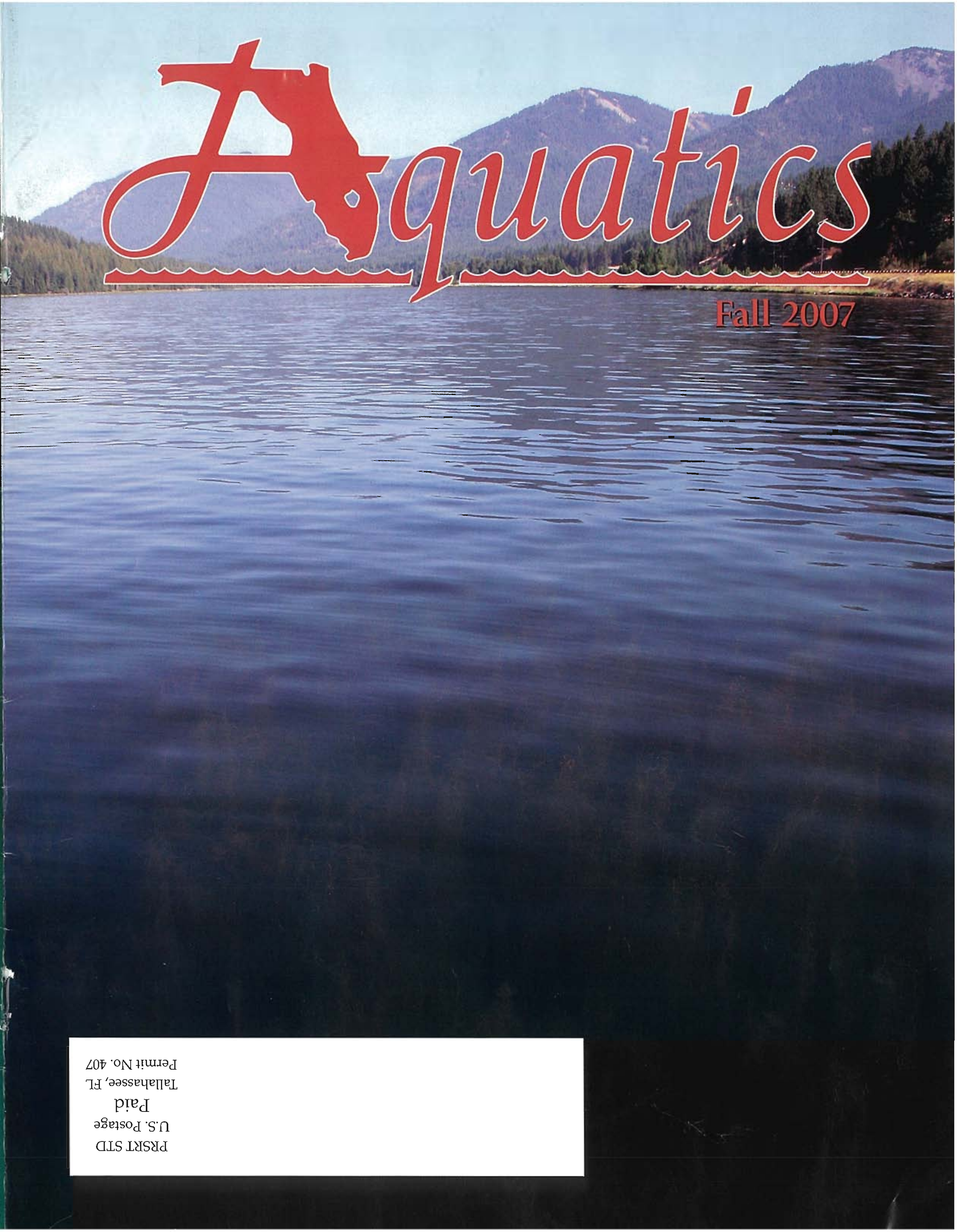
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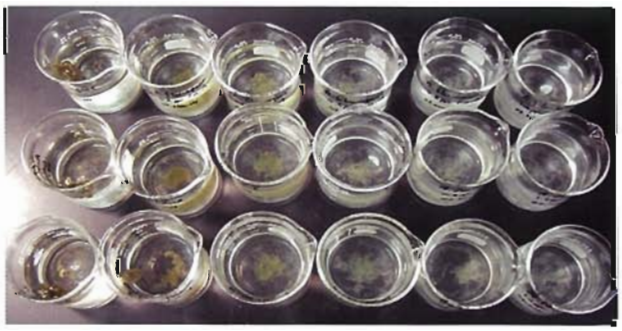

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Editorial

The Tale of Shopping for Tomatoes

A couple walks through a farmer's market looking for some fresh tomatoes. Next to a local tomato grower they find a merchant's table show casing unique looking water plants. Being do-it-yourself landscapers, the couple likes the idea of adding some nice water plants to their ugly, back-yard pond. They buy a few bundles and head back home. Once at home the couple toss the plants in their back-yard pond and wait for the plants to clean their water and beautify their pond. The "pond" actually turns out to be one of

Continued on page 9

Cover photograph by Scott Culpepper. Eurasian watermilfoil (Myriophyllum spicatum) growing to the water surface in Lake Pend Orielle located in western Idaho.

Aquatics

Fall 2007/Vol. 29, No. 3

Contents

Apple Snails in Florida 4
by L.A. Gettys and W.T. Haller

State Updates on Aquatic Plant Management Activities: Idaho, Maine, and Minnesota 12
by Michael D. Netherland, Thomas Woolf, John McPhedran and Charles H. Welling

Florida's Invasive Plant Education Initiative: Lessons Learned Along the Way 19
by Amy Richard

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Apple Snails in Florida

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Figure 1. Shells of common apple snails in Florida. Left: Island apple snail (P. insularum) – exotic from South America. Right: Florida apple snail (P. paludosa) – Florida native. Photo courtesy Lyn Gettys.

Florida's climate is ideal for a number of tropical species, including apple snails in the genus *Pomacea*. Apple snails are freshwater gastropods with both lungs and gills, and some are voracious, indiscriminate consumers of aquatic plants. Apple snails can live four years or more in the wild; those living in temperate climates undergo a winter resting period during which growth, feeding and crawling stops, but growth, mating and spawning resumes when warmer temperatures return. All apple snails have an operculum – a "trap door" that can be closed in the aperture (the mouth of the shell) to seal the soft-bodied snail in its shell. Female apple snails do not bear live young but instead deposit clutches of eggs above the water line on the stems of emergent plants, logs, boats and other vertical structures. Four species of apple snail (one native and three exotic) can be found in Florida, but only two of these species are common.

The Florida apple snail (*Pomacea paludosa*) (Figure 1) is the largest species of freshwater snail native to North America and fossil records reveal that the Florida apple snail has been present in the state since the Pliocene era (5.3 to 1.8 million years ago). This native snail is common in the warm waters of ponds, ditches, rivers, creeks and lakes of southern and central Florida but populations are limited by cooler temperatures in northern regions of the state. The Florida apple snail is not considered a threat to most aquatic plants but is instead classified as an integral part of the ecosystem. This native species serves as a food source for a number of native fauna, including limpkins, ibis, turtles, fish and alligators; in addition, the Florida apple snail is the primary food source for the endangered Everglades snail kite. The Florida apple snail grows to a maximum shell height of 70 mm; the spire and whorls of the shell are rounded and the spire slightly projects above the shell. Eggs of the Florida apple snail are white, 3 to 6 mm in diameter and borne in clutches of 10 to 80 eggs (Figure 2).

The three exotic snails found in Florida [titan (*P. haustrum*), channeled (*P. canaliculata*) and island (*P. insularum*) apple snails] are South American in origin and are closely related, so they share a great number of characteristics and are extremely difficult to identify. Snails in this group cannot be identified by shell size or color, since these traits are highly variable and strongly influenced by snail age, food availability and environmental conditions. These snails in the canaliculata complex can be separated using molecular methods, but field identification of these South American snails relies primarily on differences in egg size and color.

Titan (*P. haustrum*) and channeled (*P. canaliculata*) apple snails are uncommon in Florida. An isolated population of titan apple snails has persisted in south Florida since the 1980s but has not been found anywhere else in the state. The titan apple snail can grow as large as 90 to 120 mm in height and produces bright-green eggs that are 3 to 5 mm in diameter; eggs are compressed during clutch deposition, resulting in polygon-shaped eggs arranged in an irregular, honeycomb-like clutch. A single population of channeled apple snails has been reported in North Florida but has not been found anywhere else in the state. The channeled apple snail can grow as large as 75 mm in height and produces bright orange eggs that are 2.2 to 3.5 mm in diameter and are laid in clutches of 200 to 600 eggs.

The most common South American apple snail in Florida is the island apple snail (*P. insularum*). Reports of widely distributed populations of South American apple snails were noted in Florida in the mid 1990s; these snails were

Too Many Weeds Spoil the Fishing

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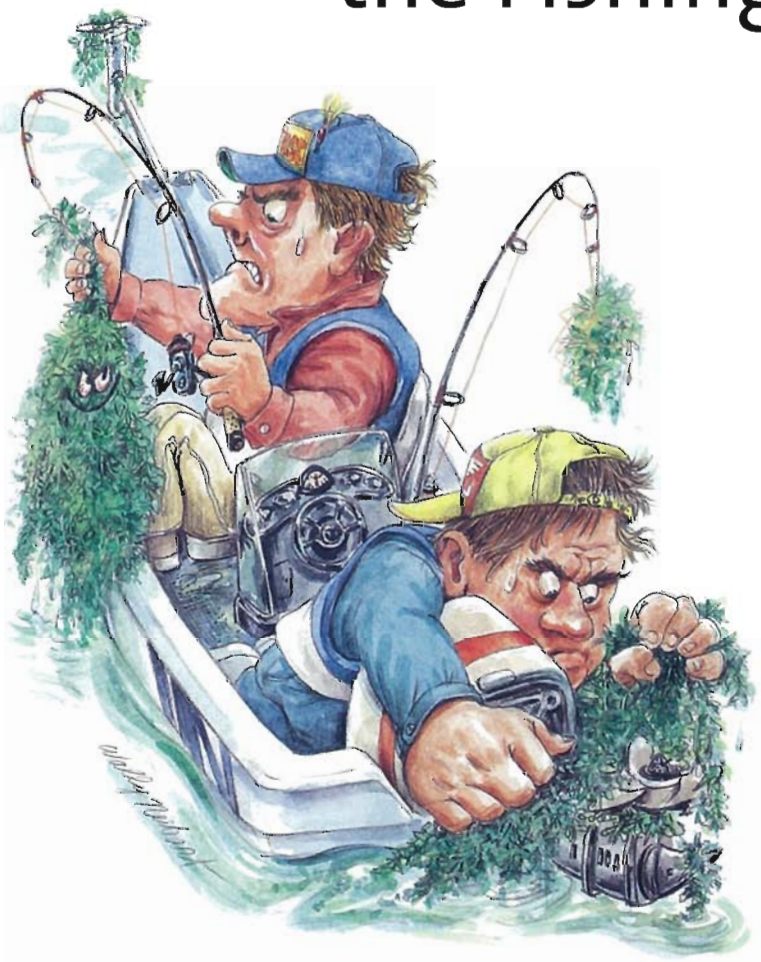

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Figure 2. Egg clutches of common apple snails in Florida. Left: Island apple snail (P. insularum) – exotic from South America. Right: Florida apple snail (P. paludosa) – Florida native. Photo courtesy Joe Richard.

originally misidentified as channeled apple snails, but DNA evidence has revealed that these snails are actually island apple snails. The island apple snail (Figure 1) can grow to 110 mm in height and produces red to bright pink eggs that are up to 3.5 mm in diameter and are laid in clutches of up to 1000 eggs (Figure 2). The island apple snail is widely distributed throughout Texas, Georgia and Florida and DNA evidence has shown that most Florida populations are closely related to island apple snails in the Uruguay River in Argentina.

Most apple snails are voracious, indiscriminate feeders and have been introduced to other parts of the world as biocontrol agents to manage aquatic weeds; for example, snails effectively controlled water lettuce (*Pistia stratiotes*) in the Caribbean. Unfortunately, the snails also feed on native plants, resulting in detrimental effects to the native fauna that rely on endemic plants for food and shelter. Cultivated aquatic plants are not immune to feeding damage from apple snails; in fact, a density of 8 snails per m^2 can reduce rice yields by 90%. Exotic apple snails can be a serious threat to human health as well, since they harbor parasites like the rat lung worm (which causes eosinophilic meningoencephalitis), flukes, and schistosomes that can cause dermatitis.

Applicators are used to seeing the familiar clutches of large, white eggs produced by Florida apple snails, but many are now reporting huge numbers of clutches of the bright pink to red eggs laid by the island apple snail as well. Although island apple snails have been in Florida since the mid 1990s, it seems that populations of this exotic snail have increased dramatically in the last 2 to 3 years. This development is not surprising, since island apple snails are prolific breeders that can produce eggs almost year-round in tropical climates and they produce up to 1000 eggs per clutch. Island apple snails are experiencing a population explosion and pose a significant threat to the health and integrity of Florida's wetlands and waterways. It is important to limit the spread of these South American snails to


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prevent decimation of the aquatic plants that are needed for our ecosystem to function properly. We must also identify methods that will successfully control this exotic species without negatively impacting the native Florida apple snail, which is the primary food source for the endangered Everglades snail kite.

Chemical control of island apple snails is not a viable option. Florida apple snails and island apple snails share the same habitat, so the use of molluscicides would kill native apple snails along with island apple snails. Research is currently underway to assess the environmental impact of exotic snails on Florida's ecosystem and to identify effective control methods, but for now the most effective method to reduce habitat expansion of island apple snails without harming populations of Florida apple snails is to prevent hatching of eggs borne by exotic snails. Clutches can be easily identified as belonging to native or exotic snails, since the Florida apple snail produces up to 80 large, white eggs in each clutch while island apple snails produce up to 1000 red to bright pink eggs in each clutch. Since clutches are deposited above the water line, locating and removing target clutches is possible. Hatching of eggs is greatly reduced when clutches are submerged for more than one week, but if eggs are simply dropped in the water after removal, the clutch could float until it lands on a surface (for example, the leaf of a waterhyacinth) that will allow it to remain above the water line. A better solution is to scrape clutches off, place them in a container and then keep them in a freezer for a few days before disposal. Scouting for exotic egg clutches must be done on a regular basis, since eggs can hatch as soon as 10 days after deposition if temperatures are warm. Scouting and manual removal is tedious because a single female island apple snail can deposit up to 3 clutches of 1000 eggs each *per week* almost year-round, so removing even a fraction of clutches from a single habitat takes a huge amount of time.

Florida's tropical climate provides an ideal habitat for colonization by a vast array of exotic species. The negative impact of exotic plant species on native plants in the ecosystem is widely understood, but invading snails are not always seen as a threat due to a number of factors. One of these factors is reduced visibility; for example, exotic apple snails in Florida are typically submersed, so if a few snails are actually visible, many more are present below the surface of the water and the severity of an infestation may be grossly underestimated. Another factor is that exotic snails are readily available in many pet and aquarium shops, where they are purchased as pets but are likely released into the ecosystem when they become too large or when the novelty wears off. As we know, some exotic aquatic plants entered Florida through this pathway as well and the mindset of those releasing the organisms is the same, to wit: "If I can buy

this at the store, it must be ok. I'm doing this _____ (fill in the blank – snail, hydrilla plant, python, etc.) a favor by freeing it from its prison of domestication", and so on. A third factor that influences the perceived impact of exotic snails is a poor understanding of the importance of maintaining the integrity of the ecosystem and food web. Island apple snails could threaten Florida apple snails by competing for resources, which could disrupt the food web since the native snail is an important food source for a wide variety of fauna, including the endangered Everglades snail kite. Island apple snails are typically much larger than the native apple snail, so one might think these exotic snails could serve as a better food source for the snail kite; unfortunately, the snail kite's beak has evolved to perfectly pluck the Florida apple snail from its shell and the bird is unable to extract the edible body from any except the smallest of the much-larger exotic apple snails.

The importance of halting the invasion of Florida by island apple snails cannot be overstated and we must ensure that early infestations of these snails are stopped. They cause direct damage to the flora of our ecosystem by consuming huge quantities of aquatic plants and they compete with Florida apple snails for habitats and resources, which further endangers the Everglades snail kite. The best method to control island apple snails at this point is the removal and destruction of their egg clutches, but this process is tedious since island apple snails produce massive quantities of clutches and removing even a fraction of clutches from a single habitat takes a huge amount of time. Research is currently underway to identify more efficient and effective control methods to help in the battle against this exotic species. This effort may reduce the likelihood of a population explosion of island apple snails and could help lessen the severity of damage to Florida's flora, fauna and ecosystem.

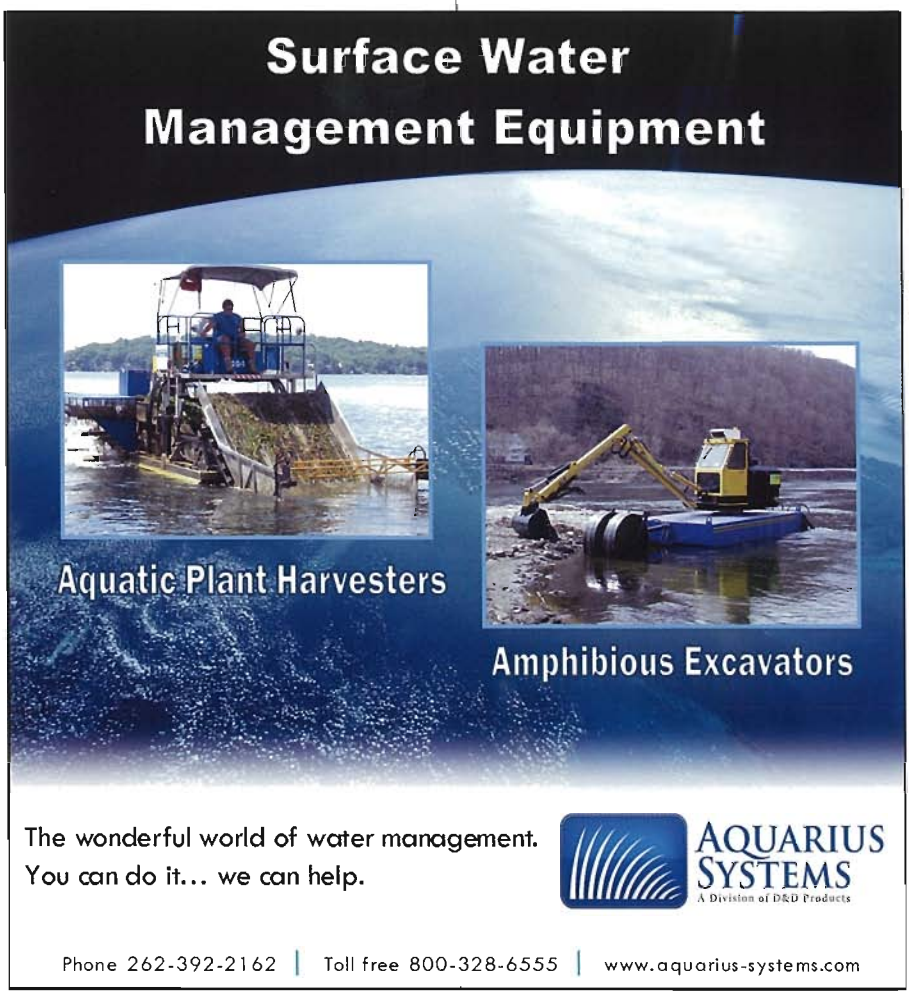
Editorial *continued from page 3*

their neighborhood stormwater ponds that lead into a major river system. The plants they purchased happened to be one of the noxious weeds like Water Hyacinth (*Echornia crassipes*) that many States fight to control.

This fictional story is based on a real problem of inter-county and inter-state sale of aquatic plants. When you buy a plant at a local nursery, do you stop to think whether the plant is a nuisance in another county? Another state? Most people don't, they figure that if the plant is for sale in a retail nursery then it must be a legal plant. While Federal regulations prohibit plants on the Federal Noxious Weed List from coming into the country and interstate transportation, it is up to individual states to regulate plants within their state lines. Check out the Aquavine section of this issue for a real example of this problem.

And remember to keep sending in those articles and photographs for the magazine.

Editor



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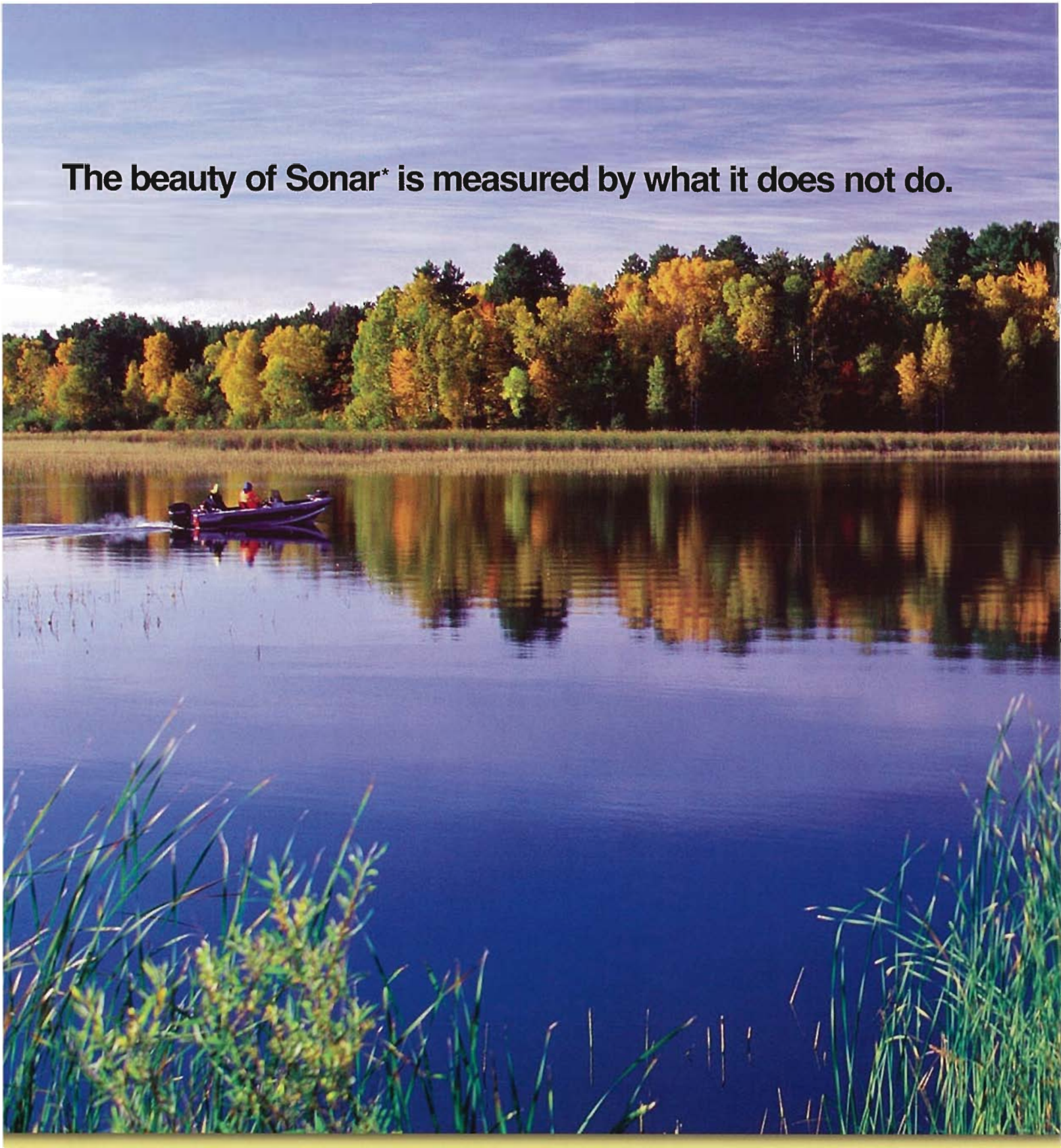

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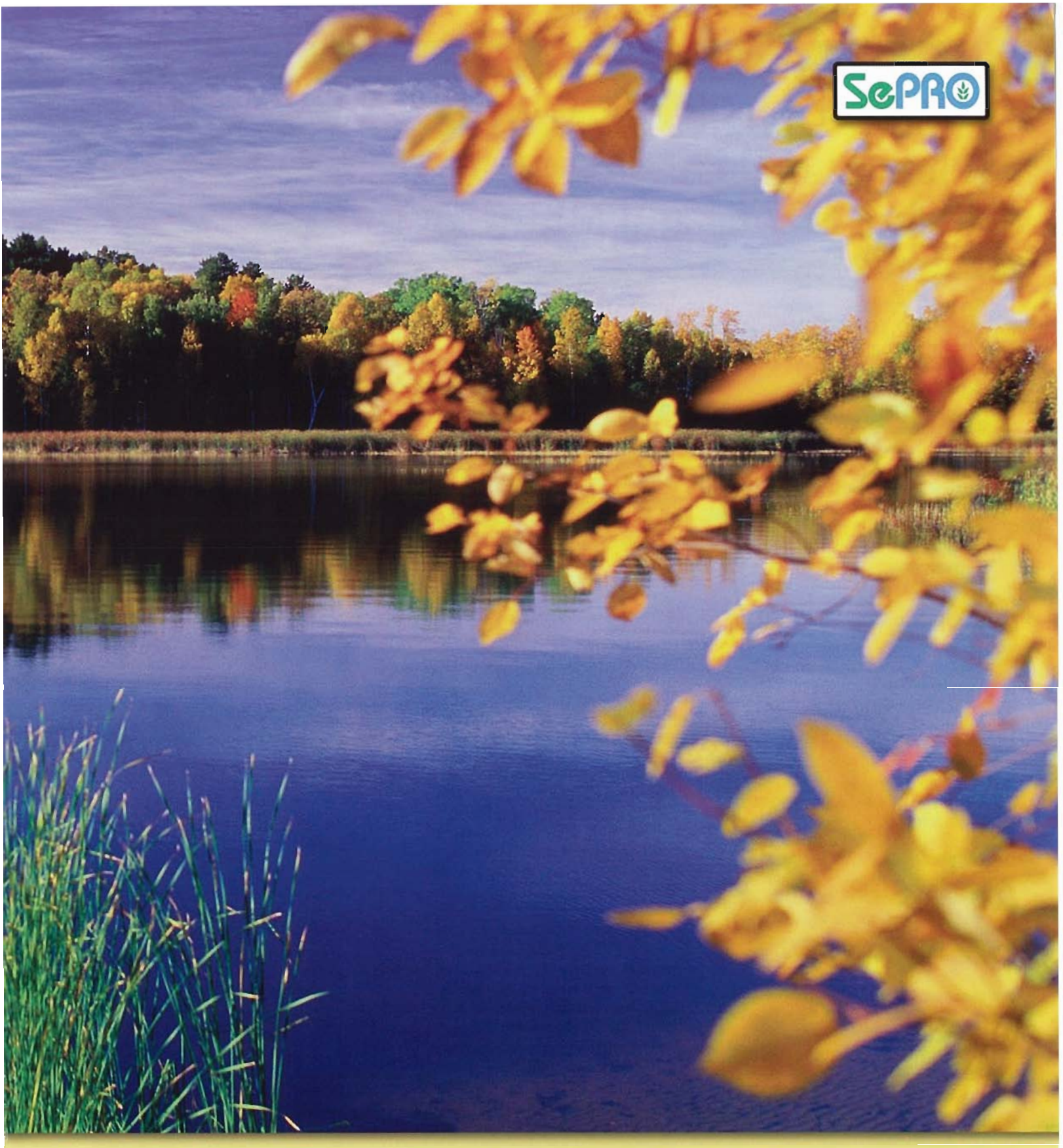

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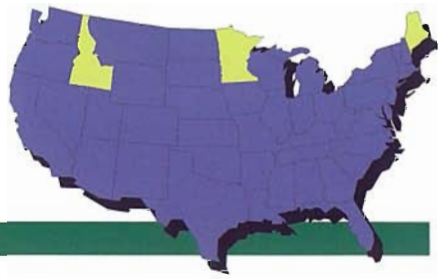
State Updates on Aquatic Plant Management Activities: Idaho, Maine, and Minnesota



Introduction

Michael D. Netherland
US Army Engineer Research and Development Center
Gainesville, FL 32653

Aquatic Plant Management in Florida is an integrated endeavor that includes personnel and resources from federal, state, and county entities, and a large contingent of private companies. The subtropical climate, abundance of natural shallow lakes, and introduction of numerous exotic invasive plants has kept, and will continue to keep, aquatic managers in very busy. Given the long history and numerous resources that have gone into aquatic plant management in Florida, it is often hard to imagine that many states are just beginning to experience introductions of invasive species, and therefore, much newer to the process of developing aquatic plant management programs. One only needs to attend the regional Aquatic Plant Management Society (APMS) meetings (Florida, Mid-South, Midwest, Northeast, South Carolina, Texas, and Western) to develop a feel for the different approaches (often between neighboring states) to aquatic plant management. The diversity of water bodies (e.g. reservoirs, kettle lakes, canals, etc.), plant species and associated problems, state regulatory environments, and management philosophies can vary to a wide degree.

All APMS regional chapter members should receive *Aquatics* magazine, and in order to provide our readers with a better understanding of regional issues we plan on including various state updates in upcoming issues of *Aquatics*. These updates will take the form of describing newer and existing management programs, new species introductions or spread of existing plants, new or existing regulations, and other items of interest involving management of aquatic plants. These state updates are being provided to give aquatic managers, researchers, regulators, and applicators a better appreciation of the issues that exist outside of their own region.

For this issue we have chosen to include updates on three northern-tier states: Idaho, Maine, and Minnesota. In Minnesota, the Department of Natural Resources continues to promote public education, fund research and operations, and evaluate potential for further spread of existing invasive species and introductions of new invasive species. In both Idaho and Minnesota, the state legislatures have allocated significant funds to combat the threat that invasive aquatic plants pose to valuable water resources. While Minnesota's fight with Eurasian watermilfoil (*Myriophyllum spicatum*) has been well publicized, I doubt that our readers would pick Idaho and Maine as hotbeds of aquatic plant problems. These states are developing programs in response to introductions of invasive species, such as hydrilla (*Hydrilla verticillata*) and variable watermilfoil (*Myriophyllum heterophyllum*) in Maine and Eurasian watermilfoil in Idaho. While hydrilla and Eurasian watermilfoil are well known to our readers, variable watermilfoil is generally considered a desirable native to the southern US. The aggressive spread and growth of this native plant in low alkalinity lakes of Maine and New Hampshire illustrates the regional nature of aquatic plant problems and potential for seemingly benign plants to become problematic under the right conditions. Idaho has moved towards large-scale management of an emerging Eurasian watermilfoil problem, and this new program is described below. In contrast the operational management program in Maine remains limited in scope; however there is a significant emphasis on identifying new introductions, preventing spread, and taking appropriate actions, if necessary.

Idaho: Invasive Aquatic Plant Management Activities

Thomas Woolf
Aquatic Plants Program Manager
Idaho Department of Agriculture

Idaho folks have the reputation of doing things their own way. Idaho was the birthplace of the Cooperative Weed Management Area (CWMA). The CWMA concept focuses on involving all landowners in a watershed or region, developing integrated management plans, and defining roles and partnerships that allow for the blurring of jurisdictional lines of ownership. CWMAs now cover more than 82 percent of the state. Due to the success achieved in Idaho, CWMAs have become a national model for successful weed management across the country. It was with this rugged, individualistic spirit that Idaho addressed the looming threat of aquatic invasive species in the state.

Eurasian Watermilfoil

North Idaho is home to the majority of the natural lakes in the state. The area is characterized by 6000-foot peaks adjacent to 1100-foot deep, 30-mile long clear natural lakes. Historically this region's economy was driven by the mining and timber industries, but over the past several decades' tourism has grown into a dominant regional industry - in large part due to the majestic lakes and rivers that characterize the area.

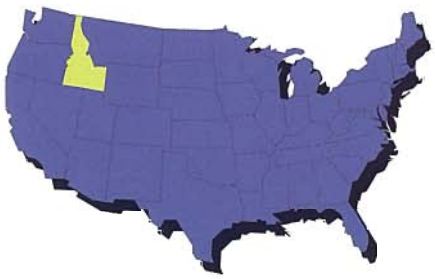
It is unclear exactly when or how

Eurasian watermilfoil (*Myriophyllum spicatum* L.) was introduced to North Idaho, but the problems associated with the weed became apparent over the last 5 years. People began to take notice of clogged marinas, tangled swimming beaches and decreased native aquatic plants. It became obvious that the plant was quickly expanding its range and something needed to be done to protect Idaho's waterbodies and the economies that depend on them.

In 2005, several forward-thinking state legislators brought their concerns about this plant to the rest of the state. An assessment of the known distribution of the plant revealed that its current range only occupied a fraction of the state's susceptible waterbodies. This fact and the threat to the lakes and to the livelihoods of people who rely on them convinced the Idaho State Legislature to take action. The legislation drafted at the State House dictated an aggressive stance based on the eradication of existing Eurasian watermilfoil populations statewide. In April 2006, the Idaho State Legislature and the Governor approved $4-million for the specific purpose of Eurasian watermilfoil eradication from water bodies in the state of Idaho.

The Idaho State Department of Agriculture's (ISDA) Noxious Weed Program was charged with administering this new program. Although Idaho is a leader in the field of terrestrial weed management, the state had never before administered a major aquatic plant control program. With just three employees, the Noxious Weeds Program developed and implemented a multi-million dollar funding program in the span of two months. Phase I of the Eurasian watermilfoil Eradication Program was up and running by the summer of 2006.

The funding program solicited funding proposals statewide from Counties, Tribes, Lake Associations and the public. In the spirit of the CWMA concept, projects were locally driven and were encouraged to be tailored to meet local needs and concerns. Funding applications were presented to an interagency review panel for project scoring using predetermined scoring criteria. Following scoring, the review panel met and discussed each proposal and made recommendations to ISDA's director.



In Phase I, 5,040 acres in the state were successfully treated in 16 projects throughout the state. Public education and outreach programs were also instituted to raise public awareness about the issue. In addition, extensive surveying helped to develop a better picture of the distribution of Eurasian watermilfoil throughout the state.

In an effort to improve the state's fledgling (albeit well-funded) aquatics program, ISDA sought an external programmatic peer review of the program following the completion of Phase I. In September 2006, ISDA invited the University of Florida (UF), Center for Aquatic and Invasive Plants to convene and chair an independent panel of recognized aquatic plant management experts to review the state's Eurasian watermilfoil program and provide short- and long-term recommendations for

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program improvement and enhancement. The panel was composed of Dr. Joe Joyce, UF (chairman), Drs. Bill Haller and Ken Langelend (UF), Jeff Schardt (Florida Department of Environmental Protection), Chip Welling (Minnesota Department of Natural Resources) and Robert Leavitt (California Department of Agriculture). Collectively, the six panelists had more than 160 years of experience in aquatic plant management and had published more than 400 papers on the subject. To ensure their independence, the panelists were free of any connection to business interests or organizations in Idaho.

A copy of the Peer Panel Report can be found on ISDA's website (www.agri.idaho.gov/). The review provided valuable information to ISDA staff and its cooperators. ISDA incorporated many of the panel's recommendations in the program and continues to work with the University of Florida to improve the state of aquatic plant management "know how" in Idaho.

In 2007, the Idaho Legislature approved an additional $4-million dollars to the program and allowed the ISDA to hire a full time Aquatic Plant Program Manager. Phase II of the program instituted monitoring and sampling requirements in order to gage treatment efficacy and to improve program efficiency. Phase II of the program wrapped up in the fall of 2007 with 3,045 of acres treated and a significant reduction in Eurasian watermilfoil.

Since its inception ISDA's Eurasian watermilfoil program has:

- Treated 8,088 acres of Eurasian watermilfoil over the last 2 years.
- Surveyed 152 waterbodies for new and existing Eurasian watermilfoil populations.
- Quantifiably surveyed 41,260 acres in 32 waterbodies to delineate treatment areas, gage treatment effects and to document native species.
- Produced a variety of educational videos and literature to improve the public's understanding and awareness of aquatic plant related issues.
- Developed a statewide survey protocol that standardizes sampling and surveying methods.
- Initiated a statewide strategy to assist program applicants in the development of treatment plans for individual waterbodies.
- Developed a website that displays survey results and lake information

In addition to the Eurasian watermilfoil program, Idaho also added several aquatic plants to its Noxious Weed Law in 2007. These species include parrot feather milfoil (*Myriophyllum aquaticum*), Brazilian elodea (*Egeria densa*), water hyacinth (*Eichhornia crassipes*) and hydrilla. While you might wonder why a state like Idaho would add these tropical aquatic plant species to its weed list, it's a little known fact that Idaho has a tremendous amount of geothermally-heated water. Florida alligators overwinter nicely just east of Boise. And on the "all-taxa" side, Idaho has just completed an Aquatic Nuisance Species Plan (ANS) for the state through the Idaho Invasive Species Council and is in the process of establishing an Early Detection and Rapid Response (EDRR) monitoring network for the notorious quagga (*Dreissena rostriformis bugensis*) and zebra mussels (*Dreissena polymorpha*). Stay tuned as Idaho gets its boots wet!

Maine: Invasive Aquatic Plant Management Activities

John McPhedran
Maine DEP

In 2006, three new infestations of *Myriophyllum heterophyllum* were documented. The new infestations were found in these water bodies:

- Little Ossipee River in Waterboro
- Skelton Flowage on the Saco River in Dayton
- Great East Lake in Acton and on the Maine/New Hampshire border.

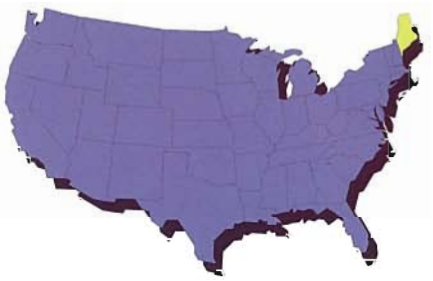
The Little Ossipee and Saco River are downstream of other *M. heterophyllum*-infested water bodies. *M. heterophyllum* may exist but has yet to be documented in other reaches of these rivers.

The Great East Lake infestation, apparently a single plant, was spotted by New Hampshire volunteers and removed immediately – truly rapid response. To date, no reemergence of this *M. heterophyllum* has been found.

Four invasive aquatic plants are known to exist in Maine lakes, ponds, and rivers: *M. heterophyllum* in 26 waters (2 of these are the hybrid with *M. laxum*) and *Hydrilla verticillata*, *M. spicatum*, and *Potamogeton crispus* in one water each.

Regulations for herbicide use

A state waste discharge license is required for discharges of aquatic herbicides in Maine. According to Maine statute, such discharges must be approved by the Department of Environmental Protection (DEP) and conducted by the DEP (or an agent of DEP) for the purpose of restoring biological communities affected by an invasive species. The DEP is



currently treating *Hydrilla* and *M. spicatum* under two individual waste discharge licenses.

The ability to respond rapidly to new infestations has been constrained by the time required for development and review of individual waste discharge licenses. To facilitate rapid response when herbicide use is deemed necessary, Maine DEP now has a General Permit for herbicide use by the DEP's Invasive Aquatic Species Program (IASP). The General Permit was signed in June 2007.

Grants

Competitive small grants (up to $2,000 each) are available to municipalities and lake associations to support invasive aquatic plant prevention and control programs. DEP continues to search for ways to increase grant funds for local control projects while maintaining the State's strong spread prevention program.

Thanks to a bill passed in 2007 to

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reduce administrative costs, Maine DEP anticipates up to $75,000 in new revenue starting in 2008. The first priority of this money will be to increase grants for local invasive aquatic plant control efforts.

New infestations

It's too early to tell if 2007 will add new infestations of invasive aquatic plants to the current list of 29 infested waters in Maine.

For More information

Please check the IASP's website http://www.maine.gov/dep/blwq/topic/invasives/index.htm or email milfoil@maine.gov.

Minnesota: Invasive Aquatic Plant Management Activities

Charles H. Welling
Minnesota DNR
Eurasian Watermilfoil Coordinator

In Minnesota there is much concern about non-native, invasive species. During its 2007 session, the Minnesota legislature increased funding for the Invasive Species Program of the Department of Natural Resources (DNR). Once the increases are fully phased-in, the budget of the program is expected to be $4.9 million. During 2006, the most recent year for which complete information is available, the DNR's Invasive Species Program had a total budget of $2 million, of which about $400 thousand was spent on control of, and research on, invasive aquatic plants. [see report: www.dnr.state.mn.us/eco/pubs_invasives.html].

Submersed invasive species that concern most Minnesotans are Eurasian watermilfoil (*Myriophyllum spicatum*) and curly-leaf pondweed (*Potamogeton crispus*). Eurasian watermilfoil, or simply milfoil, was discovered in Minnesota in 1987 and now is known to occur in 198 bodies of water in the state. Most control of milfoil is aimed at providing relief from nuisances caused by the plant for users of our lakes. The DNR is supporting research

to improve our ability to predict the future distribution and abundance of milfoil. In Minnesota, we have observed variations among lakes in the abundance of milfoil, which may be related to genotypic variation among different populations of milfoil, possibly including the recently documented hybrids between Eurasian watermilfoil and the native northern watermilfoil.

Curly-leaf pondweed is believed to have arrived in Minnesota about 100 years ago and occurs in at least 740 bodies of water in the state. In most Minnesota lakes with curly-leaf, the plant functions as a winter annual. Turions sprout in early fall, plants are alive under the ice during winter, begin to grow actively at low water temperatures after break-up, reach maximum standing crop between mid-May and mid-June, and senesce shortly thereafter, usually by the fourth of July. Minnesota lakes where curly-leaf becomes abundant often have high levels of nutrients, particularly phosphorus, and low water clarity. The DNR is supporting pilot projects on eleven lakes to determine whether control of curly-leaf can lead to improvements in water quality and increases in native submersed plants.

In addition, the DNR is addressing two species of invasive, non-native emergent plants: purple loosestrife (*Lythrum salicaria*)and flowering rush (*Butomus umbellatus*), and is closely watching for intrusion by other invasive species established elsewhere in North America.

Florida's Invasive Plant Education Initiative: Lessons Learned Along the Way

Curricula development with teachers.

Below: Biocontrol labs being created.

Amy Richard
Education Initiative Coordinator, UF/IFAS Center for Aquatic and Invasive Plants

It seems to be sinking in: after 100-plus years of aquatic plant control in Florida, there is no silver bullet that will solve our invasive plant problems. That is, as long as Florida's 17 million residents and 84 million annual visitors[1] continue to unwittingly introduce invasive or potentially invasive plants, into our backyards, cityscapes and natural areas. Public perceptions and behaviors must change or we're most certainly destined to be spraying, hacking and pulling huge infestations of invasive plants for a very long time .

But how does one get the message across to the public sector — a group that seems to embrace anything exotic and harbors a deep-seated mistrust of pesticides (except for the weeds in their own back yard)?

There is one proven way to reach adults; educate their children. After raising two sons, I know this to be true. At times, I've even found myself grumbling about the effectiveness of various school-based educational campaigns. Sometimes it was a real pain in the *arse*. For example, thanks to their school recycling lessons, my two young sons "encouraged" me to save all our cans, bottles, newspapers and plastic refuse and then drive a smelly van-load to the local recycling center every month - 60 miles, round trip.

This idea of "teaching through our children" hit home again a few years ago while I was chatting with a volunteer from the Trout Lake Nature Center in Eustis. He said one of the reasons he was so dedicated to volunteering was that it gave him a sense of hope to see how environmentally aware today's youth are compared to when he was a kid back in the 40s. He was impressed with their knowledge and enthusiasm for environmental issues that his generation never even discussed: water conservation, catch-and-release fishing, recycling, proper disposal of car oil. Hmmm... sounds like a good place to start for an education program about invasive species.

Similar sentiments are what prompted (the late) Vic Ramey to launch a statewide invasive plant education initiative at the University of Florida/IFAS Center for Aquatic and Invasive Plants (CAIP), three years ago. With unwavering support from the Florida Department of Environmental Protection/Bureau of Invasive Plant Management (BIPM), the program is now going strong. The partnership represents more

[1] http://media.visitflorida.org/corporate/news/?ID=811

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than 15 years of commitment to invasive plant education on the part of the BIPM and CAIP, who together have produced an impressive collection of educational materials and websites about Florida's native, non-native and invasive plants and plant management, in general. However, after a number of years spent producing materials, it was clear that a more concerted effort was needed to get these materials into the hands of educators, along with a clear, concise message about the problems associated with exotic plants invading our native habitats.

In the Classroom

The first year of this new initiative was spent meeting with groups of teachers and educators at venues around the state and gauging enthusiasm for the topic. We started by showing them what we already had developed and then asked what was needed to build it into curricula they could use; it also has to jive with Florida's Sunshine State Standards before they can even consider teaching it. Their fervor for the subject — something that promised to bring real-life science "relevancy" into their classroom — took us by surprise. After a few more workshop sessions, we had a much better idea of what was needed to teach this material.

The seond year produced a core set of four PowerPoint' lessons and related activities, along with a website that teachers can use as a resource (http://plants.ifas.ufl.edu/education). Now in our third year, our goal is to refine these initial materials further and build on them to create a spectrum of activities that teachers and students can draw from and get excited about.

After focusing on the "basics" of our invasive plant message for the first two years, we began to ask, "How does one 'break the spell" that computers and other hi-tech gadgetry are having on our kids?' and encourage them to focus on the quiet mysteries of plant life? How do we get them to even notice those green, leafy silent invaders that can cover large sections of our natural areas and backyards?" And what about all of those years spent learning about how great plants are? Now, we have to break the news that not all plants are "good." For those of us who are naturally interested in the subject, it's an easy sell. But what about individuals who don't even "see" plants. In some ways, the invasive animal species campaigns have it a little easier. Even the toughest kid can relate to the hazards of invasive Gambian rats in the Florida Keys (a rodent that can grow as big as a cat) or a Burmese python wrestling with alligators in the Everglades. Yikes!

When faced with this dilemma, we went back to the experts - the teachers. After all, they deal with these same challenges on a daily basis. Based on feedback from review sessions with teachers of all grade levels, we'll be working this year to take our newly developed lessons (previously vetted for accuracy, content and format) and creating motion graphic "novels" with sound, animation, and other visual affects that, according to the experts, will be more effective at capturing the attention and imagination of students. These lessons will then be built into a variety of web-friendly formats that will be easily viewed from computers, iphones, etc.

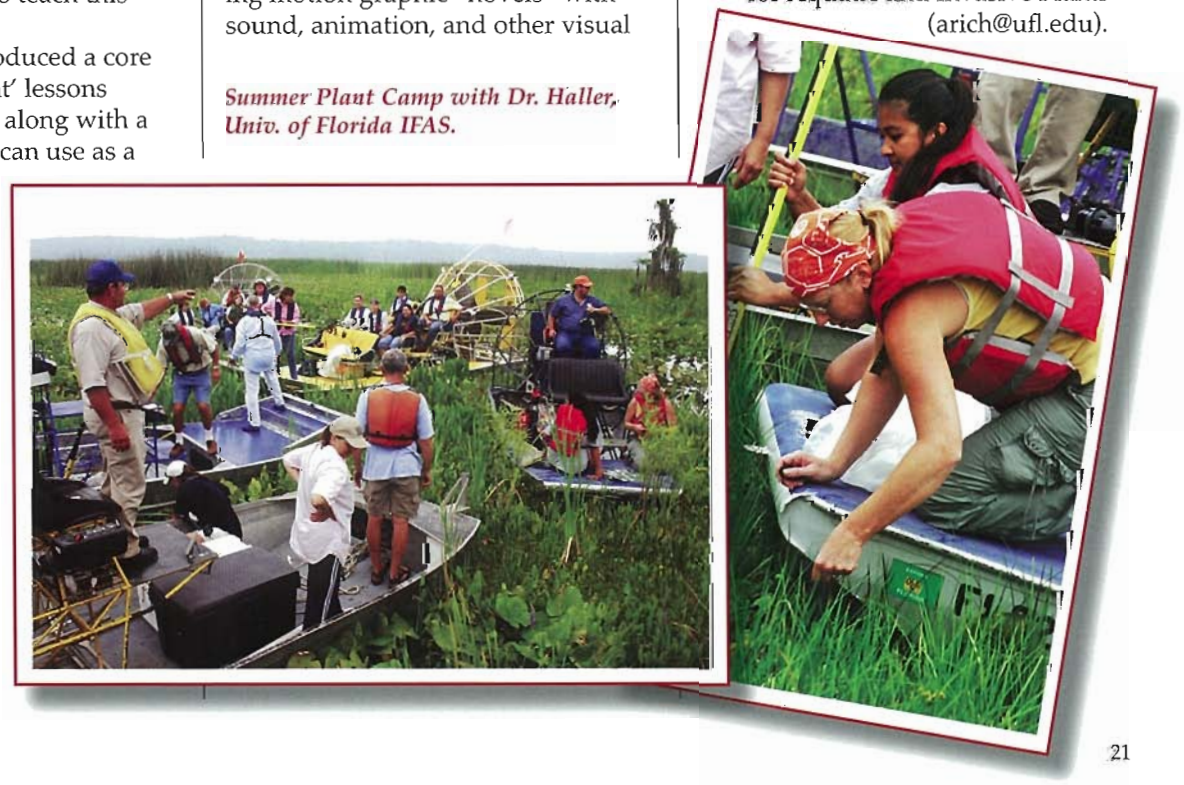
Along with their new lessons, participants will return to their classrooms this autumn with a wealth of hands-on learning materials: Freshwater Plant Bingo; "Magnify it!" activity/lesson (complete with classroom sets of hand lens) to facilitate learning about flower parts, leaf shapes, etc.; freshwater plant jigsaw puzzles and artificial aquatic plant kits (to teach about the various types of plants -emersed, submersed, floating, etc.), plant ID flash cards, DVDs, PowerPoint(tm) lessons, fact sheets, etc. etc.

For a more complete listing, visit: http://plants.ifas.ufl.edu/education/teachresfree.html .

Main education website: http://plants.ifas.ufl.edu/education

Photo gallery of this summer's workshop: http://plants.ifas.ufl.edu/education/06_07_workshop/silent_invaders_workshop.html

For more information or if you know a teacher who might be interested in this program, please contact Amy Richard at UF/IFAS Center for Aquatic and Invasive Plants (arich@ufl.edu).



Summer Plant Camp with Dr. Haller, Univ. of Florida IFAS.

Education Initiative, 1st Annual Summer Plant Camp (for teachers only)

Aside from curricula development, we've also learned that an effective way to create further excitement and interest in this subject is to hold a summer invasive plant camp for teachers (aka professional development workshop). Our first full-scale training event was held June 10-14, 2007 and represented the culmination of a long and fruitful year. And what a finale!

The four and a half-day workshop provided participants with 44 hours of professional development credits and included upland and aquatic plant field trips, hands-on plant ID sessions, lab activities, classroom lectures and breakout sessions for more curricula development. Even after days of non-stop learning and doing, these teachers were fired up, which is just what we were hoping for. The goal of the workshop was to grab the attention of a select group of teachers and inspire them to take this new knowledge back to their classrooms (participants were chosen through an application process which also required a recommendation from their school principal).

Next year's workshop is already in the planning stages. In the meantime, we're looking forward to hearing and seeing what new ideas and methods these newly trained teachers will be using in their classrooms this year. After witnessing firsthand their energy, enthusiasm and commitment, I have no doubt that, at some point, a small troop of kids throughout the state will begin braving the wilds of their own backyards or local ponds, magnifier in hand, in search of yet another silent invader. Of course, that will only be after they've beaten the "next level" of their computer game.

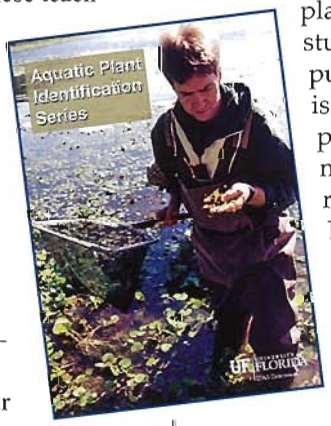
One can only hope.

by Amy Richards

AQUAVINE

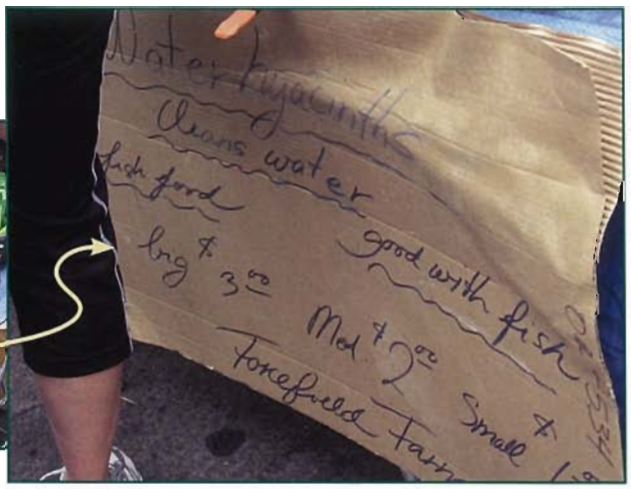
New: Aquatic Plant Identification Series

UF/IFAS Publication # DVD 084



This four-disc set covering over 100 aquatic plant species was created for the benefit of aquatic plant managers, regulators, students and the general public. Everyday language is used to describe these plants in two to three minute segments. Narrated by Dr. Kenneth Langeland.

- **Disc One: Floating and Floating-leaved Plants**, 28 minutes. Featuring 14 of the most common floating and floating-leaved plants in Florida.
- **Disc Two: Emersed Plants**, 81 minutes. Featuring 37 of the most common emersed plants in Florida.
- **Disc Three: Submersed Plants**, 62 minutes. Featuring 24 of the most common submersed plants in Florida.
- **Disc Four: Grasses, Sedges and Rushes**, 110 minutes. Featuring 40 aquatic and wetland grasses, sedges and rushes in **Florida.**



Aquatic Plants Being Sold at Local Farmer's Market in Santa Barbara, California

Although Water Hyacinth is considered a problem in parts of the Central Valley of California, there are no restrictions on its sale in Santa Barbara County, CA, according to a California IPC board member. These plants were being sold at a Farmer's Market with the following advertisement: "Water hyacinths, Cleans water, Fish food, Good with Fish. Lrg $3.00, Med $2.00, Small $1.00"

This Farmer's Market example gets Ken Langeland (University of Florida) and Don Schmitz (Florida Department of Environmental Protection) asking the question: "Are the Federal aquatic plant listing regulations adequate?" Don suggests that categories be created for Federal Noxious Weeds. For example: Category A species like hydrilla, should be banned nationwide, whereas a Category D species, like water spinach (Ipomoea aquatica) should only be banned by a few states like Florida where they can be invasive due to local climatic conditions. That way the business community is not penalized for an all or nothing type of federal regulation and this approach may result in an easier and less time consuming process of listing new harmful invasive plant species.

Treatment Tips and Scientific Efforts to Outsmart Algae

By Jim Schmidt, Applied Biochemists.

Collectively, problematic algae are perhaps some of the most challenging aquatic plants (yes, let's not forget they are plants) facing and frustrating applicators. There are numerous different forms and species adapted to growing on the water surface, lying on or attached to the bottom sediments, or even suspended throughout the water column. Identification is difficult without a microscope, and abundance measurements require laboratory methods. Unlike macrophytes, algae do not have vascular systems. Therefore, they transfer very little material, if any, from cell to cell. Controlling them requires the algaecide's active ingredient to contact each and every cell, including those "buried" in floating filamentous mats; suspended in planktonic blooms or hidden deep down in mucilaginous benthic (bottom) masses. Add to this the fact that different species have a range of sensitivities to various product formulations, and then factor in the reality that a fixed amount of algaecide will only control a certain biomass (amount) of algae, gives one lots of excuses as to why effective control is not always achieved.

Algal Challenge Test (ACT): A laboratory assessment measuring the effectiveness of different algaecides and rates in the site water containing problem algae.

Much of what applicators have learned about algae control has come from trial and error experiences using various rates of different product formulations. Within the limits of EPA registered product label rates, practical experience teaches them the more algae there is, the more product often needed. The decision as to whether single or multiple applications are made is dictated by environmental conditions and dosage restrictions. Skilled professional applicators have also learned the basics of not just applying the product to the water, but placing it as close to the target algae as possible. Using high pressure sprays to break up surface mats; injection with drop hoses or sinking granular formulations to contact benthic mats; or evenly applied at the water surface for suspended blooms are common, learned techniques.

Relatively rapid contact plus an even distribution of a suitable dose of the algaecide's active ingredient in and around these algal cells, is critical for effective control. Therefore, understanding something about the basic chemistry and characteristics of the algaecide formulation and the water can be very helpful in choosing the most effective product. Applied Biochemists has worked with Clemson University's Dept. of Forestry and Natural Resources over the past six years in evaluating dose-responses plus risk assessments for various algaecide formulations. This has resulted in the development of what is called an Algal Challenge Test (ACT). This laboratory assessment measures the effectiveness of different algaecides and rates in the actual site water containing problem algae. Dozens of algal forms from dozens of sites have been "challenged" over these past years with both single and combination product treatments. A database is under development and continues to be expanded as this research continues. Not surprisingly, this effort has provided scientific documentation for some of the practical knowledge applicators learn from their field experiences. However, the ACT has also provided answers for controlling some of the more troublesome species they encounter.

Calendar

Sept 20-22, 2007
California Invasive Plant Council Symposium
Bahia Resort Hotel, San Diego, CA.
www.cal-ipc.org

Sept 28, 2007.
Georgia Exotic Pest Plant Council – Invasive Plant Control Workshop
Invasive plant control in the Coastal Plain region: Statesboro, GA
www.gaeppc.org

October 2-4, 2007
31st Annual Florida Aquatic Plant Management Society Conference
Hilton St Petersburg. St. Petersburg, FL
www.fapms.org/meeting.html

October 5-7, 2007
Florida Native Plant Society Members Retreat
Pine Lake Retreat Center, Clermont, FL.
www.fnps.org

October 30-Nov 2, 2007
North American Lake Management Society International Symposium
Coronado Springs Resort (Walt Disney World), Orlando, FL.
www.nalms.org

November 1-2, 2007
34th Annual Conference on Ecosystems Restoration & Creation
Hillsborough Community College. Plant City, FL
www.hccfl.edu/depts/detp/ecoconf.html

November 12-15, 2007
2007 Annual American Water Resources Association Conference.
Embassy Suites Hotel, Albuquerque, NM.
www.awra.org