



Aquatics

SUMMER 2014

A Publication of the Florida Aquatic Plant Management Society

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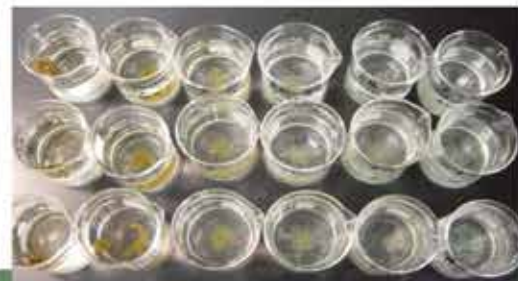
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It's that time of year again... waterhyacinths clogging a canal along US 27 in south Florida. Photo courtesy Lyn Gettys.



A happy stakeholder, see page 20. Photo courtesy Brett Hartis.

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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.

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IN MEMORIAM

David Register

Edward "David" Register, former long-time member of FAPMS, passed away at the age of 64 in Gainesville on April 1, 2014.

David was born at Fort Benning in Columbus, Georgia on October 6, 1949. He had a long, illustrious career with the federal government. He began his career by serving in the United States Army 25th Infantry during the Vietnam War. David received the Bronze Star Medal for his heroism in ground combat, along with several additional medals which included The Army Commendation Medal, Air Medal, National Defense Service Medal, and the Combat Infantry and Marksmanship Badges. He was a member of the Amvets Post 86 in Keystone Heights.

David began his career in civil service in 1976. He retired from the US Army Corps of Engineers in 2011 after 35 years of service. His last assignment was at the North Florida Aquatic Plant Control Unit in Palatka, Florida. David was a small craft op-

erator/pest control worker and he worked on the St. Johns River treating floating aquatic plants. In addition, he assisted with maintaining other federal navigation channels such as the Oklawaha and Withlacoochee Rivers. David was also instrumental in conducting the yearly biological control collection and distribution program. He received many performance awards throughout his career for his technical knowledge, skills, dependability, dedication and commitment to performing his work. David will always be remembered as having a positive "can do" attitude. He was a vital asset and was considered a cornerstone of the program at the NFAPCU.

David received the FAPMS Applicator of the Year Award in 1999 for his contributions to the field of aquatic plant management.

Submitted by Angie L. Huebner, US Army Corps of Engineers



Comparative Oral Toxicity of Aquatic Herbicides and Common Household Products

David G. Petty, NDR Research

A common question posed to aquatic applicators is “How dangerous is the herbicide product you are putting in the lake?” **Toxicology** is the study of chemical substances which interact with an organism such as a plant or a person and cause a physical response or injury to that organism. The response is directly related to dose, and thus is expressed in terms of dosage per unit weight, and the effect of that dose to the test population. All chemicals are toxic, but just how toxic they are depends on the dose or amount consumed. The discipline of toxicology was founded by the Swiss-German physician Paracelsus (1493-1541). He is credited with the saying “All substances are poisons; there is none which is not a poison. The right dose differentiates a poison and a remedy”.

Toxicology testing is performed on all pesticides, as well as on the chemicals found in all common household products. Among the tests conducted, the most common (and most useful) is referred to as the oral LD₅₀. LD₅₀ is an abbreviation for “Lethal Dose 50” and represents the dose of a chemical required to kill 50 percent of the population of a given organism after ingestion. LD₅₀ values are usually expressed in units of milligrams (mg) of substance per kilogram (kg) of body weight, which is written “mg/kg”. Toxicity increases as LD₅₀ values decrease. For example, a chemical with a LD₅₀ of 10 mg/kg is 10 times more toxic than one with a LD₅₀ of 100 mg/kg. This makes sense when you think about it. For example, let’s say you have a group of 200 critters that weigh 50 kg (about 110 pounds) each. Let’s also say you have two different chemicals: Product A (LD₅₀ = 10 mg/kg) and Product B (LD₅₀ = 100 mg/kg). If each of these critters ingested 500 mg (equal to 10 mg of chemical per kg of body weight) of Product A, 50% would be expected to die. In contrast, the group of critters would need to ingest 5,000 mg (equal to 100 mg of chemical per kg of body weight) of Product B in order to have the same 50% lethality.

Considering that LD₅₀ studies are conducted on all chemicals sold in the United States, they can be used as a means to compare the toxicity of one chemical to another. The table below presents the acute oral LD₅₀ for the active ingredient of common aquatic herbicides in comparison to common household products and substances that people ingest



Figure 1. Lab technician conducting product testing. Photo courtesy EPL Bio Analytical Services (www.eplbas.com).



Figure 2. Vials used for toxicology testing. Photo courtesy EPL Bio Analytical Services (www.eplbas.com).

intentionally. The active ingredient is the main or primary ingredient in a product that makes it effective. The numbers shown are the LD values that killed 50% of rat populations when ingested orally (taken by mouth).

Product	Oral LD ₅₀ (mg/kg)	Usage
Nicotine	50	Personal choice
Caffeine	140	Personal choice
Hot sauce (capsaicin)	161	Food seasoning
Bleach (sodium hypochlorite)	192	Household cleaner
Aspirin	200	Medication
Endothall	233	Herbicide
Naproxen sodium	248	Medication
Cinnamon	275	Food seasoning
Diphenhydramine HCl	500	Antihistamine
Diquat	866	Herbicide
Pink bismuth (bismuth subsalicylate)	1,200	Medication
Vitamin A	1,510	Vitamin
Triclopyr	1847	Herbicide
Acetaminophen	1944	Medication
Vitamin C	2,000	Vitamin
Topramezone	>2,000	Herbicide
Table Salt	3,000	Food seasoning
2,4-D	3,129	Herbicide
Vinegar (Acetic Acid)	3,310	Food seasoning, household cleaner
Bispyribac-sodium	4,077	Herbicide
Carfentrazone	>5,000	Herbicide
Flumioxazin	>5,000	Herbicide
Fluridone	>5,000	Herbicide
Glyphosate	>5,000	Herbicide
Imazamox	>5,000	Herbicide
Imazapyr	>5,000	Herbicide
Nail Polish Remover	>5,000	Beauty product
Penoxsulam	>5,000	Herbicide

David G. Petty (dpetty@ndrsite.com) is a research scientist and owner of NDR Research in Plainville, Indiana.

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CEUs just for you – finding CEU opportunities to keep your Florida pesticide applicator license current

Lyn A. Gettys

Remember back in the day before you were a certified Florida pesticide applicator? Think back and recall all that time you spent studying for the Core and Category exams, memorizing formulas and regulations, sweating bullets during testing... and then the relief you felt when you got that coveted letter from the Florida Department of Agriculture and Consumer Services (FDACS) congratulating you for passing! If you're like most Florida applicators, you do NOT want to go through that again if you can help it, and you CAN help it by earning Continuing Education Units (CEUs) during the 4 years that your license is valid after being issued by FDACS. In order to renew your license at the end of the initial 4-year period, you must submit a set number of earned CEUs for each Category – and for Core – to re-certify without re-taking the exams (Table 1).

Table 1. CEU requirements for common categories held by readers of *Aquatics*. Requirements for other categories are online at www.freshfromflorida.com – use the Search Field in the top right corner and type in CEU requirements.

Category	CEUs required
Core	4
Aquatic	16
Natural Areas	16
Right-of-Way	8
Forestry	8
Ornamental and Turf	12

If you're licensed in a single category, getting those CEUs might not be too difficult; for example, let's say you're certified in Aquatics only. This means you have to earn 4 Core and 16 Aquatic CEUs in 4 years. That's not so bad, is it? You can fulfill those requirements by attending a

single UF/IFAS Aquatic Weed Control Short Course, which is held every May in Coral Springs. However, many applicators are licensed in multiple categories; the most common combination is Aquatics plus Natural Areas plus Right-of-Way. That's 44 CEUs in 4 years – and the CEUs are category-specific, meaning you can't use Right-of-Way CEUs to fulfill CEU requirements in other categories. Many applicators think they have plenty of time to earn all the CEUs they need before their license expires, but everyone is strapped for time, especially during field season, and it can be difficult to take time out to go to meetings and training events where CEUs can be earned. As a result, some folks put off getting CEUs until their license is about to expire and it becomes an emergency. So

what's a busy applicator to do? What are your options?

1. Search for available CEU classes on the FDACS website

FDACS offers an online search for CEU classes (app1.flaes.org/ceu/AvailableClassSearch.asp). You can search this database in a number of ways. For example, you can select a specific county where classes will be held, or you can search by category, date or offering organization. Let's say you want to find upcoming opportunities to earn Aquatics CEUs in Broward County; when you plug in these search terms, you'll find out that the IFAS-FTGA (Florida Turfgrass Association) Great CEU Roundup 2014 is scheduled for July 9 in Davie. Excellent! But how many CEUs are going to be awarded

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*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

to attendees of this event? You can find out everything you want to know by clicking on the title of the program. Once you've done that, the top part of the next page reveals that the program is being held at the Fort Lauderdale Research and Education

Center at 3205 College Avenue in Davie. The program runs from 9am until 4pm and is organized by Fred Fishel. If you scroll down the page, you'll see that you can earn 6 CEUs in a wide range of categories if you attend the Roundup. You can also

view the agenda by clicking the link at the bottom of the page. So can you just show up for CEU classes that are listed in the FDACS database? Maybe... or maybe not. Some classes require that you pre-register because there are a limited number of seats available; others charge a fee. It's a good idea to contact the organizer of the event to find out if these or other situations apply. I happen to know a bit about the Great CEU Roundup so I'll give you a heads-up – registration IS required and there is a fee because lunch will be provided to attendees. You can register at the door, but if you register in advance (by July 1), you can save a little money. The registration form is available online at www.ftga.org/wp-content/uploads/2013/04/Agenda.pdf

2. Join state and local Aquatic Plant Management Societies

The Florida Aquatic Plant Management Society (FAPMS – www.fapms.org) has an annual meeting where members can earn CEUs by attending the meeting. This year's meeting is in Daytona Beach October 13 – 16, so try to attend if you can. The South Florida Aquatic Plant Management Society (SFAPMS – www.sfapms.org) hosts 3 meetings every year where attendees can earn CEUs. Meetings are usually held in Broward County, but are sometimes held in Palm Beach or Miami-Dade County if space is available. Lunch is provided and members of SFAPMS attend free of charge; non-members are welcome, but must pay \$15 to attend.

3. Find Online CEUs through the UF/ IFAS Pesticide Information Office

The University of Florida's IFAS Pesticide Information Office offers CEUs that can be earned online at pestid.ifas.ufl.edu/ceu_modules.html. To find CEUs in Aquatic, Right-of-Way, Natural Areas, Forestry, or Ornamental and Turf categories, click on the —Select A Category—link under Bureau of Compliance Monitoring Approved Categories (about the middle of the page) and scroll through the drop-down menu to find the category you need. For example, if you select the Aquatics category, you'll find a great variety of online courses that can be

The image shows two screenshots of the IFAS CEU Class Search website. The top screenshot shows the 'Available CEU Class Search' page with search filters for Date, Locations, Categories, and Sponsoring Organizations. The bottom screenshot shows the 'Search Results' page for the 'IFAS-FTGA GREAT CEU ROUNDUP 2014' class, which is available from 7/9/2014 to 7/9/2014 in Davie, FL, Broward County. Below the search results is a table of categories and approved CEUs.

Category name	Approved CEU
AERIAL APPLICATION - AG	6
AG ROW CROP PEST CONTROL	6
AG TREE CROP PEST CONTROL	6
AQUATIC PEST CONTROL	6
DEMONSTRATION AND RESEARCH	6
FOREST PEST CONTROL	6
NATURAL AREAS WEED MGMT	6
ORNAMENTAL AND TURF PEST CONTROL	6
PRIVATE APPLICATOR AG PEST CONTROL	6
REGULATORY PEST CONTROL	6
RIGHT-OF-WAY PEST CONTROL	6
COMMERCIAL LAWN AND ORNAMENTAL	6
LIMITED CERTIFICATION COMMERCIAL LANDSCAPE MAINT.	6
LIMITED CERTIFICATION LAWN AND ORNAMENTAL	6

Approved Max CEU 6

Attachments
[AGENDA_17497_20140318_PRESENTATION_SUMMARIES_AND_AGENDA.DOCX](#)

taken for CEU credits. Most are 50-minute-long presentations that allow you to earn a single CEU, but some are longer and qualify for multiple CEUs. These modules are not free; they range from \$20 for single-CEU modules to \$50 for a 4-CEU module. These can be extremely handy, particularly if you're only a few CEUs short when you're ready to re-certify. However, you could completely re-certify in some categories using modules from the UF/IFAS Pesticide Information Office; for example, you can earn 19 CEUs in Aquatics just by viewing modules. If you decide to use modules to earn CEUs, make sure you read the FAQs – they state that you should complete the modules *before* submitting payment information and also provide guidance on paying for your modules, when you'll receive your CEU attendance form, and more.

So what happens if your renewal date comes and goes and you don't have enough CEUs to recertify? First, keep in mind that the expiration date won't sneak up on you; it's on your license *and* FDACS will send you a renewal notice 60 days before your license expires (which is why you must submit a Change of Information form to FDACS if you change your address during the licensing period – forms are available at forms.freshfromflorida.com/13359.pdf). Second, don't panic! If your license expires, you won't be able to purchase or apply restricted-use pesticides, but you may renew your license up to one year after it expires by re-taking the exams or by earning the CEUs you need. However, when you submit your re-certification documentation, you will have to include a signed and notarized affidavit stating that you did not purchase or apply restricted-use pesticides while your license was expired. Also, if you renew more than 60 days after your license expires, you will be required to pay a \$50 late fee in addition to the normal licensing fee.



How can you avoid running short on CEUs when your license is up for renewal?

Plan ahead! Keep track of when your license expires and how many CEUs you'll need in each category to re-certify. Make a simple spreadsheet and attach it to the front of a folder or large envelope, then keep your CEU attendance forms inside. Write the date you earned CEUs in each category on the spreadsheet so you'll know at a glance what categories you should focus on. For example, if you're certified in Aquatic, Natural Areas and Right-of-Way, use a spreadsheet like the one below.

Don't lose your CEUs! When you attend an event to earn CEUs, *immediately* fill out the attendance form with your name, address and license number and sign the form. This greatly increases the odds that the form will be returned to you if you leave it at the meeting (*it happens!*) Also, be sure to keep them somewhere safe – they're valuable papers that represent significant time and effort on your part.

Becoming a certified Florida pesticide applicator is a big accomplishment. It shows the public and your employer that you are a professional who understands how to use pesticides responsibly. It may take a little planning to earn the CEUs needed to keep your license current, but it's well worth the effort – especially since it means you won't have to take those pesky exams again! For more information about Pesticide Applicator Certification & Licensing in Florida, please visit the FDACS webpage at www.freshfromflorida.com/Divisions-Offices/Agricultural-Environmental-Services/Agriculture-Industry/Pesticide-Applicator-Certification-Licensing or the UF/IFAS Pesticide Information Office at pested.ifas.ufl.edu – click on **Licensing and Certification** in the top left side of the page.

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

Name _____ License expires _____ License Number _____

Category	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Core	5/7/14	5/7/14	5/7/14	5/7/14												
Aquatic	5/7/14	5/7/14	5/8/14	5/8/14	5/8/14	5/8/14	5/8/14	5/8/14	5/9/14	5/9/14						
NA	5/8/14	5/8/14	5/9/14	5/9/14												
ROW	5/7/14	5/7/14														

Congratulations, good fishin', and a big thanks!

Many readers of *Aquatics* may not be aware that Dr. Ken Langeland retired from the University of Florida in May 2014. Ken was awarded **honorary lifetime membership** by the FAPMS during the Fall 2013 meeting due to his extensive accomplishments in research, teaching and extension education in the general area of invasive plant biology and control. Upon his retirement he was also awarded Professor Emeritus status by the UF/IFAS faculty and administration in recognition of his contributions towards the management of invasive plants. We thought it would be of interest to review a few of his major accomplishments since Ken was an early pioneer in invasive plant control.

His education included a bachelor's degree in biology from the University of South Florida in Tampa, followed by a master's degree from Virginia Polytechnic Institute and State University in 1978. He began research towards his doctorate at the University of Florida by working for a year at the Ft. Lauderdale AREC with Dr. David Sutton, where he learned about invasive species in natural areas and obtained additional experience in research techniques. In 1979 he moved to Gainesville to continue his PhD research at the new Center for Aquatic and Invasive Plants, where he completed his degree in 1982. Soon there-

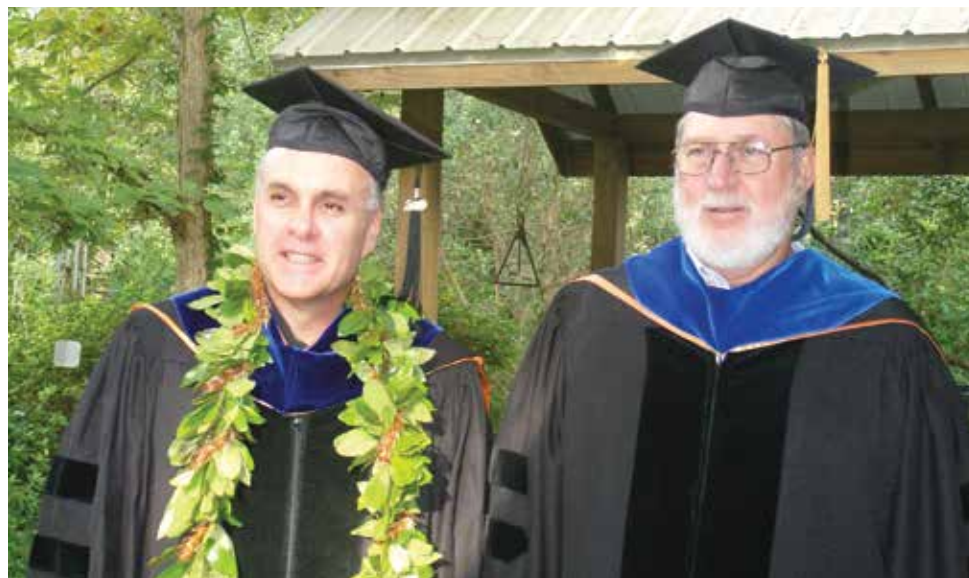


Figure 1. Ken with former graduate student Jeff Hutchinson. Photo courtesy Mary Langeland.

after, he accepted a new position as the first aquatic and non-cropland weed specialist at North Carolina State University and served as an Assistant Professor there from 1983 until 1986. In 1986, Ken was convinced by Dr. Joe Joyce (the IFAS Center for Aquatic Plants Director at that time) to consider and apply for a new extension/research position at UF; he was offered – and accepted – that position and spent the next 28 years fulfilling his mission. His responsibilities during this time were primarily in extension education and research, but

he also managed to make significant contributions to the university graduate education programs by being on the supervisory committees for a total of 31 graduate students (MS and PhD).

The majority of his assignment at UF was in extension education where he developed a state “Major Program” in the area of Management and Ecology of Aquatic Plants, which covered 4 general areas. The first objective was in the area of certification and re-certification of aquatic applicators. Ken spent several years writing and revising the aquatic applicators training manuals, and developed video tapes and several aquatic herbicide applicator training aids along with a plant identification series consisting of 4 DVDs. These training aids are widely used by Florida’s applicators but are also a critical part of training for applicators throughout the southern United States as well. The second area of emphasis was on farm pond and urban pond management. Training aids developed in this area included publications on weed control in farm ponds, weed control in irrigation water supplies and extensive county agent training in the central and north Florida areas. The third component of the overall



Figure 2. Ken in the field. Photo courtesy Phil Chiocchio.

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Figure 3. Ken living the dream. Photo courtesy Mary Langeland.

program plan was public education. This included not only the development of publications on specific aquatic plants, but also attending public meetings and writing materials such as “Citrus County Aquatic Weed Control” brochures for applicators to hand out to interested members of the public. Ken’s efforts in this area set the stage for the major public education programs now underway at the Center in cooperation with FWC. This includes teacher Plant Camps, Lakeville, website development and other public education efforts. The fourth major accomplishment in the extension plan was the development of the first “Natural Area Weed Management” training manual in the United States. Recall that during this time (the 1990s) the State of Florida was purchasing and preserving wetlands and other properties for protection of the environment. This was a new subject area for Florida and was not without controversy. Ken had to work with regulatory groups, native plant and exotic plant councils and

the Florida landscape and nursery industry, which ultimately led to the development of the IFAS Assessment by researchers within and outside of the University. In response to increased emphases by management agencies in Florida for control of natural area weeds, Ken redirected his research efforts into this relatively new subject area in the early to mid 1990s. He published over 40 publications in the scientific literature, many of which were some of the initial reports of research on the control of several “new” invasive species in natural areas. This included work on control of Chinese tallow, coral ardisia, tropical soda apple and, in particular, research on the control of old world climbing fern. In fact, his research on control of old world climbing fern was largely responsible for registration of metsulfuron-methyl for control of this particularly aggressive weed. His contributions to aquatic weed control have also been very significant. During the early years of his work at UF, he helped to develop use patterns for fluridone for hydrilla control and investigated the use of bensulfuron-methyl as an alternative mode

of action for potential control of hydrilla.

During his career in Florida, Ken cooperated on projects with essentially all Water Management Districts and all county, state and Federal agencies. He actively served in numerous capacities with aquatic plant, exotic plant and native plant societies, both in Florida and nationally. He has been a key component of the UF/IFAS efforts in the areas of invasive plant management and education, and a significant contributor to the national recognition and overall success of UF in invasive plant biology and control. In summary, the educational materials, training aids and programs that Ken has contributed to over the past 28 years have not only been used by every applicator in Florida, but also by literally thousands of other members of the public interested in invasive plants. Fortunately, Ken will maintain a close association with the Center and will be called upon for assistance when they either ain’t biting or it’s too darn cold to go after them!!!!

Submitted by Dr. Bill Haller, University of Florida Center for Aquatic and Invasive Plants



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Figure 1. The island apple snail up close and personal. Photo courtesy Lyn Gettys.

The Lake Okeechobee Apple Snail Monitoring Program

Angie L. Huebner

The island apple snail, also called the giant apple snail, is native to South America and is considered one of the world's 100 worst invasive species. It was first found in Florida in 1987 in the canals around Lake Okeechobee and was initially classified as *Pomacea canaliculata*, but molecular genetics techniques later revealed that the snail was actually *Pomacea insularum*. Taxonomists have now concluded that snails previously classified as *Pomacea insularum* are actually *Pomacea maculata* and that the species name *Pomacea insularum* is no longer valid – it's considered a synonym for *Pomacea maculata*. So what does all of this mean to you? Do we have a new invasive apple snail in Florida? No; this is the same invasive apple snail we've been battling for years, it just has another new name – the third one in less than a decade! Florida is not the only state in the US that

has been invaded; the first reported sighting of the species outside Florida occurred in 2003 and the island apple snail has since been found in Georgia, South Carolina, Mississippi, Louisiana, Texas, Arizona and Puerto Rico.

Island apple snails are round or apple-shaped (hence the common name) and may have banding on their shells. Bands are

usually brown, black, or yellowish-tan, but banding colors and patterns are variable. Albino and golden island apple snails have been seen as well, but are uncommon. Mature snails can measure as much as 6 inches in height and are much larger than our native Florida apple snail (*Pomacea paludosa*). Island apple snails inhabit shallow freshwater habitats and can tolerate temperatures that range from 59 to almost 100 °F. The species has a voracious appetite for vegetation and in other countries has converted lush ecosystems into barren wastelands. Potential impacts to Florida's flora and fauna include destruction of native aquatic vegetation, competition with native aquatic fauna (including the Florida apple snail), changes to water quality, hybridization with the Florida apple snail and introduction of nonnative parasites, including the rat lungworm, which can cause meningitis in humans. Economic impacts could include damage to rice crops,



Figure 2. Shells of island (left) and Florida (right) apple snails. Photo courtesy Lyn Gettys.

which has been documented in Asia, and increased maintenance costs for levees due to constant burrowing, which has been documented in Texas.

The island apple snail is an omnivorous feeder; although their preferred diet is aquatic plants, they will also consume periphyton, detritus and fish and snail eggs. Researchers have found that island apple snails feed on submersed weeds such as hydrilla (*Hydrilla verticillata*) and on native submersed species such as coontail (*Ceratophyllum demersum*), southern naiad (*Najas guadalupensis*), Illinois pondweed (*Potamogeton illinoensis*), eelgrass (*Vallisneria americana*), widgeongrass (*Ruppia maritima*) and the macroalga muskgrass (*Chara* sp.). Emergent feeding targets include the native species spider-lily (*Hymenocallis latifolia*) and lanceleaf arrowhead (*Sagittaria lancifolia*), the exotic species wild taro (*Colocasia esculenta*) and alligator-weed (*Alternanthera philoxeroides*), and the floating invader waterhyacinth (*Eichhornia crassipes*). Although island apples snail will eat almost any plant material, they con-



Figure 4. Island apple snail eggs on lotus. Photo courtesy Lyn Gettys.



Figure 3. Island apple snail eating hydrilla. Photo courtesy Lyn Gettys.

sume only small amounts of smooth cordgrass (*Spartina alterniflora*), maidencane (*Panicum hemitomon*), California bulrush (*Schoenoplectus californicus*), yellow canna (*Canna flaccida*), pickerelweed (*Pontederia cordata*), alligatorflag (*Thalia geniculata*) and common cattail (*Typha* sp.). The only species tested so far that is left untouched by the island apple snail is the invasive Brazilian elodea (*Egeria densa*). In fact, island apple snails will starve to death rather than eat Brazilian elodea if there is no other source of food. Because island apple snails have such a broad and diverse diet, it is likely these invaders could remain at high densities even after they have consumed most of the aquatic plants in a given area.

The island apple snail is highly fecund (it makes lots of baby island apple snails) and reproduces over a long period of time – from March through early November. A federal regulation was implemented by the United States Department of Agriculture in 2006 to require a permit for the importation or interstate shipment of all marine and freshwater snails. No permits

are being issued for any snails in the genus *Pomacea* except for the spike-topped apple snail *Pomacea diffusa*, which is widely sold through the aquarium trade.

At this time, there is little research available that identifies the impacts of the island apple snail on the Florida apple snail, the endangered Everglade snail kite (whose primary food source is the Florida apple snail) and the ecology of Lake Okeechobee. In 2010, the Lake Okeechobee Apple Snail Monitoring Program was begun in order to conduct a detailed monitoring and survey program for the Florida apple snail within portions of Lake Okeechobee's western littoral zone. The overall objective of the monitoring program is to determine the response of apple snails to long-term changes in water regulation and shifts in vegetative structure across the littoral zone. Another objective is to determine the rate at which snail populations recover from extreme flood or drought in the littoral zone. The program was implemented in accordance with an agreement between the United

States Fish and Wildlife Service and the United States Army Corps of Engineers; LG2 Environmental Solutions, Inc. was awarded a contract to execute the program. Monitoring will occur for five years (2010 through 2015) in the western littoral zone from the Herbert Hoover Dike to the waterward edge of the littoral zone. The main focus of the program is to monitor the native Florida apple snail, but data are also being collected for the island apple snail. Three years of the monitoring project have been completed and analyzed; here is what was found.

Monitoring Period 2010

Sampling took place at 22 locations within six polygons of potential apple snail habitat. Of the six polygons that were sampled, four contained apple snails. Two of the four hosted native Florida apple snails only, while the other two were home to island apple snails only. None of the areas that were sampled resulted in the capture of both Florida apple snails and island apple snails in the same location.

Monitoring Period 2011

Sampling took place at 20 locations within eight polygons of potential apple snail habitat that were located down-gradient along the locations sampled in 2010. Of the eight polygons that were sampled, six contained apple snails. Three of the six had native Florida apple snails only, while the other three hosted island apple snails only. As in 2010, none of the areas that were sampled resulted in the capture of both Florida apple snails and island apple snails in the same location.

Monitoring Period 2012

Sampling took place at 33 locations within eight polygons of potential apple snail habitat that were located between the locations sampled in 2010 and 2011. Of the eight polygons that were sampled, six contained apple snails. One of the six had native Florida apple snails only, three hosted island apple snails only and two were home to both Florida and island apple snails.

Data gathered in 2010 and 2011 indicate the island apple snail has become well-established in the northwestern littoral zone of Lake Okeechobee and has spread from the initial point of entry, which is thought to be the Kissimmee River. Data collected in 2012 shows that not only is the island apple snail well-established, but the species is also spreading southward. This monitoring program also revealed that locations hosting island apple snails are more densely populated than those that are home to Florida apple snails. 101 island apple snails were captured at locations where this exotic species was found, while only 29 Florida apple snails were found in areas colonized by this native species. Samples collected during the 2012 monitoring period were the first to capture both native and invasive snails at the same sampling site. Not only were they captured within the same sampling site, but on six occasions, they were present within the same throw trap.

This monitoring project is ongoing and final data are not available, but the information collected during the first three years of sampling suggests that expanded sampling – which includes monitoring specifically for island apple snails within the Lake Okeechobee region – may be useful. Based on monitoring data collected for native apple snails (and identified in the monitoring report), it would be useful to: (1) monitor the spread of island apple snails and their impacts on native plant and animal communities, water quality, nutrient concentrations, etc.; (2) further investigate control measures for island apple snails; (3) study conditions that affect island apple snail reproduction and dispersal; (4) determine the occurrence of parasites in apple snails; and (5) evaluate the effects of island apple snails on native Florida apple snails. The information from these types of monitoring will be helpful for resource managers and could provide additional ammunition to use in the battle against yet another invasive species that is changing our critically important ecosystem.

Angie Huebner (Angie.L.Huebner@usace.army.mil) is stationed with the Invasive Species Management Branch of the United States Army Corps of Engineers Jacksonville District.



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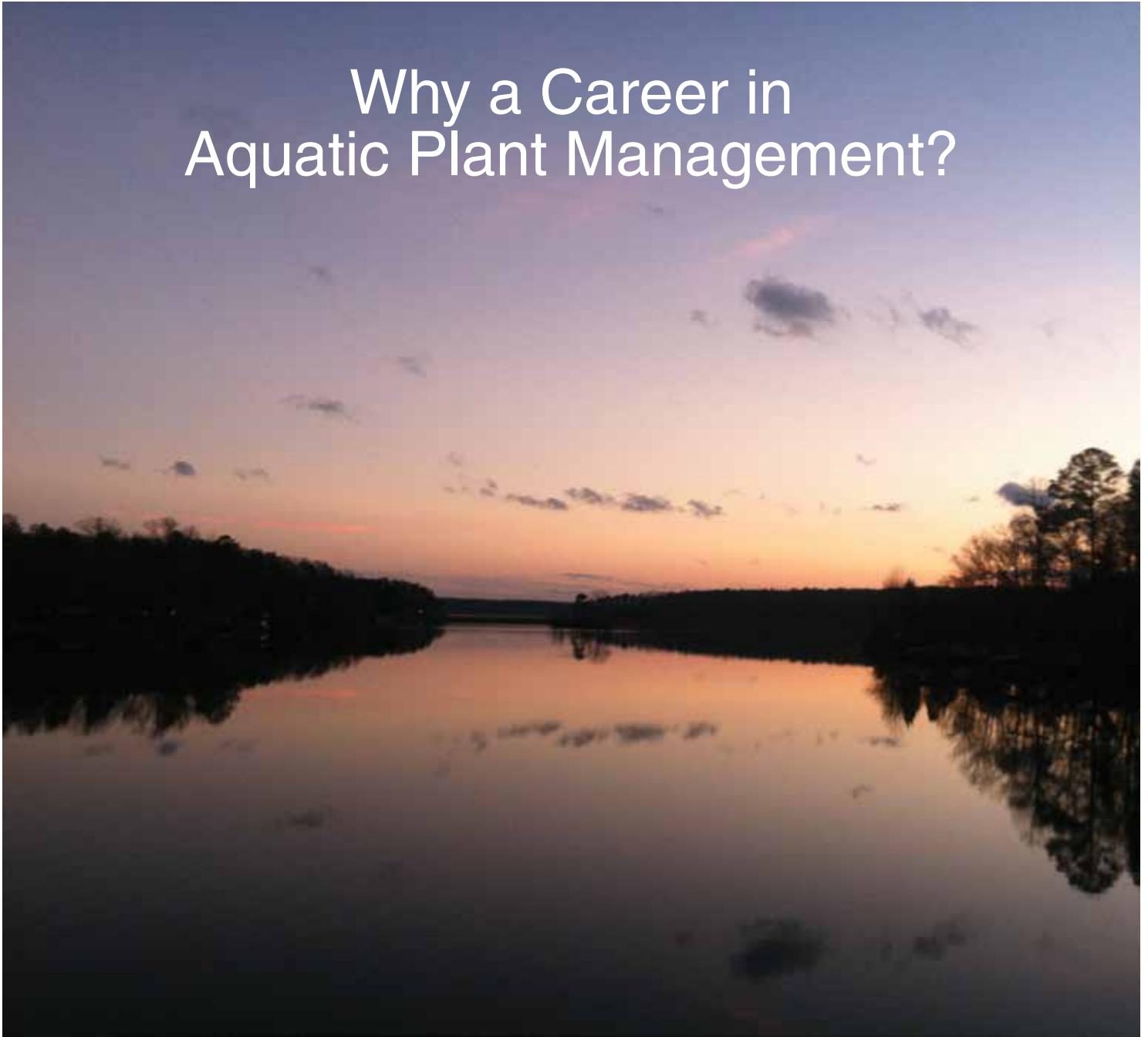


Figure 1. A day at “the office”. Photo courtesy Brett Hartis.

Brett M. Hartis

In our childhood, many of us likely imagined ourselves as firemen, astronauts, doctors or even famous musicians. Probably less likely did we imagine ourselves as applicators, distributors, and academics whose days (and nights) are often spent studying plants... And aquatic plants at that! There is certainly nothing wrong with any of these career choices. We are, in fact, some of the luckiest people alive to work in aquatic plant management, and if you didn't

already know how lucky you are, let us me tell you in this article. Careers in aquatic plant management can be some of the most rewarding jobs in the world, but if you're like me, you've likely never seen a kid-sized applicator costume equipped with all the appropriate PPE in the Halloween section of your local Wal-Mart big-box store. So the question might be, “What brought us to careers in aquatic science, and more specifically, to aquatic plant management?”

For some, that decision was made over years of academic pursuit. Others may have

seen a niche market with entrepreneurial potential. Likely, a few of you may even have a hard time answering how exactly you found yourself working in this business... So really, why choose a career in aquatic plant management? Although I can't speak for all, here are five of the many reasons that stand out in my mind which justify a career in aquatic plant science.

Outdoor Office Space – Although some of us spend more time in the field than others, the overwhelming majority

of us spend at least SOME of our time “in” the “out”doors. While our cohorts in other careers may spend hours in a 5'x 5' cubicle, we have the opportunity to take in fresh air, sunshine, and the beauty surrounding our planet's most precious resource. Remember this around about the next time you complain about hours of field work...

2.) Stewards of the Environment – While we may not be saving others from burning buildings like our childhood selves would have hoped, we are able to protect and serve the rest of mankind through ensuring that our environment, specifically our water resources, are well taken care of. Invasive aquatic vegetation degrades water quality, causing health problems for people, loss of habitat for fish and wildlife, and a decrease in the aesthetic value of aquatic environments. There is and will continue to be a pressing need to develop new strategies and refine existing ones to ensure our water resources are protected... and WE have the opportunity to do this and call it our job!

3.) Room for Innovation – In nearly all disciplines of science, we rely on our senses to tell us what we want to know about the environment in which we studywork. Although there are limitations to understanding processes along various scientific avenues, very few offer a realm of study in which we aren't perfectly equipped to use all of our senses. Although we weren't born with fins and gills, the mysterious nature of the aquatic sciences also lends itself to seemingly unbounded limits for exploration and discovery. From mapping and monitoring to precision management, we have so much to look forward to in the aquatics arena while our terrestrial counterparts scour over the same boring science.

4.) Making Connections – Aquatic systems encompass an intertwined lattice of intricate relationships with aquatic plants at the basis of those systems. Just as complex are the relationships of the stakeholders associated with problems in aquatic plant management. While to some this may seem a curse, we



Figure 2. A typical aquatic environment. Photo courtesy Brett Hartis.

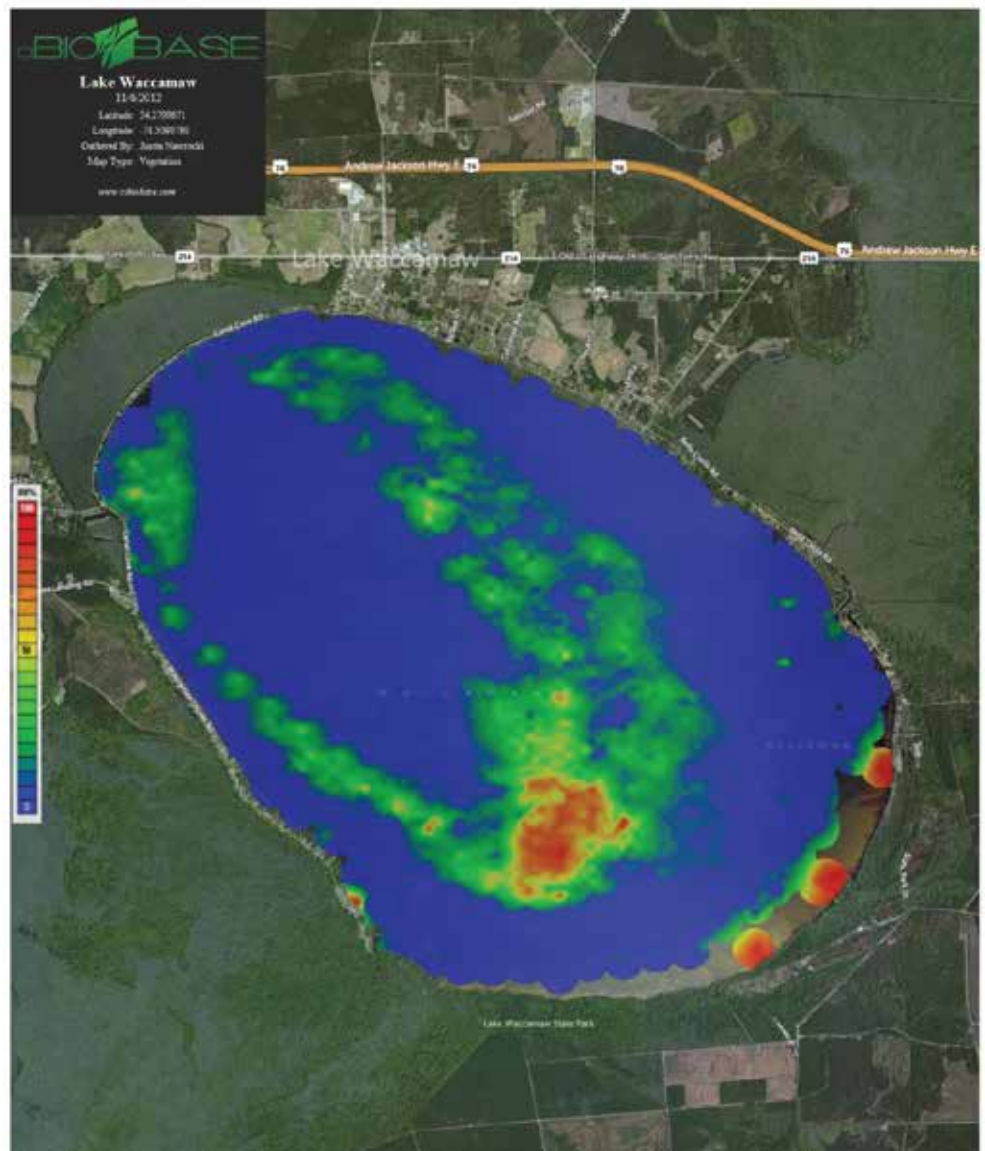


Figure 3. Map courtesy Justin Nawrocki, NC State University/Navico Biobase.



Figure 4. Working together to solve the world's problems. Photo courtesy Michelle Tomes.

as plant scientists get to work with diverse groups and individuals ranging from lake homeowners and recreational users to state and federal management personnel. These variegated relationships shape us as professionals and make us able to view life and make decisions taking into account a number of different, sometimes conflicting angles. Who we meet, and perhaps more importantly how we interact with those we meet, determines if understanding is reached on the otherwise difficult and sometimes controversial topic of management. Often those relationships can come back in aid when we need the backing and support of stakeholders in the political arena and sometimes you even walk away with a new friend or two!

5.) Publicly Generalized, yet Specialized Subject Matter – Tying in nicely with our #4 reason, we have all been faced with explaining the importance of aquatic plants, their restoration, and their management at one point or another in our careers. Whether it was presenting the importance of noxious weed management to an auditorium of hundreds, or explaining to friends over dinner what “exactly it is we do”, we have made a seemingly uninterest-

ing science to become interesting, even fascinating. Many of these types of conversations begin with “What good is studying a bunch of water plants” or worse, “I can’t stand all that SEAWEED” (Oh oh, how I hate when anything green is assumed as to

be “seaweed”!). Yet because of us, these conversations often end with “wowWow, I didn’t know this branch of science even existed” or “that That makes perfect sense”. Our science is rarely front page news, but we have the opportunity to show others of various ages and upbringings just how important aquatic ecosystems really are.

You can probably agree with these five reasons to have a career in aquatic plant management, and can more than likely add several a few more of your own. We in aquatic plant science careers are posed with some of the greatest challenges facing our world today, including the restoration of critical aquatic habitats, management of troublesome invaders, and many more tasks than we can count in between. While this may seem overwhelming at times, we work in one of the most exciting and rewarding scientific fields. I think that our childhood selves would look up and say “well done”.

*Dr. Brett Hartis (bmhartis@ncsu.edu) is an Aquatics Extension and Research Associate at North Carolina State University in Raleigh. *This article was expanded by Dr. Hartis from a blog posting in the Aquatic Ecosystem Restoration Foundation's "Aquatic Update" dated Feb 5, 2014.*



Figure 5. A happy stakeholder. Photo courtesy Brett Hartis.



Aquavine

Brett Hartis

Herbicide Resistance Modules Released

APMS, working in cooperation with the Weed Science Society of America (WSSA), has developed modules addressing herbicide resistance in aquatic plant management. An associated white paper compares aquatic plant control with crop management and addresses how the types of aquatic plants, settings in which they are controlled, and the relatively few available control options, influence herbicide resistance management strategies. Resistance management measures that applicators routinely integrate into aquatic plant control programs are reviewed along with challenges associated with incorporating stewardship actions. These lessons summarize key points and examples to illustrate complexities in managing aquatic plants with herbicides. The modules can be found at <http://apms.org/resources/resistance-management/>

NC State University New Aquatic Plant ID App

Whether you're a professional botanist, applicator, or casual nature enthusiast, the NC State Aquatic Plant App has detailed information on a wide variety of aquatic weeds to assist in identification. This app contains well organized and detailed information, as well as clear and highly detailed pictures. This handheld app is invaluable for making an accurate identification in a field situation. It's a must-have app for any aquatics professional, botanist, or fresh water preservationist. Available for FREE download at the Apple App Store; an Android version is currently under development. Watch the NC State University Crop Science Facebook page for announcement of its release. Already downloaded and like

what you see? Give them a rating in the App Store.

FAPMS and SCAPMS Annual Meetings

The Florida and South Carolina Aquatic Plant Management Society Meetings are just around the corner! The FAPMS meeting will be held October 13 – 16 at the Hilton Daytona Beach Resort in Daytona, FL. The deadline to submit a paper is July 31. Make sure to reserve your room before September 22 to take advantage of the special FAPMS block room rate. The SCAPMS meeting will be held October 8 – 10 at Springmaid Resort in Myrtle Beach, SC. For more information on each meeting visit www.fapms.org and www.scapms.org

AERF Best Management Practices Handbook – Third Edition Release

Looking for information on the biology and control of aquatic plants? The Third Edition of the Aquatic Ecosystem Restoration Foundation's popular BMP manual is now available with updated management

practices and new weed species! It can be found online as a PDF file on the AERF website at www.aquatics.org/bmp.html. Editions one and two became some of the most widely read and used references in the aquatic plant management community. The third edition has been specifically designed with the water resource manager, management association, homeowners, and operators of aquatic plant management companies in mind. While not intended to provide the answers to every question, the new BMP provides scientifically sound information to assist in decision making. The print edition is available too; get your today by sending a request to AERF Executive Director Carlton Layne at clayne@aquatics.org

APMS 2014 Annual Meeting – July 13 – 16

The 54th Annual Meeting of the Aquatic Plant Management Society will be held July 13 – 16 at the Hilton Savannah DeSoto in Savannah, GA. The Society will continue to use a 2½ day format for the meeting.



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The technical program will begin Monday morning and end around noon on Wednesday. It is certainly not too late to join them for an always wonderful conference so make your reservations now! For more information, go to www.apms.org and click "annual meeting" on the home page.

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AERF Social Media and Outreach

AERF has joined the social media scene in full force! Have you noticed the big, familiar icons at the top right corner of AERF's aquatics.org web page? Click on each link to visit us on Facebook, Twitter, or the AERF's customized blog, "The

Aquatics Update". Along with industry and regulatory updates, the blog features such segments as the "AERF Spotlight", highlighting outstanding individuals, and the "Feature Focus Friday", which showcases current research in the aquatic sciences. New postings are frequent, often 2 – 3 times per week, so please stop by and discover the latest in aquatic plant management, science, and innovation! Like what you see? Let us know by leaving us a comment, "like" on Facebook or follow us on Twitter. If you would like to nominate anyone to be featured in our blog or would like your content considered, please email socialmedia@aquatics.org. We look forward to seeing and hearing from you in each of our outlets!

Dr. Brett Hartis (bmhartis@ncsu.edu) is an Aquatics Extension and Research Associate at North Carolina State University in Raleigh.



Calendar of Events 2014

Jul 13-16

APMS Annual Conference
Joint Meeting with MidSouth APMS
Savannah, GA
www.apms.org

October 8-10

SCAPMS Annual Conference
Myrtle Beach, SC
www.scapms.org

October 12-14

TAPMS Annual Conference
Circle T Arena in Hamilton, TX
www.tapms.org

October 13-15

FAPMS Annual Conference
Daytona Beach, FL
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