Aquatics

FALL 2012

A Publication of the Florida Aquatic Plant Management Society

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Aquatics

FALL 2012 Volume 34, Number 3

Mechanical Control of Hydrilla, see page 17

Cover photo (left) by by Laura Grant *N. lutea* growing in Ontario, Canada, see page 7

Contents

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The mission of FAPMS is “To Preserve Florida’s Aquatic Heritage.” FAPMS was formed in 1976 and provides a forum for those interested in aquatic plant management to meet, discuss and exchange ideas and information.

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Aerial Inoculation of Submerged Aquatic Vegetation in Everglades Stormwater Treatment Areas

By Louis A. Toth and James V. Hines

The Everglades Stormwater Treatment Areas (STAs) consist of over 26,000 ha of constructed wetlands that were created to remove phosphorus (P) primarily from agricultural runoff water prior to discharge into the Everglades Protection Area. Each STA has multiple flow-ways that are compartmentalized by levees and water control structures into cells. Cells range in size from 100-1400 ha and are managed as either emergent wetlands (EAV) or submerged aquatic vegetation (SAV). Cells with emergent vegetation such as cattail (*Typha domingensis*) provide initial treatment of stormwater runoff containing high P concentrations, while SAV cells are expected to further reduce phosphorus concentrations to the low levels needed to achieve Everglades restoration goals. Establishment and maintenance of these vegetation characteristics are requisites for STA function and sustainability, and achievement of the rigorous water quality criteria for restoration.

Photo Courtesy of South Florida Water Management District

Timely use of newly constructed STAs required the development of a process for rapid establishment of dense beds of SAV over vast areas. This challenge was first addressed in 2004 when the start-up of STA 3/4 necessitated conversion of an 1170 ha field of sugar cane and former sod farm to a SAV cell. Following construction of STA infrastructure (levees and inflow and outflow structures), an aerial herbicide application was used to prepare the footprint of the cell for conversion. The cell was subsequently flooded and inoculated with SAV that was mechanically harvested from another STA, loaded into a cargo net, and transported 6 km via helicopter to 50 drop sites throughout the cell. Loads of SAV weighed an average of 462 kg (approximately 1,000 lbs) and consisted of variable proportions of southern naiad (*Najas quadalupensis*), musk grass (*Chara* spp.) and Illinois pondweed (*Potamogeton illinoensis*).

The success of this novel, large scale inoculation method was evaluated by presence/absence of SAV species at 5 m intervals (centers) within a 30 m x 30 m grid around each drop location. Fifty randomly-selected sites between 60 and 300 m away from the inoculation sites were also evaluated for SAV. Field observations indicate that all three transplanted species sustained minimal mortality during harvesting, aerial transport and a post-inoculation establishment period that included two hurricane events one month after inoculations. However, inoculated SAV did not begin rooting in the soil until water levels could be lowered to <50 cm during the subsequent dry season. Initial establishment of SAV beds occurred by rooting of plant fragments and/or

CONTINUED PAGE 6

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Editorial

Being the Editor of *Aquatics* is not an easy task. It takes a lot of time and effort to be able to publish just one issue of the magazine that has value and impacts the society in a positive way. My goals as editor were to improve upon each issue, make the magazine interesting and exciting to read, and produce a quality publication that the Society could be proud of using the mission of the Florida Aquatic Plant Management Society to drive each issue. My intent when I took over as Editor was to make an already excellent publication even better. I hope I did that.

Some of the things that I decided to change that made the most impact were changing the cover, adding a new feature called "Applicator Accolades", making sure that all winning applicator papers were featured in *Aquatics*, and giving each APMS Chapter an opportunity to provide updates in the issue following the FAPMS annual meeting.

In case you didn't know, all of the cover shots are taken by members of APMS. Previous issues included titles on the cover that partially hid the image. I removed those titles so that the only thing on the cover was the image (and the title *Aquatics*, of course!) Since *Aquatics* is a publication written for members by members, I felt the photographer's picture should stand alone on the cover.

Applicator Accolades was something I wanted to do to showcase people who have been in the aquatics industry for a long time. I felt those people had such knowledge and history in the industry that we needed to start sharing it with the APM Society. If you were featured in Applicator Accolades, thank you so much for your time and allowing me to share some of your stories!

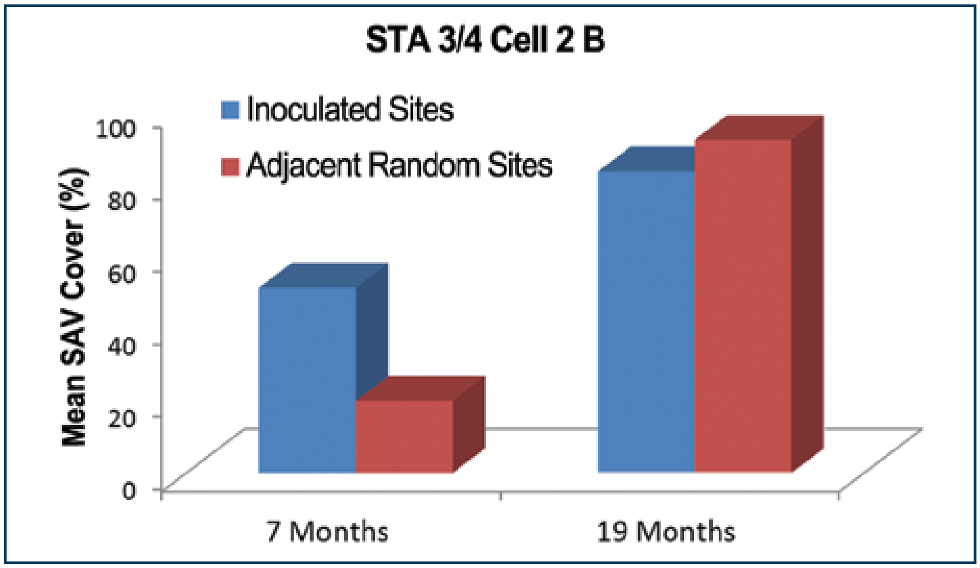
I wanted to start including all of the winning applicator papers in the magazine for one very obvious reason: the papers were written by applicators! Not only did they come up with a research topic and do the hard work that resulted in a paper, but they also got up in front of the entire FAPMS membership at the annual meeting to present their paper! As a person that does presentations, I know that is pretty nerve-wracking! The most praise I received for an issue was the Winter 2011 issue that contained all of the winning applicator papers! Your hard work and dedication to the industry does pay off and people enjoy reading about what you're working on!

In order to extend the reach of *Aquatics*, I wanted to give the presidents of all of the APMS Chapters the opportunity to let us know what was happening in their chapters. While it is important for us to know what is happening in Florida, it is equally as important to understand the impacts of aquatic plants throughout the country, and even the world (I haven't gotten that far yet!).

This will be my last issue as Editor of *Aquatics* as I explore new professional opportunities. I want to thank everyone who ever submitted an image for the cover, an article, a letter to the editor, or a snippet for Aquavine, and to everyone who I bugged for articles and who supported me throughout this ride. I have learned a lot as editor and I thank the Florida Aquatic Plant Management Society and Board of Directors for this wonderful, educational experience. I would do it again in a heartbeat!

Tina Bond

STA 5, SAV inoculation. Photo by Jimmy Hines.



Establishment of SAV cover after aerial inoculations.

germination of seed that was present on harvested plants. After seven months, SAV covered 51% of the area surrounding inoculated sites and <20% of the adjacent random (uninoculated) locations.

Poor initial colonization of SAV at random sites indicated an absence of remnant propagules of SAV in these soils but could also be attributed to the dense dead sugar cane litter that occupied much of the water column and likely impeded transport of SAV diaspores from inoculation sites. As the cane litter decomposed, hydraulic transport of SAV diaspores from established beds at inoculation sites provided for dispersal and colonization of surrounding areas. Subsequent vegetative growth contributed to local expansion of beds at inoculation sites and provided a source of both vegetative (plant fragments) and generative (seed) diaspores for colonization of the rest of the cell (i.e., random sites). Less than two years after inoculations dense SAV cover was established throughout the cell.

Anecdotal observations of rapid and full recovery of SAV beds at the donor (harvested) site further validated the applicability of this novel and unprecedented large-scale method for transplanting SAV. Aerial inoculations subsequently have been used to successfully establish SAV in three other STA locations. The most recent inoculation occurred in June 2012 when >18 metric tons of primarily *Chara* were dropped at 50 locations into a newly constructed cell in STA 5/6.

Louis A. Toth is a Principal Environmental Scientist and James Hines is a Vegetation Management Technician with the South Florida Water Management District. Louis and James can be reached at (561) 682-6615.

Photo by Laura Grant. *N. lutea* growing in Ontario, Canada.

American Lotus:

More than Just a Pretty Face

By Warner Orozco Obando, Paula Biles, Lyn A. Gettys, Ken Tilt, Kimberly Moore, Floyd M. Woods, and Daike Tian

Introduction

American lotus (*Nelumbo lutea*) has inhabited a broad range in the United States for millions of years, growing from Minnesota to Texas and eastward throughout most states along the east coast. The pale yellow flowers, huge round leaves and persistent seed pods borne on stiff stalks high above the water make the lotus both distinctive and striking. However, this species has long been valued for more than its beauty. Native Americans referred to American lotus as water chinquapin or water chestnut because the seeds were a valuable food source. In addition, many tribes also ate the large rhizomes of lotus and used parts of the plant for medicinal purposes.

Although American lotus grows in diverse climates, this long-lived perennial is deciduous in its entire range. Peak flowering typically occurs between June and September, and after the leaves die back in late fall, all that remains visible of the plant are the seedpods. Lotus prefers shallow, still water; its natural habitat includes the margins of lakes, marshes, swamps, and slow-moving rivers, and the species is cultivated in ornamental water gardens. This American native tolerates a wide range of conditions, including variations in pH, soil composition, and water depth. When coupled with its beauty, this ability to thrive in a variety of areas makes lotus an ideal native plant for botanical gardens and constructed or restored wetland areas. In addition, the majestic American lotus provides shelter, habitat and food for wildlife. It also presents striking vistas that attract photographers and nature lovers.

The increasing emphasis on native plants and the need to create balanced wetland ecosystems has spurred interest in the use of American lotus in restoration projects. As awareness of this species grows, so does the drive to return America's largest flower to the areas where it once thrived but is now endangered. We value the lotus for its beauty and its contributions to the ecosystem, but this special species has more to offer than first meets the eye. Scientists are working to unlock the physical and chemical mysteries of lotus; for example, American lotus often seems to clean the waters where it occurs, so its ability to purify waters polluted with contaminants, nutrients and other substances is being investigated. Researchers around the world are studying lotus for countless purposes that range from cancer research and medicinal products to nanotechnology applications. The relevance and uses of this ancient plant continue to grow.

Classification, Origin, and Distribution

American lotus belongs to the family *Nelumbonaceae* and the genus *Nelumbo*. The species, *N. lutea*, is one of two in the genus. According to Hall and Penfound (1944), the unusual characteristics and uses of the plant are reflected in its thirty-seven common names, the most popular being American lotus, yellow lotus, and water chinquapin. The other species in the genus *Nelumbo* is the well-known and revered sacred or Asian lotus (*N. nucifera*). Sacred lotus is distributed throughout Asia and Oceania, where it has served as a food staple, as well as an integral and pervasive part of oriental cultures, for thousands of years.

Prior to European settlement, Native Americans actively cultivated lotus and carried it west beyond its native US range of Maine to Wisconsin, and in the south, from Florida to Texas. Small native populations still grow in the West Indian Archipelago and the extreme southeastern portion of Ontario, Canada, and native stands of American lotus can also be found in Mexico plus central and northern South America. Some American lotus populations are found in headwater lakes of riparian corridors, preferring water depths from 0.6 to 2.5 meters. Most plants establish in shallow, placid water and spread into deeper water as they mature.

Morphology

Lotus is a perennial aquatic herb with fibrous adventitious roots, long rhizomes, and elongated tubers that may be up to 3 cm in diameter. Abundant roots are

Photo by Kyle Paris. Wild stand of *N. lutea* in Guntersville, AL.

produced from the rhizome nodes and may reach 3 mm in diameter and 50 mm in length. The spongy, cylindrical rhizomes produce thick tubers in the fall at the end of the growing cycle. Those tubers support the first flush of new growth the following spring. Leaves are round or circular with bluish-green upper surfaces and pale gray-green undersides. Each leaf is supported by a long petiole or leaf stalk, which is attached to the center of the leaf's underside. The upper surface is highly hydrophobic and quickly repels water. The first leaves to unfurl each season are flat and float on the water surface, as do those in deep water. Mature leaves may measure up to 60 cm in diameter and the petiole can reach 1.5 to 2 m in length. Rhizomes, petioles, and peduncles (flower stalks) all have prominent channels to transport oxygen and carbon dioxide throughout the plant.

American lotus produces large, yellow, slightly fragrant flowers through mid- and late summer and continues flowering until one month before the growing season ends. Flowers are large (up to 28 cm in diameter) and each is borne on an erect stalk that holds the flower 30 to 60 cm above the leaves. Pollination is facilitated by bees, flies, and beetles. The large, cone-shaped, golden seed head (torus) has a flat surface and contains multiple one-celled ovaries, each with a single ovule that becomes a seed or nutlet after fertilization. The torus dries slowly and turns brown before releasing the ripe seeds, then remains standing throughout the winter. These structures are attractive in the environment and are also used extensively in flower arrangements. Each 10 to 12 mm nutlet has two seed coats and a green embryo. Seeds are initially green and turn purple to black when they mature. The seed coat is very hard and waterproof, which allows seeds to survive centuries of burial in the mud. Although lotus does reproduce by seed, the species maintains itself primarily vegetatively via the rapid growth of rhizomes, which can form extensive colonies.

Natural populations of American lotus are genetically diverse, but most are very similar in appearance. Most variation occurs as small differences among shades of flower color (from deep yellow to white cream), the size of leaves and seed pods, and the presence or absence of thorns on the petioles.

Photo by Elizabeth Vaughn. *N. lutea* in South West Florida.

Propagation and Culture

Lotus can be propagated via seeds or division of rhizomes. Seed propagation is relatively easy, but is used mainly for breeding new cultivars and to preserve biodiversity because seeds are highly heterozygous and seedlings are likely to be variable. The same mechanism that protects lotus seeds and keeps them viable for long periods of time also prevents germination. Therefore, seeds must be scarified (the seed coat must be nicked or broken) and submerged in water before they will germinate. Germination containers should be placed in a protected area because direct sunlight may dehydrate the first leaves that emerge after germination. Seeds begin to germinate in 4 to 5 days if water temperatures are above 80°F; any seeds that float should be discarded. Seedlings can be transplanted

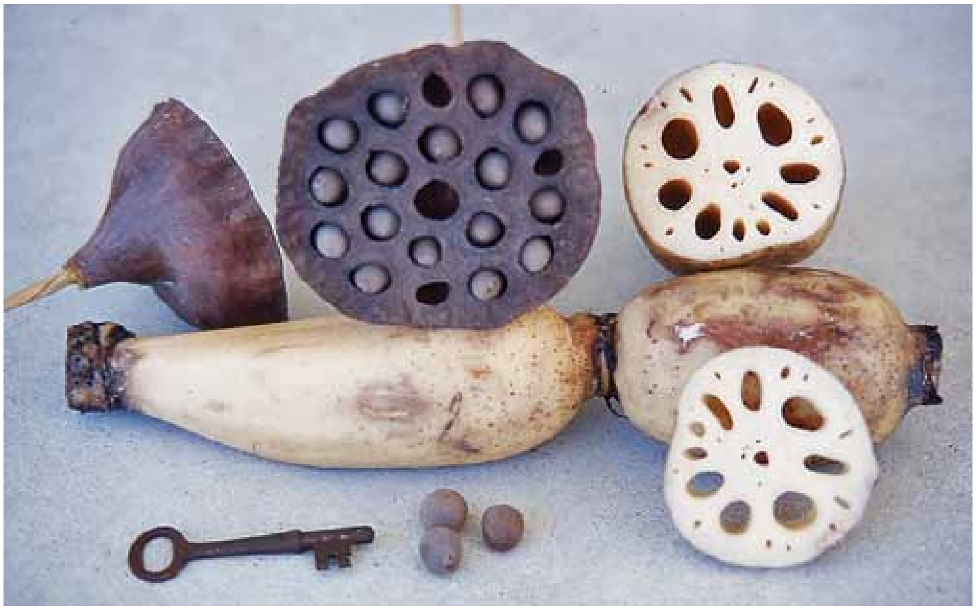


Photo by Paula Biles. Lotus rhizome and seed heads..

2 weeks after germination and should be fertilized once aerial leaves form. Lotus seedlings produce very small rhizomes in the first growing season and usually bloom the following year.

Mature rhizomes are typically used for commercial propagation of lotus and this method is employed to ensure good establishment in one season. Rhizomes should be firm, have at least two complete segments with intact nodes, have one or two growing points, and be free of pests or diseases. For best results, planting should be done before rhizomes break dormancy. Rhizomes are planted in saturated media at a 15° angle with the shoot meristem buried under 5 cm of media. Although rhizomes are the preferred propagation method, occasionally apical buds or running stems are used. Special care is needed to assure that growing points are not broken or damaged, because broken or damaged material will not be productive.

Optimal field sites for American lotus should receive at least 5 to 6 hours of midday sun and have shallow, still waters with depths that range from 20 to 100 cm, although lotus tolerates great fluctuations in water depth. They require three months of warm temperatures (75 to 85°F) and do not grow well in very dry, shaded, or extremely hot climates. Water quality is important for the success of lotus cultivation. Plants grow best in acidic soil (pH 4.5), but the species tolerates a wide range of pH values (5.5 to 8.0).

Uses

The earliest known use for American lotus was as a food source for people and animals. Seeds and tubers from Asian lotus remain important there , but lotus parts are no longer commonly eaten in the US. Although Americans rarely eat lotus seeds or tubers, the seeds are consumed by many wildlife species and the tubers are eaten by some mammals. In addition, American lotus provides important cover and habitat for fish, wildlife, invertebrates and other fauna.

The unique structure and beauty of this Florida native leads to several unusual applications. When colonies of American lotus are in bloom, they attract nature lovers, photographers, and even the general public. All are fascinated by the large yellow blooms amid unusual leaves. After flowering is complete, the long-lasting seed pods are still quite striking and are in high demand commercially for flower arrangements.

Wherever lotus grows, the water appears to be clear and clean; the plants seem to be nature's water purification system. Recent studies evaluated the use of *Nelumbo* species to remove nutrient run-off (nitrogen and phosphorus), heavy metals, and organic compounds (herbicides) with positive results. The American lotus might have as much or greater potential in this application than its relative, the Asian lotus. It is apparent that interest in lotus is rapidly increasing. For example, scientific and technical literature is filled with studies on these plants, including investigations of new applications for the hydrophobic "Lotus Effect" that causes water beading on the surface of leaves. Scientists are also working to validate and expand the potential medicinal properties of lotus and are trying to determine how lotus seeds keep their embryos viable for thousands of years, which may lead to insights on human aging. These are just a few examples of the intensive research that is being carried out on all parts of lotus, one of our most promising native aquatic plants.

Conclusion

American lotus is a striking native with a long history in Florida and portions of the US. This species is not utilized as extensively in water gardens as its sister species, the Asian or sacred lotus. However, it provides a beautiful specimen in lakes and ponds, especially when native aquatics are needed to balance the aquascape design. Additionally, this species has great potential for use in restoration and may become even more desirable once its environmental benefits are further evaluated.

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APPLICATOR ACCOLADES

Meet Vicki Pontius

By Tina Bond

Photo courtesy of Highlands County

I was fortunate to be able to sit down with Vicki Pontius to interview her for this installment of Applicator Accolades. Many of you already know Vicki. She has been active in FAPMS for many years and was president of the organization in 2007. If you don't know Vicki, read on to find out more about this amazing woman in aquatics!

Vicki is originally from Connecticut but has lived in Florida since she was 10 years old. Her grandparents lived in Hollywood, FL so her father decided to make the move south to be closer to family.

It certainly helps to know someone when you're looking for a job. In Vicki's case, her brother was employed with Highlands County and he was able to help her get an interview that led to a position with the county in 1983. Vicki started out working as a stock clerk where she was responsible for distributing parts for fleet vehicles. After dealing out parts, Vicki moved over to the Road and Bridge Department and worked there for 15 years. In 1998, she became the Assistant Director of Road and Bridge. She separated Invasive Plants and Parks from the Road and Bridge Department and in 2011 those departments merged with Natural Resources to become the Parks and Natural Resources Department. Also in 2011, Vicki became the Director of Parks and Natural Resources. There are currently 25 employees in the department, 6 with their aquatics category pesticide applicator licenses.

"HIGHLANDS COUNTY IS A COOPERATOR WITH THE STATE IN MANAGING AQUATIC INVASIVE SPECIES AND RECEIVES FUNDING TO MAINTAIN 39 LAKES AS WELL AS ALL DITCHES, CANALS, STORMWATER RETENTION PONDS, MARL PITS AND SHELL PITS."

Highlands County is a cooperator with the state in managing aquatic invasive species and receives funding to maintain 39 lakes as well as all ditches, canals, stormwater retention ponds, marl pits and shell pits. The lakes are surveyed and maintained for floating weeds and hydrilla. Managing these aquatic resources protects the health, safety and welfare of the residents.

Managing lakes and weeds are just a few things that Vicki has been responsible for. She also manages the sports complexes, playgrounds, swimming facilities, and even supervises a carpentry crew. She was also responsible for overseeing construction of one of the county's new sports complexes! While she certainly has had a plethora of responsibilities and challenges during her 29 years with the county, her passion has always been with invasive plants.

In her spare time, Vicki loves to travel. She and her husband, Rick, enjoy going to the Bahamas, Aruba and other exotic locations in the Caribbean. Vicki also has 2 daughters, Jenna and Alexis, who were recipients of the Paul C. Myers Applicator Dependent Scholarships. Jenna received her bachelor's degree and is now pursuing a career in the medical field. Alexis received her associate's degree and hopes to pursue a career performing sonograms on animals. It's great to see families like Vicki's as part of the FAPMS organization!

In the Spring 2012 issue of *Aquatics*, we began to wrap up the results of the US EPA Demonstration Project on Hydrilla and Hygrophila in the Upper Kissimmee Chain of Lakes (EPA Grant Number X796433105). The following three articles bring three more components of the project and its findings to a close. The grant came to an end March 31, 2012; however, if you have questions regarding any of the research or results, please contact Eleanor Foerste at 321-697-3000 or efoe@osceola.org or visit the website at http://plants.ifas.ufl.edu/osceola/

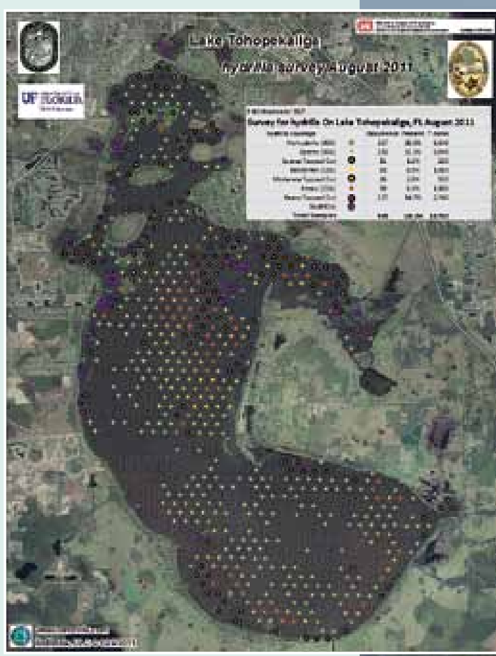
Registered Herbicides and Improving Their Efficacy on Aquatic Weeds

This article summarizes the results of Element 2 of the Demonstration Project on Hydrilla and Hygrophila

By Michael D. Netherland and K. Dean Jones

Background: When the work plan for Element 2 of the Osceola County/US EPA Demonstration Project was developed in 2006, hydrilla in the Kissimmee Chain of Lakes (KCOL) was largely resistant to the herbicide fluridone. It was this resistance issue that drove the need for the demonstration project and we initially decided that additional evaluation of fluridone was not warranted. Moreover, personnel from the US EPA and the Florida DEP Bureau of Invasive Plant Management (BIPM) discouraged evaluation of copper-based herbicides. This left endothall (registered in 1960) and diquat (registered in 1962) as the only registered herbicides for initial evaluation under this project. Our strategy was to coordinate with the BIPM and the South Florida Water Management District (SFWMD) to evaluate hydrilla control using endothall (applied as Aquathol K™ and Super K™) with a focus on large-scale and novel use patterns. As new products were registered (Element 1) they were incorporated into Element 2.

During this project, two significant changes occurred. In the summer of 2008, the BIPM was transferred from the DEP to the Florida Fish and Wildlife Conservation Commission

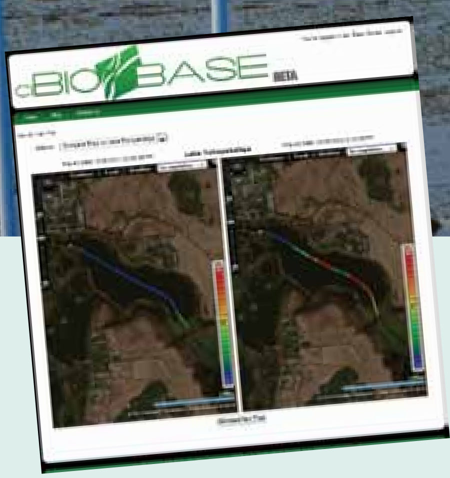


Hydrilla distribution on Lake Tohopekaliga in Aug 2011, above. Photo courtesy of ReMetrix.

Biomass sampling grids were established throughout the KCOL to monitor short and long term changes in hydrilla and native plants, right. Photo by Dean Jones.

(FWC) and BIPM personnel became the FWC Invasive Plant Management Section (IPMS). The other significant change related to the increased utilization of the KCOL by the federally endangered snail kite (*Rostrhamus sociabilis*). Observations from the Florida Cooperative Fish and Wildlife Research Unit suggested the snail kites were utilizing near shore surface mats of hydrilla as foraging habitat to target an invasive apple snail (*Pomacea insularum*) that had become widespread in the KCOL. Following several Interagency meetings the FWC significantly scaled back hydrilla control on the KCOL. Beginning in 2010, treatment strategies shifted from focusing on large areas of hydrilla to providing targeted control in smaller areas. In response, we shifted some focus to monitoring the effects of reduced management efforts by documenting changes in hydrilla distribution over time.

As with any Demonstration Project, some efforts did not yield expected or consistent results. We pursued many avenues of investigation, but we focused on four outcomes that we feel have made significant contributions to our understanding of hydrilla management. We provide a short background on these projects and give key findings from our monitoring efforts.



Vegetation heat maps comparing surveys provide a spatial view of changes in hydrilla density along a transect. Photo Courtesy of Contour Innovations

Developing a Large-scale Use Pattern for Endothall

In 2006 there were many questions regarding implementation and sustainability of a large-scale hydrilla control strategy relying on a 46-year-old product. Questions regarding efficacy, longevity, selectivity, cost-effectiveness, and water quality impacts following large-scale applications were of interest to numerous managers. We focused on linking endothall concentrations to efficacy, longevity, native plant selectivity, and impacts to dissolved oxygen. This required intensive sampling to determine the behavior of endothall following treatments of different scale, timing, formulation, and application technique. Monitoring large areas of the KCOL required many long days on the lake. For perspective, endothall analyses associated with the sampling on the KCOL exceeded 7000 samples.

Key Finding # 1 – Monitoring efforts supported large-scale use patterns for endothall. Use rates in the range of 1.0 to 2.0 ppm targeting hydrilla during the cooler months were effective and selective. Reductions in oxygen were not observed. This project was key in demonstrating efficacy at 1 to 2 mg/L in large areas and it has resulted in significant cost savings and reduced herbicide use compared to strategies that relied on 3 mg/L applications. While our group focused on technical aspects of endothall use, United Phosphorus Inc (UPI) generated data to remove the 3-day fishing and irrigation label restrictions. FWC Regional Biologists, SFWMD personnel, UPI, distribution partners, and applicators coordinated logistics (e.g. aerial vs. boat; liquid vs. pellets; totes, tanker trucks, or super sacks) to support treatments. Despite complex logistics these operations have become highly coordinated. Cooperation between researchers and IPMS Regional Biologists was crucial in developing monitoring protocols and demonstrations in the midst of large-scale operations.

Developing Techniques for Collection of SAV Data over Large Areas

Evaluating treatments covering hundreds or thousands of acres posed a challenge. We wanted to provide a quantitative measure of efficacy and hydrilla recovery through time. In 2007, we began using Lowrance™ HDS recording fathometers to collect data. Transects were recorded for plot evaluations over a period of several months to years. While equipment and quality of data collection improved we recognized that developing a capability to efficiently analyze the datasets was a key bottleneck.

Key Finding # 2 – We worked in cooperation with groups from industry and government to analyze the data collected for this project. In conjunction with Contour Innovations (www.cibiobase.com/default.aspx), project transects were analyzed using a process and algorithm they developed for Lowrance units. Both short (50 to 500 m) and long transects (500 to 5000+ m) were rapidly analyzed to record density and cover of hydrilla. This evolving technology allows resource managers to monitor changes in invasive and native plant cover at

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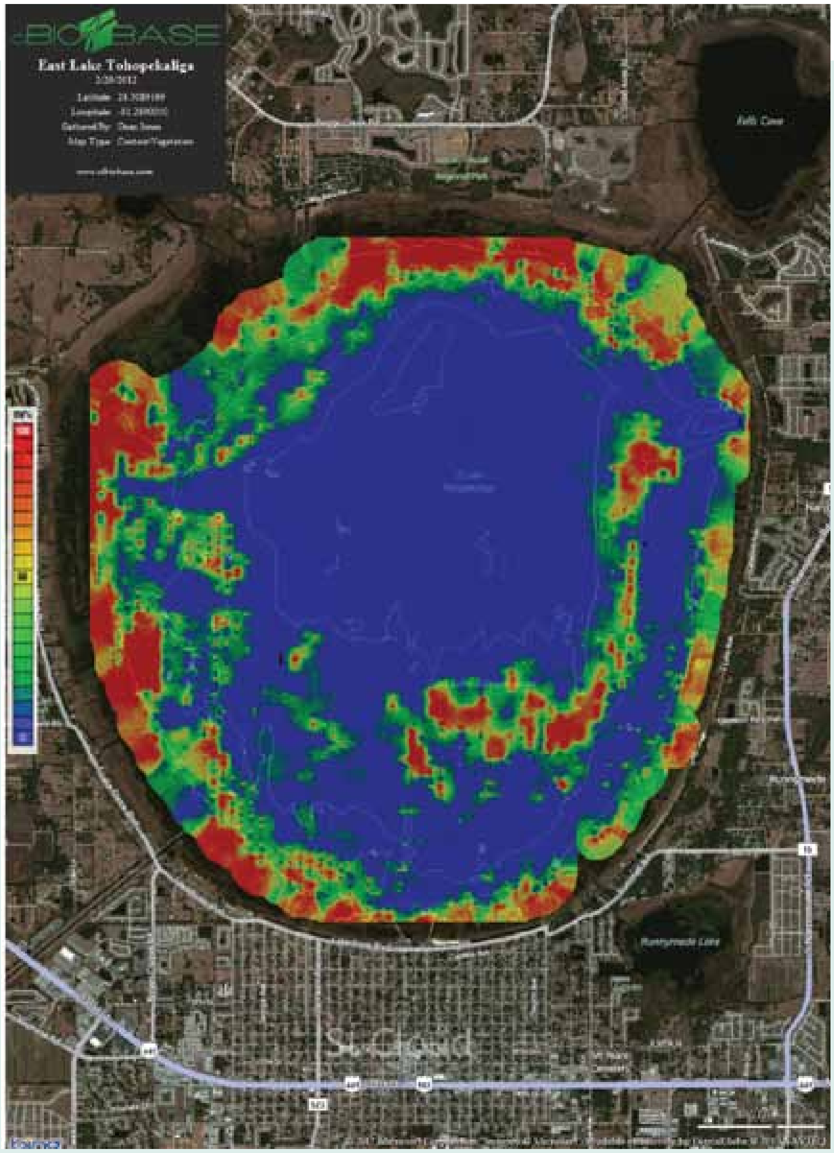


Vegetation map on East Lake Toho showing the distribution and density of Illinois pondweed in February 2012. Photo courtesy of Contour Innovations.

both a large and small scale. The hardware (transducers, structure scan) and software (algorithms for vegetation detection) will continue to improve, and the ability to create a quantitative, permanent, and unbiased record of SAV abundance will allow managers to avoid relying on anecdotal observations and memories.

On February 17, 2012 the FWC wanted to rapidly produce a map to depict coverage of Illinois pondweed in 12,000 acre East Lake Tohopekaliga. The expansion of this native plant on a lake that typically has supported limited submersed vegetation has been of significant concern to numerous stakeholders. In conjunction with FWC personnel and Contour Innovations, a mapping project was implemented on February 20 using seven boats to collect data along established transects (several miles in length). A vegetation map of Illinois pondweed distribution and density was produced by February 22nd. The ability to initiate projects of this scope with a short lead time suggests a strong future utility for this type of technology.

Determining the Status of Fluridone Resistance on the KCOL

Due to concerns regarding heavy reliance on endothall, we decided to determine the distribution of fluridone resistant hydrilla (FRH) throughout the KCOL. Fluridone was last used at a large scale on these lakes in 2004. At this time FRH was dominant throughout all four lakes, yet fluridone sensitive strains remained present. Between the hurricanes of 2004 and large-scale use of endothall, hydrilla coverage was significantly reduced. As the hydrilla began to expand again in 2010 and 2011, we wanted to determine if the ratio of resistant (R) to susceptible (S) strains had changed. Plants were transferred to the laboratory and a PAM fluorometer was utilized to compare the response of hydrilla to fluridone.

Key Finding # 3 – Results showed that fluridone resistant strains of hydrilla remain dominant on the KCOL with greater than 80% of the 260 total samples showing elevated tolerance to fluridone. While it has been 8 years since the last large-scale fluridone treatments, the majority of plants sampled remained tolerant to fluridone. There was variability in the level of fluridone tolerance detected; however, over 20% of the samples showed a very limited response to fluridone at 20 ppb. Recent development of a genetic test by the SePRO Corporation (GenTEST) allows managers to determine fluridone susceptibility on Florida lakes.

Herbicides

With widespread fluridone resistance on the KCOL and heavy reliance on endothall, new tools are critical. Cooperation between industry, academia, and regulatory groups resulted in aquatic registration of several herbicides during this project. Screening trials were conducted by Dr. Bill Haller as part of Element 1. Product registrations included penoxsulam (2007), imazamox (2008), flumioxazin (2010), and bispyribac-sodium (2011). Following treatment of several small lakes and cove treatments on Lake Tohopekaliga, the decision was made to evaluate penoxsulam at an operational scale. Developing a use pattern on the KCOL for penoxsulam and other ALS inhibitors was a priority due to their alternate mode of action.

Key Finding # 4 – A whole-lake penoxsulam treatment of 4500 acre Lake Cypress was conducted in June 2008. While selectivity was better than predicted, hydrilla efficacy was confounded by the need to maintain extended exposure to penoxsulam. The decline in hydrilla biomass was slower than predicted and results from this

A wide range of Fluridone symptoms was noted for hydrilla collected from the KCOL. Photo by Dean Jones.

and other treatments with penoxsulam led to research evaluating penoxsulam at 12 to 20 ppb in combination with endothall at 1 ppm. Treatments on Lake Kissimmee (500 acres) in the spring of 2009 and Lake Cypress (1745 acres) in the summer of 2010 were implemented and evaluated. These treatments resulted in much faster control of hydrilla versus penoxsulam alone, reduced exposure requirements, ability to target a specific area of the lake, and good overall selectivity. Given variable water flow conditions in the KCOL and the desire to allow more hydrilla growth in the lake, this use pattern may have a fit on the KCOL. As this concept has been further developed through research and demonstration, similar treatment combinations have been used in other Florida lakes.

Final Thoughts

We want to acknowledge key personnel who worked under this demonstration project. Sarah Berger was the original Biologist hired by Osceola County to assist with Elements 1 and 2 of the project. In 2009 she enrolled in graduate school at the University of Florida to pursue a Master's Degree working on a project that involved herbicide tolerance and aquatic plants. She completed her Master's degree in 2011 and is pursuing a PhD at UF. Jeremy Slade was hired at UF in 2008 to provide technical support for large-scale FWC IPMS hydrilla control projects, and he spent countless hours on the KCOL collecting data. In December 2010, Jeremy accepted a position with UPI and is now the Aquatics Technical Manager in Florida. He maintains an active role in treatments involving endothall on the KCOL. Erin Canter is an undergraduate student at UF who analyzed numerous samples for this project. She will graduate in the summer of 2012 and begin working with the Peace Corps in Cameroon Africa.

Acknowledgements

This research was supported by funds from the Environmental Protection Agency as part of the Osceola County Demonstration Project on Hydrilla and Hygrophila in the Upper Kissimmee Chain of Lakes, FL. (EPA Grant ID: X796433105). Numerous projects were leveraged with funding from the Florida FWC IPMS, and the US Army ERDC, Aquatic Plant Control Research Program. Permission to publish this information was granted by the Chief of Engineers. Specific mention of products or companies does not represent an endorsement.

Dr. Michael D. Netherland (mdnether@ufl.edu) is a Research Biologist for the US Army ERDC and a Courtesy Associate Professor at the University of Florida, Gainesville, FL.

Mr. Dean Jones was a Senior Biologist for the University of Florida/IFAS Osceola County Extension from 2009 through 2012. Mr. Jones (kdjones@ufl.edu) is now a Senior Biologist for the University of Florida/IFAS Center for Aquatic and Invasive Plants.

This article summarizes the results of Element 5 of the Demonstration Project on Hydrilla and Hygrophila

Technology and Improved Efficacy of Mechanical Control of Hydrilla

By W.T. Haller and D.K. Jones

Mechanical control of hydrilla has been hindered by the belief that the process provides only short-term control (a few weeks) due to rapid regrowth, has a high cost per acre harvest and excessive fish bycatch. This was certainly the result reported by McGehee (1979) on a US Army Corps of Engineers harvesting project conducted on Orange Lake, FL in 1976 and 1977. The Corps study evaluated the Aquamarine "AQUA-TRIO" consisting of an H-650 harvester, transporter and shore conveyer on hydrilla control in navigation trails and fishing areas in the lake. The harvester could cut hydrilla to a depth of 5 feet and was operating in surface-matted hydrilla weighing an estimated 22,000 lbs/acre fresh weight. The average hydrilla load on the harvester weighed 2,900 lbs which by calculation (22,000 lbs/acre divided by 2,900 lbs/load) indicates it took 7.6

Sorting fish from several hundred pounds of hydrilla. Each bit of hydrilla was examined by at least two enthusiastic and dedicated individuals to assure all fish were collected from the Lake Toho samples. Photo by Dean Jones.

loads to harvest 1 acre of hydrilla. The highest number of loads in an 8 hour day was 33, so the H-650 in this test harvested a maximum of 4.3 acres per day. The operation maintained 163 acres of hydrilla control over the 4 month period (July – October 1977) at a total cost of $455/acre. It was also interesting that some areas of the lake had to be harvested 6 times (once every 15 days) *while other areas only had to be harvested once* to maintain open boating trails.

In September 1977, three harvester loads of hydrilla from water 5 – 7 feet deep were hand-sorted to count fish bycatch or fish trapped in the surface-matted hydrilla and disposed on shore. Results (Haller et. al 1980) showed the number of fish harvested at 27,000 ± 800 fish/acre weighing a total of 75 ± 17 lbs/acre. These numbers represent an estimated 32% of total fish numbers and 18% of total fish weight in each acre. Dominant species in the fish bycatch consisted of bluefin killifish, dollar sunfish, gambusia and juvenile sunfish (*Lepomis* spp.).

The development of fluridone-resistant hydrilla populations in the late 1990s on several large lakes in Florida prompted managers and scientists to develop new aquatic herbicides, increase efforts to find suitable biological control agents, and re-evaluate use patterns of traditional herbicides and mechanical harvesting.

Reviewing the Orange Lake study (conducted 35 years ago) raises several questions primarily involving increased harvesting efficiency, longevity of control and reduced fish bycatch.

Harvesting efficiency can be increased by keeping the harvester operating as long as possible before requiring transport and unloading of harvested vegetation. It was reported by Sabol (1987) that in-lake disposal of hydrilla reduced harvester down time by 50%. The 1977 H-650 harvester tests on Orange Lake showed that it took 7.6 loads to harvest an acre of surface-matted hydrilla. The use of large capacity harvesters such as the 70-foot Kelpin harvester showed it could harvest 1 acre of surface-matted hydrilla in approximately 1 hour (Haller 1996). Assuming transport and off-loading times similar to the H-650, the larger Kelpin harvester can theoretically harvest 7 – 8 acres in an 8 hour day, nearly doubling the harvesting efficiency of the H-650. Another option to increase harvesting time would be to harvest when less hydrilla biomass is present to decrease transport/unloading time.

Harvest longevity is the amount of time that a harvested area remains weed-free or usable following a single harvest. The Orange Lake study reported that some areas of the lake required 6 harvests and other areas only required 1 harvest. If hydrilla grows an inch/day, as often reported, harvesting to a water depth of 10 feet would provide 4 months of control compared to harvesting to a depth of 5 feet which would provide 2 months of control. Engle (1990) reported reduced regrowth rates of pondweeds harvested in early summer compared to plots harvested in late summer. The longevity of hydrilla control can be increased by harvesting to greater water depths, but until recently, hydrilla plants needed to be visible in order to be harvested.

Reducing fish bycatch according to Engel (1990) depends upon the number and size of fish present, in-shore or off-shore location of the harvesting site, and the density of the cut vegetation. The fish bycatch in the Orange Lake study (Haller 1980) was a worst case scenario. Surface-matted hydrilla with maximum vegetation density had high numbers of juvenile sunfish harvested (hatched in Spring 1977) and contained 3 species that are more typical of dense in-shore littoral habitats (bluefin killifish, spotted sunfish and gambusia). We now believe that limnological factors also contributed to the high bycatch in Orange Lake. Hydrilla was harvested and fish were counted from transects harvested in the morning during late August 1977. This surface-matted hydrilla, growing in 5 – 7 feet of water over a highly organic lake bottom probably contained oxygen in only the top 1 –2 feet of water. This lack of oxygenated water below the hydrilla mat likely concentrated the fish in the area of highest oxygen and highest hydrilla density which contributed significantly to increased fish bycatch.

The University of Florida-IFAS Center for Aquatic and Invasive Plants (CAIP) obtained funding from Osceola County, Florida through the US EPA Demonstration Project on Hydrilla and Hygrophila in the Upper Kissimmee Chain of Lakes (EPA Grant Number X796433105) to conduct a deep water harvesting operation in February and March 2012. A Kelpin 70-foot harvester was equipped to harvest hydrilla to water depths of 10 feet. The specific objectives of the project were to harvest hydrilla in a 100 acre area in Lake Tohopekaliga (Lake Toho) where the hydrilla was 3 – 6 feet tall in 8 – 10 feet of water, measure fish bycatch, and determine if any significant changes in water quality were caused by the harvesting operation. Hydrilla could not be seen from the water surface, so the harvester was equipped with GPS equipment to allow the operator to see previous harvest tracks and adjust the harvester to cut adjacent to those tracks. Fish bycatch was determined from 4 transects harvested across the 100 acre plot. The weight of the hydrilla in the 4 transects varied from 980 to 1,470 lbs fresh weight per acre, compared to the 22,000 lbs/acre in the 1977 Orange Lake study. The study was conducted in February 2012, prior to peak spawning of *Lepomis* and other species, so fewer juvenile fish were present. Water in the harvest site was deeper and well-oxygenated from the surface to the lake bottom which allowed greater vertical and horizontal opportunity for fish to escape. The hydrilla density was much lower and there was no hydrilla at the water surface. This avoided bycatch of

The 70 ft Kelpin Harvester was fitted with GPS navigation and the pickup table extended in order to harvest to a maximum depth of 10 feet, although most of the hydrilla in the Lake Toho site was only 3-6 ft tall in 8-9 ft of water. Photo by Dean Jones.

common littoral species such as bluefin killifish, spotted sunfish and gambusia.

The total number of fish harvested in the deep water plot on Lake Toho was 121 ± 6 fish/acre compared to 27,000 ± 800 fish/acre in the 1977 Orange Lake study. The weight of fish harvested in the Lake Toho study was similarly very small compared to the weights harvested from Orange Lake in 1977.

Since the weight of the hydrilla in the Lake Toho study was minimal, the harvester was able to harvest at a rate of 2.0 to 2.4 acres/hour with no time required for transport and unloading during that period. Results of water quality studies before, during and after harvesting operations showed only temporary (a few hours) increased turbidity and no long-term impacts, probably as a result of operating in deep water with no disturbance of the lake bottom by paddle wheels used for propulsion.

This study clearly shows the feasibility of harvesting hydrilla in deep water before it reaches the water surface. Harvesting efficiency is greatly improved by handling 1,000 lbs/acre of hydrilla rather than 22,000 lbs/acre. This was made possible by the development of GPS and related software in the past few years, as well as the greater capacity of the larger harvesting equipment. Harvesting longevity is still being evaluated. However, 5 months following the Feb/March 2012 harvesting operation, the 100 acre plot remains usable with approximately 25% of the water column infested. Fish bycatch in the Lake Toho study was < 1% of the bycatch found in the surface-matted hydrilla in Orange Lake during the 1977 study. The timing of the harvest, the depth of the water, and the height of the hydrilla below the surface likely contributed to the much lower and acceptable fish impacts.

Certainly additional improvements can be made to improve efficacy, but this study should dispel the dogma that mechanical harvesting of hydrilla is too expensive and too damaging to fish populations.

For a complete list of references, please contact Dr. William Haller, University of Florida-IFAS Center for Aquatic & Invasive Plants, Gainesville, 352-392-9615, whaller@ufl.edu

Photo by Don Morgan. Boat tour on Lake Tohopekaliga as part of the Hydrilla Field Day.

This article summarizes the results of Element 4 of the Demonstration Project on Hydrilla and Hygrophila

Demonstration and Outreach, Element 4

By Stacia Hetrick and Amy Richard

The demonstration and outreach portion of the US EPA Demonstration Project on Hydrilla and Hygrophila in the Upper Kissimmee Chain of Lakes presented a great opportunity to reach out to Osceola County residents and aquatic plant managers and bring them up to speed on aquatic weed issues and the latest science from the project.

The Information Office of the UF/IFAS Center for Aquatic and Invasive Plants (CAIP) teamed up with Osceola County Extension faculty to develop numerous outreach strategies.

Project Website

A project website (http://plants.ifas.ufl.edu/osceola/index.html) was developed for timely dissemination of research, news and reports along with access to CAIP's online searchable database (APIRS)—with special focus on hydrilla and hygrophila. This award-winning site contains more than 1,300 references on the control of hydrilla and hygrophila in Florida lakes from the APIRS database, with links to a subset of the top literature. Other special features include an FAQ section, links to CAIP's aquatic plant pages (plants commonly found in Osceola County), numerous videos and downloadable publications.

In an effort to keep citizens "in the loop," the website provides a comprehensive and timely overview of the project, with easy access to research results and the scientists and project managers who implemented them.

Publications and Presentations

Numerous print materials and media were used to reach a broad spectrum of citizens in Osceola County and aquatic plant managers statewide. Brochures, web cards, award winning kiosk posters, and portable displays were developed. In addition to print materials, numerous presentations were produced and delivered to various community and stakeholder groups including elected officials, homeowners associations,

Photo courtesy of Osceola County. Educational kiosks at Kissimmee Chain of Lakes boat ramps shown by Stacia Hetrick (L) and Amy Richard (R).

community organizations, boaters, duck hunters, and anglers. Presentations highlighting the project work were given at state and national professional meetings. A selection of these print materials and presentations can be accessed on the project website.

Field Days

Demonstration Field Days were conducted to showcase the progress of the project to stakeholders and the public. During the event, attendees visited exhibits by project researchers as well as partner agencies and organizations. Attendees participated in boat tours to demonstration areas and hydrilla infestations on Lake Tohopekaliga to see first-hand the results of the project.

Science Curricula for Teachers

Development and dissemination of interactive science curricula was an especially important component of the outreach endeavor as it was designed to reach the next generation of Osceola County citizens. The lessons and activities have the potential to "keep giving" as students mature into decision-making adults and teachers cover the topic in the classroom into the future.

CAIP staff assembled and distributed resources for teachers to use and, with their assistance, also developed content for a number of core lessons and activities including *The Hydrilla Game—Tracking the Journey of An Incredibly Invasive Plant, Lakeville—A Natural Resource Management Activity*, a *Plant Morphology Lab —Aquatic Plant Identification Key*, and a Teacher Guide for the *Student Invasive Plant Video Challenge*.

The invasive plant curriculum was further reinforced with intensive professional development training for Osceola County science teachers (upper elementary, middle and high school). Two 4-day workshops, held in 2008 and 2009, included field trips and hands-on plant identification activities as a catalyst for generating excitement and interest in the curriculum. Participants earned professional development credits and returned to their classroom with new resources, greater background knowledge on the topic of invasive aquatic plants, and a better understanding of the challenges associated with managing them. A one-day follow-up workshop was held in April 2011 to revisit the lessons/activities provided in earlier workshops and demonstrate improvements that had been made as a result of input from teachers.

Invasive Plant Video Challenge for Students

Perhaps our most successful outreach effort (and definitely the most fun!) was the Invasive Plant Video Challenge for students facilitated by CAIP staff, Osceola County Extension faculty and teachers in the community. After learning about the impacts of invasive aquatic plants on local freshwater habitats, students were challenged to write, act and film their own short stories about hydrilla, hygrophila and water hyacinth. The idea was field-tested at the 2009 teacher workshop and was an instant hit with teachers who saw the potential for capturing their students' attention and interest with this non-traditional assessment technique.

Following the workshop, three teachers approached CAIP staff and asked to participate in the video "challenge." With their leadership in the classroom, students provided scripts, storyboards, and raw video footage that was pulled together into a finished product by professional videographer Phil Chiocchio of Sarasota. Amy Richard (CAIP) and Stacia Hetrick (Osceola County) provided post-production editing for content and scientific accuracy. As a result of the project, young audiences (and their parents) learned about problems and solutions associated with invasive species while having fun and being creative at the same time. A Teacher Guide was developed to encourage other educators to use this resource with their students.

Stacia Hetrick is now employed with Long's Turf Industries in St. Cloud and can be reached at stacia@longsturf.com. Amy Richard is Education Initiative Coordinator at the UF/IFAS Center for Aquatic and Invasive Plants and can be reached at arich@ufl.edu or (352) 392-6843.

APMS Honors Members and Contributors at 2012 Annual Meeting

By Jeffrey D. Schardt

The 52nd Annual Meeting of the Aquatic Plant Management Society convened in Salt Lake City on July 22-25, 2012. APMS holds its annual gathering within the boundaries of one of the Society's seven regional chapters, tailoring the program to address management issues within that region as well as presenting current research from around the world. The focus of the annual meeting is technical exchange through presentations and interactions among delegates at the many functions scheduled throughout each day. The week's premier event is the Awards Banquet where APMS honors contributions from established researchers and managers, and to students just entering the field of aquatic plant management. Following is a summary of the 2012 APMS awards and presentations.

Max McCowen Friendship Award – Dr. Vernon V. Vandiver – University of Florida

Special recognition is given to a member whose demeanor and actions display long-time APMS Member Max McCowen's sincerity and friendship in the spirit of being an ambassador for the APMS. During his professional career at the University of Florida, IFAS from 1975-2002, Dr. Vernon Vandiver exhibited modesty and respect conducting teaching and training programs on chemical and integrated control methods for aquatic weeds. His pleasant disposition and friendly smile have been a constant throughout his career. Over the years, Vernon has become a familiar, friendly face at APMS, FAPMS, and SFAPMS conferences, and has always exhibited Max's calm demeanor and positive spirit.

T. Wayne Miller Distinguished Service Award – Dr. John H. Rodgers, Jr. – Clemson University

There are several criteria for this award, named after the founder of APMS and President for its first two years, including: successful completion of a relatively short-term project taking considerable time, strategy and effort resulting in advancement of the science, educational outreach, and the APMS; and performance above and beyond the call of duty as an officer, chair, or special representative of the APMS. Dr. Rodgers orchestrated the first formal Strategic Planning Session for the APMS Board of Directors in 2005 which defined what APMS is, what it does, and why, and has served as a guiding document for APMS decisions and actions. He conducted similar strategic planning sessions for the Society in 2009 and most recently in January, 2012 to align Society goals and visions to ever-changing needs and expectations of APMS members and customers.

President's Award – Mr. Don Doggett – Lee County Hyacinth Control District

This award is presented by the APMS President to an individual who has displayed many years of dedication and contributions to the Society and the field of aquatic plant management. Don Doggett has been a member of APMS since 1978. He served as Treasurer from 1997-2003 and President in 2007, and has chaired the Local Arrangements, Site Selection, and Awards Committees. Don has also been active in the Florida Aquatic Plant Management Society, serving as a Director from 1986-1988 and 2008-2011, Secretary from 1990-2003, and President in 1996. Additionally, Don has participated on the Board of the FAPMS Scholarship Foundation for the past 17 years. He graciously donates his time and expertise on a moment's notice, forwarding the craft of aquatic plant management. Don has long been a leader, organizing and hosting workshops and tours that demonstrate the need for aquatic plant management, and highlighting operational strategies to regulatory personnel, policy makers, and visiting managers from across the country and around the world.

APMS Honorary Membership

Honorary Membership is reserved for Society members who recently retired from the field of aquatic plant management and have been long-term members who actively promoted the Society and its affairs during their career. Two persons were inducted as APMS Honorary Members in 2012.

Dr. Lars W. J. Anderson – USDA – Retired

After 37 years of service, Lars Anderson retired from the USDA-Agricultural Research Service-Exotic and Invasive Weed Research Unit, on December

31, 2011. His career focused on the biology and management of invasive aquatic weeds, including work on plant growth regulators, herbicide uptake and translocation, data supporting aquatic herbicide registrations, and developing effective management strategies using aquatic pesticides. His research also included evaluating non-chemical control technologies including triploid grass carp, herbivorous insects, plant pathogens, and bottom barriers for aquatic weed control.

Lars Anderson has been an active member of APMS since 1977. He served as President in 1986 and chaired several APMS committees through the years. Additionally, Lars was the APMS Representative on the Board of Directors for both CAST (Council for Agriculture and Food Technology) and the WSSA (Weed Science Society of America). He co-founded the Western Chapter of the Aquatic Plant Management Society and served as its President in 2006-2007. He is an active member in the Western Society of Weed Science and was recently named as a Fellow of that Society. Dr. Anderson currently serves on the Editorial Board of Aquatic Nuisance Species Digest and as an Associate Editor for Invasive Plant Science and Management.

Mr. David P. Tarver – Outdoor Tech, Incorporated

David Tarver joined APMS as a student member in 1973 after graduating from Northwestern State University (NSU) in Louisiana with a BS degree in Wildlife Management. He received a Masters Degree in Botany also from NSU in 1974, and joined the Florida Department of Natural Resources where he provided aquatic plant management extension services and law enforcement duties as the northwest Florida regional biologist. David was hired by Eli Lily and Dow to work in Sonar herbicide product development from 1981-1994, and SePRO Corporation from 1995-2011 to become Director of Technical Development. During this period, David was a leader in developing strategies to apply fluridone herbicide alone and in combination with other tools to bring hydrilla under maintenance control in Florida public lakes and rivers.

David is a 39-year member of APMS and a Charter Member of the Florida, Texas, and MidSouth APMS Chapters. He was President of both FAPMS (1986), and APMS (2002). He served on the FAPMS Board of Directors from 1983-1987 and the APMS Board from 1995-2003. David was the editor of *Aquatics* magazine from 1983-1984 and the publisher from 1985-2009. He also worked on the APMS Education and Outreach Committee where he coauthored the *Understanding Invasive Aquatic Weeds* workbook distributed to more than a half million students through printed copies and as an interactive online resource.

Student Awards

Promoting student initiatives is one of the most important core values defined during APMS strategic planning sessions. Students who present information at the

APMS Annual Meeting are offered a free one-year membership, waived registration costs, and free hotel accommodations. Student presentations are judged in oral and poster competitions and winners receive cash awards for 1st-3rd places. Following are the 2012 Student Presentation Award winners.

Oral Presentation:

1st Place: Shelley Robertson, University of Georgia – Evidence for Novel Routes of Exposure to the Biotoxin Linked to Avian Vacuolar Myelinopathy (AVM)

2nd Place: Sarah True Meadows, North Carolina State University – Monoecious Hydrilla Phenology on Two North Carolina Lakes

3rd Place: Justin Nawrocki, North Carolina State University – Evaluation of Enhanced Data Processing and Cloud Data Hosting of SONAR Based Surveys

Poster Presentation:

1st Place: Sarah True Meadows, North Carolina State University – Competition of Monoecious Hydrilla with Other Submersed Macrophytes

2nd Place: Christine Rohal, Utah State University – What are Effective Treatments for Controlling Small, Dense Patches of *Phragmites australis* in Great Salt Lake Wetlands?

3rd Place: Bradley Sartain, Mississippi State University – Variations in Water Exchange Characteristics among Hydrilla Sites in the Ross Barnett Reservoir

Graduate Student Research Grant

Aside from the Annual Meeting, the APMS' greatest investment is the Graduate Student Research Grant issued every two years. Revenues for this $40,000 grant are generated through APMS fundraising events as well as generous contributions from Regional Chapters and Society sponsors. Five proposals were submitted to APMS for the 2012-2013 period. The 2012-2013 Graduate Student Research Grant was awarded at the culmination of the APMS Awards Banquet to:

Ryan Thum, Grand Valley State University – A Quantitative Genetics Approach to Identifying the Genetic Architecture of Herbicide Susceptibility, Tolerance, and Resistance in Hybrid Watermilfoils (*Myriophyllum spicatum x sibiricum*)

Other Awards

APMS provides a poster reception on the first evening of the Annual Meeting in the exhibit hall to facilitate information exchange among vendors, sponsors, and technical research presenters. Students judge the best non-student poster and most interesting and best-presented vendor exhibit. A new award was initiated in 2012 to acknowledge the best article submitted to the APMS *Journal of Aquatic Plant Management* during the previous year as judged by the panel of Associate Editors. Following are the 2012 recipients of these awards.

Best Technical Poster Award (non-student) – Lauren Courter, Ian Courter, and Tommy Garrison, Mount Hood Environmental – Effects of the Aquatic Herbicide Endothall on Survival of Salmon and Steelhead Smolts during Seawater Transition

Outstanding *Journal of Aquatic Plant Management* Article Award – James Johnson and Ray Newman, University of Minnesota – A Comparison of Two Methods for Sampling Biomass of Aquatic Plants

Exhibitor Excellence Award – BioSonics, Incorporated – Seattle, Washington

Jeffrey D. Schardt, FL Fish and Wildlife Conservation Commission, Tallahassee, FL; 850-617-9420; jeff.schardt@myfwc.com

Aquavine

Aquatics Has Been Referenced!

UF has released a news report on feral hog research findings. The report references Ken Gioeli's article on Feral Hogs that was initially published in the *Aquatics* Summer 2012 issue. It's nice to see *Aquatics* on the forefront of these issues. Take a look at the report here: http://news.ufl.edu/2012/08/01/hogs-wallow/

Movers and Shakers

Stacia Hetrick is now with Longs Turf Industries located in St. Cloud, FL. Stacia previously worked for Osceola County Extension and was responsible for education and outreach for the Hydrilla Demonstration Project. Stacia can be reached at stacia@longsturf.com. Stacia will remain on the FAPMS Board of Directors.

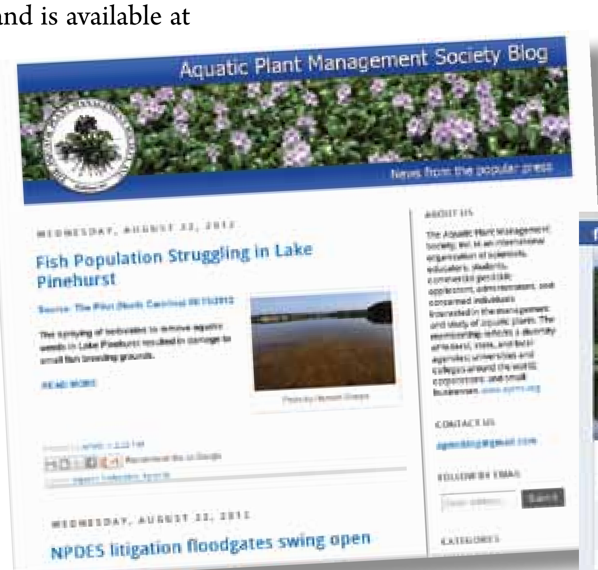
On the Web

NEW! Aquatic plant news from around the country at your fingertips!

As a new service for members from the APMS Board of Directors, an APMS News blog was created and is available at apms-blog.blogspot.com/ or at www.apms.org under the Social Networks tab.

Read the news about aquatic plant management from other states around the country. The site lists relevant headlines with the first few lines of the story. Click READ MORE if you want to view the full article. No login or password is needed and there are no ads. The blog is updated weekly. To receive an e-mail when new material is added (optional), complete the FOLLOW BY E-MAIL field. No new content – no new e-mail. If you'd like to contribute a news item, send an email with the link to apmsblog@gmail.com

See what's happening in the rest of the country – check out the APMS Blog!



FAPMS is on Facebook

The FAPMS has its own Facebook Page. Just log onto Facebook and "Like" our page to get updates on the society, news, stories and pictures. You can even submit article ideas for upcoming issues of *Aquatics*!

APMS on Linked In

Another excellent social network resource is the APMS Linked in group. Go to the APMS website at www.apms.org and click on the Social Network tab to select Linked In. It's a great site for professional networking, good answers to aquatic plant management questions, and fun conversations (see recent comments about the recent APMS Annual Conference. Who got the shotgun? And who got the rod?) Check it out!

AERF has a Facebook Page, too!

If you haven't "Liked" the AERF Facebook Page, you should! There's always something... interesting going on!!

Vic Ramey Photo Contest

The annual VIC RAMEY PHOTO CONTEST will be held at the Annual Training Conference in St Augustine. There are two categories: Aquatic Scene (any natural aquatic scene); and Aquatic Operations (operation equipment, application method, or field applicator).

Requirements for entry:

Photos must be taken by a FAPMS member during the contest year.

Photos must be submitted as a 5" x 7" or 8" x 10" print, with or without mat or frame.

Back of photo must contain photographer's name, contact number, photo category, location of photo, and description or title.

Prizes are first, second, and third place ribbons for each category.

Judges are selected from attending conference members. Photo entries may be submitted at the registration desk.

Good luck, photographers!

Calendar of Events

2012

September 17-19

MidSouth APMS
31st Annual Conference
Mobile, AL
www.msapms.org/

October 8-11

Florida APMS
36th Annual Conference
St. Augustine, FL
www.fapms.org/index.html

October 17-19

South Carolina APMS
34th Annual Meeting
Myrtle Beach, SC
www.scapms.org/index.htm

October 22-24

Texas APMS
Annual Conference
Bandera, TX
www.tapms.org

October 25

South Florida APMS
Quarterly Meeting
www.sfapms.org/

November 7-9

North American Lake Management Society
32nd International Symposium
Madison, WI
www.nalms.org

2013

January 22-24

Northeast APMS
14th Annual Conference
Westbrook, CT
www.neapms.net/

February 4-7

Weed Science Society of America
53rd Annual Meeting
Baltimore, MD
www.wssa.net/

March 3 - 6

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