

# Aquatics

March 1992



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**Editorial**

Biological Control: Is the sun setting or rising? Biological control, at first glance, seems too good to be true. Can new introductions of non-native organisms ever control Florida's non-native invaders like water hyacinth and hydrilla? Throughout this century, an international network of biocontrol scientists, led by the U.S. Department of Agriculture, have had numerous successes. About half of the 200 or so intentional worldwide introductions, primarily insects, have controlled problem pests to varying degrees. None of the released "critters" have gone on to become pests themselves. This degree of success is amazing given the traditionally shaky funding for these types of programs.

For non-native pests established here, USDA personnel go overseas inspecting, identifying (often for the first time), and collecting insects preying on the pests in their native lands. If promising biocontrol candidates are found, the scientists then evaluate and culture the biocontrol agents in quarantine, before the insects are released. In this way, American insects brought American prickly pear cactus under control in Australia, and South America insects controlled South American alligatorweed in Florida.

Traditionally, each target pest's investigation has been approached separately. This piecemeal approach both aids and damages the program. Separation of investigators is understandable. Several fully-dedicated scientists may need years to explore each pest's intricate ecological connections. However, funding each pest's investigation separately is less defensible. For instance, the Australian melaleuca has been added to the Federal Noxious Weed List, indicating its severe threat to South Florida's Everglades. Yet, funding for melaleuca biocontrol studies has had to be wrung from as many as a dozen federal, state and local entities with only short-term commitments. In addition, of the program's limited long-term federal money only a fraction is left for monitoring the released insects. Because of this lack of dedicated funding, those scientists most knowledgeable about the biocontrol agents can only guess at the causes when their releases succeed or fail.

Interest in biological controls has surged recently. U.S. Rep. E. Clay Shaw, R. - Fort Lauderdale, champions Federal Noxious Weed Act amendments which could greatly, and dependably, increase federal funds for exotic species management. Many states, especially Florida, aim to develop similar support. Resource managers from environmental advocacy societies, federal, state and local governments, and the private sector all see the promise of biocontrol. Hopefully, the stage is being set to spur further use of this crucial pest management tool.

Mike Bodle



**About The Cover**

Aquatic weed control work takes Polk County Environmental Services teams deep into God's country.

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# Should *Ipomoea fistulosa* be Listed as a Prohibited Aquatic Plant?

by  
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 Biological Scientist  
 Florida Department of  
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 Bureau of  
 Aquatic Plant Management  
 Tallahassee, Florida



Figure 1. Adult *Ipomoea fistulosa*, drawn by Laura L. Reep. Reprinted with permission from Ramey, 1990.

## Introduction

*Ipomoea fistulosa* Martius ex. Choisy is an exotic aquatic plant, not plentiful in Florida, that is being considered for the prohibited plant list of the Department of Natural Resources. It is classified within the genus *Ipomoea* (morning glories), and is a member of the family Convolvulaceae. It has been reported in disturbed sites in South Florida (Wunderlin, 1982) However, reports generally do not list a significant presence of the plant in Florida public waters, at least not yet. For example, *I. fistulosa* is not listed within *Aquatic and Wetland Plants of Southeastern United States* (Godfrey and Wooten, 1981) and the Florida State University Herbarium contains no specimens of the plant (pers. obs., 1991). In 1989, Schardt and Nall listed more than 100 species from public waters, but not *Ipomoea fistulosa*.

The species name is synonymous

with *Ipomoea crassicaulis* Bentham (B.L. Robinson), *I. carnea* Jacquemont, *Batatas crassicaulis* Bentham, and *I. carnea* ssp. *fistulosa* D. Austin (Austin, 1984). In southeast Asia, common names are besharam, sada suhagan ("evergreen", Vasudevan et al., 1986), klemut, and kangkungan (Pancho and Soerjani, 1978).

*Ipomoea fistulosa* is a native of South America that is found in various warm regions of the world. In Indonesia, about 80 percent of the water of Rawa Jabung, a natural lake, is covered by aquatic and semi-aquatic weeds, including *I. fistulosa* (Achmad and Ondara, 1969, in Soerjani, 1976).

In India, the plant makes an ideal, easy to manage living fence or hedge (Cook, 1990). The original spread of the species probably was due to this suitability for living fences.

*I. fistulosa* is an extremely fast growing, perennial, shrubby plant,

about 1-5m (3-16 feet) tall. Stems are hollow and woody and can be up to 10cm (4 inches) wide. Leaf blades are oval, about 5-25 cm (2-10 inches) long, and long-petioled. Flowers are light purple or rose-colored, about 5-8cm (2-3 inches) long and in clusters. Seed capsules are oval, and seeds are hairy and small.

The plant is found in both erect and straggling morphological forms. Because of a prolific growth rate and rapid regeneration after cutting, the stem is a useful source of fuel-wood, and the green parts, including bark and leaves, are a source of green fertilizer in India (Singh et al., 1988).

## Ecology and Ecological Impact

*Ipomoea fistulosa* is common throughout tropical countries, causing problems especially in India (Ramey, 1990). The plant can grow in the water, on ditchbanks and



# Clearly, it just makes good sense to be careful when controlling aquatic weeds!

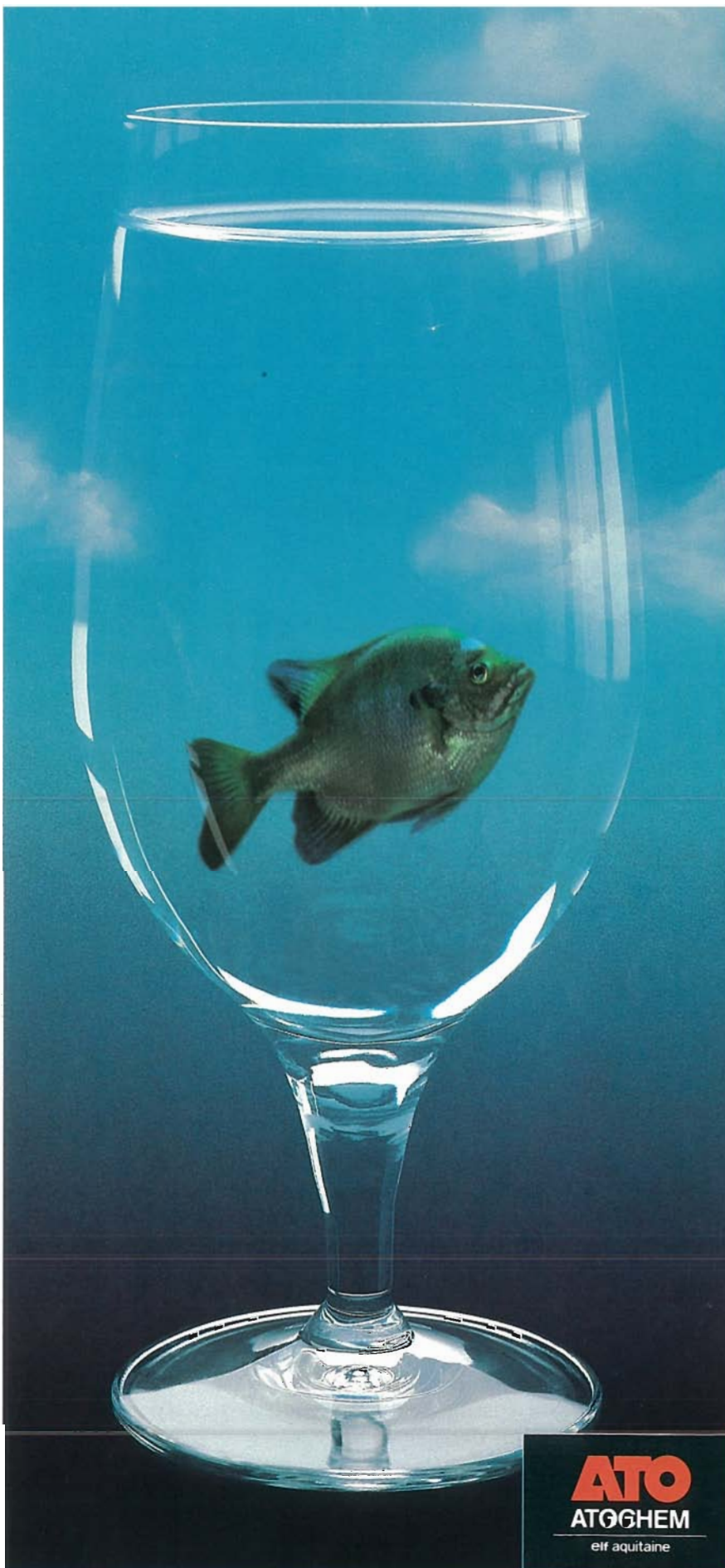
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elsewhere. In some tropical areas, it has escaped from cultivation and naturalized at low altitudes along rivers, lakes and rice paddies (Panchó and Soerjani, 1978). *I. fistulosa* is common along the banks of the Pening River in Indonesia. It is reportedly found "all over" India, especially in two hilly regions that rise up to 1400m (4600 feet, Sharma et al., 1989). (However in contrast, Cook (1987) stated that it is not known above 1000m [3300 feet]). In India, it has only been noticed outside of cultivation since the 1970s.

In its native western Brazil and eastern Bolivia, the plant is very common in silty areas but apparently absent from sandy ones (Cook, 1987). In the silty area along the River Paraguay, it shows an "enormous ecological amplitude," being found on dry rocks, on river banks, in water up to about two meters (seven feet) deep, or as a component of floating islands. In dry conditions it does not seem to tolerate much competition but in water or mud it is highly competitive. In areas of regular flooding, *I. fistulosa* is often dominant and forms stands of several hectares.

*Ipomoea fistulosa* is not eaten by livestock and propagates easily from stem cuttings. Aquatic plant expert C. D. Cook (1987) states that it has recently undergone an "enormous spread" in India. "Locally on a small scale it is already a pest but...no coordinated work on its management or eradication is being carried out in India, or indeed elsewhere." He also states that virtually nothing on the biology of the species appears to be known (pers. comm. to D. C. Schmitz, 1988).

*Ipomoea fistulosa* can colonize wetland and littoral areas, where it can quickly come to dominate. Useful native aquatic plants are replaced by this exotic invader, and the natural ecological balance is seriously altered. Not only is the natural plant life altered, but accompanying animals would be expected to change. In other words, the decreased diversity of aquatic plants could lead to decreased diversity of aquatic animals, including fish and wildlife.

### Reproduction

Stems are capable of rooting in wet areas. As soon as the plant gets into seasonally inundated land, canals, irrigation or drainage ditches, it is capable of spreading rapidly. On a local scale, the spread is presumably by vegetative growth, but the fruit-set is very good and spreading by seed is probably also important (Cook, 1987).

We might expect vegetative reproduction to have another significant effect on dispersal and survival. Besides providing a means of increase, this method of reproduction is not very vulnerable to mechanical means of control. For example, mechanical cutting of the top of the plant can result in the production of coppice (Singh et al., 1988). Thus the reproductive methods of *I. fistulosa* are doubtless very significant to its status as an exotic aquatic weed.

### Economic Impact

*Ipomoea fistulosa* leaves and stems are not used as cattle feed and have little or no economic value in the U.S. The plant cannot even be used for biological production of methane unless it is first adjusted for pH, or mixed with a large quantity of cattle dung (Sharma et al., 1989)

*Ipomoea fistulosa* is considered a weed in various warm regions of the world. It is present as a weed in Argentina, Brazil, and the United States (Holm et al., 1979). *Ipomoea fistulosa* can be killed by applying 2,4-D at 3 kg/ha with a sticking agent (Cook, 1987). However, the dead woody bases must be removed by hand if the weather is not dry enough for burning.

The plant blocks drainage ditches in India (Cook, 1987). In general, *Ipomoea fistulosa* can reduce the width of irrigation and drainage channels. It multiplies quickly and replaces more useful plants. The plant may be difficult to control because it also can survive dry conditions. Thus there can be serious economic costs of control.

In terms of the economics of aquatic systems, *Ipomoea fistulosa* competes with native aquatic plants that provide good cover and food for fish and wildlife. Thus in the future, *I. fistulosa* could have a negative economic impact on

Florida's sport fishery. This in turn could have a negative economic impact on Florida tourism.

### Conclusions

Cook (1987) concluded that in India, if *Ipomoea fistulosa* is allowed to spread in aquatic ecosystems, it could build up very large populations like it does in tropical South America. In Florida, decreasing the possibility of spread of *Ipomoea fistulosa* could have a positive effect on native aquatic plants, future water flow in public waterways, and other matters mentioned above.

Control of the plant probably can be accomplished best when populations are still small. "Eradication or control of small populations is relatively easy but eradication of large populations is another matter, it is not only expensive but dangerous" (Cook, 1987).

### Acknowledgments

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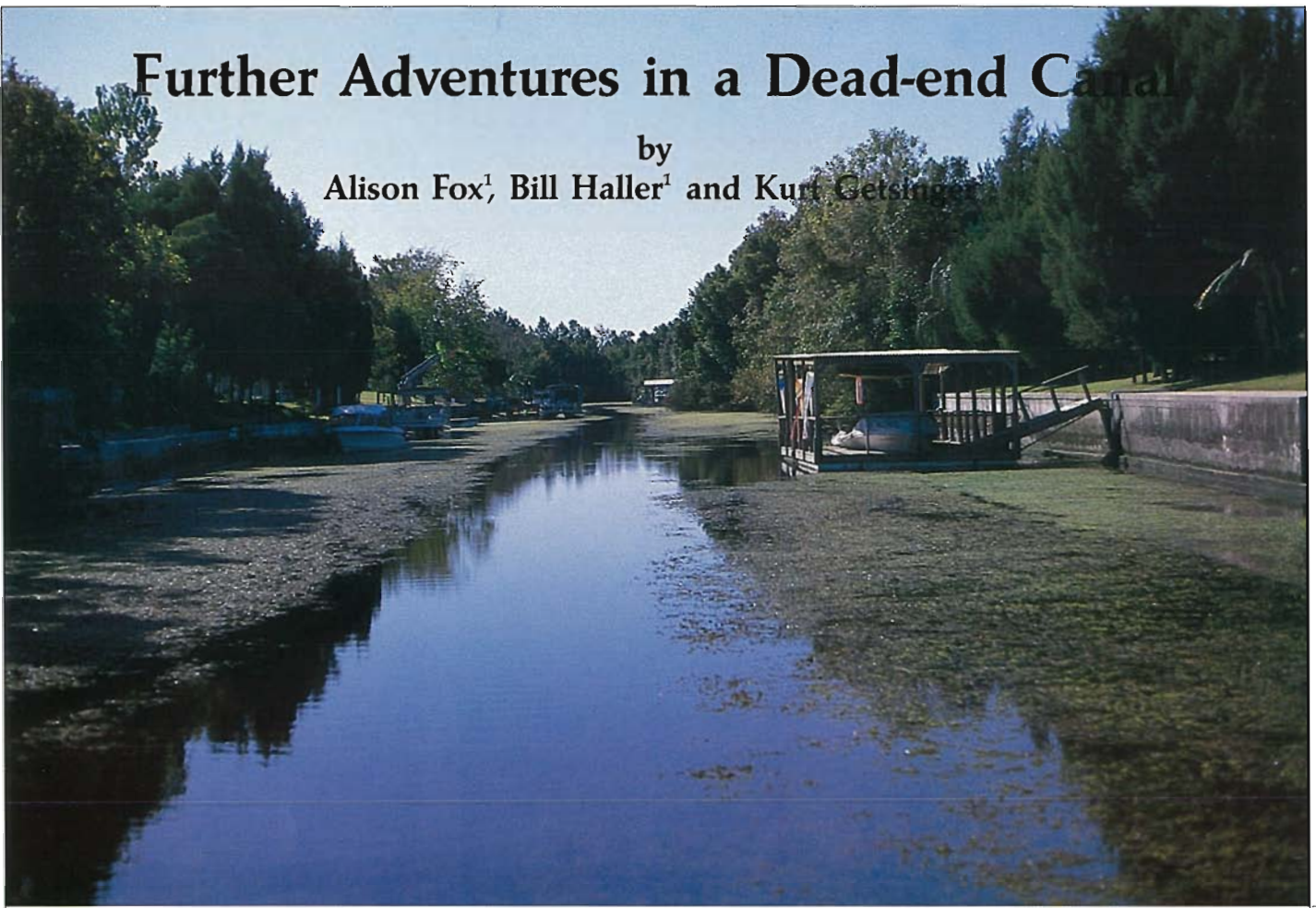


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# Further Adventures in a Dead-end Canal

by  
Alison Fox<sup>1</sup>, Bill Haller<sup>1</sup> and Kurt Getsinger<sup>2</sup>



*Three Sisters canal study area in Crystal River, Florida.*

In the June 1989 issue of *Aquatics* we briefly described studies that we were conducting with the Citrus County Aquatic Services Division (funded by the US Army Corps of Engineers Waterways Experiment Station and Jacksonville District) in Crystal River, Florida. By applying the red fluorescent dye RHODAMINE WT to the hydrilla-infested, dead-end, Three Sisters canals and measuring the changes in dye concentrations over several tidal cycles, we could estimate rates of canal water exchange resulting from tidal and spring-fed water movement. Since herbicides will be ineffective if the contact time with the plants is too short, our objective was to predict when herbicides might be most effective, by finding the conditions under which rates of tidal flushing were minimized.

So, after 27 dye applications,

over 9,900 dye readings and some 79,200 data entries, what have we learned about managing hydrilla in the tidal, dead-end canals of Crystal River?

1. The type of tidal cycle (i.e. spring or neap) did not make any significant difference to rates of water exchange in the canals. This was rather surprising because we had expected that a 4-foot difference between high and low tide (spring tide) would have resulted in a greater exchange of canal water than a 2-foot change (neap tide).
2. Dense vegetation can decrease the velocity of flowing water, so it was anticipated that water exchange would be slower when the canals were infested with hydrilla than when they were weed-free. The density of vegetation in the canals did not affect rates of water exchange in the summer, but dense stands of hydrilla did slow down the rate of water exchange in the winter.

This seasonal effect of vegetation was related to the different ways in which the water circulated in the canals depending upon the water temperature regimes. In the summer as the canals heated up during the day, most of the dye-treated water remained at the top of the water column, while cooler spring-fed water moved in along the bottom. The movement of this dye-treated water out of the canal on an ebb tide was over the top of the vegetation where it was not slowed down. In winter, the dye-treated canal water which had been cooled by the low air temperatures (especially at night) tended to sink down to the bottom half of the water column into the vegetation. Dense mats of hydrilla decreased the rate of flow of this cooler water out of the canal on an ebb tide, and so reduced the rates of water exchange.

3. There was considerable seasonal variation in water exchange rates, with fall rates being five times slower when compared to rates in

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the summer. We determined that these variations were due to seasonal water temperature changes, specifically the relationship between water temperature at the bottom of the canals and spring-water temperature of 23°C (72°F). Figure 1 shows the relationship between bottom water temperatures and the half-lives of the dye (time over which average dye concentration in a canal has halved, a useful measure of water exchange rate). Although it is not possible to guarantee the efficacy of a herbicide treatment from a dye half-life, the important point here is that we can predict conditions (water temperatures and time of year) which are most favorable for prolonging herbicide contact times and efficacy. To predict periods when dye half-lives would be longest, simple water temperature measurements can be collected in the canals as air temperature starts to decrease in the fall and to increase in the spring. Water exchange in the canals is chiefly influenced by ambient air temperatures, since spring-fed

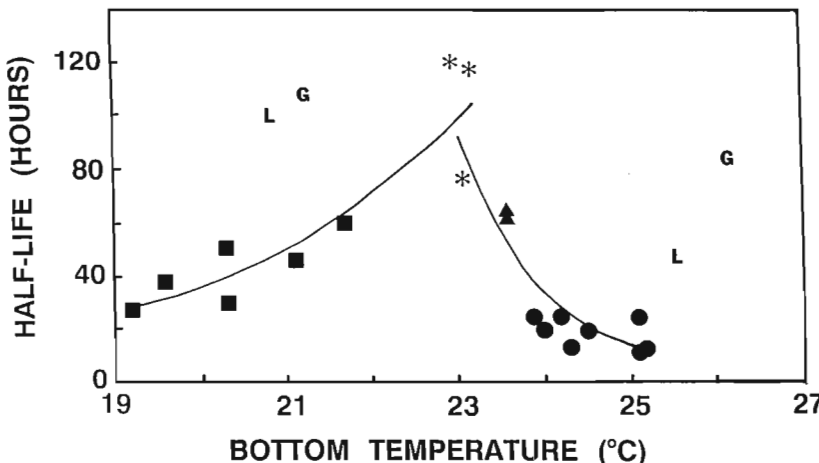


Figure 1. Dye half-lives of each canal treatment plotted against bottom water temperature with regression lines for use in predicting half-lives from temperatures. G = granules; L = long hoses; • = summer; \* = fall; ■ = winter; ▲ = spring.

ground water flowing into the canals is a constant 23°C.

4. Applications of liquid endothall (mixed throughout the water column from hoses 1 to 8 ft. long) in the fall were very effective in reducing hydrilla biomass for up to 25 weeks (average 19 weeks). In the fall, water temperatures throughout the canal were isothermal and equal


to that of the spring-water, resulting in little water circulation and exchange. This was when the longest dye half-lives were found, as shown in Figure 1.

Spring endothall treatments were effective, but for a shorter period of time. Past experience had shown that summer endothall treatments were usually ineffective, however with dye half-lives of only 12 to 24

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hours this was not surprising. During these studies, endothall was the only contact herbicide permitted for use in these canals, so comparisons with other herbicides were not conducted.

5. By applying dye through long (12 to 16 ft) weighted hoses or in granules, much longer half-lives were found than would have been predicted under those temperature conditions for applications mixed throughout the water column (G or L symbols in Figure 1). Tidal flushing had less influence on the rate of dye dilution when the dye was placed at the base of the hydrilla mats. This was found in both summer and winter conditions, with dye half-lives approaching the values that had resulted in good weed control in the fall and spring.

6. Long hose and granule treatments of endothall in winter, spring and summer provided longer hydrilla control (averaging 14 weeks)

than applications mixed throughout the water column (averaging 8 weeks) or by mechanical harvesting techniques (averaging 6 weeks). These treatments indicate that appropriate application methods (placing the herbicide at the bottom of the water column) may overcome the limitations that rapid rates of water exchange have on endothall use.

Comparisons of the frequency that re-treatments would be necessary within a year can be made between the management methods outlined here. Assuming 19 weeks of control from a fall endothall treatment, only three applications per year would be needed using long hoses or granules (19+14+14 weeks of control). Five treatments per year would be necessary if endothall was mixed throughout the water column (19+8+8+8+8 weeks of control; assuming any control could be achieved in the summer). Although harvesting in the fall reduces hydrilla for about 10 weeks (because of slower regrowth during

the winter) a total of at least 8 harvests a year would be necessary for adequate management (10+6+6+6+6+6+6+6 weeks of control). Based on these re-treatment estimates, aquatic plant control managers could compare the annual costs of different management methods to develop the most cost-effective program.

While harvesting provides immediate relief in the canals, harvesters are limited to a central channel. Herbicides tend to provide weed control across the entire canal and between and under the numerous boat docks, so the actual acreage managed per treatment is greater than with harvesting.

7. Similar dye studies in other dead-end canals in Crystal River (i.e. Hunter Springs) showed that, in the summer at least, the dye half-lives were within the range predicted from the water temperatures and Figure 1. This suggests that results from the Three Sisters canals studies may be ap-

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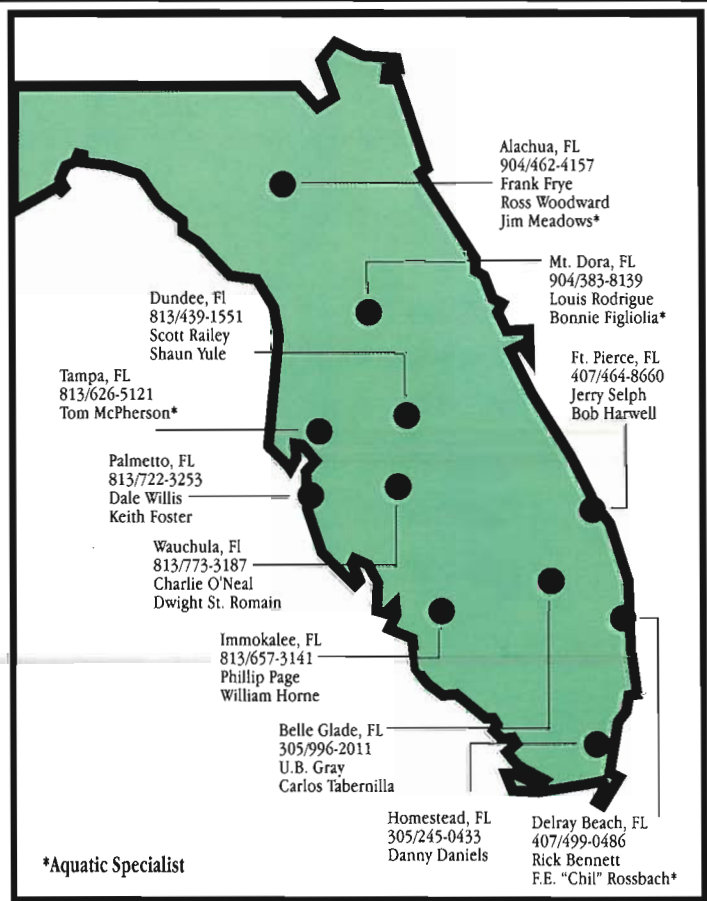
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\*Aquatic Specialist



plicable to other tidal, dead-end canal systems in spring-fed areas.


The use of RHODAMINE WT dye allowed us to evaluate instantaneously the factors which influence water exchange in these tidal canals. We have published other data which show that this dye mimics herbicide movement and dilution. Had we not been able to use the dye we would have had to collect huge numbers of water samples for endoathall residue analysis (which would have taken a considerable amount of time at considerable cost).

By finding the environmental and application method conditions that allow most effective use of herbicides in these canals, we have provided Citrus County more predictability in their efforts to control hydrilla. Another conclusion from these studies is the importance of following up on the effectiveness of various management techniques, particularly in areas that have a history of unpredictable results. Pre- and post-treatment fathometer tracings taken in these canals on a regular schedule were vital in showing which treatments were most effective. Just waiting for the next complaint on the telephone does not give a very good indication of how well the last treatment worked!

Perhaps all this research has been the easy part. Now that the expectations and limitations of various management techniques are known for these canals, decisions have to be reached with all the agencies who have an interest in vegetation management in the Crystal River system. Hopefully, all those hours of dyeing in the Three Sisters canals will make these decisions a little easier and weed control much more reliable.

**Footnote:**

Literature with supporting data available on request from authors.



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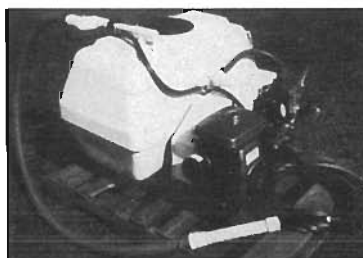
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# Status Report For Invasive Exotic Aquatic Plant Management

by

Jeffrey D. Schardt

Environmental Administrator, Florida Department of Natural Resources  
Bureau of Aquatic Plant Management, Tallahassee, FL

The 1991 DNR Aquatic Plant Survey of public lakes and rivers was completed in November. A total of 464 waterbodies covering more than 1.25 million acres were inspected for hydrilla, waterhyacinth and waterlettuce: Florida's most invasive exotic aquatic plants. The 1991 survey was the tenth annual inventory designed to provide the Bureau of Aquatic Plant Management with reliable, up-to-date information on aquatic plants in public waters. The survey enables the Bureau to develop management priorities and serves as a report card to evaluate programs funded by the State and Corps of Engineers. It is appropriate to focus on hydrilla, waterhyacinth and waterlettuce since more than 95 percent of the funds spent managing aquatic plants in public lakes and navigable rivers are for these three species.

Despite adverse weather conditions in 1991, floating plants were maintained at an overall acceptable level. Fewer than 6,000 acres of waterhyacinth and 3,600 acres of waterlettuce were reported during the survey. Hydrilla expanded by nearly 10,000 acres since 1990 to cover more than 66,200 acres; by far the highest level ever recorded in Florida public lakes and rivers (Figure 1).

At the onset of 1991, funding was thought to be the greatest impediment to successful management of invasive, exotic aquatic plants. However, heavy and seemingly incessant rains which began to quench Florida's 1989-91 drought, also stimulated a bumper crop of waterhyacinth and waterlettuce. Rising water levels germinated millions of seeds which had lain dormant on dry marshes and lake river margins. Organic-laden runoff helped to lower dissolved oxygen

levels and delay management operations. Frequent rains also washed out many attempts to control floating plants. As a result waterhyacinth and waterlettuce were able to proliferate early in 1991. Despite the setbacks, most systems were returned to maintenance control levels by year's end. A notable exception was Rodman Reservoir which harbored nearly 1900 acres of waterlettuce - more than half of the state total!

Since floating exotic plants can expand so quickly and cause such

adverse environmental impacts, waterhyacinth and waterlettuce management are the Bureau's top priority. In 1991, 265 waterbodies (57 percent) contained waterhyacinth; 142 (31 percent) supported waterlettuce. Almost \$2.9 million were spent managing 35,400 acres of these pests in public lakes and rivers in 1991. This is approximately 800,000 more dollars spent and 7,000 more acres controlled than in the previous year.

Poor weather and management conditions also played havoc with

Figure 1: Acres of Hydrilla and Floating Plants Surveyed in Public Lakes and Rivers

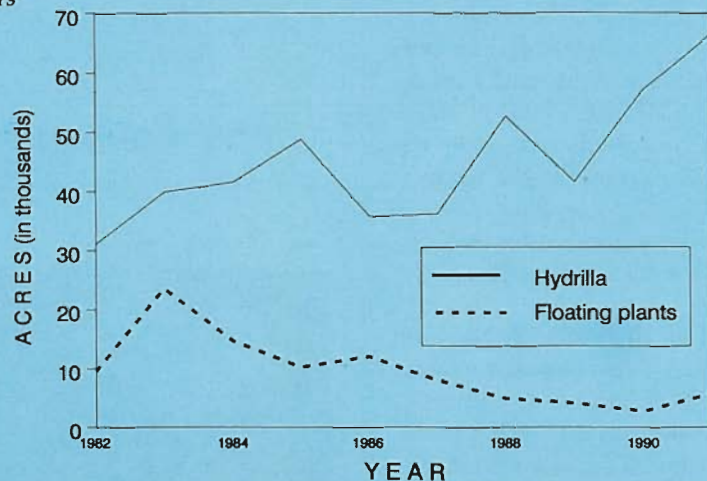
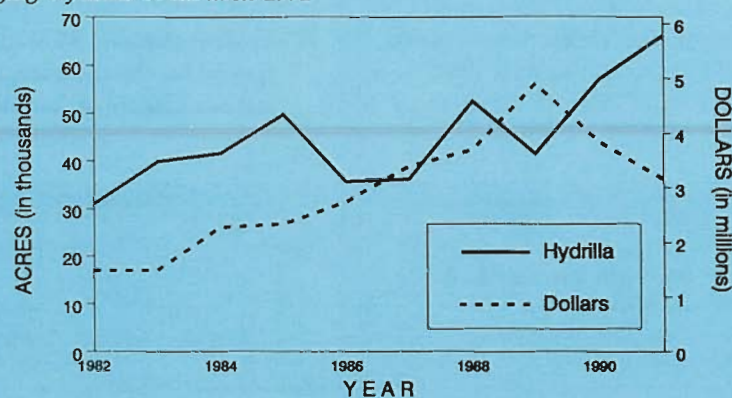


Figure 2: Acres of Hydrilla in Florida Public Lakes and Rivers and Funds Spent Managing Hydrilla From 1982-1991





the 1991 hydrilla management program. Many of the large-scale herbicide treatments were scheduled in lakes with rivers or streams flowing through or into them. Flooding would have reduced herbicide contact time or diluted herbicide concentrations, below effective levels in many cases, resulting in poor or no control. All of the management operations which were attempted appear to have been successful; however, the sheer number of programs which needed to be postponed or scaled back allowed the state's hydrilla population to expand by a net 9,000 acres.

Figure 2 demonstrates the financial dangers of inadequate funding and insufficient hydrilla control. When funds are adequate, hydrilla can be managed at a low level. For example, the last time funding was sufficient was in fiscal year 1988-1989. Four and one-half million dollars were spent controlling hydrilla. Managers used those funds to lower hydrilla to 42,000 acres statewide; the lowest level since 1983. Poor funding since 1988 has allowed hydrilla to expand by almost 15,000 acres. A level which will now require an estimated \$7.5 million dollars for appropriate management. Hydrilla is present in 188 (41 percent) of Florida's public lakes and rivers. A few more suffer hydrilla introductions each year. Hydrilla is also expanding at an alarming rate in many of Florida's largest lakes, especially those of Osceola County.

Funding for hydrilla management is better for 1992 than in the previous two years with about \$5.2 million in state and federal revenues available. This is still far less than the \$7.5 million necessary for appropriate ecological management. Clearly to break the upward spiral of expansion, and to progress toward genuine maintenance control of hydrilla, several consecutive good funding years are required. The Department of Natural Resources has proposed legislation through Senate Bill 1534 and House Bill 731 which will provide this consistent increase. However, aquatic plant management remains a cooperative venture in Florida and needs the support of the general membership of the FAPMS to help in procuring these funds.

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# Effects of a Weed Barrier on Benthic Macroinvertebrates

by

William Bartodziej

Bureau of Aquatic Plant Management  
Florida Department of Natural Resources  
Tallahassee, Florida

## Introduction:

Screening and sheeting fabrics laid over bottom areas to prevent nuisance plant growth have been promoted as an alternative to conventional herbicide or mechanical control methods (Cooke 1986). Benthic barriers act to initially compress plants, impede light penetration to the substrate, and prevent plant recolonization. Barriers are most useful when small, specific lake or river areas warrant continual plant control and access is difficult for the mechanical harvester or spray boat.

Although benthic barriers are becoming a more popular plant management tool, especially in some northern states, few studies have investigated environmental effects. The purpose of this study was to determine the impact of a common weed barrier on benthic invertebrate populations in Florida.

## Study Area:

Benthic barriers were placed in a canal connected to the Crystal River, Citrus County, Florida. The exotic plant, hydrilla (*Hydrilla verticillata*), which has been well established for over ten years in this waterway, grows in excess in several canals and must be continually harvested. Since mechanical harvesters are unable to clear vegetation close to sea walls and between docks, benthic barriers may be a practical plant control alternative.

At the two test stations selected, hydrilla was the dominant plant and reached the surface in most areas; water depth ranged from one to two meters. During the summer (August, 1990), mean temperature was 23°C and dissolved oxygen



*Barrier sheets after 4 months of submersion.*

ranged from 3.0 to 3.4 mg l<sup>-1</sup>. Conductivity was unusually high, sometimes over 1500 umhos cm<sup>-1</sup>, which may have been caused by salt water intrusion from the river into the canal. Hydrilla grows well in this system (sometimes 10 cm per day), perhaps because of the extremely clear water and elevated nutrient levels (Dick 1989).

## Methods:

On April 4, 1990, Bottom Line™ benthic barrier, a non-woven nylon fabric coated with silicone rubber, was installed by employees of Dow Corning at the two test stations. Before the barrier sheets (approx. 6 x 13 m) were secured to the substrate, benthic invertebrates were sampled with an Ekman dredge (152 x 152 mm, n=5 samples) at both barrier sites. In addition, invertebrates were sampled by the same method around the barrier sites at both stations. Because hydrilla was dense and reached the

surface, SCUBA divers parted the hydrilla at each sampling location, enabling the Ekman dredge to easily reach the substrate. Ekman contents were emptied into a sieve bucket (U.S. std. #45), rinsed, and then bagged in 70 percent isopropanol. In the laboratory, invertebrates were picked from detritus, identified to order, and counted under a dissecting microscope (30x).

In August 1990, barrier sheets were removed from both test stations. Before anchoring stakes were lifted, invertebrate samples (n=5) and physical measurements were taken under barriers at both stations. SCUBA divers gently made small incisions (about 25 cm) in the barriers at each sampling location and inserted YSI dissolved oxygen and conductivity probes. After obtaining measurements under the barriers, the probes were removed and divers guided the Ekman sampler to the substrate. Invertebrate samples (n=5) were also



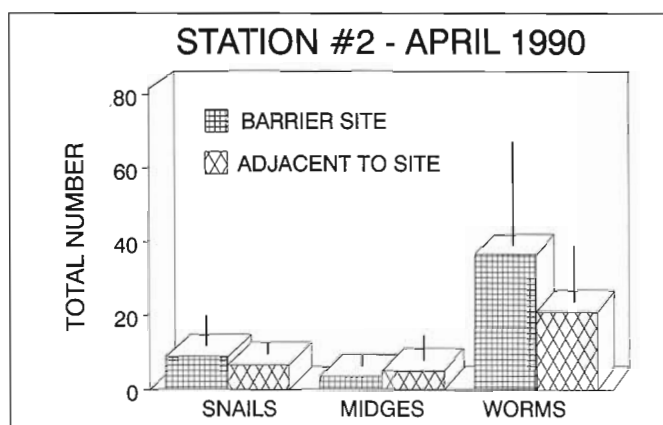
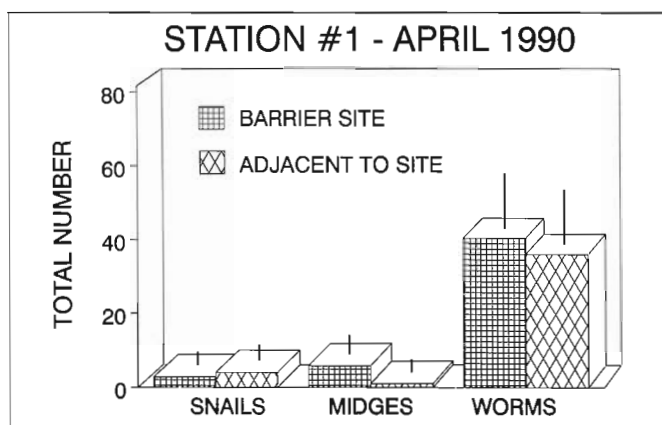


Figure 1: Mean density of common invertebrate groups (number per unit area of Ekman, 231 cm<sup>2</sup>) in April, 1990, before the barrier was installed. Vertical bars represent one standard deviation.

taken around both barriers with the aid of divers.

**Results and Discussion:**

Plants that were covered by the benthic barrier died and regrowth did not occur for the duration of the test. Although the silicone barrier used was advertised as being permeable to dissolved gases, large gas bubbles quickly formed and were trapped, pushing portions of the barrier into the water column.

Because of the uneven surface resulting from the trapped gas, deposited sediments collected in folds. Certain areas of the barriers held enough sediment to encourage hydrilla colonization. Also, a few plants grew through the small openings formed by the anchoring stakes.

Prior to barrier installation, benthic communities were similar between the barrier sites and the adjacent control sites at both stations.

Aquatic worm (Oligochaetae), snail (Gastropoda) and midge (Chironomidae) densities did not differ between treatment and control sites or between stations ( $P < 0.05$ , ANOVA, Fig. 1). Twelve families of invertebrates were collected, but numbers were low, possibly due to the unconsolidated organic sediments being a relatively poor substrate. Worms were the most common invertebrate sampled.

After approximately 4 months of

# Fatal Beauty

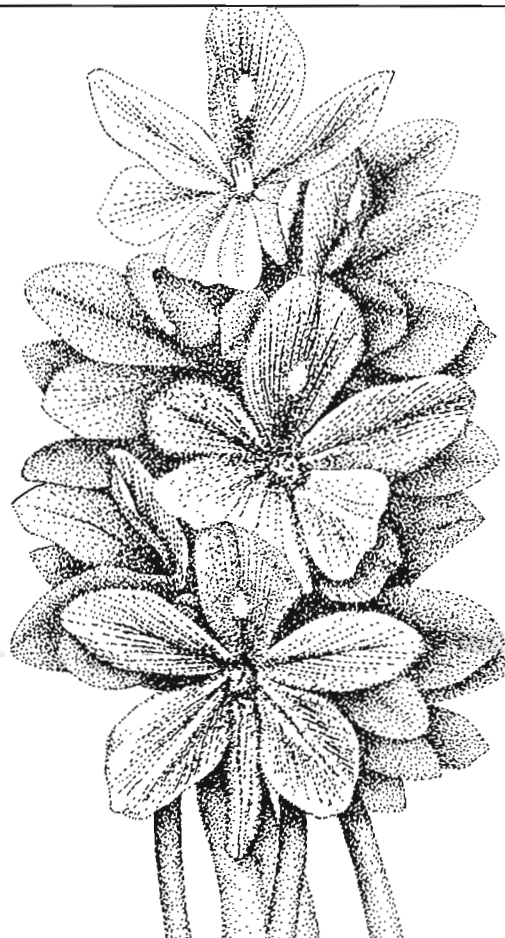
The water hyacinth is as insidious as it is beautiful. Left to its own devices, this proud beauty will continue to spread—eventually choking out waterways and making them unusable to man and uninhabitable to fish.

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cover, the invertebrate communities under the barriers were adversely affected. The midge density at station #2 and the worm densities at both stations were lower ( $P < 0.002$ , ANOVA) underneath the barriers compared to densities at the control sites adjacent to the barriers (Fig. 2). Snail densities declined from April to August at the control and barrier sites, therefore, effects on the population could not be evaluated.

Only one other published study has reported effects of weed barriers on benthic macroinvertebrates. Engel (1984) found that Aquascreen™, a polyvinyl-coated screen, decreased benthic invertebrate populations by 70 percent after three months in a Wisconsin lake. It was suggested that poor water circulation and low dissolved oxygen under the barrier caused the decline. The lower invertebrate densities under barriers in the Crystal River canal may have been caused by one or both of these factors. However, at the time of collection in August, dissolved oxygen concentrations were approximately  $1.5 \text{ mg l}^{-1}$  under the barrier; this concentration was probably adequate to support tubificid worms, which nevertheless showed the greatest decline under the barrier. Also, temperature did not seem to have an adverse effect on invertebrates since values were similar in the water column and underneath the barrier. Because of the general scope of this study, I can only speculate on probable cause; a micro-habitat investigation must be conducted to reasonably determine the factors responsible for invertebrate decline under benthic barriers.

Since there is evidence that weed barriers adversely affect benthic invertebrate populations, the lake or river manager and the regulator should consider the potential impacts to aquatic systems. Generally, in large water bodies, the amount of substrate covered by weed barriers is insignificant. However, in small aquatic systems with severe plant problems, it may be beneficial to limit barrier use and employ another means of control. An advantage of proper barrier use is long lasting plant control. However, a negative may be the equally long

lasting impact on the benthic invertebrate community.

**Acknowledgements:**

I thank Greg Jubinsky for providing administrative support during the study. Tim Troupe and Todd Bridgewater of Dow Corning installed the benthic barrier and assisted in invertebrate sampling. Brad Hutcheson and Matt Phillips picked invertebrate samples. The Plantation Resort was helpful in allowing access to the canal and furnishing SCUBA equipment.




*Rinsing an Ekman dredge sample of benthic invertebrates in a sieve bucket.*

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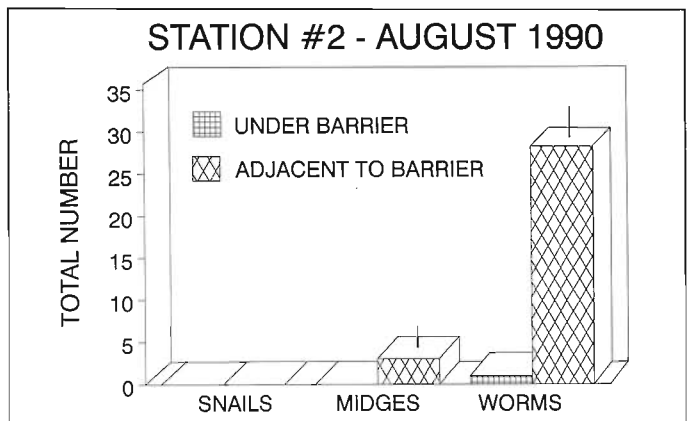
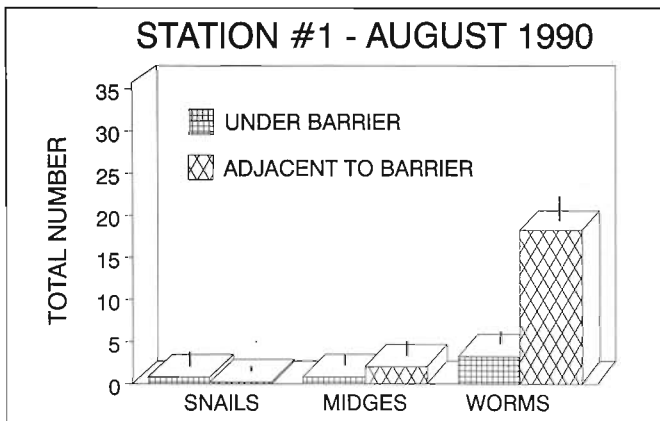


Figure 2: Mean density for invertebrate groups adjacent to barrier and under barrier after four months of cover, August 1990. Vertical bars represent one standard deviation.

**Literature Cited:**

Cooke, G.D. 1986. Sediment surface covers for macrophyte control. In: Lake and Reservoir Restoration, G.D. Cook, E.B. Welch, S.A. Peterson, and P.R. Newroth.

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Engel, S. 1984. Evaluating stationary blankets and removable screens for macrophyte control in lakes. *J. Aquat. Plant Manage.* 22:43-48.



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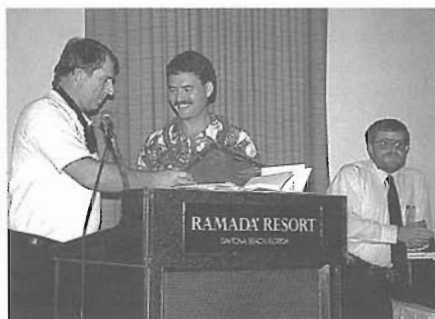
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# 1991 FAPMS Annual Meeting

The 1991 Florida Aquatic Plant Management Society meeting was held in Daytona Beach, October 15-17. Attendance hit an all-time high of 476 registrants. An upnote among many upnotes was the roughly \$12,000 which remained in the Society account after all meeting expenses had been met.



1992 FAPMS president Ken Langeland presents the Presidential Award to outgoing president Dan Thayer in recognition of Dan's extraordinary work for the Society.

Other highlights included an excellent and well-rounded program, an in-the-water demonstration of a wide variety of aquatic equipment, craft and machines and the pseudo-Hawaiian luau banquet to end all pseudo-Hawaiian luau banquets.

## Awards

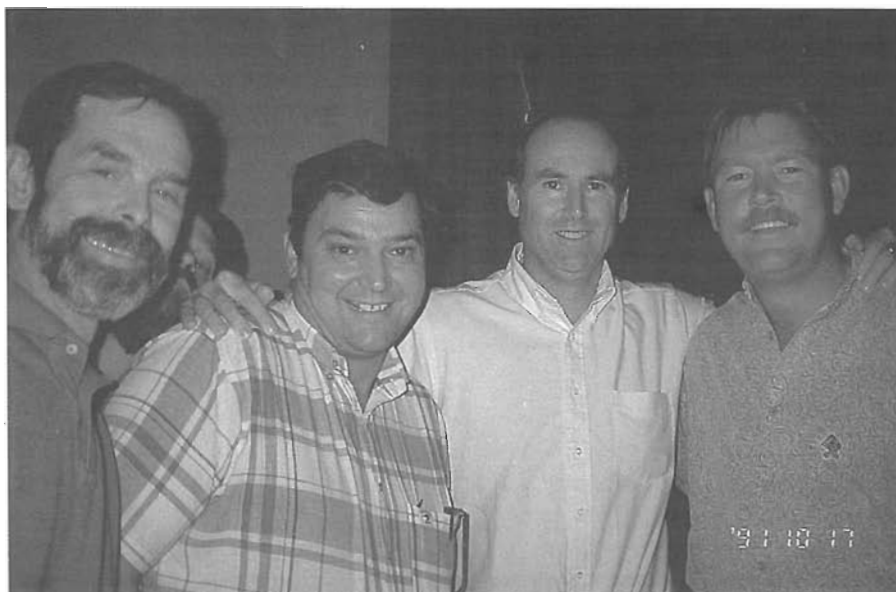
**Aquatic Plant Manager of the Year** - Fred Schudel, Lee County Hyacinth Control District

**Presidential Award** - Dan Thayer, South Florida Water Management District

**Distinguished Service Award** - Mark Edwards, Citrus County Environmental Services

**Best Aquatic Plant Manager Paper** - Darryl Blackall, "Pixie Dust, Snake Oils and Other Surfactants," St. Johns River Water Management District

**Best Exhibitor's Display Award** - Ken Stiritz, Tommy Laux, Asgrow, Inc.



Nozzleheads Sutton, Haller, Stocker, and McNabb cut loose at the banquet.

**Best Equipment Demonstration Award** - LORAN computer mapping on airboat, Judy Ludlow, Florida Department of Natural Resources

## Photography Contest

### Operations Category

Third Place - Shelly Ridderman, St. Johns River Water Management District  
 Second Place - Jerry Reeney, Applied Aquatics, Inc.

First Place - Wendy Andrew, Southwest Florida Water Management District

### Aquatic Scenes Category

Third Place - Jesse Griffen, South Florida Water Management District  
 Second Place - Jesse Griffen, South Florida Water Management District  
 First Place - David Girardin, St. Johns River Water Management District

## William Maier Educational Scholarship Fund Randomly Selected Special Awards Winners

**Custom rod and reel** - Ricky Anderson, Ameriquatic, Inc.

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Aquatic Plant Manager of the year, Fred Schudel accepts the accolades of his peers.



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Additional videotapes in the IFAS aquatic plant identification series are now available. The latest tapes identify Florida submersed (28 species in 2 tapes) and emersed (37 species in 2 tapes) aquatic plants. These add to the existing video covering floating and floating leaved aquatics. Still to come in the series are tapes describing grasses, sedges and rushes. The tapes cost \$15.00 each, plus \$.90 tax in Florida from: IFAS Publications, IFAS Bldg. 664, Gainesville, Florida 32611-1764.

## 1992 ANNUAL FLORIDA AQUATIC PLANT RESEARCH REVIEW MEETING

This year's annual Florida aquatic plant research review meeting will be held March 31, 1992 at the UF TREEO Center in Gainesville. Reports of many exciting ongoing research projects will be made. Registration will cost \$8.00 and must be made by March 20, 1992. Registrations (with checks payable to the University of Florida) should be sent to: IFAS Office of Institutes and Conferences, P.O. Box 110750, Gainesville, Florida 32611.

## PLANT ID COURSE OFFERED

The Department of Natural Resources will conduct its annual aquatic plant identification class from 10:00 AM until 3:00 PM on Tuesday, April 7, 1992, at the Episcopal Church and Conference Center in Live Oak, Florida. Ap

proximately 100 live aquatic and wetland species will be identified by Dr. David Hall of KBN Engineering. A dozen or so of the most invasive plants found in Florida will also be described. The IFAS video team will provide close-up details with their projections on several monitors throughout the classroom. For more information contact Jeff Schardt at (904) 488-5631.

## FAPMS DIRECTOR ARRESTED

On January 28, 1992, FAPMS director Alison Fox was arrested by the University of Florida Police Department on charges of being a "goody-goody." She would like to thank all the generous FAPMS members she managed to quickly reach in raising her bail, although some of them felt her charges were overdue and too lenient. Alison is anxious to have words with those who offered payments to keep her in the cold, damp jail and very grateful to those who secured her release by pledging a total of \$650 to the American Cancer Society.

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The Florida Aquatic Plant Management Society Scholarship and Foundation, Inc. announces the availability of scholarships providing up to \$1,000 each year to a deserving dependent of a FAPMS member. The source of the funds will be The William L. Maier, Jr., Memorial Scholarship Fund.

For further information or an application, please contact: Dr. Joe Joyce, Secretary/Treasurer, FAPMS Scholarship and Research Foundation, 7922 NW 71st Street, Gainesville, Florida 32606.

## AQUATIC USES OF SIMAZINE HERBICIDES END

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cancels all aquatic and non-crop uses along with applications to asparagus, artichoke, and sugarcane. The following products (with EPA Registration Numbers in parentheses) are affected:

AQUAZINE Algicide (100-570), product cancelled.

AQUAZINE 90 WDG Algicide (100-650), product cancelled.

PRINCEP 4G (100-435), product cancelled.

PRINCEP 80W (100-437), some uses deleted.

PRINCEP 4L (100-526), some uses deleted.

PRINCEP CALIBER (100-603), some uses deleted.

Further information is available from: Thomas Parshley, Regulatory Manager, CIBA-GEIGY Corporation, P.O. Box 18300, Greensboro, NC 27419. Phone: (919) 632-7202.

## In Memoriam

### Jesse Morris Hughes

It is sadly reported that Jesse M. Hughes died October 17, 1991. For five years, Jesse had been an Aquatic Plant Technician 2 at the South Florida Water Management District Clewiston office in addition to having given the United States Army twenty years of service. Jesse always went out of his way to lend a helping hand; he was full of life and loved by everyone.

## In Memoriam

### Gloria Rushing

Following an extended illness, Gloria Rushing, long time Aquatic Plant Management Society member and wife of APMS Secretary/Treasurer Bill Rushing, died January 10, 1992 at their Gaithersburg, Maryland home. Gloria put incredible effort into making annual APMS meetings smooth and enjoyable. She was always the unofficial hostess of the meetings and her gracious presence will be sadly missed. The Rushing family requests that memoriams of Gloria be made as contributions to the Montgomery County Hospice Society, 1450 Research Boulevard Rockville, Maryland 20850.



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**UPCOMING MEETINGS**

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Weed Science Society, Salt Lake Hilton, Salt Lake City, Utah.

March 12-13

The Western Aquatic Plant Management Society annual meeting, Salt Lake Hilton, Salt Lake City, Utah. Contact: Nate Dechoretz, California Department of Food and Agriculture, 1220 N. Street, Room A-357, Sacramento, California 94271-0001.

March 15-17

The Midwest Aquatic Plant Management Society annual meeting, Milwaukee, Wisconsin. Contact: Julie Liehnhart, 52143 County Road 15 N, Elkhart, Indiana 46514

March 19-21

1st annual Southeastern Lake Management Conference of the North American Lake Management Society. Contact: NALMS, 1 Progress Boulevard, Box 27, Alachua, Florida 32615-9536.

March 23-24

Exotic Pest Plant Council annual meeting and research review, to be held at South Florida Water Management District headquarters, West Palm Beach. Contact: Mike Bodle, P.O. Box 24680, West Palm Beach, FL 33416. (407) 687-6132.

March 31

Florida annual aquatic plant review meeting, U F TREEO Center, Gainesville, Florida. Contact: IFAS Office of Institutes and Conferences, P.O. Box 110750, Gainesville, Florida 32611; or IFAS Aquatic Plant Center, 7922 NW 71st Street, Gainesville, Florida 32606. (904) 392-9613

April 7

DNR annual aquatic plant identification class, Live Oak, Florida. Contact: Jeff Schardt, (904) 488-5631.

July 12-17

International Symposium on Aquatic Plants; Aquatic Plant Management Society 33rd annual meeting, Daytona Beach, Florida.

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DUE TO ILLNESS**

- 1 - 1990, U.M.I. Aquatic Weed Harvester
- 1 - 1990, U.M.I. T-6T Trailer
- 1 - 1990, U.M.I. c-500 Shore Conveyor w/Hydraulic power pack P-11
- 1 - 1990, Hoffman Airboat, 6 cylinder Equiped w/the following
  - 5 hp, D30 Hydro pump w/mech agitation & 55 gal. tank
  - Front mounted boom system w/drag hoses
  - Lake pickup assembly w/venturi meter
  - Granblo Pellet Dispenser
- 1 - 1990, Trailer for airboat
- 1 - 1988, F350 Dump Truck

Price for complete package: \$75,000.00

**ARLINGTON AQUATICS INC.**

720 Camp Indianhead Road  
Land O'Lakes, Florida 34639  
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**PELLET APPLICATOR**

The GRANBLO pellet blower is rapidly becoming the professional applicator's unit of choice for applying granular materials. This high quality unit was designed to virtually eliminate the dust problems associated with conventional spreaders. The GRANBLO unit is a light-weight, multi-use applicator for mounting in boats, trucks and All Terrain Vehicles.



**STANDARD FEATURES INCLUDE:**

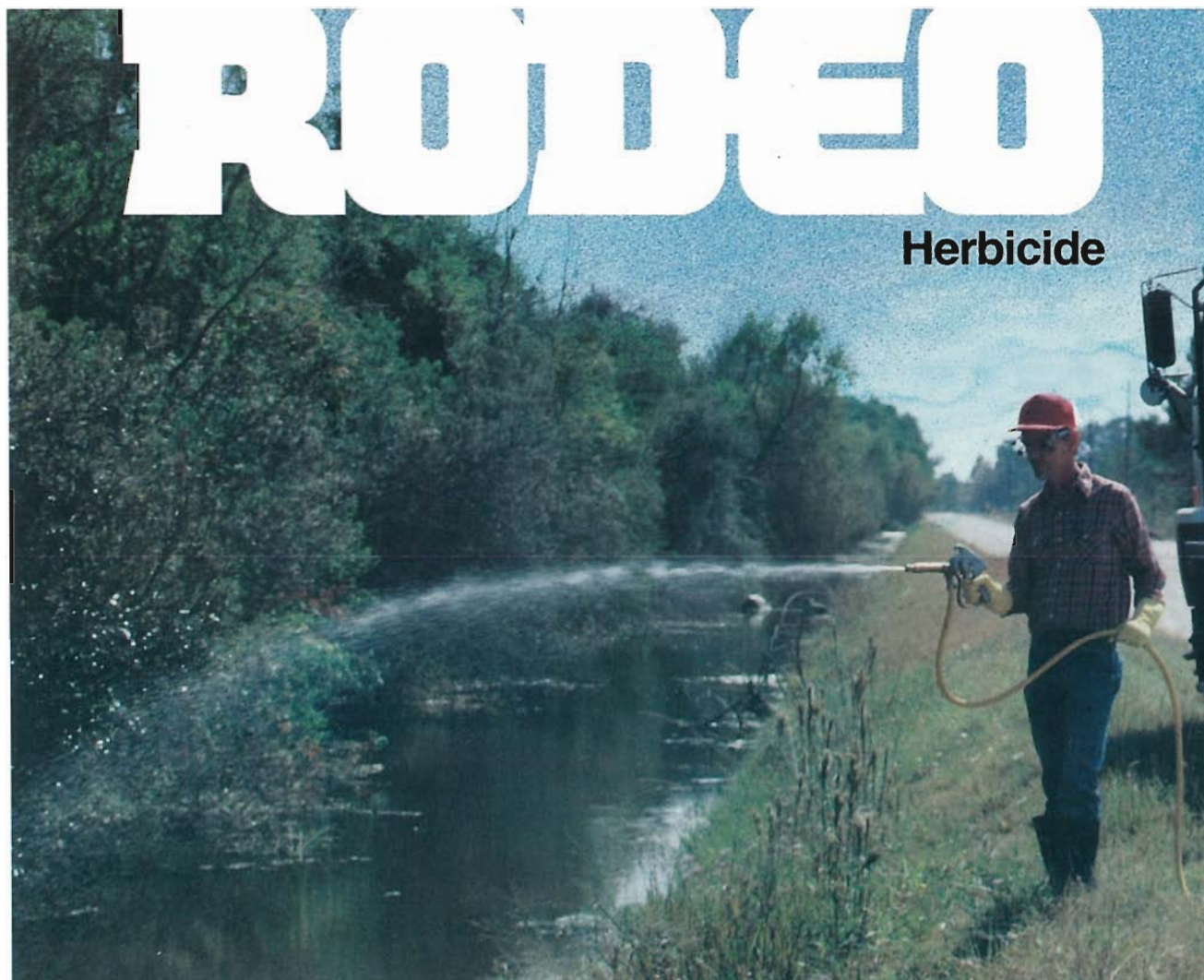
- 100 Lb. Capacity Aluminum Hopper
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- Overall Weight 50 lbs.
- Two-Cycle Engine
- Discharge distance app. 50 ft.

*For Additional information or quotation contact:*

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# HOW TO CONTROL BRUSH AND WEEDS IN AND AROUND WATER.



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DIQUAT is a highly active, water soluble contact herbicide that controls a broad spectrum of floating, submerged and marginal aquatic weeds, like hydrilla, salvinia, water hyacinth and cattails.

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biologically inactivated when absorbed through soil, it has no fishing restrictions.

So don't get tangled up with a bad crowd. Put them out of the picture with DIQUAT.

### DIQUAT<sup>TM</sup> Herbicide H/A

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