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Letter to the Editor

Dear FAPMS Members and Other Aquatics Readers,

This is my last issue as Editor of Aquatics. I can't put into words the honor and enjoyment it has brought me to serve you in continuing this tradition for the last 5 years. It's time now for someone else to have this opportunity.

The idea of Aquatics was conceived by Chuck Hargrove and Bill Maier during one of those late night FAPMS brain-storming sessions that many of us are familiar with. Bill took on the job of Editor for the first issue of Aquatics, which hit the streets in March 1979. The dedication to our profession and enthusiasm behind this new venture is expressed in an excerpt from Bill's first editorial: "—it is [also] the first publication on aquatic plant management strictly dedicated to the needs of the people actually involved in the daily chore of controlling aquatic weeds. There is a lot of pride and expertise throughout the state of Florida—." Bill went on to explain the importance of everyone's participation in this and other Society efforts.

Paul Myers took the helm as Editor of the March 1981 issue and echoed Bill's concept of the importance of everyone's contribution to the magazine: "Your input in the form of an article or simply a letter to the editor with news of interest will be most appreciated. If you have incorporated new ideas or old technology with a new twist into your aquatic plant control operations this magazine can be your vehicle to share your knowledge and experience with other applicators."

There has never been a lack of FAPMS members with the ambition and enthusiasm to carry out our mission through efforts such as Aquatics. Bill and Paul were followed by talented successors in David Tarver, Dan Thayer, and Mike Bodle, whom all enjoyed the cooperative effort of the Society in the spirit of Aquatics. I am proud to be included with this list of Aquatics Editors and dedicated Society Members. I look forward to working with all of you on other Society endeavors and will be happy to assist anyone with writing future articles to be submitted to the new editor.

Ken Langeland

Fall sweetgum and muscadine leaves decorate a small duckweed pond in North Florida.
Photo by David P. Tarver

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CONTENTS

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EDITORIAL: Address all correspondence regarding editorial matter to Ken Langeland *Aquatics* Magazine.

Butterflies of Florida's Wetlands

Part 2. Brushfooted Butterflies and Wood Nymphs

by Marc C. Minno
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This is the second part of a series of articles on butterflies found in wetland habitats of Florida. Refer to part I (*Aquatics*, volume 19, number 1, pages 14-18) for descriptions of the wetland affinity categories and other information. This article covers Florida's true Brushfooted Butterflies and Wood Nymphs. Brushfooted Butterflies and their relatives, such as the Milkweed Butterflies, Wood Nymphs, and Satyrs, appear to have only four legs. The first pair of legs has become greatly reduced in size. These legs resemble tiny brushes, hence the common name. Thirteen species ranging from obligate wetland to facultative upland affinity are discussed below. A summary of the moisture requirements of their larval host plants is given in Table 1.

Brushfooted Butterflies (Nymphalidae, Subfamily Nymphalinae)

There are approximately 22 species of true brushfooted butterflies that occur in Florida regularly. They range in size from small to somewhat large. The outer margins of the wings are often scalloped or irregular in shape. The caterpillars are usually spiny and darkly colored. Five species are closely associated with wetlands. In addition, the Pearl Crescent, Question Mark, and Red Admiral are often found in or near wetland habitats.

9. *Anartia jatrophae guantanomo* (White Peacock)

IDENTIFICATION: The wings of this butterfly are white with brownish shading, dark lines, orange bands, and small eyespots. There is a small tail on the hindwing. Wingspans range from 3.3 to 6.1 cm. The caterpillars are black with rows of branching spines on the body.
HABITATS: Wet prairies, ditches, and open disturbed sites in southern, central, and occasionally northern Florida.
WETLAND AFFINITY: Facultative Wetland.
SEASON: The adults can be found all year in south Florida.
HOST PLANTS: The caterpillars eat the leaves of *Bacopa monnieri* (Water Hyssop) and occasionally *Phyla nodiflora* (Cape Weed).

10. *Anthanassa texana seminole* (Seminole Crescent)

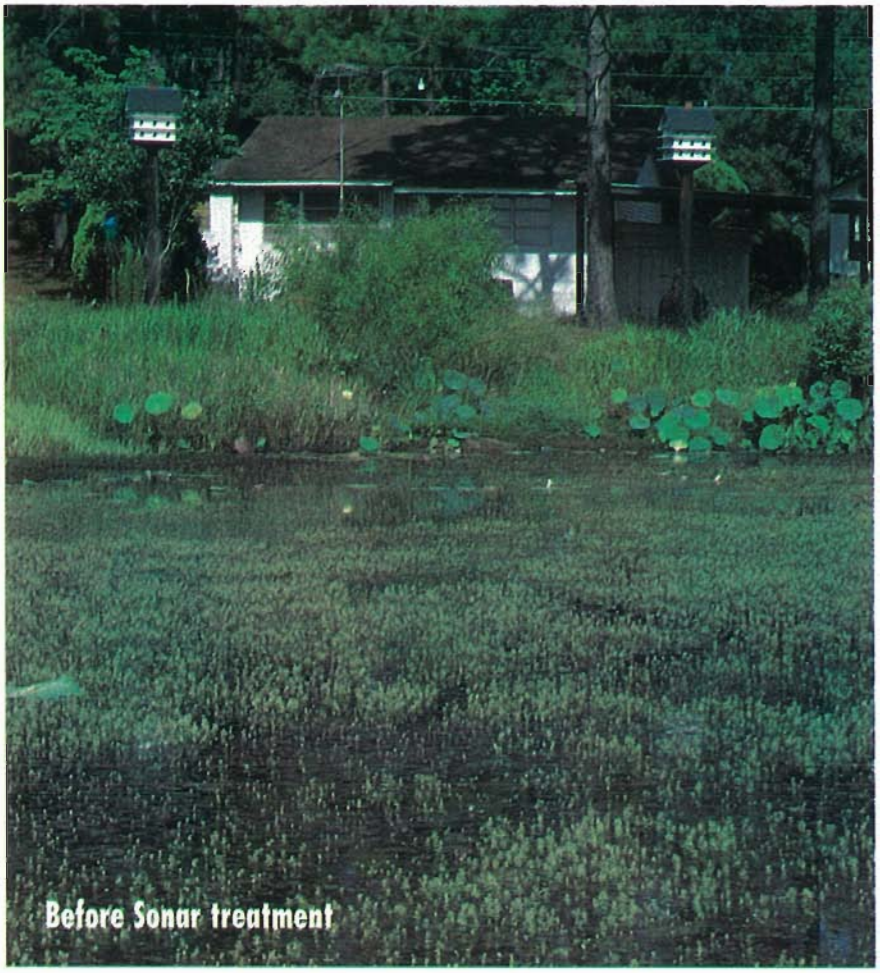
IDENTIFICATION: The Seminole Crescent is a small black butterfly with cream-colored spots and bands. There is a distinctive orange patch at the base of the wings above. Wingspans range from 2.7 to 4.1 cm. The caterpillars live in a nest of silk on the leaves of the host plant. They are black with rows of branching spines.
HABITATS: Swamps and bottomlands in northern and central Florida.
WETLAND AFFINITY: Obligate Wetland.
SEASON: The Seminole Crescent flies from May through November.
HOST PLANTS: The caterpillars feed on the leaves of *Justicia ovata* (Water Willow).

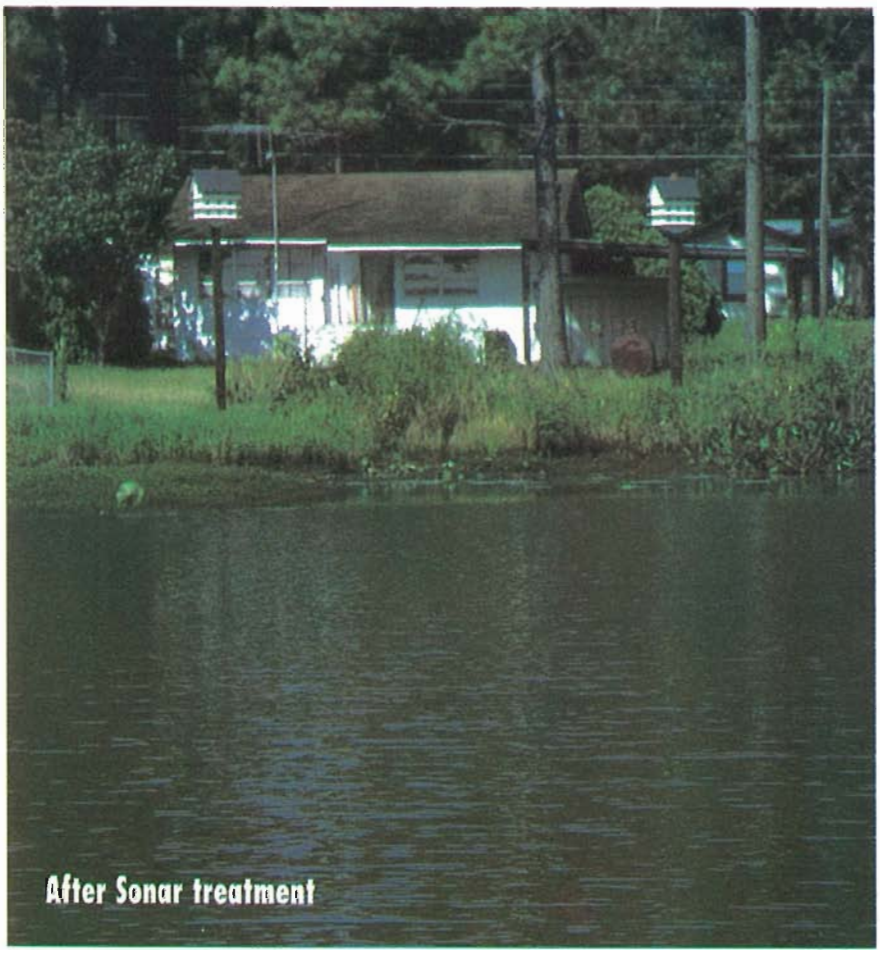
11. *Basilarchia archippus floridensis* (Florida Viceroy)

IDENTIFICATION: Adults of the Florida Viceroy are mahogany brown with dark borders. A dark line across the hindwing distinguishes this species from the milkweed butterflies. In the northern part of the state, the color varies from light orange (like the typical Viceroy found throughout the

Table 1. Wetland host plants of brushfooted butterflies of Florida, and the indicator status of the hostplant, or its degree of wetland tolerance [OBL = obligate wetland plant (always in wetlands), FACW = facultative wetland plant (usually in wetlands), FAC = facultative (equally likely to occur in wetlands and uplands), "+" = favors wetter habitats].

FAMILY	NAME	INDICATOR STATUS
Acanthaceae	*Justicia ovata* (Water Willow)	OBL
Avicenniaceae	*Avicennia germinans* (Black Mangrove)	OBL
Cyperaceae	*Rhynchospora inundata* (Beakrush)	OBL
Poaceae	*Arundinaria gigantea* (Switch Cane)	FACW
	Chasmanthium nitidum (Spikegrass)	FACW+
Salicaceae	*Salix caroliniana* (Carolina Willow)	OBL
	Salix nigra (Black Willow)	OBL
Scrophulariaceae	*Bacopa monnieri* (Water Hyssop)	OBL
Ulmaceae	*Celtis laevigata* (Hackberry)	FACW
	Ulmus americana (American Elm)	FACW
Urticaceae	*Boehmeria cylindrica* (False Nettle)	FACW+
Verbenaceae	*Phyla nodiflora* (Cape Weed)	FACW





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eastern U.S.) to dark mahogany brown. Wingspans range from 5.6 to 8.5 cm. Young larvae are brown with a white middle, and resemble bird droppings. Older larvae are greenish or brownish with a pinkish-white middle. There are two stick-like tubercles on the thorax, and a round, spiny tubercle on top of the rear end. Young caterpillars overwinter in a shelter made at the base of a chewed leaf. A closely related species, the Red-Spotted Purple (*Basilarchia arthemis astyanax*), is mostly a butterfly of upland forests that occasionally uses Carolina Willow as a host plant. In ecotonal areas where the Red Spotted Purple and the Florida Viceroy come in contact, odd hybrids sometimes result from rare cross matings.
HABITATS: This butterfly is closely associated with willows in marshes, swamps, ditches, and the margins of streams, ponds, and lakes.
WETLAND AFFINITY: Obligate Wetland.
SEASON: Adults can be found from March through November.
HOST PLANTS: The larvae eat the leaves of willows, especially *Salix caroliniana* (Carolina Willow) and *Salix nigra* (Black Willow) in Florida.

12. *Junonia evarete* (Black Mangrove Buckeye)
IDENTIFICATION: Of the three species of buckeyes in Florida, this is the largest. Diagnostic characteristics include the equal-sized eyespots on the upper hindwing, the cream-colored bar above the eyespot on the upper forewing, and the brownish undersides. Wingspans range from 4.5 to 6.1 cm. The caterpillar is black with rows of long, branching spines that have a metallic blue sheen. The head is orange and black with a pair of short horns at the top.
HABITATS: Salt marshes and the margins of mangrove swamps.
WETLAND AFFINITY: Obligate Wetland.
SEASON: Adults occur all year in south Florida.
HOST PLANTS: The caterpillars eat the young leaves of *Avicennia germinans* (Black Mangrove).

13. *Nymphalis antiopa* (Mourning Cloak)
IDENTIFICATION: The Mourning Cloak is dark reddish brown above with cream-colored borders and a row of blue spots along the outer margin of the wings. Wingspans range from 7.0 to 7.7 cm. The caterpillars are gray with a row of red spots along the back. The body has rows of long, branching spines.
HABITATS: Although common throughout much of North America, the Mourning Cloak is a rare species in Florida. This butterfly is associated with willows in northern Florida in swamps and marshes, and along streams and rivers.
WETLAND AFFINITY: Facultative Wetland.
SEASON: The adults have been found during the spring and fall.
HOST PLANTS: The caterpillars eat only the leaves of willows.

14. *Phyciodes tharos* (Pearl Crescent)
IDENTIFICATION: The Pearl Crescent is a small brown butterfly with black markings and borders. Wingspans range from 2.5 to 3.5 cm. The small black caterpillars have rows of branching spines. They live together in a nest of silk and leaves.
HABITATS: The Pearl Crescent is mostly an upland butterfly that also frequents wet prairies and open disturbed wet sites throughout Florida.
WETLAND AFFINITY: Facultative Upland.
SEASON: Adults of the Pearl Crescent occur all months of the year.
HOST PLANTS: The caterpillars eat the leaves of *Aster* species.

15. *Polygonia interrogationis* (Question Mark)
IDENTIFICATION: This medium-sized butterfly is brown with dark spots and margins. Adults that emerge during the summer have nearly the entire upper hindwing shaded with black. The undersides are brown and leaf-like with a silver question mark near the middle of the hindwing. Wingspans range from 5.2 to 6.4 cm. The caterpillar is

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variegated brown, gray, and white, and has rows of branching spines. It lives alone in a nest of silk and leaves.
HABITATS: Swamps, hydric hammocks, and uplands in northern and central Florida.
WETLAND AFFINITY: Facultative Upland.
SEASON: The adults can be found all months of the year.
HOST PLANTS: Larvae of the Question Mark eat the leaves of *Ulmus americana* (American Elm) and occasionally *Celtis laevigata* (Hackberry).

16. *Vanessa atalanta* (Red Admiral)
IDENTIFICATION: The Red Admiral is a dark brown butterfly with red bands on the upper wings. Wingspans range from 4.4 to 5.4 cm. The larva is typically black, with white patches along the sides, and has rows of branching spines. The caterpillar lives in a leaf nest.
HABITATS: Upland forests as well as swamps, marshes, and the edges of streams, rivers, and lakes.
WETLAND AFFINITY: Facultative.
SEASON: The Red Admiral flies all months of the year.
HOST PLANTS: The caterpillars feed on the leaves of plants in the nettle family. *Boehmeria cylindrica* (False Nettle) is a commonly used wetland host.

Wood Nymphs and Satyrs (Nymphalidae, Subfamily Satyrinae)

Five of the seven species of wood nymphs found in Florida occur in wetlands. These are usually brown butterflies with eyespots on the wings. The adults flutter near the ground. Wood Nymph caterpillars may be green or brown, and lack spines. The rear end is forked, and the head may bear a pair of short horns.

17. *Cyllopsis gemma* (Gemmed Satyr)
IDENTIFICATION: The Gemmed Satyr is named for the metallic silver markings on the underside of the hindwing along the outer margin. Wingspans range from 3.2 to 4.1 cm. The caterpillar is green with faint yellow stripes along the body.
HABITATS: Mesic and hydric hammocks in northern and central Florida.
WETLAND AFFINITY: Facultative.
SEASON: This satyr can be found flitting about from March through November.
HOST PLANTS: Larvae of the Gemmed Satyr eat the leaves of *Chasmanthium nitidum* (Spikegrass).

18. *Hermeuptychia sosybius* (Carolina Satyr)
IDENTIFICATION: This is one of Florida's most common butterflies. The uppersides are plain brown, but the underside of the hindwing has two or three small eyespots. Wingspans range from 2.7 to 3.6 cm. The caterpillar is bright green with white spots along the sides. The horns on the head of caterpillars in this group are reduced to tiny bumps in this species.
HABITATS: The Carolina Satyr is mostly a butterfly of upland forests. It also occurs abundantly in hydric hammocks. This species is found throughout Florida.
WETLAND AFFINITY: Facultative.
SEASON: Adults are present all year.
HOST PLANTS: The caterpillars eat the leaves of grasses.

19. *Satyrodes appalachia* (Appalachian Eyed Brown)
IDENTIFICATION: The Appalachian Eyed Brown is light brown with a row of eyespots along the outer margins of the wings below. Wingspans range from 4.6 to 5.3 cm. The caterpillar is green with pale yellow stripes.
HABITATS: Swamps in northern and central Florida
WETLAND AFFINITY: Obligate.
SEASON: This butterflies flies from March through November.
HOST PLANTS: The larvae feed on the leaves of *Rhynchospora inundata* (Beakrush).

20. *Enodia portlandia* (Southern Pearly Eye)
IDENTIFICATION: The underside of the wings of the Southern Pearly Eye have a purplish cast. There is a row of eyespots along the outer margin of the wings. This is one of the largest wood nymphs in Florida. Wingspans range from 5.2 to 6.2 cm. The caterpillar is light brown.
HABITATS: Cane brakes in hammocks of northern and central Florida.
WETLAND AFFINITY: Facultative Wetland.
SEASON: The adults occur from March through November.
HOST PLANTS: The caterpillars of the Southern Pearly Eye eat only the leaves of *Arundinaria gigantea* (Switch Cane).

Figure 1. Brushfooted butterflies found in wetland habitats of Florida.

21. *Neonympha areolata* (Georgia Satyr)
IDENTIFICATION: This little butterfly is mostly pale brown. The underside of the hindwing has teardrop-shaped eyespots enclosed by orange lines. Wingspans range from 2.9 to 3.9 cm. Caterpillars of the Georgia Satyr are green.
HABITATS: Wet prairies throughout Florida.
WETLAND AFFINITY: Obligate Wetland.
SEASON: The adults occur all year in south Florida. In the northern part of the state, the Georgia Satyr flies from March through November.
HOST PLANTS: The larvae eat the leaves of grasses and sedges. They readily accept *Andropogon glomeratus* var. *glaucopsis* (Purple Bluestem) in the laboratory.

A Historical Look at Aquatic Plant Management on Lake Rousseau - Part 2

by
Nancy P. Allen, U.S. Army Corps of Engineers
and
Terry Sullivan, Department of Environmental Protection

Continued from Aquatics 19:4-6

Corps of Engineers Begin Lake Rousseau Aquatic Plant Management

In September 1987, the U.S. Army Corps of Engineers (USACE) assumed direct supervision of the aquatic plant management program for Lake Rousseau. One of the first things the USACE developed was an Aquatic Plant Management Plan for the reservoir that identified both current (1988) and long term goals. The long term management goals were as follows:

1. Maintain non-native, problem plants at the lowest level possible with available funds. Problem plants include water hyacinths, water lettuce and hydrilla.
2. Reduce acreage covered by tussocks to less than 30 percent of present acreage and break up large mats into smaller mats for increased edge habitat and better access.
3. Encourage native aquatic plants to re-establish their dominance along shorelines and other areas.
4. Increase water movement and reduction of sediment build-up.
5. Monitoring of water quality and nutrient inputs to the lake.
6. Maintenance of open, safe, properly marked navigation channels.

From 1987 until 1992, most of the aquatic plant management was done with the use of herbicides which were applied by boat. To improve the efficiency of herbicide applications, rhodamine WT dye studies were conducted in October 1988 by Dr. Alison Fox and Dr. Bill Haller, Center for Aquatic Plants, University of Florida. The dye study showed that thermally stratified water conditions can inhibit vertical mixing of water layers and thus prevent the even distribution of post treatment herbicide concentrations (Haller/Fox 1990). Thus the use of granular formulations increased, and liquid herbicides were applied by trailing submersed hoses to insure that the product would go below the thermocline.

Several other avenues of aquatic plant management were also explored including two biocontrol projects. The establishment of the water-lettuce weevil (*Neohydronomus affinis*) and the water-lettuce moth (*Spodoptera pectinicornis*), were introduced with little to no success. Judy Gilmore from the University of Florida Entomology and Nematology Department, made six releases totaling 16,350 water-lettuce weevil larvae from April until November 1992 on Lake Rousseau. In 1993, three more releases totaling 7,800 larvae were made at another location on Lake Rousseau. In addition to the Lake Rousseau work, three more releases were made on the Rainbow River in September of 1994. Cold weather and predation were speculated to have been the factors preventing the moth from becoming established. Two releases were made of the water-lettuce weevil which was also unsuccessful in establishing a self sustaining population.

A Lake Rousseau Management Planning Task Force was developed in 1985 due to complaints and concerns regarding channel markers and aquatic plant management on Lake Rousseau. This USACE sponsored group composed of Federal, State, local governmental agencies and private individuals has made substantial headway over the years. One 1988-89 project of significance was the development and implementation of a single 3-foot water fluctuation of Lake Rousseau and a continuing 1-foot water fluctuation for the following purposes:

a. To facilitate removal of hazardous stumps from boat access trails by widening trails and cutting stumps previously missed.
b. To facilitate placement of permanent day markers along all access trails in Levy, Citrus, and Marion counties on Lake Rousseau.
c. To allow homeowners to remove stumps, repair docks and seawalls, deepen boat slips, and/or remove sediment in front of their property, subject to individual permit.
d. To allow the USACE to remove sediment on a small scale to improve fish bedding habitat, if suitable areas are located after the drawdown.
e. To obtain aquatic plant reductions.

In addition, the 1-foot fluctuation would allow for a more naturally occurring lake system and some flushing of the reservoir would result. Lake stage would correspond with wet and dry seasons, accordingly.

The single 3 foot drawdown began on December 1, 1989 and was reached 14 days later. This level was maintained until February 22,

1990 and was one week longer than originally planned. The extra week was requested to keep the discharges lower than normal for an ongoing Fluridone treatment. The pool then rose over the next 15 to 30 days, to reach normal levels. Minimum flow requirements for the lower Withlacoochee River were met during refilling. The greatest sediment exposure was in the Peaceful Acres area. For the entire lake 50 permits were issued for dock repair, 30 permits were issued for muck removal (10 cu. yards or less) and 29 stump removal permits were issued. The stump permits varied from 3 to 300 stumps each. Individual homeowners ran into problems with the permitting process which delayed their work for sediment removal. The Rainbow River was affected to a greater extent than expected. Walt Driggers, homeowner and Task Force Member said that the Rainbow River was down 26". The boat ramp at Hwy. 41 on the Withlacoochee River in Dunnellon became unsafe to use so GFC made emergency repairs on it during the drawdown. Access trails, boat ramps, and the main channel had stump cutting projects done on them. After the stump cutting, the USACE put out pipe and flagging to mark the trails in areas that were no longer identifiable.

Corps Fluridone Treatment Summary

From Fiscal Year (FY) 88 through Fiscal Year 91, the USACE conducted annual large scale Fluridone treatments on Lake Rousseau.

In FY 88, a total of 1,234.5 acres of hydrilla were treated on Lake Rousseau in an intensive effort to stop the spread of this exotic plant. Seven hundred forty six acres were treated with Endothall, 40 acres with Komeen, 47 acres with Diquat and K-Tea, 1.5 acres with Diquat and 400 acres with Sonar AS and SRP.

Thirteen Sonar plots were set up on the lake from Smith's Pasture to the main spillway. Several combinations of techniques and rates were used to determine what combination would control hydrilla most effectively. Formulations of active ingredients ranged from 1.5 to 3.0 a.i. (active ingredient) per acre. Some plots had split treatments where half of the plot was treated and then two weeks later the other half was treated. Other plots had half of the allotted product spread over the entire plot and then 2 weeks later the other half of the product was spread over the entire plot. Five of the plots used Fluridone in combination with Komeen. One control plot of 40 acres was set up and treated with just Komeen. Approximately 4-7 months of control was achieved in 70% of the plots and/or downstream from the plots. The Komeen/Sonar plots did not fare any better then the plots where just Sonar was used. An important factor was noted during these treatment studies. To get the best control of hydrilla, herbicide contact time must be as long as possible. To get the longest contact time it is necessary to keep the main spillway closed and to carefully monitor the discharge at the bypass spillway. Rainfall and in-flows also contribute

to the loss of the herbicide by increasing the discharge levels. Holding the water much above 27.5 NGVD is not allowed due to flooding concerns of the many residents around Lake Rousseau.

In FY 89, a total of 633 acres of hydrilla were treated. This is approximately half of that treated in 1987. An interesting note is that the total acres of hydrilla during these years neither increased or decreased. In March, a Sonar treatment of 256.5 acres began. Sonar SRP was used for 222 acres and Sonar AS was used on 34.5 acres. In FY 88 a lot of the product was dischargeddue to high river flow caused by heavy rainfall. From that experience, we reasoned that the pellet would provide for a slower release and longer contact time. We also decided that if heavy rains were projected we would stop the treatment. The treatment rate used was 3 pounds a.i. per acre. The plot locations were similar to the 1988 treatment except that three plots were located farther upstream. Even with higher river flows the results were much better. Approximately 3 times the area treated was affected. Results ranged from complete control to partial control, where the plants were only thinned. Coontail (*Ceratophyllum demersum*) came in and filled the niche that the hydrilla once occupied. However, the length of control was still not ideal, lasting only 4-8 months.

In FY 90, 354 acres of hydrilla were treated with Sonar AS. Seven sites were selected and this treatment was conducted over a seven week period from March 5 to April 20, 1990. Small concentrations of the product were put out into each plot 2 or 3 times a week. Random placement of the product occurred within each plot, to insure mixing. The plants in the Smith's Pasture plot area were very golden in color and had diatoms coating the surface. The plants were thick and dense but did not appear to be actively growing. This treatment was also scheduled in conjunction with the refill of Lake Rousseau from its 3.5 foot lowering. The product was put out before raising the lake level. Therefore, there was very little water movement at the bypass spillway or in the plot locations. The Old Lake Rousseau plot and the 60 acre Bird Island tussock mat was heavily impacted from this treatment. Bird island was a site that we had been cutting trails through for fishing access and increased edge effect. The Sonar went up into the tussock mat and resulted in widened fishing trails and a reduction of the mat density and height. The length of hydrilla control ranged from 6-10 months. Much of the areas had the hydrilla density reduced or thinned. That year, Egeria (Egeria densa) and coontail increased following the hydrilla treatment.

In FY 91, 339 acres of hydrilla were treated with Sonar at 2-3 pounds a.i. per acre. This 7 week treatment started on April 15th and ended May 31st. Fourteen hundred pounds of Sonar granular and 192 gallons of Sonar AS were used. Sixteen plots were established varying from 10 to 50 acres in size. One quart of Nalquatic was added per 100 gallon tank. As in previous treatments, application was by subsurface injection, trailing hoses. Afternoon showers occurred regularly which increased flows. Control results were good in the Safari plot and main spillway plot areas. Overall, the treatment did not hold back the plant growth and the hydrilla acreage increased in FY 92.

DEP Takes Over Lake Rousseau Aquatic Plant Management

Since 1992, all Cross Florida Barge Canal properties, which include the Lake Rousseau Recreation area, has been under the stewardship of the Florida Department of Environmental Protection (DEP), Office of Greenways and Trails. Aquatic plant control operations on the Backwaters are headed up by the DEP, Bureau of Aquatic Plant Management. Contracted private spray crews still are used to apply the aquatic herbicides as directed by the DEP regional biologist, Terry Sullivan.

DEP manages waterhyacinth and

water-lettuce through a program of maintenance control. This means spraying a small amount of herbicide on a few plants fairly often, rather than larger amounts later when the plants are out of control. Local fisherman expressed concerns about the spray program. One such concern was treatments occurring during the bass bedding. The current program tried not to conduct surface spraying during this period and has been successful in doing so the last 3 years. Another request from fishermen was that the pennywort fringe remain so that shiners could be fished under these edges. When DEP began its program the spray crews used a combination of 2,4-D amine and Reward to spray waterhyacinth and water-lettuce on the lake. Due to the low hyacinth level the 2,4-D was removed, so not to impact the pennywort. Now only Reward is used to spray for floating plants with only temporary impacts.

Floating tussocks create problems when they break loose and drift into boat trails or wrap around channel marker, sometimes causing them to move out of place. Tussocks are normally managed using the herbicide, Rodeo. Tussocks are comprised of a variety of floating and emergent plants, and Rodeo has done well in controlling these small floating mats. Granularformulations of both Sonar and Aquathol have been found to work best on the lake's hydrilla treatments.

DEP Fluridone Treatment Summary

In 1993, a 400 acre, Sonar treatment was completed at 2 lbs a.i./ acre. From February 22 - April 15, 1993, 200 acres were treated with SRP and 200 acres were treated with AS. The SRP plots were treated once each week and the AS plots were treated twice each week. All plots had the product applied evenly over the entire plot for five weeks. The extended treatment was caused by the March 13 "Storm of the Century", which unexpectedly roared into the Inglis area. The storm temporary halted the treatment. Mother Nature, once again, was out to confound a perfectly good management program. The high winds and rain associated with the storm, diluted the results, but not our spirits. Approximately 1,200 acres of hydrilla were impacted by this treatment and the results lasted about 10 months.

The 1994 Sonar treatment was conducted over a period of six weeks, from February 9 to March 18, 1994. Twenty plots ranging in size from 10 to 60 acres were placed in the western portion of the lake where the greatest hydrilla infestation occurs. These plots began near the dam and extended eastward to the Old Mill area. One-fifth of the Sonar SRP was put out each week in each plot. Because of bad weather during the fourth week, herbicide was not applied that week. A total of 425 acres were treated, which resulted in the control of over 2000 acres of hydrilla which is half the size of the entire lake. The total cost of this treatment was $258,525.

From February 1994 to July 1995, 31 water samples were taken at 8 locations around the lake. Fluridone concentrations were measured from these water samples. The highest concentrations of 2 ppb occurred approximately one month after the last treatment.

The 1995 hydrilla Sonar treatment was targeted at tuber sprouts. The treatment went out between March 14 and April 11, 1995. The treatment plan was analogous to the previous DEP treatments; however, due to funding considerations, 50 fewer acres were treated. Also, it was determined that the entire treatment would be done with the granular formulation. Twenty plots ranging from 10 to 40 acres in size were treated with a total of 750 pounds (a.i.) of fluridone at 2 pounds per acre. The plot size and location was determined by its proximity to the main channel. It was better to keep plots well away from the main channel and its high flow rate to prevent the product from being moved off site. One-fifth of the herbicide was distributed per week. Good weather allowed the treatment to be completed in five weeks. Weather conditions were favorable following the treatment, which provided for excellent control of the hydrilla. This 375 acre application controlled an estimated, 1000 or more acres of hydrilla tuber regrowth at a total cost of $230,390.

January surveys indicated a major regrowth of hydrilla from tubers; thus, a significant hydrilla treatment was planned again for 1995. Winter rain created high flow rates in the system, which persisted into summer. The treatment had to be eventually canceled. In spite of the cancellation, the hydrilla remained under control through 1996. For once, Mother Nature was on our side. Dark tannin stained water poured down from the Withlacoochee River in heavy volume and lead to the control of the resprouting plants.

This year in January 1997, surveys were conducted to determine if hydrilla was present. Guess what? Hydrilla had reared it's ugly head again and it was determined that another large scale hydrilla treatment would be required. During the survey, flow rates were low and the water clarity was excellent. Low rainfall levels this past fall has allowed the Withlacoochee basin to dry out and most of the river flow is originating from ground water. Unfortunately, the combination of the clear river water and the warm winter has provided the ideal growing conditions for hydrilla. This shoreline strip treatment with fluridone SRP pellets has been planned and approximately 310-325 acres will be treated.

Conclusion

Have we made any progress? Where do we go from here? So what have we learned over the years? Looking at Figure 1, you can see that it has taken six years of repetitive Sonar treatments to impact the tuber populations enough to reduce the overall hydrilla infestation. Does it really requiresix years of intensive

treatment to get hydrilla under control? Maybe, if weather and flow work with you and if ideal conditions occur then the lake possibly could of seen quicker results. The presence of tannins in the water is another important factor regarding hydrilla suppression and regrowth on this system. The 2 consecutive Sonar treatments in FY 94 and FY 95 brought us to our all time low hydrilla presence in 1996 of a mere 10 acres. However, this year, we are seeing a regrowth from tubers and a major treatment is again needed.

Looking at Figure 2, we can see that hyacinths and lettuce were in a general decline from FY 91 to FY 94. Hyacinths and lettuce were kept at maintenance control from FY 94 through FY 96. In the fall of 1996, dissolved oxygen levels dropped to below levels considered safe for herbicide applications. During this 3 month period, floating plant levels increased from 20 acres to 150 acres. This required several treatments in order to return the lake to a maintenance control level after oxygen levels returned to normal. The total number of acres treated has been reduced by approximately 75% since FY 89.

The battle against invasive exotics will continue on Lake Rousseau. The public perception of aquatic plant management has undergone a major change, from the time that the Florida Game and Freshwater Fish Commission was heralded for spraying hundreds of acres of plants, to nowadays, when verbal and physical threats are directed at our applicators for spraying a few acres under the maintenance control program. I am optimistic however, that we are turning the corner and may one day reach a full circle. The message that exotics are invasive and environmentally damaging is being told daily. As more and more large scale restoration projects occur such as in the Everglades, a wider base of people will come to respect the work that we are doing. It must be realized that we are all striving for a healthy ecosystem through the suppression of exotics.

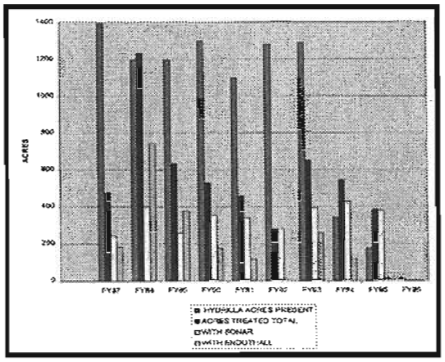

Figure 1. Summary of hydrilla coverage and herbicide treatment on Lake Rousseau from 1987 through 1996.

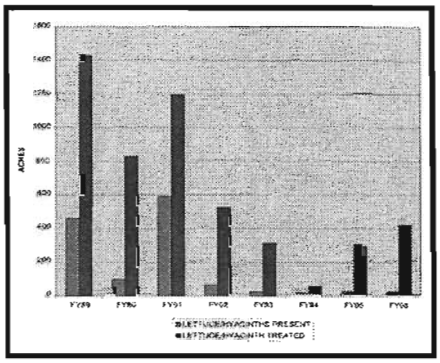

Figure 2. Water hyacinth and water lettuce coverage and herbicide treatment on Lake Rouseau from 1989 through 1996.

Local input and aquatic plant research have gone into shaping the aquatic plant management program being conducted on Lake Rousseau today. Public support and backing is one of the most important ingredients in any management program. There are no silver bullets or easy solutions to managing exotic aquatic plants. Only one thing is for sure; and that is, that many residents will continue to refer to Lake Rousseau simply as the "Backwaters".

Acknowledgments

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Robbie Lovestrand, DEP, Floral City
Catherine Johnson, USACE, Orlando

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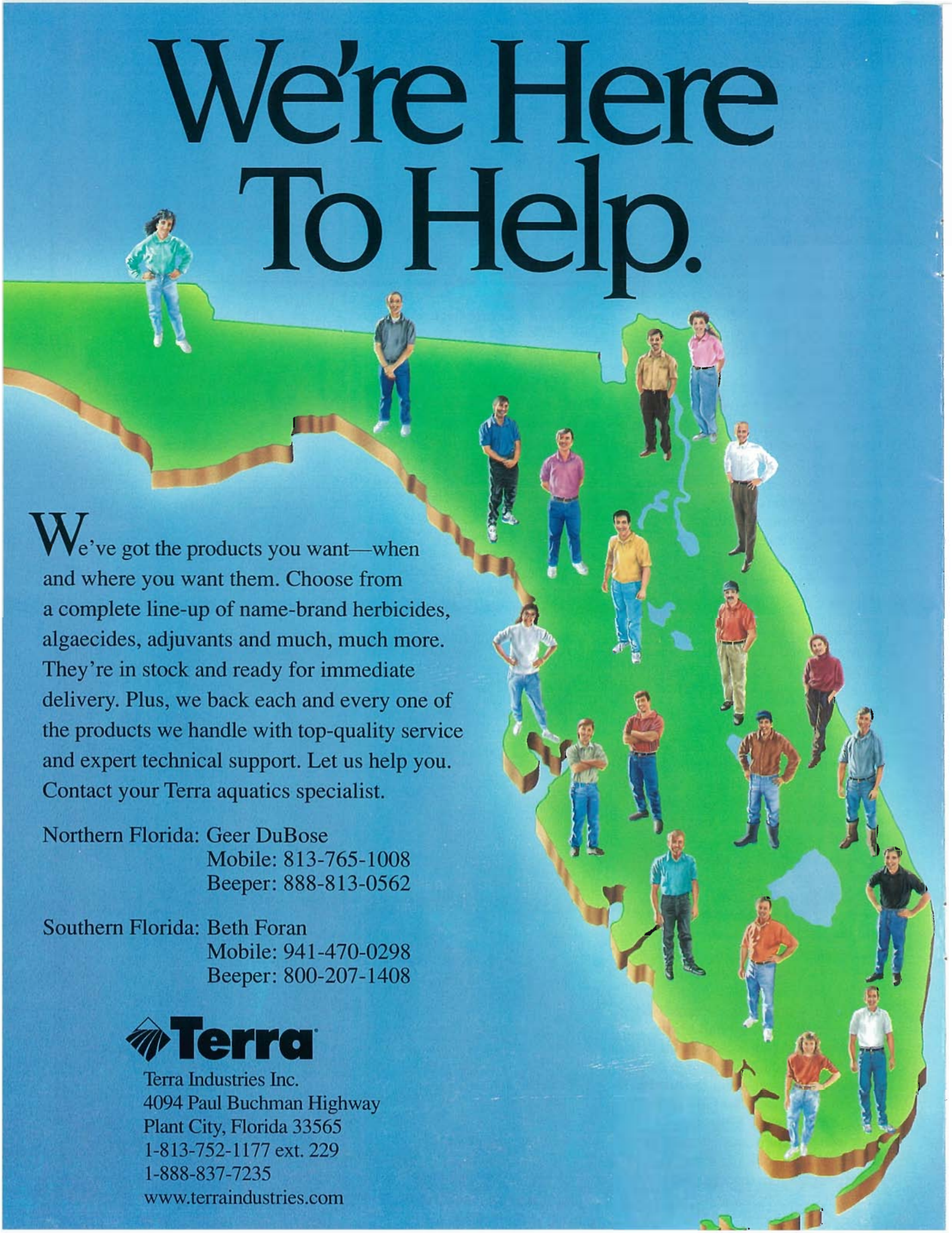

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Aquatic Ecosystem Restoration Foundation, Inc.

By
Lewis Decell,
Executive Director

The Aquatic Ecosystem Research Foundation (AERF), Inc. is a nonprofit, tax-exempt corporation created to conduct and support applied research in the management of aquatic pest species, with emphasis on nuisance vegetation.

The AERF's mission is:

- support technology development that result in strategies and techniques for the environmentally-sound use of chemical products in the management of aquatic ecosystems;
- provide public information concerning the benefits and value of conserving and restoring aquatic ecosystems;
- promote and facilitate cooperation between the public and private sectors;
- enhance interaction among Federal, state, and local natural resource and regulatory agencies involved in aquatic ecosystem management and restoration
- act as a clearing house for information on the proper use of herbicides in the aquatic environment.

During the past 25 years, the US Army Corps of Engineers (USACE) Aquatic Plant Control Research Program (APCRP) carefully established a coalition of in-house scientists, cooperative natural resource agencies, leading research and development (R&D) institutions, and interests in the private sector. This coalition represented the nation's leading scientific expertise in the use of herbicides in aquatic ecosystems. The coalition fostered consistent communication and interaction with the US Environmental Protection Agency and various state and local regulatory agencies. The result was an effective, national alliance for improved management of aquatic ecosystems using herbicides in an environmentally-compatible manner.

In 1996, the U. S. Congress significantly reduced the Federal funding for the APCRP. The reduced level eliminated funds for the Federal/State, 50%/50% cost-shared program, and reduced the research program funding by 50%.

To ensure that the long established technical expertise and capabilities are not lost, and that future needed technologies are developed in a timely manner, the AERF was formed by several companies involved in aquatics. The AERF membership structure consists of aquatic pesticide manufacturers, formulators and distributors. In addition, allied groups such as applicators, lake associations and scientific societies are being invited to participate.

At the present time, memberships in the AERF are held by the following companies:

Applied Biochemists
Brewer International
Cyanamid *
Cygnet Enterprises
Elf Atochem, N.A.
Monsanto *
Rhone-Poulenc
SePro Corporation
Zeneca

* Commitments pending

Projects

One value of the AERF is the opportunity to participate on an R&D level with the Federal Government thru Cooperative Research and Development Agreements (CRADA). These agreements facilitate partnership arrangements under the Federal Technology Transfer Act of 1986 between private organizations and the Federal government, encouraging broader collaboration among scientists. Under a CRADA, the AERF can contribute technical expertise, products, and/or funds to a Federal agency. In return, a Federal agency can provide technical expertise, research concepts, and R&D facilities. The AERF's first CRADA was established in June 1996 with the USACE Waterways Experiment Station. As the AERF becomes more established, additional CRADA's will be initiated as needed. The AERF will also provide direct research grants to support funding at universities and other research organizations.

In general, AERF projects will include:

- developing cooperative R&D programs with academic and government entities
- sponsoring applied research
- promoting the safe and proper use of pest management chemicals in the aquatic environment
- developing educational programs targeted for the general

public and state and Federal agencies

This year the AERF funded 2 research projects through the CRADA with the WES. These are:

Evaluation of Aquatic Plant Management Techniques
Evaluation of Aquatic Plant Metabolites

The Future

In the coming years, the AERF intends to play the leading role in support and continuation of a national R&D coalition to promote the environmentally-sound use of chemicals for managing aquatic plants. This coalition of diverse members has the capacity to ensure that the needed studies that demonstrate, verify and justify the appropriate use of aquatic pesticides will be conducted. Routine communication and scientific credibility will be maintained and strengthened with the EPA, state and local regulatory agencies, natural resource agencies, as well as the general public. All of these factors contribute to a renewed regional and national interest that demonstrates the environmentally sound use of chemicals to manage aquatic ecosystems.

Financial support for the AERF will be derived from annual membership dues, endowments, and possibly funds derived from the sale of aquatic herbicides. In this way, those principal groups deriving long-term benefits from the AERF sponsored research will also share a major portion of the contributed resources. In the next 2-3 years, the AERF will be seeking endowments and research funding to ensure that the capabilities developed over the last 25 years are available to industry, academia, government and the general public.

For more detailed information about the AERF, including membership and participation, please contact Mr. Lewis Decell, Executive Director, P O Box 820438, Vicksburg, MS 39182-0438; Phone 601-638-7150; FAX 601-629-9272.

AQUAVINE

MEETINGS

Florida Aquatic Plant Management Society 1997 Annual Meeting, Sheriton West Palm Beach, October 7-9, 1997.

Mid South Aquatic Plant Management Society 16th Annual Meeting, Holiday Inn, Vicksburg, Mississippi, October 22-24, 1997.

10th International Symposium on Aquatic Weeds, "towards an integrated aquatic plant management", Lisben, Portugal, September 22-25, 1998.

Florida Weed Science Society Annual Meeting, Apopka Florida, February 26-27, 1998. Contact Ken Muzyk, 813/681-3461.

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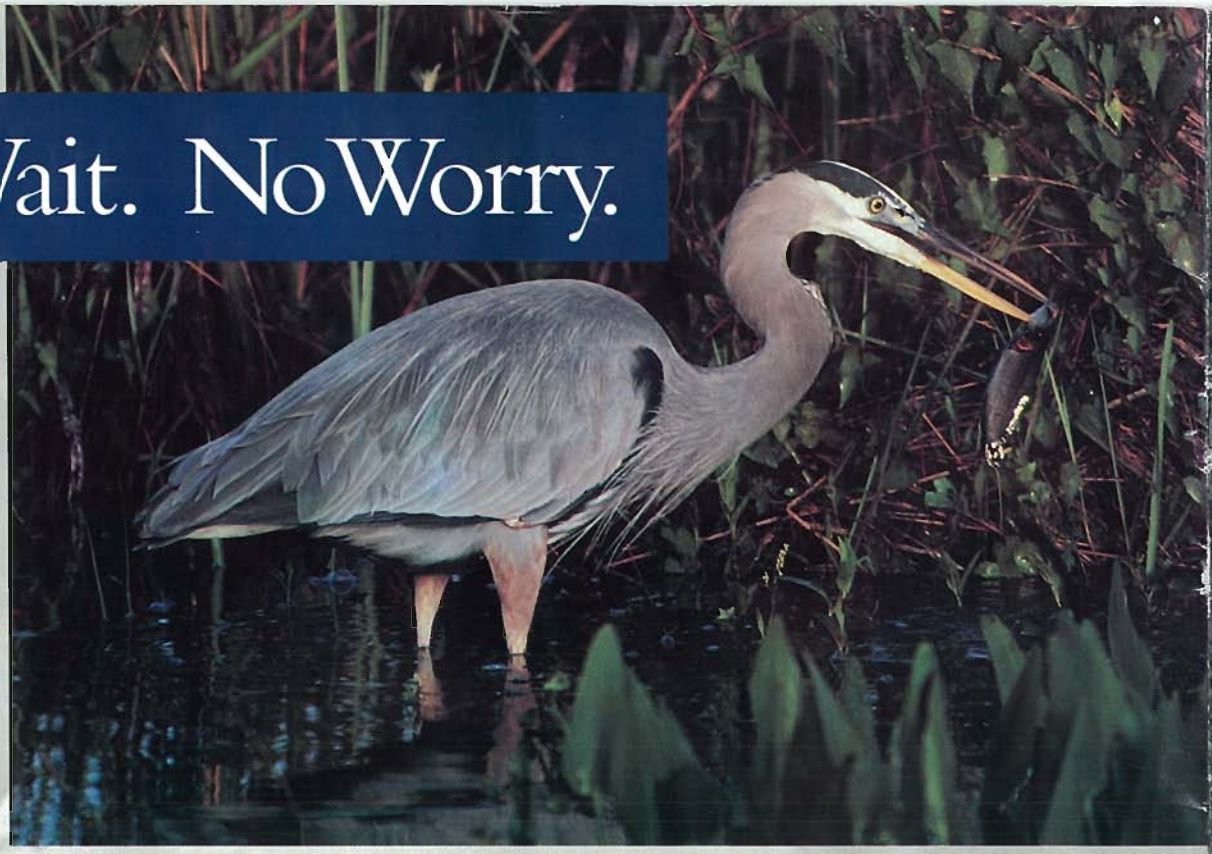

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