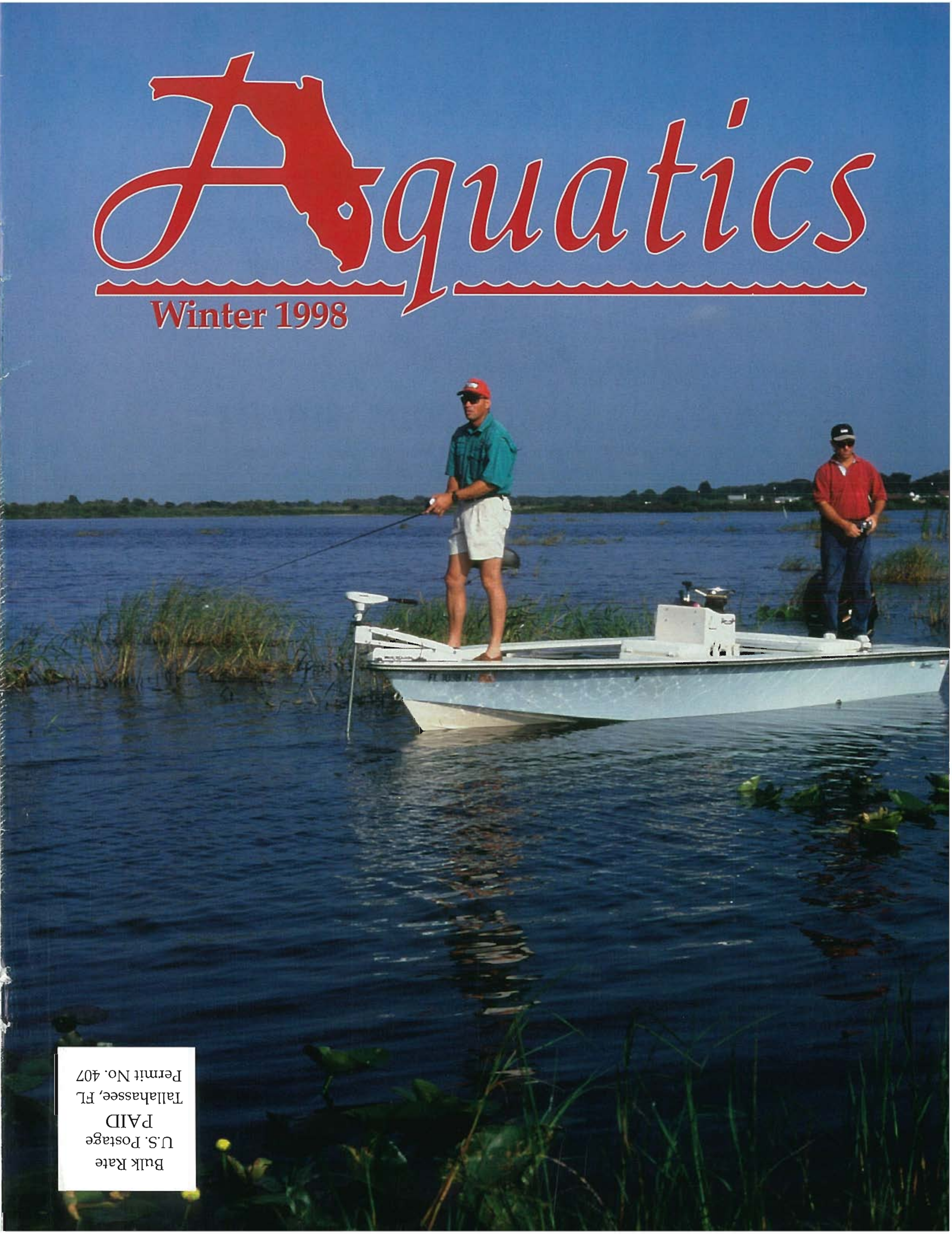
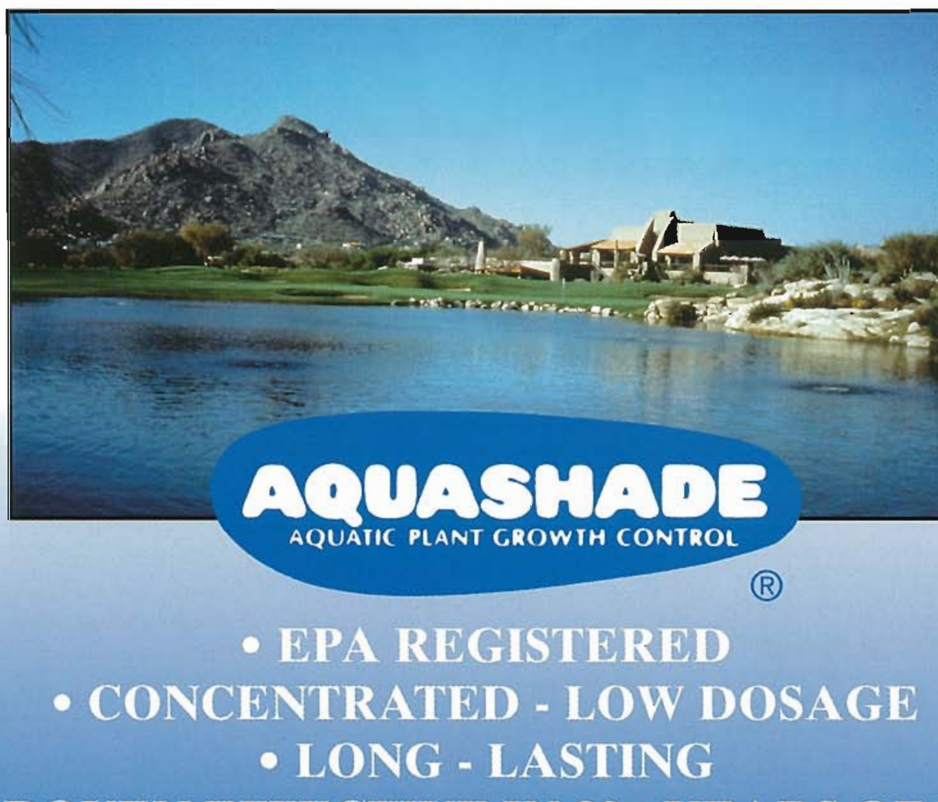
Aquatics

Winter 1998





Letter to the Editor

YEAR OF THE APPLICATOR

I first started coming to the FAPMS Annual Meetings in 1981. What impressed me most then, and still does today, is the energy level of our field applicators in their dedication to our professional society. I attend over a dozen professional-type conferences in the course of a year, all over the country, and there is not a one I enjoy more than our FAPMS meeting in October. Why? Because at FAPMS the focus is the applicator, the guy or gal in the field doing the actual work.

What can I do as President of FAPMS to continue this tradition? First of all, I will listen to your suggestions and encourage our Board and various committees to include your ideas in their planning. We have applicators on our Board, and on many of the committees. At our recent Annual Conference in Cocoa Beach, two applicators were elected to the Board as Directors and one as your next Treasurer. We also have several key committees chaired or co-chaired by applicators. Remember every member of FAPMS is always welcome to attend Board and committee meetings. Make your voice heard!

We are all aware of the Applicator of the Year award given out at each Annual Meeting. It is the award we all look forward to with the most anticipation. Well, let us make this the ***Year of the Applicator***, and do all we can to include our applicators in the Society's work and have the Society work for the Applicator.

I would like to see the number of applicator papers presented at the 1999 Annual Meeting in Daytona double over the previous years. (Contact Sam Coward, an applicator herself, as chair of the Program Committee to get on her list). I would like to see each issue of Aquatics profile an applicator, or applicator team, highlighting the professionalism of their day-to-day work in the field. I hope this encourages more applicators to join FAPMS. Share your thoughts about the benefits of being part of FAPMS with your fellow applicators who are not yet members - and win the $50 Recruitment Contest for signing up the most new members.

My father, Paul Brewer, was one of the first to attend the early meetings in the mid-1970's. Folks like Dr. Haller, Harold Brown, Bill Moore, Ross Hooks, Bob Blackburn and many others, did a fantastic job in getting FAPMS off the ground. From the beginning, the needs of applicators have always been a priority. Let us make 1999 the Year of the Applicator and honor the foresight of our founding members!

Jim Brewer

'Tis the season . . . for the best fishing in Florida's freshwaters!

Lake Kissimmee

Photo by David Tarver

Aquatics

Winter 1998/Vol. 20, No. 4

CONTENTS

AQUATICS (ISSN 1054-1799): Published quarterly as the official publication of the Florida Aquatic Plant Management Society Registration No. 1,579,647. This publication is intended to keep all interested parties informed on matters as they relate to aquatic plant management particularly in Florida. To become a member of FAPMS and receive the Society newsletter and Aquatics magazine, send $20.00 plus your mailing address to the Treasurer.
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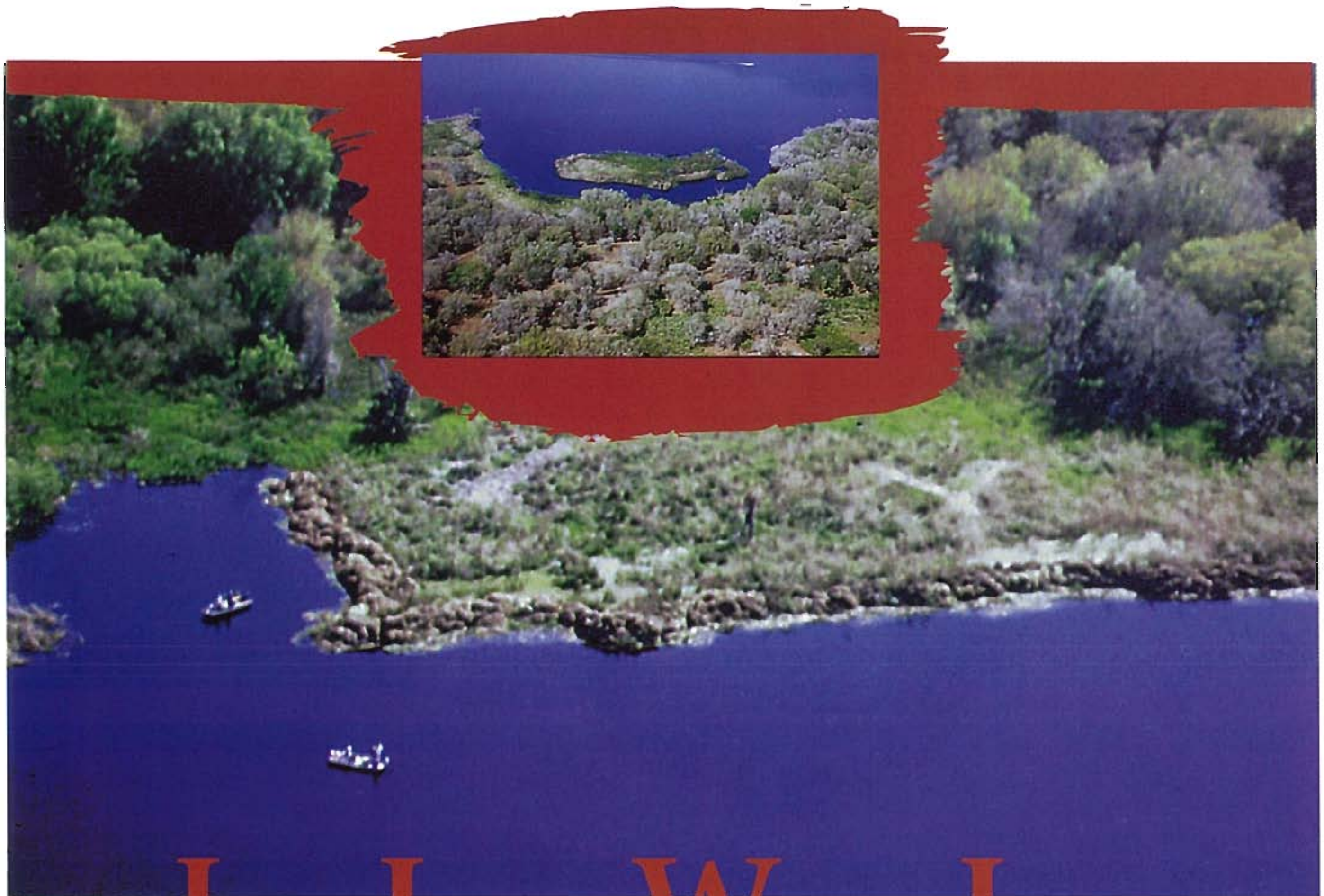

Lake Jackson Wildlife Islands

by
Mike Hulon, Adriene Furukawa, Jon Buntz, Jim Sweatman, and Chris Michael
Florida Game and Fresh Water Fish Commission
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Kissimmee, Florida 34741

During a 1994 extreme drawdown on Lake Jackson (Osceola County, Florida), organic material was removed from the dry lake bottom and stockpiled to create two in-lake wildlife islands. The islands were monitored quarterly for a three-year period to determine what wildlife and plants would inhabit them. During the study period, over 67 animal species and 44 plant species were trapped or observed. Seven different animal species reproduced on the islands. In summary, wildlife islands provided a cost effective alternative to upland muck disposal and sustained animal habitat and vegetative growth.

Introduction:

The Kissimmee Chain of Lakes is the headwaters for Lake Okeechobee and the Everglades. Stabilized water levels associated with the advent of flood control in the late 1960's created conditions that caused excessive growth of aquatic vegetation and the accumulation of organic material. Habitat

Figure 1. Top inset, cove wildlife island completely surrounded by water.
Figure 2. Top, ramp wildlife island, actually a peninsula rather than an island.

enhancement projects by the Florida Game and Fresh Water Fish Commission on the Kissimmee Chain of Lakes (1971, 1977, 1979, 1987, 1990, 1992, 1993, 1994, 1995, 1996, 1997) utilizing drawdowns have been conducted to offset habitat loss associated with stabilized water levels.

One technique used in many of the projects coupled organic muck removal with extreme drawdown. This technique involved dewatering approximately 40% of the lake bottom during the dry season (March-May) and removing shoreline organic material with bulldozers, front-end loaders and dump trucks.

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Until 1994, all organic material was deposited on upland sites within one mile of the work site. However, lack of readily available upland disposal sites caused Commission personnel to investigate stockpiling organic material in-lake.

Because in-lake disposal (wildlife islands) was an unexplored arena, the Department of Environmental Protection (DEP) requested the Commission investigate water quality, natural re-vegetation and wildlife utilization as part of the permit conditions. Following agreement of these conditions, two in-lake wildlife islands were constructed during the 1994 Lake Jackson muck removal project.

One of the two wildlife islands is completely surrounded by water at 53.5 ft mean sea level (msl), normal low pool stage. The depth of water between the shore and this island at 53.5 ft msl is approximately 3-4 ft (Figure 1). The other wildlife island is actually more of a peninsula and is accessible from shore at any water level (Figure 2).

During the study, three extreme drawdowns and associated muck removal projects were conducted (1994, 1995, and 1997). Boards were removed at the water control structure between January and April prior to the commencement of each project. Lowest water levels were reached in May or June and ranged from 49.3 ft above mean sea level (msl) in 1994 to 50.5 ft msl in 1995.

A one-year water quality study (July 1994-August 1995) indicated that the wildlife islands did not produce a nutrient pollution source or a turbidity problem (Hulon et al. 1997). This paper reports results of a study investigating wildlife utilization and vegetation composition of these two islands.

Materials and Methods:

Two wildlife islands were sampled quarterly (March, June, September, December) from 1 September 1994 to 30 June 1997 for a 30 day period each quarter. Sampling techniques included silt fence arrays with pitfall, funnel and Sherman live traps (3 in x 3.5 in x 9 in); track and scat identification; and visual observations from both island and airboat. Birds were counted only if they were on the island or in the water along its immediate shoreline. No song or perching birds were counted. Sherman traps ran for five consecutive days within each 30 day period. Other survey methods were checked daily when Sherman traps were sampled and were checked twice weekly during the rest of the 30 day period. Animal reproduction on the islands was assumed to occur if nests were discovered or if the size and number of hatchlings were indicative of a nest nearby.

Silt fence arrays (three feet high) consisted of black woven polyproylene geotextile, used to control sediment runoff on construction sites (Enge 1997). The arrays were constructed in a "T" formation with each leg approximately 33 ft long. Two arrays were set per island. Each array had six single funnel and three double funnel traps made from 1/4" galvanized hardware cloth. Traps were handmade and held together with cage C clips and hognose rings. Aluminum window screen was initially used but mammals chewed through the traps. Each array also had six pitfall traps (buried five gallon buckets) arranged at different locations along the legs.

Vegetation samples were collected biannually from 1 September 1994 to 30 June 1997 using a point transect method. Three samples were taken one meter apart, every 10 meters, along two cross sections on each island. A pole was held vertically at each site and all plants touching it were recorded. One cross-section went east to west, the other north to south; both covered the entire island.

Results and Discussion:

Over 2,600 specimens representing 67 species were documented utilizing the wildlife islands (Table 1). Evidence of reproduction by seven species was also observed: American alligator (*Alligator mississippiensis*), banded water snake (*Nerodia fasciata*), eastern mud snake (*Farancia abacura abacura*), Florida softshell turtle (*Apalone ferox*), ground skink (*Scincella lateralis*), peninsula cooter (*Pseudemys floridana peninsularis*) and stinkpot turtle (*Sternotherus odoratus*).

Alligator nests were first documented in spring/summer of 1996 (Figure 3). Yearling alligators were also observed, indicating the first alligator reproduction on the islands may have occurred in 1995. Young-of-year of other species mentioned above were also discovered during 1996. Reproduction in 1997 was just getting started when the project ended.

Numbers of specimens increased from approximately 700 annually during the first two years of study to over 1,000 during the final year. Increased reproduction, increased vegetation density, and the fact that no extreme drawdown was conducted in 1996 may explain the trend. To elaborate, without low water associated with an extreme drawdown, predators such as grey fox (*Urocyon cinereoargenteus*), raccoon (*Procyon lotor*), and bobcat (*Felis rufus*) would be less likely to visit the island in Figure 1. This would in turn reduce predation of

Figure 3. Alligator nest on the cove wildlife island.

many of the marsh rats, etc. that dominated abundance estimates. Furthermore, as time progressed, increased vegetation density would create conditions more favorable to species abundance by providing nest material and cover.

Most of the "game" species such as white-tailed deer (*Odocoileus virginianus*), wild turkeys (*Meleagris gallopavo*) and wild pigs (*Sus scrofa*) used the wildlife island that was connected to the shoreline. During the extreme drawdowns, however, both islands had an abundance of game animals. The exposed lake bottom likely provided an abundant, easily accessible food source in the form of invertebrates and young, tender, terrestrial vegetation.

Shore and wading birds utilized the open shoreline of the islands quite extensively which was likely a function of the excellent habitat created for small fishes, benthos,

Table 1. Wildlife species trapped or observed on wildlife islands from September 1994 through June 1997 on Lake Jackson, Osceola County, Florida.

AMPHIBIANS	BIRDS	MAMMALS	REPTILES
Eastern Narrowmouth Toad	American Bittern	Bobcat*	American Alligator*
Florida Cricket Frog	American Crow	Cotton Mouse	Banded Water Snake**
Greater Siren	American Kestrel	Fox*	Corn Snake
Green Tree Frog	Anhinga	Hispid Cotton Rat	Eastern Indigo Snake
Oak Toad	Belted Kingfisher	Least Shrew	Eastern Mud Snake**
Pig Frog	Black Vulture	Marsh Rabbit*	Florida Cotton Mouth Snake
Pine Wood Tree Frog	Common Moorehen	Marsh Rice Rat	Florida Softshell Turtle**
Southern Leopard Frog	Double-crested Cormorant	Nine-banded Armadillo*	Garter Snake
Southern Toad	Glossy Ibis	Raccoon*	Green Anole
	Great Blue Heron	River Otter*	Ground Skink**
	Great Egret	Round-tailed Muskrat	Peninsula Cooter**
	Green-back Heron	Skunk*	Peninsula Mole Skink
	Least Bittern	Southern Short-tailed Shrew	Ribbon Snake
	Limpkin	White-tailed Deer*	Southern Black Racer
	Little Blue Heron	Wild Pigs*	Stinkpot Turtle**
	Purple Gallinule		Striped Crayfish Snake
	Red-shouldered Hawk		Striped Mud Turtle
	Snowy Egret		Swamp Snake
	Tricolored Heron		Yellow Rat Snake
	Turkey Vulture		
	White Ibis		
	Whooping Crane*		
	Wild Turkey		
	Wood Stork		
TOTAL SPECIES: 9	TOTAL SPECIES: 24	TOTAL SPECIES : 15	TOTAL SPECIES: 19
	*Observed and photographed during non-sampling month.	*Tracks, digging and/or scatwas observed on numerous occasions but only one count was tabulated for each month of sampling.	*Young of the year, hatchlings, adults and three active nests observed. **Reproduction/hatchlings observed.

Table 2. Frequency of occurrence (percent composition) for plants sampled on wildlife islands in Lake Jackson from 1994 to 1997.

Scientific Name	Common Name	1994 TRANSECT				1995 TRANSECT				1996 TRANSECT				1997 TRANSECT			
		I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
Bidens spp.	Bur-marigold	12.2	19.2														
Eupatorium spp.	Dog fennel	7.0	7.7			45.8	26.7	5.9	15.2	34.0	29.2			35.9	30.8	2.6	
Ludwigia octavalis	Water primrose	16.2	7.7	2.3							1.3	3.8					
Polygonum sp.	Smartweed	28.4	30.8	18.2	13.8	35.4	33.3	26.5	9.1	41.5	33.3	27.3	28.6	3.8	7.7	15.4	9.5
Pontederia spp.	Pickerelweed	21.6	11.5	4.6	6.9			3.0		2.3							
Stachys floridana	Mint													20.5	23.0		

and reptiles. Raptors were also common thanks to the abundant rodent population. No bird nests were noted but as woody stem plants take root it is reasonable to assume the nests will follow.

A variety of plant species (44) were observed growing on or around both wildlife islands during the monitoring period (Table 2). A gradual increase in terrestrial plants occurred as waters receded during the three drawdowns. The plant community on the islands were dominated by dog fennel (*Eupatorium* spp.) and maidencane (*Panicum hemitomon*). We postulate that the succession of terrestrial plants is largely dependent on Lake Jackson's water levels and rainfall. With the majority of enhancement work complete, extreme drawdowns will likely be conducted on a three to five year schedule. This will, on average, provide fewer low water periods and may reduce the terrestrial component on the islands, at least around the periphery.

In conclusion, where upland disposal of organic material is not possible, wildlife islands offer a cost-effective alternative that allows for muck removal projects essential to maintaining sportfish and aquatic-orientated bird habitat in our lakes. At the same time, in-lake disposal islands do not present water quality or turbidity problems, vegetate quickly, are utilized by wildlife and even serve as reproductive habitat for some species.

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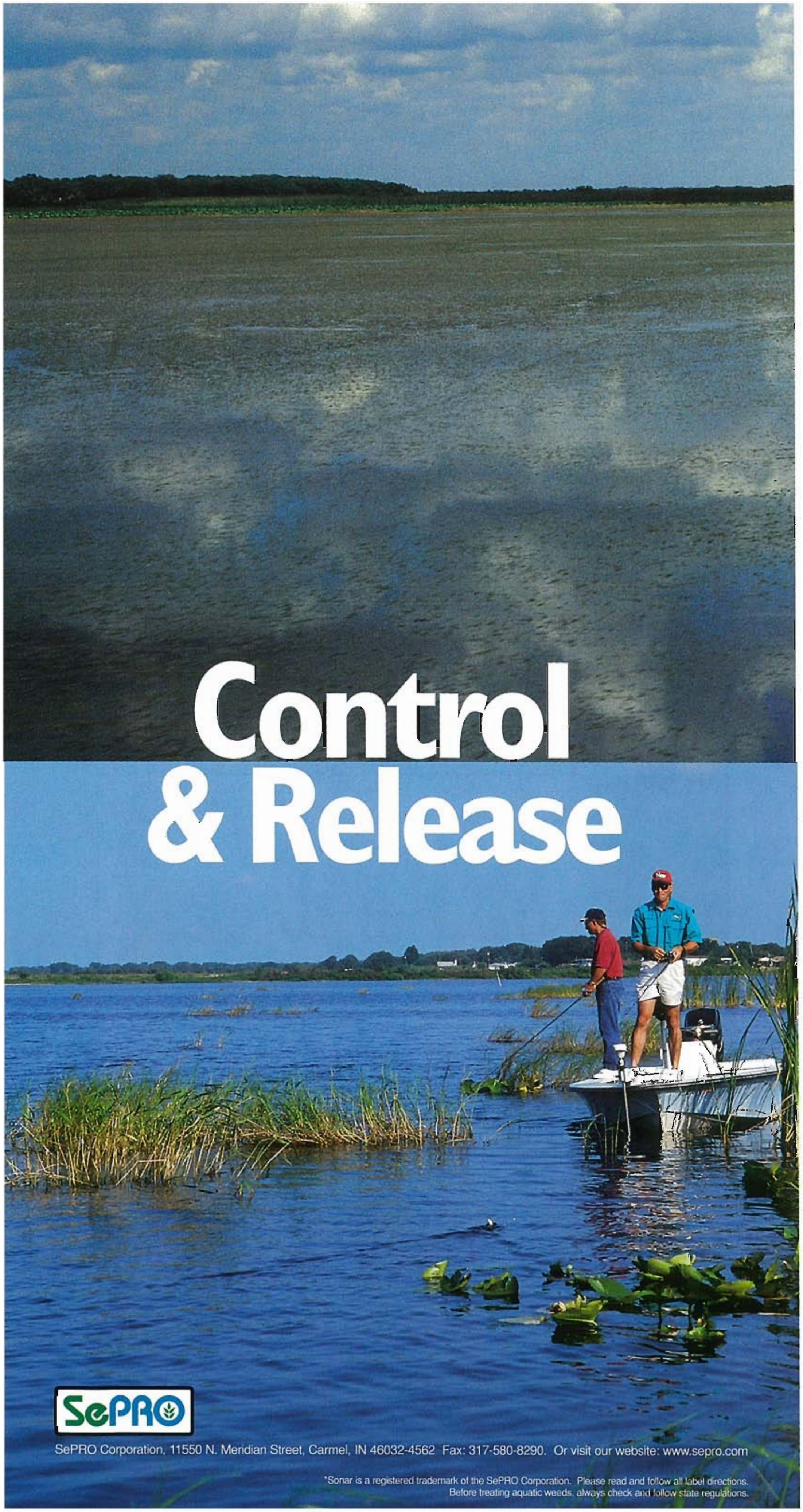
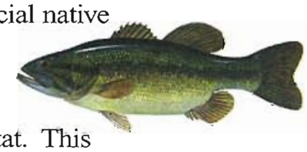


Every bass angler worth his salt recognizes and appreciates the value of structure. Aquatic vegetation plays an important role in providing structure for fish and wildlife. But exotic invasive plants like hydrilla and Eurasian watermilfoil crowd out the more beneficial native plants, thus disrupting a diverse habitat. This mixture or balance of plants and structure can improve both the number and quality of fish.



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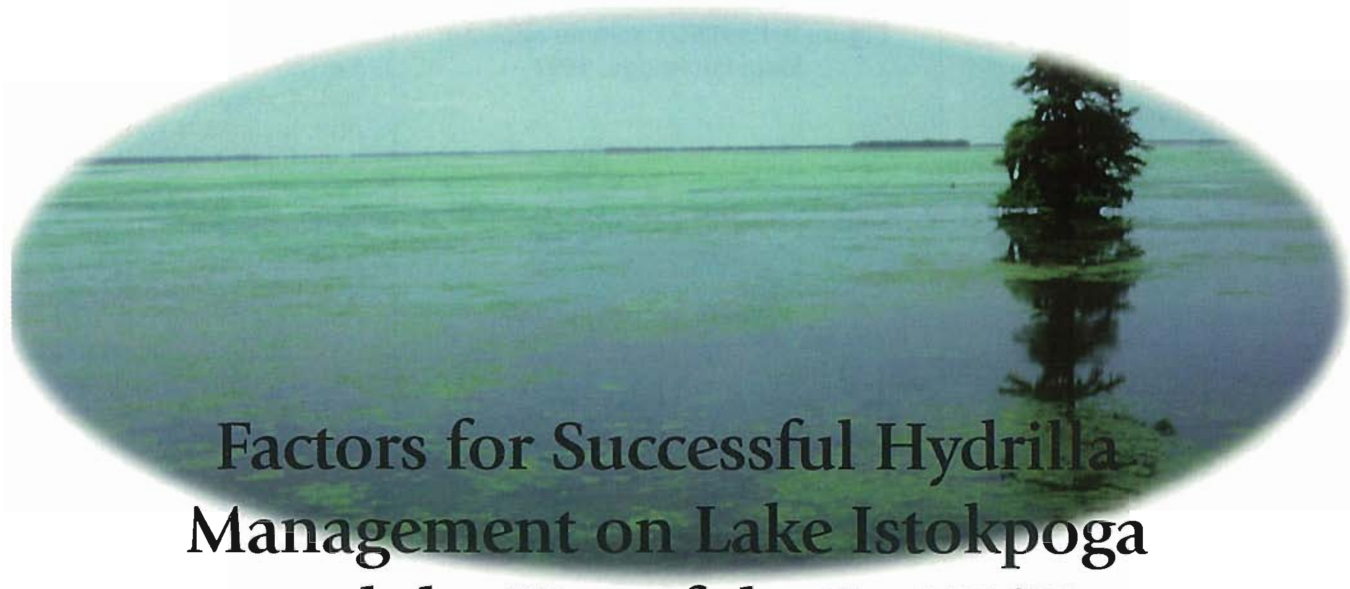


Factors for Successful Hydrilla Management on Lake Istokpoga and the Use of the FasTEST

By David F. Demmi
Department of Environmental Protection Bureau of Invasive Plant Management

INTRODUCTION

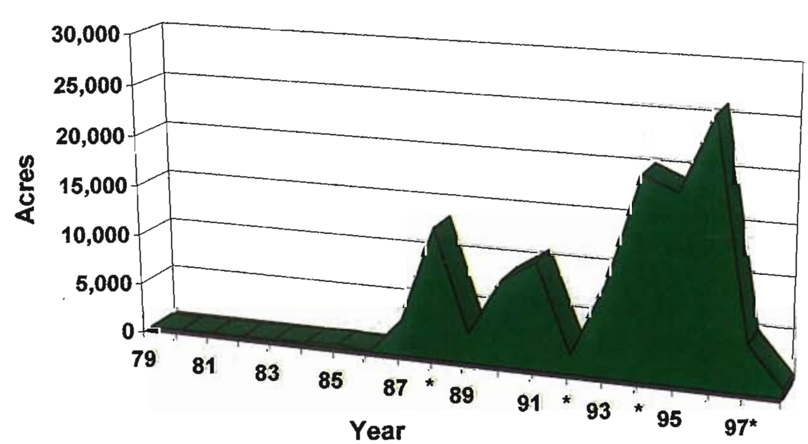
Lake Istokpoga is located in Highlands County and is the fifth largest (27,692 acres, 11,207 hectares) lake in Florida. The lake is relatively shallow with an average depth of 1.8 meters. Its watershed encompasses an area of approximately 1,572 square kilometers and is comprised primarily of pasture lands, citrus groves, caladium farms, cypress swamps, and residential developments. Lake Istokpoga is an open system, with Arbuckle and Josephine Creeks flowing into the lake on the north end and water flowing out through a flood control structure on the southeast side of the lake. Highlands County conducts aquatic plant management on Lake Istokpoga and is a participant in the Department of Environmental Protection's Cooperative Aquatic Plant Control Program.

Hydrilla (Hydrilla verticillata) (L.F. Royle) was first documented in Lake Istokpoga in 1979. By 1988 hydrilla coverage had expanded to an estimated 20,000 acres, approximately 70% of the lake's surface area (Figure 1).

HYDRILLA MANAGEMENT

Since 1988, four large-scale hydrilla treatments have been conducted using the herbicide fluridone (Sonar) in the pelletized form (SRP). The SRP was applied to twenty-five and fifty acre plots located throughout the lake at intervals 10-14 days apart. Lake Istokpoga is relatively shallow and has a predominately sandy bottom. Sandy bottom lakes are ideal for the use of SRP pellets due to the abrasive nature of sand particles which can effectively release the herbicide into the water column. The optimum period for fluridone application in Lake Istokpoga has proven to be late fall or late winter. Treatments during this time frame minimize impact to non-target vegetation, since native vegetation is dormant. Additionally, higher dissolved oxygen levels assist the decomposition of hydrilla and provide a buffer for fisheries. Further, rainfall is at its lowest levels on Lake Istokpoga from November through February.

Figure 1. Lake Istokpoga Hydrilla Expansion and Management



*** Indicates Large Scale Hydrilla Treatments**

This factor maximizes herbicide contact time as the chance of water movement through the flood control structure is reduced.

THE 1997 HYDRILLA TREATMENT

When the October 1996 annual aquatic plant survey indicated that hydrilla had expanded to approximately 25,829 acres, approximately 93% of the lake's surface area, another whole lake treatment was planned. Areas that had minimal hydrilla infestation were located in the northwest lobe of the lake (Henderson's Cove) and southeastern portions of the lake. All other areas of the lake had hydrilla that was topped out or was less than 1.0 ft below the surface.

This most recent whole lake treatment began in early January 1997 and was completed by mid-February 1997. Sonar SRP was applied by a helicopter contracted by Highlands County to 48- fifty acre plots. These plots were scattered throughout the lake except for Henderson's Cove. The Sonar was applied to 12-14 fifty acre plots every other week until all 48 plots had been treated.

Figure 2. FasTEST sample sites on Lake Istokpoga, 1997

FasTEST Samples

FasTEST water samples were collected from Lake Istokpoga after treatments were completed and shipped to the SePro Corporation Lab for analysis. Ordinarily, FasTESTs are collected during the application of Sonar to assess levels of fluridone concentration. If needed, more Sonar could be added to bring fluridone concentrations up to target levels and maximize herbicide efficacy. The FasTEST water samples collected on Lake Istokpoga were used to gauge fluridone concentrations after treatment, and monitor herbicide movement throughout the lake.

The first sampling date for the FasTEST was approximately 44 days after the initial herbicide application began. FasTEST samples were collected once a week from February 19, 1997 through March 25, 1997 and sent to SePro for analysis. There were ten sample locations placed throughout the lake (Fig. 2). One sample location was in an area where no treatment plots were placed (number eight, near Josephine Creek). Samples were collected at this site for purposes of comparison with treatment plots and to document any dispersal patterns of the herbicide into this area.

RESULTS & DISCUSSION

The results from the analysis are interesting and at times, puzzling.

One of the most interesting results was that even though no herbicide plots were placed in the sampling location (number eight) near Josephine Creek, concentrations of fluridone were detected with a maximum of 10.9 ppb on March 25, 1997 (Fig 3). What is also puzzling is that Josephine Creek is a tributary flowing into Lake Istokpoga. Also, the average of these samples is higher than six other sample sites where herbicide plots were placed. A possible explanation may be related to herbicide movement throughout the water body. Previous studies (Leslie, et al., 1993) have demonstrated extensive herbicide movement using the aqueous formulation of fluridone. Although the SRP formulation was used on Lake Istokpoga, FasTEST analysis suggests similar herbicide dispersal through the water column may have occurred.

At sampling location number seven, near the Mouth of Arbuckle Creek, the highest fluridone concentration of all sampling sites, 16.9 ppb, was recorded on the February

Figure 3. Lake Istokpoga FasTEST Results, 1997

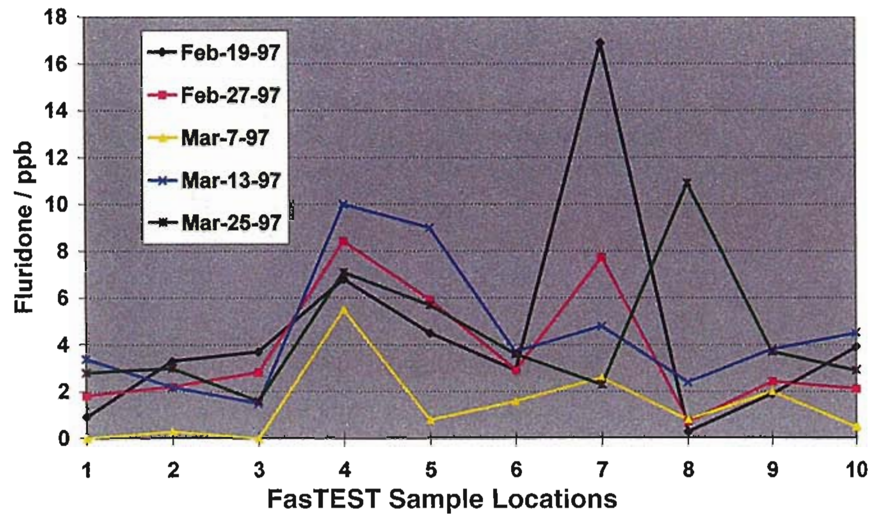
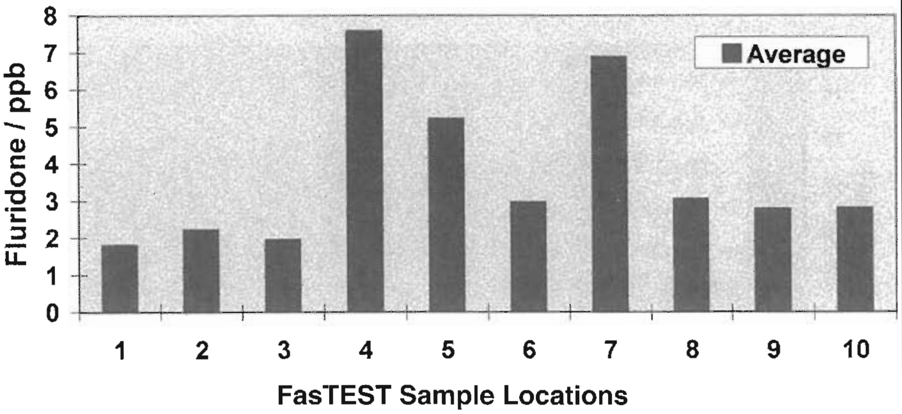


Figure 4. Average of FasTEST Results on Lake Istokpoga, 1997



19, 1997 sample collection. This spike is puzzling since Arbuckle Creek is the main tributary flowing into Lake Istokpoga. Previous studies have observed peaks of fluridone and postulated that it was due to the herbicide being released by decomposing vegetation (Muir et al., 1980; Schmitz et al., 1987). Since this area was heavily infested with hydrilla, a release of fluridone from dying hydrilla may have contributed to this spike.

Results for sample location number three, near Istokpoga Canal, were also interesting since this is an outflow canal with a spillway dam at its lower reaches. Fluridone concentration averages were the highest at this site, indicating movement of the herbicide toward the canal. Usually, flows are minimal during the fall-winter season, but a structural breach at the spillway may have contributed to the movement of fluridone toward the canal.

Averages for all sample locations (Fig 4) were above the threshold concentration of 1-3 ppb for inhibition of hydrilla growth (Netherland et al, 1995). The last sampling date on March 25, 1997 also indicated that fluridone levels were above these threshold values. Even though the lethal concentrations of fluridone on hydrilla under field conditions is believed to be between 5 and 10 ppb, the regulation of tuber and turion formation in hydrilla may be possible between 0.5 and 5.0 ppb (MacDonald et al, 1993). Information from various studies suggest that a treatment strategy may be to apply an initial fluridone rate (> 10 ppb) that produces more rapid and immediate injury followed by long term maintenance (> 60 days) of threshold concentrations of 1-3 ppb (Netherland et al, 1995). This long-term threshold concentration was maintained throughout all stations sampled on March 25, 1997. This date was 78 days after the initial application on January 7, 1997, longer than the 60-day minimum.

SUMMARY

The 1997 hydrilla treatment on Lake Istokpoga was very successful. A survey of the lake in May of 1997 indicated approximately 4,552 acres of hydrilla, a reduction of 21,277 acres. A survey done in February of 1998, almost a year later, indicated a reduction of hydrilla infestation to less than 1,000 acres. Hydrilla levels remained low through the summer of 1998 providing nearly two years of control. Recent surveys show hydrilla is beginning to re-colonize the lake, and a treatment may be necessary in 1999.

Ideal climatic conditions and other environmental factors likely influenced the success of the 1997 hydrilla treatment on Lake Istokpoga. In 1997, floodgates remained closed optimizing herbicide contact time. Due to El Nino, 1998 winter rainfall increased water depth. Runoff from these storm events may have caused an influx of organic humus and tannins into the water column. The increase of water color and water level may have extended hydrilla control by suppressing re-growth. The effects of color and water depth on hydrilla have been previously documented (Barltrop et al., 1984).

There are many factors that can influence a successful hydrilla management strategy, but on Lake Istokpoga in 1997, all the ducks were in a row.

ACKNOWEDGEMENTS

Many thanks to the Highlands County Aquatic Weed Section for their assistance and cooperation.

References available upon request.

Aquatic Vegetation Monitoring by Natural Resources Agencies in the United States

by
William Bartodziej[1] and Judy Ludlow[2]

[1]Ramsey-Washington Metro Watershed District, Minnesota
[2]Florida Department of Environmental Protection

Adapted for Aquatics and printed with permission from the Editor of the Journal of Lake and Reservoir Management, and the authors. Bartodziej, W. and J. Ludlow. 1997. Aquatic vegetation monitoring by natural resources agencies in the United States. Lake and Reserv. Manage. Vol. 13(2): 109-117.

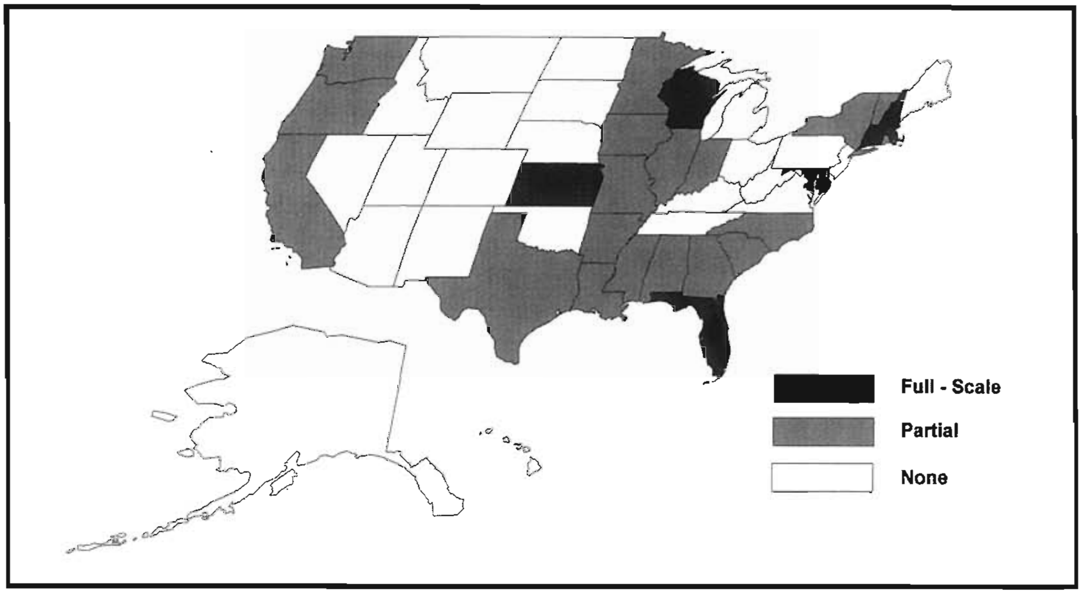


Figure 1. Map of states that conduct full-scale and partial aquatic plant monitoring, along with states that do not have an aquatic plant monitoring program.

Introduction

Lakes and rivers in the united States are losing biological diversity through habitat modification and the creation of new habitats by invasive nonnative plant and animal species (Vitousek 1986). Driven by the loss of native species and habitat alteration that adversely affects recreational water use, many state agencies have assembled management programs to address non-native species invasions. Nonnative plant species are a concern in all regions of the country, however, the scope and resources allotted to aquatic plant management vary widely.

As with any biological community that falls under management, it eventually becomes necessary to quantify populations and determine distributions within that community. In aquatic plant management, monitoring is most often needed to determine the extent of nuisance plant populations. This information is necessary in formulating effective control strategies, and for assessing the success of past management efforts. Comprehensive monitoring that inventories native plant species is valuable in that it can lead to the detection of rare species, and help to determine the effects from nonnative plant invasions. Standardized, large-scale plant monitoring by personnel trained in plant identification can also increase the detection rate of nonnative plant infestations. This saves money because new infestations are typically small and still relatively easy to control. Aside from monitoring increasing management efficiency, funding and permitting agencies often require abundance estimates of invasive plants to justify expenditures for control operations. Also, when a state agency requests funds for plant management, monitoring data may be used as a persuasive tool.

Pioneering nonnative plant introductions and the continual spread of established nonnative species have increased the need for sound monitoring programs across the nation. However, the current push to downsize government will make it difficult for state agencies to create new or expand existing programs responsible for this type of monitoring. With an increasing need for good, long-term survey data in an economic climate of stable or diminishing agency funds, it becomes important to reassess current plant monitoring protocols and formulate new program objectives. To compare aquatic plant monitoring approaches and to gain insights, state-agency biologists familiar with the topic in all fifty sates were polled. This paper presents results from our survey in a fashion intended to aid managers in determining which methods may be suitable to reach their program goals.

Methods

Data were gathered by means of a telephone poll conducted from July 1995 through February 1996. Persons working for state natural resources agencies with aquatic plant management program knowledge or a general understanding in program directives were surveyed. Certain federal agencies monitor aquatic plant communities, but this poll focused on programs administered by state agencies.

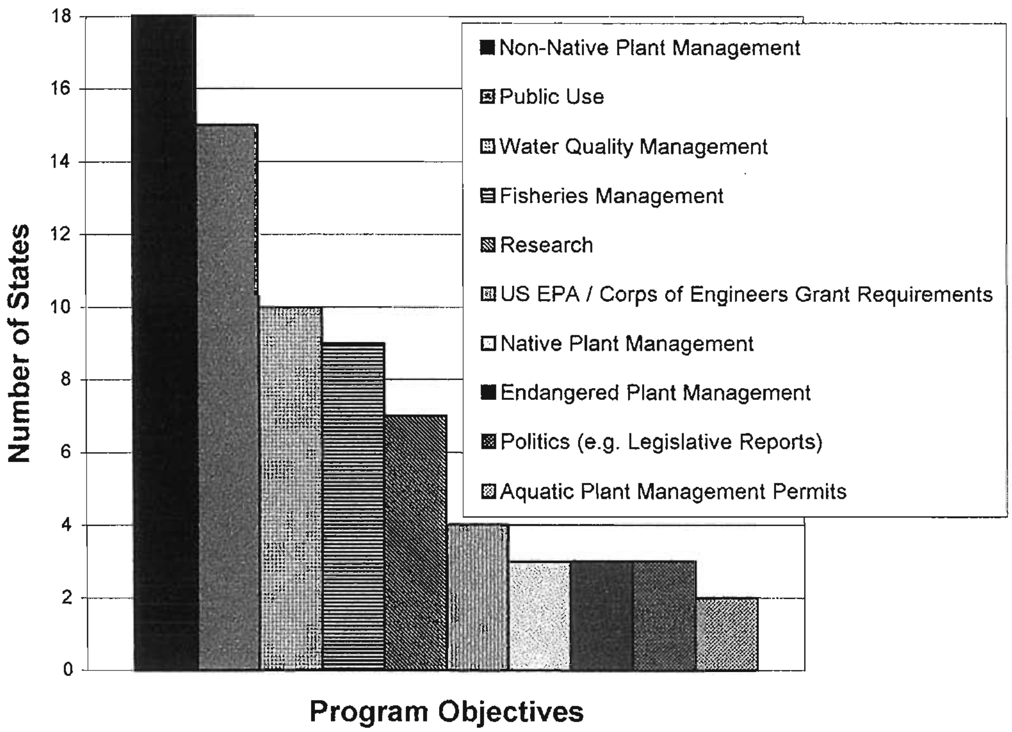


Figure 2. Number of States that use aquatic plant monitoring data to fulfill certain program objectives.

Monitoring was split into two categories

Full scale: A program that requires long-term (greater than 3 years) monitoring to be conducted on a regular basis (semi-annually or annually) on selected lakes and rivers. The entire plant community must be monitored. This includes states that monitor all public waters, or a subset.

Partial: A program that conducts usually short-term (1 to 3 years) monitoring on a limited number of lakes and rivers, or on selected plant species. These survey efforts are usually an artifact of research or a high-profile resource management issue.

The following data classifications were used to categorize various aquatic plant survey techniques (similar to Bonham 1989):

Quantitative: Methods that result in reproducible abundance or frequency data, such as line transects, point intercept, biomass, remote sensing, etc.

Semi-quantitative: Methods that generate subjective data involving judgment by the investigator, such as visual estimations of acreage, percent coverage, percent volume, or ranking of dominance. Sometimes data from these methods are used in statistical computations, therefore, the term semi-quantitative is preferred over qualitative.

Presence/absence data or species list: These data are considered quantitative, but the quality depends on the survey method.

Results and Discussion

Seven states conduct full-scale aquatic plant monitoring and twenty states have partial programs (Fig. 1). Of the twenty-three states that do not have programs, fourteen believe that some sort of program is needed.

The composition of aquatic plant monitoring programs varies considerably among states. Florida's program consists of 15 biologists surveying 450 public lakes and rivers on an annual basis, while Maryland has one biologist responsible for monitoring 1800 miles of shoreline. California has the largest staff with 35 biologists monitoring 500 water bodies, and Louisiana surveys the most water — 4 million acres. Fisheries biologists and limnologists are often charged with aquatic plant monitoring; professionals on staff average ten years of experience or more. All but two of the full-scale monitoring programs are over ten years old, while most of those classified as partial are younger than ten years. The exception was the Arkansas program, that has been monitoring aquatic plant communities for thirty-five years. Summer into fall seemed to be the prime time for conducting surveys.

Madsen and Bloomfield (1993) strongly suggest the collection of quantitative aquatic plant data, pointing out that objective data is the most useful, allowing for complete statistical analysis. However, because of limited resources, an overwhelming majority of monitoring programs in the United States (20) rely on some form of semi-

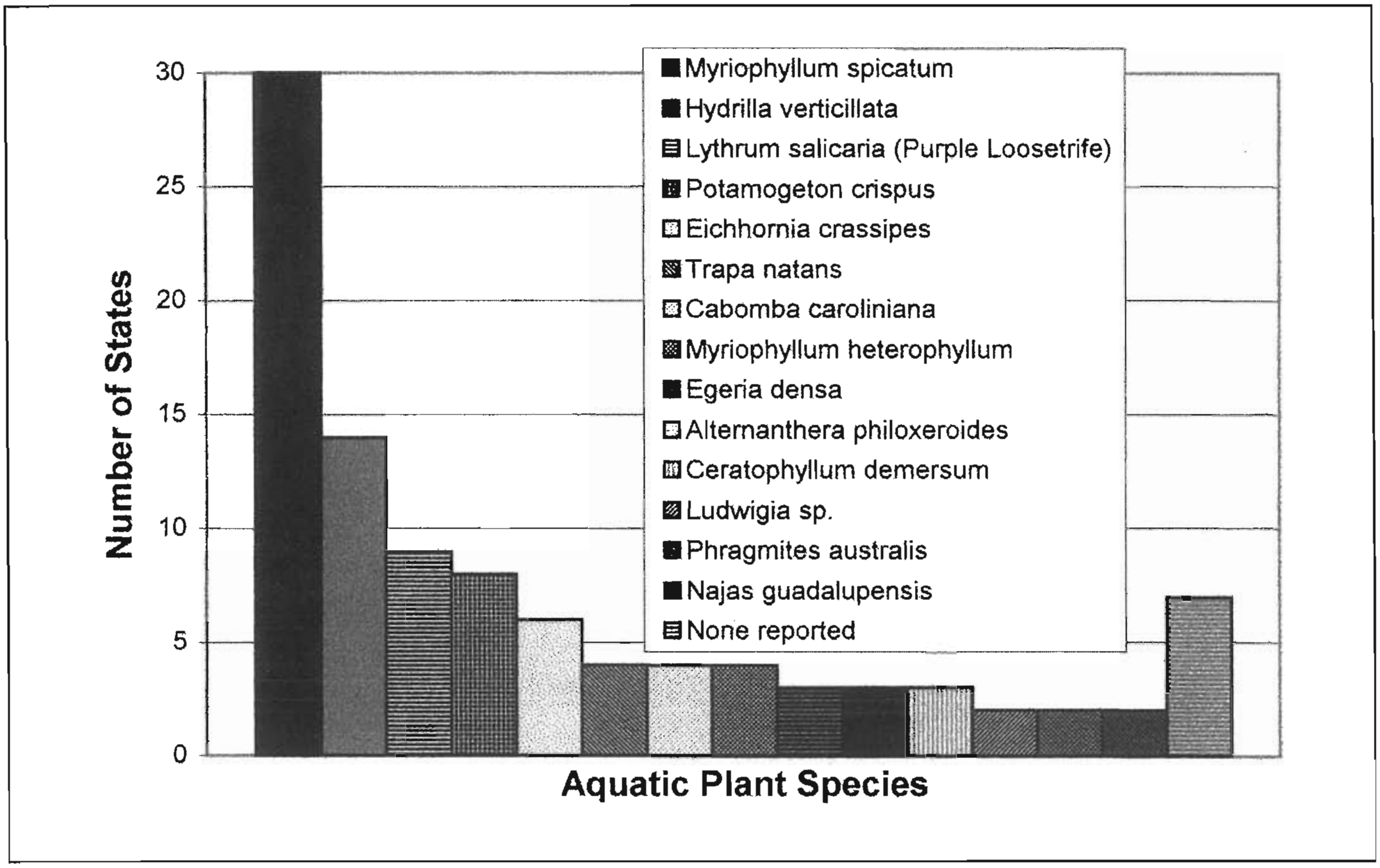


Figure 3. Aquatic plant species that are a management concern in two or more states.

quantitative data. Four states, (NC, NY, RI, WI) generate quantitative data.

The number one objective in aquatic plant monitoring programs is to assess the dynamics of nonnative plant populations (Fig. 2). These efforts are often coupled with plant control programs, or the data are used to track new infestations. It was evident that most states use the plant data to form management strategies: if not in designing plant control programs, then in water quality or fisheries management. Florida and Minnesota write annual reports to their state legislatures describing the success of management efforts, including plant surveys.

Based on this telephone poll, Eurasian watermilfoil (*Myriophyllum spicatum*) is targeted for management in all regions of the country (Fig. 3). Dioecious hydrilla is a major concern in the east, south, and western states. Several native plants in many states are considered nuisance species. *Myriophyllum laxum*, a candidate for federal threatened or endangered species listing, was the focus of control operations in South Carolina. The native milfoil, *Myriophyllum heterophyllum*, was managed in four eastern states. From these data, it is evident that not all native plant populations are perceived as beneficial, and excessive growth in certain waters, possibly aided by eutrophication, has resulted in "problem" natives being priority species in monitoring and control programs.

Conclusions and Recommendations

Quantitative aquatic plant survey data is considered ideal information in management planning, however, most states employ survey methods that yield semi-quantitative data. One reason for this approach is that numerous state aquatic plant management programs are limited by funding. States that collect quantitative plant survey data focus on a limited number of lakes, either chosen for their nonnative plant problems or because of their value as reference ecosystems. Because of the substantial effort and cost, quantitative monitoring is typically only conducted on waters with high-priority management objectives.

Lakes that receive expensive aquatic plant management or another form of restoration should be quantitatively surveyed. The more money going into management, the more important objective monitoring data become. Typically, more expensive treatments are associated with large water bodies; in these cases, remote sensing techniques offer the greatest spatial coverage for the least expense.

In terms of a program design, collecting only quantitative data would likely limit the number of water bodies surveyed. Conversely, a program relying on purely semi-quantitative data will be limited by not being able to use rigorous statistical data analyses. State agencies that have adequate resources should prioritize waters to be monitored, and seek a balance between semi-quantitative and quantitative approaches.

Having personnel trained in plant identification collect presence/absence data on a large number of lakes and rivers increases the detection rate of pioneering nonnative plant infestations. This monitoring may pay for itself by lowering control costs and may even provide an opportunity for eradication.

References are available on request.

AQUAVINE

Belated Thanks to Highlands County Crew

In October, at the FAPMS annual meeting, I was honored to be the recipient of the "Applicator of the Year" award. When the initial shock wore off, I was disappointed in myself for not recognizing the employees in the department that make my job so much easier. I really want to thank Bruce Burley, Chris Mayhew and Willie Ward for their dedication to our program. I could not have won any award without them. I also want to thank the awards committee for selecting me for this honor.

New USACE Employee

Miles Meyer, has been hired in the USACE Aquatic Plant Management section in the Jacksonville office. He primarily maintains their new website and fields questions about aquatic plant management. Welcome Miles!

Bob Blackburn Retires

Bob Blackburn, owner of Future Horizons, Inc. announced at the 1998 Annual FAPMS meeting that he is retiring. Bob worked as staff at Auburn University, and as the director of the USDA Aquatic Plant Research Station in Fort Lauderdale between 1955 through 1974 when he created Future Horizons, Inc. Bob is well known for once collecting a difficult-to-control submerged plant from a Crystal River canal and a Miami canal in 1960. This plant was later identified as the first known specimens of **hydrilla!** The rest is history. Good luck Bob and enjoy your retirement!

MEETINGS

FAPMS Board All are welcomed and encouraged to attend! January 13, 1999, 10:00 am, Orlando, Contact Stephanie McCarty 404-827-2754

Aquatic Weed Control, Aquatic Plant Culture and Revegetation Short Course. May 17-20, 1999. Ft. Lauderdale, FL. Contact Vernon Vandiver or David Sutton at 954-475-8900

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	24 hours	92%	92%
	48 hours	93%	93%

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Source: Van Thai, K., et al, *Weed Science*. 1987. Volume 35: 247-252.

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