ABSTRACTS AND BIOGRAPHIES FOR PRESENTATIONS

AT THE

11th ANNUAL CONFERENCE

OF THE

NORTHEAST AQUATIC PLANT MANAGEMENT SOCIETY

18-20 JANUARY 2010

GIDEON PUTNAM RESORT

SARATOGA SPRINGS, NEW YORK

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

Aquatic Macrophyte Workshop: *Potamogetons*

Monday, January 18th 3:00-5:00 p.m.

C. Barre Hellquist, Ph.D.
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NOTES:

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. During the summer of 2008 he surveyed the aquatic plants of Yellowstone National Park.

Status of NPDES Permitting Activities for Aquatic Herbicides

Carlton Layne, Executive Director
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NOTES:

Carlton R. Layne received his BA Degree in Biology from Clarion State University, Clarion, PA and an MS Degree in Criminal Justice from Rollins College in Winter Park, FL. Carlton spent 5 years with the USDA, Agricultural Marketing Service, and 30 years with the US EPA in the Pesticides & Toxic Substances Branch. While with US EPA, Carlton was an Inspector, Grant Monitor, and Regional and National Training Officer (1973-1990), Chief of the Region 4 Pesticides Section (1990-1999), and a National Pesticides Expert (2000-2003). Currently, Carlton is the Executive Director of the Aquatic Ecosystem Research Foundation. Carlton is Past President of the Florida Aquatic Plant Management Society and Past Director Aquatic Plant Management Society.

Operational Monitoring of Herbicide Dissipation following Applications of Renovate OTF (granular triclopyr) in Multiple Northern Lakes

Mark A. Heilman, Ph.D. [1], SePRO Corporation, Whitakers, NC; Cole Hulon, SePRO Corporation, Whitakers, NC; markh@sepro.com
Tyler Koschnick, Ph.D., SePRO Corporation, Carmel, IN; Bob Johnson, SePRO Corporation, Brownstown, IN; Sarah Miller, SePRO Corporation, Knightdale, NC

[1] *SePRO Corporation, 1550 N. Meridian Street - Suite 600, Carmel, IN 46032*

In 2006, the first granular formulation of triclopyr herbicide, Renovate OTF, was introduced to provide an alternate delivery system for triclopyr to target submersed macrophytes such as *M. spicatum* (Eurasian watermilfoil). In the last two years, Renovate OTF has been successfully incorporated into large-scale treatment programs for milfoil control in multiple northern states. In 2008-2009, intensive field sample collection of treated water across multiple locations and water depths from 0.5 to 96 hours following Renovate OTF application was performed as a component of the monitoring protocols for representative treatments. Data from four lake treatments will be presented: Grandview Lake (IN) – 4 ha bay treated in 132 ha lake, Lake Morey (VT) – 8 shoreline zones ranging from 2.2 to 3.6 ha in 218 ha lake, Lake Minnetonka (MN) – 48.6 and 49 ha bays treated in 5,879 ha lake, and Houghton Lake (MI) – 3 open water plots totaling 365 ha in 8,112 ha lake. For Grandview Lake treatment, liquid rhodomine dye was also simultaneously applied via subsurface injection through weighted trailing hoses to compare with granular herbicide dissipation. Grandview results indicated a 26.7 hour half-life for triclopyr and 12.4 hours for the dye (2.2x longer exposure time for herbicide released off granular formulation), with notably higher nominal herbicide levels compared to dye in deeper water samples. For Morey application, average triclopyr concentrations were 1.6 – 2.2x higher in samples taken 0.3 m above the bottom compared to those taken 0.9, 1.8, and 3.5 m above bottom (3.65 m total depth). For Houghton and Minnetonka treatments, triclopyr levels in near-bottom water samples were between 1.2 – 2.5x higher than surface samples. Overall, operational field sampling confirms improved contact with target milfoil, particularly in deeper water, with implications for optimizing future submersed aquatic plant management.

NOTES:

Dr. Mark Heilman is currently the Aquatic Technology Leader for SePRO Corporation based out the company's Research and Technology Campus (SRTC) in Whitakers, NC. Dr. Heilman received both his BS in Biology (1992) and his Ph.D. in Aquatic Ecology (1998) from the University of Notre Dame. After a post-doctoral instructorship at Rice University in Houston, TX, Dr. Heilman worked for two years as a project manager for ReMetrix LLC overseeing aquatic vegetation assessments for major aquatic plant managements projects around the US. In 2002, Dr. Heilman took a research position with SePRO Corporation and continues in that role today with focus on new product development and technical solutions for control of invasive aquatic vegetation.

Control of monoecious hydrilla with endothall

Sarah True
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Graduate Research Assistant
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Hydrilla (*Hydrilla verticillata* (L.f.) Royle) is an exotic, submersed weed that has invaded many waterbodies in the U.S. and continues to expand its range. There are two biotypes present in the U.S., monoecious and dioecious. On the east coast, the monoecious form is predominant in North Carolina to New England, while the dioecious form is predominant from South Carolina to Florida. In the past, most research has focused on the dioecious biotype of hydrilla. Laboratory, greenhouse, and field trials were conducted to determine the efficacy of endothall (Aquathol®, dipotassium salt) and combinations of endothall plus other aquatic herbicides on monoecious hydrilla. Laboratory results showed that endothall is efficacious against both monoecious and dioecious hydrilla, reducing biomass by >85% with concentrations of 2 mg ai L^{-1}, coupled with exposure times of 48 hours for dioecious and 72 hours for monoecious plants grown from shoot fragments. Higher concentrations (4 mg ai L^{-1}) or longer exposure times (96 hours) were required to control hydrilla grown from tubers. In greenhouse trials, an increase in exposure time (12 to 48 hours) increased monoecious hydrilla control from 68 to 80% and increased endothall concentration (2 to 4 ppm) increased monoecious hydrilla control from 65 to 78%, when data was pooled by factor. In field trials, monoecious hydrilla was controlled with endothall alone (2 or 3 mg ai L^{-1}), endothall (1 or 2 mg ai L^{-1}) plus 0.37 mg ai L^{-1} diquat (Reward®), and 2 mg ai L^{-1} endothall plus 0.5 mg ai L^{-1} copper (Nautique®). Results from these studies indicate that endothall has the potential to be utilized in hydrilla management programs. Future research will focus on quantifying changes to the hydrilla tuber bank in response to endothall treatments to determine if tuber populations can be reduced over time.

NOTES:

Sarah True received a B.S. in Biological Science and an M.S. in Crop Science from North Carolina State University. She is currently Ph.D candidate and graduate research assistant working under Dr. Rob Richardson at NC State. She studies aquatic and non-cropland weeds.

Promising Data for the Control of Aquatic Weeds from Two New Aquatic Herbicides: Clipper and Tradewind

Jill Calabro

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Research by the University of Florida and other universities and the Army Corp of Engineers led to the development of two herbicides for the aquatic market, Clipper™ (flumioxazin) and Tradwind™ (bispyribac-NA). Clipper is a PPO inhibitor and acts as a contact herbicide. Clipper dissipates rapidly from the water column and has short residual activity. Rates of 100 – 400 ppb of Clipper applied subsurface have shown short-term control of Hydrilla, knockdown of Eurasian watermilfoil, and effective control of watermeal and cabomba. Surface applications of 4 to 8 oz per acre provide control of water lettuce, giant salvinia and other floating aquatic weeds. Tradewind is an ALS inhibitor and is a slow-acting, systemic herbicide with a long residual. Tradewind is in a different class of chemistry than other recently introduced ALS inhibitors. Rates of 10 - 45 ppb of Tradewind applied subsurface controls Hydrilla, watermilfoils and other aquatic weeds while per acre surface applications of 1.5 to 2 oz controls water lettuce, water hyacinth, giant salvinia and other floating aquatic weeds. Its effect on most native plants is minimal. Aquatic use labels are expected in the first quarter of 2010. In 2009, an experimental use permit (EUP) was granted for both Clipper and Tradewind in fourteen states targeting Hydrilla, milfoils, water lettuce, cabomba, watermeal, and duckweed. Through the EUP trials in 2009, Clipper has demonstrated excellent control of watermeal, duckweed, cabomba, curlyleaf pondweed and other aquatic weeds while Tradewind has controlled Eurasian watermilfoil, hydrilla, and other aquatic weeds.

NOTES:

Jill Calabro is a Field Market Development Specialist with Valent USA, Professional Products Division. Dr. Calabro received her B.S. in Horticulture from Iowa State University, M.S. in Plant Pathology from the University of Minnesota, and her Ph.D. in Plant Pathology from Oregon State University. Her Graduate Research Assistant Studies at Oregon State University focused on the biology of sweet cherry powdery mildew caused by *Podosphaera clandestina*. Dr. Calabro's current role is to Provide technical information and market support on Valent's turf and ornamental products in the Northeast territory, from Virginia to Maine. Design and coordinate research trials with key cooperators in the Northeast region of new and developing products, with an emphasis on issues relating to plant pathology.

Mid-summer Water Quality and Macrophyte Communities in Brackish and Fresh-water Ponds on Nantucket Island – Management Considerations in a Restrictive Environment

James W. Sutherland[1], Sarah D. Oktay[2], Cormac Collier[3], Marc Bellaud[4], Chris Doyle[5], Gerald Smith[4] and Glenn Sullivan[5]

[1]Division of Water, New York State Department of Environmental Conservation (retired), Nantucket, MA 02584, jwsinack@comcast.net,
[2]University of Massachusetts, Boston, Nantucket Field Station, Nantucket, MA 02554, [3]Nantucket Land Council, Nantucket, MA 02554, [4]Aquatic Control Technology, Inc., Sutton, MA 01590, [5]Allied Biological, Inc., Hackettstown, NJ 07840

Hummock and Miacomet Ponds are elongated coastal waters situated along the southwest shore of Nantucket Island. Hummock Pond (surface area ~142 acres, length ~2.3 miles) is brackish water which is opened to the Altantic Ocean twice each year (spring and fall) to alleviate flood conditions and enhance marine fisheries. Miacomet Pond (surface area ~47 acres, length ~1.0 miles) is a freshwater environment. During the summer of 2009, water quality monitoring was conducted on both ponds including biweekly sampling for physical and chemical data and a comprehensive aquatic macrophyte survey during the height of the growing season using the point intercept method. The results of the 2009 mid-summer monitoring are presented including vegetation maps showing the relative abundance and distribution of key macrophyte species which reach nuisance levels in both ponds. In general, Hummock and Miacomet Ponds are nutrient stressed and exhibit eutrophic conditions; however, certain regions of Hummock Pond exhibit hypereutrophy during extended portions of the mid-summer period. The major source of elevated nutrient concentrations in both ponds appear to be from external sources, primarily groundwater from residential development and septic systems which drain through very sandy soil. Management techniques for both ponds are discussed in the context of realistic goals and objectives to improve water quality and decrease aquatic vegetation to enhance access for recreational usage while complying with environmental regulations which are intended to protect pond ecology, adjacent wetlands and groundwater.

NOTES:

Jim Sutherland earned a M.S. in Limnology from the University of Buffalo and a Ph.D. in Aquatic Ecology and Physiology from the State University of New York at Albany. Jim was employed for 25+ years as a water quality Research Scientist with the Northern Watersheds Section, Division of Water, New York State Department of Environmental Conservation, and recently retired to Nantucket, MA. Areas of research and investigation included (1) nonpoint source runoff and its impacts on Lake George, NY, (2) the long-term effects of acid rain on the biotic communities of Adirondack lakes and ponds, and (3) the management of Eurasian watermilfoil in New York State recreational lakes.

Jim has been active with the Society since its formation, serving as Treasurer, President and Secretary.

Interactions between Eurasian Water Milfoil and Native Water Stargrass in Cayuga Lake, New York

Bin Zhu[1] and Samuel Georgian[2]

[1] Department of Biology, University of Hartford, 200 Bloomfield Avenue, West Hartford, CT 06117, zhu@hartford.edu

[2] Finger Lakes Institute, Hobart and William Smith Colleges, 601 S. Main Street, Geneva, NY 14456

Decline of Eurasian water milfoil (*Myriophyllum spicatum*) population at both south and north ends of Cayuga Lake has been observed since 1980s. Past literature suggested that herbivory was responsible for the decline. However, a recent survey in 2008 showed Eurasian milfoil was the most abundant species at the south end followed by native water stargrass (*Heteranthera dubia*) whereas water stargrass was the only dominant species at the north end with just few Eurasian milfoil. Insect herbivore populations have not been different at the two ends. This suggests there might be other important factors contributing to the decrease in water milfoil at the north end and the possible increase at the south end. Therefore a series of experiments were conducted to investigate the interactions between Eurasian milfoil and water stargrass. The competition experiment revealed there were 27.0% increase in stem length and 203.2% increase in biomass in native stargrass while there were no significant changes in Eurasian milfoil. Allelopathy experiments showed that extracts from Eurasian milfoil increased stargrass biomass (+19.0%) at lower concentrations and decreased its biomass (-29.1%) at high concentrations. The results also demonstrated extracts from stargrass reduced Eurasian milfoil growth by 45.5% at high concentrations but no effects occurred at low concentrations. Results from these experiments and our findings in the lake were highly correlated. This indicates there are strong interactions among invasive and native plants such as Eurasian water milfoil and water stargrass, thereby affecting plant community in lakes. Aquatic plant management should take these interactions into account.

NOTES:

Dr. Bin Zhu is an Assistant Professor of Environmental Science at University of Hartford in Connecticut. He was a Research Scientist at the Finger Lakes Institute, NY for about three years. Bin's research interests focus on biology and management of invasive species and aquatic plants. His current projects include the management of invasive European frogbit and Eurasian water milfoil, and dynamics of aquatic plant communities in the Finger Lakes. Bin has published articles in *Aquatic Botany*, *Ecosystems*, *Fisheries*, *Journal of Aquatic Plant Management*, and *Journal of Great Lakes Research*. He is also a reviewer for a number of journals including *Aquatic Ecology*, *American Naturalist*, *Journal of Aquatic Plant Management*, *Journal of Ecology,* and *Journal of Great Lakes Research*. He currently serves on the Board of Directors of NEAPMS.

Alismataceae: The Water-Plantain of the Arrowhead Family

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The Alismataceae is one of the larger worldwide families of aquatic plants with up to 100 species in 12 genera. It is primarily tropical and subtropical with four genera in North America and three genera, *Alisma, Echinodorus*, and *Sagittaria*, in northeastern United States. The genus *Sagittaria* is the dominant member of the family in the United States with 25 species of which nine occur in the northeast. The most common species is *Sagittaria latifolia* while *S. teres* is the rarest. The closely related *S. filiformis* and *S. subulata* occur predominantly in rivers and are uncommon. *Echinodorus tenellus* is the smallest, rarest, an only representative of the genus *Echinodorus* in the northeast. Three species of *Alisma* occur in the northeast with *A. gramineum* the most restricted in its range.

NOTES:

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. During the summer of 2008 he surveyed the aquatic plants of Yellowstone National Park.

Cyanobacteria Neurotoxins and Amyotrophic Lateral Sclerosis

Tracie Caller, James Doolin, Hanna Farrar, Brent Harris, James Haney, Amanda Murby, **Elijah Stommel**

Elijah Wentworth Stommel, M.D.
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Dartmouth-Hitchcock Medical Center
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Lebanon, NH 03756

Background: There is substantial evidence to suggest that the incidence of the incurable, fatal disease amyotrophic lateral sclerosis (ALS) is increasing and that environmental influences play a role in initiating the disease. Cyanobacteria produce many toxins, including ß-methylamino L-alanine (BMAA), an amino acid that is demonstrably toxic to motor neurons and has been linked to ALS and neurodegenerative disease in humans. Eutrophication of fresh and marine water bodies has increased the prevalence of cyanobacterial blooms throughout much of the world, placing humans at risk of exposure to cyanobacterial toxins. We have identified a higher rate of ALS among New Hampshire residents living in close proximity to lakes where blooms of neurotoxin-producing cyanobacteria have been previously documented by the NH Department of Environmental Services (NHDES), Dartmouth-Hitchcock Medical Center and the University of New Hampshire (UNH). Given the association of BMAA with sporadic ALS in other parts of the world such as Guam and the Kii Peninsula, we have investigated a possible correlation between cyanobacterial blooms in NH and other northern New England water bodies and the development of sporadic ALS.

Objective: To initiate a collaborative effort involving Dartmouth Medical School, DHMC, UNH Center for Freshwater Biology, UNH Cooperative Extension, NHDES, and the Institute for Ethnomedicine in order to investigate a possible link between toxic cyanobacterial blooms and the development of ALS.

NOTES:

Dr. Elijah Stommel is an Associate Professor of Medicine at Dartmouth Medical School in Hanover, New Hampshire. Dr. Stommel is also a Staff Neurologist at The Hitchcock Clinic in Lebanon, NH and a Consultant Neurologist at the VA Medical Center in White River Jct., VT. Dr. Stommel received a B.A. from Bowdoin College and studied at M.I.T. and as a Research Assistant at the Marine Biological Laboratory in Woods Hole, before earning his M.D. and a Ph.D. in Physiology from the Boston University School of Medicine. Dr. Stommel has a lengthy list of presentations and published journal articles and is involved in education and research. He is currently involved in Epidemiology research in ALS related to BMAA and clinical trials research in ALS and peripheral neuropathy.

Toxic Blue-Green Algae: What Every Lake Manager Should Know

Bill Ratajczyk
New Product and Technology Development Manager
Applied Biochemists, an Arch Chemicals, Inc. Company
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There is increased awareness, discussion, research, monitoring, and publicity surrounding Harmful Algal Blooms (HAB's). For those professionally involved or for impacted stakeholders, the real concerns, disguised under this rather generic title and acronym, are algal toxins. A variety of byproducts metabolized within different algal species can have very targeted detrimental ecological effects ranging from killing fish and causing brain disease in waterfowl and predatory birds to ruining habitat of endangered or protected animals. Actual and potential impacts to humans range from making drinking water taste and smell bad or killing their pets to direct health issues including: rashes, respiratory distress, liver or nerve damage, and/or gastrointestinal inflammation. Despite scientific verification of these real and potential threats to both human health and environment, there is seemingly a lack of urgency, direction and consistency as to how or if algal toxin problems should be or are addressed. This discussion will present a number of facts, factors, considerations, consequences and concerns relating to Toxic Algal Blooms at the local, state federal and world levels to provide a better understanding of where we stand as lake managers today and how we may help guide some decision-making in the future.

NOTES:

For the past year, Bill has served as the New Product and Technology Development Manager for Applied Biochemists, an Arch Chemicals, Inc. Company. For the preceding 19 years, Bill was a Technical Sales Manager with Applied Biochemists after working as a Field Technician and Applicator at Marine Biochemists for three years. Bill earned a B.S. in Aquatic Biology from the University of Wisconsin. He has served on the Board of Directors for the Midwest A.P.M.S. for 15 years and served two terms as its President. With more than 20 years of technical speaking experience, Bill is a nationally recognized expert in algal management. In 1995, Bill was awarded Applied Biochemists Innovation Award for formula ideas leading to the development of new chelated copper products.

Algal Identifical Workshop

Tuesday, January 19th 5:00-6:00 p.m.

Kenneth J. Wagner, Ph.D., CLM.
AECOM, Willington, CT.
ken.wagner@aecom.com

NOTES:

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.

Dreissena in Massachusetts: A Look at the Background and Response to Zebra Mussels in the Bay State

Tom Flannery, Aquatic Ecologist
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Lakes and Ponds Program
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Although the infamous Zebra Mussel had been knocking on our door for quite some time, this aquatic invader was not documented in Massachusetts until July of this past summer and caused quite a stir in the Bay State. We will briefly discuss the species' background but this talk will focus primarily on the discovery of the mussels by DCR-trained volunteers, the conditions of the first water body affected, the State's response through the "Interim Zebra Mussel Action Plan", results of the rapid response surveys of western Massachusetts water bodies, and next steps including the Governor's appointment of an official Zebra Mussel Task Force.

NOTES:

Tom Flannery graduated in 2002 from the University of Massachusetts, Amherst, with degrees in Wildlife and Fisheries Conservation and Biology. He worked for Lycott Environmental, Inc. of Southbridge MA between 2003 and 2007, prior to be hired as Aquatic Ecologist for the DCR Lakes and Ponds Program in September of 2007. Tom serves as a primary contact for freshwater aquatic invasive species in Massachusetts and continues to conduct surveys for aquatic invasive species and also to assess and oversee management of these species in Commonwealth lakes and ponds. He participates in State and regional invasive species working groups and presents at numerous workshops and conferences. Tom has served as a primary contact for zebra mussels in Massachusetts since the development of the Lakes and Ponds Program's 2008 "Zebra and Quagga Mussel Education, Monitoring, and Outreach Program". He has attended symposiums and workshops with Pennsylvania Sea Grant and Lake Champlain regarding zebra mussels; and served as project manager in development of educational signage and brochures, education of user groups, DCR boat ramp monitors, and volunteer training in identification of zebra mussels, sample collection and identification of zebra mussel veligers using the cross-polarization technique. Tom was the primary contact and confirmed the volunteers' discovery of zebra mussels in Laurel Lake. With other DCR staff, conducted SCUBA surveys of Laurel Lake, Quabbin Reservoir, Lake Mansfield, Otis Reservoir, and Big Pond. Currently serves as project manager for the rapid response surveys of Berkshire County lakes.

Rapid Response Planning for Aquatic Invasive Species in the Lake Champlain Basin

Meg Modley
Aquatic Nuisance Species Coordinator
Lake Champlain Basin Program
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Lake Champlain Basin partners recognize the ecological, economic, and possible human health implications of the 49 known nonnative species in Lake Champlain. Protecting Lake Champlain from future aquatic invasive species invasion is a high priority. The best approach is to prevent the introduction of aquatic invasive species through early detection, monitoring, and education and outreach. However, when prevention measures fail and a new AIS is discovered, rapid response is the last line of defense. Rapid response planning was conducted in the Lake Champlain Basin to ensure a coordinated interstate and international response in which staff, expertise, equipment, and other resources may be shared. The Rapid Response Plan identifies lead agencies in each jurisdiction, provides and step by step plan, a species evaluation questionnaire (risk assessment), priority species for management, and a thorough review of all applicable permits for control options. Valuable lessons were learned by identifying gaps in policy and legislation in the review of permitting process.

NOTES:

Meg Modley is the Aquatic Nuisance Species Management Coordinator for the Lake Champlain Basin Program where she has worked for the past 6 years. She coordinates aquatic invasive species management in the Lake Champlain Basin with the states of VT, NY, and the province of QC. She has been involved with the development of a binational rapid response action plan for the Lake Champlain Basin, coordinates the Lake Champlain boat launch steward program, and is currently a chair of the Northeast Aquatic Nuisance Species Panel.

Do Plant Growth Regulators Have a Fit in Aquatic Plant Management?

Alan "Bo" Burns
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The use of plant growth regulators (PGR's) in agricultural production within the United States began in the 1930s. PGR's or inhibitors are being used increasingly to suppress seedheads and leaf growth due to rising mowing costs and danger to operators and the environment in roadsides, airports and golf course roughs. In recent years, new chemicals have been developed which may be used in higher maintained commercial situations and environmentally sensitive areas. So what are PGRs? Simply put, PGR's are chemicals used to alter the growth of a plant or plant part. With this in mind the questions has been asked if PGR's could have a fit in Aquatic Plant Management. This presentation will take a look at what PGR's are and examine where and when they might have a fit in Aquatic Plant Management. Aquatic plants are well known and understood as being a valuable part of many aquatic environments, but we also know that an over abundance of aquatic plants can interfere with many uses of our waterways. PGR use in aquatics may provide nuisance level relief, while also leaving plants in the environment to function as wildlife habitat.

NOTES:

Bo Burns has worked in Aquatic plant management and exotic plant management for the last 24 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. He 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 also 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. He also spent 9 years working for SePRO Corporation as an Aquatic Specialist working in aquatic plant management. He currently is in his sixth year with BASF working as an Aquatic Market Development Specialist. He is a past president for the NEAPMS, SCAPMS and past board member for the Mid West APMS. He is currently serving as a board member for the National Aquatic Plant Management society and is on the board of directors for the Aquatic Ecosystem Restoration Foundation. He also serves on the aquatics committee for RISE (Responsible Industry for a Sound Environment)

Whole Lake, Early Spring Applications of Endothall Combined with low dose 2,4-D for Selective Control of Eurasian Watermilfoil and Curlyleaf Pondweed

John G. Skogerboe
*Research Physical Scientist
U.S. Army Engineer Research and Development Center
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Curlyleaf pondweed (*Potamogeton crispus*) and Eurasian watermilfoil (*Myriophyllum spicatum*) have become wide spread problems in many northern lakes. Previous research conducted on four lakes in MN demonstrated that applying endothall (1 mg/L active ingredient [ai] applied as Aquathol K) combined with 2,4-D (0.5 mg/L ae applied as DMA 4) in early spring to blocks within the lakes resulted in good control with a high level of selectivity. Based on these results, a cooperative field study was initiated with the WI Department of Natural Resources on Half Moon Lake (111 acres), Eau Claire, WI to demonstrate selective, long-term control of curlyleaf pondweed and Eurasian watermilfoil using whole lake, early spring applications of endothall combined with 2,4-D. Pretreatment plant surveys were conducted in June and August of 2008 using the point intercept method with a 40 x 40 m grid. The lake was treated with endothall (1 mg/L ai) and 2,4-D (0.1 mg/L ae) in April 2009. Post treatment plant evaluations were conducted in June and August, 2009. Additional herbicide treatments will be conducted as needed through 2012, although additional endothall treatments are anticipated through at least 2011 to deplete residual curlyleaf pondweed turions in the sediment. A comprehensive herbicide water herbicide residue sampling program was conducted in 2009 (pre treatment, 1, 2, 3, 5, 7, 11, 14, 21, 28, 35, 56, 63 days after treatment) to quantify herbicide degradation rates. Samples were analyzed for endothall and 2,4-D using enzyme-linked immunosorbant assay (ELISA). Control of both curlyleaf pondweed and Eurasian watermilfoil was excellent based on visual observation, but point intercept data for both species as well as native species and water residue concentrations will be reported.

NOTES:

Mr. Skogerboe has been involved in studying the management of aquatic plants since 1994. He is currently stationed at the US Army Engineer Research and Development Center, Eau Galle Aquatic Ecology Laboratory, Spring Valley, WI where his research interests have focused on the selective chemical control of submersed, floating and emergent exotic plant species. He began his Federal career with the Environmental Laboratory at the US Army Engineer Research and Development Center (ERDC), Waterways Experiment Station, Vicksburg, MS, in 1977. Mr. Skogerboe has a BA degree in Environmental Science from the University of Virginia, and an MS degree in Civil Engineering from Louisiana Tech University. He also serves as a technical reviewer and advisor pertaining to aquatic herbicide issues for various Federal and state agencies. He has authored or co-authored numerous articles on chemical control of aquatic and wetland vegetation.

Trio of insect herbivores control Eurasian watermilfoil in Chautauqua Lake, NY

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Chautauqua Lake a large recreational lake in western New York has a long history of managing submersed macrophyte growth with herbicides and lake-wide use of mechanical harvesting. The primary target of control has been the excessive growth of the exotic Eurasian watermilfoil (*Myriophyllum spicatum*). The lake's harvesting operation is one of the largest in the United States and operates from late May until September. In spite of this, much of the extensive littoral zone remains unmanaged by harvesting. These areas harbor large diverse populations of invertebrates including numerous herbivores. Three aquatic insects, a naturalized pyralid moth (*Acentria ephemerella*), a native weevil (*Euhrychiopsis lecontei*) and a native caddis (*Nectopsyche albida*) feed selectivity causing significant damage to watermilfoil. An outbreak in 2007 of the caddis *Nectopsyche* a longtime resident of Chautauqua devoured several hundred hectares of standing watermilfoil, damaged earlier in the season, by the other two herbivores. While this caddis eats watermilfoil, we find no reference of it being an important herbivore of the plant. Watermilfoil did not return in any significant quantity in 2008 and growth in early 2009 is severely depressed. Plant abundance measures show a significant decrease of the exotic invasive from early 2007 contrasted to late summer 2007, and early and late Summer 2008 with preliminary observations indicating that growth in 2009 will also remain significantly less. We will present multiyear population estimates of *Acentria* and *Euhrychiopsis* densities similar to earlier published findings of the effective density necessary to negatively impact watermilfoil growth.

NOTES:

Robert L. Johnson is the Manager of the Cornell University Research Ponds that support research, teaching and Cornell Cooperative Extension activities in Aquatic Ecology. Personal research utilizes the Research Ponds and numerous lakes throughout New York State to concentrate on investigating factors that influence aquatic plant growth. Current studies focus on the aquatic plant pest, Eurasian watermilfoil, and assess the effects that insect herbivores have on its growth in New York Lakes. In addition, since 1966, a major task is to provide aquatic plant information through outreach programs in New York State to Cornell Cooperative Extension, New York Department of Environmental Conservation, lake associations, soil and water conservation districts and watershed groups. Bob has been active with NEAPMS since its formation serving multiple terms on the Board of Directors, as Editor and is the current President.

Patten's Unpatented Methods for Controlling *Myriophyllum spicatum* L.

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In the early 1950's, when Lake Musconetcong (Morris and Sussex Counties, NJ) was already brimming with *Myriophyllum spicatum* and chemical control had already been attempted, a young Master's student named Bernard Patten undertook an extensive ecological study of this now-infamous aquatic weed. In response to both "the futility of all [previous control] efforts... [and] the clamor of local public opinion," Patten, now Regent's Professor in the Odum School of Ecology at the University of Georgia, made detailed observations and conducted experiments on each life history stage of *M. spicatum*, as well as on its habitat requirements and preferences. His goal was to make ecologically sound management recommendations that would "provide the best results with the least expenditure of time and effort" (and money). Patten advocated a combined approach of altering habitat favorability and inhibiting both sexual and vegetative reproduction. More than 50 years later, the pages of Patten's M.S. thesis have yellowed, but his control recommendations for *M. spicatum* are still based on sound ecological principles and remain as promising as when they were made. Patten's research is presented as a model for understanding a species' basic biology—especially reproductive biology—and ecology as a critical first step towards effective management.

NOTES:

Robynn K. Shannon earned a Ph.D. in Plant Ecology from the University of Connecticut and an M.S. in Botany from the University of New Hampshire, and has been certified as an Ecologist by the Ecological Society of America. She has been a faculty member at Wesleyan University (CT), Ramapo College of New Jersey, and Eastern Connecticut State University. 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. She is currently collaborating on a study of ploidy levels in *Najas* with Don Les (University of Connecticut) and serving as a Scientist Mentor for the Botanical Society of America. She loves "getting her feet wet," and considers herself fortunate to count both Garrett Crow and Barre Hellquist as mentors on aquatic plants. She enjoys trail running in her free time.

POSTER **NEAPMS Scholarship recipient**

Examining the Ability of Hydroacoustics to Identify Eurasian Watermilfoil across a Trophic Gradient

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Management of Eurasian watermilfoil (EWM) requires the ability to quickly evaluate its presence on a large scale to ensure all of its loci are contained within the management effort. This project has utilized hydroacoustics to swiftly and accurately identify milfoil in a range of lakes along a trophic status gradient (Lake George, oligotrophic; Lake Hortonia, mesotrophic; and Saratoga Lake, eutrophic). At each lake we deployed a Biosonics DTX system with 430 kHz and 70 kHz transducers pinging 10 x per second with a pulse width of 0.1 ms. Previously we have reported success in EWM identification in Lake George, a large oligotrophic lake with a managed EWM population (via hand harvesting, suction dredging and benthic matting). Lake Hortonia (VT) is a mesotrophic lake with abundant native plant life and a managed widespread EWM population. Saratoga Lake (NY), a eutrophic lake, also has an extensively managed and controlled milfoil population. Generally, at each lake, locations with known milfoil and a mix of native species were chosen to be included in a series of transects within each lake. Successes and failures at each lake and comparisons between efforts on each lake will be presented.

POSTER

Response of *Myriophyllum heterophyllum* and Non-Target Plants to Two Different Concentrations of 2,4-D BEE

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Variable watermilfoil (*Myriophyllum heterophyllum* Michx) is considered to be the most problematic and widespread invasive aquatic plant in freshwater lakes and ponds in New Hampshire. Recent herbicide evaluations completed by the US Army ERDC determined that 2,4-D BEE (granular formulation) was the most effective herbicide for control of New Hampshire strains of variable watermilfoil. These findings have been anecdotally confirmed by the results of treatments performed in New Hampshire over the past two decades, but limited comprehensive analysis of actual treatment sites has been performed. Over the course of the 2009 summer season, differences in the efficacy of 200lbs per acre and 100lbs per acre treatment rates were evaluated utilizing presence/absence data from point intercept surveys conducted prior to treatment and twelve weeks post-treatment. Background variation was evaluated at two control (no-treatment) sites utilizing the same methods. In general, for both treatment groups in all of the experimental sites, the percent frequency of occurrence for variable watermilfoil declined dramatically post treatment as compared to pre-treatment conditions. The results of the 2009 survey work are presented, including geospatially referenced maps depicting the distribution of variable watermilfoil prior to treatment and after treatment, chi square test results comparing pre and post treatment variable watermilfoil frequency of occurrence data, and mean species richness values for all experimental groups and control groups. Factors affecting the variations in frequency of occurrence of variable watermilfoil as well as variations in mean species richness among the two experimental groups (200 lbs per acre and 100 lbs per acre) will be discussed.

POSTER

The State University of New York College at Oneonta announces a Master of Science in Lake Management

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The Biology Department at SUNY Oneonta has proposed a MS in Lake Management that has reached the final approval stages. It is expected to be first offered during the fall semester of 2010. The program will train students for careers as lake managers capable of modifying the character and quality of our aquatic resources to meet the needs of water providers, lakeside municipalities and recreational lake users, as well as improving the quality of life for those who live, work and play on our tens of thousands of inland lakes, ponds, reservoirs and the streams tributary to them. Degree recipients will meet the requirements to apply for certification as Lake Manager (CLM) by NALMS. The program will include 32 hours of theory and closely-aligned field and laboratory experiences as well as thesis research involving the development and implementation of a lake management plan and monitoring of short-term responses. Admission to the program will require a baccalaureate, including undergraduate courses in the natural sciences, communications, business, government and statistics. Those deficient in undergraduate requirements may be accepted provisionally on the condition that such deficiencies are made up. It is expected applicants may have a diversity of widely varying technical and liberal arts backgrounds.

Requested data:
Dr. Willard N. Harman, SUNY Distinguished Service Professor, The Rufus J. Thayer for Otsego lake Research and Director, SUNY Oneonta Biological Field Station, 5838 St. Hwy. 80, Cooperstown. NY 13326. FAX 607-282-4009, harmanwn@oneonta.edu

Biography:

1956. US Navy. Explosive and Nuclear Weapons Disposal
1965. BS. SUNY College of Forestry, Syracuse
1968. PhD. Cornell University, Ithaca
1968 Post-PhD. Marine Biological Laboratory, Woods Hole, Mass.
1968 – present SUNY Oneonta

POSTER

NEAPMS Scholarship recipient

Use of Upflow Water Circulators for Managing Eurasian Watermilfoil in Lake Cochituate

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Eurasian watermilfoil (*Myriophyllum spicatum*, milfoil) is an invasive submerged aquatic macrophyte that was first identified in Lake Cochituate, a three-basin lake in eastern Massachusetts, in 2002. Milfoil and is now established in all three basins, with the heaviest densities (50-75% coverage in beds along the shoreline) in Middle and South Ponds.

To help control milfoil growth in Lake Cochituate upflow water circulators – an alternative to conventional mechanical, chemical and biological treatment measures – were deployed. Upflow circulators have been used in lakes and waste-water ponds to control blue-green cyanobacteria, and there is anecdotal evidence that they can reduce milfoil growth. We hypothesized that vertical circulation increases delivery of well-oxygenated surface waters to the sediments thereby promoting sediment oxygenation, and conversion of ammonia, the preferred nitrogen source for milfoil, to less utilizable, oxidized nitrogen species. Our objectives were to determine if water circulation reduced milfoil biomass in plant beds, and whether circulation significantly changed water column and sediment pore-water nutrient levels.

Two upflow circulators were installed in October 2006, one in the South Basin and one in the Middle Basin in areas with moderate-to-heavy milfoil cover. Measurements of physical and chemical parameters in the water column and sediment pore water, as well as milfoil density, were made before the circulators were installed in August and September 2006 and throughout the growing season (May – October) in 2007. Surface water quality and milfoil density measurements were also made monthly from May to October in 2008. Measurements included temperature, pH, conductivity, dissolved oxygen, chlorophyll-*a*, secchi depth, total dissolved phosphorus, ammonia, nitrate and nitrite, total dissolved iron, total suspended solids, turbidity, and alkalinity.

Our results show that there was no apparent change in milfoil abundance or distribution in the study areas of Middle Pond and South Pond over the course of the investigation. Some seasonal changes in milfoil growth were observed but these did not appear to be attributable to the action of the circulators. Likewise, changes in sediment pore-water ammonia and nitrate levels did not appear to be due to the circulators. The sediment pore water at all four sites was generally anoxic (dissolved oxygen levels were <1 ppm) on all measurements dates. Pore-water ammonia levels generally increased with sediment depth on all dates at both sites in each basin. Ammonia levels exceeded 1 ppm at most sediment depths, a level that is well in excess of published thresholds to support milfoil growth. Pore-water ammonia levels increased throughout the growing season, but by September the levels dropped sharply (presumably due to uptake by macrophyte roots) in both the Control and Experiment sites in each basin. Nitrate levels in the pore water also did not show differences between Control and Experiment sites in either basin. Like ammonia a seasonal nitrate increase was observed at all sites, followed by a decrease at the end of the growing season, presumably due to uptake by rooted macrophytes. Pore-water phosphate levels did not appear to exhibit any discernible temporal or spatial variations in either basin.

In the water column there were no apparent differences in T, DO, pH, conductivity, or chlorophyll-*a* between the Control and Experiment sites in the two basins on all sampling dates. Changes in some of the parameters (e.g., T and DO) appear to be due to seasonal effects. Ammonia, nitrate, total dissolved iron, alkalinity, and turbidity were also generally indistinguishable between the Control and Experiment sites on all measurement dates.

Our results in Lake Cochituate show that after nearly two years of circulator use, there was no measurable change in milfoil extent or abundance within the study areas of the lake. These results suggest that in highly anoxic sediments where O_2 supply is exceeded by O_2 demand, milfoil is still capable of growing.

Maris Mann-Stadt is a native of Asheville, NC. She is currently a senior at Tufts University, majoring in Environmental Engineering. Maris has always enjoyed working outside and became even more interested in environmental projects after working with the Student Conservation Association to remove invasive species in the Upper Connecticut River Basin during the summer of 2006. She is currently an active member of both the Tufts Cycling Team and the Tufts Mountain Club. Maris sincerely appreciates the opportunity to work on this project, which would not have been possible without the funding provided by NEAPMS.