Aquatics

SUMMER 2016

A Publication of the Florida Aquatic Plant Management Society

Aquatics
SUMMER 2016
Volume 38, Number 2

Cover: This colony of the introduced floating fern *Azolla pinnata* (feathered mosquitofern) was collected by Dr. Bill Haller in Palm Beach County, east of Wellington at STA 1E, Cell 6 near the pump station. Sporocarps were not present, although this has no impact on the ability of plants to spread rapidly by stem fragmentation. See article on page 18.
Photo by Colette C. Jacono

Contents

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.

 Aquatics (ISSN 1054-1799) is the official publication of the Florida Aquatic Plant Management Society.

Committees

Aquatics Magazine Advertising
Angie Huebner
Invasive Plant Management
701 San Marco Blvd,Jacksonville, FL 32207-8175
904-894-3648
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
220 S Service Lane, Lake Buena Vista, FL 32830
Scott.glasscock@disney.com

By-Laws
Stephanie McCarty
407-461-4635, stephemccarty@aol.com

Editorial
Lyn Gettys
University of Florida Fort Lauderdale Research and Education Center
3205 College Ave, Davie FL 33314
954-577-6331, 954-475-4125 fax
lgettys@ufl.edu

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

Governmental Affairs
Matt Phillips
Florida Fish and Wildlife Conservation Commission
Invasive Plant Management
850-617-9429
mattv.phillips@myfwc.com

Historical
Andy Fuhrman
Allstate Resource Management, Inc.
6900 SW 21st Court, Unit #9
Davie, FL 33317
954-382-9766
afuhrman@allstatemanagement.com

Local Arrangements
Bill Torres
Florida Event Planning & Meeting Service
329 Dreadnaught Ct.,Tallahassee, Fl. 32312
850-519-4310
fapms@embarqmail.com

Membership and Publicity
Andy Fuhrman
Allstate Resource Management, Inc.
6900 SW 21st Court, Unit #9
Davie, FL 33317
954-382-9766
afuhrman@allstatemanagement.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

Nominating
Ed Harris
FWC
6830 Shadowridge Dr.
Orlando, FL 32812
407-858-6170
ed.harris@myfwc.com

Program
Kris Campbell
FL Fish and Wildlife Conservation Commission
Invasive Plant Management Section
6830 Shadowridge Dr. Suite 201
Orlando, FL 32812
407-858-6170 Ext. 223
kristine.campbell@myfwc.com

Resource Demonstration
Dave Lattuca
Invasive Species Management Branch
525 Ridgelawn Road
Clewiston, FL 33440
863-983-8101

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

Vendor
Scott Jackson
Sygenta
133 Sarona Circle, Royal Palm Beach, FL 33411
561-402-0682
scott.jackson@syngenta.com

Web Site
Angie Huebner
Invasive Plant Management
701 San Marco Blvd, Jacksonville, FL 32207-8175
904-894-3648
Angie.L.Huebner@usace.army.mil

In Memorium

Wendy Andrew

One of our own, Wendy Andrew, left us on June 8th, 2016. Wendy was President of the Florida Aquatic Plant Management Society in 1994.

Wendy May Andrew passed away on June 8, 2016, from breast cancer. She was 54. Born in Anaheim, CA, she moved as a child to Central Florida where she grew to love its natural beauty and habitat. A 1980 graduate of West Orange High School, Wendy went on to the University of Florida where she earned a BS in Forest Resources and Conservation and an MS in Agronomy. She began her professional life in 1985, as a Staff Assistant on the Environment to Senator Lawton Chiles. In 1986, she became one of the first women employed as an Aquatic Plant Manager for the Southwest Florida Water Management District. She launched a 24-year career with Walt Disney World in 1992. As Horticulture Manager for Disney's Animal Kingdom since 2000, Wendy lived her professional dream. Along the way she met the love of her life, Michael Andrew, while engaged as a diver at EPCOT's Living Seas Pavilion. She took her passion for the natural world beyond her professional duties by consulting on environmental projects within Florida and around the world, including Uganda, South Africa, Tanzania, Mexico, Cambodia, and Thailand. She served on the Florida Department of Agriculture Endangered Species Task Force, as a Director and Treasurer of the Association of Zoological Horticulture, and President of the Florida Aquatic Plant Management Society. Florida Audubon recognized Wendy as Volunteer of the Year in 2012. Wendy cared as deeply about people as she did about the environment. She loved the Southwest Community Church. In 2006, she melded her faith, her concern for the environment, and her compassion for people in her service work with ECHO, a faith-based organization dedicated to solving global hunger through sustainable farming. Acting as an ECHO Board Member from 2013 to the present became a richly rewarding experience for her. She was an accomplished amateur photographer, a prolific reader, and a great and generous cook. She enjoyed swimming, fishing, kayaking, and volleyball. Wendy completed over 20 triathlons – all since her initial cancer diagnosis in 2008. She was inherently curious and instinctively kind. Wendy loved her family and she lived her faith. She was the beloved daughter of Kathy Matheison who predeceased her in 2004. She is survived by her husband of 27 years Michael Andrew, her father Robert K. Matheison and his wife Arra Mae, her aunt Linda Palmer Garberson, her siblings Cindy, Molly, and Robert, and her nine adoring nephews and one niece. Wendy encouraged us all to never fear our challenges, to live life to the fullest, and to love God by loving each other. A celebration of her life was held on July 9 at The Pines in Windermere, FL. If you wish, please consider making a contribution in Wendy's memory to ECHOnet.org

Breaking through the confusion of herbicide labels

By Stephen F Enloe

In IFAS Extension, there is one central dogma regarding herbicides that we consistently preach like no other. It is a dogma applicators frequently hear, already know, strongly dislike, and occasionally practice. That dogma concerns reading herbicide labels and includes statements such as "Always read the label!" or "The label is the law" or "Failing to read the label may result in a tragic fate similar to breaking a chain letter." Just kidding on that last one, for you old folks who actually understood that joke.

Let's face it. We don't like to hear this message. We enjoy reading herbicide labels about as much as we would enjoy hand removing fifty acres of rotala from a canal loaded with alligators in July in the middle of a hurricane. Yeah, sometimes it is that bad. Herbicide labels appear to be written by lawyers and bureaucrats, who provide applicators with just enough rope to hang them. Over my career in Cooperative Extension, I have spent hundreds and hundreds of hours reading herbicide labels. Not because I love it or am certifiably nuts, but because it is abundantly clear that many herbicide labels frequently cause uncertainty and confusion. They often contain language that puts treatment around or in water into a gray area of uncertainty. As environmental stewards, we are trained to be highly "chemical conscious" and I believe most applicators truly want to do the right thing when it comes to herbicide application in and around water.

Over the last nine months, I have routinely conducted live quizzes during many extension programs I have given. These quizzes have had two purposes: first, to see how much applicators really know about herbicide label interpretation and second, to provide clarity on some gray areas that many folks struggle with, especially around water. These quizzes were conducted using Turning Technology clickers, which allows for real-time polling of a live audience in an anonymous manner. We have found that few people want to raise their hands to answer questions but are very willing to participate when they know that responses will be anonymous. The clickers tend to engage audiences quite well, and create a "game show" feel that is both educational and entertaining.

With the exception of two private pond owner meetings in the Florida Panhandle, polling was limited to professional aquatic and natural area herbicide applicator training meetings. This is important because it provides a glimpse within our industry of just how knowledgeable our own applicators are. Meetings included venues such as the Florida Aquatic Plant Management Society annual conference, Water Management District applicator training events, IFAS CEU Roundups for pesticide applicators, The Florida Vegetation Management

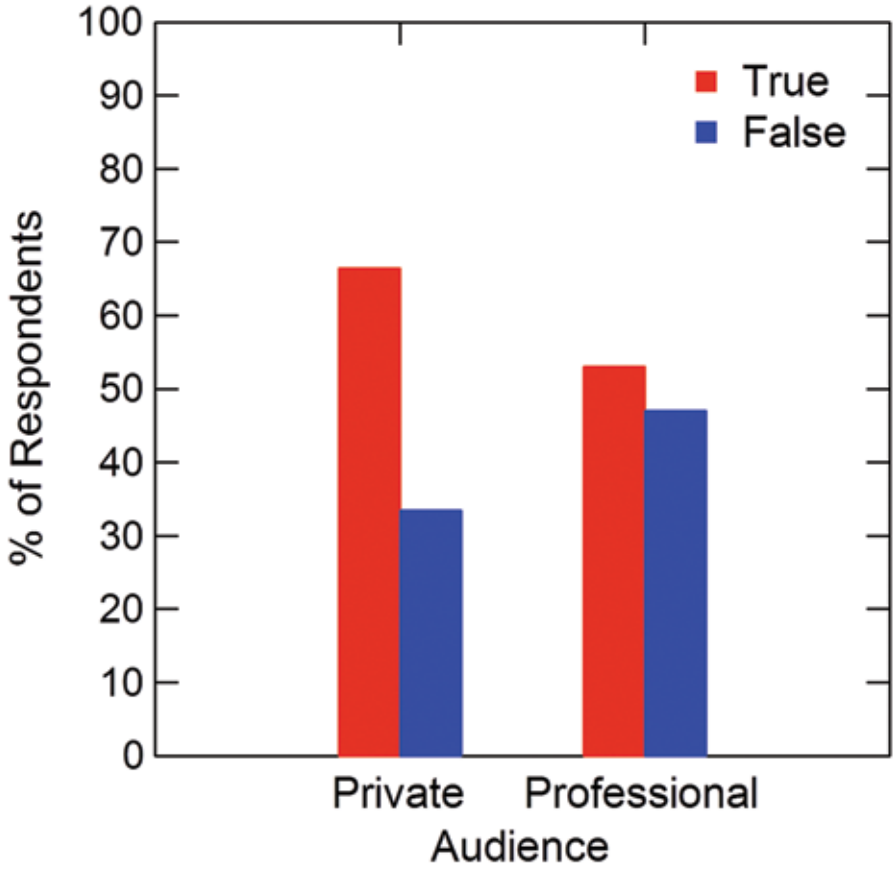


Figure 1. Results for question 1: Any herbicide label with the following statement cannot be used in water: "This pesticide is toxic to aquatic invertebrates." The correct answer is false. Sample sizes: n=375 for professional, n=34 for private.

Association annual conference, and Cooperative Invasive Species Management Area (CISMA) meetings. All meetings occurred between October 2015 and June 2016. The quiz was also given at the UF/IFAS Aquatic Weed Control Short Course in 2016, but an unfortunate technology failure resulted in no data being collected at that meeting. Total questions varied across meetings, but a core set of questions were common among most meetings. Responses were separated between private and professional audiences.

So what did we discover in this exercise? First, it is clear that there is still confusion regarding label statements about herbicide toxicity and aquatic applications. When audiences were polled on whether or not an herbicide that the label declared to be toxic to aquatic invertebrates could be used in water, less than 35% of private pond owners and less than 50% of professional applicators answered correctly (Figure 1). At least six active ingredients have the following statement (or a slight variant) in the Environmental Hazards section of products labeled of aquatic use: "This pesticide is toxic to aquatic invertebrates." These include diquat, 2,4-D, flumioxazin, carfentrazone, endothall, and copper. Almost any aquatic applicator in business routinely uses some or most of these active ingredients. So how can this be? Should we suddenly stop using these active ingredients? The answer lies in what is meant by this statement regarding toxicity. This statement is placed on the label in accordance with the results of a battery of tests designed to examine the active ingredient's potential toxicity to certain aquatic invertebrates. When a product has this statement, it is indicative that toxicity can be an issue. However, the risk of that toxicity is factored into the allowable application rate within the context of the use patterns for the product. This means ***when you follow the label***, aquatic invertebrate toxicity should not be an issue. However, if you violate the label or have an accidental spill of concentrated material into a water body, toxicity to aquatic invertebrates will likely be an issue. The aquatic herbicide/algaecide that is of most concern regarding toxicity is copper, especially in low alkalinity conditions. Copper product labels are also very clear on this issue, so be extra careful when making applications of copper for algae control.

The next issue concerns irrigation restrictions. When presented with the following question, "A good rule of thumb for turf and ornamental irrigation restrictions is to wait five days before irrigating with treated water", roughly 50% of private pond owners and 70% of professional applicators answered correctly (Figure 2). The best rule of thumb here is to not use any rule of thumb on this issue! There is no "rule of thumb" concerning irrigation restrictions that applies across aquatic herbicides. Each product label will clearly specify any restrictions for irrigation, swimming, drinking, and fishing. For example, irrigation restrictions for diquat may be up to three days while triclopyr amine may be up to 120 days! The good news is that this is spelled out very clearly on the product labels. It is one thing the lawyers got right.

The next two questions addressed misconceptions concerning triclopyr use around water. There are now four formulations of triclopyr: amine, ester, acid and choline. However, there have historically been two formulations, the amine and the ester, which we focused our questions on. The amine form of triclopyr is labeled for use in water, while the ester form is not. There is a common idea that you must use the amine formulation when working around water or in riparian or upland areas where surface water is present. This comes from the assumption that it is the safest

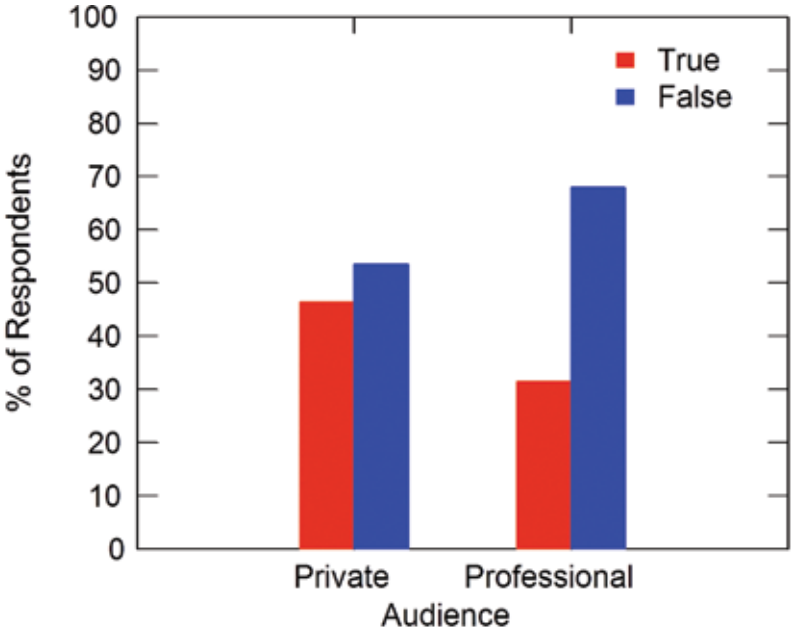


Figure 2. Results for question 2: A good rule of thumb for turf and ornamental irrigation restrictions is to wait five days before irrigating with treated water. The correct answer is false as there are no "rules of thumb" for interpreting herbicide labels. Sample sizes: n=60 for professional, n=37 for private.

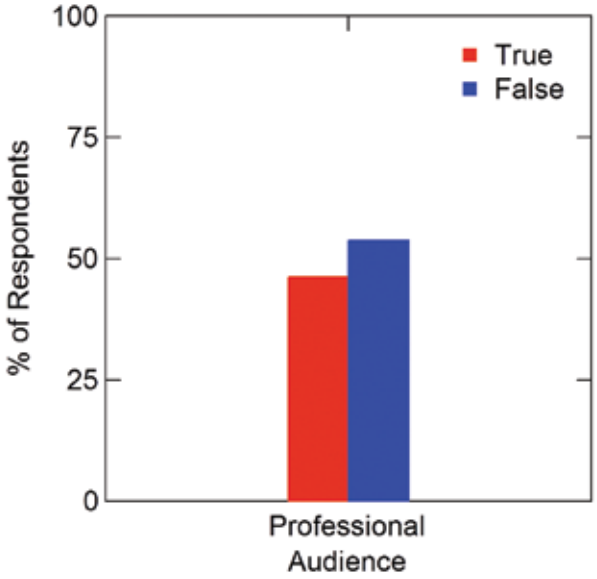


Figure 3. Results for question 3: Garlon 3A applications cannot be made to woody brush along water if overspray into open water is unavoidable. The correct answer is false. Sample size: n=303.

product to use if overspray of water is likely. However, potential overspray into open water is still a gray area. When given the following statement: "Garlon 3A (triclopyr amine) applications cannot be made to woody brush along water if overspray into open water is unavoidable", approximately 50% of professional applicators answered incorrectly (Figure 3). The Garlon 3A label clearly says (albeit on the last page), "Minimize overspray to open water when treating target vegetation in and around non-flowing, quiescent or transient water. When making applications to control unwanted plants on banks or shorelines of flowing water, minimize overspray to open water." This means there is an acknowledgement that overspray into open water is likely to happen, but the intent is just what it says: be a good steward and make every effort to minimize overspray into open water.

For triclopyr ester, product labels clearly state in the Environmental Hazards section, "Do not apply directly to water, to areas where surface water is present…" This would seem to clearly prohibit its use in most riparian and wetland areas. When given the following statement, "In natural areas, Garlon 4 Ultra cannot be used where any standing water is present," approximately 50% of professional applicators agreed with this (Figure 4). However, this is incorrect because an additional statement in the General Use Precautions and Restrictions section establishes its use in many wetland and riparian situations: "It is permissible to treat non-irrigation ditch banks, seasonally dry wetlands (such as flood plains, deltas, marshes, swamps, or bogs) and transitional areas between upland and lowland sites where surface water is not present except in isolated pockets due to uneven or unlevel conditions. Do not apply to open water (such as lakes, reservoirs, rivers, streams, creeks, salt water bays, or estuaries)." This indicates that triclopyr ester can be used in many seasonally dry wetlands where surface water is present in isolated pockets. For many invasive plant managers, this statement is the difference between using triclopyr ester as a basal bark treatment instead of the much more laborious cut stump method with triclopyr amine. However, good stewardship here is still critical and this does not give you free rein to apply triclopyr ester to plants growing in standing pockets of water. Don't do it.

Next up is buffer zones. When treating plants around water, the question of the need for buffers frequently arises, even when herbicide labels state that the product may be used to the water's edge. When applicators were asked to interpret what the true intended application distance from the water's edge is within the context of that label statement, over 40% of respondents incorrectly placed it between 0.5 and 5 meters from the water's edge (Figure 5). The water's edge truly means what it says. However, good stewardship is still critical here, and this does not give an applicator freedom to carelessly overspray open water along uneven shorelines. There also may be buffer restrictions in place, especially for public lands in certain instances. However, the intent here is to clarify exactly what is meant by the language written for the herbicide label, and water's edge means to the edge.

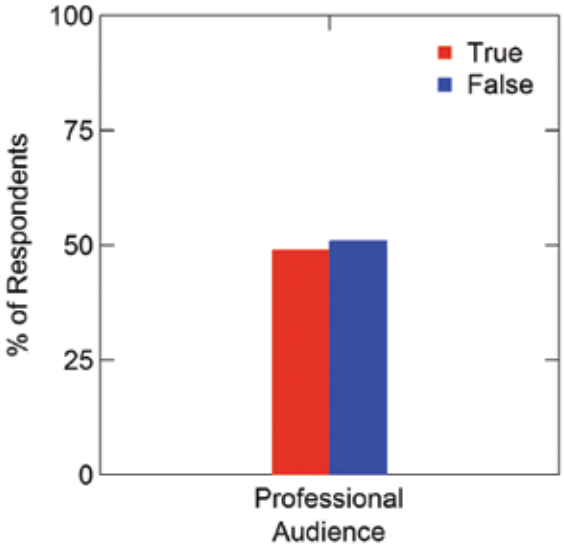


Figure 4. Results for question 4: In natural areas, Garlon 4 Ultra cannot be used where any standing water is present. The correct answer is false. Sample size: n=296.

Finally, indicator vegetation. Wetland delineators commonly use the presence of

hydrophytic (water-loving) vegetation as a positive indicator of wetland sites. At first, this seems like a good way to identify sites where non-aquatic herbicides should not be used. Many aquatic applicators seem to agree. When given the following statement: "The presence of wetland indicator species prohibits the use of non-aquatic herbicides," approximately 25% of professional applicators agreed (Figure 6). However, this statement is false and herbicide labels do not delineate aquatic/upland herbicide use by the presence of wetland species. For the entire country, this would be unbelievably complex and unduly burdensome. Wetland species can be extremely useful in recognizing that water may be or become an issue. However, many wetland species tolerate seasonally dry conditions, where applications of certain upland herbicides are legal. Good stewards will recognize this and make herbicide choices appropriate to the site.

To wrap this up, here are a few final thoughts. The results of these quizzes indicate many applicators still struggle with herbicide labels. Good stewardship when using herbicides is critical. Part of this stewardship includes reading the label to better understand the allowances and limitations of applying a given herbicide in and around water. If you need clarification on label interpretation, start with company representatives for the herbicide in question. Then, if you are still unclear, contact an IFAS extension specialist. Finally, contact Florida Department of Agriculture and Consumer Services, Agricultural Environmental Services Division. Additionally, for public lands, the contracting agency can generally provide clarification for specific situations. So here's to good stewardship, a better understanding of herbicide labels, and bringing clarity to those gray areas. Oh, and get ready. This label quiz is likely coming soon to a meeting near you!

Dr. Stephen Enloe (sfenloe@ufl.edu) is an Associate Professor of Agronomy at the University of Florida's Center for Aquatic and Invasive Plants in Gainesville.

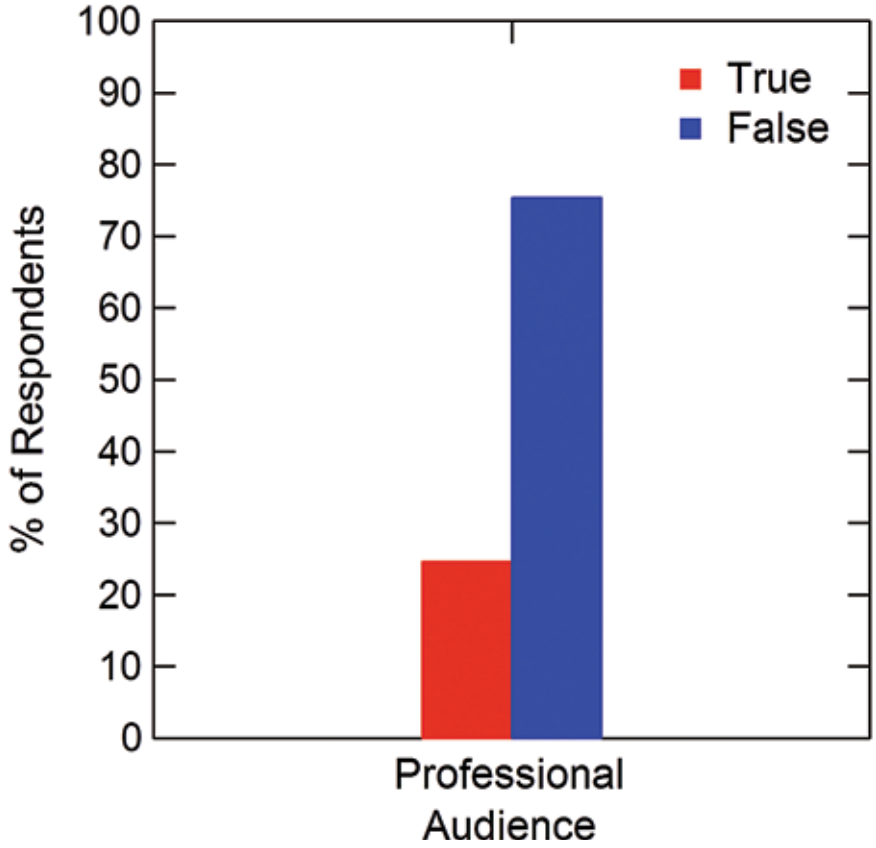


Figure 5. Results for question 5: The presence of wetland indicator species prohibits the use of non-aquatic herbicides. The correct answer is false. Sample size: n=144.

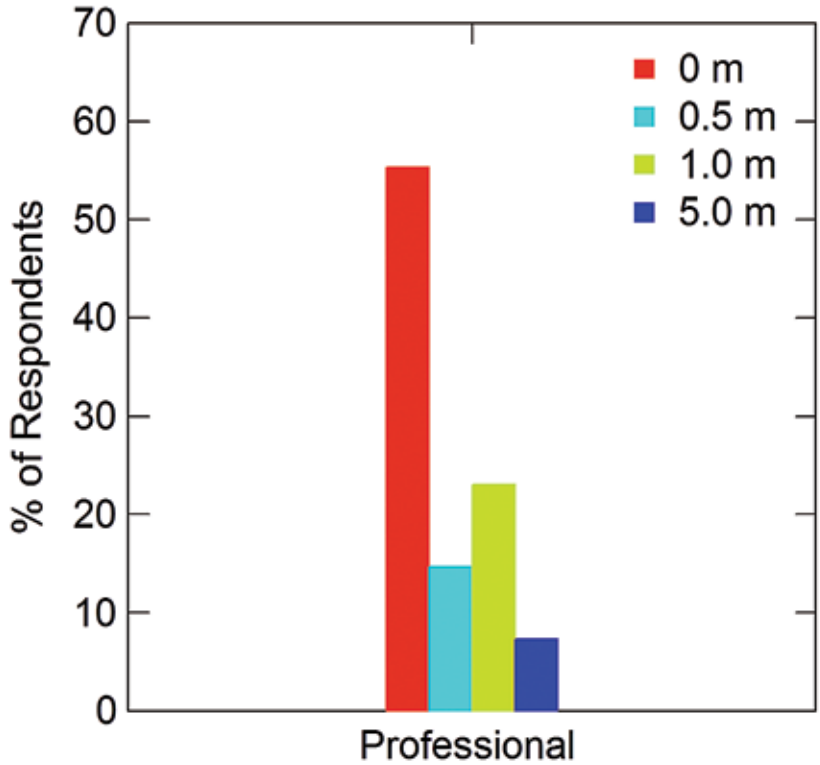


Figure 6. Results for question 6: When an herbicide label states that the product can be used to the water's edge, what is the actual buffer distance intended? The correct answer is 0 m. Sample size: n=138.

Register TODAY for the 40th Annual FAPMS Training Conference!

This year marks the 40th Anniversary of the Florida Aquatic Plant Management Society. The FAPMS Board of Directors and Program Committee are working to make this year's conference a special anniversary celebration. We are completing a presentation and display that will include photos throughout the past 40 years. If you have digital pix that you're willing to share of FAPMS members and conferences, aquatic plant management operations, projects, equipment, etc. (basically anything that pertains to aquatic plant management and FAPMS), please email them to us at fapms40years@gmail.com. We appreciate any photos you're willing to share.

We are looking forward to this year's conference and hope that you will be able to join us to celebrate 40 years of FAPMS! If you register before October 7, 2016, you'll pay only $135 — a savings of $50 off the regular registration cost of $185. In addition to providing you with access to all sessions, the Awards Banquet and the world-famous duck races, your registration includes a one-year FAPMS membership. Register online today by following the links on the FAPMS website at fapms.org

Make your hotel reservation TODAY for the 40th Annual FAPMS Training Conference!

This year's Conference will be held at the Hilton Daytona Beach Resort (100 North Atlantic Avenue, Daytona Beach). Located in the heart of the Ocean Walk Village on the "World's Most Famous Beach", the Hilton Daytona Beach offers stunning views of the Atlantic Ocean and easy access to the thriving seaside, entertainment and meetings district in Daytona Beach.

The Hilton Daytona Beach Resort/ Ocean Walk boasts an extensive range of bars and restaurants. Indulge in ocean-front dining at Doc Bales' Grill, the hotel's signature restaurant, or enjoy a casual meal at the beachfront Poolside Pelican Bar. Whether you wish to stay active or simply relax, enjoy endless recreational facilities at this Daytona Beach hotel. Rejuvenate at the fitness center, pools and whirlpools or sample the latest treatments at the hotel spa, while the kids have fun at D-Dawg's Kidszone. Retire to a refreshing guest room, suite or beachfront cabana and enjoy stunning views overlooking the city or Atlantic Ocean. Guest rooms at the Hilton Daytona Beach feature tropical decor and are equipped with high-speed internet access. Upgrade to a suite for extra space and special upgraded amenities like cotton bathrobes.

A block of rooms has been reserved for us from October 16, 2016 through October 21, 2016. The special room rate — starting at $119 per night — will be available until September 25th or until the block is sold out, whichever comes first. The Resort Charge for FAPMS members has been waived, so disregard any mention elsewhere of the charge throughout the site. Go to fapms.org and click on the Reservation Link under Hotel Information on the 2016 Conference page to get our special rates. If you'd rather register directly on Hilton's website, be sure to enter "FAPMS" in the "Special Accounts and Rates" section.

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 under the Awards tab, 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 on October 19, 2016.

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

Good luck, nominees!

CALL FOR PHOTOS

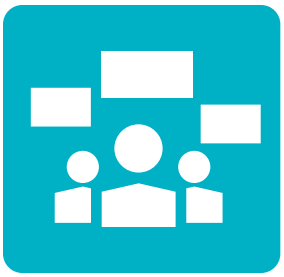
The annual VIC RAMEY PHOTO CONTEST will also be held at the Annual Training Conference in Daytona Beach. The contest was created to inspire photographs to promote education, discussion and competition towards the Society's objective of aquatic plant management. There are two categories:

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. Set your camera to 1MB or 5 megapixels or higher for best results. Photos may also be posted on the FAPMS website.

Good luck, photographers!

The 2016 Aquatic Weed Control Short Course – 40 years of killing weeds

By Lyn A Gettys, Fred M Fishel and William T Haller

The 2016 University of Florida/IFAS Aquatic Weed Control Short Course marked 40 years of the largest aquatic weed control training program in the United States. This year's event was a great success, with around 450 attendees convening at the Fort Lauderdale Marriott Coral Springs Hotel, Golf Club & Convention Center in early May. To celebrate this momentous occasion, we put together special "swag bags" that were given to everyone registered for the Short Course. In addition to the always-welcome Book of Presentations, this year's giveaways included:

HAT

SWAG BAG

- A fabric messenger bag imprinted with the Short Course logo
- A "plant ID" kit, consisting of an imprinted magnifier, measuring tape, and "boat float" keychain
- A T-shirt with a special commemorative Short Course logo
- An embroidered cap

PLANT ID KIT

Many applicators in Florida have been licensed by the Florida Department of Agriculture and Consumer Services (FDACS), well, almost forever and have been attending the Short Course since the beginning. However, newbies may not know the history of the Short Course and how it developed into its current form, so let's do the time warp and visit the groovy 70s…

The US Environmental Protection Agency (USEPA) amended the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) in the mid-1970s to include new certification and licensing programs for pesticide applicators. These new regulations authorized each state to enact a certification and licensing program for applicators of restricted use pesticides (RUPs), which are classified as such by the USEPA because they pose a significant risk to humans or to the environment. The licensing agency that oversees this program in Florida is FDACS and UF/IFAS provides educational programs that meet FIFRA and FDACS requirements. Briefly, applicators who want to become certified to purchase and handle RUPs must pass the written General Standards ("CORE") exam and at least one category exam with a minimum score of 70% on each. Category exams are designed to test competency in specific areas and include aquatic weed control (AQ), natural areas weed management (NAWM), right-of-way (ROW) and others. A license is valid for 4 years and can be renewed by re-taking the exams or by accumulating an appropriate number of category-specific continuing education units (CEUs) during the 4-year license cycle (see "CEUs Just for You" in the Summer 2014 issue of *Aquatics* for more information).

The first Aquatic Weed Control Short Course was developed to address applicator-specific FIFRA regulations and was held in Gainesville on the UF campus in 1975. The 8-day-long program was designed specifically for aquatic vegetation managers and included 5 days of classroom presentations, a 1-day field trip and 2 days of fishing. The Short Course was held during alternate years until it became an annual event in 1984; the length of the event varied and average attendance was around 100.

Dr. Jay Ferrell (UF/IFAS) discussing the environmental fate of aquatic herbicides

Dr. Lyn Gettys (UF/IFAS) welcoming attendees to the 2016 UF/IFAS Aquatic Weed Control Short Course

Mike Sowinski (FWC) outlining how to use grass carp for aquatic weed control

Mike Bodle (SFWMD) teaching the wildly popular Natural Areas Weed Identification Session

When the Short Course moved to Fort Lauderdale in 1995, attendance jumped to 270 and in recent years, attendance has consistently been more than 400. Why the surge in attendees?!?

Location:

More than 5,000 individuals in Florida hold licenses with AQ, NAWM and/or ROW categories, and most are based in south Florida — only a fraction of them (around 10, 12, and 20% of AQ, NAWM, and ROW applicators, respectively) live and work in north Florida. Since most applicators live and work in south Florida, moving the Short Course from Gainesville to south Florida allowed many more applicators to attend because the event is much closer to home

Content:

Pre-1995 Short Course programming focused exclusively on aquatic resource managers, but programming during the last 20 years has been expanded to include a much broader target audience that includes upland vegetation managers too

Dr. Fred Whitford (Purdue University) showing attendees how to make an emergency preplan site map for first responders to your facility

Exam preparation and administration:

Early versions of the Short Course did not offer study sessions to prepare wanna-be applicators to take the CORE and category exams. In contrast, exam prep (CORE, AQ and NAWM) sessions at the 2016 Short Course were very well-attended (as always) and over 160 exams were administered on the final day of the event

CEUs:

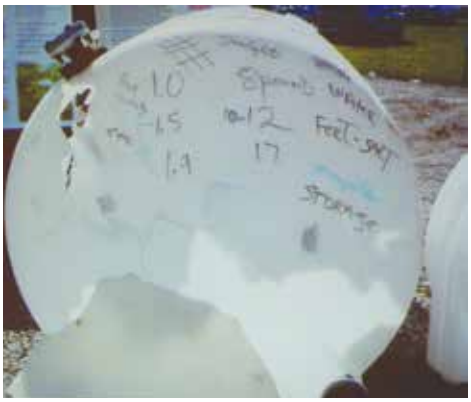
The vast majority of applicators prefer to renew their license using CEUs instead of re-taking the written exams. However, many applicators are licensed in multiple categories and it can be a challenge to accumulate enough category-specific CEUs during the 4-year license period. For example, an applicator with AQ, NAWM and ROW categories needs 4 CORE, 16 AQ, 16 NAWM and 8 ROW CEUs. The original incarnations of the Short Course didn't offer CEUs to attendees, but the modern version of this 3.5-day-long event allows attendees to earn up to 22 CEUs – enough to meet the 4-year requirement for both CORE and the AQ category.

Back to the Future

So now we've flashed forward to 2016, where we've marked 40 years of killing weeds. We appreciate your support throughout the years and look forward to another 40 years of helping you do battle with Florida's invasive plants. The 2017 Short Course is scheduled for May 8-11 and will once again be held at the Coral Springs Marriott – we'll see you there!

Dr. Lyn Gettys (lgettys@ufl.edu) is an Assistant Professor of Agronomy at the University of Florida's Fort Lauderdale Research and Education Center. Dr. Fred Fishel (weeddr@ufl.edu) is a Professor of Agronomy at the University of Florida and is Director of the UF/IFAS Pesticide Information Office. Dr. Bill Haller (whaller@ufl.edu) is a Professor of Agronomy at the University of Florida and is Director of the UF/IFAS Center for Aquatic and Invasive Plants.

Attendees using breaks to network, make new connections and catch up with colleagues



Dr. Fred Whitford (Purdue University) demonstrates the perils of a degraded tank

Taking a second look at floating ferns

Native

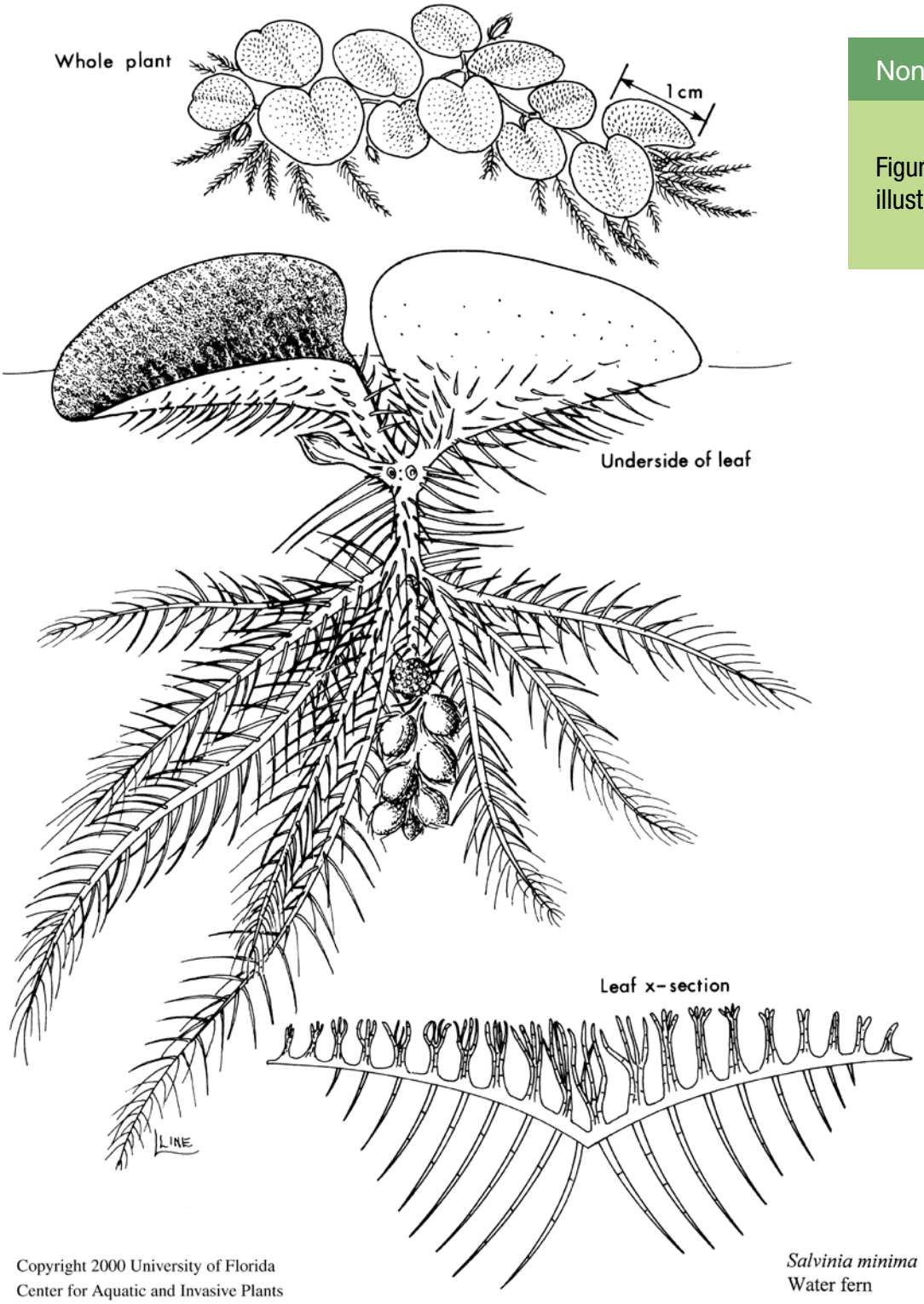
Figure 3. The alternate branches of *Azolla filiculoides* hold the upper lobes of its leaves well above the water surface. Studded across the leaf surface are papillae, rounded projections that repel water.

By Colette C Jacono

Small floating plants, how many times do we offer an initial glance but not a second thought? Just another duckweed? Well, look again and you may find one of our two types of floating ferns: the small *Salvinia* or the even smaller *Azolla*. Floating ferns appear worlds apart from land ferns. Having evolved in environments where water availability is not an issue, they have lost the roots and rhizomes needed for anchoring into the substrate for its search and uptake. Likewise, their stems and leaves have been greatly reduced in size and complexity to accommodate a different set of stressors presented by living life on the water's surface. To combat potential drowning from winds, waves and rain, floating ferns have reduced their leaf size and shape to lie low on the water surface. Modified roots or other root-like structures act more for buoyancy than for nutrient uptake; and modified foliar hairs excel in repelling water.

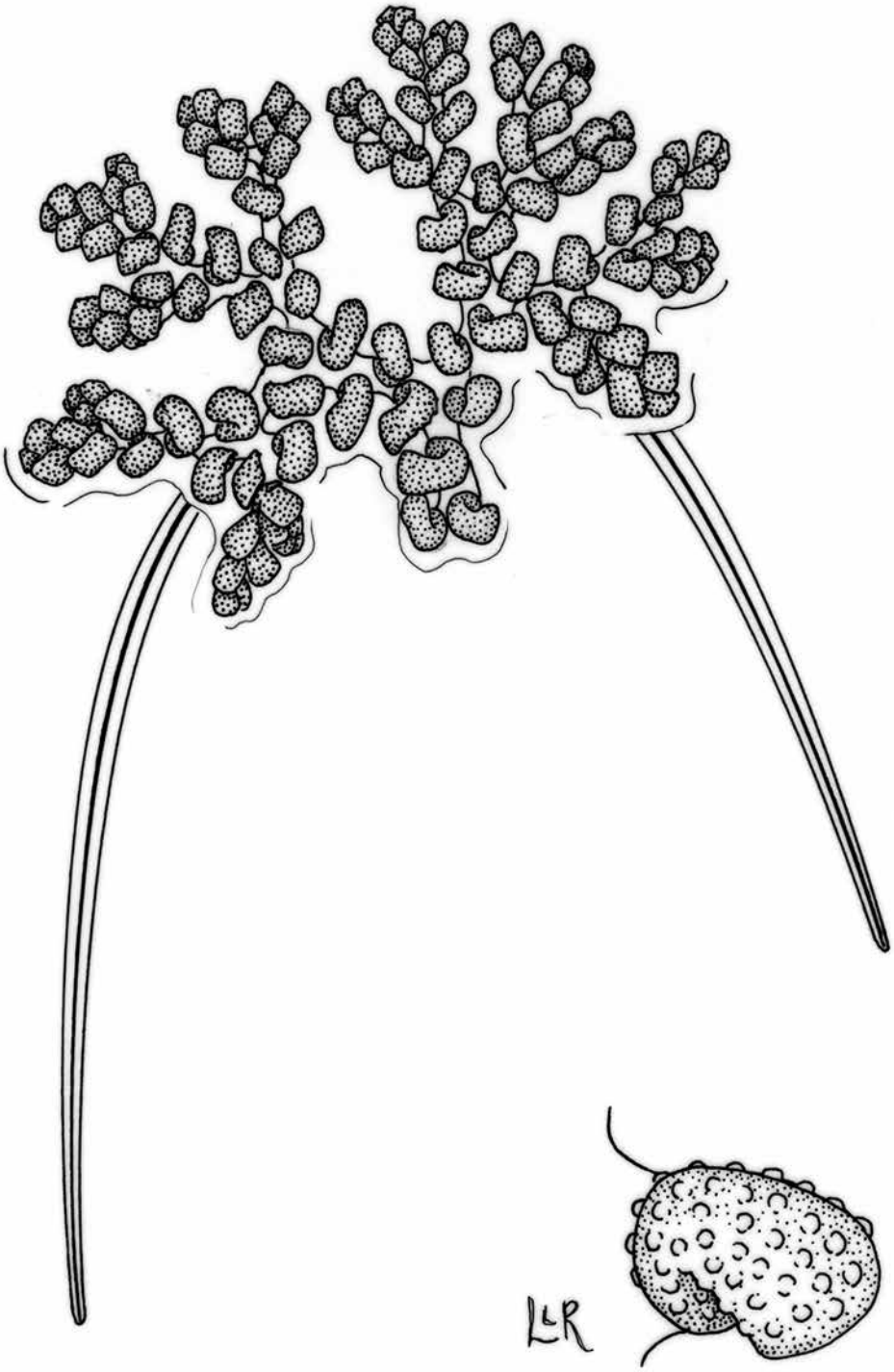
In *Salvinia*, the typical ferny fronds have been reduced to pairs of simple, oval leaves connected by short stalks to a single stem that floats on the water surface (Figure 1). Every floating leaf pair is accompanied at the node by a third, submersed leaf so extensively divided that it is mistaken for roots, though it mostly functions to shelter sporangia (spore cases) and provide buoyancy. Two species of *Salvinia* occur in Florida, *S. minima* (common salvinia) and *S. molesta* (giant salvinia), and both are non-native and invasive.

The smaller floating ferns belong to the group *Azolla* which constitute the very



Non-native

Figure 1. *Salvinia minima* illustrated by Laura Line.



Native

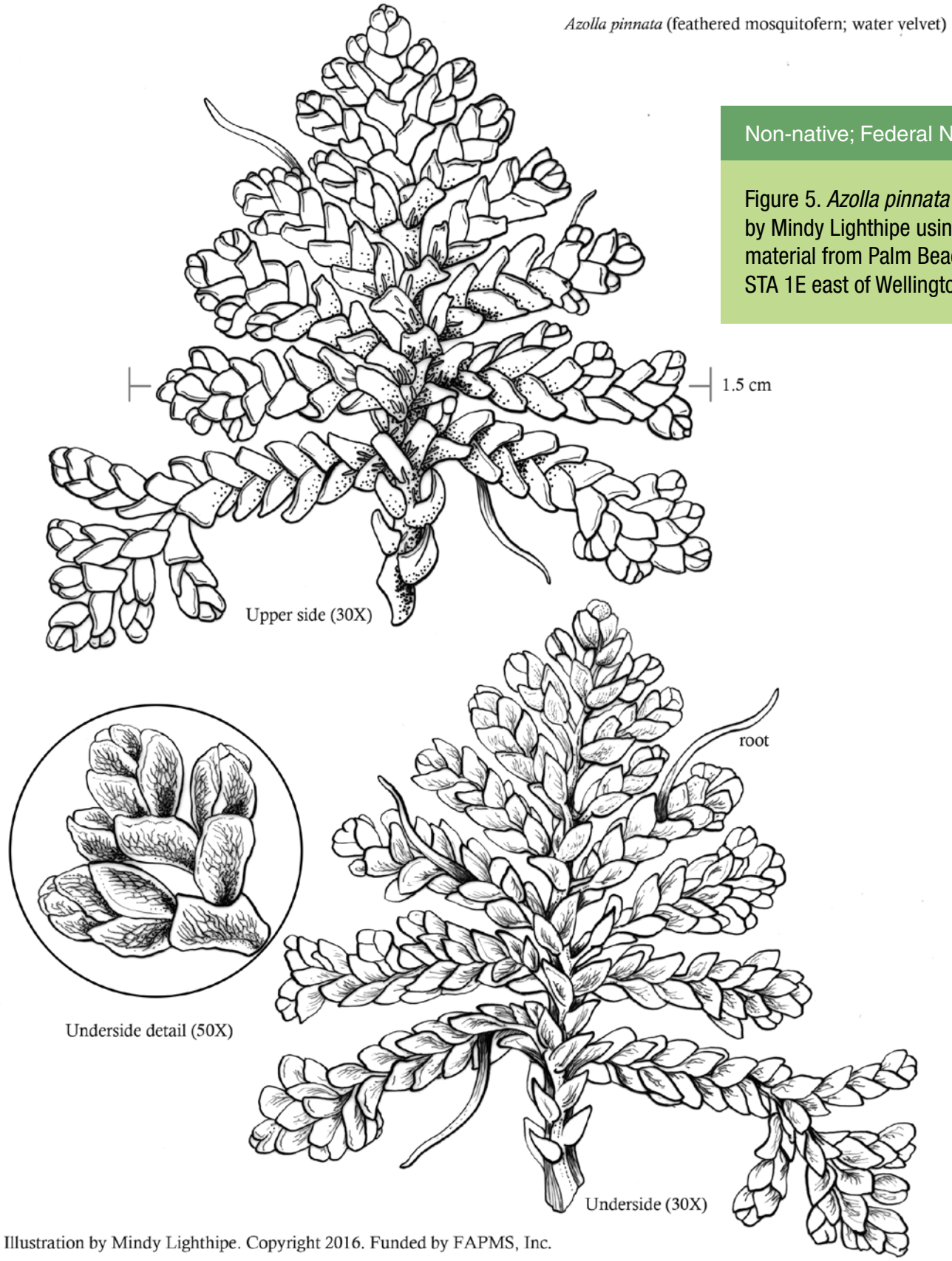
Figure 2. *Azolla filiculoides* (formerly known as *Azolla caroliniana*)
illustrated by Laura Line.

Figure 4. A single plant of *Azolla pinnata* encompasses nearly the entire view when compared with the native *Azolla filiculoides*, in the lower right.

smallest of all ferns worldwide. While a leaf on *Salvinia* can measure 1-cm long, an entire plant of *Azolla* might fit within the same space. *Azolla* continues to differ from *Salvinia*, primarily based on its stem structure. Individual plants of *Azolla* consist of a main stem with branches; each branch develops from a single, superficial cell on the main stem. The leaves of *Azolla* have been drastically reduced by nature. They measure only 1-mm or so long and are arranged in an alternate, overlapping pattern along the branches (Figure 2). Each leaf is directly attached to its branch, wrapping around the branch to form an upper and a lower lobe. The upper leaf lobe is held above the water surface. It is fleshy and green with chlorophyll and has a cavity specialized for harboring the cyanobacterium *Anabaena azolla*, famous for its symbiotic relationship in providing nitrogen, as ammonium ions, to its ferny host. The lower lobe sits on the water surface: it is not submerged. It is composed of a single, simple layer of cells and appears nearly translucent. This general description holds worldwide for *Azolla*, of which there are only 6 or 7 species.

Florida can claim one species as its own — *Azolla filiculoides* (commonly referred to as mosquitofern). Previously called *A. caroliniana*, the two species are now understood to be the same. *Azolla filiculoides* became the chosen name because it happens to be the older of the two. A widespread native species, *A. filiculoides* is recognized for its irregular branching pattern (Figure 3). The branching can vary from asymmetrical to symmetrical, depending on the environment and developmental stage of the plantlet. Color is also dependent on the environment, and this goes for all *Azolla* — under environmental stress, plants turn red from the production of anthocyanin pigments.

In 2007 and 2008 several introduced populations of *Azolla pinnata* (known as feathered mosquitofern) appeared in Palm Beach County. In 2014 these non-native plants were also found at Maclay Gardens in Leon County, a first record for North Florida. Notably larger than *A. filiculoides*, *A. pinnata* is also known for its triangular branching pattern, which offers the superficial image of a pine tree (Figure 4). The branches form in alternate arrangement off both sides of the main stem. They are longer than those of our native *Azolla* and are held at a wider angle. At times, the lower branches appear nearly opposite (Figure 5).



Non-native; Federal Noxious Weed

Figure 5. *Azolla pinnata* illustrated by Mindy Lighthipe using sterile material from Palm Beach County, STA 1E east of Wellington.

Non-native; Federal Noxious Weed

Figure 6. Stem fragmentation results in the release of a lower branch on *Azolla pinnata.* The terminal growing point of this branch had already produced secondary branches. With its release the cycle of vegetative reproduction is maintained.

The 25X magnified view of the underside branch tip of *A. pinnata* (Figure 5) demonstrates the transparency of the lower lobe which is clear as glass along the outer margin and a useful feature in identification.

All floating ferns rely on vegetative fragmentation (Figure 6) for their rapid reproduction and for that reason are known to become problematic in managed systems. Like *Salvinia molesta, Azolla pinnata* is a Federal Noxious Weed, which means it is illegal to import and to transport across state lines. Yet both remain, whether as contaminants or the item for purchase, entrenched in the aquatic garden trade. Just last week, Karen Brown, UF/IFAS Center for Aquatic and Invasive Plants, spotted *Azolla pinnata* for sale at a Gainesville nursery. Karen's keen observation stemmed from overseeing the production of this new FAPMS funded illustration of *Azolla pinnata* by Mindy Lighthipe. Perhaps this will sharpen your eye as well and encourage a second look at small floating plants.

References

Cook, C.D.K. 1990. Aquatic Plant Book. SPB Academic Publishing, The Hague, The Netherlands.

Evrard, C. and C. Van Hove. 2004. Taxonomy of the American *Azolla* species (Azollaceae): a critical review. Systematics and Geography of Plants. 74: 301-318

Saunders, R.M.K. 1998. Azollaceae. Flora Malesiana, Series II. 3: 277-284.

(References are available at the Information Office, UF/IFAS Center for Aquatic and Invasive Plants.)

Acknowledgement

Special thanks to Anne Taylor, UF/IFAS Center for Aquatic and Invasive Plants, for editorial comments.

All photos by Colette C. Jacono

Dr. Colette Jacono (colettej@ufl.edu) is a Botanist at the University of Florida's Center for Aquatic and Invasive Plants.

NEW!

CONTROL ALGAE WITH GREENCLEAN LIQUID 5.0

NSF

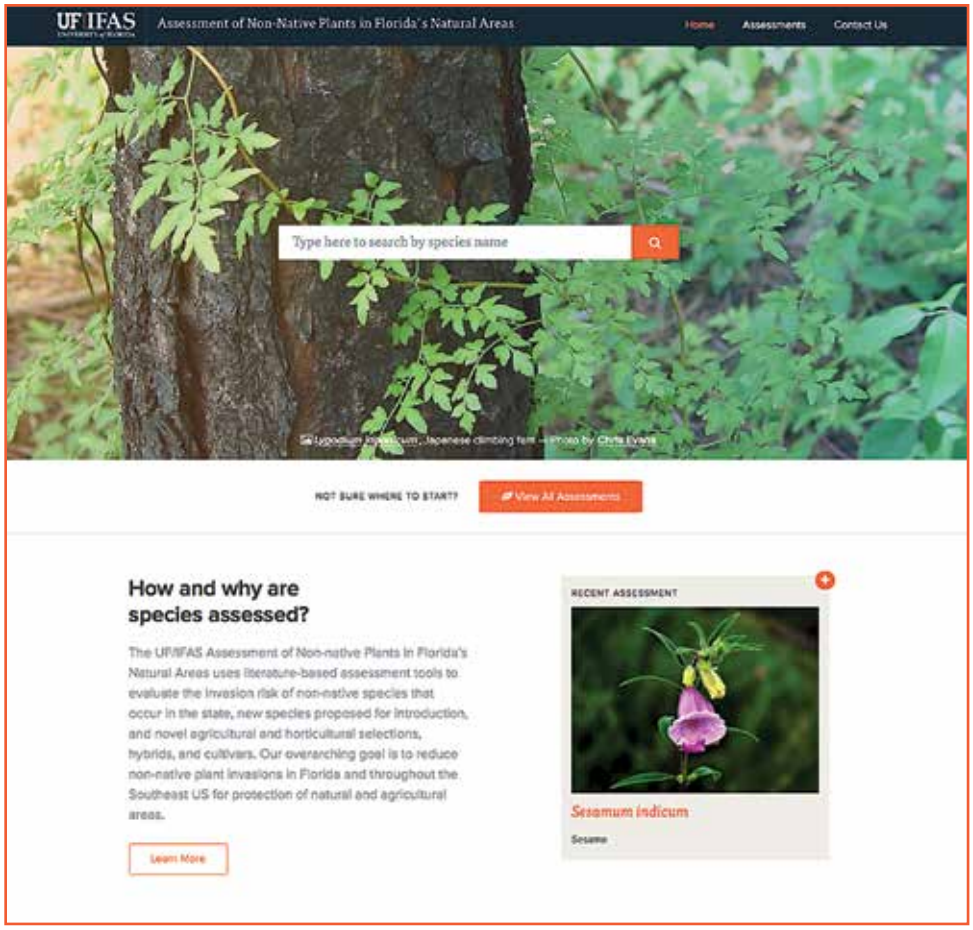
For more information
Tom Warmuth
336.402.4449 direct
twarmuth@biosafesystems.com

BioSafe Systems® LLC
Simply Sustainable. Always Effective.

1.888.273.3088 | biosafesystems.com

New GreenClean Liquid 5.0 immediately fights algae and cyanobacteria. The powerful formula allows for greatly increased efficacy at economical application rates. The unique, patented activated peroxygen chemistry releases vital oxygen into water as it biodegrades. Use GreenClean Liquid 5.0 at any pH range for faster results and superior algae control.

IFAS Assessment FAQs



By Deah Lieurance

FAQ: I recently visited the UF/IFAS Assessment website. Can you tell me more about it?

The UF/IFAS Assessment of Non-native Plants in Florida's Natural Areas (hereafter, UF/IFAS Assessment) is an extension service provided by the University of Florida's Institute of Food and Agricultural Sciences (IFAS). The UF/IFAS Assessment uses literature-based risk assessment tools to predict the invasion risk of non-native species that occur in the state as well as species proposed for introduction. There are three tools: the Status Assessment for species currently in the state; the Predictive Tool; and the Infraspecific Taxon Protocol for species proposed for introduction. The UF/IFAS Assessment team has evaluated the invasion risk of more than 850 species, including 127 species proposed for introduction or new uses. The team is actively identifying and evaluating potentially problematic non-native species and regularly reevaluates conclusions of species already in the database. Recommendations and supporting information for the UF/IFAS Assessment can be found at http://assessment.ifas.ufl.edu

FAQ: Why was the UF/IFAS Assessment created?

In the mid-1990s, conflicting information regarding the use of several non-native species was coming from different university departments. For example, some researchers were promoting the use of a particular species, perhaps as a landscape ornamental, while other faculty members were providing recommendations for management of the same species in natural areas. Additionally, the Florida Exotic Pest Plant Council (FLEPPC) published a list of non-native species that were already established and reproducing in the state. Many of these species were still being promoted for use by some UF faculty and staff. A tool was needed to get everyone on the same page concerning the use of non-native plants in Florida. In 1999, a subcommittee of the UF/IFAS Invasive Plant Working Group began development of the UF/IFAS Assessment to provide objective, science-based recommendations for the use of non-native species in Florida. The goal of the UF/IFAS Assessment is to decrease invasion into natural areas by ensuring that plant species with invasive characteristics are not recommended for use by UF/IFAS faculty.

FAQ: So IFAS faculty developed the UF/IFAS Assessment?

Yes. At the time, the Invasive Plant Working Group (IPWG) was composed of several UF faculty members, including Doria Gordon, Alison Fox, Ken Langeland, and others. These experts evaluated other plant assessment protocols from around the globe and developed several versions of the protocols specific to the geography and climate of Florida before all committee members agreed to its use. As of today, the IPWG has many faculty members representing a range of expertise including horticultural science, weed science, and

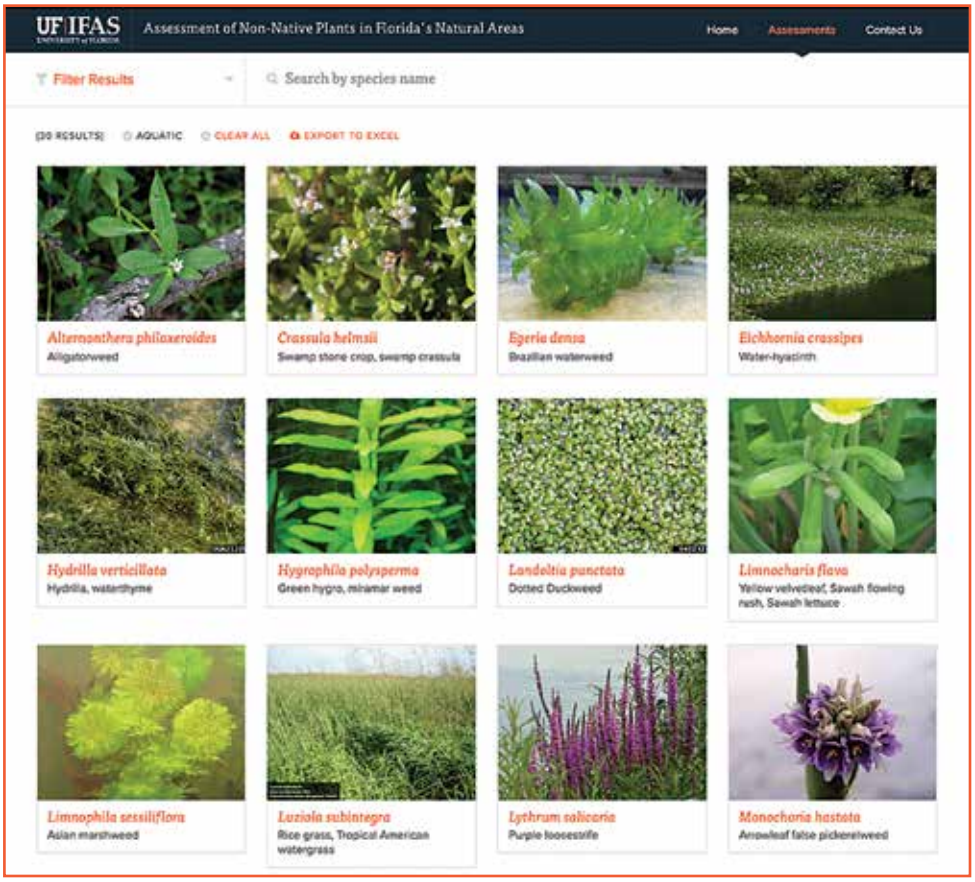
invasion ecology, as well as representatives from the nursery growers association, and members from the Florida Department of Agriculture and Consumer Services (FDACS) Division of Plant Industry (DPI).

FAQ: Why is Florida so susceptible to invasion by non-native species?

Florida has many biological invasions by plants, animals, insects, and pathogens for multiple reasons. First, it is estimated that approximately 85% of all non-native plant species enter the United States through the airports and shipping ports of Florida. A small proportion of these species escape and become invasive. Second, Florida is particularly vulnerable to non-native invasive species due to its peninsular geography, tropical/subtropical climate, and diverse yet fragile ecosystems. More than half of the land area in Florida is either being developed or used for agriculture, and the remaining natural areas are either disappearing or the quality of protected habitat is deteriorating. When you combine all of these factors, a "perfect storm" for invasion by non-native species is created.

FAQ: Who uses the assessments?

The results of the UF/IFAS Assessment are used primarily by university faculty and staff. Any UF/IFAS Extension publication or newsletter that refers to specific non-native plants (e.g., invasiveness, ecology, distribution, management, use, and value) is required to include the recommendations of the UF/IFAS Assessment. University extension programs such as Florida Friendly Landscaping and the Master Gardeners also use our list. Additionally, FDACS consults with the UF/IFAS Assessment to evaluate proposed biomass and bioenergy crops as a part of its biomass planting rule (5B-57.011). FDACS also contacts us when they are considering adding plants to the state noxious weed lists. Landowners, managers, and industry use the UF/IFAS Assessment when deciding on the use of non-native species in Florida. Finally, the tools employed by the UF/IFAS Assessment have been internationally recognized as models for evaluating non-native species and our office has worked with the Midwest Invasive Plant Network, California Invasive Plant Council, and the European and Mediterranean Plant Protection Organization in the evaluation of non-native species and the development of evaluation tools.



FAQ: What are the differences between the UF/IFAS Assessment list, the FLEPPC list, and the FDACS prohibited list?

The UF/IFAS Assessment provides conclusions that are non-regulatory and specifically apply to the invasion risk of non-native species in *natural areas*. For example, species that are abundant in disturbed habitats but have not encroached into natural areas are not considered a problem species and may still be suitable for recommendation. The FLEPPC list does not make that distinction, specifically for Category II species (see the 2015 FLEPPC list at fleppc.org/list/list.htm. In addition, the UF/IFAS Assessment uses quantitative protocols and provides detailed background information for each species evaluated, and both results and methods are transparent to the public. FDACS maintains the only statewide regulatory lists with the Prohibited Aquatic Plants and Florida Noxious Weed list; links to both lists can be found at www.freshfromflorida.com/Divisions-Offices/Plant-Industry/Business-Services/Plant-Pest-Permits/Noxious-Weed-Permit. The cultivation, introduction, collection, and transport of plants on these lists are prohibited without a permit.

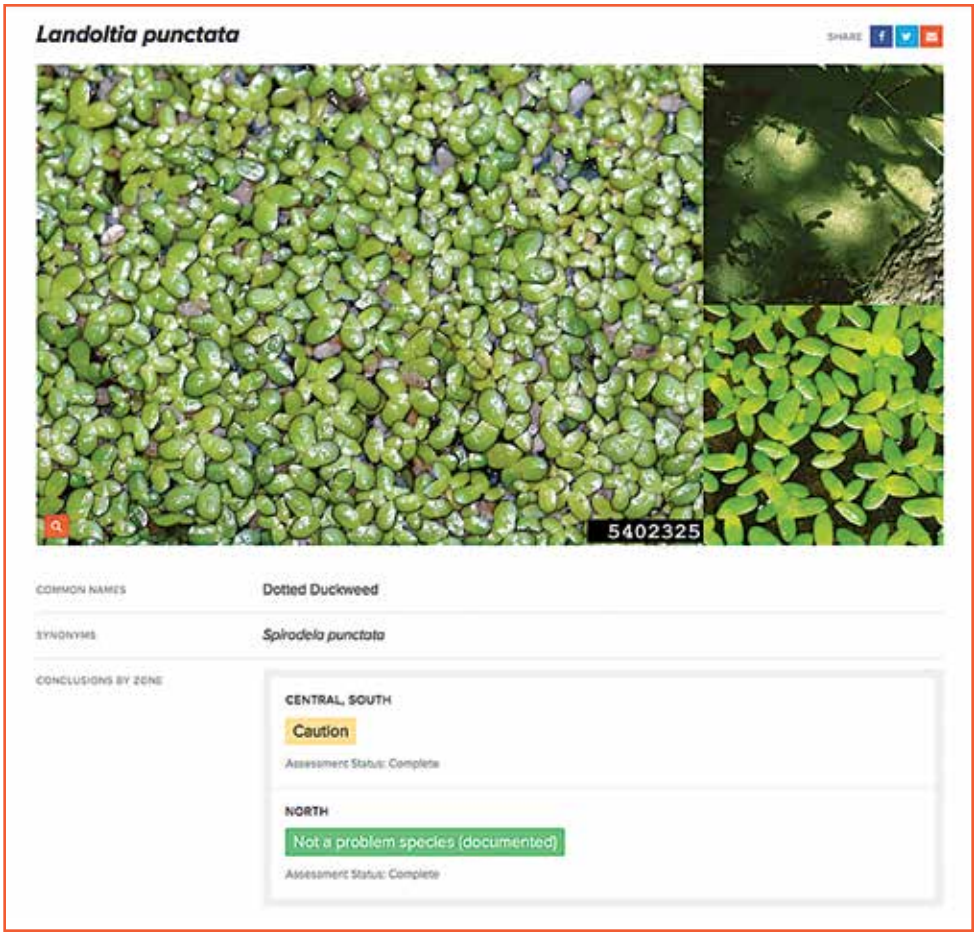
FAQ: You mentioned there are three tools used to assess species. Can you more specifically explain each tool?

Sure, the first tool developed was the Status Assessment for non-native species already present in the state. This tool consists of questions about ecological impacts to natural areas, management difficulty and costs, economic value of the species, and the potential to expand into non-invaded zones. To account for differences in how a species will perform in different regions of the state, we divided Florida into three zones — North, Central, and South — and conclusions are specific for each zone. At least three experts (land managers or scientists) familiar with the species in each

region complete questionnaires about the factors listed above. Their responses are incorporated with information gathered from an extensive literature search (herbaria records, peer-reviewed literature, floras) to provide final recommendations.

The Predictive Tool (PT) is designed to evaluate species before they are introduced. The PT is a weed risk assessment (WRA) modified from the Australian WRA protocol to specifically account for Florida's climate and geography. This tool consists of 49 questions focused on a species' invasion history, ecology, and life history traits. Questions in the Predictive Tool are answered by conducting thorough literature searches using sources such as herbaria records, agency reports, and peer-reviewed primary literature. Like the Status Assessment, conclusions for the Predictive Tool are separately derived for each zone.

The final tool is the Infraspecific Taxon Protocol (ITP). It is used to evaluate cultivars, varieties, hybrids, or subspecies of resident invasive species (non-native species found in Florida) to determine if all taxa associated with a particular species should receive the same recommendations as the parent species. This tool is typically used internally to evaluate infraspecific taxa before they are released by the University of Florida.



FAQ: Can I access a list of conclusions for just aquatic plants?

Yes. The UF/IFAS Assessment website can be filtered by zone, conclusion type, origin, tool used, and growth habit. To filter for aquatic plants, go to the "Assessments" page. There you will see the "Filter Results" drop-down menu in the upper left corner. Select "Growth Habit" and another drop-down menu will appear. Click the box next to "Aquatic" and then click "Apply Filters". Now you will only see the species that are filtered from our database; in this case, just the aquatic plants.

To find out more about the UF/IFAS Assessment, visit the website at assessment.ifas.ufl.edu

Dr. Deah Lieurance (dmlieurance@ufl.edu) is Coordinator of the UF/IFAS Assessment of Non-native Plants in Florida's Natural Areas

A sampling of Florida's native aquatic plants

By Lyn A Gettys

Frog's-bit (*Limnobium spongia*)

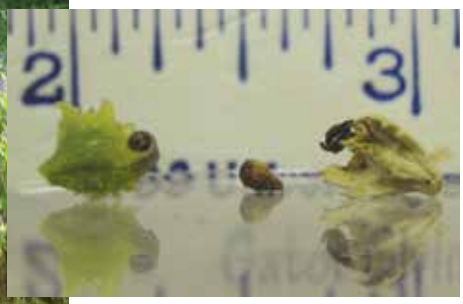
Frog's-bit is a floating plant that is sometimes mistaken for immature waterhyacinth (*Eichhornia crassipes*). Both have bright-green rubbery leaves, but the petioles (leaf stalks) of frog's-bit are thin and rigid with a coarse texture (waterhyacinth petioles are usually swollen and spongy). The flowers are very different as well; everyone is familiar with the spike of showy purple flowers produced by waterhyacinth, but frog's-bit flowers are small, white and held just above the surface of the water.

American lotus (*Nelumbo lutea*)

American lotus has floating and emergent leaves that are round and measure up to a foot across. Leaves are attached to the petioles in a peltate manner, meaning the petioles attach to the center of the leaves (similar to an umbrella) rather than at one end of the leaf. American lotus bears large, pale yellow flowers that are held above the surface of the water and have a delicate scent. Green seeds are borne in a structure that looks like a shower head and are edible, although they do contain a very bitter embryo that looks like a miniature leaf. If the seed is split open and the embryo is picked out, the remaining part of the seed tastes like a peanut. Mature seeds are dark brown and have an extremely hard seed coat — don't try to eat them or you'll break a tooth! Fun fact: 4,500-year-old lotus seeds have been recovered from tombs in Egypt… once the hard seed coats are nicked to allow water to enter, the seeds germinate and produce normal lotus plants.

Pickerelweed (*Pontederia cordata*)

Pickerelweed is a fleshy, emergent plant that grows along shorelines and in water that is up to a few feet deep. Pickerelweed is a close relative of waterhyacinth and the leaves have the same rubbery feel, but pickerelweed leaves are produced on long, thin petioles that are attached to the base of the plant near the soil line. Leaf shape is highly variable and can range from very broad and sagittate to very thin and lanceolate (sword-shaped). Individual flowers of pickerelweed are small (less than 1/2 inch across) and up to 250 flowers are borne in a single spike inflorescence. Each flower is only open for a single day but the flowers on a spike open on different days so an inflorescence may be colorful for up to two weeks. Each flower produces a single fruit that is green when fresh, light tan when ripe and may contain a single small, hard seed.



Spatterdock, yellow pond lily, cow lily (*Nuphar advena*; also called *Nuphar lutea*)

Spatterdock produces submersed, floating and emergent leaves that are cordate (heart-shaped) to sagittate (arrowhead-shaped). Like American lotus, spatterdock produces yellow flowers. However, the flowers of spatterdock are much smaller (usually 3 inches or less across) and appear partially open. The rhizome of spatterdock is creamy in color and can become quite large and thick. These rhizomes sometimes "pop" from the bottom of the waterbody and float to the surface, where they can be mistaken for all sorts of odd things, including a bloated corpse – yikes!

Buttonbush (*Cephalanthus occidentalis*)

Buttonbush is a woody, shrub-like plant that is common along shorelines and in shallow water. The leaves of buttonbush are coarse and have a sandpapery feel. Buttonbush is deciduous, meaning it drops its leaves during the winter and produces new ones the following spring. The flowers of buttonbush are arranged in a dense inflorescence that looks like a golf ball with many yellow-headed sewing pins stuck in it. Immature seeds are green, then turn brown and fall off the plant once they're ripe.

Dr. Lyn Gettys (lgettys@ufl.edu) is an Assistant Professor of Agronomy at the University of Florida IFAS Fort Lauderdale Research and Education Center.

All pix are courtesy Lyn Gettys, UF/IFAS

Calendar of Events 2016-2017

October 5-7, 2016
SCAPMS Annual Conference
Myrtle Beach, SC
www.scapms.org

October 10-12, 2016
TAPMS Annual Conference
Tapatio Springs Resort in Boerne, TX
www.tapms.org

October 17-20, 2016
FAPMS Annual Conference
Daytona Beach, FL
www.fapms.org

November 1-4, 2016
North American Lake Management Society Annual Symposium
Banff, Canada
www.nalms.org

January 9-11, 2017
Northeast Aquatic Plant Management Society Annual Conference
Portsmouth, NH
www.neapms.org

January 23-25, 2017
Southern Weed Science Society Annual Conference
Birmingham, AL
www.swss.ws/

January 29-February 3, 2017
Florida Mosquito Control Association Dodd Short Course
Altamonte Springs, FL
www.dodd.floridamosquito.org/Dodd/

February 6-9, 2017
Weed Science Society of America Annual Conference
Tucson, AZ
wssa.net/meeting/2017-meeting/

February 27-March 2, 2017
Midwest Aquatic Plant Management Society Annual Conference
Milwaukee, WI
www.mapms.org

March, 2017
Florida Weed Science Society Annual Conference
Haines City, FL
sites.google.com/site/floridaweedscience society/2010location

March 13-16, 2017
Western Aquatic Plant Management Society Annual Conference
Coeur d'Alene, ID
www.wapms.org

May 8-11, 2017
UF/IFAS Aquatic Weed Control Short Course
Coral Springs, FL
conference.ifas.ufl.edu/aw

Paul C. Myers Applicator Dependent Scholarship

The Florida Aquatic Plant Management Society Scholarship and Research Foundation, Inc. is pleased to announce the availability of the *Paul C. Myers Applicator Dependent Scholarship*, which provides up to $1,500 to deserving dependents of FAPMS members. The scholarship is based on:

1. The applicant's parent or guardian having been a FAPMS member in good standing for at least three consecutive years

2. Financial need, which will be determined based on need and the expected family contribution amount indicated on the processing results of a Student Aid Report (OMB No. 1845-0008). This report is available by completing a Free Application for Federal Student Aid Federal Form available online at fafsa.ed.gov

3. The applicant being a high school senior entering college the next academic year, attending community college, or being a college undergraduate

4. An evaluation of the quality of the application and required essay by the Scholarship Selection Committee, which is composed of three FAPMS members and four FAPMS Scholarship and Research Foundation members

5. Submission of a completed application by June

PRESORT STANDARD
US POSTAGE
PAID
PERMIT #592
PONTIAC, IL

Florida Aquatic Plant Management Society
FAPMS
Established in 1976

More information and the application packet are online at http://fapms.org/scholar/myers_scholar.html or contact Keshav Setaram at 407-891-3562