ABSTRACTS AND BIOGRAPHIES FOR PRESENTATIONS

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NORTHEAST AQUATIC PLANT MANAGEMENT SOCIETY

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

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Devon Taylor
National Accounts Manager
SonicSolutions – Algae Control Without Chemicals
dtaylor@sonicsolutionsllc.com

Algae Control Without Chemicals

As more and more communities and states tighten up the limits and rules on chemical applications in bodies of water, pond managers are being encouraged, and sometimes forced, to look for alternative tools for algae control. The United States Environmental Protection Agency is working on new National Pollution Discharge Elimination System rules that will place new limits and rules on pond and lake managers as well. Ultrasonic technology is an environmentally friendly and cost effective way to achieve algae control. Ultrasonic technology is safe for fish, frogs, snakes, turtles and all other forms of aquatic life – except algae. Ultrasonic technology is not a tool to be used in every pond, however. This presentation will discuss the biology behind how ultrasonic technology works, what it is capable of, it's limits, recent studies and the best use of ultrasonic technology.

Devon Taylor is the National Accounts Manager for SonicSolutions ~ Algae Control without Chemicals. She has been involved with SonicSolutions since the company started in 2003, and has been the National Accounts Manager for the past year. Devon's primary clients/applications include golf courses, home owners associations, municipalities, and private ponds, including national accounts like Trump Golf and Troon Golf Management (largest golf management company in the world). SonicSolutions is a 7 year old company with over 2,000 devices installed around the world including Canada, Mexico, Australia, South Korea, Spain, England, United Arab Emirate, New Zealand and Germany.

Bill Ratajczyk
New Product and Technology Development Manager
Applied Biochemists, an Arch Chemicals, Inc. company
billratajczyk@appliedbiochemists.com

Targeted Algal Management Case Studies; using lake based data to proactively manage problematic Algae and Cyanobacterial blooms

Algae and Cyanobacteria under varied conditions are known to produce seasonal blooms; events of dominance changing the population dynamics of the phytoplankton population and the aquatic ecosystem. Bloom conditions can result in a "boom" phase during the high growth stage; and a "crash" phase after the logarithmic growth quickly senses. During the "boom" and after the "crash" algae and cyanobacteria can potentially produce secondary compounds affecting the aquatic ecosystem, and in turn the use of the water as a resource. Impaired water resources include Drinking Water where Algae and Cyanobacteria produce compounds such as 2-methylisoborneol (MIB) and Geosmin that contributes to undesirable tastes and odors in the potable water source. In cases when specific possible toxin producing Cyanobacteria are in the bloom cycle; toxic compounds can be produced including substances such as Microcystin. As a result the Water Body during bloom phase may be prohibited to use and impair all water uses without further treatment.

Targeted Algal Management (TAM) is an adaptive technique to proactively treat an algal bloom; evaluating multiple key data parameters from a water resource monitoring program. Site specific case studies with relevant data to drive sound management decisions provide information to evaluate future TAM decisions for proactive management. In each case, an Algal Challenge Test at Clemson University was conducted in vivo to gain predictive insight to rate and product choice for a proactive algaecide application. Application methods were refined based on in situ cell counts(density) relative to potentially problem species.(classification) Case studies of recorded TAM techniques from 2000 to 2011 reflect results relative to greatly improved water quality and restoration of the water use; reflected in data collected pre and post treatment.

Bachelors of Science- University of Wisconsin Stevens Point—Aquatic Biology

- 3 Years New Product and Technology Development Manager
- 19 Years Technical Sales Mgr. Applied Biochemists
- 3 Years Field Tech./Applicator/ Marine Biochemists
- 2 times President Midwest A.P.M.S. (99) & (05)
- 15 Year Board of Directors Midwest A.P.M.S.
- 22 years Technical speaking experience
- Member of Wisconsin Invasive Species-Scientific Advisory Group/Aquatics
- Applied Biochemists Innovation Award (1995) – for formula ideas leading to development of new chelated copper products

West M. Bishop
Algae and Aquatic Research Scientist; SePRO Corporation, SePRO Research and Technology Campus, Whitakers, NC
westb@sepro.com

Advanced Solutions for Combating Harmful Algal Infestations

With increased demand on our freshwaters, factors that threaten water quality elicit devastating ecological and economic consequences. Numerous types of algae that infest our critical water resources are resilient to conventional treatment methods. Other algae continually persist and re-grow following algaecide treatments resulting in minimal abatement of obviated water resource uses. Progressive solutions like Captain XTR, a chelated copper algaecide with a unique surfactant package, and SeClear, an algaecide and water quality enhancer, can alleviate the constraints imposed by nuisance algal infestations. The objectives of this presentation are 1) to show responses of dense and robust algae to exposures of Captain XTR and 2) to provide data on the efficiency of SeClear at controlling algae, removing phosphorus and preventing re-growth of harmful algae. Captain XTR was able to significantly decrease biomass (over 85% compared with initial values), plant height (60% decrease) and chlorophyll content of Starry Stonewort (*Nitellopsis obtusa*: Charophyta) in 3 weeks. Captain XTR also controlled *Lyngbya wollei*, Cyanophyta, in both laboratory and field studies. SeClear significantly decreased phosphorus levels in field management programs (30-99%), controlled a broad range of nuisance algae (*Oedogonium*, *Pithophora*, *Chara*), and selected for a beneficial algae assemblage that supported a healthy ecological system. By evaluating the immediate and long-term impacts of these advanced algae and water quality solutions, an efficient and effective management strategy can be implemented for a specific site.

Contributors:
Bob Johnson, Aquatic Consultant, SePRO Corporation
Sarah Miller, Aquatic Specialist, SePRO Corporation
Mark Heilman Ph.D., Aquatics Technology Leader, SePRO Corporation

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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. In January 2011, he took a position with SePRO Corporation as Algae and Aquatic Research Scientist where he continues to provide scientifically defensible solutions for ecologically sound algae management and water quality improvement.

Mark A. Heilman
SePRO Corporation
11550 North Meridian Street, Suite 600
Carmel, IN 46032
Ph: 317.388.3336

Innovative Formulation Development for Sonar, Renovate, and Clearcast Herbicides: Past, Present, and Future

Much has been learned on operational performance of formulations of Sonar™ (a.i., fluridone), Renovate™ (a.i. triclopyr), and Clearcast™ (a.i. imazamox) Aquatic Herbicides. These experiences have led to refinements in formulation design to better enhance efficiency of controlling various aquatic invasive plants. Low-dose use patterns for Sonar have been optimized through the use of controlled release pellet formulations to better target herbicide dosing in partial site applications or higher exchange treatments. Four different Sonar pellet formulations are now available with different release profiles for improved control of different target plants and under various treatment conditions including water exchange and sediment type. The latest formulation improvement for Sonar is the newly registered Sonar Genesis™ liquid formulation, which shows potential in 14C translocation studies for up to 60% greater herbicide uptake by target submersed plants and enhanced action on floating weed target plants while maintaining overall selectivity. The introduction of Renovate OTF and MAX G (auxin combination) granules has provided improved delivery and performance of auxin herbicides for targeted selective management. Recent 14C studies indicate that these granular formulations can increase herbicide absorption by milfoil root crowns by as much as 10X versus liquid formulations, and research has built off these findings for future formulation refinement. Finally, field dissipation monitoring and efficacy assessments have shown that the new 2.7G formulation has improved targeted treatment designs for Clearcast application to curly-leaf pondweed and other potential target submersed weeds.

Contributors
Tyler Koschnick, Ph.D., SePRO Corporation, Carmel, IN
Hamid Ullah, SePRO Corporation, Whitakers, NC
Todd Horton, SePRO Corporation, Anderson, SC
Cole Hulon, SePRO Corporation, Whitakers, NC

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 coordinates SePRO's development of new technical solutions for management of aquatic invasive species, with an emphasis on aquatic invasive plants.

Jill Calabro, PhD,
Research and Development Specialist
Valent USA Corporation
227 Garden Gate Lane
Annapolis, MD 21403
Jill.calabro@valent.com

A Case Study of the Operational Use of Tradewind Herbicide for the Control of Hydrilla in a Florida Lake

Hydrilla verticillata is a submersed invasive plant which causes severe disruptions to native ecosystems, inhibits water flow and navigation, and tends to monopolize systems in the Southern USA when allowed to grow unmanaged. Bispyribac-sodium, marketed as Tradewind Herbicide by Valent USA Corporation, received an EPA Section 3 registration in early Spring 2011 and was registered for us within the State of Florida by June 1. Tradewind is an ALS inhibitor (acetolactate synthase).

The key requirements for aquatic herbicide use include the following: control the target species, high level of selectivity to native plant species, few or no water use restrictions, and ease of application and handling.

This paper will review the first large scale lake application of Tradewind in Florida including Hydrilla control, non-target effects, residues, and other data collected following an operational application.

Jill Calabro is a Research and Development Specialist with Valent Professional Products and has been in this position for 5 years. She received her BS from Iowa State University, her MS from the University of Minnesota, and her PhD from Oregon State University.

Jim Petta, Territory Manager,
Valent USA Corporation
5221 River Oaks Drive, Corpus Christi, TX 78413
Jim.petta@valent.com

A Summary of the Field Use of Clipper Herbicide (flumioxazin) in the First Year of Use, 2011

Clipper (flumioxazin) received its Section 3 EPA registration in November of 2010 followed by most state registrations within a few months. Clipper is from a new class of herbicides called the PPO inhibitors. It has already become a significant asset in the control of difficult invasive and nuisance plants including Fanwort (*Cabomba caroliniana*), East Indian Hygrophila (*Hygrophila polysperma*), coontail (*Ceratophyllum spp*.), watermeal (*Wolffia spp*.), duckweed (*Lemna spp*.), waterlettuce (*Pistia stratiotes*), and others. In addition, Clipper also demonstrated selectivity to native and non-target species.

This paper will review the field experiences of Clipper in 2011 and research efforts on others.

Jim Petta is the territory manager for Valent USA Corporation Aquatics. Jim joined Valent USA Corporation in July of 2010 after 25 years in various technical and commercial roles within Aquatics and the agricultural industry. Jim received his BS from Texas A&M University and his MS from California State University. Jim has commercial responsibility for the aquatics market for Valent USA Corporation.

Hands-On Plant Workshop

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.

<u>Presented by NEAPMS Experts:</u>

Robynn K. Shannon, Ph.D., University of Connecticut, rndshannon@cox.net
Robert L. Johnson, Cornell University, rlj5@cornell.edu
Chris Doyle, Allied Biological, Inc., doyle@alliedbiological.com

Kurt D. Getsinger, PhD
Research Leader
Chemical Control and Physiological Process Team
US Army Engineer Research and Development Center
Vicksburg, MS, USA

KEYNOTE SPEAKER

The Future of Third-Party Research and Development as Related to Aquatic Plant Control

Since 2002, the US Army Engineer Research and Development Station (ERDC) has spear-headed a public-private-academic research and development (R&D) partnership that has revolutionized the aquatic herbicide landscape. Cooperators have included Federal and state agencies, university research institutions and non-profit organizations, such as the Aquatic Ecosystem Restoration Foundation (AERF). These collaborative efforts played a key role in re-registering the important old chemistries, and helped produce seven new compounds labeled for aquatic sites. In addition, invasive plant subject matter expert positions have been established within the US Environmental Protection Agency, via the ERDC, the AERF, and the Weed Science Society of America. The success of this multi-faceted partnership led to the most innovative decade of aquatic herbicide technology in over 25 years. However, continued erosion of Federal funds will necessitate the creation of a new and refined model to maintain a national level of unbiased, third-party R&D activities. The scope of this new model may have to include non-chemical and integrated alternatives, as resources for those efforts are dwindling as well. What will be the structure of this new model, how will it be funded, and when should it be launched?

Dr. Getsinger has been studying the biology, ecology, and management of aquatic plants since 1973, focusing on chemical control of submersed, floating and emergent invasive species. After staff appointments at several universities, he began his Federal career at the US Army Engineer Research and Development Center (ERDC), Vicksburg, MS, in 1986. Since 1988 he has been the research leader of the Chemical Control and Physiological Processes team at the ERDC. Dr. Getsinger earned a BS-Biology from Campbell University, an MS-Biology from East Carolina University, and a PhD-Plant Physiology from Clemson University. He is past president of the Aquatic Plant Management Society and an active member of other national and regional scientific organizations.

Dr. Getsinger has served on the board of the Council for Agricultural Science and Technology (CAST), chairs the Technical Advisory Committee of the Aquatic Ecosystem Restoration Foundation (AERF), serves on the US Department of Agriculture IR-4 Project Aquatics Committee, and is an aquatics subject matter expert at the US Environmental Protection Agency Office of Pesticide Programs. He also serves as technical advisor for over 30 Federal, state, and international water resource and aquatic plant management agencies. He currently holds adjunct faculty appointments at Mississippi State, North Carolina State, and Portland State universities. Dr. Getsinger has authored over 150 scholarly articles on the management of aquatic and wetland vegetation using herbicides.

John D. Madsen
Geosystems Research Institute,
Mississippi State University

Evaluating the Effectiveness and Potential Interactions of Combining Triclopyr and 2,4-D for Eurasian watermilfoil Control

Invasive aquatic plant species are a widespread problem in the northeast, often occurring in aquatic habitats that in the past have proved difficult for management. Applying combinations of herbicides at permissible concentrations is one approach in which adequate concentrations and exposure times may be achieved. We tested combinations of liquid triclopyr and 2,4-D alone and in combinations ranging from 0.02 to 0.16 mg/L of triclopyr and 2,4-D from 0.08 to 0.64 mg/L. Statistically significant control with triclopyr required 0.08 mg/L, with only 68% control achieved with 0.16 mg/L of triclopyr alone. Statistically significant control with 2,4-D occurred at a threshold of 0.16 mg/L with 98% control at 0.64 mg/L. Combinations of 0.02 mg/L triclopyr and 0.08 mg/L of 2,4-D provided statistically significant control, with 90% control at four WAT with only 0.04 mg/L of triclopyr combined with 0.16 mg/L of 2,4-D. An analysis using the Colby equation indicated that the effectiveness of 2,4-D and triclopyr together is additive. Effective control with combinations of the two active ingredients at low concentrations enhances the potential for selective control and effective applications at low levels, where in-water concentrations may be limited by formulation and label restrictions.

Co-Author: Ryan M. Wersal

Dr. John D. Madsen is an Associate Extension/Research Professor in the Geosystems Research Institute and the Department of Plant and Soil Sciences, Mississippi State University. Dr. Madsen is responsible for coordinating programs on invasive species for the Geosystems Research Institute. He is also responsible for research, education and outreach on invasive aquatic plants. Before joining the faculty of Mississippi State University in 2003, he was an Assistant Professor of Biology at the Minnesota State University, Mankato from 2000 to 2003; and a Research Biologist in the Environmental Laboratory, U.S. Army Engineer Research and Development Center, Waterways Experiment Station (WES), Vicksburg, MS from 1991 to 2000. Dr. Madsen has a Bachelor of Science (1980) degree from Wheaton College, Wheaton, IL, and Master of Science (1982) and Doctor of Philosophy (1986) degrees in Botany from the University of Wisconsin-Madison. Dr. Madsen is a past editor of the Journal of Aquatic Plant Management, past associate editor of Wetlands, and a past member of the editorial board of the Journal of Freshwater Ecology. He is currently an Associate Editor for both Invasive Plant Science and Management, and the Journal of Aquatic Plant Management.

Dr. Scott Nissen
Professor Weed Science
Colorado State University
Fort Collins, Colorado
snissen@lamar.colostate.edu

Absorption and Translocation of Fluridone, Penoxsulam, and Triclopyr by Eurasian Watermilfoil and Hydrilla

Eurasian watermilfoil (*Myriophyllum spicatum*) (EWM) and hydrilla (*Hydrilla verticillata*) are submersed, invasive species that occur across much of the United States. Both species are perennials that form dense stands, impacting the ecological, recreational and economic values associated with infested water bodies. One common control method for these species is the use of systemic herbicides, including fluridone (Sonar™), penoxsulam (Galleon™), and triclopyr (Renovate®). An ongoing project has evlautated absorption and translocation of these three herbicides in EWM and hydrilla using radiolabeled herbicides. The first experiments focused on translocation to roots following herbicide exposure in the water column. Plants were treated with 10 ppb fluridone, 10 ppb penoxsulam, or 1 ppm triclopyr plus radiolabeled herbicide. A second set of experiments evaluated translocation to shoots following root exposure. The same three herbicides were used, and each were treated with 200,000 dpm of radiolabeled herbicide. For both studies, plants were harvested over a 192-hour time course. After harvest, all plant parts were dried, oxidized, and radioactivity quantified using liquid scintillation spectroscopy. Absorption by hydrilla was only 24-39% of absorption by EWM. Translocation to roots following shoot exposure was limited. A maximum of 12.5% and 2.6% was present in the roots of EWM and hydrilla 192 hours after treatment (HAT). For both species, triclopyr showed the greatest accumulation 192 HAT. Translocation to shoots following root exposure was slightly higher, with up to 24.6% and 16.2% present in EWM and hydrilla shoots 192 HAT. Following root exposure, fluridone showed the greatest accumulation in both species 192 HAT. In addition to these previous studies, ongoing experiments to evaluate differences in absorption and translocation between granular and liquid triclopyr treatments will be discussed.

Contributors:
Joseph D. Vassios, Ph.D., Colorado State University, Fort Collins, CO
Tyler J. Koschnick, Ph.D., SePRO Corporation, Carmel, IN
Mark A. Heilman, Ph.D., SePRO Corporation, Carmel IN

Ph.D. Montana State University, 1986
Assistant Professor; University of Nebraska, Lincoln, 1989-1995
Assistant, Associate, Full Professor; Colorado State University, 1995-Present

Dr. Nissen has been working on aquatic plant management for six years, primarily with sago pondweed and Eurasian watermilfoil. He has a background in herbicide behavior in plants with years of work in terrestrial plants and has now used that experience to develop an understanding of herbicide behavior in aquatic species.

Dean R. Long, AICP
Director of Environmental Planning
The LA Group
Landscape Architecture and
Engineering, P.C.
40 Long Alley
Saratoga Springs, NY 12866
dlong@thelagroup.com

Saratoga Lake Successful Management of Eurasian Watermilfoil

In the mid 1970's, just before diversion of major waste water discharges in the basin, Eurasian Watermilfoil (EWM) was introduced into Saratoga Lake. By 1980, the EWM had reached nuisance density, and control options were evaluated. This was followed by establishment of a tax district called Saratoga Lake Protection and Improvement District (SLPID). From 1986 to 2007, mechanical harvesting and drawdown were the control methods utilized by SLPID. In 2007, a three year segment whole lake herbicide treatment began. The EWM frequency of occurrences has decreased from 54% of sample points in 2004 to a low of 7% in 2009. A preliminary report from 2011 shows the EWM frequency of occurrences is under 30%, but EWM no longer forms continuous beds or impedes recreation. In 2011, a combined application of RenovateÒ and Aquathol K was completed and control of EWM is continuing. A boat launch steward program has been operated in conjunction with Paul Smiths College for the last two years. This program has contacted the largest number of recreational boaters at a single location of all the monitoring sites operated by Paul Smiths program.

Dean R. Long has assisted the Saratoga Lake Protection and Improvement District (SLPID) since 1998, starting with the preparation of grant applications. Since that time, he has advised the SLPID on invasive species management efforts along with other programs examined and carried out by SLPID. Additionally, Mr. Long has been on the NYS Federation of Lakes Board of Directors for over 25 years.

Janet Andersen, VP of Three Lakes Council, Volunteer
5 Orchard Drive
South Salem, NY 10590
fablesx2@optonline.net

BEEP: Brazilian Elodea Eradication Project on Lake Waccabuc, NY
A case study of early detection and rapid response to an invasive aquatic plant

In the summer of 2008, Brazilian elodea (*Egeria densa*) was found during an aquatic plant survey of Lake Waccabuc, in Westchester County, NY. Members of the Three Lakes Council worked with expert advisors and community residents to identify and evaluate options. Herbicides, suction harvesting, and grass carp were the top three control options considered. In making the treatment decision, criteria included a desire for eradication vs control, impact on lake users, impact on connected lakes, reproductive behavior of the target species, permit difficulties, and expense projections. Because the infestation was limited to about one acre of the 140 acre lake, because Lake Waccabuc is used for household water supplies, and because the plant does not reproduce by seeds, suction harvesting was chosen as the treatment option. The permitting process began almost immediately, and initially it was unclear what permits were needed. Permit applications were filed with ACOE, NYS DEC, NYC DEP, and the Town of Lewisboro. The local town permit was unexpectedly difficult to obtain. Funding was entirely by successful community fundraising efforts; grants were applied for but not awarded. The suction harvesting occurred during 2009, with daily management of logistical issues during the treatment. Volunteers monitored by scuba and snorkeling, and continued hand harvesting later that year. In lake monitoring continued in 2010. In 2010 and 2011, rake toss surveys were also used to continue to monitor for the presence of Brazilian elodea in the lake. The treatment approach was successful. However, only long term monitoring (with at least three years of no detection) will enable us to declare eradication and celebrate success. In the interim, the Lakes community has a much stronger awareness of invasive plants.

After almost 34 years of financial planning, treasury, and controls for a major corporation, Jan retired and returned her attention to her early interest in topics around water, and became a full time volunteer. For the local community drinking water supply, she is a director and volunteer water operator, with a NYS Grade C operator's license. She is the Vice President of the Three Lakes Council, an umbrella environmental organization for the various lake associations around three connected lakes. She is in charge of BEEP in that role. Jan currently is active in Town Committees: she is the Chair of the Conservation Advisory Committee, and is on the Lakes Committee and the Stormwater Committee. She is on the board of directors of the NYS Federation of Lake Associations, which is the NY affiliate of NALMS, and serves as their secretary as well as a member of their Bylaws and CSLAP (Citizens Statewide Lake Assessment Program) committees. Jan is also a board member and secretary for Bedford Audubon Society. In addition, Jan has taken courses at Western Connecticut in Limnology, Stream Ecology, and Vascular Aquatic Plants, and at SUNY Purchase in Aquatic Pollution and Marine Ecology.

Tim Hunt
Vermont Department of Environmental Conservation, Lakes and Ponds Management Section
tim.hunt@state.vt.us

Report on Lake Champlain Water Chestnut Management 1982-2011

After being controlled in the late 1960's with applications of 2-4-D and handpulling water chestnut control in Vermont was abandoned. In the late 1970's Vermont Department of Environmental Conservation's (VTDEC's)lake staff began noticing large growths of water chestnut again in southern Lake Champlain and realized that control efforts were essential to keep the native aquatic plant community from being wiped out. A water chestnut management program of mechanical harvesting and handpulling was initiated which has continued for 29 years focusing on Lake Champlain both in Vermont and New York waters, covering currently approximately 1300 shoreline acres. VTDEC is also managing infestations in more than 20 other waterbodies in Vermont which have become infested since the 1980's. Lack of long term funding has plagued the project through the years, but despite those and other issues Vermont and New York's water chestnut populations have been managed to a level not seen since the 1960's.

Tim Hunt, VT DEC Environmental Technician, Manager of Lake Champlain water chestnut harvesting program for over two decades.

George Knoecklein, Ph.D.
Northeast Aquatic Research, LLC
74 Higgins Highway
Mansfield Center, CT 06250
knoecklein@juno.com

Evaluation of potential impacts to Candlewood Lake from 25 years of winter water level drawdown

Beginning in 1983, the water level of Candlewood Lake, 5200 acre lake in western Connecticut, has been drawdown each winter between 4 and 9 feet to control nuisance growths of Eurasian milfoil (Myriophyllum spicatum). However, water level drawdown is unpredictable due to the variability of the winter climate and has been shown to cause impacts to lakes (Mattson et. al. 2004, Cooke et. al. 2005). To date, no evaluation has been made to determine if winter water level drawdown at Candlewood Lake is a successful weed management option or if there have been any impacts to the lake environment. This paper presents results of an evaluation of data records on water quality (water clarity, total phosphorus, total nitrogen, dissolved oxygen, water clarity), and fisheries electroshocking survey results for evidence of impacts to lake systems. In addition, distribution mapping of Eurasian milfoil was compared to drawdown exposure areas and weather records to assess success of the method at controlling the milfoil.

George W. Knoecklein is currently founder and principal of Northeast Aquatic Research a limnological research company located in Mansfield, Connecticut. George obtained his PhD from University of Connecticut in 1997 studying under Dr. Peter Rich. His thesis involved anaerobic respiration in a eutrophic lake. George got his MS Degree from Michigan State University where he studied under Cal McNabb. At MSU, George worked on two clean lakes programs, Skinner Lake, Indiana, and Lake Lansing, Michigan. In 1985, George moved to Connecticut to join Ecosystem Consulting Service, Inc., as a limnologist in it's research division. At ECS, Inc. he directed limnological studies at over 50 recreational lakes and ponds, and 20 drinking water supply reservoirs, in the Connecticut-New York-New Jersey-Massachusetts area. Studies were initiated to determine the causes of eutrophication, and evaluate the feasibility of restoration methodologies. Specific studies focused on in-lake processes such as oxygen loss, nutrient regeneration, and blue-green algae population dynamics. George has been conducting lake diagnostic work in the Northeast since 1985.

Sarah True Meadows
Graduate student/Research assistant
North Carolina State University
Raleigh, NC
sltrue@ncsu.edu

Monoecious Hydrilla Phenology on Two North Carolina Lakes

Monitoring stations were established in April 2010 to determine monoecious hydrilla growth and life stage as correlated to water temperature and light intensity. Five spatially separated locations were established on Lake Gaston, NC and VA to enable sampling across a gradient of conditions. Another study location was established on Lake Raleigh, North Carolina. All six locations were selected to avoid herbicide applications for hydrilla management. At Lake Gaston, fenced exclosures were built at the sample points, to allow hydrilla to mature without herbivory from grass carp. No grass carp have been historically stocked in Lake Raleigh, therefore, an exclosure was not necessary.Temperature and light pendant data loggers were placed at each location to record water temperature and light intensity values every six hours throughout the year. All sites were monitored biweekly from April 2010 until late fall 2010, after hydrilla senesced. Data collected included hydrilla life stage, hydrilla turion density, and hydrilla shoot length. Soil cores were collected and sifted to determine the number of tubers and turions.

In addition, tuber or turion sprouting was noted and length of sprout was measured. Stations were reestablished at the same points in 2011, and monitoring continued until late fall 2011. This study will enable the generation of a 'story' of the monoecious hydrilla life cycle throughout the year. A predictive model will be generated to allow lake managers to better time management practices to the hydrilla life cycle based on environmental conditions. This information will be crucial in creating monoecious hydrilla management plans in North Carolina and elsewhere.

Co-Author: Robert J. Richardson, Ph.D.

Sarah True Meadows grew up in Wilmington, NC. She received her B.S. degree in Biological Sciences from North Carolina State University, with a minor in Environmental Science. While completing a coastal management summer internship, she realized the need for control of invasive plant species in order to conserve native species. She went on to work towards a Masters degree in Weed Science under Dr. Rob Richardson. During her graduate career, Sarah has been involved in multiple Aquatic Plant Management societies as well as Weed Science societies. Sarah is continuing her education in aquatic plant management through a PhD program under Dr. Rob Richardson.

Justin Nawrocki
North Carolina State University
Raleigh, NC
jjnawroc@ncsu.edu

Monoecious Hydrilla Tuber Dynamics over Five Years of Management

Hydrilla [*Hydrilla verticillata* (L.f.) Royle] is the most economically damaging aquatic weed in the United States. Long term control of hydrilla is complicated by persistent subterranean turions (tubers) that the plant forms each year. Elimination of the tuber bank is essential for control and eradication. Tuber surveys were initiated on three North Carolina lakes to determine the effects of specific management techniques on monoecious hydrilla tuber numbers over time. Sampled lakes included Lake Gaston, Shearon Harris Lake, Lake Tillery, and the Tar River Reservoir. Tuber counts were conducted in the late fall of 2007 - 2011 on each lake using a four-inch core sampler. Sample points were selected based upon the presence of an established tuber population. Management practices on the lakes included fluridone treatment or no treatment on Lake Gaston, fluridone treatment on Lake Tillery, a combination of fluridone application and drought-induced summer drawdown on the Tar River Reservoir, and no management on Shearon Harris Reservoir. De-watering and fluridone application from 2007 to 2010 resulted in a 98% reduction in tuber densities in Tar River Reservoir. Alternate year fluridone treatments were evaluated on Lake Gaston and a 26% decrease in tuber densities was observed after 2 years and a 60% decrease after 4 years. Consecutive fluridone treatments from 2008 to 2010 and grass carp stockings have resulted in a 45% decrease in tuber densities. Shearon Harris Lake has no history of any organized management practices which have resulted in averaged whole lake tuber densities from 939 to 1,700 tubers/m^2.

Co-Authors: Robert J. Richardson, Ph.D. and Steve T. Hoyle

Justin Nawrocki was born and raised in Grand Rapids, MI and went on to get his B.S degree in Environmental Science from University of Idaho. He has recently completed his M.S degree from North Carolina State University (NCSU) with the main focus of his research being monoecious hydrilla tuber bank response to active management practices. Justin will be working on his PhD at NCSU researching the effectiveness of establishing native plant species in hydrilla infested Piedmont reservoirs and the impact on relative habitat use by sport fish.

C. Barre Hellquist, Ph.D.
Professor Emeritus
Massachusetts College of
Liberal Arts
North Adams, MA 01247

The Water-lilies (Nymphaeaceae) of the World with emphasis on the native northeastern species.

The water-lily family Nymphaeaceae is comprised of approximately70 species world-wide in five different genera: *Barclaya*, *Euryale*, *Nuphar*, *Nymphaea*, and *Victoria*. The genera *Nymphaea* and *Nuphar* are common in North America. The common *Nymphaea odorata* is divided into two subspecies *N. odorata* subsp. *odorata*, and *N. odorata* subsp. *tuberosa*. In the northeast U.S. the rare, dwarf *N. leibergii* is found only in northern Maine and Vermont. *Nuphar* is confined to three species: the common *N. variegata* in the north, *N. advena* in the south and the uncommon *N. microphylla*. World-wide, water-lilies hybridize easily, even across subgenera. This is especially true within *Nymphaea* and to a lesser extent within *Nuphar*. *Nymphaea* and *Nuphar* are mostly rhizomatous and may become very aggressive, often presently problems in weed control. *Nymphaea* has been widely hybridized in the water-gardening trade and many of the hybrids have been planted in local water and become extremely aggressive.

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.

Robynn K. Shannon, Ph.D.
Research Scientist (gratis)
Department of Ecology &
Evolutionary Biology
University of Connecticut
Storrs, CT
robynn.shannon@uconn.edu

Beyond the Birds and the Bees: Pollination in Aquatic Plants

Pollination is the first step in the process of sexual reproduction in flowering plants. The aquatic environment poses unique challenges for pollination. After all, there aren't many bees or butterflies flying around "out there" (on the open water), much less "down there." Not only that, but pollen typically becomes inviable once it gets wet! The evolutionary ancestors of all aquatic flowering plants were terrestrial, and the adaptation of sexual reproduction to aquatic environments must represent a difficult evolutionary transition. Do in part to the difficulties associated with achieving pollination, many aquatic plants simply bypass sexual reproduction and get by entirely or mostly on vegetative reproduction, even though they retain the ability to produce flowers and seeds. Many of the aquatic plants that do reproduce sexually have evolved some pretty amazing adaptations, described by one author as "elaborate contrivances," to increase the likelihood of effective pollination. Drawing on detailed research from a number of sources, this talk describes the myriad adaptations exhibited by aquatic plants for achieving pollination—under, on, and above the water surface—some of which are truly weird.

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 *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 aquatic plant mentors. She enjoys trail running in her free time.

Mark June-Wells, Ph.D.
Post Doctoral Research Associate
The Connecticut Agricultural Experiment Station
Invasive Aquatic Plant Program
mark.junewells@ct.gov

Abiotic Characteristics Controlling Plant Community Structure, Native Plant Diversity, and Non-native Plant Dominance in Lentic Systems: Implications for Risk Assessment and Management

Environmental conditions are factors that affect the outcomes of competitive interactions in developing plant communities. Lakes have unique sets of these conditions that can be used in risk assessment and strategic management. Water chemistry, water clarity, depth, as well as soil structure and chemistry are the major abiotic factors impacting the assemblages of plants in these systems. Describing the concurrent patterns among plant species, community structure, and abiotic conditions will allow for the development of risk assessment models and more precise strategic management of non-native plants.

Two studies investigating the abiotic processes that control non-native plant presence and plant community structure were conducted between 2010 and 2011. We investigated the role of water chemistry and clarity, lake-bottom structure, and soil chemistry in the structuring of lentic macrophyte communities. Our results indicate that non-native species have distinct water chemistry and depth preferences in the lake systems of Connecticut. Additionally, species abundance and diversity are controlled in part by depth and soil chemistry.

These findings are important to the understanding of plant community structure and the development of risk assessment models for non-native plant invasion. Moreover, these results are important for the development of better management choices where the broad implications of lake-drawdown, herbicide application, and harvesting techniques can be weighed against the overall impact to the plant community.

Mark is currently a post-doctoral researcher at The Connecticut Agricultural Experiment Station in New Haven, CT. His primary area of interest is in the abiotic factors that control plant community composition in lentic systems. He obtained a B.S. from Southern Connecticut State University, an M.S. from Rutgers University, and his Ph.D. from Rutgers University.

Gregory Bugbee
Department of Environmental Sciences
Connecticut Agricultural Experiment Station
New Haven, CT

The Aquarium Trade as a Risk for Non-native Aquatic Plant Introductions

The aquarium trade can be a source for the introduction of non-native aquatic macrophytes when the contents of fish tanks are released into lakes and ponds. In Connecticut, 20 non-native aquatic or semi-aquatic macrophytes are banned from sale. At least 13 of these species are established in the State's lakes. We documented the sale of banned plants in the aquarium trade by visiting 75 retailers in Connecticut during 2008 and 2010. Plants that resembled Connecticut's banned species were purchased and identified using standard morphological techniques and DNA sequencing. Nearly 30% of the stores sold banned aquatic plants including; *Cabomba caroliniana, Egeria densa, Myriophyllum aquaticum,* and *Myriophyllum heterophyllum. Cabomba caroliniana* represented over half of the banned species found. Mislabeling and ignorance of the laws are common. *E. densa* was often mislabeled as *E. najas* or *Anacharis najas.* Some banned plants are being sold as simply as "bunch plants" and retailers often stated their distributor told them that although a plant may look like a banned species it actually was a similar different species. Identification of many of the plants was difficult because our taxonomists were more familiar with plants seen in the wild. Over 40 percent of the *Myriophyllum* specimens could not be identified either visually or with DNA sequencing. Improvements are needed in identification, labeling and awareness of retailers and wholesalers regarding the sale banned aquatic plants. We revisited all the aquarium plant retailers and handed out identification guides and copies of the state statutes regarding the sale of banned aquatic plants. All seemed interested in being a part of the solution and many wanted to attend a workshop on the subject.

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

Robynn K. Shannon, Ph.D.
Research Scientist (gratis)
Department of Ecology &
Evolutionary Biology
University of Connecticut
Storrs, CT
robynn.shannon@uconn.edu

Boom and Bust: Biological Invasions from a Population Ecology Perspective

Management of invasive species has become a major area of concern in conservation biology and resource management, and is embedded in the mission of NEAPMS. Many of the most problematic aquatic plant species we deal with now were almost unknown a generation or two ago. Why are they so problematic now? Why do outbreaks of "weedy" species (plant or animal) occur at all? What is it about invasive species that makes them invasive? Once a species has been introduced (whether to a new body of water or a new continent!), what determines whether it will become established and spread? Do invasive aquatic plants tend to share certain preferred ecological conditions? Can we predict future outbreaks, or what the next major pest species will be, based on particular suites of characters shared by current invasive species? Most importantly, can we put the brakes on looming outbreaks, or alter the trajectory of an invasive species that appears poised to become the Next Big Weed? These questions will be addressed as we take a look at the population biology and ecology of invasive species, reviewing recent literature on theory, empirical research, and practice.

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 *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 aquatic plant mentors. She enjoys trail running in her free time.

Tyler J. Koschnick, Ph.D.
APMS President
Director, Research and Regulatory Affairs
SePRO Corporation
11550 N. Meridian St., Ste. 600
Carmel, IN 46032

Balancing Strategic Goals with Emerging Threats

The Aquatic Plant Management Society held its 51st Annual Meeting in Baltimore, MD in July 2011. The theme of the meeting was "Emerging Threats". There were many special sessions, including a session sponsored by the NE Chapter. This presentation will highlight some of those "Threats" and opportunities, including the status of NPDES permitting for application of pesticides in, over, or near water and actions APMS has taken. In addition, the strategic goals of APMS will be reviewed and potential challenges will be described that may affect those goals.

Tyler Koschnick received his M.S. degree and Ph.D. in Weed Science from the University of Florida under the direction of Dr. Bill Haller. Currently, he is the Director of Research and Regulatory Affairs at SePRO Corporation. He has served on the Board of Directors for the Aquatic Plant Management Society (APMS), Midwest APMS, Western APMS, and Indiana Lake Management Society, and served on numerous committees. He has served as a technical advisor on the Washington State Aquatic Plant Technical Advisory Committee and on the Scientific Advisory Panel for the California Department of Food and Agriculture. Currently, Dr. Koschnick is President of APMS, and is the Vice President of the Midwest Aquatic Plant Management Society. He lives in Indiana with his wife and three children.

West M. Bishop
Algae and Aquatic Research Scientist; SePRO Corporation, SePRO Research and Technology Campus, Whitakers, NC
westb@sepro.com

POSTER PRESENTATION

High Levels of Phosphorus, Negative Water Quality: The Solution, Phoslock

A devastating culprit has polluted numerous aquatic systems causing degradation of water quality and subsequent harmful ecological and economic consequences. Phosphorus is the primary component governing eutrophication and is highly correlative to algal productivity, water clarity, TSS and pH/dissolved oxygen fluctuations. High phosphorus inputs, along with historic internal accumulation, have created a need for innovative in situ management strategies that effectively remove bio-available phosphorus and restore water quality. Phoslock® is a lanthanum-based phosphorus locking technology that provides an effective approach to combat the eutrophication process and improve overall water quality. The objectives of this presentation are 1) to correlate phosphorus levels to algae densities and classification; 2) to illustrate water quality impacts of increased phosphorus levels; and 3) to highlight technical laboratory and field research data on the efficiency of Phoslock® at removing phosphorus and improving water quality parameters (chlorophyll, turbidity, etc.). Laboratory and field research studies documented significant decreases (50-90%) in both total and free reactive phosphorus at all treatment sites within 24 hours and continually decreased throughout the studies. Immediate and long-term improvements were measured in water quality and prior water resource use restrictions were diminished (i.e. beach closures due to toxin levels). Phoslock provides an efficient proactive approach and restoration tool to select for a healthy aquatic system.

West M. Bishop[1], Shaun Hyde[2]

[1] Algae and Aquatic Research Scientist; SePRO Corporation, SePRO Research and Technology Campus, 16013 Watson Seed Farm Rd., Whitakers, NC 27891, Ph. 252-801-1623, Fax 252-437-3280, westb@sepro.com

[2] Water Quality and Technology Leader, SePRO Corporation

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. In January 2011, he took a position with SePRO Corporation as Algae and Aquatic Research Scientist where he continues to provide scientifically defensible solutions for ecologically sound algae management and water quality improvement.

Jason Fausey, Ph.D.
Valent USA Corporation

POSTER PRESENTATION

Monitoring Midwest field applications of Clipper Herbicide

Vegetation management is a common issue in Michigan water bodies and Long Lake and Waumegah Lake are no exceptions as these lakes both contain several challenging and difficult to mange plants. Clipper is a new herbicide containing the active ingredient flumioxazin that has been developed by Valent U.S.A. Corporation for use in aquatics. In research and Experimental Use Permit (EUP) trials Clipper has shown the potential to be a valuable tool to manage unwanted vegetation in water bodies and provide a new option for control of difficult to manage plants such as Fanwort (*Cabomba caroliniana*) and Watermeal (*Wolffia* spp.). The objectives of these trials were to monitor the persistence of Clipper and evaluate the performance of this herbicide when applied to selected areas of these two large Michigan lakes. Over the past several years a limited number of new active ingredients have been introduced in the aquatics market, leaving applicators with few management options once problems exist. A recent influx of Fanwort and Starry stonewort (*Nitellopsis obtusa*) that are difficult to manage with the current herbicides has resulted in an increase in observations of these plants in Michigan water bodies. This shift in plant communities has become a challenge for applicators and in many cases successful management options for these plants has not existed. Data taken from these trials confirmed 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.

Ashlee Kirkwood
Eric Wilson
James Hoberg
Smithers Viscient
Wareham, MA
akirkwood@smithers.com

POSTER PRESENTATION

To Kill a Macrophyte: Exposure Methods to Examine the Sensitivity of Aquatic Macrophytes to Chemicals

Smithers Viscient, Wareham, MA, specializes in ecotoxicity testing for a host of aquatic and terrestrial organisms. The vast majority of the work is performed in order to determine the toxicological effects of agricultural, pharmaceutical and industrial compounds, for registration with the EPA and their equivalent agencies worldwide. Over the last several years, we have performed a variety of tests with aquatic macrophytes, in order to provide a more in-depth environmental risk assessment for herbicides. Typically, the toxicity data for *Lemna gibba* and green algae are used for the risk assessment. However, within the last several years some agencies have expressed concern that toxicity data from several aquatic macrophytes might be more appropriate for determining risk to native aquatic plants.

As a response to this heightened interest in these studies, Smithers Viscient has developed several formats to assess the sensitivity of a number of aquatic macrophyte species to chemicals. These methods are based on the test method proposed by Kubitza and Dohmen (2008) which is currently under validation in the U.S. and Europe through a series of inter-laboratory ring tests.

The test designs can be extended to incorporate target plants to view the success of control agents and any concerns regarding native, non-target species. Smithers Viscient provides these exposures in a laboratory or greenhouse setting year round or in small, outdoor artificial ponds during the spring and summer growing seasons. Species typically tested include: *Cabomba caroliniana* (fanwort), *Ceratophyllum demersum* (coontail weed), *Elodea canadensis* (Canadian water weed), *Glyceria maxima* (reed sweetgrass), *Mentha aquatica* (water mint), *Myriophyllum aquaticum*, (parrotfeather), *Myriophyllum heterophyllum* (variable water milfoil), *Myriophyllum spicatum* (Eurasian water milfoil), *Nymphaea odorata* (fragrant white water lily), *Sagittaria latifolia* (arrowhead weed), *Salvinia minima* (common Salvinia), *Stuckenia pectinata* (sago pondweed), and *Vallisneria americana* (American eelgrass), but other species can be used in the testing format as well. This list includes emergent, floating and submerged species from a variety of families. Please feel free to contact us at www.SmithersViscient.com for further information.

Ashlee Kirkwood is a Study Director for algae and aquatic plant studies in the Ecotoxicology Department at Smithers Viscient's Massachusetts Research Center. Ashlee received her Master of Environmental Science and Management Degree from the University of Rhode Island in 2010, and her Bachelor of Science in Earth Science from Bridgewater State University in 2006.

Eric Wilson is part of the Chemistry Department at Smithers Viscient's Massachusetts Research Center. He received a Bachelor of Science degree in Geology and Geologic Oceanography from the University of Rhode Island in 2010.
Jim Hoberg is a Research Director in the Ecotoxicology Department at Smithers Viscient's Massachusetts Research Center. He received his Bachelor of Science degree in Wildlife Biology from the University of Massachusetts: Amherst in 1976, and has been part of the lab in Wareham, MA for over 35 years.

Ashlee and Jim work together on many different ecotoxicology studies, mostly with aquatic macrophytes. They like to work cooperatively with clients to develop exposure systems that meet their specific needs, and are always up for the challenge of uncharted laboratory territory. They have been members of the NEAPMS for a number of years.

Paul Lord
Environmental Science,
Biology Department
SUNY, Oneonta, NY
lordph@oneonta.edu

POSTER PRESENTATION

New Eurasian watermilfoil (*Myriophyllum spicatum*) Biocontrol Insect in Deruyter Reservoir, Madison County, NY

Eurasian watermilfoil (*Myriophyllum spicatum*) is a little noticed part of the aquatic plant community in its native Europe while it disrupts recreational uses of New York lakes and ponds. Augmentation of New York lakes with milfoil insect herbivores has yet to provide a consistently satisfactory result. In evaluating a Madison County, NY lake for walleye (*Sander vitreus*) stocking to initiate a trophic cascade to reduce Eurasian watermilfoil biomass, we determined that Eurasian watermilfoil was being controlled by a *Leptocerus* sp. caddis fly which produced most of its damage in June. North American keys identify the caddis as *L. americanus*, the only member of its genus known to be present in North America. Since *L. americanus* has, heretofore, never been associated with damage to Eurasian watermilfoil, we tried to identify the caddis using European keys which identify the caddis as *L. tineiformis*. We are pondering two possibilities. We may be witnessing new behavior for *L. ameiricanus* in DeRuyter Reservoir. Alternatively, we may be identifying a new North American introduction of L. *tineiformis*. In either case, the occurrence of the preponderance of Eurasian watermilfoil damage in June damage is desirable insomuch as it facilitates lake recreational uses throughout the warmest part of the summer.

Co-Author: Timothy Pokorny

Paul H. Lord is a researcher employed by SUNY to perform research on the biocontrol of Eurasian watermilfoil and to evaluate the viability of pearly mussel populations. Additionally, he instructs in aquatic pollution and environmental sciences at SUNY-Oneonta. He holds an MS in operations research from the Naval Postgraduate School, Monterey, CA and an MA in biology from SUNY-Oneonta. He is also a retired U.S. Marine lieutenant colonel and a 25-year SCUBA instructor. Lord is the immediate past president of the Otsego Lake Association for which he continues to serve as a director, has served on the board of directors for the Northeast Aquatic Plant Management Association, is the immediate past chairman for the Town of Otsego planning board on which he still serves, and is a regular presenter at annual New York State Federation of Lakes conferences. He has performed aquatic macrophyte surveys across New York State but the bulk of his research, dealing with interferences in the biocontrol of Eurasian watermilfoil, has taken place in Madison County, NY. He has performed mollusk surveys all around the globe, but is most focused on the pearly mussels of the New York Susquehanna River watershed. He has written various technical reports summarizing his experiments with and surveys of aquatic plants and their herbivores and other papers of more general interest. Lord cares strongly about mitigating our impacts on the lakes and rivers we love.

Jeremy Farrell- Presenter
Darrin Fresh Water Institute
5060 Lake Shore Drive
Bolton, NY 12814
jeremyfarrell@yahoo.com

POSTER PRESENTATION

Identification of Eurasian Water-Milfoil with Hydroacoustics

Eurasian Water-Milfoil management requires the ability to rapidly establish presence and relative abundance of the plant. Using hydroacoustics (Biosonics DTX equipped with 430 kHz and 70 kHz transducers) this investigation attempts to rapidly assess the littoral zone for beds of Eurasian Water-Milfoil. The algorithm developed from the hydroacoustics data identifies the plant based on physical life history constraints including depth, extent, percent of water column used by the plant and other parameters that can be exploited to define the plant hydroacoustically. After transects are completed and data processing occurs, all potential sites are then revisited with either a rake toss survey or snorkel survey to assess the accuracy of the hydroacoustics. Currently 85% of sites marked with potential milfoil are confirmed.

Co-authors:
Lawrence Eichler
Sandra Nierzwiki-Bauer
Charles Boylen

Jeremy Farrell is a PhD candidate at Rensselaer Polytechnic Institute and a member of the research staff at the Darrin Fresh Water Institute, located on Lake George in Bolton Landing, New York. Jeremy holds a BS in Geology from Union College. Jeremy's research interests include the use of hydroacoustics to identify and quantify biota of lakes, with particular interest in macrophytes, zooplankton and fish populations. Jeremy is also a NEAPMS scholarship recipient and is using his scholarship to advance his research in hydroacoustic mapping of aquatic plant distribution in lakes.

Courtney E. Rickett
Matt Rayl (presenter)
Aquatic Eco-Systems, Inc.,
Apopka FL
www.aquaticeco.com
mattr@aquaticeco.com

POSTER PRESENTATION

Preliminary Response to a Destratification System in Lake Florence

Lake Florence is a 132 acre lake located in Montverde, FL affected by unfavorable water conditions. In 2007 an aeration system was planned and designed for the lake and in July of 2009 the system was installed in the lake in an effort to improve water quality through de-stratification. De-stratification of the lake allows for a reduction in internal nutrient recycling.

Lake Florence exhibited an overgrowth of filamentous algae during the summer months. Other undesirable characteristics exhibited by the lake include: Low dissolved oxygen concentrations, high phosphorus, nitrogen, and chlorophyll levels, high water surface temperatures, and foul odors. Following the installation of the aeration system data was collected in order to monitor the progress of the lake. Immediately following installation, data collection and study revealed an increase in Phosphorus and Chlorophyll-A. However, data collected 18 months following the installation suggests an improvement in water quality and a decrease of total phosphorus levels.