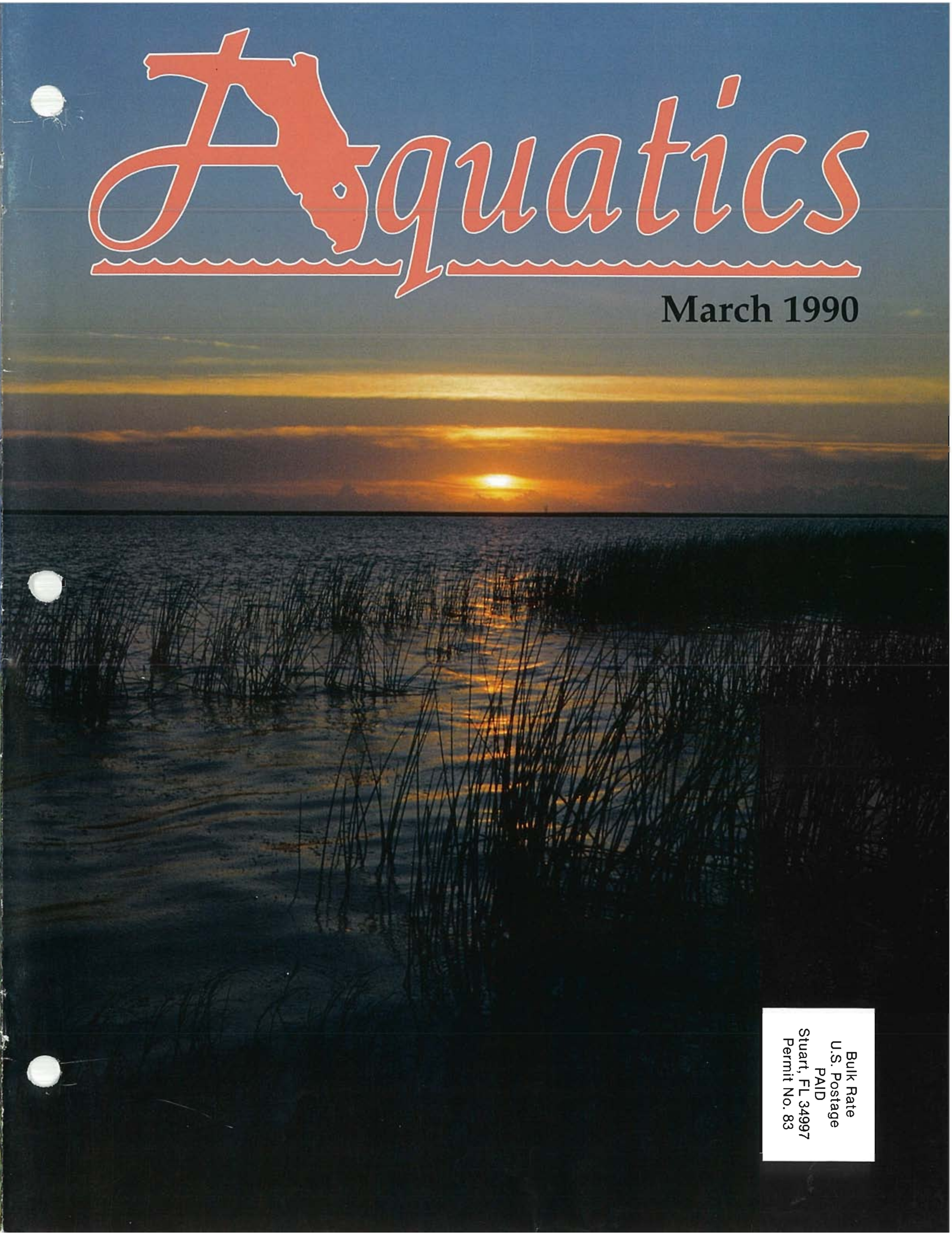
Aquatics

March 1990



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EDITORIAL

*"Don't it always seem to go,
You don't know what you've got 'til
it's gone..."*
–Joni Mitchell song of the '60s

Sure enough, just as Florida's community of professional aquatic plant-managers has gained able mastery of the tools of its trade and funding has allowed consistent, effective use of these tools, the whole picture appears able to disappear, leaving stunned resource experts wondering, "Where did it go?"

The relative stability of funding and coordination evident in the program as administered by the Department of Natural Resources during the last couple of years may have allowed an air of complacency to arise. Aquatic plant managers expected to continue using the available control methods and to receive the support of the public, the Florida Legislature, and their respective agencies. In the process, the century's lowest water hyacinth populations were achieved, and the tide was turned on hydrilla's boundless expansion.

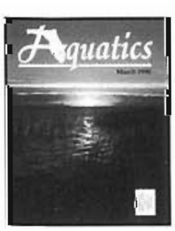
Aquatic plant management has always been a frustrating field for those who enjoy praise for work well done. Time and time again, well-spent work and money have reopened weed-choked waters. People have returned to fish, water ski, buy bait and tackle, stay in local hotels, and otherwise contribute significantly to local economies. Yet, rarely are those directly responsible for these revitalizations given even the slightest pat on the back. Legislative aides call only to ask why so much funding is necessary when a voter just called in who, "...couldn't find a single water hyacinth out there." The DNR Executive Director repeatedly postures that the value of aquatic plant management eludes him. Legislators, yet again, propose transferring the Bureau of Aquatic Plant Management from DNR to a Florida Game and Fresh Water Fish Commission un-enthusiastic about receiving it.

Yet, without high-level recognition of the essential role aquatic plant management plays in maintaining public waters what legislator wouldn't grasp at such a transfer as a means to allow hollow statements about reorganization serving to improve state government? In a deficit-ridden state, without money to toss to the hometown constituencies, one of the few ways of justifying legislative activity is stirring the bureaucratic stew in the name of increased efficiency. Will a period of confusion and inadequate resources follow? Will the offspring of recent repeated successes be an orphan program?

–Mike Bodle

Editor's Note: See "Exotic Plant Control, A Look Back, A Look Ahead," page 4, for more detail on this subject.

About The Cover



Sunrise on Bird Island, Lake Okeechobee.
Photo by: Cindy Pelescak

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Exotic Plant Control: A Look Back, A Look Ahead

By
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Although the current decade does not officially end until December 31, 1990, it is fashionable to discuss the achievements and events of the 1980s now. With that in mind, it is worth a look back at the aquatic plant management accomplishments for the past ten years, especially for waterhyacinth, waterlettuce and hydrilla, Florida's worst exotic plant problems.

Waterhyacinth

The '80s began quietly enough for aquatic plant managers. Maintenance control, was becoming an accepted practice for managing floating vegetation. Waterhyacinth covered nearly 125,000 acres of Florida public waters during the early 1960s, but had been reduced to the ten thousand acre range aided in part by the severe drought of 1980 and 1981. However, as the rains returned in 1982, so returned waterhyacinth; quadrupling in just one year to more than 20,000 acres in 1983. Hard, tedious work drove the waterhyacinth management program through the remainder of the '80s, and this floating pest which once dominated Florida's aquascapes was reduced from the 3rd to the 24th most abundant aquatic plant in public waters (Figure 1).

WATER HYACINTH SURVEY RESULTS

Year	Waters (%)	Acres (Rank)
1982	239 (56)	8,500 (3)
1983	287 (61)	20,700 (4)
1984	282 (61)	9,400 (8)
1985	295 (63)	5,800 (*)
1986	278 (58)	7,100 (11)
1987	309 (64)	5,800 (*)
1988	314 (65)	3,600 (24)
1989	285 (57)	2,600 (*)

* Only Water hyacinth and Hydrilla surveyed

Fig. 1 Water hyacinth coverage in Florida, 1982-1989.

Even though several biological controls were in operation during the '80s, waterhyacinth maintenance success lies in the perseverance of field crews and the courage of managers who implemented strong management plans despite public sentiment against waterhyacinth control, particularly against the use of herbicides. Occasionally one or the other or both management convictions faltered and waterhyacinth's potential for explosive growth was again demonstrated in Florida's waters. The most notable breakdowns occurred on Orange Lake in 1983 when the population increased from fewer than 100 to more than 2,100 acres, and on Lake Okeechobee in 1986 when waterhyacinth quadrupled in five months to 8000 acres. While the results were similar; loss of access, navigation, native vegetation, and associated habitat, the magnitude of the Lake Okeechobee failure overshadowed any floating vegetation outbreak of the '80s. Nearly two years of labor and $2 million were spent regaining control.

With only a few north central Florida exceptions, waterhyacinth is under excellent maintenance control at the onset of the 1990s (Figure 2).

A 1989 survey detected only 2,500 acres in more than 500 public waters; probably the lowest level in this century. As exemplified by the management program on the Suwannee River (Figure 3), the benefits projected by maintenance control proponents are paying off in the form of restored native vegetation, a reduction in herbicide use and a savings statewide of more than $600,000 in management costs during 1989. However, more than 35,000 acres of this biological pollutant required control in 1989 to sustain this low level.

Waterlettuce

While most of the attention was directed toward waterhyacinth, its floating counterpart, waterlettuce expanded to nearly 7,500 acres in 1984. As with waterhyacinth, a strong maintenance control program using herbicides is credited for the reduction of waterlettuce from the 1984 highwater mark to fewer than 2,900 acres in 1989. Waterlettuce ranked 12th in abundance among aquatic

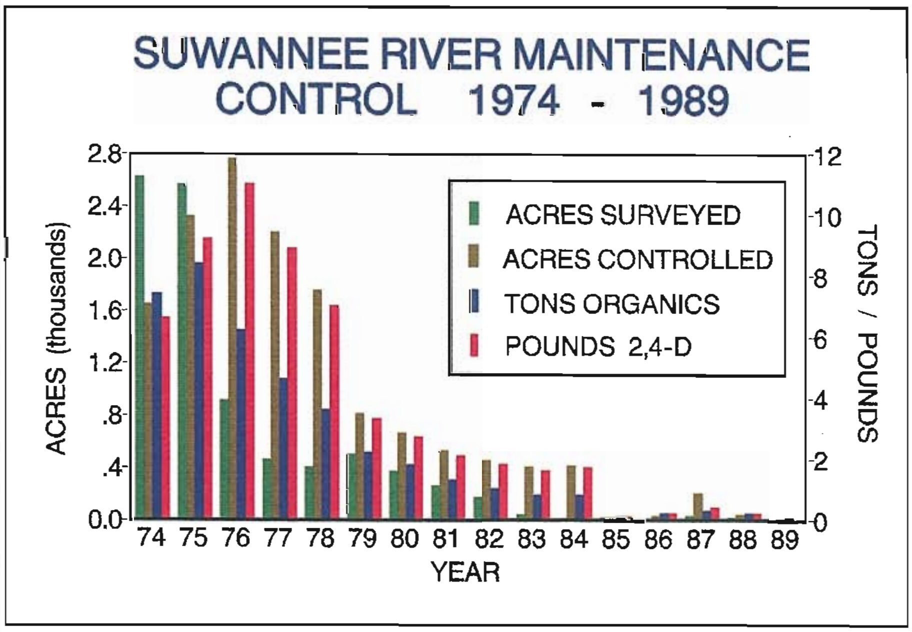

Fig. 3 Water hyacinth management data on the Suwannee River, 1974-1989.

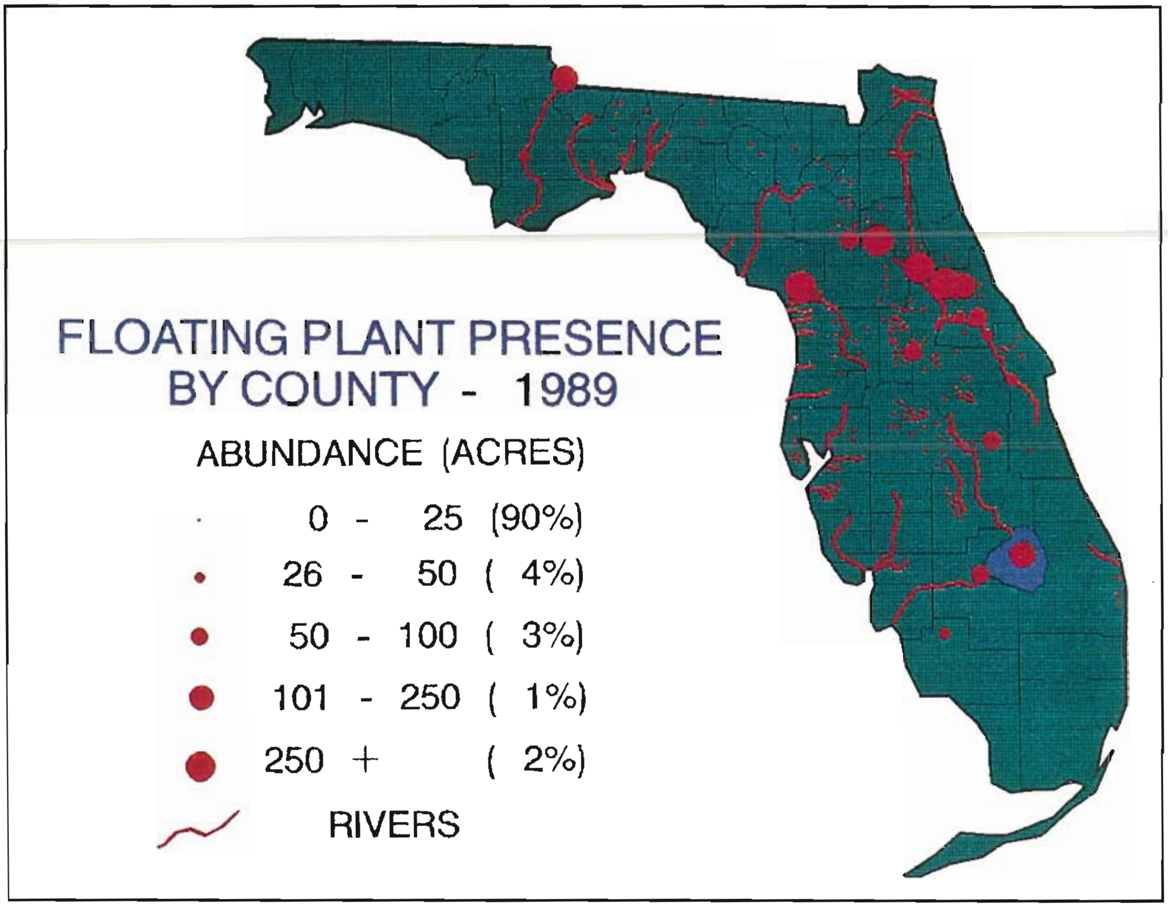

Fig. 2 Occurrence and relative abundance of water hyacinth and water lettuce in 1989.

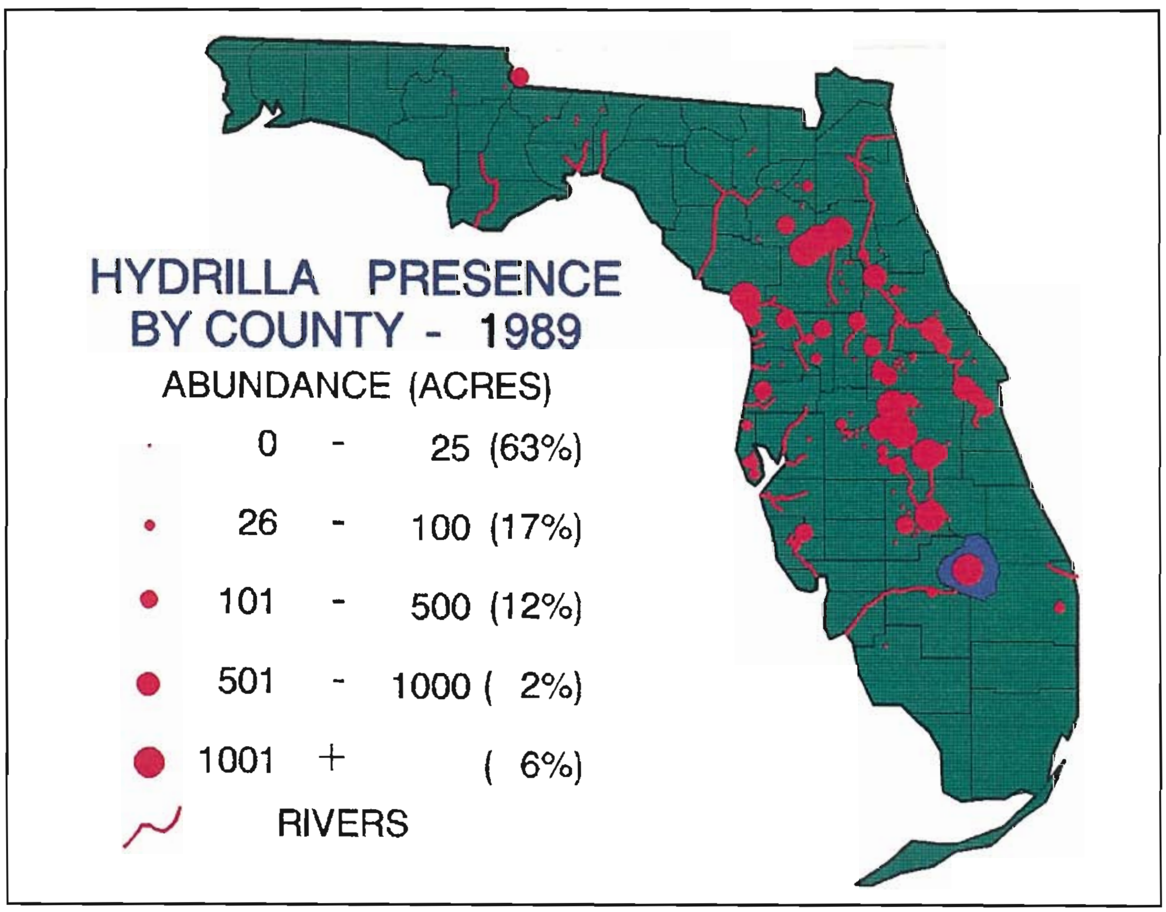

Fig. 5 Occurrence and relative abundance of hydrilla in 1989.

plants found in public waters during 1982; 30th in 1988. To attain this level, nearly 30,000 acres of waterlettuce are controlled with herbicides each year.

Biological controls are beginning to brighten management prospects for the 1990s. A weevil, *Neohydronomous affinis* was released on Lake Okeechobee in 1986 and within two years, decimated most of the waterlettuce in the control site. This weevil has been released in nearly 40 sites ranging from flood control canals to hard to access nursery areas in lakes and rivers. Further raising hopes is a moth, *Episamea pectinicornis*, soon to be released from quarantine. Both of these controls have proven effective overseas and may now hold the key to successful waterlettuce management in Florida.

Hydrilla

Hydrilla populations roller coasted through the 1980s (Figure 4). The early years were characterized by rapid expansion made possible by the lack of feasible large scale management techniques. The middle '80s showed a decline in hydrilla after registration of the herbicide, fluridone. In the latter years, hydrilla

HYDRILLA SURVEY RESULTS

Year	Waters (%)	Acres (Rank)
1982	176 (41)	42,000 (1)
1983	214 (45)	50,000 (2)
1984	211 (46)	46,000 (1)
1985	222 (47)	52,500 (*)
1986	223 (47)	58,000 (1)
1987	214 (44)	48,000 (*)
1988	239 (49)	57,200 (1)
1989	232 (46)	44,100 (*)

* Only Hydrilla and Water hyacinth surveyed

Fig. 4 Hydrilla coverage in Florida, 1982-1989.

both advanced and declined; moving forward through colonization within new waters and backward from herbicide treatments and to some extent from the release of triploid grass carp.

In 1980, approximately 32,000 acres of hydrilla were reported in public lakes and rivers. The largest population, 5,300 acres, occurred in Orange Lake. When the rains returned in 1982, lakes not only filled with water but also with hydrilla. The 3,500 acre population in Lake Okeechobee burgeoned to 10,000 acres in just two years. Hydrilla was introduced into and subsequently flourished in many of Florida's largest lakes including Kissimmee, Istokpoga, Hatchineha, Yale, Harris, Griffin, East and West Toho, Marion, Sampson and the headwaters of the St. Johns River. Fluridone made possible extended, large scale reductions, but as fast as hydrilla was controlled in one water it invaded another.

The greatest expansion to date occurred in Lake Istokpoga where hydrilla increased from 4,000 to 20,000 acres during 1988. Nearly $1.25 million were necessary to return the lake to its 1987 condition. The Department estimates at least $500,000 will be required to manage portions of the 28,000 acre lake each year in order to sustain control.

Statewide, nearly $6 million are now needed annually to sustain hydrilla control and to initiate management programs on additional waters infested by hydrilla. The program is effective when adequate funds are available. In 1989, hydrilla was reduced by 23% to 44,100 acres, the lowest level recorded since 1982. As the 1990s begin, Florida waters teeter at the edge of maintenance control, a goal which was only a dream in the early 1980s (Figure 5).

Technology and management strategies have reached the point where, except for fast-flowing waters, long term control of most exotic species, including hydrilla, is a reality. Talk of hydrilla eradication from small systems is even being discussed. Sterile grass carp have been stocked in nearly 5000 sites. Herbicides can be used to effectively weed out waterhyacinth, waterlettuce and hydrilla from native vegetation with little non-target impact. Five host specific insects (3 for hydrilla and 2 for waterlettuce) are ready for statewide dispersal.

The Future

While new technology and management strategies dominated the 1980s, funding will dictate the degree of aquatic plant control, at least in the early 1990s. More than $110 million were spent managing exotic plants in Florida during the 1980s; approximately $48 million for hydrilla and $38 million to control waterhyacinth and waterlettuce. As hydrilla expanded and management costs rose in the latter 1980s, the Aquatic Plant Trust Fund, from which much of the State's aquatic plant control revenues are dispersed, was depleted. In 1990, federal funds were cut by nearly $500,000 due to Gramm-Rudman budget reductions. State funding will fall short by an addition $1.5 million this year. Whereas nearly $9 million were available in 1986 to manage aquatic plants, less than $5 million are available in 1990 (Figure 6). Consequently, the Department could

Continued on page 20

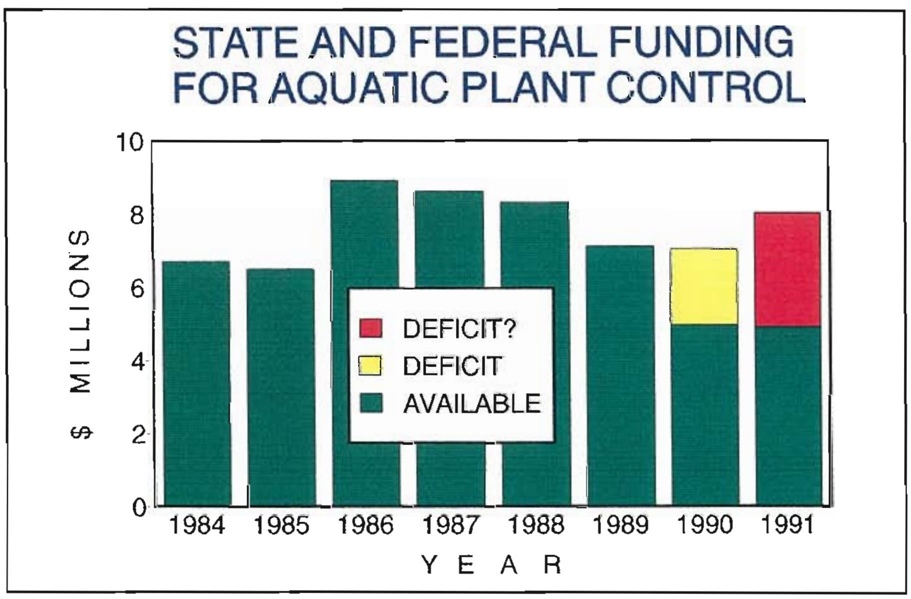

Fig. 6 Florida aquatic plant management costs and projected deficits, 1984-1991.

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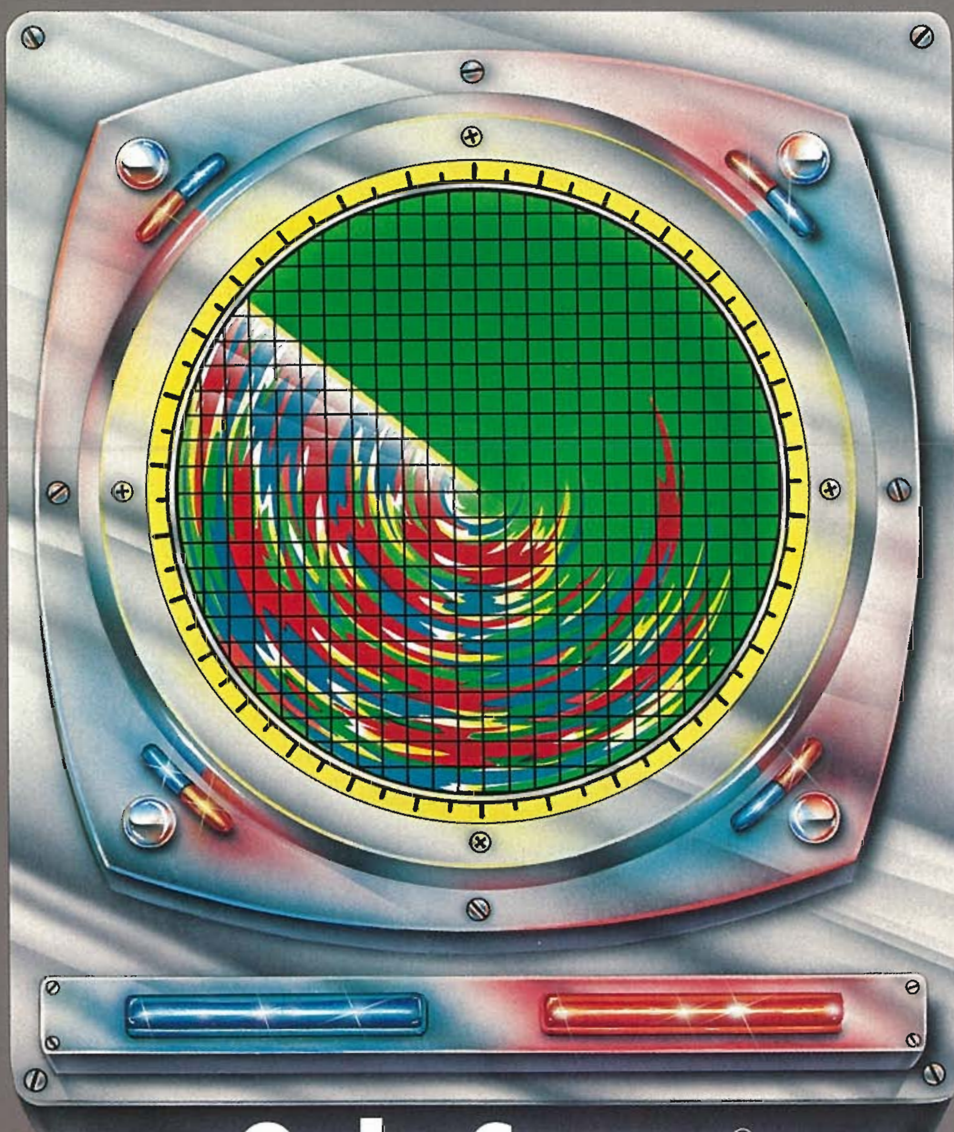

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Flowering-Rush: A Plant Worth Watching

By
John E. Boutwell

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Environmental Sciences Section
Denver, Colorado

Introduction

In less than 100 years flowering-rush has become widely distributed, although scattered, throughout much of the United States and Canada. Isolated populations, long distances from the first sighting on the St. Lawrence River, are probably present because of the collection and transport of the flowers and plant material by humans. Populations in the Great Lakes and St. Lawrence River regions, once established, were likely expanded by the natural dissemination of the seeds, bulbils, and rhizome material by wind and water. Animals, such as muskrats, which use flowering-rush for food and shelter, may also account for some of the short distance phytogeographic expansion of flowering-rush throughout the Northeastern United States. The U.S. Bureau of Reclamation is concerned with the invasion of flowering-rush, because it has caused water delivery problems in Reclamation's Pacific Northwest Region, within the upper Snake River drainage. It has also adversely affected the recreation and esthetics of a public swimming and boating lake in the area. Flowering-rush is also found in Reclamation's Great Plains Region, which is comprised of the Missouri and other major river drainages. Water storage and water delivery operations, as well as the degradation of native wetlands are threatened by flowering-rush, in both of these regions.

Distribution

Flowering-rush was introduced to North America from Eurasia where it is established in an area ranging from the Amur River Region in the Soviet Union on the east, to Spain on the west, and from Finland in the north, to the Delhi and Kashmir Regions of India in the south. It was first observed growing in North America in Quebec along the St. Lawrence River in 1987. Since that time, flowering-rush has become widely distributed throughout the Northern United States and the Southeastern Canadian provinces. It was found along the east end of Lake Erie by 1941 and is now established throughout the Great Lakes Region. It has since been found in isolated spots of the Western United States such as Flathead Lake near Kalispell, Montana, and the Snake River Valley near Pocatello, Idaho. Flowering-rush is now established at or near the headwaters of several river drainages including the Mississippi and Missouri, as well as the Snake River (Figure 1).

Classification and Description

The Family, Butomaceae to which flowering-rush belongs, is comprised of a single genus *Butomus*. The genus is made up of one or two species, *Butomus umbellatus* L. and possibly *Butomus junceus* Turez, depending upon the taxonomic authority surveyed. It is riparian/aquatic in nature and is found along rivers, lakes, irrigation systems, and in marshes. This perennial arises each year, from a tenacious rhizome upon which many subterranean bulbils form (Figure 2); these bulbils can also form in the inflorescence in rare cases. Flowering-rush also propagates from seeds which germinate readily in the spring. Flowering-rush is found growing under three different environmental conditions, as terrestrial, emergent, and submergent forms. The terrestrial and emergent forms have upright leaves approximately 3 feet (1 meter) tall, which are triangular in cross section, and produces showy pinkish/white flowers. Each flower has three sepals, three petals, and nine sta-

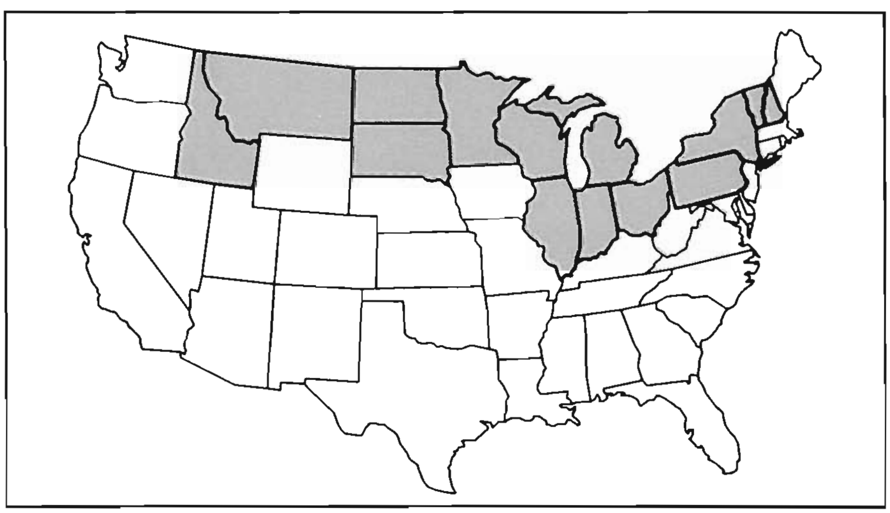

Figure 1. Approximate distribution of flowering-rush (*Butomus umbellatus* L.) populations within the United States.

mens. The flowers are born on a slender scape, which is circular in cross section. The inflorescence is umbellate in shape, prevalent from late June through August, and usually exceeds the leaves in height upon blooming (Figure 3). Many seeds are produced within each flower, and these can remain viable for several years. The terrestrial form can establish in areas where the soil moisture is high, at least during the spring. Flowering-rush also survives well in submerged aquatic habitat. The submerged form has limp leaves which flow with the current, and its ability to become emergent appears to be dependent on the velocity and the depth of the water. The submergent form does not flower, and therefore is considered sterile. The rhizome is edible, but like the rhizome of cattails (*Typha sp.*), few people are likely to try to consume such a plant in this country.

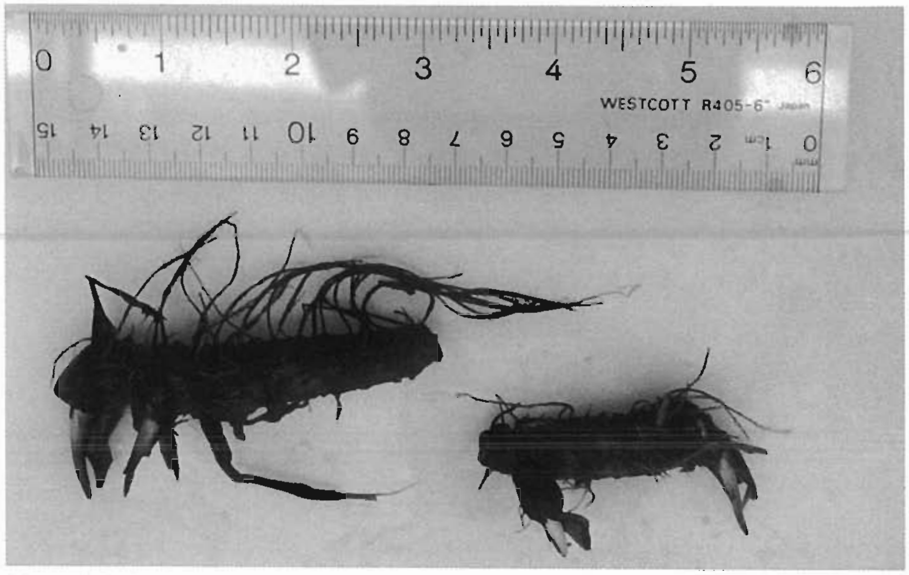

Figure 2. Subterranean rhizome material and sprouting bulbils of flowering-rush.

The Problem

Because flowering-rush can propagate in a variety of ways, it can spread quickly into unwanted areas if left unchecked. Flowering-rush has been found to be more aggressive, and therefore, out compete some native plants which provide good

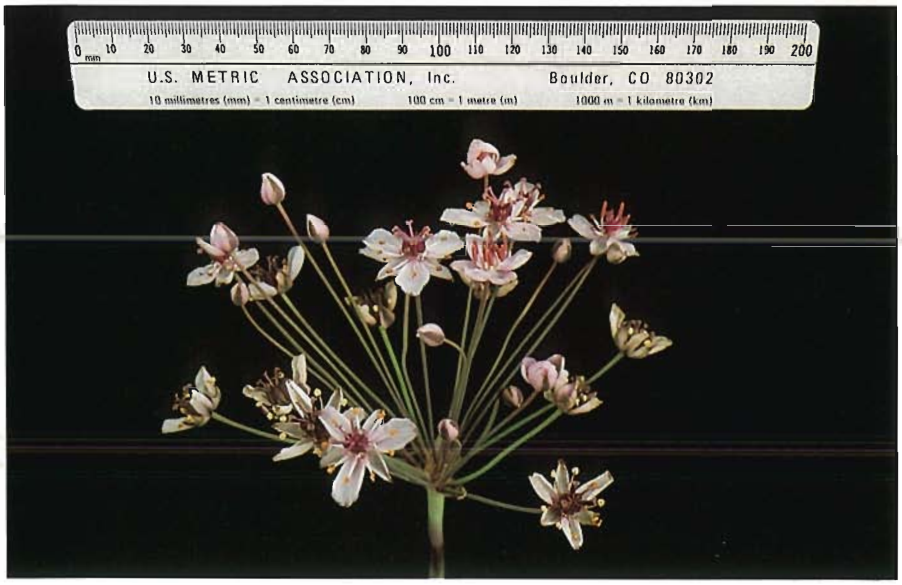

Figure 3. Close-up of the inflorescence of flowering-rush (*Butomus umbellatus* L.)

habitat for wildlife, such as bulrush (*Scirpus sp.*). On lakes, large free-floating mats of root and rhizome material have caused obstruction problems, presenting hazards to boaters and water skiers. In irrigation systems, flowering-rush can slow the delivery velocity, not only along the sides of the canal but across the bottom as well, causing huge silt deposits to form within the center of the canal. These silt deposits drastically reduce the delivery capacity of the canal, which in turn represent an economic loss to agriculture (Figures 4, 5).

Flowering-rush appears to have limited value as a food for wildlife, as there is only one account of the bulbils being eaten by waterfowl, that of green-winged teal on Lake Champlain. As for forage, it is grazed upon only slightly in pasture wetlands by livestock. Flowering-rush has become naturalized in North America, causing weed problems similar to purple loosestrife (*Lythrum salicaria*), and given its wide geographic range throughout North America, it deserves our guarded attention.

Control Methods

Like many introduced plants to North America, flowering-rush seems to have few natural enemies. A fungus (*Physoderma butomi*) which has been found in Michigan populations of flowering-rush, parasitizes flowering-rush to some extent. This fungus might hold the key to a biological control method in the future. It is also used by muskrats, as mentioned, but this represents little harm to the plant population. Because flowering-rush can grow in several habitats, various chemical application methods are sometimes needed to provide good control. This means a pre-emergent, submergent, dewatered, emergent, or a combination of several of these treatment methods might be needed to bring a flowering-rush problem under control. The Environmental Sciences Section, U.S. Bureau of Reclamation, has been evaluating herbicide effectiveness in controlling flowering-rush both in laboratory and field studies; following is a summation of our findings. Good control of the submergent form has been obtained using diquat and fluridone formulations applied to ponded water areas. Diquat provided only temporary control, as would be expected of a contact herbicide, whereas the fluridone, a systemic herbicide, has provided control of flowering-rush in a shallow lake area for over a year and a half. Acrolein can provide temporary control of flowering-rush in flowing water situations such as an irrigation canal system where wildlife is not a consideration. The emergent and terrestrial forms can be controlled well using glyphosate, and to a lesser degree with 2, 4-D, or imazapyr, which can be used in terrestrial areas. Diquat also provided good control of the emergent and terrestrial forms of flowering-rush, but like the submergent application, the efficacy of these treatments was also temporary. A non-ionic surfactant was used to improve the adherence of some of the herbicides applied to the emergent and terrestrial flower-

Figure 4. Flowering-rush blossoms throughout most of the summer.

ing-rush. As always, the choice of a herbicide must meet the label restrictions for the particular situation, concentration, and the site of the application.

Conclusions

For the present, flowering-rush has presented only localized weed problems, even though it has established over a large geographic area. Because of its diverse propagation methods and the varied habitats in which it can thrive, flowering-rush has the potential to create severe weed problems. Flowering-rush has obstructed water delivery systems, infested boating and swimming areas, reduced quality wildlife habitat, and infested field crops, such as rice. For these reasons, and many more, flowering-rush is truly a plant worth watching.

Acknowledgments

Additional information for this article was obtained from Dr. Ernie Schuzler of the Flathead Lake Biological Station, University of Montana, and Morris Esterson of the Pelican Water District, Detroit Lakes, Minnesota.

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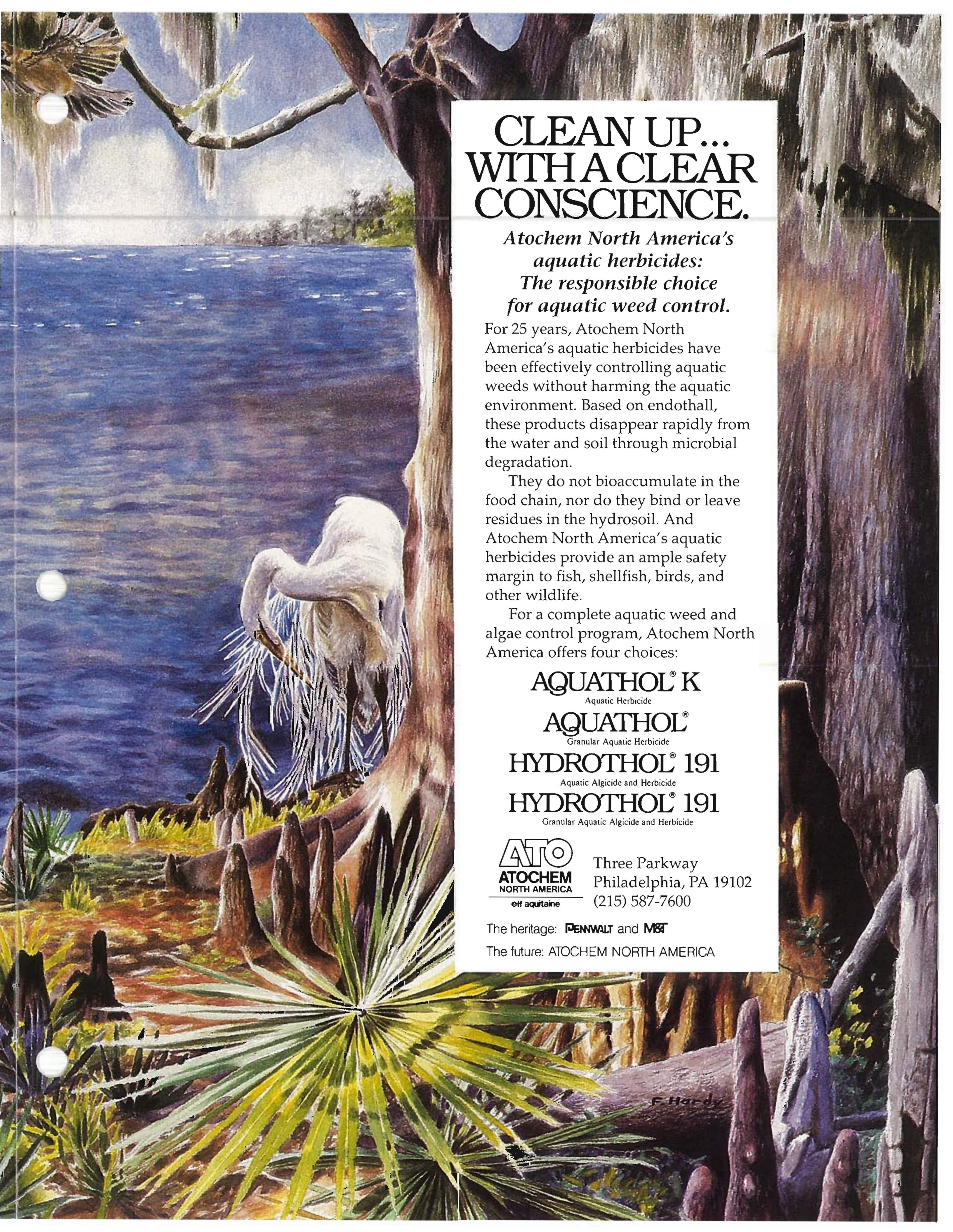
Figure 5. Silt deposition in a dewatered canal caused by the infestation of flowering-rush along the sides and across the bottom of the canal (silt has been removed from the right side of the canal to help meet water delivery requirements).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The Impact of 2,4-D Used in Water Hyacinth Control Programs on the Growth of Non-target Spatterdock

By
Chuck Hanlon and Bill Haller[1]

Spatterdock (Nuphar luteum), a native Florida plant, is considered beneficial for fish and wildlife habitat. It is often found inter-mixed with the nuisance aquatic plant water hyacinth and is consequently exposed to 2,4-D applications since this herbicide is used in many hyacinth control programs. It is known that 2,4-D controls water hyacinths, however little quantitative work has been published documenting the effect of 2,4-D on spatterdock. These studies were developed to determine the minimum concentration at which water hyacinth can be controlled using 2,4-D and to evaluate the short and long term effect of 2,4-D on the non-target plant spatterdock.

Water hyacinth and spatterdock were sprayed with a CO_2 powered backpack sprayer calibrated to deliver 100 gallons of total mix per acre. The herbicide 2,4-D amine (4 lbs/gallon) was used at rates of 0.0, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5 and 4.0 lbs/acre and each treatment was replicated three times. Water hyacinth were harvested 30 days and spatterdock 59 days after treatment (dat).

For water hyacinth, 27 one m^2 plots, enclosed by pvc pipe, were set up in August (1989) and filled with 35 plants. Three plots were used as unsprayed controls, while the other 24 were sprayed with varying rates of 2,4-D. Eight 8 m^2 plots, which had similar densities of spatterdock leaves, were also sprayed in August with the same concentrations of 2,4-D and a control plot was established. Two months later, three random 1 m^2 plots inside the treatment area were harvested by cutting the emergent spatterdock leaves from their stems. At harvest, live water hyacinth plants from all treatment plots and spatterdock leaves from the 1.0, 2.0, 3.0 and 4.0 lbs/acre plots were counted and oven dried for approximately 1 week. Dry weights for these plants were then determined for each treatment rate.

Water hyacinth

Visible damage was evident on water hyacinth plants which had been sprayed with 1.0 to 4.0 lbs/acre 2,4-D within four days. At 22 dat, it was apparent good control would be obtained at 2,4-D rates of 1.5 lbs/acre or greater. At harvest (30 dat), the

Table 1. The effect of 2, 4-D on water hyacinth 30 days after treatment. The treatment rate is in lbs./acre applied in 100 gallons of total tank mix. The number of plants and their dry weight values are based on a 1 m^2 area.

Treatment rate	Number of live plants	Dry weight (grams)
0.0	75 a[1]	559 a
0.5	59 b	428 b
1.0	44 c	285 c
1.5	14 d	95 d
2.0	8 de	56 d
2.5	2 e	13 d
3.0	6 de	24 d
3.5	4 de	23 d
4.0	5 de	28 d

[1] Numbers within a column followed by the same letter are not significantly different ($p > 0.05$)

[1]*Assistant in Aquatic Weeds and Professor, Agronomy Department, Center for Aquatic Plants, IFAS, University of Florida.*

Table 2. The effect of 2, 4-D onsmall plots of spatterdock 59 days after treatment. All weights are dry weight values expressed as g / m². The treatment rate is lbs / acre applied in 100 gallons of total tank mix.

Treatment rate	Number of live leaves (m²)	Leaf weight	Average weight per leaf
0.0	14	98 a[1]	7.4 a
1.0	9	32 c	3.5 b
2.0	8	37 c	4.6 b
3.0	15	75 b	4.9 b
4.0	12	55 bc	4.1 b

[1] Numbers within a column followed by the same letter are not significantly different ($p > 0.05$)

average number of water hyacinth in the control plots had more than doubled in number (75 plants/m²) and regrowth was occurring in nearly every treatment. The lowest rate of 2,4-D which controlled water hyacinth was 1.5 lbs/acre. There was no significant difference in the number of live water hyacinth plants when comparing the 1.5 pound rate to the 2.0, 3.0, 3.5 and 4.0 lbs/acre rates. For these treatments, the average number of plants left in the plot after 30 days ranged from a high of 14 in the 1.5 lbs/acre plot to a low of 4 which occurred in the 3.5 lbs/acre treatment (Table 1). These values represent a reduction of 81 and 95% respectively when compared to control plots. Although acceptable water hyacinth control was not obtained at the 0.5 or 1.0 lb/acre rates, the number of live plants remaining in these plots was significantly less when compared to the unsprayed control plots (Table 1).

Similar results were found for the dry weight of water hyacinth at harvest. There was no difference in the average weight per plot when comparing the 1.5 through 4.0 lbs/acre rates. These rates all had significantly less biomass than the 0.5 or 1.0 lb/acre rates which had significantly less biomass than the control plots (Table 1).

Spatterdock

Three weeks after treatment the effects of the 2,4-D were visible at all rates, 0.5 through 4.0 lbs/acre. There did not appear to be a rate dependent effect since the extent of stem elongation (epinasty) and chlorosis appeared similar in all treatments. At harvest (59 dat.), it was obvious most plants were living and although 2,4-D symptoms were still present, these symptoms were greatly reduced.

Dry weight analysis of the harvested spatterdock showed leaves in the control plot had a significantly greater biomass/m² when compared to leaves in the treated plots (Table 2). Leaf biomass averages ranged from 32 to 75 g/m² in the treated plots which represent a 67 and 24% reduction respectively when compared to the control plot (98 g/m²). Treating spatterdock with 2,4-D did not appear to have a significant effect on the number of leaves within a plot, however, 2,4-D caused the weight of individual leaves to be reduced. The average individual leaf weight in the control plot was 7.4 g which was significantly greater than the average individual leaf weight in any of the treated plots (Table 2). This reduction in leaf weight caused spatterdock biomass to be reduced in all treatment areas.

Conclusions

Under "ideal" treatment conditions, water hyacinths were controlled using 2,4-D at rates of 1.5 lbs/acre or greater. These were small plots, easy to treat and uniform coverage was obtained with the backpack sprayer. These conditions are not always present in the field and higher rates are often needed to control water hyacinths.

At harvest time, spatterdock plants had essentially recovered from the initial epinasty and chlorosis which resulted from the 2,4-D treatments. Application rates of 2,4-D as high as 4.0 lbs/acre did not kill the plants and the number of emergent leaves did not appear to be affected by the treatment, however, leaf size was reduced. It appeared that any plant damage caused by 2,4-D was not rate dependent since similar symptoms were observed at all treatment rates. Spatterdock did not grow as uniformly as water hyacinths and by harvest time plants outside the treated area had produced new leaves which grew into the plots (edge effect). In order to eliminate the edge effect and evaluate the long term effect of 2,4-D, five 0.25 acre plots were set up in Orange Lake and sprayed with 0.0, 1.0, 2.0, 3.0, and 4.0 lbs/acre 2,4-D amine. These larger plots were treated by the St. John's River Water Management District and will be monitored throughout this year in an attempt to further quantify any effect 2,4-D has on spatterdock.

Acknowledgments

We appreciate the assistance of Wayne Corbin, Darrell Blackall and Matthew Cole of the St. Johns River Water Management District. This project is partially funded by University of Florida (IFAS), and the U.S. Department of Agriculture (ARS) Cooperative Agreement No. ARS 58-43YK-9-0001.

How Much is Enough?

By
Joe Kight
Mobile, AL District
U.S. Army Corps of Engineers

reprinted from the USACOE APC Bulletin, V.2, n.4

"Weeds are good for fish. Don't kill the weeds."

"Weeds are taking over the lake. I can't even get to places where I used to catch fish. The government ought to DO something."

"Hydrilla is great for ducks. We haven't had so many ducks in years. Don't bother the hydrilla."

"I can't even run my boat in the lake anymore. Think I'll sell out and move – only no one wants to buy my cabin. The government ought to DO something."

"Maybe some hydrilla would help the fishing and duck hunting in the lake back home. Let's take some back and plant it!"

Who is right? Do weeds cause better fishing and duck hunting? What does that really mean? Increasing the number of fish caught or ducks killed does not necessarily mean that the populations of either fish or ducks have been increased. Who is being helped? Or hurt?

Seems like folks with different interests are each singing off different pages. For instance, hydrilla does appear to attract ducks. But attracting ducks and increasing their population are two entirely different things. The over-all number of ducks has been declining for the past several years. Perhaps a more accurate statement would be that hydrilla attracts duck hunters.

What about fish, especially large mouth bass? Do aquatic weeds help or hurt the population? Do weeds result in more catchable size bass? Or do they tend to concentrate the bass so that they are not spaced out all over the lake? If weeds do cause more catchable size bass, then how many more?

What about the lakes themselves: clear, steep banked, deep lakes in the mountains; moderately sloping bottoms of lakes in the piedmont and upper coastal plain; or shallow lakes in the middle and lower coastal plain. Are all lakes affected the same? What about the type of bottom in these lakes; clay, rocks, mud, sand, muck, and various combinations. Does this really matter?

What about the size of the lake? Do farm ponds need weeds? Tens of thousands of people have gone to considerable trouble and no small expense to keep weeds out of their ponds. Are they wrong?

Fertility, hardness, pH, and numerous other water quality parameters. How do all these and many, many other factors influence the weeds' effect on fish?

If weeds do increase the fishery, which weeds are best? What species, density, distribution, and species diversification is optimum? How many more bass will the best combination produce? What are the trade-offs between weeds and such things as water contact sports and property values? Who pays?

It seems that aquatic plants are being deliberately spread from one waterbody to non-contaminated areas. This makes for an up-hill battle (in which the war will be lost) for us as aquatic plant managers.

Public education and awareness are vital. But to mount a public education program, we'd best have some accurate, substantiated data.

Does anyone really know (and can prove) the answers to these questions?

If so, how much is enough?

1990 IFAS/FAPMS AQUATIC PLANT MANAGEMENT SHORT COURSE

THE 1990 IFAS/FAPMS Aquatic Plant Management Short Course will be held June 19-21, 1990 at the TREEO Center, University of Florida, Gainesville. As usual, topics will include water quality, environmental aspects, herbicide physiology/technology and other exciting topics related to aquatic plant management. For more details contact Ken Langeland at the Center for Aquatic Plants, (904) 392-9613.

PENNWALT CORPORATION CHANGES NAME

Pennwalt Corporation, manufacturer of Aquathol "K" and Hydrothol 191 aquatic herbicides has changed its name to Atochem North America. This is a result of a reorganization of the parent company, Elf Aquitaine. Any questions can be referred to Bill Moore, Florida representative for Pennwalt-Atochem North America. Bill can be reached at (305) 656-5838.

SUBSCRIBER INFORMATION

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Please give four weeks advance notice. Attach the mailing label from your last issue in the space above and write in your new address below.

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FAPMS Treasurer
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OSCEOLA COUNTY WATER SPINACH INFESTATION

Water spinach, *Ipomoea aquatica*, was discovered on West Lake Tohopekaliga, Osceola County in December 1989 by Ernie Feller, SFWMD Aquatic Plant Technician II. DNR was notified and the adjacent homeowner, who had planted the plant, was informed of the federal and State prohibitions against transportation and cultivation of water spinach. The homeowner and the Christmas freeze effectively removed the infestation.

Ernie says he was able to identify the plant because he'd seen presentations on it at related meetings. His discovery of this unusual plant highlights the importance and efficacy of the Florida professional aquatic plant management community's continuing education program.

Continued from page 6

lose current hydrilla maintenance levels on several waters in 1990 or early 1991 including Lakes Hatchineha, Kissimmee, Arbuckle and Istokpoga. If adequate funding is not restored in the upcoming legislative session, the financial crisis will compound and control will be threatened in Lakes Jackson, Orange, Lochloosa, Newnans, Marion, Myakka, Sampson, the Crystal River and the tributaries of the St. Johns River.

The Department has begun a campaign in conjunction with several water management districts and counties as well as FAPMS to restore state and federal funding. The success of this effort will dictate the condition of Florida's waters far into the 1990s – and determine whether the struggle for maintenance control in the '80s was worth the effort or if it was in vain.

Plan to Attend and Present a Paper at the APMS 1990 Annual Meeting

You are invited to attend the 30th annual meeting of the Aquatic Plant Management Society to be held July 15-18, 1990 at the Radisson Admiral Semmes in the heart of downtown Mobile, Alabama. Mr. Joe Zolczynski of the Alabama Game and Fish Division and Chairman of the Local Arrangements Committee has planned a super set of activities to include a beach party and seafood feast on the shores of the Gulf of Mexico. A special prize of an artist proof of the 1989 Alabama duck stamp will also be won by some lucky participant.

This year's program will begin with a session on "why we do what we do", i.e. the ecological and environmental impacts of aquatic weeds, and then move into more general papers on other aspects of our profession. If you are planning to attend, why not present a 15 minute talk on some interesting activity you are involved in. The deadline for the submission of abstracts and titles is April 30, 1990. If you are interested in presenting a paper submit the following information to Joe Joyce, Program Chairman.

Plan to attend, it's going to be a great meeting with good ole southern hospitality.

Paper Submission Form for the 1990 APMS Meeting
DEADLINE FOR SUBMISSION IS APRIL 30, 1990

TITLE: ____________________

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AUTHORS: ____________________

ORGANIZATION: ____________________

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ADDRESS: ____________________

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TELEPHONE: ____________________

REGULAR PAPER: ____________ STUDENT PAPER: ____________

ABSTRACT (75 words or less) : ____________________

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Please send this form to:
Joseph C. Joyce
IFAS Center for Aquatic Plants
University of Florida
7922 NW 71st Street
Gainesville, FL 32607

Phone (904) 392-9613

AquaVine

FAPMS 1990 DISTINGUISHED SERVICE AWARDS NOMINATIONS

If, in the course of aquatic events, situations arise in which heroic or otherwise exemplary behavior is displayed by FAPMS members, the Society would like to recognize same. All FAPMS members please submit names of any of our peers who act to save lives or otherwise exemplify the kinder, gentler and heroic side of our members. Include an outline of the related events to: John T. Kelso, Awards Committee Chairman, SWFWMD, 2379 Broad Street, Brooksville, FL 34609 by August 31, 1990. Also, it's never too early to submit papers and Applicator of the Year nominations for the October 1990 Annual Meeting.

DNR – WEST PALM BEACH

The DNR Aquatic Plants Bureau South Florida office had yet another Regional Biologist opening. Julie O'Connell, after two years with DNR, has taken an Environmental Analyst position with the Palm Beach County Environmental Services Department. Her duties will include marine investigations including beach renourishment and artificial reef monitoring. The vacancy was filled in March by Ms. Jackie Jordan, currently Biol. Sci. III -DNR, Tallahassee. Welcome to Jackie; and Julie, we hardly know ye, but congratulations and best wishes!

PERSONAL PROTECTIVE EQUIPMENT

The National Technical Information Services (NTIS) has a new publication, *Personal Protective Equipment for Pesticide Applicators: Guide to Sources.* You may want this new source guide, if you are having a hard time finding suppliers. Contact NTIS, 5285 Port Royal Road, Springfield, VA 22161 or call (703) 487-4650.

DNR AQUATIC PLANT TRAINING COURSE

The Florida Department of Natural Resources will conduct its tenth annual aquatic plant identification and survey training course on Wednesday and Thursday, April 4 and 5, 1990 at the Episcopal Church Conference Center in Live Oak, Florida. Approximately 125 live submersed, floating and emersed plants will be identified in a classroom setting by a taxonomist who will also provide techniques for distinguishing between species of similar appearance. Fine detail will be enlarged with video projection equipment to facilitate identification.

Basics in survey techniques as well as the latest computer, LORAN and Satellite mapping methods will be taught through classroom instruction and lab and field exercises. Lectures on Florida limnology, large scale hydrilla control and recognition of biological controls and associated plant damage will also be provided.

There is no registration fee for this two day program. Call Jeff Schardt at 904-488-5631 for registration details.

FLORIDA AQUATIC PLANT RESEARCH REVIEW MEETING

The 1990 Annual Aquatic Plant Research Review Meeting will be held March 28 at the University of Florida Rietz Union Auditorium in Gainesville. The meeting will highlight aquatic plant research projects currently underway in the state.

Because the meeting is co-sponsored by the IFAS Center for Aquatic Plants and the Florida Aquatic Plant Management Society there will be no registration fee for the meeting or refreshments. Pre-registration by March 14 will assure attendees of a campus parking permit. Registrants should send their names, business address, organization and position title to address below:

Aquatic Plant Research Review
IFAS Office of Institutes and
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551 IFAS

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