

Aquatics

Summer 1999



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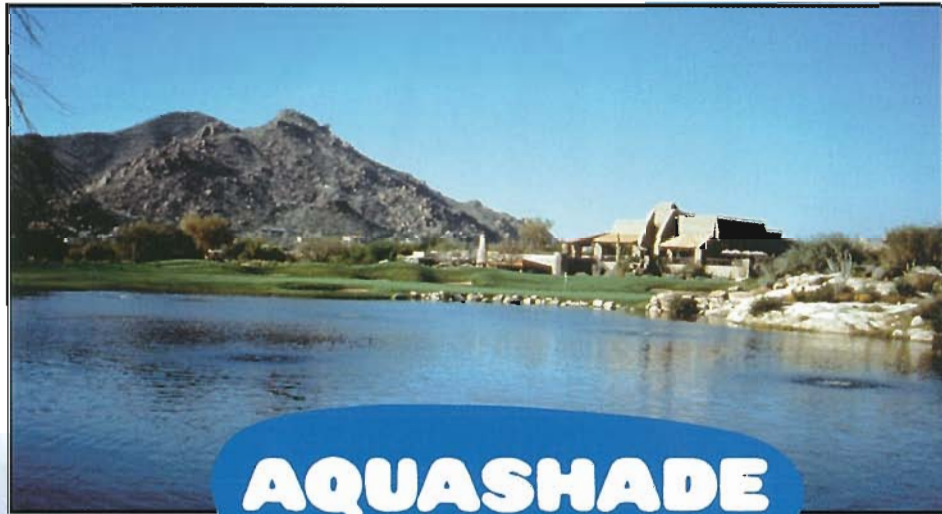
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One Hundred Years of Aquatic Plant Management in Florida

The year 1999 is the one hundredth anniversary of U.S. Army Corps of Engineers' aquatic plant management in Florida. The Rivers and Harbors Act of 1899 is considered the authorization of the Corps Removal of Aquatic Growth (RAG) Project which is responsible for the removal of aquatic vegetation interfering or threatening navigation in Federal navigation channels. In Florida, federal navigation channels in the St. Johns River, Kissimmee River, Withlatchoochee River, Crystal River, Ocklawaha River and the Okeechobee Waterway have been eligible for RAG funding. This work is fully funded by the Federal government with no local sponsor required.

In 1896, as waterhyacinth began to create major navigation problems in the St. Johns River near Palatka, concerned local citizens delivered a petition for relief to the Secretary of War in Washington, D.C. The following year, two Corps engineers began an investigation to seek methods to relieve the problems encountered by river traffic. They experimented with machinery designed to crush waterhyacinths, techniques to move large mats to areas where they could be removed from the river, chemical treatment with sulfuric and carbolic acid, and treatment with steam. They even considered the use of parasites (!) to kill the troublesome vegetation. After the testing, the engineers recommended that the Corps proceed only with construction of a crusher boat similar to one being used at the time in Louisiana, for water hyacinth control. The Fifty-Fifth Congress appropriated funding for the Florida crusher boat in the Rivers and Harbors Act of 1899. So began the RAG Project.

In the ensuing 100 years, numerous control methodologies and technologies have been developed and evaluated by the Corps; academia; local, state and other Federal governmental agencies as well as by private individuals and private industry. Water hyacinth have been pulverized, crushed, steamed, harvested, sprayed, pushed to sea and even lazied. It is interesting that the three technology areas considered one hundred years ago (mechanical, chemical and biological control) remain the foundation of the aquatic plant management industry in 1999 and into the new millennium.

Although the ebb and flow of funding cycles has diminished Federal funding for cost-shared operations under the Aquatic Plant Control (APC) Program, the RAG project remains healthy. U. S. Army Corps of Engineers staff joins others in the management community in wishing the RAG Project a happy centennial anniversary and many more anniversaries to come!

By Bill Zattau
US Army Corps of Engineers,
Jacksonville District



Mechanical removal of water hyacinth, Julington Creek, St. Johns River, 1927. Note the size of grapple compared to man on deck!

Photo Courtesy of USACE Archives, Jacksonville, FL

Aquatics

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Twenty Years of Aquatics Magazine

In addition to 100 years of aquatic plant management in Florida, the year 1999 is also the 20th year anniversary of *Aquatics Magazine*. *Aquatics* was first published in March of 1979, and to avoid paraphrasing what has already been written, I thought you might enjoy re-reading a page from the inaugural issue. Many of the thoughts and goals from 1979 ring true today.

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A WORD FROM THE PRESIDENT
Congratulations to those responsible for this first issue of *Aquatics*. If you have never been involved in an effort like this, it will be hard to visualize the work required — but please take our word for the fact that we are indebted to many and especially the editors, reviewers and publishers of *Aquatics* for the hours they have spent in preparation for and of this magazine.

Several months ago, Chuck Hargrove conceived the idea of our Society generating a quarter magazine similar to this and was promptly handed the jobs of editor, designer, promoter and planner. In October 1977, Chuck was given a nice promotion by his company and moved away from Florida but he had established the concepts that have guided the production of *Aquatics* as you now have it. At the request of the Board of Directors, Paul Deets and Bill Maier accepted the positions of editor and co-editor respectively. Through no fault of theirs, these gentlemen were unable to bring a magazine to press so another printer in a different city was engaged. Due to the change in location, Paul handed his duties over to Harold Brown while Bill Maier remained as the other half of the team. Thank you, Paul, for your willing service to this Society.

Aquatics is designed to be a reliable source of information for everyone interested in aquatic plant control and related pursuits. Each issue will feature a problem aquatic plant, its history, characteristics, identification, possible beneficial uses and methods of control. Special departments will deal with ideas from "the man who holds the spray gun", new developments from industry, articles from regulatory agencies, discussion of legislation and administrative rules affecting aquatic weed control and progress reports from the research community. The range of subjects can and will be amplified to serve the changing needs of our Society.

To insure quality and accuracy, the contents of *Aquatics* will be reviewed by men who are qualified in the subjects under discussion. Additionally, the companies whose advertising appears on these pages are sources for the products and services you may require in your program — so we expect *Aquatics* to be a regular meeting place for producer and consumer.

The Florida Aquatic Plant Management Society has come a long way in the two plus years since its inception because you, the membership, wanted it to succeed. The Society will continue to grow and become more useful if everyone will add his ideas and work in a spirit of cooperation.

We urge you to assist your present and future Board of Directors by making suggestions for the improvement of the Society and this magazine, pay your dues on time, invite your friends to join, send the names and addresses of interested persons whom you would like to receive *Aquatics* on a regular basis including your county commission, purchasing agents, sports clubs, environmental organizations, libraries, purchasing agents, etc. We have a good thing going, so let's make it even better!

We personally thank each one who has contributed articles for this first issue and the editors, reviewers, advertisers, and printers for their pleasant cooperation. We expect the same spirit to continue for the benefit of all concerned.

Sincerely,
Leslie E. Bitting, Sr.
Leslie E. Bitting, Sr. President 1978

Harold F. Brown
Harold F. Brown, President 1979

Aquatics

FIRST EDITION VOLUME 1 • MARCH 1979

AQUATICS: Published quarterly as the official publication of the Florida Aquatic Plant Management Society. This publication is intended to keep all interests informed on matters as they relate to aquatic plant management, particularly in Florida.

CORRESPONDENCE: Address all correspondence regarding editorial matter to William L. Maier, Editor, AQUATICS Magazine, Dept. of Natural Resources, Crown Bldg., 202 Blount St., Tallahassee, Fla. 32304.

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COVER
Hydrilla — the number one aquatic weed problem in Florida is exemplified by this picture showing a severe infestation which prohibits normal usage of this natural resource.

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EDITORIAL
by William L. Maier

This publication may well prove to be one of the greatest milestones ever reached by a society in such a short time. Better than that, it is also the first publication on aquatic plant management strictly dedicated to the needs of the people actually involved in the daily chore of controlling aquatic weeds. There is a lot of pride and expertise throughout the state of Florida, and this publication is one avenue of communications.

It is extremely important that you as a reader and worker help your society in maintaining this magazine. We solicit your participation, whether it be in the form of an article or simply a letter and/or time in assisting with each and every issue. We are dedicated to the field operations and are not intending to publish scientific papers.

If you or your agency has any information it would like to share with others involved in the control of aquatic plants, we encourage you to submit this for publication in *Aquatics*. The editors and reviewers as well as the Board of Directors will be more than glad to assist you in the preparation of any articles. In many cases the most insignificant short cut for you might turn out to be of great benefit to your neighbor.

We would like to include in our publication a question and response section. This can only be generated by letters to the editors. We will then seek to answer those questions by contacting the best source possible. These will then be published on a regular basis.

As you can see, this publication offers many benefits to the aquatic community, and with active participation can be molded into a tremendously useful reference to fit your everyday needs.

A special recognition is due to all who spent a lot of time and effort in developing this publication and to those who have prepared the information for this first issue.

Please plan to submit and share your methods and ideas for our next issue in June.

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William L. Maier, Jr. Scholarship, FAPMS Scholarship and Research Roundation

By Brian Nelson,
SWFWMD and Dr. Joe
Joyce, University of Florida

As *Aquatics* celebrates its twentieth anniversary it seems like a good time to reflect back on how and why the FAPMS Scholarship and Research Foundation was begun, discuss the ongoing activities of the Foundation, and describe the new Applicator Assistance Program.

Efforts to create a scholarship foundation were begun in 1984 following the death of William (Bill) Maier. In case you may not have known Bill, he was a charter member and a director of FAPMS, he served as President in 1981, and most importantly he developed "AQUATICS" magazine by serving as the first editor from 1979 to 1981. Bill's motivation for this endeavor was his desire to provide authentic, readable information to aquatic plant applicators. His interest, dedication and involvement in the aquatic plant management industry was inspirational to all. Bill's friends included most everyone who knew him thanks to his never-met-a-stranger-style, enthusiastic and helpful attitude, and unbridled optimism. His ear to ear grin is still remembered and missed. One of his greatest pleasures was working with applicators in the field. Their thoughts, concerns and needs were always one of Bill's primary concerns. He would undoubtedly be proud of his fellow aquatic plant managers and FAPMS for creating the Scholarship Foundation and even prouder that members of the Society have so successfully supported the Foundation enabling so many students to benefit.

The FAPMS Scholarship and Research Foundation was incorporated in 1985 as a non-profit, tax exempt, charitable corporation. While closely



Bill Maier, Photo by Dave Tarver

associated with FAPMS, the Foundation is a separate corporation with separate by-laws. Members of the Foundation are Past-Presidents of FAPMS. Officers and Directors are selected annually from the Foundation members. Current officers and directors are President-Brian Nelson, Vice President-David Tarver, Secretary / Treasurer-Dr. Joe Joyce, Directors-Don Dogget, Wendy Andrew and Francois LaRoche. An annual Scholarship Foundation meeting is held in association with the annual FAPMS meeting and all FAPMS members are welcome to attend.

The first scholarship available was the Graduate Student Scholarship. This scholarship is awarded during the fall to a graduate student enrolled at a Florida College or University who is majoring in a field of study related to aquatics and who is a U.S. citizen. The student is selected by the officers and directors of the Foundation, based on the student's grades, financial need, references and an essay on the benefits of aquatic plant management. During the years this scholarship is awarded (it will not be awarded in 1999), the application deadline is August 1. Past award winners are listed in Table 1.

A second scholarship, initiated in 1992, is the Applicator Dependent Scholarship. The eligibility criteria for this scholarship was developed by a joint committee of FAPMS and Foundation members. It is designed to be awarded to a dependent of a FAPMS member who has been a member of

FAPMS for at least three consecutive years. Any member of FAPMS may apply whether they are a commercial applicator, harvester operator, fish biologist, insect collector or university scientist. Applicants must be enrolled as an undergraduate in the next academic year. Awardees are chosen by a committee of three FAPMS members appointed by the president of FAPMS and four members of the Foundation selected by the Foundation president. The award is based on financial need and an essay on the most helpful or best course they have taken. There are no restrictions on the course work taken or major selected. This is an annual scholarship and completed applications are due by May 15 of each year.

The Applicator Assistance Program is a new program which began last year. The intent of this program is to assist aquatic plant managers to take additional courses to further their educational goals. Applicants must be a current FAPMS member in good standing for the past two years. Applicants must be employed "full time" in the aquatic plant management profession and must be attending college, community college or vocational/technical school and have paid tuition receipts to submit for reimbursement. Assistance will be provided on a prorated basis by dividing the amount of funds available for the program by the total amount of eligible tuition costs submitted by all applicants. No applicant would be able to receive more than 50% of their tuition costs regard-

less of the number of applicants or total amount of eligible tuition costs. Applications and tuition receipts are accepted during the one month period between August 15 and September 15 for the preceeding year. The program runs from August 1 to July 31 of each year.

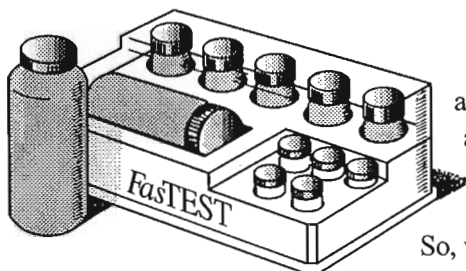
Since it's beginning, the Foundation has awarded \$20,400 to twenty-two deserving students. Current assets of the Foundation exceed \$50,000. Interest from this endowment and the funds raised at the annual FAPMS meeting will allow approximately \$4,000 - \$5,000 to be available each year for scholarships. Whether you knew Bill Maier or not you should be proud of what FAPMS has accomplished in his memory and the many students who have been helped.

Announcements and information concerning deadlines for submitting applications routinely appear in the FAPMS newsletter. Additional information and applications for the above scholarships can be obtained by writing Brian Nelson, 3287 Rackley Rd., Brooksville, FL 34609.

TABLE 1. SCHOLARSHIP RECIPIENTS

| <u>YEAR</u> | <u>GRADUATE STUDENTS</u> | <u>UNDERGRAD STUDENTS</u> | <u>AMOUNT \$</u> |
|--------------|--------------------------|---------------------------|------------------|
| 1986 | Pam Botts | | 300 |
| 1987 | Chuck Hanlon | | 400 |
| 1988 | Mark Mossler | | 600 |
| 1989 | Elsie Gross | | 450 |
| | Tammera Lee | | 450 |
| 1990 | Greg McDonald | | 450 |
| | Brian Smith | | 450 |
| 1991 | Melanie Moon | | 400 |
| | John Chick | | 400 |
| 1992 | Marvin Boyer | | 500 |
| | | Cameula Cope | 500 |
| | | Jamie Weinsier | 500 |
| 1993 | Jeff Sowers | | 500 |
| | | Sally Ann McGill | 1,000 |
| 1994 | Mike Mumma | | 500 |
| | | Sally Ann McGill | 1,000 |
| 1995 | | Sally Ann McGill | 1,000 |
| 1996 | Jigna Thakone | | 1,000 |
| | | Sally Ann McGill | 1,000 |
| | | Shawn Gallagher | 1,000 |
| 1997 | | Michael Moyer | 1,500 |
| | | Gabriel Heidt | 1,500 |
| 1998 | Daniel VanGenechten | | 1,000 |
| | | Gabriel Heidt | 1,500 |
| | | Carley Hinkle | 1,500 |
| Total | | | \$20,400 |

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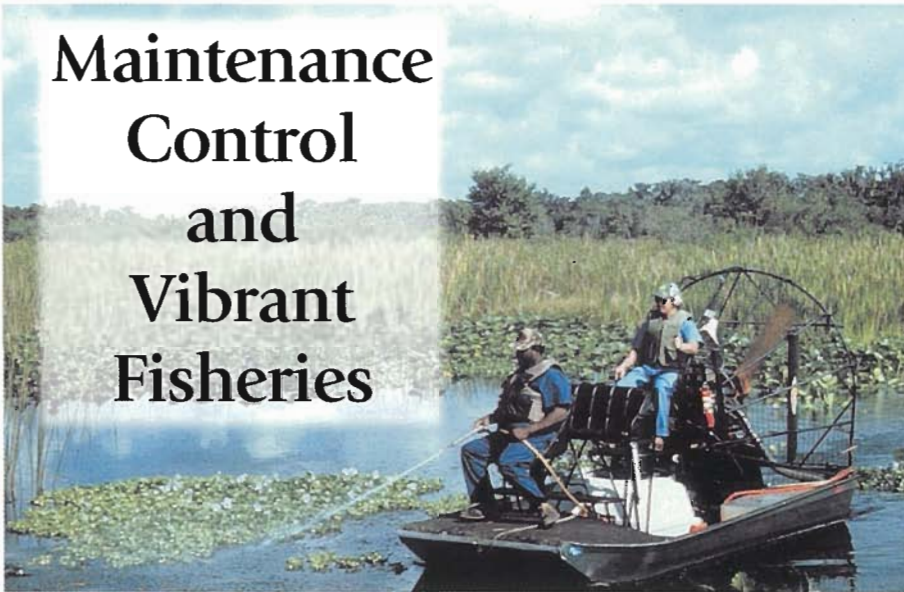
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Maintenance Control and Vibrant Fisheries



Maintenance Control, Highlands County Crews, Photo by Jeff Schardt

By Jeff Schardt, DEP

When I began my employment with the Bureau of Aquatic Plant Management in 1976, managers were embroiled in a controversy surrounding water hyacinth control. This was also to become one of the major issues facing the soon to form Florida Aquatic Plant Management Society. Applying different techniques and strategies to manage this floating plant over the previous 90 years had finally convinced managers as well as policy makers that the most ecologically and economically responsible way to deal with water hyacinth was to reduce it to, and sustain it at, the lowest possible levels. Water hyacinth had proven to be different from native plants in that it grows much faster and has more reproductive capabilities than native plants. Consequently, it displaces native vegetation and animal communities by competing for space, altering water temperatures, oxygen content, and acidity, and increasing sedimentation rates.

If water hyacinth had no redeeming values, then its control probably would have been of little concern to anyone. However, the beauty of its flower, the reason for its initial introduction, had endeared plant fanciers to lobby for its salvation. More importantly, bass anglers had

long since discovered increased fishing success at the fringes of water hyacinth mats. Here the plants supply shade, refuge and invertebrate substrate; all of which were exploited by bass and, in turn, bass anglers. Ironically, the interior areas of water hyacinth mats are almost devoid of invertebrates and fish because of low oxygen.

Exploitation of invasive species and subsequent opposition to their control is a common challenge for natural area managers. South Florida beekeepers have become economically dependent on melaleuca trees, as have some florists who harvest Brazilian pepper berries for Christmas decorations. Coastal Floridians have become emotionally attached to Australian pines much like Americans across the country have become attached to wild mustangs and feral burros. In each of these cases single-issue user groups have eroded ecosystem-based managed programs despite catastrophic ecological consequences presented by the invasive species.

Act One - Water Hyacinth Management

Intensive water hyacinth management began in the early 1970s after many blockages were reported in Florida waterways, especially

along the St. Johns River. Both the US Army Corps of Engineers (through policy) and the State of Florida (through law – s369.22, F.S.) adopted a management strategy later known as maintenance control. Under maintenance control, water hyacinth populations are kept at the lowest possible levels. This results in reduced: sedimentation, native plant damage, management costs, herbicide use, and transportation and flood control problems, while enhancing habitat, recreational opportunities, and property values. However, it also means that even small, seemingly insignificant, bands of water hyacinth along lake and river shores must be managed because they can quickly congregate or expand into large, damaging mats of plants.

Biological controls suppress somewhat, but do not control water hyacinth. Seventy-five years of mechanical control development had not provided a device that could control water hyacinth selectively or economically, or work closely enough to shorelines to reduce rapid recontamination from uncontrolled bands. In the 1970s as now, herbicides provided the most environmentally compatible, cost-effective means of water hyacinth control. However, regularly scheduled herbicide applications also meant that there would no longer be bands of water hyacinth to be utilized by anglers.

Anglers accustomed to fishing water hyacinth bands either did not comprehend or chose to disregard the ecosystem-based reasoning behind the maintenance control philosophy. Although the stated mission was to reduce the negative impacts of water hyacinth to ultimately enhance native plant habitat, many anglers were more concerned with the immediate loss of water hyacinth structure regardless of the long-range benefits of maintenance control.

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water hyacinth maintenance control program began based on this concept. The public, on the other hand, gets much of its education from the media and through cultural experience. We have learned that green is good and more is better. Additionally, we have come to accept that chemical medicines are inherently good while chemical pesticides are inherently evil. Further complicating matters is the deepening public mistrust of government activities in general.

As water hyacinth maintenance began, alliances were formed among anglers, who opposed what they portrayed as wholesale destruction of valuable fishery habitat, with environmentalists who feared the use of so called "chemical poisons" in the environment. Ignored was the fundamental principle that biological diversity is paramount to ecosystem stability, and the fact that diversity is difficult if not impossible to achieve in the presence of invasive plant species. On the other side, agencies coordinated activities and sponsored research to support water hyacinth management strategies. In this confrontational atmosphere, emotion and hyperbole counterbalanced many years and millions of dollars worth of research and policy development. Vocal opponents of maintenance control made bold statements and predictions about aquatic plant management. Included among these were lack of program leadership, lack of coordination among management authorities, wholesale, wanton destruction of habitat, unholy alliances between chemical companies and plant managers, and chemical dumping in public waters to ensure continued budgets. Paramount among the predictions was that water hyacinth management would lead to the demise of Florida's fresh water fishery.

Unbiased evaluations and audits of the aquatic plant management program, conducted by outside entities, supported the needs for invasive plant control, program

structure, and management strategies, allowing the program to proceed. A notable exception, on Lake Okeechobee, served both as a postponement and exoneration of the herbicide-based water hyacinth maintenance control program. In 1986, anglers and environmentalists convinced the Governor that the 120 square mile algae bloom in this 450,000 acre reservoir was brought on in part by the water hyacinth control program. The Governor declared a moratorium on herbicide use and recommended mechanical harvesting. Despite the presence of several harvesters and the moratorium beginning near the end of the growing season, water hyacinth and associated floating water lettuce expanded from about 2,000 acres in mid July 1986 to 8,000 acres by the end of December 1986, an increase of approximately 40 acres per day. By December, floating invasive plants obstructed most of the boat trails and canals within the levee surrounding Lake Okeechobee as



Figure 1. Bulrush impacted by water hyacinth on Lake Okeechobee.

well as the 22 flood control and navigation structures. The herbicide program resumed in January 1987 to restore order but not before thousands of acres of native vegeta-

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tion (especially bulrush), beneficial to fisheries and waterfowl, were smothered or uprooted by floating mats of water hyacinth (Fig. 1). More than two years and two million dollars were spent managing more than 11,000 acres of water hyacinth and water lettuce to regain control in Lake Okeechobee. The greatest irony was that many more gallons of herbicide were used to control many more acres of floating plants while regaining control than if the maintenance program were not postponed in the first place.

Florida contains 450 public water bodies covering more than 1.25 million acres of fresh water. About 300 of these waters contain water hyacinth. Water hyacinth, which once covered 125,000 acres of public waterways, has since the middle 1980s, covered less than 5,000 acres at any one time during any one year. There are occasional flare-ups but these are usually quickly returned to maintenance control levels. About 25,000 acres of water hyacinth and water lettuce are annually managed at a cost of about \$2.5 million to sustain control. Most importantly, diverse assemblages of native vegetation have returned to the shores of public waterways and contrary to the grave predictions, fisheries remain vibrant.

Act Two – Hydrilla Management and Déjà vu

Despite the lessons provided by the water hyacinth management program, similar errors and accusations are still made in Florida's hydrilla management program. Hydrilla was introduced into Florida in the early 1950s. Ignorance of its invasiveness and exploitation of this exotic plant to improve fisheries and waterfowl harvest allowed it to expand from localized nuisances in the early 1970s to a statewide crisis by the middle 1990s.

Like water hyacinth, hydrilla is one of the fastest growing plants known. Growing about an inch per day, hydrilla can quickly reach the surface of Florida's shallow waters (7-15 feet average depth range)



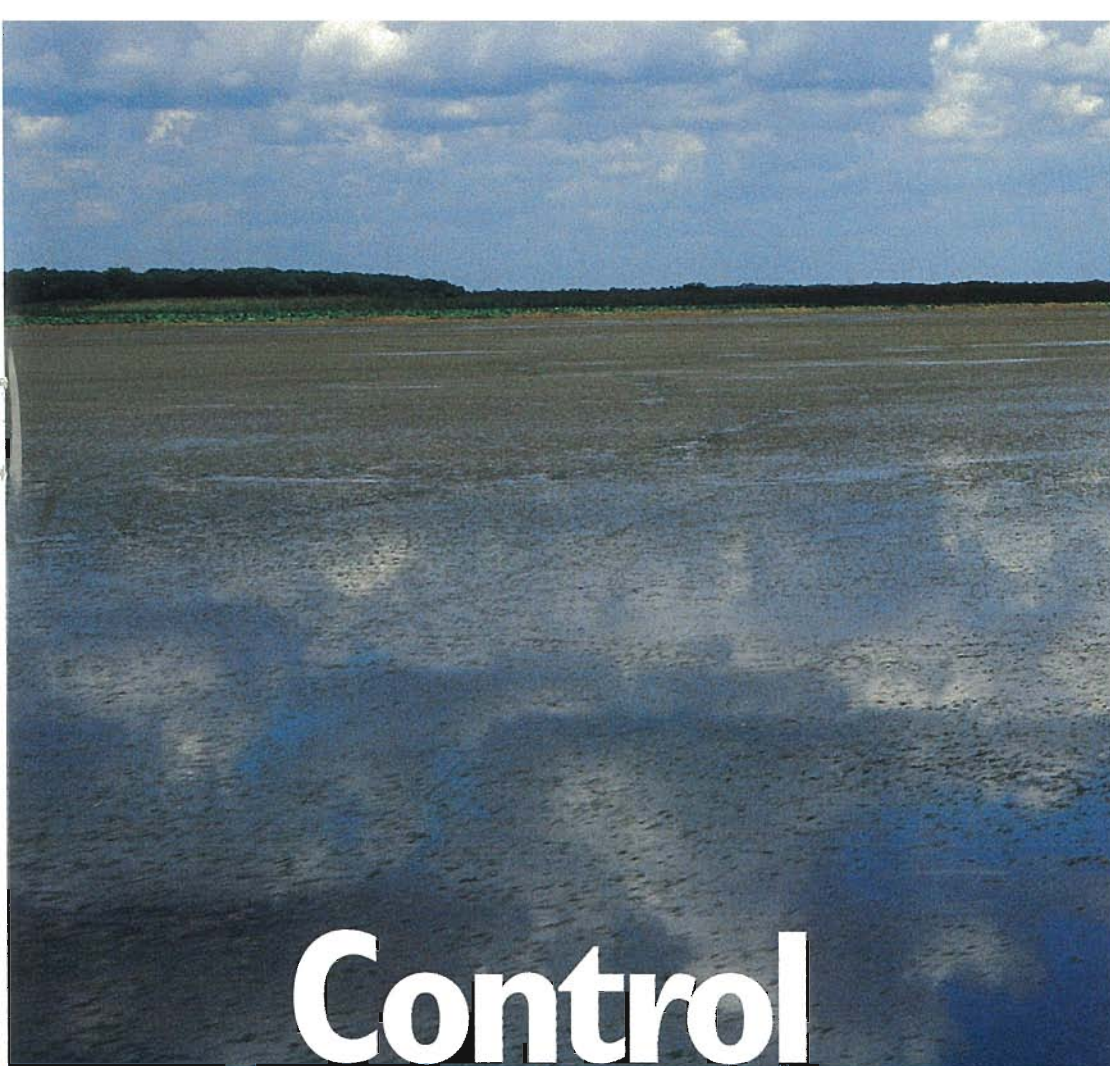
Figure 2. Hydrilla surface mat in Lake Istokpoga. Photo by Jeff Schardt

where it forms dense tangling mats. A 9-12 month growing season coupled with naturally and culturally nutrient enriched waters make Florida an ideal habitat for this exotic invader. This plant is reproductively mature at an early age and has developed a variety of methods of procreating and spreading including fragmentation, bud formation, and stolon production. Hydrilla resists natural and human-induced stress through the formation of millions of underground buds called tubers that may lie dormant for up to seven years.

Hydrilla's ecological and economic impacts also parallel water hyacinth. Any benefits derived early after introduction or along the edges of hydrilla stands are far outweighed by problems caused by mature mats. Without intensive management, hydrilla can expand to fill Florida's shallow waters in a matter of a few months to a few years (Fig. 2). As is the case with water hyacinth, interiors of hydrilla mats contain little oxygen, raise surface temperatures, cause wide fluctuations in pH, and reduce the rate of decomposition (by reducing oxygen and wave action). Also like water hyacinth, once established, hydrilla eradication is difficult if not impossible, necessitating long-term maintenance programs to lessen its devastating environmental and economic impacts.

Several economic studies have been conducted on Florida public waters. Lake Jackson, a notable 4,000 acre fishing lake near Tallahassee, had an estimated \$10 million recreational value to the surrounding community in 1993. While bass fishing was important, it ranked third among activities behind picnicking, general boating, and swimming. A \$50 million annual value was calculated for 2,000-acre Lake Tarpon in 1998. Similarly, fishing was important, but ranked third behind picnicking and wildlife observation. Economic studies done on Orange and Lochloosa Lakes in the middle 1980s showed that a \$10 million annual fishing value, when the lakes were navigable, plummeted by 90% when invasive plants like water hyacinth or hydrilla covered the surfaces.

The US Fish and Wildlife Service estimated, in the middle 1980s, a \$1.5 billion dollar annual recreational value for Florida's freshwaters. However, the most important reason for controlling aquatic plants in Florida public waters is for flood control. Nearly all of Florida's public lakes and rivers are interconnected via some type of water control structure. Invasive plant growth presents one of the greatest threats to the ability to move water through these systems during



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While there are many more reasons for controlling aquatic plants in Florida public waters, no control is initiated without considering impacts to fish and wildlife and their habitat. Like water hyacinth, the goal of the hydrilla maintenance program is to reduce hydrilla abundance in order to enhance native vegetation. Florida's hydrilla management strategies are developed with input from federal, state, and local water quality, health, and environmental agencies. Where there is public interest, task forces are organized to explain reasons for control and to select management options that fit local use patterns. Individual projects are developed at the beginning of the year and are reviewed 1-4 weeks before execution to ensure conditions remain favorable for the selected management program.

Harvesters, Herbivores, or Herbicides?

Most hydrilla control in Florida public waters is conducted using herbicides. Although five insect species have been evaluated and released to consume hydrilla, none has shown promise for control in Florida waters. Low numbers of triploid grass carp are stocked in about 60 smaller public lakes (less than 500 acres), but few large waters are suitable for grass carp. Stocking rate technology does not seem to transfer well from small to large lakes, and carp containment is difficult in most large systems where outfalls must remain unobstructed for flood control. Dozens of mechanical harvesters have been evaluated over the past 30 years, but they have proven too slow and costly for large-scale hydrilla control. Fluridone herbicide controlled 25,000 acres of surface-matted hydrilla on 27,000 acre Lake Istokpoga from January 1997-January 1999. The cost was \$1.8

million (including labor), or about \$36 per acre of hydrilla controlled over the two year period. The herbicide selectively removed hydrilla from about 2,000 acres of pondweed and eel-grass. An estimated 200 harvesters would be required to work seven days per week for the two-year period to supply the same level of control as herbicides (based on two acres controlled per harvester per day). At approximately \$500 per acre to harvest and dispose hydrilla, and cutting the lake a required three times per year (hydrilla cut to a five-foot depth in Central-South Florida will grow to the surface in about 60 days), the two-year cost to harvest hydrilla on Lake Istokpoga would be about \$75 million. This is more than six times the annual hydrilla control budget for the entire state program. Additionally, research conducted in Florida and other states shows that harvesters remove substantial numbers of fish, reptiles, amphibians, and inverte-



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brates in addition to plants.

Millions of dollars have been spent researching hydrilla management and hundreds of scientific reports are available (at the University of Florida's Aquatic Plant Information Retrieval Service) on hydrilla's invasiveness and management. This information has been presented through the media, at conferences and at numerous task forces and town meetings. Despite the overwhelming wealth of literature that, on balance, hydrilla is one of the most invasive and disruptive plants known, vocal disapproval of the hydrilla program remained strong in Florida until the middle 1990s.

Rewriting History – Water Quality and the Harris Chain of Lakes

History continues to be rewritten by some who are intent on promoting invasive exotics in lieu of ecosystem-based habitat management. In a recent story published in *Honey*

Hole magazine, testimony attributes the demise of water quality and the fishery in the Harris Chain of Lakes in Central Florida to uncoordinated and duplicative poisonings by two or more aquatic plant management agencies. Renditions of government ineptitude and insensitivity regarding the Harris Chain of Lakes have been repeated so often that this legend has now become truth. Lost are the findings of the 11-person panel that met on alternate months for two years (1992-1994) to re-search the problems within this lake chain. Inconsequential are the facts that: sewage and fruit processing wastes were discharged into the lakes from the 1920s-1970s; cleansing marshes surrounding the lakes were drained for agriculture in the 1940s; a dam was constructed in 1957 to stabilize water levels for agriculture and navigation; and stormwater from at least six lakeshore municipalities with about 100,000 residents enters the lakes after each rainfall. Insignificant is

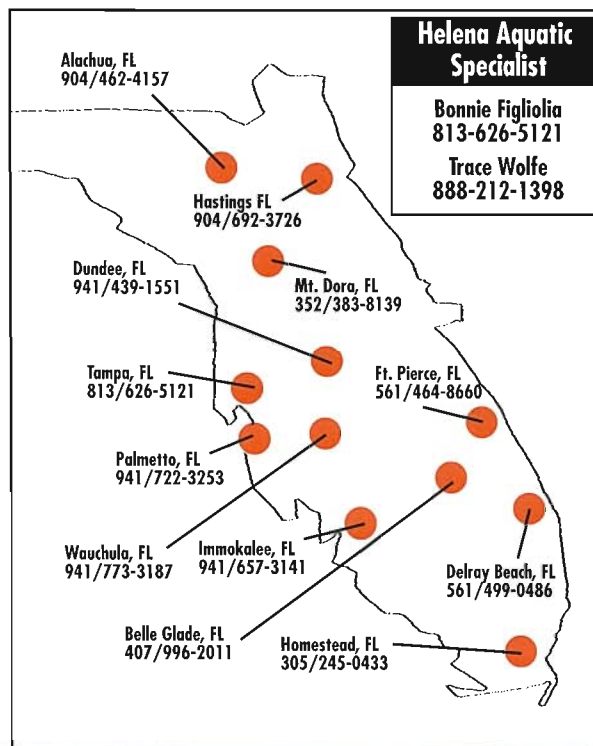
the fact that the Department of Environmental Protection permits aquatic plant control in Florida after review by other environmental agencies. One contractor controls plants under the supervision and review of the DEP. Disregarded are the facts that: Lake Apopka is the headwaters of the Harris Chain of Lakes; nutrient enrichment and lakewide blue-green algae blooms have been documented on the Harris Chain since at least 1981 and in Lake Apopka since the 1950s; the last large-scale hydrilla treatment (400 acres) in the Harris Chain occurred in 1987 – five years before the poor B.A.S.S. Invitational fishing tournament results in 1992; hydrilla persisted for several years after the 1987 treatment, but the algae bloom was so intense that not even hydrilla, that needs only 1% surface sunlight intensities, could survive; 171 major fishing tournaments were scheduled for the Harris Chain in 1992; and prior to 1992, the St. Johns River Water Manage-

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ment District had already spent tens of millions of dollars purchasing thousands of acres of farm land surrounding the Harris Chain to restore cleansing capacity before the lakes met the same water quality demise as Lake Apopka.

The Harris Chain example is important because it usually surfaces in the context of opposition to hydrilla control. Not only is this tactic counterproductive to invasive plant management, but it also draws attention away from chronic problems plaguing Florida public waters such as water level stabilization and nutrient enrichment. As long as hydrilla is blamed for water quality woes, less attention will be directed toward solving underlying pollution and water level stabilization problems.

Common Goals and Invasive Plant Management

The Harris Chain debate was similar to other discussions that played critical roles in the spread of hydrilla across Florida. Voters in Florida have made it clear to legislators that although additional government services like aquatic plant control are still in demand, new taxes or user fees are not acceptable. In order to increase hydrilla management revenues in this atmosphere, money must be transferred from other programs. However as long as managers and users were at odds over hydrilla control, legislators had little incentive to sacrifice other programs to support one surrounded by such controversy. Consequently, funding remained insufficient and hydrilla expanded into additional public waters and within water bodies already colonized.

In the 1970s and 1980s, when hydrilla surface mats overgrew one water body, anglers simply moved to another lake leaving the residents and businesses dependent upon the infested lake to fend for themselves. By 1994 however, most of Florida's largest lakes were full, or perhaps just another growing season from being full, of hydrilla. There were few lakes left to turn to. Hydrilla

was present in nearly half of Florida's public waters and had covered almost 140,000 acres. At this point, opposition to hydrilla management in Florida nearly ceased. Resource managers, anglers, water front residents, and politicians worked together to secure sufficient funding, principally from Florida's solid waste recycling program, to bring hydrilla under maintenance control. A bill passed the Florida legislature in 1999 that, beginning in 2001, will provide sufficient, recurring funding to achieve and sustain hydrilla maintenance control along with other invasive exotic plants disrupting Florida's public waters.

Since 1995, the \$24 million in additional funds that were provided by the Legislature have enabled managers to reduce hydrilla to a standing crop of less than 40,000 acres statewide. The irony is that before hydrilla's rapid expansion, maintenance control cost about \$5-6 million per year. Now with a tuber bank of almost 140,000 acres, hydrilla maintenance control costs taxpayers about \$12 million per year.

Fisheries Status After Hydrilla Maintenance

If any good has come from the rise and subsequent control of hydrilla, it is that hydrilla can be managed in Florida while retaining viable fisheries and habitat. Despite the dire predictions of management operations ruining fishing, the opposite occurred. For example; unmanaged hydrilla resulted in the death of an estimated 8.5 million fish as reported in the September 15, 1985 issue of the *Tampa Tribune-Times*. Major fish kills also have been reported in Lakes Kissimmee, Rousseau, and Winder when surface mats of hydrilla bled life-sustaining oxygen from these systems.

On the other hand, sport fisheries appear to have rebounded in lakes in which repeated large-scale herbicide treatments are being applied to bring and keep hydrilla under maintenance control. Five

thousand acres of hydrilla were controlled with fluridone herbicide in 1993 in 6,000-acre Lake Lochloosa. This project also resulted in the control of 30 of approximately 60 acres of spatterdock lilies in the lake. Anglers, focusing on the 30 acres of lily control rather than the 5,000 acres of controlled hydrilla, petitioned the Alachua County Commission to ban further use of EPA aquatic-registered herbicides in Alachua County waters. The County opted for a wait-and-see approach. Hydrilla has not required control in Lake Lochloosa since 1993 (10 acres of hydrilla were reported in March 1999). With the competitive pressure from hydrilla reduced, the *Florida Game and Fish* magazine published reports in its April 1999 issue that lily pads and maiden cane have come back "big time"... "almost like 20 years ago before hydrilla." Further the GFC reports that fisheries on Lakes Lochloosa and Orange (a connecting 12,000-acre lake, intensively treated with fluridone for the past 15 years) "are a lot bigger than we were aware."

Public meetings to explain aquatic plant management programs on 4,000 acre Lake Rousseau required armed guards as depicted in the August 30, 1991 issue of the *St. Petersburg Times*. This reservoir contained as much as 2,700 acres of hydrilla. Hydrilla was reduced to fewer than 35 acres by December 1998 using fluridone and endothall herbicides. The April 1, 1999 *Citrus County Chronicle* now labels Rousseau as "an angler's mecca" describing one recent four-hour trip that accounted for 70 bass.

Hydrilla covered about 26,000 of 27,000-acre Lake Istokpoga in 1996. A large-scale fluridone herbicide treatment, applied in January 1997 (the fourth large-scale treatment since 1988), reduced hydrilla by 25,000 acres for nearly two years. The March-April 1999 issue of *Florida Wildlife* discusses the trophy size bass being caught in the lake even in the hot summer months. The author relates that "the lake is mostly clear except for natural vegetation growth."

The March 1999 issue of *Bassmaster Magazine* discusses the excellent fisheries in the large lakes of eastern Polk County including Lakes Arbuckle, Marion, Pierce, and Walk-in-Water. Dense surface mats of hydrilla have at one time or another during the past 18 years covered all of these waters. Consequently, all are under intensive maintenance control programs using fluridone, and occasionally endothall herbicides. The author recounts catching 10 pound bass every year for ten years in Lake Marion, and 50 bass over ten pounds from Lake Pierce. Lake Pierce has been managed with fluridone since 1981, and has received large-scale fluridone treatments during seven of the past eight years.

Lessons Learned

Only during the past decade have scientists, managers, and policy makers come to realize the pronounced and permanent ecosys-

tem-level impacts caused by introduced invasive species. After habitat destruction, invasive species are the greatest cause of species endangerment and decline worldwide. Lack of legislative and public concern allows these species to expand and costs the US more than \$120 billion annually, with fisheries listed as one of the most negatively impacted resources. Economic losses from invasive species range between \$3-5 trillion annually worldwide. On February 3, 1999, with the urging of more than 500 eminent scientists and resource managers, President Clinton signed an executive order that in part authorizes the development of invasive species management plans at the federal and state levels.

Floridians have learned the hard way that invasive plants are poor choices for improving upon natural areas. While they may provide some immediate benefit, unless they are intensively managed, invasive plants will eventually destroy the

ecosystem that they were intended to enhance. The same arguments, for and against hydrilla, that brewed in Florida, are now heating up from Virginia to Texas. The mission of invasive aquatic plant management in Florida is to help preserve Florida's water heritage. It would also be satisfying to know that all people faced with invasive plant decisions in other states would learn from Florida's lessons and become responsible **ecosystem** users and managers.

This tip just in; the Florida GFC rates the bass fishing as excellent in the Kissimmee Chain of Lakes of Central Florida. The Kissimmee Chain accounts for about 5% of Florida's public waters, but in the early 1990s supported about half of Florida's hydrilla. Intensive hydrilla management with fluridone herbicide during each of the past five years has restored the flood control and recreational capacity of this system and fishing is the best it has been since before the hydrilla invasion.

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FAPMS – The Early Years (Part I)

**By Catherine Johnson,
USACE**

How did our Society form and why? Sometimes an organization needs to look back at the motivations and aspirations that got it started and then see if it is still holding to them. Sit back and enjoy this walk down memory lane.

The roots of the Florida Aquatic Plant Management Society (FAPMS) go back to the creation of the Hyacinth Control Society in 1961. Florida folks, who battled the evil plant of the day, water hyacinth, started the Hyacinth Control Society for the purpose of sharing and comparing control information. The information sharing went so well that water hyacinth came under maintenance control and managers focussed attention on other plants with emphasis on research and plant problems in other areas of the country. The Hyacinth Control Society continued to hold meetings in Florida, but signs of a shift toward national issues were apparent. In 1970, the Chevron Chemical Corporation, then manufacturers of diquat, started sponsoring one-day meetings called the annual Chevron Seminars in October. The meetings started out small (20-30 people) with the focus being on field applications. As time went on the demand for the seminars increased to nearly 200 people in attendance by 1976. This became a large financial burden for Chevron. When the Hyacinth Control Society changed its name in January 1976 to the Aquatic Plant Management Society (APMS), reflecting their national focus, there was a groundswell of support in the Society for an applicator based organization dealing with the unique problems in Florida.

The Florida Aquatic Plant Management Society was formed for many reasons but primarily for applicator education and exchange of information. Also, new environmental regulations were being written because of increased public interest. In 1974,

EPA started requiring state certification programs for applicators, so continuing education credits became important. The high cost of meetings then became an issue to the applicator. For example in 1976, the Aquatic Plant Management Society meeting at the Bahia Mar in Ft. Lauderdale had \$65 rooms and a \$60 registration fee. Finally it was realized that one organization that spoke for the aquatic plant managers, mosquito managers, and "298" (canal) districts was needed to address changes in state regulations, to reorganize the state aquatics program, and to provide a place where applicators could meet and deal with Florida issues face to face.

In July 1976, immediately following the APMS meeting, an initial meeting at the instigation of Les Bitting, Bill Maier, Al Burkhalter and others was held at the Old Plantation Water Control District to discuss the possible formation of a Florida Applicator Society. It was a gripe session on how things had changed and the need for an organization that was a voice for the applicator. What came out of this meeting were reasons for forming a Society, and these were:

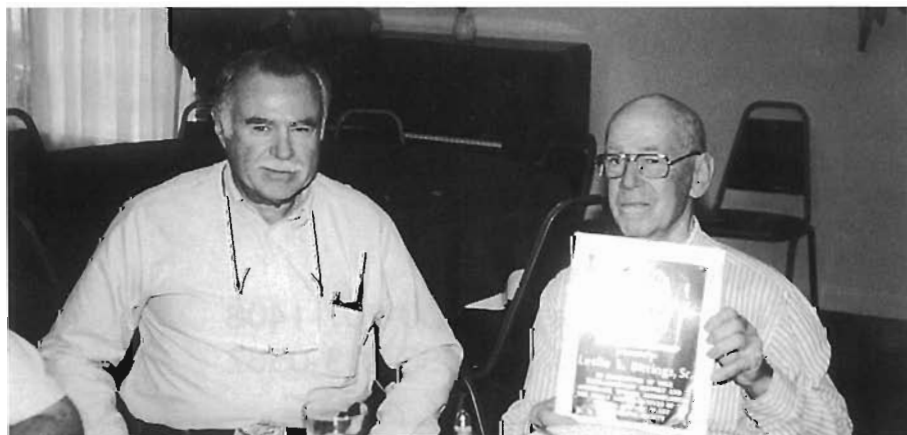
- 1) Some aspects of aquatic plant management were only applicable in Florida;
- 2) Annual meetings needed to be held at slower times of the year – the summer months (when APMS

meets) were not advantageous to busy applicators;

- 3) Structure of the board – the people felt it imperative to form a group which would reach the applicator and forgo the practice of placing those who were governmentally affiliated as systematic, continuous candidates for leadership positions.

Assurance was given that there would be a continuous turnover in leadership positions and that all aspects (in alphabetical order) of aquatic plant management would be represented: agriculture, commercial applicators, drainage districts, government, industry, "298" districts, and universities.

Not content to be discontent, a group met on November 12, 1976 at the Lakeland Utility Operations Center, in Lakeland to sign the charter for the Florida Aquatic Plant Management Society. The charter was signed by Leslie E. Bitting, Sr. (Old Plantation Water Control District (OPWCD)), Harold F. Brown (Southeastern Helicopter Services), Gordon E. Baker (Central and Southern Florida Flood Control District (C&SFFCD)), Porter A. Lambert (Southwest Florida Water Management District (SWFWMD)), Charles L. Hargrove (Rhodia, Inc.), Vernon W. Myers (Florida Game and Fresh Water Fish Commission (GFC)), William L. Maier, Jr. (Department of Natural Resources (DNR)), Robert J.



Harold Brown (left), and Les Bitting (right), our society's first two presidents.

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Gates (SWFWMD), Robert P. Blakeley (OPWCD), Joseph A. Schweigert (C&SFFCD), Frank Wilson (Imperial Polk Co.), J. Clarke Hudson (Chevron) and Robert Morrow (3M Corporation). The following officers were elected to serve:

- President – Les Bitting, Sr.
- Vice President – Harold Brown
- Secretary – Gordon Baker
- Treasurer – Porter Lambert
- Editor – Vernon Vandiver
- Directors – Robert Gates, Vernon Myers, Charles Hargrove

The first order of business for this new board was to develop by-laws, file articles of incorporation with the state, and obtain a bulk mailing permit. The Society was incorporated on November 24, 1976 with charter number 737376. It was decided that FAPMS would be structured as a chapter of APMS. The first board of directors meeting was held at Host International Hotel in Tampa on December 8, 1976 with the main topics being the final preparations for the upcoming annual meeting, discussion about liability insurance, and IRS requirements for the Society. The first committee reports came from the program chair, Bill Maier; local arrangements chair, Frank Wilson; legislative chair, Clarke Hudson; public relations, Bob Gates; and nominating chair, Robert Morrow. The first annual meeting was scheduled for March 16-17, 1977 at River Ranch. The meeting program was planned to contain information on aquatic herbicides, equipment, biological control, certification, plant identification, safety, regulatory agencies, short reports on current research, and panel discussions to address local problems and needs. Membership dues for active and associate members were \$5 per year and the annual meeting registration was not to exceed \$10.

1977

APMS was petitioned by FAPMS on January 12, 1977 at their mid year board meeting to be recognized as a chapter of the society. FAPMS was granted chapter status and APMS donated \$500 to help the Society.

The first annual meeting started from 12 to 5 p.m. on March 16th and from 8 am to 12:30 p.m. on the 17th with 245 attendees at the Polk County Agricultural Center. Five months after formation, FAPMS had 306 members. The hotel accommodations were at the Davis Brothers Motel and Cafeteria in Bartow with \$12-\$16 room rates. A barbecue was held at the Peace River Park for a price to the Society of \$4.90 per person for food and 3 beers. The first set of official by-laws were adopted and signed on March 17, 1977. The first resolution 1-77, also signed on March 17, 1977 was concerned with the creation of a manageable and effective aquatic weed permit program and water quality standards and recommended the establishment of an Aquatic Plant Management Advisory Council with representatives from all of the agencies, FAPMS, and the University of Florida. Copies of the resolution were sent to the Governor, legislators, and every agency. The officers selected at the first annual meeting were:

- President – Les Bitting
- Vice President – Harold Brown
- Secretary – Gordon Baker

Treasurer – Porter Lambert
Editor – Vernon Vandiver
Directors –

- Charles Hargrove (one year)
- Clarke Hudson (two years)
- William Maier (three years)

Committee appointments were legislative chair, Clarke Hudson; program chair, Pete Pederson; membership chair, Harold Brown; and by-laws chair, Herb Cummings. The membership voted to hold meetings during the fall months and Orlando was chosen as the next annual meeting place.

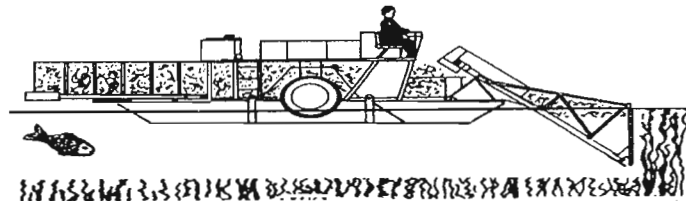
A survey form was passed out at the first meeting and some of the comments were: *see more of* – new techniques, herbicides, hydrilla control, other exotics, more time for questions; *see less of* – dry, technical presentations with bad slides, duplication of talks, agency bickering, alcohol at barbecue; *additional comments* – have no smoking in meeting room, additional equipment demonstrations, coffee for breaks. The first newsletter was sent in May 1977 to 350 members with abstracts from the presentations at the annual meeting. A student membership category of \$5/year and an increase



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Aquarius Systems has equipment to help you safely rescue your lake from over-grown aquatic weeds. Boaters will be happy. Swimmers will be happy. Fish will have a safe habitat to grow and multiply. This makes Semore a HAPPY fish.

in the number of directors to four was passed by the Board.

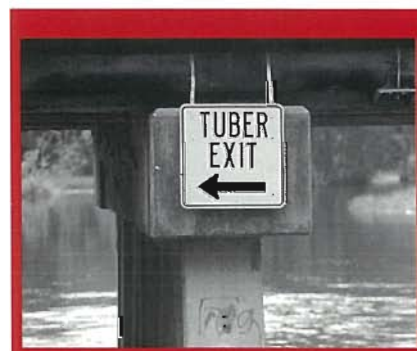
A special field day event and fish fry was held at Okee-Tantie on September 29-30, 1977 in place of the annual meeting. The program started on the 29th with a fish fry. The next day focused on showing unusual equipment and short talks on products. Legislative issues were the major emphasis of this board. The legislative chairman was given the power to speak for the Society. The committee then met with GFC, the Department of Environmental Regulation (DER), and DNR to discuss whether commercial applicators would be able to obtain liability insurance by virtue of permit protection, whether man-made canals would be permitted on a different basis than other aquatic sites, and specific procedures established in the event of a fish kill. The Society requested from DER that aquatic weed and mosquito control activities be fully exempted from 403.088 Florida Statutes since a) millions of dollars are spent on the

EPA label registration process; b) all applications are regulated by a state permitting system; c) applicators are certified; d) removal of noxious aquatic plants is a reduction rather than an increase in water pollution; e) mosquito control is a necessary public service. The creation of an advisory council with the responsibility to advise and help coordinate the state program and to arbitrate differences between agencies was also discussed. As a result of this meeting, an interagency agreement was drawn up between DER, DNR, and GFC, which clarified the roles of each agency.

At the November 1st board meeting, discussion centered on the creation of a Society publication. It was determined that the magazine would be called *Aquatics* and that a publisher would be sought for the magazine. The publisher would be responsible for the advertising and distribution while the editor would have the authority to approve or disapprove an article. The second resolution of the Society, 2-77 was to

Charles Hargrove in appreciation of his support of the Society since he was moving out of state. Jerry Perryman (GFC) was elected to serve the remainder of Chuck's term and Paul Deets (C&SFFCD) and Bill Maier (DNR) were selected as editor and co-editor of the new publication. Paid membership stood at 356 members.

Look for Part II in a future Aquatics.



*If only hydrilla management were this easy.
Photo by Jeff Schardt*



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AQUA VINE



HEY APPLICATORS!!

This is your year! I chose the theme "Year of the Applicator" to reinforce the reason our Society was organized in November of 1976. Our founders were determined to keep their primary focus on the field applicator. So attention out there in nozzlehead land! Now is the time to submit your applicator talk to the program committee. Now is the time to recruit fellow applicators into the Society (and win \$50 for the most recruits). Now is the time to contact Committee chairs and ask how you can get involved next year. Now is the time to submit a fellow applicator's name for the Applicator of the Year Award. And most of all now is the time to set aside October 5-7 to attend our 23rd annual meeting in Daytona and have the best meeting ever-for education and for fun! Now is the time...Your President, *Jim Brewer*

Know Your FAPMS Presidents (Will You Be Next?)

- 1978 Les Bitting.
- 1979 Harold Brown
- 1980 Bill Haller
- 1981 Joe Joyce
- 1982 Bill Maier
- 1983 Carlton Layne
- 1984 Paul Myers
- 1985 Clarke Hudson
- 1986 David Tarver
- 1987 Mike Mahler
- 1988 Eddy Knight
- 1989 Bill Moore
- 1990 Brian Nelson
- 1991 Dan Thayer
- 1992 Ken Langeland
- 1993 Wayne Corbin

- 1994 Wendy Andrew
- 1995 Mike Hulon
- 1996 Don Dogget
- 1997 Ernie Feller
- 1998 François Laroche
- 1999 Jim Brewer
- 2000 Jeff Schardt

MEETINGS

Aquatic Plant Management Society 39th Annual Meeting

July 11-14, 1999
Asheville, North Carolina
Contact Lewis Decell at
601-638-7150

FAPMS Board Meeting
June 23, 1999, Palm Coast Resort
John Rodgers 813-744-6163

FAPMS 1999 Annual Meeting
October 5-7, 1999 Daytona Beach
Holiday Inn
John Rodgers 813-744-6163

**Aquatic Nuisance Species:
A Focus on the Southeast**
October 12-14, 1999
Charleston, South Carolina
Steve Dekozlowski, 803-734-9114

100 years of Aquatic plant management, and 20+ years with these guys. Do you recognize them?



2nd CALL FOR PAPERS FAPMS 1999 ANNUAL MEETING October 5-7, 1999 • Daytona Beach, FL

Now is the time to get your slot on the soon to be fabulous program. Remember that this Society was formed for the applicator and the annual meeting is a chance to share what you have learned with other members. Each year, the Society awards all applicators (non supervisory field staff) who present a paper with a plaque. The applicator who presents the best paper will also receive \$100.00 ! We are looking for papers on herbicide application techniques, mixtures, innovative control methods, etc....

DEADLINE FOR SUBMISSION IS JULY 31, 1999

**SUBMIT YOUR 75 WORD OR LESS
ABSTRACT and BIOGRAPHY TO:**

Michelle "Sam" Coward
South Florida Water Management District
1000 NE 40th Ave • Okeechobee, FL 34792
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