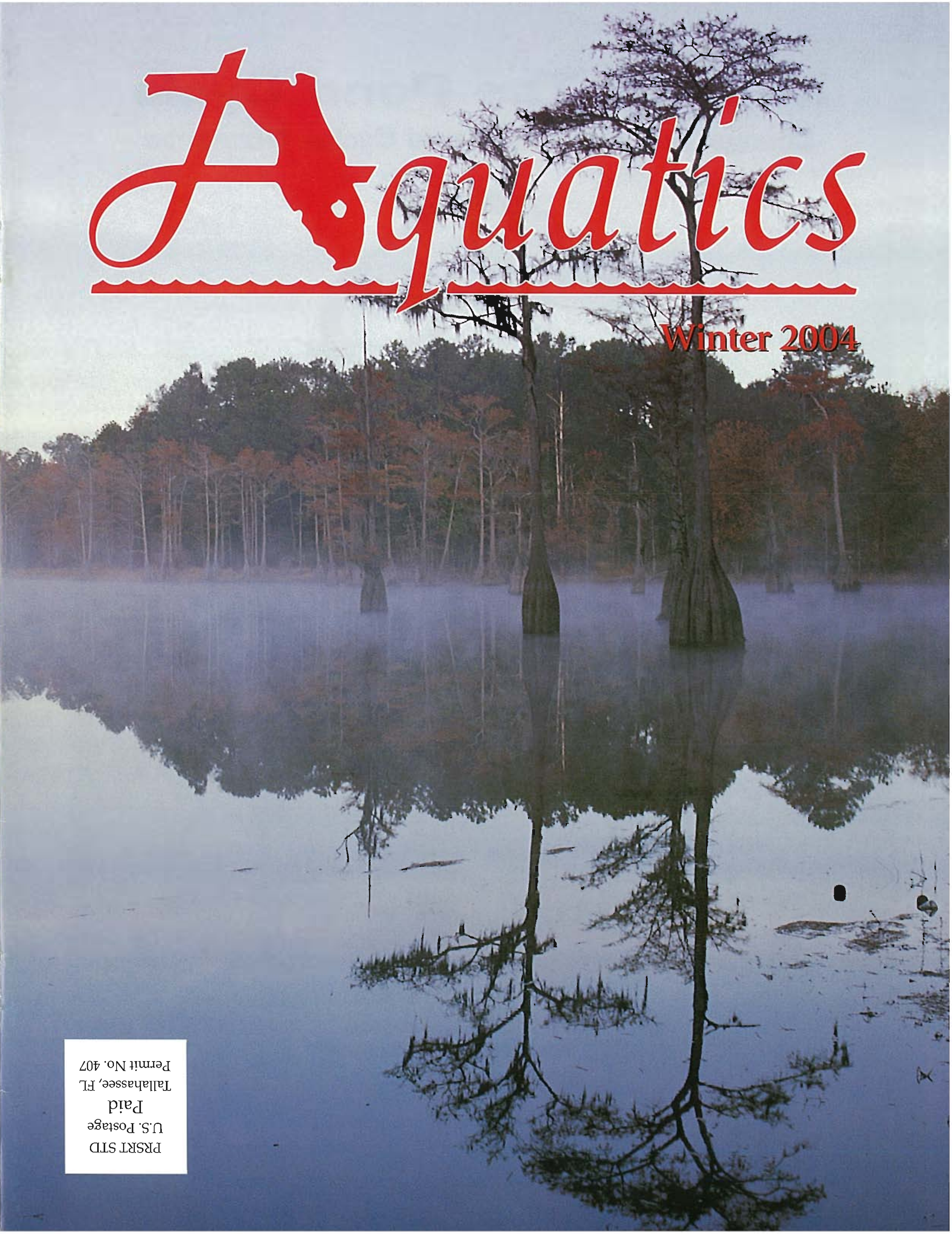
Aquatics

Winter 2004



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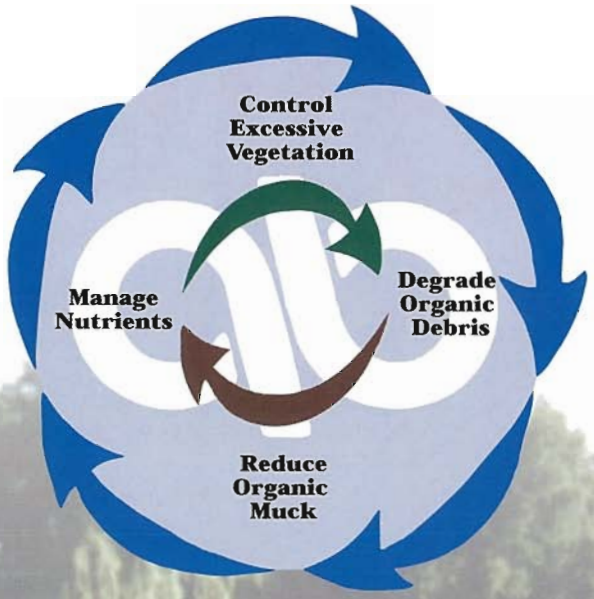

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Editorial

I would like to express my appreciation to the members of the Florida Aquatic Plant Management Society for selecting me as editor of the *Aquatics* magazine. I will have to work extra hard to keep up with the high standard that the former editor, Judy Ludlow, has set for the magazine.

Variable responses of aquatic plants to herbicides are causing increased discussions on how managers can economically control these plants. Research in aquatic plant science has reached the beginning of another large growth curve caused by the need to answer many new questions. A lot of FAPMS members work on ground zero, in the field witnessing first hand the impact of variable responses to time-proven herbicides. As your editor, I will be organizing *Aquatics* magazine to bring you articles that cover these new plant tolerance issues, plant/fish relationships, updates on previously written articles, and other interesting topics.

Two of the primary tools that I will be using to post and solicit articles are the society's Internet web site (www.fapms.org) and email. I encourage every member to regularly use the web site and its many helpful links, such as IFAS Center for Aquatic Plants or the EDIS on-line information database. *Aquatics* magazine has its own page (www.homestead.com/fapms/Aquatics_Magazine.html) with information on how to submit articles and photographs for the magazine. The last thing I want to mention about the website is that members should take advantage of the links to contact the society's Board members. Phone or email your elected board members to offer support or differing opinions on issues you consider important to our organization or our environment. It is your society and the Board needs your feedback to continue making it a successful organization.

Please feel free to contact me with any thoughts or ideas. Jeff

FAPMS Website: www.fapms.org

Scenic photograph of a north Florida pond. Photo by Jeff Schardt, Florida Department of Environmental Protection.

Aquatics

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Contents

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Paul C. Myers
1948-2004

By Dr. William (Bill) Haller
University of Florida

Paul C. Myers' 27-year battle with a rare cancer ended on September 19 at his home in Eagle Lake, FL. Confined to his home the last 2-3 weeks of his life, Paul was inundated by numerous visitors from near and far, which indicated just how many hundreds of people he befriended during his 55 years.

Paul was a charter member of FAPMS when it was founded in 1976 and served in several capacities: including our seventh President (1984) and Editor and publisher of *Aquatics* magazine. Most recently he served on the FAPMS Scholarship Board of Directors and always was supportive of our scholarships, fund raising and research and educational programs.

He graduated from Clemson University with a B.S. in biology where he excelled in academics and track and field (pole vault). From 1971-77 he worked for the old Florida Department of Pollution Control sampling lakes and streams and enumerating benthic critters and water quality. He left the microscope behind when he became Director of Aquatic Plant Control for Polk County Environmental Services in 1978, which at that time was directed by another FAPMS charter member, Frank Wilson. Paul and Frank were very active in organizing and re-organizing statutes, regulations, and funding for both aquatic plant management and research in Florida during this time. The formation of the IFAS Center for Aquatic Plants at the University of Florida was strongly supported by the Polk County legislative delegation. Paul and Frank recognized that more research was needed to develop environmentally sound methods of aquatic plant management in Florida.

In 1981, Paul and Linda founded Applied Aquatic Management, a plant management company that would eventually take on not only aquatic weeds, but weeds in wetlands, mine reclamation sites, canals, rights of way and many other sites.

LINDA, ROBIN, PJ, JENNIFER, JAKE, JORDAN AND THE ENTIRE MYERS FAMILY wish to express our deep appreciation for your support during this time of change. Many of you have stood by our family for years and years. We are overwhelmed with the outpouring of love and concern. We so appreciate your attendance at his memorial. The flowers, cards, calls and food were so thoughtful.

We would also like to express our gratitude to FAPMS for naming a scholarship in Paul's memory. The donations you have sent speak highly of the legacy Paul has left each of us. Thank you for keeping his memory alive. We miss him.

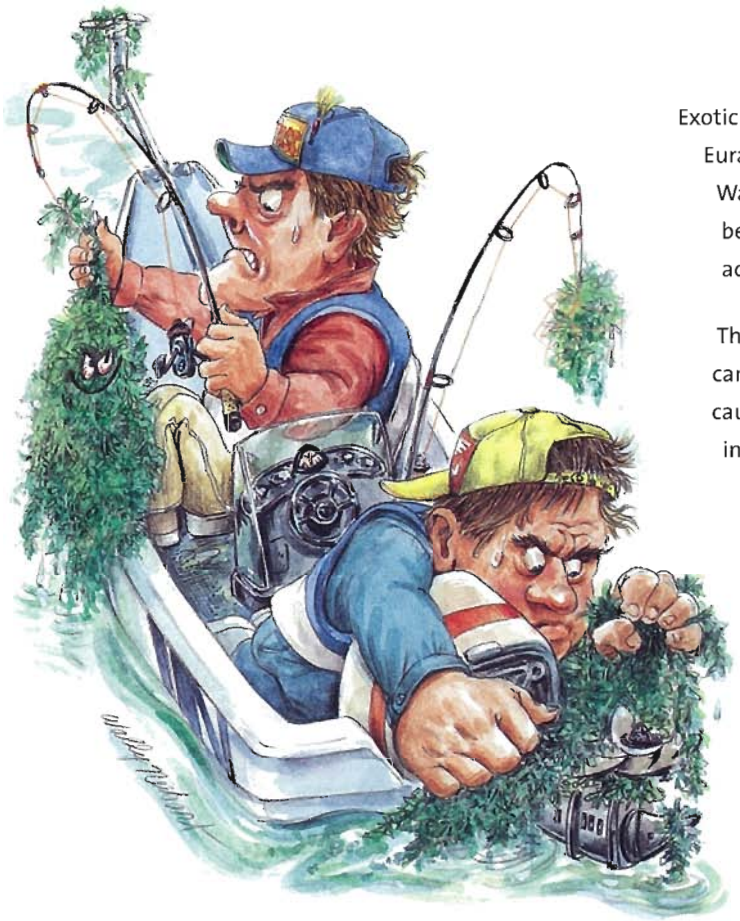
He never shunned the tough jobs. When considering a contract for hyacinth control on a reservoir in which there was much fisheries opposition to spray programs, he met with fish camp operators to discuss their concerns and ended up hiring one of them to oversee the management program. End of Opposition!

Paul's quiet nature, extensive knowledge and disarming smile carried the day on numerous occasions. The stories he could tell; they were true and often almost unbelievable. He worked and played hard, and he trained and taught some of the best applicators. In fact, he was a teacher by his nature. Who hasn't benefited from learning something from him? Whether it was about plants, water quality, herbicides, fishing, hunting, or even how to kick the tires on a used car. He even taught us how to live life, if not through words, by example.

Paul's contributions to our profession, our societies and to his colleagues will be long remembered. The Myers family has continued this support by designating the FAPMS Scholarship Foundation as a recipient of donations in Paul's name: the funds being used for the Paul C. Myers Applicator Dependent Scholarships.

Contributions may be sent to: FAPMS Scholarship Fund, c/o Don Doggett, PO Box 60005, Ft. Myers, Florida 33906 or to the First Baptist Church of Lake Alfred, 280 E. Pierce Street, Lake Alfred, Florida 33850.

Too Many Weeds Spoil the Fishing



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

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

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Photo 1. Alternanthera philoxeroides (Alligatorweed)

Successful Biocontrol Insects to Control Alligatorweed

By Charles E. Ashton
U.S. Army Corps of Engineers, Jacksonville District.

Alligatorweed (*Alternanthera philoxeroides*) was introduced into the United States from South America in the late 1800s and became problematic in the southeastern United States. This sprawling emergent plant formed dense floating mats which once grew across many narrow rivers and canals (photo 1). In 1959, cooperative efforts on biological control of aquatic plants were initiated between the U. S. Army Corps of Engineers and the Agricultural Research Service, U. S. Department of Agriculture. Overseas searches began for potential biological control insects to control alligatorweed in the 1960s. An extensive process of overseas surveys and research, screening and quarantine was involved prior to releasing insects in the United States. This process produced three insects: the Alligatorweed flea beetle (*Agasicles hygrophila*), the Alligatorweed thrip (*Amynothrips andersonii*), and the Alligatorweed stem borer ((*Vogtia*) *Arcola malloi*). The flea beetle, the thrip and stem borer were released in Florida in 1965, 1967 and 1971, respectively. These insects have been successfully established in most of the southeastern United States and successfully control alligatorweed. Three years after the introduction of the alligatorweed flea beetle in Florida, the U.S. Army Corps of Engineers Jacksonville District stopped herbicide spraying for alligatorweed in Florida. The insects have not eliminated alligatorweed in Florida waters. As alligatorweed populations increase in the spring, the populations of the biocontrol insect increase and their feeding keeps the plant from becoming a problem. Unfortunately, alligatorweed is more cold tolerant than the biocontrol agents. The beetles will not survive freezing weather, so beetles do not overwinter in cooler climates. In these areas, aquatic plant managers would typically have to rely on herbicides or other methods to control alligatorweed.

In 1980, a freeze in Northern Florida depleted the alligatorweed flea beetle population to such an extent along the St. Johns River that alligatorweed populations began to be a problem again along the River. The Jacksonville District sent staff to South Florida to collect and repopulate the St. Johns River with alligatorweed flea beetles. In a short time, the insects brought the problem weed back under control. Due to the success of this effort, it was determined that it may be possible to expand alligatorweed biological control efforts into colder climates by introducing alligatorweed flea beetles in the spring. In 1981 a program was established to provide alligatorweed biocontrol insects to states where the insects did not overwinter. The collection and distribution of the alligatorweed flea beetles was the primary focus of this effort.

Biocontrol Insects

The adult alligatorweed flea beetles are black with yellow stripes (photo 2). The adults have well developed flight muscles and travel to new areas in search of food. All life cycles feed on alligatorweed. A female can lay approximately 1000 eggs in her lifetime. The entire life cycle including adult, egg, larvae, pupae, and adult is completed within 30 days. In 1965 the beetles

Photo 2 (above). Adult alligatorweed flea beetle

Photo 3 (top right). 1965 Ortega River, Jacksonville

Photo 4 (right). 1966 Ortega River, Jacksonville

(photo 3) were released on the Ortega River in Jacksonville, Florida and by 1966 the alligatorweed had been controlled (photo 4).

The adult alligatorweed thrips are shiny and black (photo 5). They exist in two forms, a short-winged and a long winged form. Only the long winged form is capable of flight.

Photo 5. Adult alligator-weed thrip

Photo 6. Adult alligator-weed stem borer

A female deposits an average of 200 eggs in her lifetime. The larva feed by piercing young plant leaves producing a characteristic distortion and curling of the young leaves. The total generation time of the insect is approximately 28 days. The adults can live up to four months. The thrips are established in most alligatorweed beds in the collection areas but only limited numbers are collected with sweep nets. Although we have permits to collect and ship these insects to other states recently, no efforts have been made to collect them.

The alligatorweed stem borer is a moth and in the adult form ranges from ½ to ¾ inch in length (photo 6). It is dull brown in color and is seldom observed in the wild. Females lay eggs on the upper leaves of alligatorweed and lay from 200 to 300 in their short lifetime (6-8 days). The eggs hatch in several days and larvae bore into the plant stems. The larva continues feeding and each larva (photo 7) may bore into several stems prior to developing into a pupa and adult. The life cycle is completed in about 39 days. The larva feeding inside the hollow stem stops the flow of nutrients to the upper portions of the plant causing the stems and leaves to die and appear wilted (photo 8). The stem

Photo 7. Alligator-weed thrip larva

Photo 8. Larval damage to alligatorweed

borer appears to be the most cold tolerant of the alligatorweed biocontrol insects.

U.S. Army Corps of Engineers established the Aquatic Plant Control Operations Support Center (Center) located in the Corps of Engineers Jacksonville District to serve as the Corps-wide center of expertise in the operational aspects of aquatic plant management. Providing alligatorweed biocontrol insects to public agencies with alligatorweed problems is one of the services that the Center provides. The U.S. Army Corps of Engineers, Engineer Research and Development Center (ERDC) laboratory in Vicksburg, Mississippi funds the project through the Federal Aquatic Plant Control Program. Currently the Center holds permits from the U.S. Department of Agriculture Animal and Plant Health Inspection Service (USDA-APHIS) to collect, ship, and field release these insects in Alabama, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Texas and Puerto Rico. Permits for insect release in the continental U.S. are issued for a period of 10 years while permits for Puerto Rico are issued on a yearly basis.

Adult alligatorweed flea beetles are collected in May along the St. Johns River by Center staff utilizing sweep nets while running airboats through beds of alligatorweed (photo 9). The insects are sorted from other bugs, packed in Styrofoam cups with alligatorweed, and then packed in coolers with a small amount of ice, to be air expressed to their destinations. Each cup contains approximately 300 alligtorweed flea beetles and each cooler can hold a maximum of 32 cups. The collection is made on Monday and Tuesday and shipped on Wednesday.

The shipments arrive on Thursday, which allows two days to distribute the insects in the field. State and county agencies, universities, and other federal agencies receive the shipments and utilize them to control alligatorweed on their properties or distribute them to other individuals as needed.

The U.S. Department of Agriculture, Agricultural Research Service at the Beltsville Agricultural Research Center in Maryland keeps records on the beneficial non-quarantine insects that are transferred among the states. The APCOSC began the alligatorweed flea beetle collection and distribution project in 1981. During this time, the Center has distributed approximately 800,000 alligatorweed flea beetles to 8 southeastern states and Puerto Rico (figure 1). During this 23-year period, flea beetles were not distributed in 5 years because of lack of beetles or funding problems. In 1981, 1983, and 1984, 27,000 alligatorweed thrips were also collected and distributed. The number of beetles distributed over the years has been based on requests from aquatic plant managers in the field. No collection was made in 2002, due to funding problems. In the last 5 years excluding 2002, an average of 52,000 alligatorweed flea beetles were distributed to the southeastern United States and Puerto Rico.

Photo 9. St. Johns River

In 2004 the Center shipped insects to Alabama, Georgia, Mississippi,

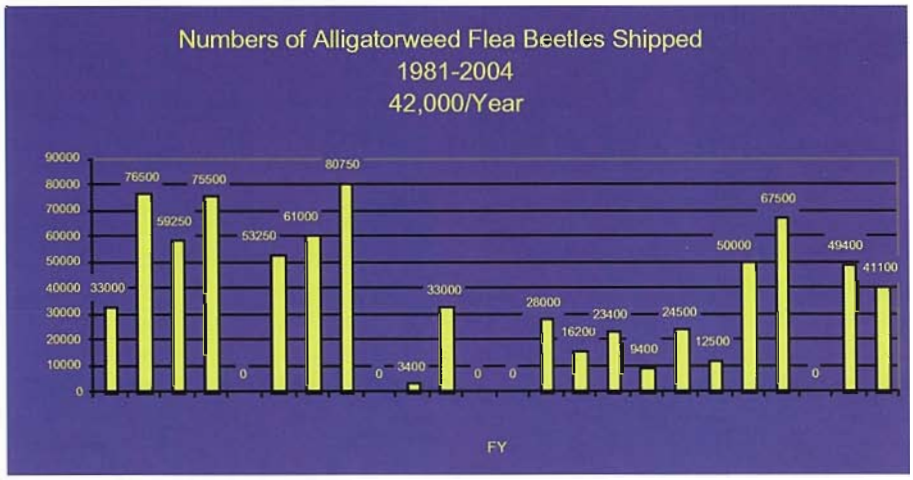

Figure 1. Numbers of Alligatorweed Flea Beetles Shipped, 1981-2004

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North Carolina, South Carolina, and Puerto Rico. In South Carolina, the Center works with Clemson University. For the last two years, Dr. Jack Whetstone has released flea beetles in the Georgetown Canal in Georgetown, South Carolina. This 26-mile long canal supplies water to a paper company and serves as a drinking water supply for the city of Georgetown. In the past, the city had to continually harvest alligatorweed from the canal by mechanical means. Since the introduction of the flea beetles, the need to harvest alligatorweed in the canal has been significantly reduced. In Alabama, the Center provides flea beetles to the Alabama Fish Center, which in turn supplies them to individual fish farmers to control alligatorweed in their ponds. In Mississippi, Alabama, Georgia and Texas, insects are provided to National Wildlife Refuges, county agents, water control districts and State Wildlife, Fisheries and Parks. These agencies report good results with the flea beetles and reductions in the use of herbicides.

In the past, the Center had only shipped flea beetles to Puerto Rico. However this year, Center staff has been working with Dr. Edwin Abreu with the University of Puerto Rico to provide stem borers to assist with the control of alligatorweed on the island. The literature indicates that the best way to collect and ship alligatorweed stem borers is by collecting larva in the wilted stems of alligatorweed. To determine the percentage of viable larva in wilted stems, 40 wilted stems of alligatorweed were collected and examined in the field. Of the 40 stems collected 20 larva and 2 pupa were found (55 %). The wilted stems of alligator weed are collected in the field, placed in coolers with a small amount of ice, and shipped to Dr. Abreu in Isabela, Puerto Rico. Dr. Abreu harvests the larva and pupa from the stems to establish a laboratory colony for later field release. In the current year, the staff has collected and shipped 689 wilted stems (3 coolers full) of infected alligator weed to Puerto Rico.

The introduction of the three-alligatorweed biocontrol insects into Florida has successfully controlled alligatorweed in the state. Neither the Corps of Engineers nor the State of Florida expends funds for spraying alligatorweed. This project gives aquatic plant managers the option of utilizing biocontrol insects instead of herbicides to control alligatorweed in colder climates. In areas where alligatorweed flea beetles do not overwinter, the release of the beetles in May generally allows them to control alligatorweed for the remainder of the growing season. In the future, the project will be expanded to include the addition of the alligatorweed stem borers.

If you have a problem with alligatorweed and need biocontrol insects contact the APCOSC at E-mail charles.e.ashton@saj02.usace.army.mil. Provided the project is funded, the Center will be happy to help.

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Acknowledgements

I would like to thank the U.S. Army Corps of Engineers, Engineer Research and Development Center laboratory for providing funding and photographs.

For more information contact Charles E. Ashton (904) 232-2219, U.S. Army Corps of Engineers, Jacksonville District, Aquatic Plant Control Section, Aquatic Plant Control Operations Support Center (APCOSC), charles.e.ashton@saj02.usace.army.mil.

New Era Approaches in Aquatic Plant Management

By Tyler J. Koschnick
Recipient of 2004 William L. Maier, Jr. Memorial Scholarship

We are entering a new era in aquatic plant and natural area weed management in Florida. The discovery of herbicide resistant aquatic plants and new introductions of exotic plants, species with unprecedented impacts on the environment, are leading us into unchartered waters. New herbicides are being sought to battle this new "invasion" of plants. Herbicides that can supplement management with older herbicides, and ones that are potentially more selective and efficacious against target weeds are needed. Impetus is being placed on finding new herbicides and biocontrol agents capable of providing long-term control of these invasive plant problems.

Fluridone has successfully been used for 10 to 15 years to manage lake wide infestations of hydrilla in many Florida lakes. It is a unique herbicide. Fluridone allows huge infestations of weeds to be targeted in large lakes at low concentrations (<20 ppb), provides selectivity desired by lake managers that have to consider all facets of lake use, and has minimal impact on water quality. Fluridone seemed to be the answer to Florida's hydrilla problems. It set the standard. Unfortunately, those days are slowly coming to an end in many Florida lakes. Hydrilla has developed an increased tolerance/resistance to fluridone, and in some lakes it is being rapidly degraded by what is suspected to be microbes. Consequently, in some lakes, fluridone can no longer be used effectively. The importance and success of Florida's aquatic plant management program will be realized when hydrilla can no longer be effectively managed with the available tools. Recreation, navigation, water conveyance, system ecology, water quality, and aesthetics will all be impacted, displaying the results of a once successful management program.

The identification of at least one species of diquat resistant duckweed has come on the heels of fluridone resistant hydrilla. Although duckweed may be considered a minor problem, the same lessons being learned from hydrilla and fluridone can be applied to duckweed. And if it can happen in duckweed, what other species might develop resistance and to which herbicides?

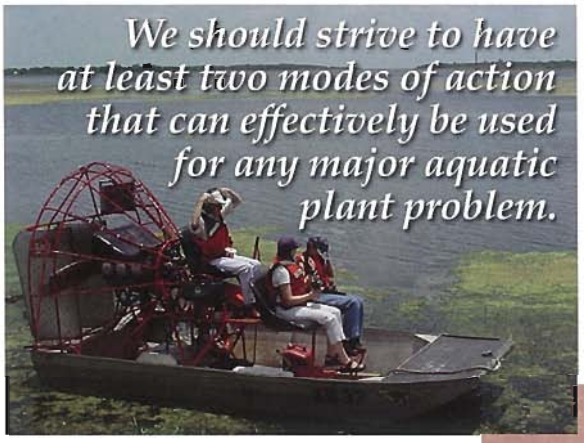
Aquatic plant managers rely on a limited number of herbicides to manage invasive plants. Many times there are one or maybe two herbicides that are used on a regular basis for any one species. There just aren't many options for affordable management. Invasive, exotic plants make this task even more difficult. Therefore, we are left with very few choices when it comes to chemical weed control.

Comparing herbicide resistance in aquatics versus terrestrial weed control is important. I will speculate that fluridone tolerant hydrilla will have the greatest monetary/ecological effect of all herbicide resistant plants. The reason is simple: even when a terrestrial weed develops resistance to an herbicide, that herbicide can still be used to control other species of weeds. We are often targeting only one plant species for control in aquatics, and when that species becomes resistant then that herbicide can no longer be used effectively in that system.

Managers rely on herbicides to meet the State's goal of maintenance control of certain invasive plants and to maintain the population at the lowest possible level. This method of control has always been a sound model for long-term management. Once large infestations are under control, continuous monitoring and small-scale applications minimize the selection pressure on weeds. And if a plant becomes more tolerant, the population may be confined to a small area. Maintenance control has proven useful on both water hyacinth and water lettuce in state waters and should be expanded to other species.

So, looking back on the recent occurrences in aquatic plant management the question becomes, should we have done anything differently? I think this is an important question that needs to be addressed to prevent the loss of another herbicide for the next invasive plant program (i.e. hydrilla). I hope the answer to this question is yes.

Now that herbicide resistance has occurred in aquatic weeds, we need to be aware of it and manage for it so that another useful herbicide is not rendered useless on another species. Alternating herbicides used at a single lake, on a



single species need to be used to delay the onset of resistance for any species. We should consider delaying applications of the same herbicide in a system year after year when an alternate herbicide is not available, maybe treating every other year, or every two years. Monitoring results of herbicide treatments should increase to potentially detect any portion of a plant population not controlled by a particular application.

Furthermore, the need for research and education is of utmost importance. Research is needed to discover and find new herbicides for aquatic plant management to combat new plant introductions, to offer different modes of action for ongoing operations, and to effectively control hydrilla. We should strive to have at least two modes of action that can effectively be used

for any major aquatic plant problem. A continued effort in finding new potential biocontrol agents for hydrilla, and other exotics is necessary. Education is vital as we start dealing with herbicide resistance issues since it is a subject that hasn't been discussed in our field. Management practices should be addressed for each exotic plant species.

Although, those in aquatic plant management don't need to panic and rewrite the book on management, I think certain issues should be considered. Integrated plant management is vital to the long-term success of aquatic plant management in the state of Florida, which includes integrating biologic and chemical control practices where possible. More choices are needed when it comes to managing invasive aquatic and natural area weeds. Due to the new challenge of herbicide resistant plants, more demands are placed on water resources and new exotic plants are introduced that are harder to control. In addition, we cannot forget the lessons learned over the past 10 to 15 years as we move forward. The success and importance of Florida's aquatic plant management program will potentially be very obvious in the next couple years due to the inability to control hydrilla. We can't become complacent.

What You Said: Survey Results from Restricted Use Pesticide Applicators Concerning Continuing Education Needs and Preferences

Ken Langeland, Professor
IFAS Agronomy Department and Center for Aquatic and Invasive Plants

Survey

The IFAS Center for Aquatic and Invasive Plants conducted a survey to determine if recertification needs were being met for all applicators and to gather information on how to ensure that these needs are met in the future. Licensed applicators in Aquatic, Right-of-Way, and Natural Areas Weed Management were surveyed to determine the following:

1) by whom they are employed
2) if they preferred renewing their license by re-testing or CEUs
3) how they actually have renewed their license in the past six years
4) ability to obtain CEUs
5) ability to travel to attend training for obtaining CEUs
6) ability to pay to attend meetings for obtaining CEUs
7) preference for length of meetings
8) preference for frequency of attending training to obtain CEUs
8) frequency of attending previously mentioned meetings in the past six years.

Geographic Distribution of Licensed Applicators

Survey results were divided among the four regions of the state shown in Figure 1. These regions correspond to the IFAS Extension Administrative Districts and were divided in this way to facilitate future planning for IFAS sponsored CEU training. Analysis of DACS' database of licensed applicators in Aquatic, Right-of-Way, and Natural Areas Weed Management shows that the number of licensed applicators in all three categories increases toward the southern part of the state (Tables 1-3). The greatest numbers of licensed Aquatic applicators occur in the South and South Central regions, a high number in the Central region as well, and comparatively few in the Northwest. Right-of-Way applicators are distributed fairly evenly among the South, South Central, Central, and Northeast, with again, relatively few in the Northwest. The highest numbers of

Figure 1. University of Florida IFAS Extension Administration Districts by which survey data was sorted (created by Larry Halsey).

Why Pesticide Applicators are Certified

The National Environmental Policy Act was enacted in 1970 following publication of Rachel Carson's "Silent Spring" and the resulting widespread concerns over pesticide use. This congressional legislation was charged with "creating and maintaining conditions under which man and nature can exist in productive harmony and fulfill the social, economic, and other requirements of the present and future generations of Americans" and provided for creation of the U.S. Environmental Protection Agency (EPA). The EPA was given the responsibility for regulating pesticides and establishing tolerances of pesticides in food.

A classification system for registered pesticide products was developed by EPA in 1972 that created two levels of pesticides: general use pesticides and restricted use pesticides (RUPs). This classification system was the result of a compromise whereby restrictions could be used as a risk reduction measure short of cancellation and to ensure that the individual using an RUP is trained and certified in its use. A pesticide (or particular use) may be classified as an RUP if its misuse "may cause unreasonable adverse effects on the environment or the acute dermal or inhalation toxicity of the pesticide presents a hazard to the applicator or other persons." The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), as amended in 1972, authorized EPA to require certification of applicators in order to use RUPs. The applicator is required to be certified in a subject area or category (e.g. aquatic, forestry, turf, right-of-way) pest consistent with the use of the pesticide.

FIFRA also gave states the opportunity to administer their own certification program, with the approval of EPA. The Florida Department of Agriculture and Consumer Services (DACS) administers Florida's RUP program, as authorized in Florida Statutes Chapter 487.042-049. Certification standards, and procedures for certification, licensure, and renewal are described in Chapter 5E-9.026-029 Florida Administrative Code. Currently there are no herbicides used for right-of-way, aquatic, or natural area weed control classified as RUPs but many employers and contractees of applicators in these categories require certification and/or licensing as an industry standard of competency. Licenses must be renewed every four years by retesting or earning Continuing Education Units (CEUs). Commercial and public applicators must have 4 core CEUs plus the number of CEUs required for each category for which they are licensed. Category CEU requirements are 16 for Aquatic, 8 for Right-of-Way, and 16 for Natural Areas Weed Management.

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Natural Areas Management applicators occur in the South, South Central, and Central regions with only nine applicators in the Northwest licensed in this category. Many applicators are licensed in multiple categories.

Large concentrations of licensed applicators occur in population centers within the regions. In Broward and Palm Beach Counties alone there are 338 Aquatic applicators. In Hillsborough and Pinellas Counties there are 217 aquatic applicators and in Lee County there are 97. In Polk and Orange Counties combined there are 157 aquatic applicators and in Brevard alone there are 72. Concentrations of Right-of-Way and Natural Areas Management applicators are similar but with relatively fewer numbers in most cases. A large number, 101, of Right-of-Way applicators have addresses in Dade County.

Table 1. Number of licensed aquatic applicators per county and region.

	South	South Central	Central	Northeast	Northwest
	Broward-179 Dade-73 Hendry-39 Indian River-18 Martin-28 Monroe-2 Palm Beach-159 St. Lucie-31	Charlotte-26 Collier-29 Desoto-4 Glades-10 Hardee-6 Highlands-20 Hillsborough-107 Lee-97 Manatee-45 Okeechobee-29 Pinellas-110 Sarasota-53	Brevard-72 Citrus-22 Hernando-12 Lake-27 Marion-8 Orange-81 Osceola-23 Pasco-32 Polk-76 Seminole-40 Sumter-4 Volusia-43	Alachua-21 Baker-1 Bradford-3 Clay-9 Columbia-17 Dixie-1 Duval-60 Flagler-2 Gilchrist-2 Lafayette-1 Levy-3 Nassau-4 Putnam-26 St. Johns-17 Suwannee-3 Union-2	Bay-10 Calhoun-1 Escambia-1 Franklin-1 Gadsden-4 Jackson-5 Jefferson-1 Leon-9 Liberty-1 Okaloosa-1 Santa Rosa-3 Taylor-4 Wakula-2 Walton-8 Washington-2
Total	529	536	440	172	53

Table 2. Number of licensed right-of-way applicators per county and region.

	South	South Central	Central	Northeast	Northwest
	Broward-85 Dade-101 Hendry-18 Indian River-14 Martin-13 Monroe-10 Palm Beach-117 St. Lucie-30	Charlotte-36 Collier-12 Desoto-9 Glades-7 Hardee-7 Highlands-15 Hillsborough-95 Lee-81 Manatee-30 Okeechobee-14 Pinellas-113 Sarasota-30	Brevard-52 Citrus-10 Hernando-10 Lake-30 Marion-9 Orange-46 Osceola-18 Pasco-33 Polk-61 Seminole-17 Sumter-11 Volusia-40	Alachua-32 Baker-5 Bradford-4 Clay-19 Columbia-35 Dixie-4 Duval-78 Flagler-3 Gilchrist-5 Hamilton-1 Lafayette-1 Levy-9 Nassau-8 Putnam-18 St. Johns-17 Suwannee-4 Union-2	Bay-11 Escambia-5 Gulf-2 Holmes-2 Jackson-2 Jefferson-6 Leon-6 Liberty-2 Madison-2 Okaloosa-4 Santa Rosa-14 Taylor-7 Wakula-1 Walton-8 Washington-6
Total	388	449	337	245	78

Table 3. Number of licensed natural area applicators per county and region.

	South	South Central	Central	Northeast	Northwest
	Broward-27 Dade-16 Hendry-3 Indian River-2 Martin-3 Monroe-4 Palm Beach-36 St. Lucie-2	Charlotte-8 Collier-15 Desoto-1 Glades-3 Highlands-4 Hillsborough-23 Lee-43 Manatee-6 Okeechobee-6 Pinellas-25 Sarasota-12	Brevard-21 Citrus-2 Hernando-2 Lake-3 Marion-1 Orange-8 Osceola-2 Pasco-6 Polk-24 Seminole-4 Volusia-11	Alachua-11 Bradford-1 Clay-1 Columbia-6 Dixie-1 Duval-1 Flagler-1 Hamilton-1 Levy-1 Nassau-1 Putnam-8 St. Johns-1	Bay-1 Franklin-1 Jackson-1 Taylor-6
Total	93	146	84	34	9

Survey Results

Distribution by Employment

Seven hundred seventy eight applicators responded to the survey. The largest number, 183, of those who answered the question "By whom are you employed?" work for County Government (Table 4). The second largest group, 111, work for a commercial aquatic herbicide application company. When all respondents' employers were totaled, a large majority of applicators, 466, work for some type of public agency, while 257 are employed commercially.

Preference for Renewing License Categories and Ease of Obtaining CEUs

Ninety five percent of respondents preferred to renew their license categories by obtaining CEUs. While high percentages of applicators did renew their licenses by obtaining CEUs in all categories and regions, in no instance (other than Natural Areas in the Northwest where the number of respondents is very small) was this number as high (95%) as those who wish to renew in this way (Table 5). This suggests that a fairly good job is being done of providing opportunities to obtain CEUs but there is need for improvement. Responses to how easy it is to obtain CEUs also suggest room for improvement (Table 6). In all regions and for all categories, the majority of respondents said that it was at least reasonable to obtain CEUs but in no case did over a fourth of respondents say that it was easy to obtain CEUs. While overall few respondents said that it was impossible to obtain CEUs, between 20% and 40% (this representing a small

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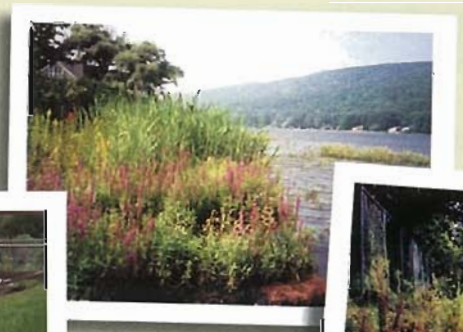

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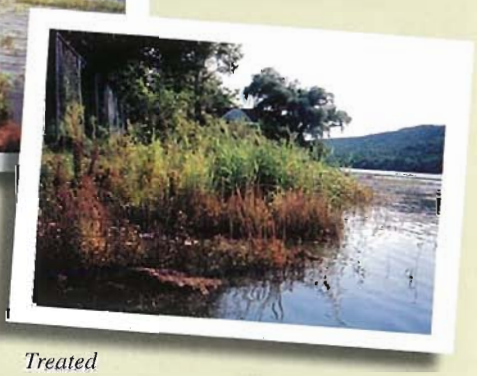

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Table 4. Employment of respondents.

183	County government
111	Aquatic herbicide application company
95	City government
64	Water Management District
53	Florida Department of Transportation
49	Self Employed
35	Landscape Company
26	Consultant
17	Florida Wildlife Commission
17	Drainage District
12	Industry
11	Department of Environmental Protection
10	Pest Control Operator
9	University
9	Golf Course
5	Citrus Industry
5	Mosquito Control
3	U.S. Department of Agriculture
2	U.S. Army Corps of Engineers
2	National Park Service
2	The Nature Conservancy
2	Justice Department
1	Florida Division of Forestry

number of respondents in the Northwest) said that it was difficult.

Preferences for Travel, Length, Frequency, and Cost of Training for CEUs

A large majority of respondents are willing to travel regionally or to a neighboring county to obtain CEUs (Table 7). Very few have unlimited travel ability, except for a small number of respondents in the Northeast and Northwest. Some, especially in the South and South Central, prefer to have training within their own county.

Few respondents were limited to $10.00 for attending meetings to obtain CEUs (including registration and travel expenses) but only a few had unlimited travel budgets (Table 8). In the South, South Central, and Central regions 40% to 50% of respondents are willing to pay $50.00 and 33% to 39% are willing to pay $500.00. In the Northeast and Northwest, 31% and 20%, respec-

Table 5. Applicators who renewed license by CEUs (% of respondents).

	Aquatic Pest Control	Right of Way	Natural Areas
South	81	91	83
South Central	84	86	71
Central	89	89	79
Northeast	90	84	80
Northwest	85	90	100

Table 6. Availability of CEUs (% of respondents).

South			
	Aquatics	Right-of-Way	Natural Areas
Impossible	2	0	6
Difficult	20	26	34
Reasonable	56	55	47
Easy	23	20	13

South Central			
Impossible	4	5	8
Difficult	35	33	40
Reasonable	49	48	42
Easy	13	15	10

Central			
Impossible	2	4	6
Difficult	29	28	33
Reasonable	52	52	51
Easy	17	17	11

Northeast			
Impossible	2	4	7
Difficult	12	22	36
Reasonable	52	46	36
Easy	33	28	21

Northwest			
Impossible	18	13	0
Difficult	18	42	43
Reasonable	41	33	29
Easy	23	13	29

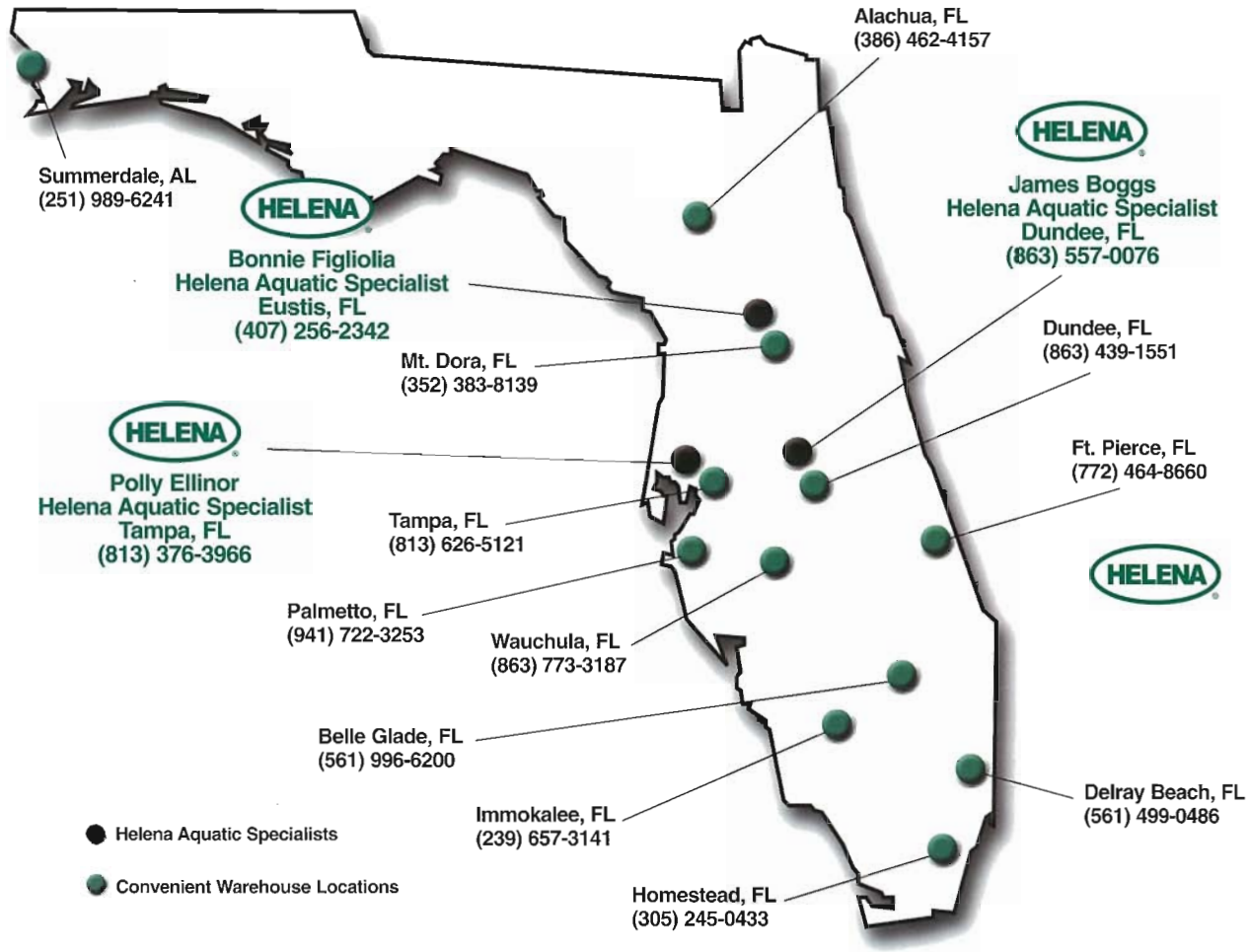

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Table 7. Ability to travel to attend CEU workshops (% of respondents).

	South	South Central	Central	Northeast	Northwest
In County	18	19	6	2	0
Neighboring County	39	30	38	13	19
Regional	36	45	41	66	53
Unlimited	7	6	7	20	28

Table 8. Ability to pay to attend a CEU workshop (% of respondents).

	South	South Central	Central	Northeast	Northwest
$10	11	13	5	10	0
$50	40	46	50	31	20
$500	39	34	33	52	67
Unlimited	10	7	12	8	13

Table 9. Preference for length of training to obtain CEUs (% of respondents)

	South	South Central	Central	Northeast	Northwest
Half day	15	25	16	14	10
One day	43	45	41	43	39
two days	29	23	31	29	29
Four days	9	7	7	8	23

Table 10. Preference of frequency of training to obtain CEUs (% of respondents).

	South	South Central	Central	Northeast	Northwest
Once every year	77	77	76	68	73
Once every two years	18	15	14	20	13
Once every three years	1	3	2	2	0
Once every four years	5	5	7	11	13

tively, will pay $50.00 and 52% and 67%, respectively, are willing to pay $500.00.

The highest percentages of respondents in all regions, 39% to 45%, prefer 1-day meetings while 23% to 29% prefer 2-day meetings. Only 10% to 25% prefer ½-day meetings (Table 9). The smallest percentages, 7% to 25% prefer 4-day meetings.

A large majority of respondents in all regions, 68% to 77%, prefer to attend meetings to obtain CEUs once every year, and 14% to 20% preferred once every two years (Table 10). Only a small percentage, 0 to 13% preferred only once every three or four years.

How many Applicators attend Existing Scheduled Meetings to Obtain CEUs?

The first IFAS Aquatic Plant Management Short Course was held in Gainesville in 1976. In 1992, IFAS held the first Aquatic Plant Management, Propagation, and Revegetation Short Course in Ft. Lauderdale where larger numbers of applicators attended than when held in Gainesville. This meeting has been held every year in Ft. Lauderdale since 1992 with approximately 400 attendees annually. CEUs in Aquatic, Right-of-Way, and Natural Areas Weed Management are awarded for attendance at this 4-day meeting. Between 36% and 62% of respondents have not attended this meeting in the past six years and 15% to 38% have only attended once (Table 11). Zero to 26% have attended two times or greater in the past six years. The largest percentage, 26%, of respondents who attended this meeting more than three times in the past six years are in the south region.

FAPMS offers CEUs at its 3-day annual meeting. Historically, FAPMS annual meetings have been held at different locations around the state but the meeting has been held in Daytona Beach for three consecutive years (2001-2003). As with the IFAS short course, a large percentage, 48% to 67%, of respon-

dents have not attended the FAPMS annual meeting in the past six years and, except for the Central and Northeast regions, only a small percentage attended two or more times (Table 12). Thirty percent and 21% in the Central and Northeast, respectively, have attended greater than three times and this may be attributable to the location of the meeting within the Central region and in proximity to the Northeast region in the past three years.

The FLEPPC meeting has only offered CEUs for attendance at their annual meeting for the past two years. High percentages of respondents have not attended the FLEPPC annual meeting in the past six years (Table 13). This may be in part because CEUs have only recently been offered for attendance but may also reflect the smaller number of respondents having the Natural Areas Weed Management category on their license.

Table 11. Attendance at IFAS Aquatic Plant Management, Propagation, and Revegetation Short Course in Ft. Lauderdale in the past six years (% of respondents).

	South	South Central	Central	Northeast	Northwest
0	36	57	58	62	55
1	22	29	20	15	38
2	16	10	7	12	7
>3	26	5	15	12	0

Table 12. Attendance at FAPMS Annual Meetings in the past six years (% of respondents).

	South	South Central	Central	Northeast	Northwest
0	49	74	48	54	67
1	21	11	9	21	10
2	13	8	13	4	10
>3	18	8	30	21	13

Table 13. Attendance at FLEPPC Annual Meetings in the past six years (% of respondents).

	South	South Central	Central	Northeast	Northwest
0	80	76	84	74	89
1	11	16	8	8	11
2	4	4	2	12	0
>3	6	5	6	6	0

Table 14. Attendance at County Extension CEU Workshops in the past six years (%of respondents).

	South	South Central	Central	Northeast	Northwest
0	21	16	47	56	33
1	18	13	18	18	20
2	21	17	17	14	17
>3	39	54	18	12	30

The highest percentages of respondents who have attended training at County Cooperative Extension offices in the past six years occur in the South and South Central Regions (Table 14). This probably reflects availability of opportunities in Counties in these regions. St. Lucie, Palm Beach, and Miami-Dade Counties in the South region and Pinellas and Lee Counties in the South-Central routinely hold training for acquiring CEUs.

Conclusion

Opportunities are reasonably available in Florida for earning CEUs to renew RUP applicator licenses in the Aquatic, Right-of-Way, and Natural Areas Weed Management categories and the majority of applicators who wish to renew their license categories by earning CEUs are able to do so. However, improvement needs to be made for availability of CEUs on a regional basis, especially for those applicators that are distant from meetings that are routinely held in the more southerly regions of the state. Based on responses from this survey, the IFAS Center for Aquatic and Invasive Plants will cooperate with the IFAS Pesticide Information Office, Pesticide Trainers in Cooperative Extension Offices and others to hold 1 to 2-day regional training for acquiring CEUs in the five IFAS Extension Administrative Districts. Notice of training will be available on the DACS Agricultural Pesticide Certification and Compliance Program Website: www.safepesticideuse.com.

Acknowledgments

The mailing list for this survey was provided by the Florida Department of Agriculture and Consumer Services. Thaddeus Hunt and Michael Meisenburg entered responses from surveys onto spreadsheets and collated data. I appreciate the efforts of all the licensed applicators that took the time to fill out and return the survey.

AQUAVINE

January 17-19, 2005. Northeast Aquatic Plant Management Society Annual Meeting, Saratoga Springs, NY.

February 7-10, 2005. Annual Meeting of the Weed Science Society of America, Sheraton Waikiki, Honolulu, Hawaii, www.wssa.net.

February 10-13, 2005. Southern Division American Fisheries Society Spring Meeting. Hosted by the Virginia Chapter AFS, Virginia Beach, VA. http://faculty.virginia.edu/vcafs/

February 22-24, 2005. 25th Annual Meeting of the Florida Chapter of the American Fisheries Society. Ocala 4H-Camp, Ocala, FL. www.sdafs.org/flafs/

March 5-7, 2005. 25th Annual Midway Aquatic Plant Management Society Conference, Sheraton-Indianapolis, Indianapolis, IN. www.mapms.org

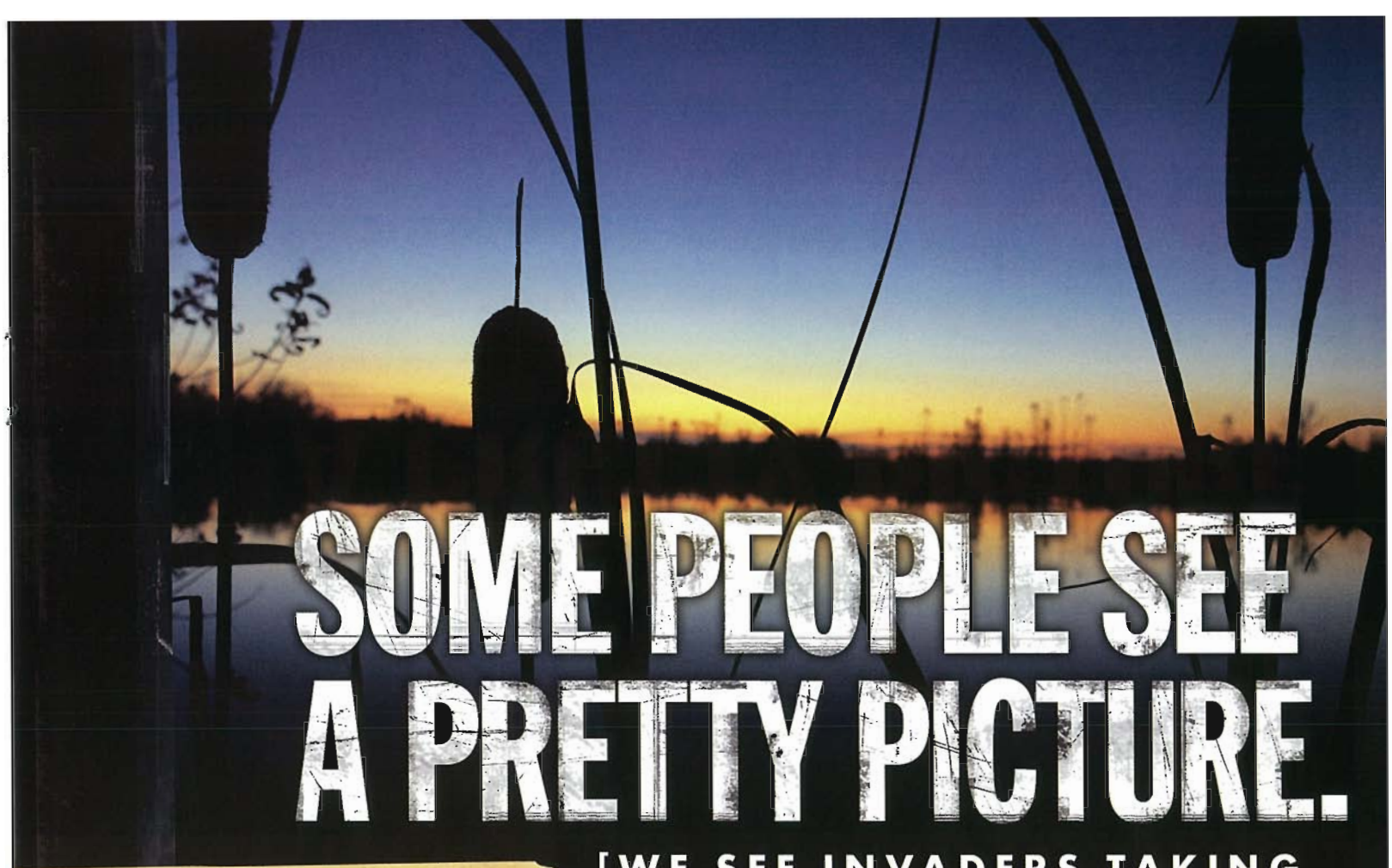
March 10-11, 2005. Western Aquatic Plant Management Society, Denver, CO www.wapms.org

March 20-23, 2005. 9th International Symposium on Biogeochemistry of Wetlands. Baton Rouge, LA. www.conference.ifas.ufl.edu/wetlands

April 13-15, 2005. 14th Annual Southeastern Lakes Management Conference. "Lakes, Reservoirs, Watersheds – Challenges and Opportunities." Asheville, NC. www.nalms.org

May 16-20, 2005. IFAS Aquatic Weed Control Short Course. "Aquatic, Upland and Invasive Weed Control; Aquatic Plant Identification." University of Florida, IFAS Extension. Fort Lauderdale, FL. www conference.ifas.ufl.edu/aw/

June 6-9, 2005. 16th Annual Florida Lake Management Society Conference, Hawk's Cay Resort, Duck Key, FL. www.flms.net/florida/



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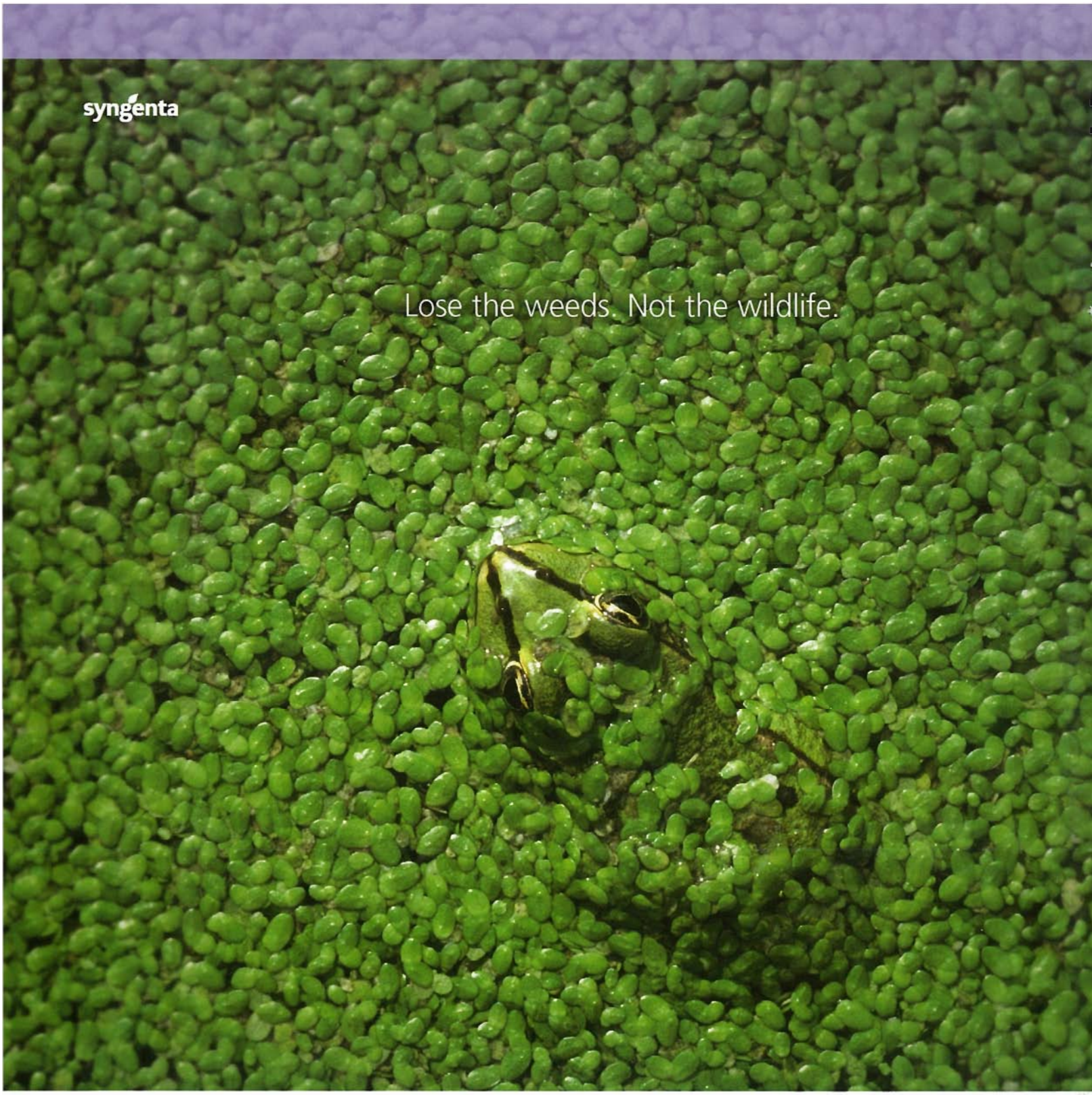

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