

Aquatics

SUMMER 2013

A Publication of the Florida Aquatic Plant Management Society



DON'T LET ALGAE RUIN YOUR DAY

We're being
watched and monitored
as if we
were terrorists!

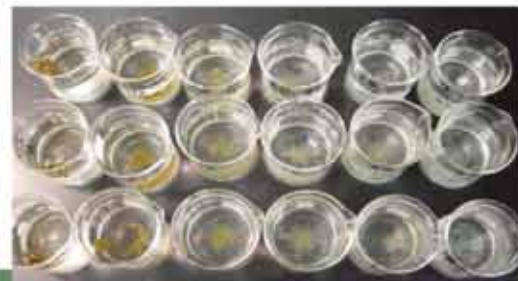
We have
the news media
talking about us.

In some places
they even
test us on a
regular basis.

One of our
biggest fears is the
Applied Biochemists'
Algal Challenge Test.



**Take the
Algal Challenge Test
and choose your
best defense.**



ARCH
is now a part of
LONZA
www.lonza.com

www.appliedbiochemists.com
1-800-558-5106



A new take on submersed aquatic plant management at Silver Springs, Florida. Photo by Bruce Mozert, "Mowing the Eelgrass." Read about this imaginative photographer and his work on page 10.



Rare invasive *Hygrophila corymbosa* flowers. See more on page 14.

Contents

- 5** You Know You're Having a Bad Day When ...
- 6** Pond, Selectivity and Irrigation Studies on Potential New Aquatic Herbicides
BY WILLIAM T. HALLER AND LYN A. GETTYS
- 8** The Influence of Aquatic Plants on Dissolved Oxygen
BY ERIN BRADSHAW SETTEVENDEMIO
- 10** Bruce Mozert and Silver Springs
- 12** Leeches and Snails and Flukes – Oh My! A first-person account of my close encounter with swimmer's itch
BY LYN A. GETTYS
- 14** *Hygrophila corymbosa* – A "Rare" But Potentially Invasive Plant from San Felipe Springs, Del Rio, Texas
BY JEFFREY HUTCHINSON AND CASEY WILLIAMS
- 20** Remembrances

To become a member of FAPMS and receive *Aquatics* magazine, please visit the website at: www.fapms.org

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.

All rights reserved. Reproduction in whole or in part without permission is prohibited. *Aquatics* (ISSN 1054-1799) is the official publication of the Florida Aquatic Plant Management Society.

The Florida Aquatic Plant Management Society has not tested any of the products advertised or referred to in this publication, nor have they verified any of the statements made in any of the advertisements or articles. The Society does not warrant, expressly or implied, the fitness of any product advertised or the suitability of any advice or statements contained herein.

FAPMS 2013 Board of Directors

Officers

President

Tim Harris
602 North Palm Ave, Palatka, FL 32177
386-328-2737
Tim.T.Harris@usace.army.mil

President-Elect

James Boggs Jr.
Helena Chemical
P.O. Box 1758, Dade City, FL 33526
352-521-3538; boggsj@helenachemical.com

Past President

Jerry Renney
Applied Aquatic Management, Inc.
P.O. Box 1469, Eagle Lake, FL 33839
863-533-8882; 863-534-3322 fax;
jerryrenney@tampabay.rr.com

Secretary

Stephanie Walters
Winfield Solutions
2601 W Orange Blossom Trail, Apopka, FL 32712
407-466-8360; 407-884-0111 fax;
swalters@landolakes.com

Treasurer

Jennifer Myers
Applied Aquatic Management, Inc.
P.O. Box 1469, Eagle Lake, FL 33839
863-533-8882; 863-534-3322 fax;
jmyers@tampabay.rr.com

Editor

Karen Brown
University of Florida - IFAS
Center for Aquatic & Invasive Plants
7922 NW 71st Street, Gainesville, FL 32653
352-273-3667; kpbrown@ufl.edu

BOARD OF DIRECTORS

Third Year

Karen Brown
University of Florida - IFAS
Center for Aquatic & Invasive Plants
7922 NW 71st Street, Gainesville, FL 32653
352-273-3667; kpbrown@ufl.edu

Jeremy Crossland
701 San Marco Blvd, Jacksonville, FL 32207
904-571-5410
Jeremy.M.Crossland@usace.army.mil

Scott Glasscock
Disney Pest Management
2220 S Service Lane, Lake Buena Vista, FL 32830
407-824-1528; Scott.glasscock@disney.com

Second Year

Melissa Barron
Syngenta Professional Products
664 Hempstead Ave, Orlando, FL 32803
407-257-8043; Melissa.barron@syngenta.com

Stacia Hetrick
Long's Turf Industries
1400 Hamlin Ave, Suite H, St Cloud, FL 34771
407-454-3557; stacia@longsturf.com

John Gardner
Aquatic Systems Inc.
2100 NW 33rd Street, Pompano Beach, FL 33069
954-977-7736; john@aquaticsystems.com

First Year

Angie Huebner
Invasive Species Management
701 San Marco Blvd, Jacksonville, FL 32207
904-894-3648; 904-232-3696 fax
Angie.L.Huebner@usace.army.mil

J. D. Gillenwalters
Aquatic Vegetation Control, Inc.
16351 SW Pinto Street, Indiantown, FL 34956
561-261-4592; jd@avcaquatic.com

Craig Smith
Territory Manager-Aquatics – UPI
4230 NE Indian River Drive, Jensen Beach, FL 34957
561-301-8326; craig.smith@uniphos.com

Manage your liquid assets.



Admiral®

Blue Lake Colorant

Keep your water bodies free of noxious plant growth and algae with **Admiral®** lake colorant. With the highest pure dye content of all EPA registered lake colorants, **Admiral** imparts a natural, rich blue color while controlling the growth of several types of aquatic weeds and algae. For your convenience, both liquid and WSP® (water soluble packets) formulations are available.

betterturf.basf.us



The Chemical Company

Committee Chairs

Aquatics Magazine Advertising

Angie Huebner
Invasive Species Management
701 San Marco Blvd, Jacksonville, FL 32207
904-894-3648; 904-232-3696 fax
Angie.L.Huebner@usace.army.mil

Auditing

Keshav Setaram
SFWMD St. Cloud Field Station
3800 Old Canoe Creek Road, St. Cloud, FL 34769
ksetaram@sfwmd.gov

Awards

Scott Glasscock
Disney Pest Management
2220 S Service Lane, Lake Buena Vista, FL 32830
407-824-1528; Scott.glasscock@disney.com

By-Laws

Stephanie McCarty
Walt Disney World Company
Environmental Affairs Division
P.O. Box 10000, Lake Buena Vista, FL 32830
407-824-7279; stephanie.mccarty@disney.com

Editor

Karen Brown
University of Florida - IFAS
Center for Aquatic & Invasive Plants
7922 NW 71st Street, Gainesville, FL 32653
352-273-3667; kpbrown@ufl.edu

Associate Editor

Lyn Gettys
Assistant Professor, UF IFAS FLREC
3205 College Ave, Davie, FL 33314
954-577-6331; lgettys@ufl.edu

Governmental Affairs

Jeff Schardt
Florida Fish & Wildlife Conservation Commission
Invasive Plant Management Section
3800 Commonwealth Blvd, MS 705
Tallahassee, FL 32399
850-617-9420; jeff.schardt@myfwc.com

Historical

John Gardner
Aquatic Systems Inc.
2100 NW 33rd Street, Pompano Beach, FL 33069
954-977-7736; john@aquaticsystems.com

Local Arrangements

Bill Torres
Florida Event Planning & Meeting Service
329 Dreadnaught Court, Tallahassee, FL 32312
850-519-4310; fapms@embarqmail.com

Membership & Publicity

James Boggs Jr.
Helena Chemical
P.O. Box 1758, Dade City, FL 33526
352-521-3538; boggsj@helenachemical.com

Merchandise

Steve Montgomery
Allstate Resource Management
6900 SW 21st Court, Bldg. #9, Davie, FL 33317
954-382-9766; 954-382-9770 fax
smontgomery@allstatemanagement.com

Nominations

Jerry Renney
Applied Aquatic Management, Inc.
P.O. Box 1469, Eagle Lake, FL 33839
863-533-8882; 863-534-3322 fax
jerryrenney@tampabay.rr.com

Program

Mike Hulon
Texas Aquatic Harvesting
P.O. Box 4034, Lake Wales, FL 33859
863-696-7200; 863-696-2922 fax
texasaquaticmh@aol.com

Resource Demonstration

Brett Bultemeier
Clarke Aquatic Services
6416 NW 168th Street, Alachua, FL, 32615
352-240-5560; bbultemeier@clarke.com

Scholarship

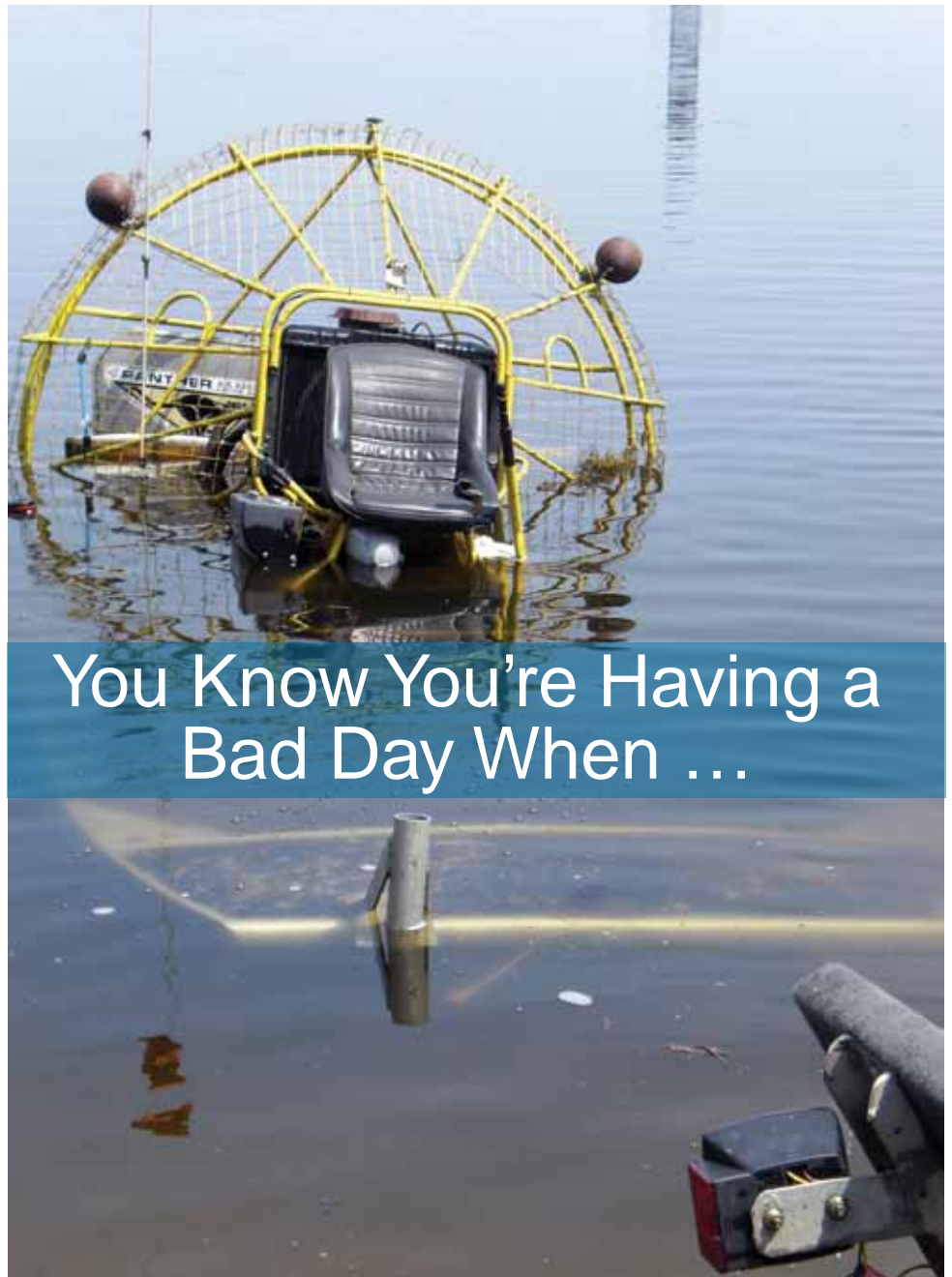
Keshav Setaram
SFWMD St. Cloud Field Station
3800 Old Canoe Creek Road., St. Cloud, FL 34769
407-846-5226; ksetaram@sfwmd.gov

Vendor

Scott Jackson
Syngenta Professional Products
133 Sarona Circle, Royal Palm Beach, FL 33411
561-402-0682; Scott.Jackson@SYNGENTA.COM

Web Site

Angie Huebner
Invasive Species Management
701 San Marco Blvd, Jacksonville, FL 32207
904-894-3648; 904-232-3696 fax
Angie.L.Huebner@usace.army.mil



You sink the airboat in Lake George while backing it off the trailer.

After getting the boat back on the trailer with the help of some gator hunters, you get a flat tire on the trailer on busy Highway 40 on the way home. Fortunately, a spare tire and a jack were on hand.

Photos submitted by Margaret Glenn (retired), a biologist for Dr. Bill Haller for 30+ years at the University of Florida IFAS Center for Aquatic and Invasive Plants in Gainesville.

Pond, Selectivity and Irrigation Studies on Potential New Aquatic Herbicides

By William T. Haller and Lyn A. Gettys

The registration of aquatic herbicides was discussed in the Winter 2012 issue of *Aquatics*. The Spring 2013 issue followed with a description of the hydrilla screening program that, since 2000, contributed to the registration of seven new aquatic herbicides with two new modes of action. This article outlines additional research conducted on herbicides that showed potential for control of fluridone-resistant hydrilla in small mesocosms.

The ability to control hydrilla is a logical and major step towards ultimate registration of a herbicide for aquatic use, but many other factors determine if a product will be registered. The registrant of a potential new product has to devote significant funds, time and effort to conduct additional research on herbicides being considered for aquatic use. The total cost and number of studies needed varies and depends upon research that has already been completed on a particular product. Additional studies typically include establishment of fish and water tolerances, analyses of fish metabolism and pond dissipation, and possibly additional aquatic toxicity profiles, all conducted under U.S. Environmental Protection Agency (USEPA) Quality Assurance/Quality Control (QA/QC) guidelines.

The registrant's decision to proceed with testing and registration of a potential new

aquatic herbicide depends on many factors and includes not only the projected cost of additional studies, but also the projected market share (sales), patent life, projected use rate, half-life in water, concern for irrigation use and other liability issues.

The use of a product (market share) depends upon state, federal, local agency and private purchase and use of the new herbicide. "Use", then, depends very much on a number of factors, including selective control of the target plant with little or no impact on non-target vegetation, cost, availability of other products and any water use restrictions for irrigation, swimming, fish consumption and/or potable water.

A problem with any of the issues listed above would likely result in the registrant's decision to not proceed with registration. For example, a new product that controls hydrilla at 50 ppb, but has poor selectivity and also kills native pondweeds, naiad, vallisneria, coontail, pickerelweed, bulrush and cattail would have little or no utility in public waters. Similarly, a herbicide that selectively controls hydrilla at 200 ppb, but has a 90 day half-life in water and is phytotoxic to turf, ornamental plants and crops at 50 ppb would also not be considered due to necessary irrigation restrictions during the 4 to 6 month period after treatment. Several of these factors have to be analyzed so decisions can be made regarding whether or not to proceed with further efforts towards registration.

Note: To demonstrate the type of information that is collected for a herbicide being considered for possible registration, we are presenting the results obtained from studies of a herbicide that may or may not become labeled for aquatic use.

Selectivity Studies

It is impossible to test a potential new herbicide on all native plants, so we evaluate its effects on the most common submersed and emergent non-target species. Studies were conducted in 100-liter mesocosms with a range of herbicide concentrations similar to the methods we used to screen products on hydrilla (see Spring 2013 *Aquatics*). Native non-target species were grown in 2.5-liter pots and placed in 100-liter tubs or mesocosms at maturity. The tubs were treated once with the test herbicide at a range of concentrations (for example, at 0, 25, 50, 100, 200 and 400 ppb) and all live tissue was harvested and weighed after 8 to 10 weeks of exposure. This protocol allowed the determination of EC_{50} values (the concentration of herbicide that reduces dry weight by 50% compared to untreated [control] plants). The results of these studies are listed in Table 1. The EC_{50} value for hydrilla is 25 ppb and this research suggests that emergent plants (with EC_{50}



Figure 1. The bedding plant melampodium irrigated 8 times over a 4-week period with an experimental herbicide. From left to right, herbicide concentrations were 0 (control), 100, 250, 1,000, 2,500, 10,000 and 25,000 ppb. The EC_{10} value for this herbicide on melampodium is 1,590 ppb.

values of 40 to 275 ppb) are more tolerant of this herbicide than hydrilla. These results are likely conservative because the plants are grown in builders' sand which allows both the lower stems and plant roots to be exposed to the herbicide. While some damage to lanceleaf sagittaria plants may occur in areas where applications of 25 to 30 ppb of this herbicide are used for hydrilla control, it is likely they will recover soon after treatment. Similar studies are conducted on other submersed and emergent species to obtain an indication of the relative selectivity characteristics of the test herbicides.

Irrigation Studies

The USEPA requires that any herbicide applied to food crops by any means (even in irrigation water) must have tolerances (acceptable levels of pesticide in or on the crop) for each crop being irrigated. Since

Table 1. The EC₅₀ values (in ppb) of a potential new aquatic herbicide on emergent non-target aquatic plants compared to the EC₅₀ value for hydrilla (Atul Puri, unpublished data).

Plant	EC ₅₀
Hydrilla	25
Lanceleaf sagittaria	40
Pickerelweed	79
Fragrant waterlily	120
Maidencane	223
Cattail	275

most “new” aquatic herbicides do not have crop tolerances, the use of herbicide-treated water will be restricted. However, irrigation of turf and ornamental plants by homeowners is not as strictly regulated and exceptions to irrigation of these non-edible plants may be less stringent (read the label!) The phytotoxicity of these herbicides in treated water, however, is a major concern to the applicator and the registrant. Consequently, additional studies have been conducted on ornamental (Figure 1) and turf (Figure 2) species to determine the potential effects of irrigating landscape plants with these herbicides. The response of ornamental and turf species was determined by irrigating plants 4 to 8 times with a range of herbicide concentrations, similar to the selectivity studies described above. The EC₁₀ values (the concentration of herbicide that reduces plant dry weight by 10% compared to untreated plants) are then used to determine potential impacts of irrigation on these species. These data are provided to the herbicide registrants for consideration in development of the aquatic herbicide label.

Experimental Use Permit (EUP) Pond Studies

At some point during this process, a decision is made to evaluate the new herbicide in ponds and larger water bodies to collect additional data, since research in 100-liter tubs does not truly represent real-life aquatic conditions. The registrant must submit a draft label to the Florida Department of Agriculture and Consumer Services (FDACS) and the USEPA in order to obtain an Experimental Use Permit

(EUP) or label, which specifies where and how the test herbicide can be used for experimental purposes. Since most EUP herbicides do not have fish and water use tolerances, the treated water in these experimental sites cannot be used for fishing, swimming, irrigation or as potable water. Research sites included an abandoned fish farm, secured retention ponds, and ponds constructed for experimental use in South Florida. All sites were behind locked gates and were visited by FDACS or USEPA staff for approval before use. Research conducted in these ponds included residue analyses, selectivity studies, evaluations of various concentrations of herbicide, longevity of control, and evaluation of split or bump applications. The cooperation of the South Florida Water Management District, St. Johns River Water Management District, Polk County, Osceola County and Sonny Philips is gratefully acknowledged. The data from these studies were provided to the registrants and were essential in the development of data packages that were submitted to the USEPA for evaluation of the aquatic use label.

The final fluridone use patterns for hydrilla control evolved over a period of 5 to 10 years following its registration for aquatic use in 1985. The final use characteristics of the 4 to 5 new hydrilla products will also require time and applicator experimentation. Labels will change over time, so it is the user’s responsibility to read and work within the label. The next and final article of this series, “Herbicide Resistance and Applicator Responsibilities,” will appear in the next issue of *Aquatics*.

Dr. William Haller, University of Florida-IFAS Center for Aquatic & Invasive Plants, Gainesville; 352-392-9615; whaller@ufl.edu and Dr. Lyn Gettys, University of Florida-IFAS Ft. Lauderdale Research and Education Center, Davie; 954-577-6331; lgettys@ufl.edu



Figure 2. St. Augustine grass irrigated 8 times over a 4-week period with an experimental herbicide. From left to right, herbicide concentrations were 0 (control), 7.5, 15, 30, 60, 120 and 240 ppb. The EC₁₀ value for this herbicide on St. Augustine grass is 3.5 ppb.



The Influence of Aquatic Plants on Dissolved Oxygen

By Erin Bradshaw Settevendemio

There are four essential elements needed by living organisms on Earth: light, nutrients, water, and oxygen. For the foreseeable future, sunlight is in great supply, adding up to about 274 million gigawatt-years of energy per year. Nutrients are found in all living organisms as well as organic soils, and are continually recycled through our ecosystems. As most of us know, 70% of the earth is covered in water, supporting great numbers of organisms across the globe. It seems odd, then, that oxygen is comparatively in such little supply. Our atmosphere is composed mostly of nitrogen, with oxygen constituting only 20% to support life on our planet. Furthermore, this is the availability of oxygen for *terrestrial* organisms; the amount of available oxygen in aquatic environments is approximately 13,500 times *less*, rarely exceeding 0.0015%, or 15 ppm. This relatively low amount of oxygen in water has caused important influences on the evolutionary biology of aquatic organisms such as submersed aquatic plants (macrophytes) and fish. For instance, submersed macrophytes lack the waxy cuticle layer commonly found on terrestrial species, facilitating the diffusion of gases across the plant epidermal layer; many fish species living in low dissolved oxygen (DO) environments are morphologically evolved for surface breathing or have rudimentary lungs.

Factors That Influence Dissolved Oxygen

As major producers and consumers of DO, autotrophs have substantial influence over the biological community in our fresh waters. Autotrophs are organisms which use sunlight energy to produce sugars, proteins, and fibers. Examples of aquatic autotrophs include macrophytes, phytoplankton, and algae. During the process of photosynthesis in our aquatic environment, oxygen is a by-product

that is released to the surrounding water. However, in the absence of sunlight, these organisms switch gears and consume oxygen (respire) and release carbon dioxide as a by-product, sometimes resulting in a depletion of DO concentrations (hypoxia).

There are a number of other factors that influence DO concentrations in the aquatic environment. For instance, water circulation by wave action can increase DO, while stagnation can lower it. The benthic sediment type and organic layer buildup can also lead to DO consumption by bacteria as dead and dying plants are broken down. Finally, DO is negatively correlated with temperature, which causes a decrease in DO as temperature increases. Combined with the natural daily fluctuation of DO caused by plants, these factors ultimately result in compounding effects. Impacts can be severe in late summer, lowering DO to levels unsuitable for many aquatic fauna such as fish and invertebrates (DO <2.0 ppm).

How Hydrilla Impacts Dissolved Oxygen

Hydrilla (*Hydrilla verticillata*) is a fast-growing, dense aquatic weed found extensively in Florida and throughout the United States. This species provides beneficial habitat for invertebrates and fish species; however, it can also negatively impact water quality. Hydrilla exhibits high complexity due to abundant stem production and branching near the water surface, contributing to a high biomass. This thick floating mat results in very limited water circulation. In addition, the surface mat dramatically decreases sunlight transmission through the water column, limiting DO production via photosynthesis. In late summer when temperatures are high, these combined factors may result in hypoxic conditions.

In a study conducted during the summer of 2012 on Sandmine Lake in Lake County, Florida (Figure 1), dissolved oxygen, temperature, and hydrilla density were monitored in dense hydrilla

beds to evaluate how water quality is impacted by the growth of this aquatic weed during summer months. Although our hypothesis was confirmed and we did find complete hypoxia (hypoxia extending through the entire water column) in dense hydrilla beds, we did not find a direct correlation with biomass density or temperature. Biomass was consistently very high throughout summer ($\geq 3.5 \text{ kg/m}^2$ dry weight), and temperature peaked in July; however, we did not see hypoxia until August and September. According to our hypothesis, we would have expected to see hypoxia in July when hydrilla density was high and temperature was at a maximum. However, hydrilla density was not significantly higher and temperature was actually lower in September than at the beginning of the summer season (Figure 2).

Hydrilla Isn't The Whole Story

These results suggest that other factors which influence DO may contribute significantly to the occurrence of hypoxia in dense hydrilla beds. By late summer, day length is decreasing and gradually limiting the time period in which the plants are able to produce oxygen, while increasing the time period of oxygen consumption. The decrease in day length also results in plant senescence; the increase in released nutrients from dying plants promotes filamentous algal blooms on top of dense hydrilla mats, which can also substantially influence dissolved oxygen concentrations.

Although we did find hypoxia in dense hydrilla beds, it was limited to a portion of the day and only at a certain time of year. We did not see fish kills during our sampling periods, even when

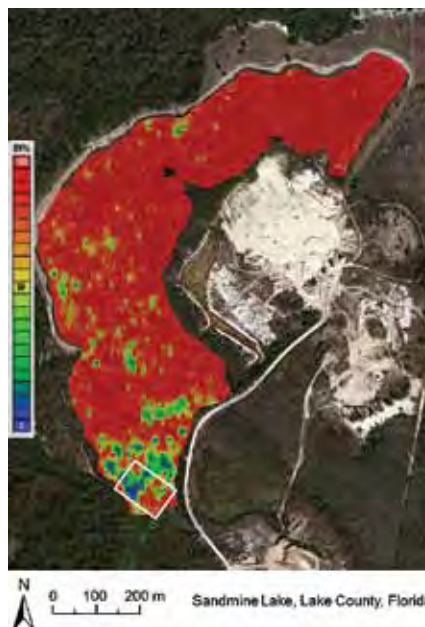


Figure 1. Sandmine Lake was constructed at a former sandmine operation in the Lake Norris Conservation Area. Its depth ranges from 2–9 meters. Hydrilla coverage is substantial throughout the year, particularly when coupled with mild winters. This map shows surface-matted hydrilla coverage on Sandmine Lake during March 2012. The white box represents the primary sampling area from June through September 2012.

severe hypoxia ($\text{DO} < 1.0 \text{ ppm}$) extended throughout the water column. Although fish kills do occur occasionally, they are usually caused by compounding factors such as overcast skies, increased water circulation due to wind, and turbidity, which combined with warm temperatures and nightly plant respiration can result in fish kill events. It is also clear that treatment with herbicides during late summer would be hazardous to fish communities, given the additional depletion in dissolved oxygen due to plant senescence.

Our results show that dissolved oxygen dynamics in dense hydrilla are not very different from other submersed aquatic mac-

CLEAN LAKES INC.

Aquatic Ecosystem Restoration & Maintenance

LittLine® Littoral Zone Treatment Technology



The LittLine is a patent pending Littoral Zone Treatment Technology that was developed to support increased efficacy from aquatic pesticide applications for the control of Aquatic Invasive Species (aquatic vegetation, cyanobacteria, mussels and fish).

Through the use of the LittLine, aquatic pesticides applications can target any portion of the water column, rather than the entire water column, allowing increased efficacy through the use of the lowest effective amount of pesticides in compliance with NPDES PGP requirements.

The LittLine is available for hire throughout the U.S., and or through a licensing agreement to meet your AIS control program requirements.

info@cleanlake.com

www.cleanlake.com

BEST AVAILABLE TECHNOLOGIES (BAT) TO MEET NPDES PESTICIDES GENERAL PERMIT (NPDES PGP) REQUIREMENTS

Aquatic Ecosystem Mapping



Aquatic Ecosystem Mapping and Monitoring provides accurate information in support of lake management decisions to protect the beneficial uses of the aquatic environment.

Benefits include supporting Submerged Aquatic Vegetation (SAV) control planning, project implementation and post treatment efficacy evaluations; water volume calculations; sediment accumulation monitoring; fisheries management; and habitat improvement project planning.

Clean Lakes, Inc. employs a state-of-the art fleet of survey vessels equipped with the latest technologies that includes hydroacoustic vegetation data collection and processing tools.

877-FIX-LAKE

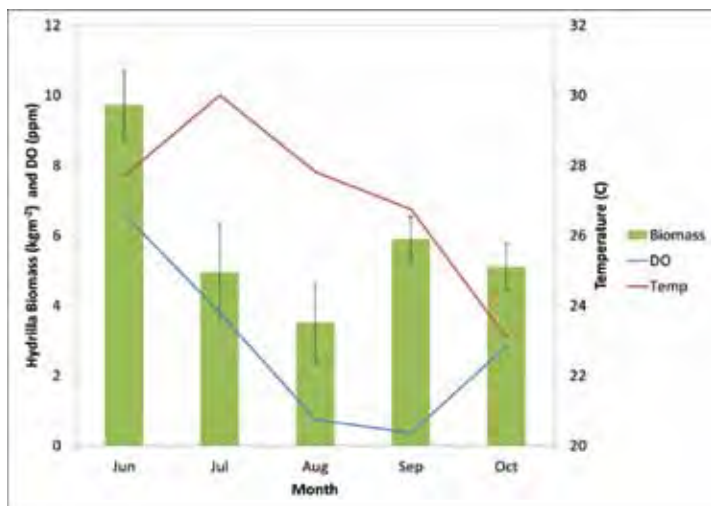


Figure 2. Hydrilla biomass (kg/m²), dissolved oxygen (mg/L), and temperature (°C) at Sandmine Lake, June – October 2012.

rophytes, including native species evaluated in other studies. Furthermore, macrophytes such as hydrilla or coontail (*Ceratophyllum demersum*) are probably of better habitat quality for invertebrates and fish compared with floating-leaved species which have lower complexity, prevent wind mixing and light penetration, and can cause prolonged hypoxic events.

Erin Bradshaw Settevendemio, recent graduate of the University of Florida – IFAS School of Forest Resources and Conservation, (518) 534-2798, ErinLBradshaw@gmail.com

BRUCE MOZERT AND SILVER SPRINGS

Bruce Mozert was an accomplished photographer in New York City when he moved to Silver Springs in 1938 after hearing about the Tarzan films being made with Johnny Weissmuller. Soon after, he built his first underwater camera case and began providing publicity stills, corporate advertisements, and snapshots of the steady stream of tourists in glass-bottom boats for Silver Springs, then the premier tourist attraction in Florida. Mr. Mozert was a pioneer of underwater photography with his inventiveness, artistic eye and creative ideas. Young women were photographed underwater performing typically above-ground activities such as playing golf, bicycling, and barbecuing to promote the crystal clear waters of Silver Springs. Thousands of his glossy photos were sent across the nation by the news wire services from the 1940s through the 1970s, enticing snowbound northerners to become snowbirds and experience “Nature’s Theme Park.” He was the official photographer at Silver Springs for 30 years and still has a studio in Ocala, Florida at the age of 96.

Prints made from the original negatives and signed by Mr. Mozert are available from www.mozertstudio.com/. *Silver Springs: The Underwater Photography of Bruce Mozert*, a book by Gary Monroe, is available from numerous online sources, including amazon.com.

Paul Mason

S.E. Regional Aquatics Manager
407-718-9154
paul.mason@cpsagu.com

Aquatics & Invasives

Joe Collins

Sales/Gov't Accounts Coordinator
352-222-0655
joseph.collins@cpsagu.com

Herbicides Adjuvants & Pre-mixes

Crop Production Services



Sales Service & Support

TIMBERLAND DIVISION

Troy Knowlton

Aquatic Specialist
727-348-7569
troy.knowlton@cpsagu.com

FAX

321-226-0213

Cary Martin

Aquatic Specialist
704-305-7752
cary.martin@cpsagu.com

AUTHORIZED DISTRIBUTOR FOR ALL MAJOR CHEMICAL MANUFACTURERS



Products That Work. From People Who Care. | www.valentpro.com | 800-89-VALENT (898-2536)
Always read and follow label instructions.

SELECTIVE ON NATIVE PLANTS!



DON'T LET HYDRILLA GET IN THE WAY.

For clear, beautiful waters, use the new, systemic chemistry of Tradewind™ Aquatic Herbicide for selective control that gets results. *Tradewind* removes hydrilla, Eurasian watermilfoil and other aquatic plants, with minimal impact on many desirable plants. Plus, it's a great resistance management tool with long-lasting residual activity for both submersed and floating aquatic plants. Find out more at valentpro.com/tradewind.

HYDRILLA | EURASIAN WATERMILFOIL | MANY OTHERS

Tradewind™
AQUATIC HERBICIDE
Clear the way!

Leeches and Snails and Flukes – Oh My!

A first-person account of my close encounter with swimmer's itch

By Lyn A. Gettys

I spend entirely too much time chained to my computer and am always looking for a reason to get outside and play with my plants. On the warm and cloudy last day of May, I decided to clear out the algae on some of the eelgrass sod I'm growing in one of my tanks here at the FLREC. I usually keep the water at around 2 feet deep, but it's easier to pull and rake algae in the shallows, so I put on my board shorts, lowered the level to around knee-deep and climbed in (barefoot, of course!) I busily started raking and pulling clumps of algae. After about 2 hours, I got a little bit itchy. A quick inspection of my lower legs revealed pretty much nothing except for the nasty little tan leeches that always find me when I'm working in tanks. Yeah, I know, they're gross, but they're unavoidable and I've been colonized by them bunches of times without any ill effects. I still had lots of work to do, so I stayed in the tank for another 3 hours until I was satisfied that the bulk of the algae was out and the eelgrass was happy. The water level in the tank was down to a few inches at this point, so I climbed out and started increasing the depth back to 2 feet. While I was waiting for the water to come up, the itching on my lower legs got worse... and worse... and worse. Still no sign of critters, bites, or anything obvious, but I felt like I'd been chewed up by invisible fire ants. What to do?

My first stop was to visit our office manager, Sarah, who knows all sorts of bizarre things about critters. She didn't have a good explanation so we called Dr. Bill Kern, our resident urban entomologist extraordinaire, to see if he had any ideas. I asked if I could have developed an allergy to the leeches; he said that was a possibility. Then he asked if the tank had snails. Yep, it's like an ecosystem in there – aquatic snails, the little tan leeches, big black leeches (which thankfully have never found me!) and mosquitofish. Bill asked if there were birds around; actually, now

that he mentioned it, we did notice that a pair of ducks had taken up residence near the tanks over the last few weeks. He stated that it was possible that I had been invaded by parasitic flukes (also called schistosomes) that are normally hosted by birds and aquatic snails.

Say what?!?!?

Bill assured me that humans are not suitable hosts for these flukes and they don't cause long-term damage to people. When the fluke larvae are released from the snails, they swim around hoping to bump into a bird to infect so they can complete their life cycle. If they bump into a human instead, they penetrate the skin and die immediately, which triggers an allergic reaction. Since the fluke larvae are microscopic, it's almost impossible to test for them to determine whether they're the cause of the itchiness. Great... so maybe my itchiness was due to parasitic flukes or maybe it was a new leech allergy. I still didn't have any marks or redness on my legs, but it seemed like the wise thing to do was to load up on antihistamines which didn't really help much.

The next day (let's call it 1 DAE, for "1 day after exposure"), I still had an intense itch from mid-calf down and I saw some small red spots scattered on my lower legs. Now, I'm not one to panic about injury and that sort of thing; for example, I've been known to cut splinters out of my hands with an Exacto knife (don't try this at home!), I've installed flooring with a broken finger and I'm used to being covered by leeches. However, it was now Friday... the weekend was coming and I had to go out of town for a conference on Sunday. I've had some fairly impressive allergic reactions in the past, so I decided to use an abundance of caution; I called my doc to get a quick evaluation by an actual medical doctor instead of trying to figure it out myself. By the time I made it to his office, I had a few more red spots, but definitely nothing to justify the level of itching I was experiencing. Frankly, I felt a



little like I was over-reacting. Regardless, I told him my story and the possible explanations we'd come up with. He wasn't really sure what was going on either, but he did think that an allergic reaction was the most likely culprit. He prescribed topical and oral steroids, but said to hold off on the oral tabs unless I felt like I really needed them. He told me to go to the emergency room if it got worse over the weekend (hah!) I filled both prescriptions and started using the topical cream that night, along with more antihistamines, but held off on taking the oral steroids. I went to bed and fell asleep pretty quickly, but it was a rough night; I scratched myself awake in the middle of the night and the itching made it hard to get back to sleep.

By Saturday morning (2 DAE), more red spots popped up and the itching continued, although the steroid cream and antihistamines seemed to be helping a little. I started feeling better, but looking worse. Definitely not bad enough to go to the emergency room; let's face it, I'd have to be in danger of losing a limb to go to the emergency room. I ran errands, used the topical steroid cream as directed and got ready for my trip out of town. So far, so good. The itching was pretty much gone by Sunday morning (3 DAE) and I headed north for my conference. I checked into the hotel after 3 ½ hours in the truck, then took a look at my legs. OMG... not good! The red spots had multiplied,

gotten bigger and were very angry, with a measles-like appearance. Yikes! I tried to remain calm and headed down for the opening night social, where I ran into some friends and colleagues. Since they're a pretty knowledgeable bunch, I decided to see if they had any ideas as to what was really going on with me.

Important safety tip: NEVER ask former Peace Corps volunteers what's wrong with you unless you're interested in dying from fright... First I was told I had river blindness; I heard how the flukes would swim through my bloodstream and get into my eyes (but that I was OK for now because my irises would turn milky first). Next it was sleeping sickness.

At this point, I was getting just a little bit panicky. I abandoned my friends and went back to my room to check in with that highly regarded authority, Google, where I searched for "aquatic measles-like rash." Guess what came up? Dengue fever. I do NOT have dengue fever. I am 100% certain that I do not have dengue fever. My legs were underwater and dengue is mosquito-borne, so I was confident that I could rule that out. However, that was pretty much the only thing that came up in my search. This was not very encouraging, and I still didn't have a good idea of what this was and how much worse it would get. I slathered on more steroid cream, took more antihistamines and went to bed.

Monday was my 4th day after exposure and things were still looking grim. The itching was long gone (yay!) but my spots were very angry and red and seemed to be increasing in number. I worried all day until I ran into my Peace Corps friend again. He finally took pity on me and told me I had swimmer's itch and would be fine.

What?! I thought swimmer's itch was a salt-water thing from jellyfish larvae...but it turns out there's a freshwater version, too, and it's caused by those pesky parasitic flukes that Bill Kern told me about back at the very beginning of this saga. I turned to my valuable resource Google once again, but this time I searched for images of swimmer's itch.

Eureka!!!! It was like looking in a mirror. Turns out I'm not going to die or go blind after all – what a relief! After going through

the pictures, I checked out websites from a number of reputable sources, including a number of state health departments. They all said the same thing – long story short, swimmer's itch can be a major annoyance, but it's not dangerous, there are no long-term effects and it will go away on its own with time. Some people are immune to swimmer's itch; however, unlucky folks like me are susceptible, and once you've been exposed you're likely to have a more severe reaction if you encounter the flukes again.

Swimmer's itch was first described in Michigan in 1928; it seems that the condition is more common in the northeastern US and it occurs in calm, warm, shallow water when snails and birds are present. The official medical name of swimmer's itch is schistosome dermatitis, and common names include duckworms, duck lice, clam digger's itch, beaver lice, pelican itch and lake itch. Swimmer's itch can be avoided by staying out of water where birds and snails are known to congregate. Several sources report that uncovered skin is more likely to be attacked and that any barrier that covers the skin will prevent the flukes

from penetrating. Water-resistant DEET or other products may help, as will wearing something to keep your skin covered. Another strategy is to dry off with a rough towel as soon as possible after getting out of the water (and learn from my mistake – if you start itching while you're in the water, get out and dry off immediately!)

So there you have it... I'm at 7 DAE, and while I don't see much improvement, things do not seem to be getting worse. I've been jumping into natural and man-made waters for close to 20 years and I had never heard of freshwater swimmer's itch until my close encounter with the flukes. Since this happened, I've talked with a number of folks who have said, "Oh, yeah! I know all about that!" but I have yet to meet anyone who has actually had swimmer's itch or ever seen anyone who has had it. I hope you never find out how unpleasant swimmer's itch is first-hand; as for me, I have brand-new pink chest waders and I'm going to work in them forevermore!

*Dr. Lyn Gettys, University of Florida-IFAS
Ft Lauderdale Research and Education Center, Davie; (954) 577-6331; lgettys@ufl.edu*

Restore Lakes Naturally



Vertex aeration helps:
Lower nutrients that feed algae
Grow bigger, healthier fish
Reduce bottom muck

 **Vertex Water Features**
Pond & Lake Restoration

800-432-4302 • www.vertexwaterfeatures.com

Hygrophila corymbosa – A “Rare” But Potentially Invasive Plant from San Felipe Springs, Del Rio, Texas

By Jeffrey Hutchinson and Casey Williams

Introduction

Preservation of rare native species is one of the primary objectives of habitat conservation managers. Conversely, the timely control of “rare” *non-native* species is also important, particularly when the opportunity exists to eliminate the species before it expands its range (Early Detection/Rapid Response). Conservation management commonly focuses on the invaded system rather than the invader (Hobbs and Humphries 1995); however, this is problematic given that it is often more costly and has a lower probability of success after an invader becomes widely distributed or well established. *Hygrophila corymbosa* (Blume) Lindau represents such a plant that is rarely found in its currently documented range in the United States and could potentially be eliminated with proper management. In the U.S., this species is documented at two locations that are greater than 2000 km apart and possess disparate habitat conditions, thus suggesting the potential to become a problematic aquatic plant over a much wider range.

Hygrophila corymbosa is an aquatic macrophyte native to India, Burma, Malaysia, and Indonesia. The species belongs to the Acanthaceae family, which includes species in the genus *Justicia* and *Ruellia*, among others. Some species in this family are marsh or aquatic plants, with some considered weedy in rice fields and irrigation ditches (Cook 1974). *Hygrophila corymbosa* is listed by the USDA as an obligate wetland indicator in the Great Plains Region (USDA NRCS 2013). The family is composed of approximately 2,500 species, with most found in tropical regions. According to the World Wide Web, *Hygrophila corymbosa* is popular with the aquarium trade and is often cultivated as an aquarium plant that is not eaten

by herbivorous fish. However, very little information is available on this species.

The scarcity of this plant in the U.S. may lead to confusion of its true identity. Previous synonyms of *Hygrophila corymbosa* include *Nomaphila stricta*, *Hygrophila stricta*, and *Justicia stricta*. The University of South Florida’s Institute of Systematic Botany lists the species as *Hygrophila corymbosa* and the common name as starhorn (Wunderlin and Hansen 2008). The U.S. Department of Agriculture Natural Resource Conservation Service lists the species as *Nomaphila stricta* and the common name as stiff beargrass (USDA NRCS 2013). Common names for *Hygrophila corymbosa* are also varied and confusing. A World Wide Web search revealed common names such as giant hygrophila, giant hygro, temple plant and water wisteria.

Most accounts for *Hygrophila corymbosa* appear cursory and applicable to aquariums, and may not apply to natural systems. Suitable growth conditions for *Hygrophila corymbosa* include water temperatures between 18 and 28 °C, pH from 5.0 to 8.4, variable light from open sun to shade, marshy habitat, and shallow water (Aqua Essentials 2013; Diszhal.info 2013). *Hygrophila corymbosa* is described as fast-growing and easily propagated from cuttings (The Planted Tank 2013), making it a potentially invasive plant in aquatic and riparian habitats.

Within the continental U.S., *Hygrophila corymbosa* is documented from two locations: 1) a maple swamp in Ft. Lauderdale (Broward County), Florida and 2) a spring run in Del Rio (Val Verde County), Texas. In both locations, *Hygrophila corymbosa* was observed as one of the most common species. A third account is a 1970 herbarium record of a specimen collected from a greenhouse in Otsego County, New York (University of Florida Herbarium, accession # FLAS 106984). The species was described as a volunteer in a greenhouse tank of water-lilies obtained from a New Jersey distribution house. Based on this



Figure 1. *Hygrophila corymbosa* showing variation in color and pubescence between a) in water, emergent stem and b) out of water.

record, *Hygrophila corymbosa* has the potential to be an accidental invader from seeds or fragments with the importation and movement of other aquatic plants. Ramamoorthy and Turner (1992) suggest this species may have been introduced into the U.S. from Florida, but provide no evidence to support this claim. There are no known restrictions on the importation, sale, or movement across state boundaries of *Hygrophila corymbosa* in the U.S., so the species introduction may have come from multiple sources and pathways.



Figure 2. Submersed *Hygrophila corymbosa* with purplish-greenish leaves on upper side (a) and light green leaves on underside (b).

The herbarium record from Florida indicates the species was collected January 30, 1987 east of I-95 and south of the North Fork of the New River in Ft. Lauderdale (Wunderlin and Hansen 2008). It was noted on the herbarium record as being abundant in the saturated, muck soil of a maple (*Acer rubrum*) swamp, but no other information is known, nor is it known if this population still exists.

In Texas, *Hygrophila corymbosa* was first reported from San Felipe Springs near Del Rio, Texas in September 1991 (Ramamoorthy and Turner 1992). San Felipe Springs is the third largest artesian spring system in Texas, arising from the karstic Edwards aquifer, and is a minor tributary to the Rio Grande River. It has a constant temperature of 22 °C (72 °F). The species is found growing in association with Rio Grande bugheal (*Shinnersia rivularis* [syn. *Tricochoronis rivularis*]) in waters up to 1 m deep in mucky to gravel substrate (Poole et al. 2007). Rio Grande bugheal is a rare native species known from only three counties in Texas (Poole et al. 2007). *Hygrophila corymbosa* is thriving and possibly expanding its coverage in the headwaters of the spring.

Identification

Hygrophila corymbosa is a perennial, herbaceous aquatic macrophyte that exhibits submersed and emergent forms. The species grows in water or terrestrially in or near saturated soils, but it is doubtful that it can tolerate mesic or xeric soils. No known documentation exists of this

species growing in dry soils. *Hygrophila corymbosa* has opposite, lanceolate leaves with crenate to dentate edges, pointed tips, and long petioles. The stems are rectangular, a trait commonly seen in members of Acanthaceae. All parts of the plant are pubescent, with pubescence more prominent on emergent plant parts. Leaves of the emergent forms are typically light green in color when newly developed but darken to purple as they mature (Figure 1a

and 1b), while leaves of submersed plants develop as purple or purplish-light green in color and remain so until senescence (Figure 2a and 2b). Submersed plants with emergent stems are more whitish in color, while riparian plants are purplish. Emergent plants tend to be woody and form dense colonies, while submersed plants tend to be more herbaceous and prostrate. An extensive, dense stolon and rhizome system is present in both forms (Figure 3a





**RED RIVER
SPECIALTIES**
INCORPORATED



*When you choose Red River Specialties
as your herbicide provider, you will receive:*

- Superior customer service
- A comprehensive range of products
- Convenient warehouse locations to ensure fast delivery
- Management of terrestrial and aquatic vegetation

Red River Specialties employs the most experienced professionals in the industry who are focused on providing products and services that help you achieve your aquatics management objectives.



Contact us for all your herbicide needs.
Red River Specialties, Inc.
1-800-256-3344
www.rsi.com

Brian Van Dam
Florida Area Manager
954-612-9664
Brian.VanDam@rsi.com



Figure 3. Submersed stolons (a) and rhizomes (b) of *Hygrophila corymbosa*.

and 3b). The flowers occur in the leaf axils on emergent portions of the plants and are light purple on the outside, and purple with white streaking on the inside (Figure 4a and 4b). The flowers are highly fragrant. The fruit of this species is a dehiscent, elastic capsule with seeds having small hook-like projections. For additional morphological traits of *Hygrophila corymbosa*, see Ramamoorthy and Turner (1992).

Potential Threats to Aquatic Systems

On November 5, 2012, the authors searched the first 1.6 km in the water and along the banks of San Felipe Springs.

Hygrophila corymbosa was commonly found but widely scattered along this stretch. Based on visual estimates, the largest patch of *Hygrophila corymbosa* was approximately 60 m² with around 75% submersed and 25% emergent. Most patches ranged between 0.1 to 0.4 m². Common aquatic and riparian species growing in association with *Hygrophila corymbosa* included: Rio Grande bugheal, Carolina fanwort (*Cabomba caroliniana*), coontail (*Ceratophyllum demersum*), Indian swampweed (*Hygrophila polysperma*), American water-willow (*Justicia americana*), creeping primrose-willow (*Ludwigia repens*) (Figure 5a), water-milfoil (*Myriophyllum heterophyllum*), watercress (*Nasturtium officinale*), sand spikerush (*Eleocharis montevidensis*) (Figure 5b), and wild taro (*Colocasia esculenta*). At one location near the end of our search, the species was observed growing in a crack in a retaining wall around 0.75 meters above the water line, an indication it can survive harsh conditions and develop an extensive root system. As suggested by Ramamoorthy and Turner (1992) and our observations, it is likely that *Hygrophila corymbosa* has spread further downstream and possibly into the Rio Grande River located less than 10km downstream. Additional surveys are needed to determine the extent of this species in lower portions of San Felipe Springs.

The limited information and documentation of *Hygrophila corymbosa* in the U.S. indicates it is a “rare” non-native species, but exhibits the potential to become problematic. Based on our observations and those of Ramamoorthy and Turner (1992)

in San Felipe Springs, *Hygrophila corymbosa* is a potential threat to spring runs and other habitats throughout the southern half of the United States.

In Texas, *Hygrophila corymbosa* poses a serious threat if introduced into other spring runs or aquatic systems. Spring runs in Texas are biologically diverse but threatened by siltation, dams, aquifer depletion, recreation, floods, droughts, and non-native species. While *Hygrophila corymbosa* is rarely found in the United States, it appears tolerant of a wide array of aquatic and wetland habitats. In San Felipe Springs, the species could pose a serious threat to Rio Grande bugheal (Poole et al. 2007), and the federally endangered Texas wild rice (*Zizania texana*) if introduced into the upper headwaters of the San Marcos River in central Texas.

Based on Ramamoorthy and Turner (1992), *Hygrophila corymbosa* has been present in San Felipe Springs for at least 22 years. Randy Gibson (USFWS, San Marcos, Texas, pers. observ.) has been surveying San Felipe Springs for fish since 2006 and has not observed a large increase in *Hygrophila corymbosa* over this period in the upper headwaters. However, there is often a lag time associated with non-native plant introductions and an increase in cover or range (Hobbs and Humphries 1995). Our observations indicate the species may become more problematic and invasive over time in riparian and littoral zones of San Felipe Springs.

At this time, no known management efforts are underway for control of *Hygrophila*



Figure 4. Frontal view (a) and top view with fruit capsules (b) of *Hygrophila corymbosa* flowers.

For over 20 years, SePRO Corporation has developed innovative products and technologies to advance the science of water resource management.

SePRO Preferred Applicators are a select group of knowledgeable, skilled, and environmentally conscientious partner companies. Along with SePRO, they provide aquatic plant and algae management, water quality restoration, laboratory analysis, mapping and data management for our nation's water bodies.

For more information, visit www.stewardsofwater.com.

Solutions to Preserve our most Precious Natural Resource...Water



The Stewards of Water

SonarGenesis[®], Captain[®] XTR and Phoslock[®] are some of the innovative solutions from SePRO Corporation to improve the management of aquatic plants, algae and water quality. Call 800-419-7779 for more product information.



SePRO Corporation Carmel, IN 46032

*Trademark of SePRO Corporation. Phoslock is a registered trademark of Phoslock Water Solutions Ltd. Always read and follow label directions. ©Copyright 2013 SePRO Corporation.





Figure 5. *Hygrophila corymbosa* in San Felipe Springs: a) emerged and submersed plants growing in association with *Ludwigia repens* and b) riparian (bottom left and center) and emerged plants (top right) growing in association with *Eleocharis montevidensis*.

corymbosa in San Felipe Springs. A major problem with potential management efforts is the presence of state and federally listed species. The Devils River minnow is a federally threatened species known from only three locations. Based on the extensive root and rhizome system observed from specimens examined in the springs, it is doubtful that manual removal would be effective and, in fact, would likely result in multiple resprouts from the numerous rhizomes. However, with the presence of Rio Grande bugheal, mechanical treatments using a suction dredge may be practical for emergent plants. Suction dredging has proved effective for control of Beckett's water trumpet (*Cryptocoryne beckettii*) in areas of the San Marcos River where threatened and endangered plants and animals were present (Alexander et al. 2008). Selective treatment of *Hygrophila corymbosa* in non-aquatic areas with an herbicide such as triclopyr or glyphosate may be effective by cutting the stem just above soil level and applying the herbicide to the cut stem.

The latitude (29° 22') of *Hygrophila corymbosa* in Del Rio, Texas is equivalent in latitude to areas in extreme southern Louisiana and north-central Florida between Gainesville and Ocala. It is unknown if *Hygrophila corymbosa* can survive in the brackish waters of southern Louisiana. However, this species has the potential to become problematic if introduced into water bodies throughout most of peninsular Florida. The spring runs of Florida are similar to those in

Texas with water temperatures a constant 22 °C. Based on the herbarium record from Florida, the species could also become problematic in forest swamps and the Everglades. It is unknown if the population of *Hygrophila corymbosa* is still present in Florida or if any management efforts were made to eliminate it from the maple swamp.

Conclusion

Based on limited information from two accounts for *Hygrophila corymbosa* in natural systems and a single herbarium record from a greenhouse, this species appears tolerant of a wide range of environmental conditions from stagnant, humid, mucky swamps in Florida to cool, flowing, spring runs in Texas. The disparity in range among these records indicates that *Hygrophila corymbosa* has the potential to invade a wide range of the southeastern U.S. and possibly spring runs and other aquatic systems in the southwestern U.S. The account of *Hygrophila corymbosa* as a volunteer in a New Jersey greenhouse and the popularity of the species in the aquarium trade indicate its potential to be accidentally introduced in imported plant material from seed or fragments. Monitoring of the Texas population is needed to determine its rate of spread, along with experimental control plots comparing manual and chemical treatments.

Jeffrey Hutchinson, U.S. Fish and Wildlife Service Aquatic Resources Center, San Marcos, TX; jeffrey_hutchinson@fws.gov, 512-353-0011 x-228. Casey R. Williams,

Biologist; BioWest Inc., Round Rock, TX; cwilliams@bio-west.com.

Literature Cited

- Alexander, M.L., R.D. Doyle, and P. Power. 2008. Suction dredge removal of an invasive macrophyte from a spring-fed river in central Texas, USA. *Journal of Aquatic Plant Management* 46: 184-185.
- Aqua Essentials. 2013. *Nomaphila stricta*. Available at: <http://www.aquaessentials.co.uk/nomaphila-stricta-fleur-p-5148.html>. Accessed May 3, 2013.
- Cook, C.D.K. 1974. *Water Plants of the World – A Manual for the Identification of the Genera of Freshwater Macrophytes*. Dr. W. Junk, Publisher, The Hague, Netherlands. 561 pp.
- Diszhal.info. 2013. *Nomaphila stricta*. Available at: http://diszhal.info/english/plants/en_Nomaphila_stricta.php. Accessed May 3, 2013.
- Hobbs, R.J., and S.E. Humphries. 1995. An integrated approach to the ecology and management of plant invasions. *Conservation Biology* 9:761-770.
- Poole, J.M., W.R. Carr, D.M. Price, and J.R. Singhurst. 2007. *Rare Plants of Texas*. Texas A&M University Press, College Station, TX. 640 pp.
- Ramamoorthy, T.P., and B.L. Turner. 1992. *Nomaphila stricta* (Acanthaceae), a newly discerned aquatic weed in Texas, and the first report for North America. *Sida* 15:115-117.
- The Planted Tank. 2013. *Nomaphila stricta*. Available at: http://www.plantedtank.net/forums/myPlants.php?do=view&p=101&n=Giant_Hygro_Nomaphila_stricta. Accessed May 3, 2013.
- USDA NRCS. 2013. United States Department of Agriculture, Natural Resources Conservation Service, The PLANTS Database. Available at: <http://plants.usda.gov>. Accessed May 2, 2013.
- Wunderlin, R. P., and B. F. Hansen. 2008. *Atlas of Florida Vascular Plants* (<http://www.plantatlas.usf.edu/>). [S. M. Landry and K. N. Campbell (application development), Florida Center for Community Design and Research.] Institute for Systematic Botany, University of South Florida, Tampa.

PROTECT THE LIFE OF THE SYSTEM.

Reward® herbicide controls a broad-spectrum of floating and submersed weeds and is EPA approved for aquatic use. It can help restore ecological balance fast so you see results within hours of application. Reward is the no-wait, no-worry aquatic management tool.

To learn more about the only diquat product with a performance guarantee*, visit Greencastonline.com/RewardHerbicide



syngenta®

© 2013 Syngenta. **Important: Always read and follow label instructions before buying or using any Syngenta products. The label contains important conditions of sale, including limitations of remedy and warranty. All products may not be registered for sale or use in all states. Please check with your state or local extension service before buying or using Syngenta products.** Reward®, the Alliance Frame, the Purpose Icon and the Syngenta logo are registered trademarks of a Syngenta Group Company. Syngenta Customer Center 1-866-SYNGENT(A) (796-4368). MW 1LGT2050_P1 02/13

*Terms and Conditions of the 2013 H2O Aquatic Herbicide Performance Guarantee apply. The maximum benefit a Qualifying Participant may receive during the 2013 Program Period is a \$50,000 contribution toward the cost of retreatment.

TM



Bo Burns Joins Valent Professional Products

Valent Professional Products has announced that industry veteran Bo Burns has been hired as territory manager for the company's aquatics business. Burns, who will be based in Raleigh, N.C., has nearly three decades of experience in aquatic and vegetative management. He most recently served as national aquatic sales manager for

Crop Production Services (CPS). Contact Bo at (919) 605-8016 or ABURN@VALENT.COM

New Aquatic Product – Trycera®

Helena Chemical Company announces the release of a new aquatic herbicide, Trycera®, a patented, acid technology herbicide with the active ingredient triclopyr. Key differences between Trycera® and amine and ester formulations are: very low volatility, it is odorless, it is not antagonistic with hard water, and it has a built-in surfactant. Trycera® is already in an acid form that is readily available for plant uptake. For more information, contact your local Helena representative.

The Future of Aerial Applications?

A small, remote-controlled helicopter successfully applied a test spray to the Uni-

versity of California Oakville Experimental Vineyard on June 6th as part of a public demonstration. The concept is nothing new, having been used for 20 years in Japan to treat rice fields. The motorcycle-sized chopper is being tested in the United States to see if it's safer and more efficient than tractors to apply pesticides. UC Davis is one of the few universities in the nation with a Federal Aviation Administration permit to test unmanned aircraft. The testing at Oakville began in November 2012. The site was chosen because it's a working vineyard and meets FAA requirements for flight zones for remote-controlled aircraft. Experienced Yamaha flight instructors from Japan trained UC Davis researchers Ken Giles and Ryan Billing to fly the remote-controlled chopper which is similar to smaller ones flown by hobbyists. In Japan, about 2,500 RMAX helicopters are used

IN REMEMBRANCE

PETER VERHULST (1927 – 2013)

Peter Verhulst, the 1993 FAPMS Aquatic Plant Manager of the Year (it was then called "Applicator of the Year") passed away on May 20th, 2013. He was 85. Pete was employed by the Lee County Hyacinth Control District from 1980-1993. His primary job was as a herbicide applicator, but he was also well-versed in mechanical and biological



control of nuisance aquatic weeds. After retirement, he came back several summers as a part-time inspector for Mosquito Control, responding to service requests. Pete served in the U.S. Navy during World War II and was a retired Captain with the Ridgewood, New Jersey Fire Department.

—submitted by Don Doggett, Lee County Hyacinth Control District

HOWARD F. KROSCH (1935 – 2013)

Howard F. Krosch of Stillwater, Minnesota passed away on March 4th, 2013 at the age of 77. He was retired from the Minnesota Department of Natural Resources where he managed the aquatic plant management program for many years. Howard's efforts to learn about aquatic plant management approaches and developments outside Minnesota helped the state take a more informed approach to this work. He co-authored

Control of Eurasian watermilfoil in Minnesota with Chip Welling in 1994 for the 9th International Symposium on Aquatic Weeds in Dublin, Ireland. He received a Bachelor's degree in Wildlife and Fisheries Management from the University of Minnesota and served in the Minnesota National Guard for nine years. Howard was a very dedicated and active member of the Midwest Aquatic Plant Management Society (MAPMS) almost from

its beginning. He served as the President in 1989 and was awarded Honorary Membership upon his retirement in 1999. Howard always provided a valuable and honest perspective on aquatic plant management from a regulator's perspective. In addition, he and his wife, Penny, frequently attended the national APMS meetings throughout his dedicated career.

—submitted by Chip Welling, Minnesota DNR

to spray approximately 40 percent of rice fields. Currently, the researchers are only applying water and are using water-sensitive paper to gauge application accuracy. The craft can carry up to 16 liters, or slightly more than 4 gallons, of liquid and the recommended spraying speed is about 15 MPH. Results of the study, expected later this summer, will help guide where and how the mini-choppers may be used in U.S. agriculture. (*The Grower*, 6/6/13) From *Chemically Speaking*, June 2013, available on the University of Florida's IFAS Pesticide Information Office website at: <http://pested.ifas.ufl.edu/newsletter.html>

Paula Dockery recently retired from the Florida Legislature after serving as a Republican state senator from Lakeland for 16 years. Dockery was a legislator who saw the value in preserving our natural resources and ensuring a clean and adequate water supply. In a letter to the Miami Herald in April, she noted that our economy is dependent on these resources for our top three economic drivers: tourism, agriculture and development. In January 2000, FAPMS sponsored a reception honoring Dockery and others involved in passing the Florida Forever Act which provided additional funds for aquatic plant control. Dockery received a plaque for her part in the development of the Act and her spirited support of recurring aquatic plant control funding. A summary of the FAPMS-sponsored legislative reception appeared in the Spring 2000 issue of *Aquatics* (available online at www.fapms.org/aquatics/issues).



Representative Paula Dockery accepts her plaque from FAPMS President Jeff Schardt at the January 19, 2000 Legislative Reception. Photo by Don Doggett.



Highlights from the 53rd Annual Aquatic Plant Management Society Meeting

The 53rd Annual Meeting of the Aquatic Plant Management Society was called to order by President Terry Goldsby on July 14, 2013. The meeting was held in San Antonio, Texas and was attended by 192 registered delegates and 29 vendors. Highlights of the program included invited talks on science and management progress in the related disciplines of harmful algal blooms, terrestrial weed science, and mosquito control. There were six student presentations, and of the 16 poster presentations, seven were given by colleagues visiting from Brazil. A joint session was held with the **Texas APMS** on Tuesday afternoon and a special ses-

sion on herbicide resistance in aquatics took place on Wednesday morning. **Don Doggett** and **Richard Hinterman** were recognized as **Honorary Members of the Aquatic Plant Management Society** for their long-term service to the Society and to the field of aquatic plant management. The Society also recognized **Dr. Deborah Hofstra** from New Zealand for her **Outstanding International Contributions**. **Ms. Sarah True Meadows** from North Carolina State University was recognized as the **Outstanding Graduate Student**. **Dr. John Madsen** received the **T. Wayne Miller Distinguished Service Award** and **Dr. Mark Heilman** received the **Outstanding Technical Contributor Award**. During the business meeting, **Dr. Jay Ferrell** was voted in as the new **Editor of the Journal of Aquatic Plant Management**. The APMS thanks **Dr. John Madsen** and **Mr. Craig Aguillard** for their three years of service on the Board of Directors and welcomes **Dr. Vernon Vandiver** and **Dr. Rebecca Haynie** to the Board.

Too Many Weeds Spoil the Fishing



Exotic invasive aquatic plants such as Hydrilla, Eurasian Watermillfoil and Curlyleaf Pondweed, can be detrimental to a healthy fishery in lakes across the country.

These invasive plants when left unmanaged can alter the ecosystem of lakes and reservoirs, cause a decline in the fishery, and interfere with other valued uses of waterbodies.

The Authoritative Leader in Aquatic Habitat Management

Successful aquatic habitat management is all about achieving a balance in the aquatic ecosystem. United Phosphorus, Inc. offers assistance and a full line of aquatic products for properly managing exotic and invasive plants and algae to achieve and maintain a healthy aquatic environment for native aquatic plants.

*Refer to the Directions for Use on the specific product label. Always read and follow label directions and precautions. Aquathol® K, Current®, Hydrothol® 191, and Symmetry® NXG are registered trademarks of United Phosphorus, Inc. Copyright © 2013 United Phosphorus, Inc.

TO OBTAIN A COPY OF OUR VIDEO, AQUATIC PLANT AND HABITAT MANAGEMENT, CALL 1-866-257-5190



AQUATIC HABITAT MANAGEMENT
BALANCING NATURE WITH SCIENCE™
AD UPI

Aquathol® K and Aquathol® Super K Aquatic Herbicide
For selective control of Hydrilla, Curlyleaf Pondweed, Coontail and other invasive and nuisance aquatic plants.
*No restrictions on swimming, fishing or irrigation**

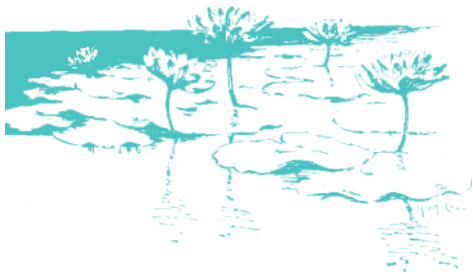
Current® Aquatic Herbicide
A broad-spectrum non-selective aquatic herbicide.
No restrictions on fishing, swimming, irrigation, livestock watering, or potable water use.

Hydrothol® 191 Aquatic Herbicide & Algaecide
A broad-spectrum herbicide and algaecide. Hydrothol® 191 provides a companion product or an alternative to copper algaecides when controlling difficult algae species.
*No restrictions on swimming, fishing or irrigation**

Symmetry® NXG
A broad-spectrum algaecide.
No restrictions on fishing, swimming, irrigation, livestock watering, or potable water use.



United Phosphorus, Inc.
www.upi-usa.com



Calendar of Events 2013

September 16-18, 2013
MidSouth APMS 32nd Annual Conference
 Tunica, MS
www.msapms.org

October 14-17, 2013
Florida APMS 37th Annual Conference
 St. Augustine, FL
www.fapms.org

October 23-25, 2013
South Carolina APMS 35th Annual Meeting
 Myrtle Beach, SC
www.scapms.org

October 30-November 1, 2013
North American Lakes Management Society
 33rd International Symposium
 San Diego, CA
www.nalms.org

October 31, 2013
South Florida APMS General Meeting
 Davie, FL
www.sfapms.org

January 22-24, 2014
Northeast APMS 15th Annual Conference
 Westbrook, CT
www.neapms.net

March 2-5, 2014
Midwest APMS 34th Annual Conference
 Lombard, IL
www.mapms.org



Alachua, FL
 386-462-4157

Belle Glade, FL
 561-996-6200

Boynton Beach, FL
 561-585-2221

Dade City, FL
 352-521-3538

Dundee, FL
 863-439-1551

Ft. Pierce, FL
 772-464-8660

Homestead, FL
 305-245-0433

Immokalee, FL
 239-657-3141

Mt. Dora, FL
 352-383-8139

Palmetto, FL
 941-722-3253

Wauchula, FL
 863-773-3187

James Boggs
 863-557-0076

Polly Ellinor
 813-376-3966

Tim McDuffie
 352-206-5087

Chance Dubose
 407-256-2342

Always read and follow label directions.
 People...Products...Knowledge... is a registered trademark of Helena Holding Company. © 2012 Helena Holding Company.



Helena Chemical Company • 2405 N. 71st St. • Tampa, FL 33619
813-626-5121 • www.helenachemical.com

SunWet™

NONIONIC SPRAY ADJUVANT

The Earth-friendly choice for enhanced aquatic herbicide performance

SunWet is a new generation, natural spray adjuvant that's kind to the environment while still doing a terrific job enhancing performance of postemergence herbicides. SunWet increases wetting and penetration of herbicides so you get better control of aquatic weeds, nuisance vegetation and undesirable brush.

To order call your local distributor or

800-228-1833



P.O. Box 690037 • Vero Beach, FL 32969 Phone: 772- 562-0555 • Fax: 772-778-2490
www.brewerint.com

Made from a 100% blend of methylated seed oil and emulsifiers





Products That Work. From People Who Care® | www.valentpro.com | 800-89-VALENT (898-2536)

Always read and follow label instructions.

Clipper is a trademark and Products That Work, From People Who Care is a registered trademark of Valent U.S.A. Corporation. ©2011 Valent U.S.A. Corporation. All rights reserved. 8828310-04

NEW



It's tough. It's fast. It's gone.

When it comes to aquatic plant control, nothing works better than the new contact chemistry of Clipper™ Aquatic Herbicide. *Clipper* delivers a new mode of action for fast and selective control of tough invasive and nuisance plants like cabomba, watermeal, Eurasian watermilfoil, water lettuce, duckweed, giant salvinia and more. Plus, *Clipper* dissipates quickly from the water column and does not accumulate in sediment. And reduced PPE and the 51% WDG formulation mean easier application and handling. Find out more at valentpro.com/clipper.

Clipper™
AQUATIC HERBICIDE
Tough. Fast. Gone.



CALL FOR EXHIBITORS

FAPMS is now accepting exhibitor applications for the 37th Annual FAPMS Conference being held October 14 – 17 in St. Augustine. There are a number of sponsorship levels (Grand, Diamond, Platinum, Gold and Silver) to choose from.

The meeting will provide an excellent forum for you to exhibit your goods and services and to interact with key individuals and organizations involved in aquatic plant management in Florida. A Vendor Registration Form and additional conference information can be found on the FAPMS website: www.fapms.org.

Vendor support has always been critical to the success of this meeting and 2013 will be no exception. Your generous contributions will be most appreciated!

The final date to sign up for any sponsorship level (excluding Silver) is September 14th. Please direct questions to Scott Jackson, FAPMS Vendor Committee Chair, Scott.Jackson@SYNGENTA.COM; 561-402-0682.

CALL FOR NOMINEES

FAPMS Aquatic Plant Manager of the Year Award

Now is the time to start thinking of someone you believe is worthy of winning the FAPMS Aquatic Plant Manager of the Year Award. Please think about the aquatic plant manager you respect the most and why. The cash award for this honor is \$500. Winners also receive an engraved plaque. Eligibility requirements and the official nomination form are on the FAPMS website at: <http://www.fapms.org/awards/manager.html> where you can also view the list of previous winners. You may complete the form online and save it using your name in the filename (for example: GLASSCOCK-manager_form.pdf) You may also print the form or cut it out of the last FAPMS newsletter and complete it by hand or typewriter but you must stay within the space provided to allow for uniform evaluation. Extra pages will not be considered.

The deadline for submission is September 30th. The winner will be announced at the FAPMS Annual Training Conference Banquet October 16, 2013.

Good luck, nominees!

Please send completed nomination forms to:

Scott Glasscock, Awards Committee Chair
2200 South Service Lane
Lake Buena Vista, FL 32830
Fax: 407-824-7054
Scott.Glasscock@Disney.com

CALL FOR PHOTOS

The annual VIC RAMEY PHOTO CONTEST will also be held at the Annual Training Conference in St. Augustine. The contest was created to inspire photographs to promote education, discussion and competition towards the Society's objective of aquatic plant management. 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.

Photos are judged on category relevance (40%), creativity or artistic impression (40%), composition and arrangement (10%), and focus and sharpness (10%). Judges are selected from attending conference members. Photo entries may be submitted at the registration desk.

NOTE: Winning photos may be used in *Aquatics* magazine at the editor's discretion if they are also available as electronic files of sufficient resolution. Set your camera to 1MB or 5 megapixels or higher for best results. Photos may also be posted on the FAPMS website if an electronic version is submitted.

Good luck, photographers!