and Massachusetts that have been actively managed over the past decade will be provided.

A panel discussion and question and answer session will follow.

Bo Burns

Valent Professional Products

Optimizing The Use of Clipper Herbicide

Abstract: Vegetation management in water bodies can be challenging, which often makes it difficult to maintain water in pristine condition. Clipper herbicide contains the active ingredient flumioxazin and has been developed by Valent Professional Products for use in aquatics to assist in the management of unwanted vegetation. Field applications of Clipper in 2012 displayed limitations, yet have proven to be a valuable tool to manage unwanted vegetation in water bodies and provide an alternative option for controlling difficult to manage plants such as Fanwort (*Cabomba caroliniana*) and Watermeal (*Wolffia* spp.). Treatments of Clipper throughout the country have provided an opportunity to monitor and evaluate the performance of this herbicide when applied under a wide array of conditions. Surface as well as submersed applications of Clipper were monitored for activity on specific vegetation, movement from the treatment area, and persistence in the water column. Few contact herbicides have been introduced in the aquatics market that displays selectivity on floating and submersed weeds. Data taken from these trials will be shared that confirms Clipper is a selective herbicide with a short-life in the water column that can be used as part of a successful management strategy for selected unwanted vegetation in Midwestern water bodies.

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).

**Ryan M. Wersal, Applied Biochemists
Ph.D.**

**Evaluating the Sensitivity of Hydrilla and America Lotus to
Different Copper Formulations Applied Alone and in
Combination with Diquat.**

Abstract: Reservoirs in the southeastern United States have been particularly susceptible to invasion by both monoecious and dioecious hydrilla (*Hydrilla verticillata*) in the past three decades. Reservoirs often have areas of high water exchange or rapidly changing water flows that prevent the effective use of systemic herbicides for control of hydrilla. While contact herbicides are effective in rapid control of hydrilla biomass under conditions of high water exchange, the downside of many usage patterns is reduced selectivity. In many southeastern reservoirs, American lotus (*Nelumbo lutea*) is a common native plant that provides needed habitat and refuge for both fish and waterfowl. Our recent experience with using a tank mix of diquat with chelated copper in the Ross Barnett Reservoir (MS) was that, while it was effective in controlling hydrilla, it damaged adjacent American lotus populations. Therefore, we designed a study to examine the effectiveness of diquat and four chelated copper formulations to control hydrilla while minimizing damage on American lotus. This study was conducted at the R. R. Foil Plant Science Research Center at Mississippi State University, in 132, 100-gallon mesocosm tanks. Hydrilla was planted in five pots per tank, (66 tanks); while American lotus was planted in three pots per tank, in the remaining 66 tanks. Plants were allowed to grow for four weeks. Tanks were treated with diquat or one of four formulations of chelated copper, as well as combinations of diquat with each copper formulation; and an untreated reference for a total of 21 treatments. Each treatment was replicated three times. While several of these combinations provided better than 70% control of hydrilla, most also caused significant damage to American lotus. Copper ethylenediamine liquid alone at both 0.5ppm and 1.0 ppm provided 80% control of hydrilla, while American lotus actually increased biomass. Further research to demonstrate chelated copper formulations in the field are planned.

Speaker Biography: I am a native of Minnesota where I received my Bachelor and Master of Science degrees in Biology. I moved to Mississippi in 2004 and received my PhD in Weed Science in 2010. I am currently the Aquatic Plant Scientist at Lonza in Alpharetta, GA. In my current role, I coordinate the interaction between the business and research and technology personnel. I oversee the research and development projects with respect to aquatic herbicides and algaecides. I conduct basic research under both controlled and field conditions to support our current products, verify efficacy of new products, and to develop the most effective use pattern for our herbicides and algaecides to promote product stewardship.

**West M. Bishop SePRO Corporation
and Ben E. Willis**

Strategic Design of New Copper Formulations

Abstract: With increased regulatory scrutiny on copper, markedly focused on historic use of copper sulfate, it is critical to reinforce the significant, recent formulation advancements. We created copper formulations specifically designed to address nuisance algae/weed infestations impacting the usability of our freshwater resources. In addition to efficiently solving a problem and restoring water usages, this enhanced affinity and efficacy results in a concomitant increase in the margin of safety for non-target organisms. The objectives of this research were to 1) compare pond management programs using only copper sulfate with new technologies, 2) compare the copper absorption efficiency and algacidal efficacy between algacide formulations and 3) evaluate the spatial exposure and subsequent efficacy using a unique polymer granular chelated copper (Komeen® Crystal). Total number of treatments and overall amount of copper required to maintain ponds below action threshold levels was decreased with the SeClear pond management program compared with copper sulfate. Captain XTR formulation efficiency was compared by measuring copper remaining in exposure water, adhered externally on the algae, and absorbed by the algae. Compared with other copper formulations tested, Captain XTR produced greater absorbed (infused) copper (average 36%) and proportional decreases in amount of product needed for control. Komeen Crystal results showed majority of copper was released over an ideal exposure period (hours) as well as enhanced spatial concentration targeting submerged weeds. This resulted in significant control (> 90% reduction of biomass or chlorophyll a content) of many nuisance species tested (*Chara* sp., *Vallisneria*, *Hydrilla*, etc.). As continued regulations (NPDES, EPA RED) strive for more efficient copper algacide use, progressive solutions that provide more effective proactive and efficient reactive control are needed to address increasingly challenging algae/weed infestations.

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.

**James Haney, University of New Hampshire
Ph.D.**

**Toxic Cyanobacteria in Lake Food Webs and their Possible
Modes of Transfer to Wildlife and Humans**

Abstract: The threats of blooms of toxic cyanobacteria have been increasing worldwide. Modes of exposure of humans and wildlife are often assumed to be through direct contact with or drinking lake or pond water. Growing evidence suggests other routes of exposure may be important, including consumption of attached cyanobacteria or inhalation of aerosols. This talk will focus on the possible role of epiphytic cyanobacteria on *Hydrilla* as sources for the poisoning of waterfowl and bald eagles. Also, the talk will explore the role of aerosols as possible triggers for neurological diseases.

Speaker Biography: Jim Haney is a Professor in Department of Biological Sciences at the University of New Hampshire where he teaches courses in Ecology, Limnology, Stream Ecology and Lake Management. He is also Director of UNH Center for Freshwater Biology. Prior to his arrival at UNH, he taught briefly at Yale University. He has a Bachelors and Masters degree in Zoology from Miami University; his Ph.D. is in Limnology from the University of Toronto and he also did post doctoral work at Michigan State University and at the .Max Planck Institute for Limnology in Germany. His research interests include the ecology of lakes and streams, and the impact of toxic cyanobacteria on lake food webs and human health.

Elijah W. Stommel, M.D. and Tracey Caller, M.D.

Dartmouth-Hitchcock Medical Center

Relationship Between Cyanobacteria and ALS: An Update. Is there a link between ALS epidemiology and BMAA?

Abstract: Amyotrophic lateral sclerosis (ALS) is a fatal neurodegenerative disease that likely involves genetic, environmental interactions. We are developing geographic information systems (GIS) methodologies to investigate exposure to environmental toxins/toxicants and the risk of developing ALS. The hypothesized ALS risk factors that we are examining include: (1) cyanobacterial derived BMAA and (2) industrial derived methyl-mercury. Our study population of 700+ ALS cases is from Northern New England ALS databases. Controls come from non-neurodegenerative diseases in the same sex/age matched controls. We are developing indirect sensing techniques to measure cumulative exposure to cyanobacteria in Northern New England water-bodies and correlate them with direct collection databases. We estimate the relative risk of developing ALS according to the distance between place of residence and sources of each individual hypothesized environmental toxins (BMAA and methyl-mercury). We compare the relative risk of proximity to sources of such toxins. We are using questionnaires to investigate potential environmental triggers for ALS. We have initiated an investigation of potential biomarkers using human biological samples both from selected ALS patients and controls. We (Dartmouth-Hitchcock Medical Center) are collaborating with Dartmouth College, The Cleveland Clinic, Applied GeoSolutions, the University of Miami Miller School of Medicine and Bowling Green University on this project and related projects.

Speaker Biography: Elijah W. Stommel, M.D. is presently a Professor of Neurology at the Geisel School of Medicine at Dartmouth. Dr. Stommel received a B.A. from Bowdoin College and Ph.D. and M.D. from the Boston University School of Medicine. For the last 5 years, his research has focused on potential environmental risk factors related to amyotrophic lateral sclerosis (ALS). Stemming from my background in marine neurotoxins, interest has been directed towards the neurotoxin β -Methylamino-L-alanine (BMAA) implicated as an environmental toxin responsible for the high levels of ALS on the island of Guam over 50 years ago. Using GIS mapping techniques, my research colleagues and I established convincing geospatial relationships between cyanobacterial blooms and ALS in northern New England..

Speaker Biography: Tracie A. Caller, M.D. is presently a Neurophysiology Fellow at the Dartmouth-Hitchcock Medical Center. Dr. Caller received a B.A. from the University of Wyoming, an M.D. from the University of Washington School of Medicine and a M.P.H. from the Geisel School of Medicine at Dartmouth. Current research bridges the domains of neurology, public health, and the prevention of human disease, specifically neurodegenerative diseases.

Dominic Filiano **Dartmouth College**

**Method to Determine Phycocyanin-Rich Algal Bloom Location
from 3-Color Band Raster**

Abstract: Toxic cyanobacteria are implicated in the etiology of sporadic amyotrophic lateral sclerosis (sALS). Mapping harmful algal bloom (HAB) locations is key to demonstrate spatial correlation between sALS clusters and HABs. Cyanobacteria and other phycocyanin-rich phytoplankton display distinctive spectral reflectance patterns detected by space-borne moderate resolution imaging spectroradiometry (MODIS). MODIS “true-color” images are useful for mapping HABs. In many cases, however, the images have not retained their spectral attribute data. We propose a method of processing MODIS images using their 3 color bands. We visually inspected a MODIS (250m) image of Lake Erie, USA in the open-source GIS platform, Quantum GIS (QGIS). Areas within the lake were classified according to the feature that dominated that area’s spectral reflectance pattern. The classifications were Chlorophyll-Phycocyanin (Chl-PC), Detritus-Gelbstoff-Particulates (DGP), and non-turbid water (NTW). The Chl-PC areas were further classified as high, moderate, or low concentration. The pixel distribution was calculated for each category and spectra were defined as two standard deviations from the median. Raster calculations produced new rasters for each category according to their spectra. The concentration rasters were summed to produce an estimate of the location of the algal bloom. NTW and DGP were subtracted from the concentration sum to produce a composite raster showing location of NTW, DGP and algal bloom. Interference from clouds and land was minimized and the locations of areas dominated by cyanobacteria were differentiated from areas dominated by DGP and non-turbid water. This simplified HAB mapping method facilitates clarification of an etiology for sALS and is a step toward a near-real-time system for HAB tracking and forecasting.

Speaker Biography: I am pursuing a B.A. in geography and mathematics at Dartmouth College where I also compete on the varsity track and fields team. I have always been fascinated by cross-discipline applications of ideas and am an excited new comer to the fields of GIS, remote sensing and spatial epidemiology. In my free time I enjoy exploring and photographing New England’s rugged landscape.

**Kenneth J.
Wagner, Ph.D,
CLM**

Water Resource Services, Inc.

Cyano update: Practical information from recent research and practice

Abstract: Cyanobacteria continue to represent a threat to lake uses and ecology, and considerable effort has gone into research and applied control efforts. Important developments of the last few years will be discussed, and include the following areas. Cyanobacteria taxonomy is changing; while annoying, the changes make sense in ecological and management contexts. Some species known to be toxic in other regions or in the lab do not exhibit toxicity in many lakes where they are encountered. At least one species has arisen as a dominant toxin producer. Distribution of toxins among and within lakes is still hard to predict and does not follow any simple trend of cyanobacteria abundance; cell count or pigment thresholds are useful as warnings, but actual toxin testing remains essential to assessing actual threat. Modes of bloom formation are now fairly well understood and fall into three main groups: rapid rise from the sediment, accumulation near the thermocline, and gradual bloom generation in the upper water column; each has distinct management implications. Prevention is best achieved through control of phosphorus and nitrogen, and it is possible to prevent cyanoblooms with the addition of nitrogen in some cases, but reduced phosphorus remains the most desirable approach. Effective use of algaecides and successful control through phosphorus inactivation require an understanding of which cyanobacteria are present and bloom formation mode. Mixing systems can limit or aid bloom formation, depending on which species are involved and the depth to which algae can be mixed. Biological structure, especially as relates to fish and zooplankton, is an important influence on bloom formation potential and efficacy of management options.

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.

**Paul Lord and
Tim Pokorny**

SUNY Oneonta

**Biocontrol of *Myriophyllum spicatum* in
Woodridge Lake, Litchfield County, CT** **POSTER**

**Ryan A. Thum,
Ph.D. and
Syndell Parks**

Grand Valley State University

**Different Invasive Potentials of Visually
Cryptic Watermilfoil Stress the
Importance of Accurate Identification**

POSTER

**Aryk S. Bingham University of Tampa Nutrients from fertilizers causing algae blooms
& Kiyoko Yokota & SUNY Oneonta**

POSTER

Abstract: Nutrient-rich run-offs are known to cause eutrophication and harmful algal blooms in water bodies. In urban and suburban areas, the nutrients often come from non-point sources such as lawns and paved surfaces. We investigated the possible impact of local lawn fertilizer ordinances in the Tampa Bay area, FL, that ban conventional inorganic nitrogen (N) and phosphorus (P) fertilizers during the rainy season, specifically the new types of lawn fertilizers that are marketed to areas with similar fertilizer ordinances that ban either or both N and P fertilizers. Twenty units of containerized lawngrass were randomly assigned to one of four treatments: control (water only), a standalone iron (Fe) fertilizer, a P-free conventional fertilizer with added Fe, and a conventional N+P+K fertilizer. Our results indicate that the conventional fertilizer containing both N and P is indeed most likely to contribute to N & P runoff and decreased phytoplankton diversity. Iron run-off from a P-free conventional fertilizer with added Fe was significantly higher than others, and this, combined with its high N runoff, may potentially promote unwanted algal growth when it enters the aquatic environment.

Presenter Biography:

Aryk Bingham is a junior majoring in Environmental Science and minoring in Aerospace Studies at the University of Tampa. He is an Air Force ROTC Cadet and also a member of the Honors Program at the Univ. of Tampa. Aryk has been involved with this project studying lawn fertilizer runoffs since he was a freshman. On top of his busy schedule with coursework, ROTC, and work as a Resident Assistant, he spent countless hours maintaining the experimental lawngrass units, performing soil and water chemistry analyses, and analyzing phytoplankton samples under the microscope to complete this project. Aryk is planning to take his experience into the military working as a bioenvironmental engineer to help manage healthy working environments for military personnel, or he may specialize in environmental law for the USAF JAG Corp to help manage good environmental relations between our country's military and the natural world around us.

Kiyoko Yokota is currently an Assistant Professor of Biology at State University of New York College at Oneonta (SUNY Oneonta). She earned her Ph.D. in Ecology, Evolution and Behavior from University of Minnesota; her dissertation was on population dynamics of green algae (*Desmopdesmus* and *Monoraphidium* spp.) and how they are affected by nutrient availability and chemical cues from zooplankton. Kiyoko worked at the Netherlands Institute for Ecology (NIOO-KNAW) as a short-term postdoc before she started teaching full time at University of Tampa. At SUNY Oneonta, she is planning research programs on nutrient limitation status and phytoplankton species composition of local lakes. She also is interested in tropical biology and hopes to apply her expertise to improved management of tropical lakes and reservoirs.

Bin Zhu, Michael S. Ellis, Kelly L. Fancher, and Lars G. Rudstam **University of Hartford** **Shading as a Control Method for Invasive European Frogbit** **POSTER**

Abstract: Invasive European frogbit (*Hydrocharis morsus-ranae* L.) has negative environmental and economic impacts in American water bodies. It affects native aquatic vegetation by blocking light; animals by reducing food plants and dissolved oxygen; and human commercial and recreational activities by interfering with boating, fishing, swimming, and hunting. It is therefore crucial to develop effective management tools to control this invasive species. This study investigated shading as a control method for European frogbit in both greenhouse and lake mesocosm experiments. A series of shade treatments (0%, 50%, 60%, 70%, 80%, and 100%) was tested in the greenhouse for three weeks. Results showed that the 100% shade was most effective at controlling European frogbit, and other shade treatments greater than 50% were relatively effective, reducing frogbit biomass up to 38.2%. There were no differences found in temperature between treatments, but dissolved oxygen decreased as shading increased, possibly due to more decomposition in higher shade conditions. A lake mesocosm experiment utilizing 0% shade, 70% shade, and 100% shade treatments was performed in a sheltered inlet of Oneida Lake in New York State for one month. Resulting European frogbit biomass was 25 times less in areas treated with the 70% shade and nearly zero with the 100% shade. Shading did not affect temperature but did improve dissolved oxygen conditions. Additionally, the 70% shade caused no major changes on the submerged macrophyte communities whereas the 100% shade had larger negative impacts on species richness, species composition, and abundance of submerged macrophytes. We concluded that treating with 70% shade can be a feasible, time efficient, and cost efficient method to control European frogbit with minor impacts on the ecosystems. More experiments with larger scales and longer time periods are suggested for further investigation.

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 the 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 and he has published more than ten peer-reviewed articles in journals including *Aquatic Botany*, *Ecosystems*, *Fisheries*, *Journal of Aquatic Plant Management*, *Journal of Great Lakes Research* and *Journal of Plant Ecology*. He is an Associate Editor of *Journal of Plant Ecology* and also an invited reviewer for a number of journals such as *Journal of Aquatic Plant Management*, *Journal of Ecology*, *Journal of Great Lakes Research*, and *Science of the Total Environment*. Dr. Zhu served on the Board of Directors of Northeast Aquatic Plant Management Society and received the honorable "Outstanding Member" award in 2011. He currently serves as the secretary at the Asian Ecology Section of Ecological Society of America.