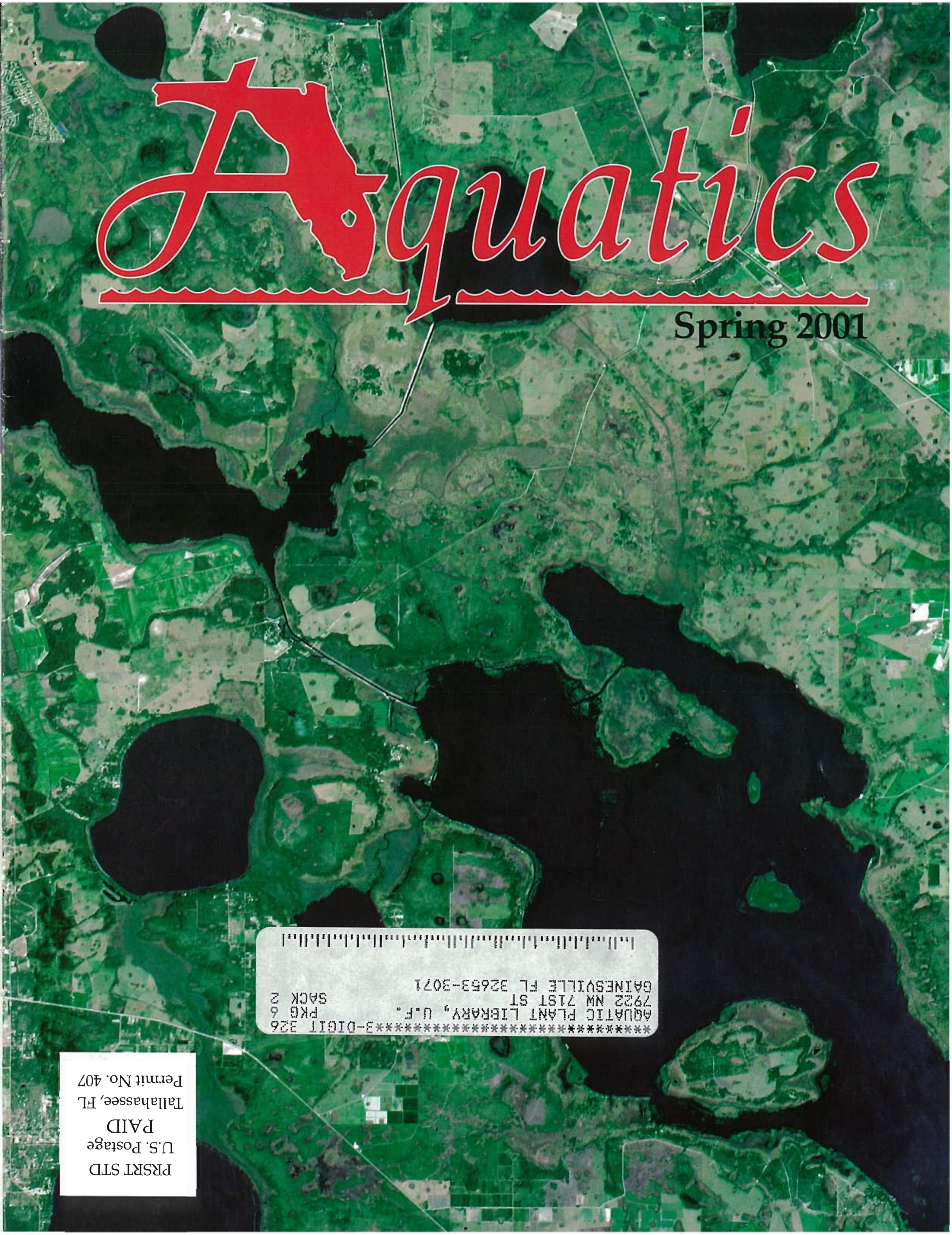
Aquatics

Spring 2001



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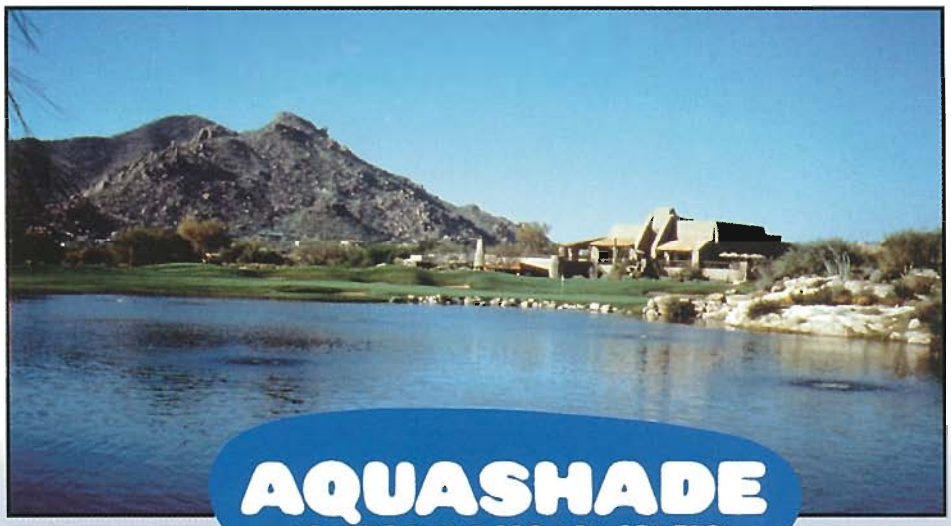

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The Aquatic Plant Management Society, Inc. – The Next Forty Years

by Jim Schmidt
President

First, let me thank the Florida Aquatic Plant Management Society and the *Aquatics* magazine staff for the opportunity to editorialize in your fine publication. Your organization has provided an outstanding example by sharing this information with the National and Chapter members throughout the country over its years of circulation. While the primary focus has been on Florida aquatic plants and issues, many articles have related to the same challenges we face elsewhere in the country. Keep up the good work.

The Aquatic Plant Management Society (APMS) proudly celebrated its fortieth "birthday" last year as we hosted an International Meeting and Conference in San Diego. By today's standard, forty is on the younger side of middle age, so we expect to have at least as long a life ahead of us. Perhaps, you might view the analogy as inappropriate, but from an organizational standpoint, we have reached maturity. We have been through both lean and profitable years with regards to finances and membership. We have learned from some mistakes, and unfortunately repeated others. However, not unlike a matured stand of nuisance aquatic plants, we have become stronger with age and at times have overcome influences that might otherwise have

Continued on page 10

FAPMS Website:
www.homestead.com/fapms/main.html

Satellite image of part of the Kissimmee Chain of Lakes, Osceola County, FL. The image was collected 1/28/00 by SPOTView Plus® ©CNES/SPOT Image Corp. 2000

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Contents

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Advances In Aquatic Plant Management Using Mapping Technologies

By Douglas Henderson,
ReMetrix LLC

Figure 1. SPOTView Plus® satellite image of the Kissimmee chain of lakes. Lakes Tohopekaliga, Cypress, Hatchineha, and Kissimmee (outlined white, north to south). Image ©CNES/SPOT Image Corp. 2000.

INTRODUCTION

Conceptual Approach

Aquatic plant management on Florida's Kissimmee chain of lakes has undergone a revolution in the past year. Seeking a comprehensive management approach, the Florida Department of Environmental Protection (DEP) contracted ReMetrix LLC to complete a program of advanced bathymetric and vegetation mapping. The initial results of this new approach have been very successful-so much so that highly accurate lake assessments are becoming an essential component for developing sound aquatic plant management programs.

Why conduct a detailed study?

Detailed, accurate bathymetric data is critical to determining accurate lake volumes. Proper application of aquatic herbicides at target rates requires a reliable calculation of water volume. Bathymetric maps greater than ten to fifteen years old are often outdated and no longer accurately represent the volume or morphology of an entire system. Many existing bathymetric maps have contour intervals that are too coarse to calculate typical system fluctuations (e.g., five-foot contour intervals for a water body that only fluctuates three-feet during the year). Simply estimating volumes in large lakes can frequently lead to significant errors in herbicide concentrations, especially if one must factor in lake level changes. Using mapping technology, various lake volumes can be reliably calculated in advance so as to minimize the variables affecting treatment programs.

Accountability is another reason for conducting a detailed study. Considering the often large budgets allocated toward aquatic plant management, it is valuable to have a reliable method for determining and documenting the true extent of the problem and the results of any mitigation efforts. In essence, these are "before and after" assessments. It is also important to recognize the extended benefits of investing in advanced management practices. Building historical digital databases for water bodies is an incredibly valuable approach for long-term management. For example, a detailed bathymetric survey has value for at least ten to fifteen years. Subsequent bathymetric maps can also help determine sedimentation rates.

Historical Background

The Kissimmee chain of lakes begins approximately 20 miles south of Orlando. The major lakes in this system are Lake Tohopekaliga, Lake Cypress, Lake Hatchineha, and Lake Kissimmee (Figure 1). The chain is part of the South Florida Water Management District's integrated water storage and drainage system for the region, and is also a valuable recreational resource. Lake levels are controlled by the District and the U.S. Army Corps of Engineers. Hydrilla appeared in the Kissimmee chain in the 1970's, and has been the target of ongoing management programs by the DEP. Because management outcomes have been variable, and in order to better ensure the success of future efforts, DEP decided to acquire and integrate more sophisticated lake data in 2000.

METHODOLOGY

Tools

The primary mapping tools for this assessment were Differential Global Positioning Systems (DGPS), remote sensing software, and Geographic Information Systems (GIS) software.

At the time the GPS data for this study were collected, selective availability degradation of GPS signals by the U.S. government was still activated. Base station data acquired from the National Geodetic Survey were used to differentially correct the GPS data to meter-accuracy using post-processing algorithms.

Remote sensing software was

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used to analyze satellite imagery, and Geographic Information Systems software was used to create the final maps. Geographic Information Systems software is designed to actively link geographic coordinates with data such as water depth and plant species. Linking these data to coordinates permits thorough geographic analyses of the data.

Field Data Collection

The goal of the field data collection effort was to acquire a dense grid of GPS points on each lake with bathymetric and vegetation data as attributes. The GPS points were collected along transects with pre-determined spacing for each lake. The transects were designed to achieve maximum coverage of the lakes in the time allotted. Areas of the lakes that were discovered to have particularly complex morphology were given extra attention during the data collection.

The majority of field data for all four lakes were collected during the six-week period of January 31 to March 9, 2000. Prior to initiating data collection, the field crew flew over the Kissimmee system in a helicopter to get a more detailed preview of the lakes scheduled to be mapped. During the flight, Mike Bodle of the South Florida Water Management District provided key information about the Kissimmee chain that was relevant to the field campaign.

It is important to note that lake-level measurements were monitored throughout the field work to ensure consistent conditions during data collection.

Image Acquisition

The exceptionally large surface area of the study lakes (almost 70,000 acres) makes ideal the use of satellite imagery for analyses. Three sets of satellite imagery were acquired for the lakes relevant to this study. The first image set acquired included coverage of all four lakes and was taken on January 28, 2000, corresponding to the beginning of field data collection (Figure 1). A SPOTView PLUS® image with 20-meter ground resolution was used to determine shoreline boundaries and areas of emergent vegetation.

A set of high-resolution CARTERRA™ Geo satellite imagery was acquired for two of the lakes (Cypress and Hatchineha) on March 31, 2000. High-resolution color satellite imagery is presently defined as having 4-meter ground resolution. This imagery also includes an infrared band, which is helpful in vegetation analyses. A primary goal for acquiring this imagery was to determine the scope of its usefulness for this kind of aquatic vegetation mapping. A thorough field effort by ReMetrix provided excellent ground reference data for comparing field observations with image interpretations. In this project, the imagery also establishes a before-treatment baseline for comparison with the post-treatment conditions.

High-resolution CARTERRA™ Geo color satellite imagery collected in early November and December, 2000, constitutes the third image data set. This imagery is useful for determinations of post-treatment efficacy, both through direct image interpretation and as an aid to future field data collection.

Field Data Reduction and Analysis

Field data were processed weekly during the field campaign. This allowed the field team to make refinements to the data collection strategy when necessary.

Using the GIS software, the bathymetry for each lake was calculated at one-foot contour intervals (Table 1; Figure 2).

Table 1. Lake Statistics for the Kissimmee Chain

Water Body	*Surface Acres**	*Maximum Depth*
Lake Tohopekaliga	20,807	14 feet
Lake Cypress	4,227	9 feet
Lake Hatchineha	7,772	12 feet
Lake Kissimmee	37,127	18 feet

*Calculated at full volume.

Figure 2. Bathymetry map for Lake Kissimmee.

Figure 3. Vegetation map for Lake Kissimmee. Red areas are dense hydrilla, yellow are sparse, light green are mixed emergent vegetation, and blue represents open water. Black numbers are sample sites.

Table 2. Volume Loss at 2.5 Feet Below Full Pool

Water Body	*Percent Volume Loss*
Lake Tohopekaliga	32%
Lake Cypress	41%
Lake Hatchineha	40%
Lake Kissimmee	29%

Accurate lake volumes were calculated based on the contour intervals. Lake volumes at various lake levels were also calculated, and these proved valuable in tailoring management programs to the specific conditions of each lake. The location, density, and areal extent of hydrilla was also mapped from each lake's field data using the GIS software (Figure 3).

RESULTS

GIS Analyses

The results of the GIS analyses highlight the importance of obtaining pre-treatment lake data. At low stage, herein defined as a two and a half foot decrease in lake level, the volume loss for each lake is dramatic (Table 2).

The implication of this situation for management programs is significant. Failure to recognize and consider such effects can result in critical errors in treating a water body. The DEP immediately recognized the value of this information.

Aquatic herbicide treatment plans were derived from the vegetation maps and bathymetry data, and the proposed plans were overlaid on a new set of maps. Because of the quality of the source data, the resulting treatment maps helped achieve unprecedented accuracy in planning and executing the treatment programs. According to Mike Page, who conducted the aerial aquatic herbicide applications, "The level of detail of these maps made our work very efficient."

Herbicide concentration maps were also produced for Lake Kissimmee in 2000 (Figure 5). Throughout the summer, FasTEST™ water samples were gathered at predetermined locations. Geographically mapping the concentration values enables management personnel to better assess flow variations throughout a water body or system.

Figure 4. CARTERRA (color infrared satellite image. Dark areas are water; topped-out vegetation is visible in shades of red. Image ©Space Imaging, Inc., 2000.

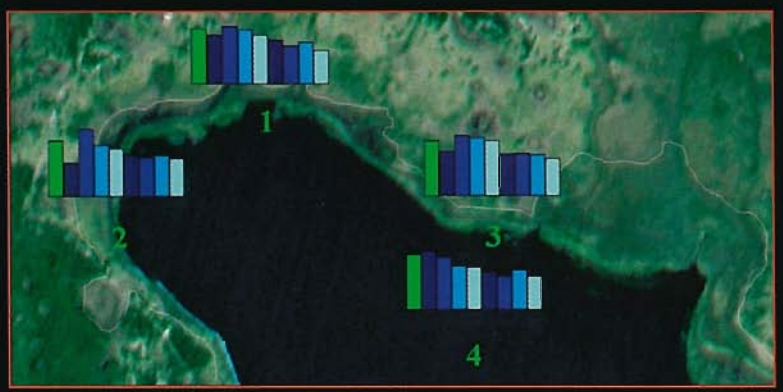

Figure 5. Bimonthly concentration data plotted over sample sites. Target concentrations are plotted in green.

Image Analyses

The satellite images were analyzed for surface and near-surface aquatic vegetation without consulting the field maps. This independent approach was used to determine the effectiveness of satellite image analysis for mapping aquatic vegetation in this system. The results were promising, though the need for ground referencing still exists. The satellite image vegetation maps were then revised based on the field maps and now provide a reliable baseline for future imagery studies (Figure 4).

The pre-treatment satellite imagery is being compared to the end-of-season imagery so that preliminary conclusions can be drawn about the effectiveness of the treatment programs. Statistics from the comparison are not yet available, but differences in surface aquatic vegetation are clearly visible and show a significant hydrilla reduction.

Long Term Database Established - The Future

The Florida DEP now has a solid database on which to build for long-term management of the Kissimmee chain of lakes. Everything from lake volumes (bathymetry) to vegetation maps to treatment protocols are archived and can be revisited to refine future plans. These data provide a tenable approach to decision making, and demonstrate how essential these data are for developing sound aquatic plant management plans.

The author wishes to thank Mark Heilman, PhD, Terry McNabb, George Ruschhaupt, and David Tarver for editorial suggestions.

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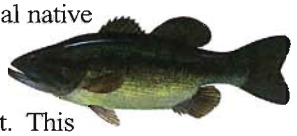
Control & Release

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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Editorial

Continued from page 3

destroyed us.

Maturity is not to be confused with complacency. Sure, it is easy for an organization to fall into the trap of saying things like: "we made that decision never to do this, or that, a long time ago;" "we've never done it that way;" or "we tried that way back when and it didn't work." It's also easy to decide that the main function of society is to hold an annual social affair called a conference for the members to have a good time, see your old friends and colleagues and maybe tie in a vacation afterwards. In a world where some technology changes as fast as hydrilla infests a lake, each of us needs to be positioned to not just accept change, but to be the ones leading and guiding it in our chosen professions. From the APMS's standpoint, this means a collective and coordinated effort to impact favorable changes.

Where is our strength in the APMS and all of the Regional Chapters? It lies in our collective individual memberships and participation. As compared to many other organizations, our numbers may be few, but our knowledge is unique and our diversity is great. Knowledge is power, and diversity is the key to stability. We have both, and we are striving to not only increase this core of knowledge and experience but to expand our diversity thorough recruitment and encouragement. The APMS has taken several recent initiatives to do just this.

We wish to thank those Chapters who have pledged to continue their final support for the joint AERF/APMS Graduate Scholarship Assistance for 2001/02. It is through these efforts and actions that we will continue to lead the way for future research and development within our discipline. Another encouraging aspect to note in this regard was the participation of a record ten students in our 2000 Annual Student Paper Contest at our 2000 conference. They joined us from all regions of the U.S., plus we even entertained two international entries. For those who may not be aware, the APMS pays for the rooms and registrations of participating students. More information on this is available on our website.

Recognizing the need for education outside of our immediate "clique" and focusing on the general public, the APMS has committed monies from their scholarship fund to support primary education projects related to learning more about invasive aquatic plants. Regional Chapters are being encouraged to follow suit on this worthwhile cause. This educational outreach program is being coordinated through the FL DEP in conjunction with the federal Sea Grant Program. Targeting 3rd – 5th grade students, it will serve to recruit an even younger group of aquatic plant scientists and practitioners in generations to come. What better way to gain support of what we do and why we do it than to have our message sent home with the kids to the parents?

Over the years, the APMS has established important liaisons with related organizations in an attempt to strengthen our voice at the national level. This has included sharing the expense of a Scientific Adviser with the Weed Science Society of America (WSSA) to keep a finger on the pulse of pertinent legislative issues in Washington D.C. Similarly, we hold an Associate Membership and a seat on the Board of the Council for Agricultural Sciences and Technology (CAST) to include our position on decision-making that could affect our industry under the broader agricultural sector.

APMS recognizes the importance of communication with scientists in related disciplines and other stakeholder groups utilizing aquatic resources. We have participated with the North American Lake Management Society, Inc. (NALMS), exchanging technologies on how aquatic vegetation control relates to overall lake management improvement. Our outreach has been extended to include organizations such as B.A.S.S. in an effort to provide a better understanding and compromise between fisherman and invasive aquatic plant control activities. The B.A.S.S/Grass Alliance has been formed to further explore and compare the scientific body of facts within both fisheries management and aquatic plant management. Perhaps, this group will move us closer together when the relationship becomes clear between control of exotic/invasive

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Front Row: President Elect David Tarver, Editor John Madsen, Secretary Mike Stewart, Vice President Richard Flinterman, President Jim Schmidt, Treasurer Don Doggett.
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species and maintaining a sustainable fishery.

The "Journal of Aquatic Plant Management" provides a means to share and document our science. Over the years, dedicated Editors and reviewers have ensured that scientific papers are properly scrutinized to maintain the integrity of the published information. We continue to be encouraged by the quantity and quality of submissions to the Journal, and we hope to maintain its unique position in the scientific literature for many years to come.

Internal communication and coordination is a necessity for the efficient and effective operation of any organization. Like most totally voluntary societies, we do this through a newsletter, e-mails, faxes, phone calls, and Board Meetings. Greater emphasis has recently been placed on keeping our website up-to-date as a source of current information for members and non-members alike. We encourage you to visit us at www.apms.org.

The APMS leadership recognized that getting caught up in the details of what needs to be done today was preventing us from looking ahead as to what we need to do now for tomorrow. An ad-hoc Strategic Planning Committee was formed in 1999 to do just that. The stage has been set and actions have been taken to review our history, query our membership, scrutinize our financial planning, and ultimately make recommendations for the directions to take in years ahead.

Where we have been, where we are today and where we are going tomorrow has been, is and will be dependent upon a continuum of hard-working, dedicated APMS and Regional Chapter volunteers. While it is always good to see "old" friends and colleagues at the meeting, it's even more important that we all welcome and meet the new members coming into our industry. Encourage the involvement of those who meet the standards of integrity that our collective societies have established over the years. Many of us who have been in the industry for over twenty years have proudly made aquatic plant management a career, not just a job. I have personally quipped to some that I have made a living off of pond scum. Seriously, it is important that we continue to offer professional development to our members, so all aspects of aquatic plant management, from researcher to applicator, are in fact professions.

I wish to personally invite each of you to attend our 41st Annual Meeting to be held July 15 – 18, 2001 in Minneapolis, MN. Furthermore, I want to encourage your individual memberships in the APMS as a further commitment to your career in aquatic plant management. More information is available at our website: www.apms.org.

Giant Salvinia (*Salvinia molesta* D.S. Mitchell) in Texas: a destructive menace

By
Rhandy J. Helton
Aquatic Habitat Biologist
Texas Parks & Wildlife Department
Jasper, Texas

and

Dr. Earl Chilton
Aquatic Habitat Enhancement Program Director
Texas Parks & Wildlife Department
Austin, Texas

Texas Parks and Wildlife Department personnel spraying giant salvinia on Toledo Bend Reservoir, Summer 2000. Photo by Rhandy Helton

"You've got a bloody problem!" Those were the somber words of Australia's Dr. David Mitchell after a July 1999 tour of giant salvinia (*Salvinia molesta* D.S. Mitchell) infestations in Southeast Texas. Dr. Bill Haller of the University of Florida, also touring the infestations, concurred. Not that the state of Texas needed any more aquatic plant problems but when gentlemen of the status and acumen of Dr.'s Mitchell and Haller pronounce your aquatic resources are imminently threatened one is wise to consider strongly the warning given.

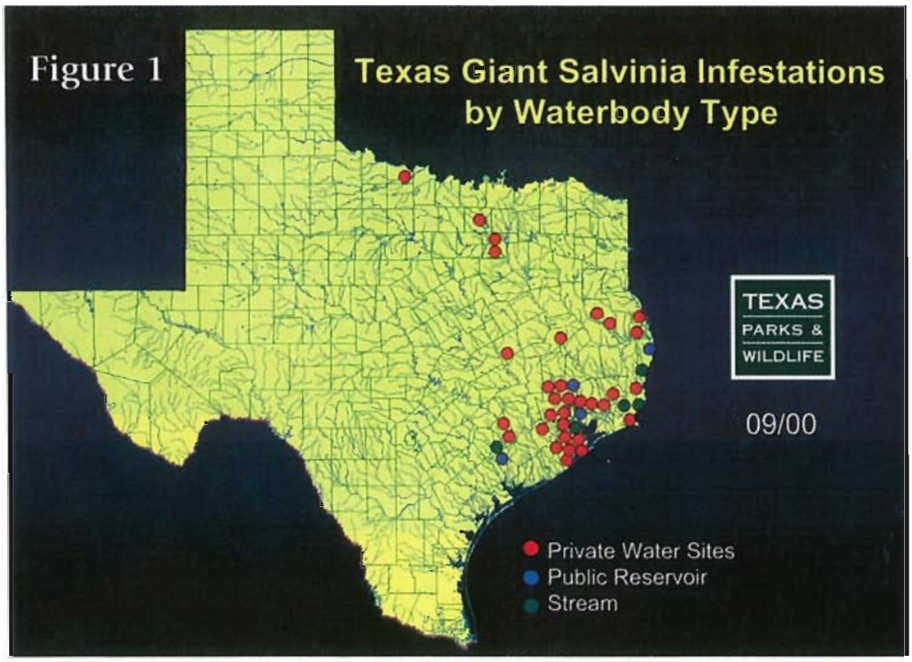
Giant Salvinia, a floating aquatic fern, was first identified in Texas from a wild population in April 1998. This was only the second U.S. record, the first being in South Carolina in 1995. Salvinia was eradicated from that 1.5 acre pond in South Carolina. However, eradication may never be a reality in Texas. In three years the infestation has spread at breakneck speed. Efforts to control the plant and stop its spread have been considerable, but success as of yet can hardly be measured. Because new infestations of giant salvinia can approach severe conditions in a matter of weeks, reaction time is critical. Giant salvinia has taken advantage of our climate and productive waters to provide first-hand experience of the explosive growth rate (doubling every 5-7 days), for which the plant is famous. Oxygen levels of 2.0 ppm or lower and pH of 5 seem to be common in small lakes/ponds covered with giant salvinia. Resource managers within the state, at least those close to the situation, are aware that giant salvinia imperils desirable aquatic life in the waters we manage.

Why the Concern

In Texas, giant salvinia has been referred to as the "beast," or "swamp thing" not to mention a number of more colorful descriptors unprintable in most public forums. Giant salvinia's considerable reputation as an invasive species of

note was built in exotic places like New Guinea, Zimbabwe, Australia and India. Infestations in the Sepik River of Papua New Guinea reached a surface coverage of 96 square miles. In Kariba Reservoir (over 1,000,000 acres) of Zimbabwe the giant salvinia infestation reached nearly 250,000 acres in a little over 3 years time. Could infestations of that magnitude occur in Texas and the U.S? Word from investigators experienced with the plant was that we did not want to find out.

The confirmation of giant salvinia in Toledo Bend, Texas' largest reservoir, in September 1998 dispelled any such notions that this troublesome plant was going to be confined to a few small, isolated farm ponds. Toledo Bend straddles much of the Texas-Louisiana border. The possibility that Toledo Bend could serve as a source of infestation to other areas, including a number of valuable public waterbodies in eastern Texas and western Louisiana, was very likely. Toledo Bend covers 185,000 acres and has 1200 miles of shoreline. The reservoir is an economic magnet for anglers and outdoor enthusiasts from both Texas, Loiuisiana and other midwestern states. If you could design and build a premier reservoir largemouth bass fishery, Toledo Bend would be the prototype. Most of it is prime largemouth bass habitat with large timbered coves and backwater areas. However, the same timber-studded shorelines that provide habitat for a prized gamefish also harbors giant salvinia. The excellent water quality parameters characteristic of Toledo Bend and the Sabine River Basin provide more than ample nitrogen and phosporous for plant growth. Toledo Bend has a wide diversity of native and exotic vegetation. Most of the reservoir littoral zone is vegetated. Hydrilla (*Hydrilla verticillata*) is the dominant aquatic macrophyte and may cover 50,000 acres. All the desirable growth requirements for aquatic plants including nutrients, warm climate and long growing season are present in abundance. Field observations on Toledo Bend during summer surmise that giant salvinia is indeed, doubling its coverage in as little as 7 days.



Unfortunately, a little over two years after discovering giant salvinia in Toledo Bend, the plant has now been verified in 3 other public reservoir in Texas including Lake Texana near Victoria, Lake

Conroe near Houston and Sheldon Reservoir also in the Houston area. Additionally, the plant has been confirmed in 5 streams including the Sabine River below Toledo Bend dam. Ten commercial nurseries within the state have eradicated the plant from their property and 27 private lakes/ponds have confirmed identifications (Fig. 1).

Waging War on Giant Salvinia Through Professional Planning and Public Education

The discovery of giant salvinia in Toledo Bend Reservoir spurred efforts to seriously consider the plant a national concern. A national Giant Salvinia Task Force (GSTF) was formed and first met in Houston in November 1998. The task force proposed, through the action plan developed, that affected agencies respond using public education, aquatic herbicides, biological control and mechanical removal where feasible. These methods should be employed with the resolve necessary to eradicate giant salvinia from the aquatic resources within Texas and the nation. Since early detection of new infestations was critical the U.S. Geological Survey Biological Resources Division had already prepared a fact sheet to aid in identification. To date over 80,000 copies of the fact sheet have been printed and distributed coast-to-coast.

Texas Parks and Wildlife Department personnel spraying giant salvinia on Toledo Bend Reservoir. Photo by Rhandy Helton

The GSTF met again in Houston in April 2000 to consider the status

of giant salvinia, which in 2 years had spread to 8 other states. The assemblage of over 50 concerned scientists reiterated that the action plan needed to be aggressively implemented. Early detection of giant salvinia was seen as paramount, especially in reservoir-type systems. The inspection of commercial nursery operations was discussed and stressed at length. The GSTF was essentially unanimous in agreement that new stakeholders needed to be a part of the process. These stakeholders might include environmental groups, nursery associations, lake homeowner and marina associations and organized fishing groups.

In Texas, the Lake Conroe Homeowners Association has been a perfect example of citizen participation to assist in the location and eradication of giant salvinia. A fact sheet specific to Lake Conroe was prepared and mailed to all residents around the lake. Residents were encouraged to "adopt-a-shoreline" in their areas and quickly notify the San Jacinto River Authority (SJRA) if plants were found. The SJRA has pursued Giant Salvinia with a "seek and destroy" mentality so that there is the very real possibility that the plant may be eradicated from the lake in the near future. The local residents and the controlling authority have learned from hydrilla infestations in the late 70's and early 80's that exotic species populations can quickly get out of hand if prompt and decisive measures are not taken to prevent it.

Figure 3. Giant salvinia growing under American Lotus. Foliar application is difficult in these situations. Photo by Rhandy Helton.

Putting Plans Into Action

Aquatic Herbicides

The GSTF action plan to address the giant salvinia problem was completed by Spring 1999 and implementation began almost immediately. In Texas the decision was made to begin aquatic herbicide applications on Toledo Bend as soon as possible. It was agreed that personnel from the Texas Parks and Wildlife Department (TPWD) and the Louisiana Department of Wildlife and Fisheries (LDWF) would apply the herbicides on their respective sides of the reservoir. The lake controlling authority, the Sabine River Authority, consented to purchase the herbicide/adjuvants to be used.

Diquat dibromide (Reward®) at .75% v/v or 3 quarts per acre has been employed since spraying began on Toledo Bend in May 1999. The adjuvants used in combination are two: a non-ionic penetrant (either Aqua-King Plus® or Activate III®) at .25%v/v or 1 quart per acre and a non-ionic organo-silicone, Thoroughbred® at 12 ounces per acre. Initially only 6 ounces of the organo-silicone were used, but field tests indicated a higher herbicide

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efficacy with the 12 ounces. Some applicators are now even using a full pint of the organo-silicone. The hairs or pubescence on the leaf surface of giant salvinia actually repels moisture so that the organ-silicone is a valuable and necessary component of the spray mix.

Aquatic herbicide applications on Toledo Bend have thus far been effective at forestalling a much more serious infestation. Since diquat is a contact herbicide covering each plant is critical. Applicator skill and care are both important. Utilizing a larger orifice size on sprayguns (#5-#7) is advantageous because coarser droplets capable of crashing through leaf pubescence are produced. TPWD personnel consistently achieve 90% efficacy after a single application, however 1-2 re-sprays are necessary through the season. Plants not sprayed can grow rapidly, even in a month's time, to re-infest a previously treated area. On Toledo Bend most spraying is shoreline work generally in the back of coves where creeks enter the lake. Through two growing seasons since May 1999, the TPWD and LDWF have eradicated 1,493 acres of giant salvinia on Toledo Bend (Fig. 2). In spite of intense efforts, salvinia continues to expand slowly and in the not too distant future the infestation may approach a level at which aquatic herbicide applications (given current available manpower) will be unable to control and thus significantly reduce expansion.

Aquatic herbicide applications have made significant headway on infestations in Lakes Conroe, Texana and Sheldon. The San Jacinto River Authority (SJRA) reports excellent results using glyphosate (Rodeo®) at .75%v/v with the same adjuvants/rates as used with diquat. The SJRA is now using glyphosate exclusively on giant salvinia and are encouraged that they may be able to eradicate the plant from the lake. This infestation was discovered early and mainly confined to a 40-acre area. The infestation on Lake Texana has been limited to the Sandy Creek portion of the lake but heavy waterhyacinth has made aquatic herbicide applications for giant salvinia control a challenge. The Lavaca-Navidad River Authority (LNRA) and the TPWD have worked together, using diquat and glyphosate, to reduce the infestation. An oil pollution boom was utilized to restrict movement of giant salvinia from the creek channel into the main lake. Unfortunately, the LNRA reports that excessive rainfall in Fall 2000 has now washed a small amount of giant salvinia into the lake proper. Sheldon Reservoir is a 1200 acre lake almost within the Houston city limits. The lake is heavily covered with American lotus. Giant salvinia was first identified in the lake in July 2000. Aquatic herbicide applications by TPWD personnel using diquat and glyphosate were initiated upon discovery but finding the giant salvinia in a 1000 acre Amercian lotus stand is trying. (Figure 3)

Two other labeled herbicides have been used successfully on giant salvinia in Texas. Initial test plot data indicate that a chelated copper (Clearigate®) applied at 2.5% v/v as a foliar spray, can produce results. Estimates of 85-90% efficacy were achieved in Summer 2000 on Toledo Bend with a single spraying. This is promising since the label on chelated copper products allow treatment near potable water intakes. Fluridone (Sonar® A.S.) at 1 qt./ac. used in small lakes or farm ponds has produced excellent results. A 1-ac. pond that was 50% covered with giant salvinia was treated in June 1999 and through October 2000 the plant had not reappeared. Nearby ponds were then treated at 1 pt./ac. with less favorable results but when they were re-treated with an additional pint eradication was achieved. Fluridone will work on giant salvinia where excessive water movement and subsequent dilution

Figure 2
1999-2000 Herbicide Applications (Acres) for Salvinia Control

Waterbody	1999	2000	Herbicide
Toledo Bend Res.*	297	1196	Diquat
Lake Conroe		35	Diquat & Rodeo
Sheldon Res.		25	Diquat
Sheldon WMA	3		Sonar AS
Lake Texana	22	10+	Diquat & Rodeo

*Louisiana & Texas combined

is not a factor. Fluridone should be considered for whole lake treatments to eradicate giant salvinia. In our applications using fluridone the herbicide was applied using a backpack sprayer with a sub-surface injection from a canoe!

Biological Control

Biological control methods have been developed on serious giant salvinia infestations elsewhere in the world. The salvinia weevil, *Cyrtobagous salviniae,* is host-specific to *Salvinia* species. Adult insects have an affinity for the leaf buds but the larvae also feed on other parts of the plant. In places such as India, South Africa, Papua New Guinea and Australia infestations of giant salvinia have been reduced to 1% of their former size by the salvinia weevil. After introduction and establishment results have often been measured in months rather than years. Exactly how the insects will do in the U.S. is not known at this time. Several important factors including climatic conditions and plant nutritional status have a bearing on insect effectiveness. Research, led by the team of scientists at U.S. Department of Agriculture Invasive Plant Research Laboratory in Fort Lauderdale, Florida, is moving forward. The Australian strain of *Cyrtobagous salviniae* is now in quarantine in Florida and Texas. Once further host-range studies are complete releases of the insect will be made into selected locations in southeast Texas. Whether this is accomplished in 2001 is uncertain but 2002 may be a more realistic target.

Summary

The TPWD considers giant salvinia infestations Tier 1 response situations. Plants classified as such are targeted for immediate eradication using all available technology developed in the field of aquatic plant management. Professional and non-professional interests within the state are surprisingly agreed on this. We do not want the aquatic resources of our state ruined by this plant. What happens and is learned in Texas may determine, to a large extent, what possible impacts lie in wait for other states now dealing with giant salvinia. The TPWD Inland Fisheries and Wildlife Division staffs and the resource professionals of the Giant Salvinia Task Force are firmly committed, with the cooperation of federal (USDA, USFWS), state and local government entities, to meet the challenge of this foreign invader to the aquatic resources of our state and nation.

Please visit the U.S. Geological Survey website at http:// nas.er.usgs.gov/ferns for the current range of giant salvinia within the U.S. and to learn more about plant biology. An article in the Spring 1999 issue of *Aquatics* by C. Jacono also highlights identification and biology of giant salvinia.

HELP!

The Florida Aquatic Plant Management Society Historical Committee needs your help in locating photographs (slides or prints) from any and all past Society events, especially the early years (1977 –1990). Even if you don't have the photos, maybe you remember someone who was taking pictures. We are especially looking for pictures from the early years. Please contact us with either pictures or information as to who may have pictures. We promise to return all pictures when we've made copies.

Thanks!

Catherine Johnson
Corps of Engineers
5882 S. Semoran Blvd.
Orlando, FL 32822
Ph. (407) 380-2024

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~ ATTENTION STUDENTS ~

APMS Student Paper Contest 2001

Since 1975, the Aquatic Plant Management Society has conducted a student paper contest in conjunction with its annual meeting. The objectives of the contest are 1) to encourage student participation in the Society affairs; 2) to provide students with the opportunity to gain experience in preparing and presenting scientific papers; and 3) to recognize outstanding achievements by student members of the Society.

All contest entrants receive free meeting registration, free accommodations (based on double occupancy), book prizes, and certificates. Cash awards are granted to first through fourth place winners.

Graduate and advanced undergraduate students who have had the opportunity to conduct independent research are encouraged to present their findings in the 2001 contest to be held July 15-18 in Minneapolis, MN. Papers presented in the contest should be the results of the student's original research and should contain information not previously presented at an APMS meeting.

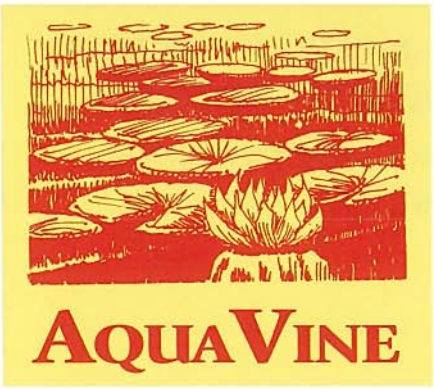
Sign up now! Student entrants must submit a title and abstract using the "Call for Papers" form found in the November or March issue of the APMS Newsletter. The meeting registration form should also be submitted. These forms are also available via the APMS website at www.apms.org (click on the "2001 Annual Meeting" section). Only oral presentations will be accepted for the contest. The submission deadline for title and abstract is April 15, 2001. If you need forms or have questions concerning the contest, contact:

Linda Nelson, EP-P
ERDC-Waterways Expt. Station
3909 Halls Ferry Road,
Vicksburg, MS 39180-6199
Phone: (601) 634-2656
Fax: (601) 634-2617
E-mail:
NELSONL@wes.army.mil

AMAZING ALIEN FACTS

Compiled by Jeff Schardt, FL DEP

- Alien species cost the US $122 billion annually
- Globally, there are $1 trillion annual losses to invasive weeds
- Weed control is the #1 task of 80% of the world's population
- Invasive species cause the 2nd largest loss of biodiversity after development
- ~30% of US endangered and threatened species are listed, in part, from invasive species impacts
- Alien species eliminated 27 of 40 fish that became extinct world-wide in past 100 years
- US is home to 4,000 exotic plant and 2,300 exotic animal species
- >40% of pest insects and >50% of pest plants in the US are exotic species
- The aquarium trade is responsible for 65% of exotic fish established in US waters
- Exotics offer an easy way out for resource managers (intro hydrilla rather than plant natives)
- Invasive species impacts have been studied globally for only 10 years
- Invasive plant associated losses and management costs in US is >$30 billion annually
- The US spent $200 million managing invasive plants in '97
- Florida spent ~$60 million managing invasive aquatic plants in '99
- In Florida, 31% of plant species (1180) are exotic, 69% are native (2650)



Meetings & Announcements

FAPMS Board Meeting
April 10, Daytona, Todd Olson 800-327-8745

CEU Courses Hillsborough Extension Service, Seffner, FL

- Apr 25th 9-11am ROW Exam Prep Class, 2 ROW CEU's
- May 15th 8-10am 2 Aquatic CEU's, 10-12noon 2 Core CEU's, 1-3pm 2 ROW CEU's
  Dave Palmer 813-744-5519x103

Aquatic Weed Control Short Course 2001
May 14-18, 2001, Fort Lauderdale Research and Education Center and the Marriott North, Fort Lauderdale. Up to 28 CEU's for FL, GA, NC, and SC. Contact University of Florida, IFAS, 352-392-5930 or visit www.ifas.ufl.edu/~conferweb/AW

APMS 41st Annual Meeting
July 15-18, 2001 Minneapolis, MN Visit www.apms.org for more information

Florida Lake Management Society 12th Annual Conference
May 21-24, Tallahassee, FL Angustus B. Turnbull III Florida State Conference Center with accommodations at Doubletree Downtown Hotel, Contact Mike Scheinkman, 850-921-9918 or visit www.nalms.org/flms/florida.html

North American Lake Management Society 21st International Symposium "2001-A Lake Odyssey"
November 7-9, 2001, Madison Wisconsin. Call for papers deadline May 18, 2001. Contact Richard Lathrop, 608-261-7593 or visit www.nalms.org

11th International Conference on Aquatic Invasive Species
October 1-4, 2001. Alexandria, VA. Call for paper deadline is December 17, 2000. Sponsored by the U.S. Army Corps of Engineers. For more information visit USGS Nonindigenous Aquatic Species home page http://nas.er.usgs.gov, Aquatic Plant Management Society at www.apms.org. or http://www.aquatic-invasive-species-conference.org/abstracts.htm

College Scholarship Available!
The South Carolina Aquatic Plant Management Society is seeking applications for its annual scholarship grant. A **$2000** grant will be awarded in Fall 2001. Applications must be received no later than May 1, 2001. Contact Danny Johnson, SC Department of Natural Resources, Columbia, SC, 803-734-9099, or johnsond@ water.dnr.state.sc.us

Congratulations to the Myers Family!

Paul Jacob Myers II was born December 21, 2000 to PJ and Jennifer Myers.

Company Name Change

Effective January 1, 2001, the Agricultural Chemicals Division of Elf Atochem has become **Cerexagri, Inc.** a wholly-owned subsidiary of ATOFINA Chemicals, Inc. (Formerly Elf Atochem). Contact Bill Moore, 352-242-2360 for more information.

The following items of interest are reprinted from the Center for Aquatic and Invasive Plants' Aquaphyte Volume 20 Number 1, Summer 2000:

"A Weed of National Significance." Cabomba, (*Cabomba caroliniana*) has been named as a "Weed of National Significance" in Australia. Cabomba has recently infested several water storage dams, and "is a concern with regard to blocking water flow, reducing water quality and reducing access for boating and swimming. It has also been observed to outcompete native aquatic plants, with subsequent effects on native fish and invertebrates."

Report Non-Native Pest Plants in Florida. The Exotic Pest Plant Database is an online database which may be used to obtain lists of occurrences of pest plants in Florida public lands and waters. Or you may report a field occurrence yourself. The database is a collaborative effort of the Florida Exotic Pest Plant council and the Florida DEP, Bureau of Invasive Plant Management. The site is www.fleppc.org/database/data_intro.htm

Free Topographic Maps. Topo maps for the US are now on-line. They are in color and may be printed. The site is www.topozone.com

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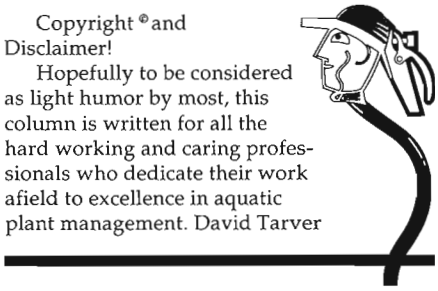
Hopefully to be considered as light humor by most, this column is written for all the hard working and caring professionals who dedicate their work afield to excellence in aquatic plant management. David Tarver



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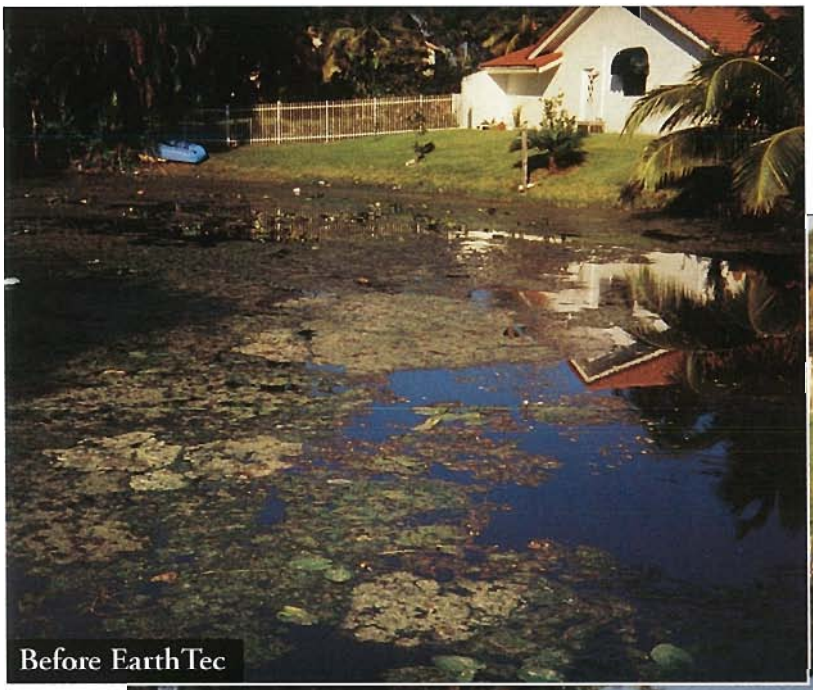

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