

# A Q U A P H Y T E



UNIVERSITY OF  
FLORIDA

Institute of Food and Agricultural Sciences

## CENTER FOR AQUATIC PLANTS

### With Support From

The Florida Department of Environmental Protection,  
Bureau of Aquatic Plant Management  
The U.S. Army Corps of Engineers, Waterways Experiment Station,  
Aquatic Plant Control Research Program

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## Wetlands Delineation In Florida Usually Depends on Plants

In Florida, determining the "landward extent of wetlands and surface waters" became easier with new delineation laws which came into effect in July 1994. The Florida Department of Environmental Protection (DEP) is responsible for ensuring statewide coordination and consistency in delineating surface waters and wetlands, and has established methodology rules that include using a "vegetative index", hydric soils and hydrology to determine where wetlands begin and end.

(DEP's delineation methodology is spelled out in Chapter 62-340 of its rules and regulations. The wetlands laws upon which the DEP rules are based are Florida Statutes 373.019 and 373.421. DEP is also responsible for providing wetlands training and guidance to water management districts and local governments in Florida.)

The first step in determining whether a place is a wetland or not under the new rules is for someone using "reasonable scientific judgement" and having "all reliable information" to decide if the place is a swamp, marsh, bayhead, bog, cypress dome or strand, slough, wet prairie, riverine swamp or marsh, hydric seepage slope, tidal marsh, mangrove swamp or "other similar area". The place must have a "prevalence of vegetation typically adapted for life in saturated soils"; that is, "facultative or obligate hydrophytic macrophytes...that have the ability to grow, reproduce or persist in aquatic environments or anaerobic soil conditions". "If the boundary cannot be located easily" in this way, then the further methods described in Chapter 62-340 apply.

Chapter 62-340 includes a vegetative index which mostly lists aquatic macrophyte species and trees. Under "obligate species", some 272 genera and species are listed. Under "facultative wet species", another 310 genera and species of plants are listed. Two other lists apply only to Monroe County and the Key Largo portion of Dade County, and include an additional 156 "facultative wet" genera and species and 11 "facultative" species.

In addition to simple expert declarations that are encouraged under the laws and rules, the extents of wetlands and surface waters can also be determined in any of four additional ways:

The first way under 62-340 to determine where a wetlands is requires that the aerial extent of "obligate plants" (listed) be greater than 50% of all plants present in the stratum, and requires the presence of either a hydric soil or a hydrologic indicator.

The second method requires that the aerial extent of obligate or "facultative wet plants" (as listed) be equal to or greater than 80% of all plants in the stratum, plus the presence of a hydric soil or a hydrologic indicator.

A third way to determine the extent of a wetland requires the presence of *undrained* hydric soils, as classified by United States Department of Agriculture (USDA) soil taxonomy, or as shown in USDA-Soil Conservation Service hydric mapping. Or the

[See NEW WETLANDS LAWS on Page 15]

## APIRS Online Soon

As announced last November, the APIRS office is accessible by e-mail at:

VARAMEY@NERVM.NERDC.UFLEDU

About one-quarter of APIRS' business is now conducted through the Internet. In the near future the aquatic plant database will also be accessible via gopher, mosaic, telnet and modem.

Thanks to support from the Aquatic Plant Control Research Program (U.S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg, MS), new computers and systems are being installed to place the APIRS database and services online 24-hours-a-day. Even users on the other side of the world will be able to access APIRS services anytime via the Internet.

By the end of 1995, the APIRS "home page" will enable users to access the 40,000-item aquatic plant database; the copyright-free line drawings of aquatic plants; and a collection of several hundred color images of more than 200 freshwater plant species. Future pages will enable user access to facsimile files of informational brochures and out-of-print reports, as well as to video clips relating to freshwater plant ecology, biology, control and utilization, as well as scenes of Florida's natural landscapes.

Information about these changes will be included in the next issue of *AQUAPHYTE*.

## *Alternanthera to Zizaniopsis*

### Digitized Aquatic Plant Photographs Available

In the spirit of our copyright-free line drawings, the **APIRS** office is now making available computer graphics files of aquatic plant photographs for *not-for-profit educational use*.



As of now, 364 aquatic plant images of 192 species are in the **APIRS** digital collection.

Each image is readily available in three resolutions: 128 X 192 dpi; 256 X 384 dpi; and 512 X 768 dpi. Higher resolution files (to 2048 X 3072 dpi) are available by special arrangement. The images are suitable for display on computer monitors; for input into brochures, booklets and other not-for-profit publications; and for slide/photograph production. Users of this **APIRS** service are limited to five images at a specified resolution. As of now, there is no charge.

These digital image files are available in PCD, TIF, GIF, JPG or PCX image formats, and are distributed uncompressed on IBM compatible 3.5" disks. If necessary, arrangements can be made to transfer requested files via FTP on the Internet.

Of course, users need to have "photo/paint programs" or "graphics viewers" installed on their computers in order to display and use these computer files.

In exchange, users are expected to acknowledge the source of these free images in any productions in which they are used.

For more information, and a listing of the images available, contact the **APIRS** information office at the address on page 16, or email to [VARAMEV@NERVM.NERDC.UFL.EDU](mailto:VARAMEV@NERVM.NERDC.UFL.EDU)

If you are interested in *purchasing* a set of CDs containing aquatic plant computer image files, please see below.



## Aquatic Plant Photo CDs

### Advance Order Form

Would you like to have your own stock library of aquatic plant photographs that can be used for non-commercial or commercial use? High-res, royalty-free photos that can be viewed on your own computer's monitor, or that can be downloaded for use in desktop publishing or in computer-aided training applications?

If you have a PC- or MAC-compatible computer with a CD-ROM drive and a VGA (or better) monitor, you may be in luck!

The **APIRS** office has produced a four-CD set of 364 color images of 192 freshwater plant species. We are considering reproducing these CDs and selling them in sets. But before we can decide, we need to know how much interest for them there is out there.

Each compact disc includes approximately 100 photos in five resolutions. Resolutions for each photo include 128 X 192 dpi; 256 X 384 dpi; 512 X 768 dpi; 1024 X 1536 dpi and 2048 X 3072 dpi. All digitized photos are in the Kodak Photo-CD format (\*.PCD). The PCD format may be "read" by any number of common "paint" programs such as Photoshop, Photostyler, Corel, etc., and then, of course, can be saved as other formats such as PCX, TIF, BMP, JPG and PIC.

We expect to sell the 4-CD set for \$100 plus tax and S/H.

If you wish to be informed if/when this aquatic plant photo CD-set becomes available, please complete this form and send it to the **APIRS** office as soon as possible. Or e-mail us at [VARAMEV@NERVM.NERDC.UFL.EDU](mailto:VARAMEV@NERVM.NERDC.UFL.EDU)

### AQUATIC AND WETLAND PLANTS - 4-CD SET

#### Non-Binding Advance Order Form

I am interested in learning more about this product if/when it becomes available.

Name \_\_\_\_\_

Affiliation \_\_\_\_\_

Address \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

E-mail \_\_\_\_\_

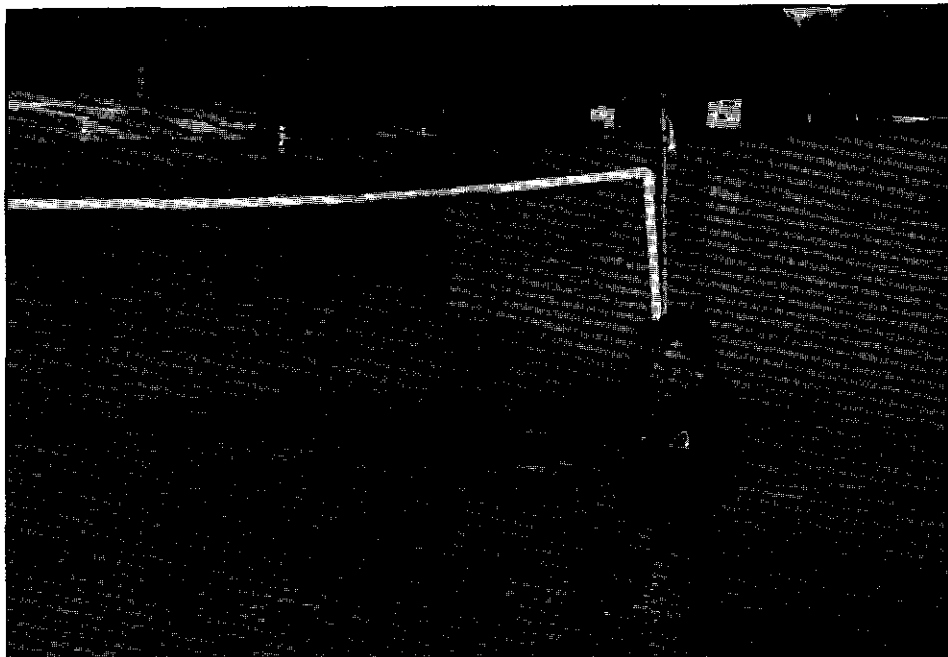
# A T T H E C E N T E R

## Torpedograss Targeted

**T**orpedograss (*Panicum repens*) now covers approximately 6,000 hectares of the 40,000 hectare littoral zone in Florida's largest lake. The exotic, perennial weed has displaced native sedge and rush communities and continues to invade new areas of Lake Okeechobee. Dr. Kenneth Langeland and assistant Mr. Brian Smith are targeting torpedograss in a three-year research project.

Extensive rhizomes comprise 70-90% of the total biomass of torpedograss. To effectively control the weed, herbicide must be absorbed and translocated to the rhizomes in sufficient concentrations. The registered herbicide glyphosate will be used in the study. The researchers intend to study the efficacy of seasonal herbicide treatments, the correlation between leaf exposure and herbicide toxicity, herbicide surfactants and 'rain-fasteners' (glyphosate requires a three day rain-free period for optimum results), and plant growth regulators to manipulate the growth and development of rhizomes for more effective herbicidal control.

Langeland and Smith hope to develop new management strategies which can be used to yield long-term control of the weed. The work will be funded by the South Florida Water Management District.



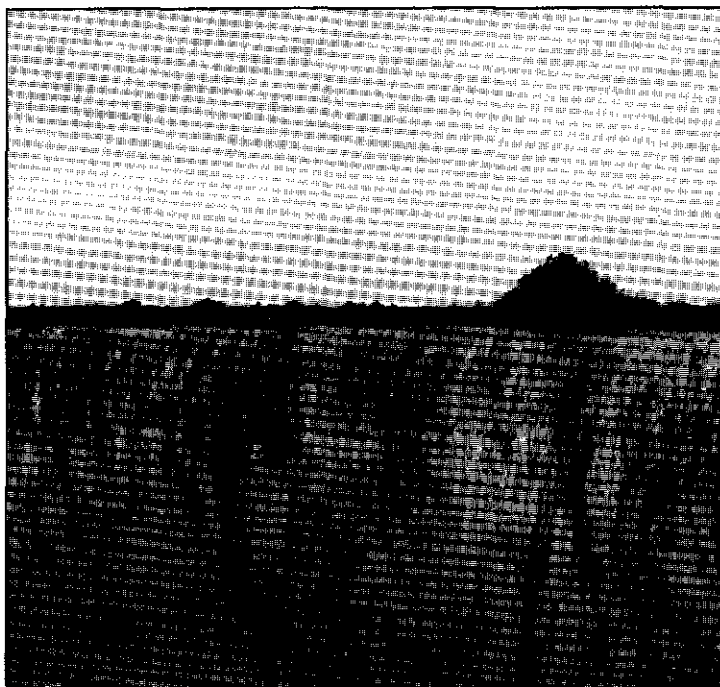
Vegetation drifting downstream was sampled using 2-meter wide nets.

## Rainbow River Study

**D**esignated as a National Natural Landmark, an Outstanding Florida Water and a State Aquatic Preserve, the Rainbow River is one of the largest spring-fed rivers in Florida. Dr. Charles Cichra (Fisheries and Aquatic Sciences), Mr. Jeff Sowards and graduate student, Mr. Mike Mumma, in cooperation with Dr. Steve Holland (UF Department of Recreation, Parks and Tourism), recently completed a study to determine the impacts of recreation on the water quality and the aquatic plant community in the river. Although the river is heavily used for motorboating, canoeing, fishing, swimming, tubing and SCUBA diving, they concluded that no significant damage is occurring.

The researchers studied changes in suspended solids, dissolved oxygen and water clarity in response to recreational activities. They also studied the effects of recreation on aquatic plants which are torn or uprooted. The river has an abundant population of both *Sagittaria kurziana* and *Vallisneria americana*. *Potamogeton illinoensis* is common only in the headsprings area. *Hydrilla verticillata* is present throughout much of the river and appears to be increasing. In addition to addressing the effects of users on the river, the study has established a baseline water quality and aquatic plant community database for the river.

The work was funded by the Florida Department of Environmental Protection, Division of Recreation and Parks.



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## MEETINGS

### **35TH ANNUAL MEETING - AQUATIC PLANT MANAGEMENT SOCIETY. July 9-12, 1995. Seattle, Washington.**

This year's meeting will be held at the Hyatt Regency Hotel in Bellevue, Washington. To submit a paper, contact Terry McNabb, APMS Program Chair, Resource Management, Inc., 2900-B 29 AVE SW, Turnwater, WA 98512, 360/754-3460. For pre-registration information, contact Wendy Andrew, APMS Secretary, POB 121086, Clermont, FL 34712-1086.

### **HABITAT FRAGMENTATION & INFRASTRUCTURE, International Conference. September 17-21, 1995. Maastricht, The Hague, THE NETHERLANDS.**

"Infrastructure" is one of the principal causes of the fragmentation of nature. The aim of this conference is to present an overview of how highways and other infrastructures fragment nature in different countries. The program is aimed at scientists, consultants and those involved in mitigating problems in nature caused by infrastructure.

The meeting is sponsored by the Dutch Ministry of Transport, Public Works and Water Management, in cooperation with the International Ecological Engineering Society (IEES) and the Ecological Society of the Netherlands and Belgium (NEVECOL).

For information, contact the Congress Office ASD, PO Box 40, 2600 AA Delft, THE NETHERLANDS. voice: 31/15/120234; fax: 31/15/120250

### **NORTH AMERICAN LAKE MANAGEMENT SOCIETY, 15TH INTERNATIONAL SYMPOSIUM. November 6-11, 1995. Toronto, Ontario, CANADA.**

The theme for this year's conference is "Aquatic Ecosystem Stewardship". Sessions will be organized into "technical" and "lake user friendly" themes. The deadline for the first call for papers is June 1, 1995. For information about presenting papers, contact N.Hutchinson, Ontario Ministry of Environment and Energy, Dorset Research Centre, POB 39, Bellwood Acres Road, Dorset, Ontario, CANADA POA 1E0. voice: 705/766-2418; fax: 705/766-2254.

### **SHALLOW LAKES '95, International Conference on Trophic Cascades in Shallow Freshwater and Brackish Lakes. August 21-26, 1995. Mikolajki, POLAND.**

This meeting continues the work of the international conference on shallow lakes held in Silkeborg, Denmark in 1992. It will cover all aspects of shallow lake research such as lake succession, nutrient dynamics, trophic relations, stable states, and bio-restoration practices.

The conference will be conducted in English and will be hosted by the Mikolajki Hydrobiological Station of the Institute of Ecology. It will be chaired by Lech Kufel, Andrzej Prejs and Jan Igor Rybak.

For more information, contact Lech Kufel, Institute of Ecology, PAS, Hydrobiological Station, Lesna 13 11-730 Mikolajki, POLAND.

### **THE ECOLOGY OF LARGE RIVERS, First International Symposium. April 18-22, 1995. Krems, AUSTRIA.**

The main sessions of this symposium are: community and population ecology in rivers, process studies, river hydraulics and sediment transport, production in larger rivers, large river research case studies, a poster session and two workshops to incorporate the comments of session chairmen.

The program is being organized by the Austrian Committee of the International Association on Danube Research, the Freshwater Biological Association and the Danube University Krems. It will be held on the grounds of Danube University.

For more information, contact Austrian Committee of the International Association on Danube Research, c/o G. Burget, Schiffmullenstrasse 120; A 1220 Wien, AUSTRIA: 234591/15.

### **19TH ANNUAL MEETING - FLORIDA AQUATIC PLANT MANAGEMENT SOCIETY. October 10-12, 1995. St. Petersburg, Florida.**

For information, contact Nancy Allen, 904/795-2239.

## Getting to Know the Natives

**RUPPIA vs POTAMOGETON**

by Kathy Craddock Burks, Botanist, Technical Services, Bureau of Aquatic Plant Management, Florida Department of Environmental Protection, 3917 Commonwealth Blvd., MS 710, Tallahassee, FL 32399, 904/487-2600.

In clear brackish waters along Florida's coasts, *Ruppia maritima* (wigeongrass) is a common submersed aquatic, forming "grassy" beds with its thin, much-branched stems and many threadlike leaves. It often occurs with--and is often confused with--the much-branched and slender-leaved pondweed, *Potamogeton pectinatus* (sago pondweed).

Both have a delicate, flexuous habit in the water column; both have very narrow alternate leaves with stipular sheaths (extra leaflike tissue attached to the leaf bases). Shoots in both species arise from slender rhizomes, and the flowers are somewhat similar in appearance, especially when young. In fact, most European and Australian taxonomists place *Ruppia* in the pondweed family, Potamogetonaceae, rather than in a family of its own, Ruppiaceae, as many researchers do here in the United States (a few place it in the eelgrass family of Zosteraceae).

Despite their casual resemblance, these two species can be distinguished in the field with a closer look at certain characters. For example, the rhizomes of *P. pectinatus*, which may become thickly matted, often terminate in small round tubers (bulblets) which eventually break away as vegetative propagules. Although *R. maritima* also colonizes by rhizome extensions (and by easily rooting stem fragments), it does not form tubers.

The stipular sheaths of the two species differ considerably as well. On *R. maritima*, the sheath ranges in length to 1.5 cm (5/8 in.) with the free portion, i.e., the tip end not attached to the leaf base, being very short. On *P. pectinatus*, the sheath ranges from 2 to 5 cm (3/4 to 2 in.) long, with the free portion 1 to 3 cm (3/8 to 1 1/4 in.) in length.

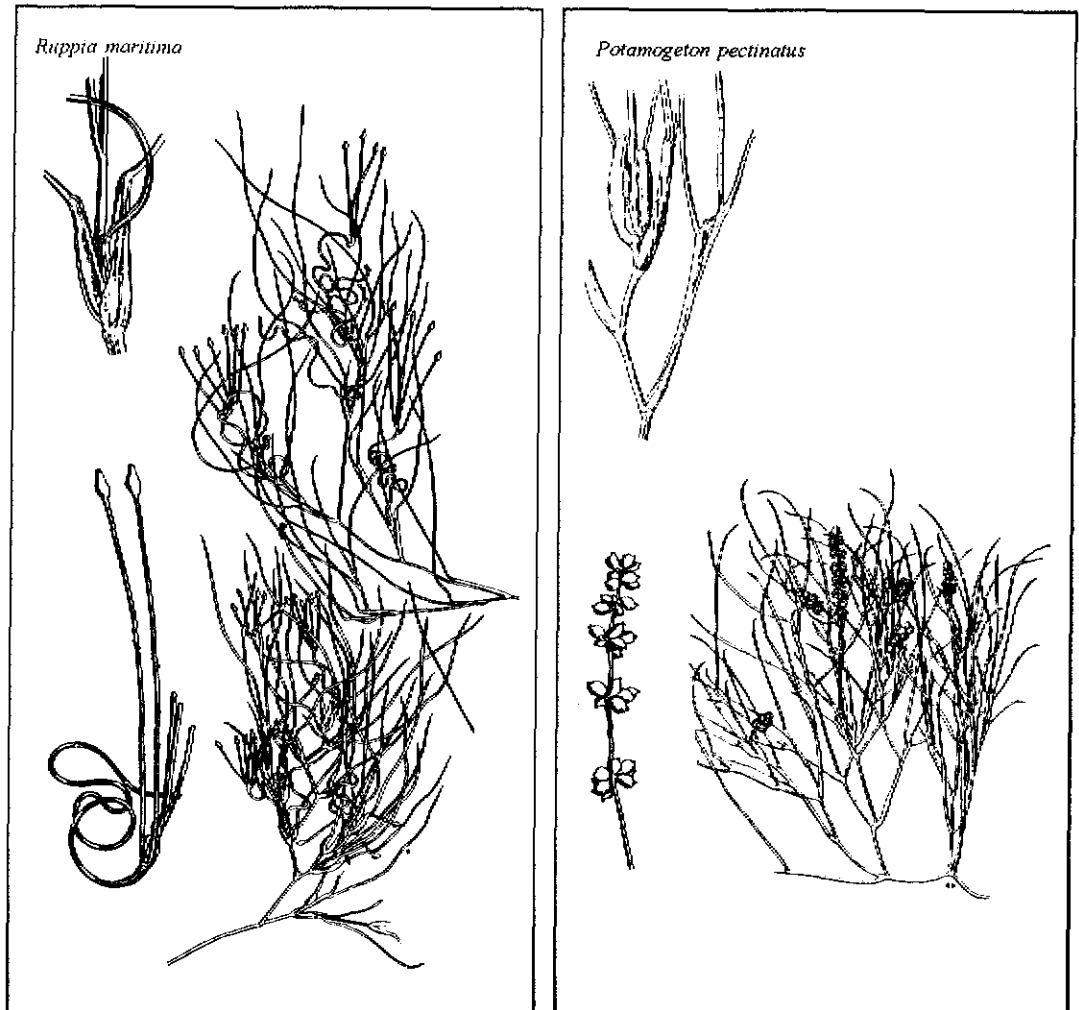
Perhaps the easiest feature to compare, when the plants are sexually reproducing, is the arrangement of the tiny fruits. The dark, oval drupelets of wigeongrass are individually stalked, while the crusty, broadly oval achenes on sago pondweed occur in sessile (unstaked) clusters on the inflorescence spike (peduncle). The main flower stalks for both species (peduncles) will elongate during the flowering and fruiting process, but that of

wigeongrass may reach about 10 dm (3 ft.) in length and become coiled to bring mature fruit back beneath the water's surface. An array of 7 or 8 stalked drupelets on the end of a long peduncle brings to mind another common name used for *R. maritima*--tassel grass, or tassel pondweed.

A few other slender-leaved submersed aquatics of brackish waters might be confused with these two species. Nearer fresh-water may be an occasional patch of the sago pondweed's cousin, *P. pusillus*, which has no rhizomes and whose stipular sheaths are free, or unattached. Also occasional is the horned pondweed, *Zannichellia palustris*, which has opposite rather than alternate leaves and flowers clustered in leaf axils rather than on stalks.

One important characteristic all of these species have in common, particularly wigeongrass and sago pondweed, is the wildfowl food and underwater habitat they provide.

For more information, contact the Bureau's Technical Services section at the address above.



Both illustrations above taken from *Aquatic and Wetland Plants of Southwestern United States*, Vol. 1, by D.S. Correll and H.B. Correll. 1975. Stanford University Press. Used with Permission.

## ElectroPhyte

By next year, the APIRS aquatic plant database will be online and available directly through modem, or through the Internet. Our current e-mail address is:

VARAMEY@NERVM.NERDC.UFL.EDU

Already there are electronic resources about plants available to those with computers, modems and knowledge of how to use them.

Below is a listing of some bulletin board systems (BBS), "list servers" and World Wide Web hypertext pages about plants, and related subjects:

### Aquatic Plant Bulletin Board System (APBBS)

This new BBS is managed by the U.S. Army Corps of Engineers, Center for Aquatic Plant Research and Technology (CAPRT), at the Waterways Experiment Station in Vicksburg, MS.

It provides users "an abundance of aquatic plant information", and can get you in touch with Corps aquatic plant managers and researchers. Using APBBS, it is also possible to conduct online discussions and meetings.

The APBBS number is 601-634-3018. Set your communications software to 28,800 baud or less, 8 bits, no parity, 1 stop bit. New users will be asked several questions to register. Usage is limited to 60 minutes per day per person.

If more information is needed, contact Carolyn Schneider, System Operator, at 601/634-3657, or Bob Gunkel, Assistant Director--CAPRT, at 601/634-3722.

### Florida State Legislature BBS, On-Line Sunshine

This new BBS enables legislators as well as ordinary citizens to access state documents, including current law and the constitution, pending bills and bill history, and information about individual legislators.

As of now, only eight slow (2400 B) phone lines are available to the public, and calls may be only 30 minutes long. But unless one knows *exactly* what one wants, where it is, and how to access it, 30 minutes is not long enough.

As a test of this BBS, I searched the 1993 statutes for "aquatic and plant and (management or control)", a standard Boolean search construction. I got 395 hits, including the statute chapter dealing with "dissolution of marriage". There was not enough time to load and look at even a small number of these laws to find out if any of them actually had anything to do with aquatic plants.

Searching the current bills part of the BBS, I found 22 hits for "aquatic and plant", including bill HB 1009, a bill to re-new the Aquatic Plant Control Trust Fund. I tried to download the bill before my 30 minutes were up, without success. Because of heavy use of this BBS, I was not able to log on again that day.

The On-Line Sunshine number is 904-488-1945. Set your communications software to 2400 or less, 8 bits, no parity, 1 stop bit. Anyone can log on for 30 minute calls, and if you can get through, you can call as many times as you like.

### LAKES-L, Network on Lakes

This "list service" is "an international computer discussion place for lakes, where professionals, people who live on lakes and/or are concerned, talk about them and their watersheds." All related topics are discussed online and distributed as e-mail to all who subscribe to this free list service.

A recent discussion among several subscribers about the use of grass carp in northern lakes proved an interesting and enlightening diversion for others on the service, and showed that there still is significant confusion and debate regarding the use of grass carp for aquatic plant control.

LAKES-L is available by free subscription. To subscribe, send an email message to MAJORDOMO@BADGER.STATE.WI.US in the body of the message write SUBSCRIBE LAKES-L

To distribute a message to subscribers of the service, send it to LAKES-L@BADGER.STATE.WI.US

### BEN, Botanical Electronic News

This new list service covers everything of a botanical nature.

BEN is managed by Dr. Adolf Ceska and is available by free subscription at ACESKA@FREENET.VICTORIA.BC.CA or ACESKA@RBML01.RBCM.GOV.BC.CA

### WI-Lakes BBS

The Wisconsin Department of Natural Resources, Water Resources Management Bureau, maintains this BBS. Many kinds of Wisconsin-related information may be downloaded from this resource, from aquatic plant management brochures to three different newsletters. DNR biologists may also be contacted here.

To access the BBS and receive a list of free publications, email to LAKEEBB@DNRMAILDNR.STATE.WI.US To access the BBS via modem, dial 608-267-7551 and set your software to 9600 baud or less, 8 data, no parity, 1 stop bit. It operates 24 hours a day, everyday.

### AquaNIC, Aquaculture Network Information Center

This is a "gateway to the world's electronic resources in aquaculture", maintained at the Purdue University and supported by the Cooperative Extension Service.

It is available via gopher, mosaic, telnet and modem. For modem, the phone number is 317-496-1440, 14,400 baud or less, 8 data, no parity, 1 stop bit; enter first and last name, then enter "connect thorplus.lib.purdue.edu", then login as "cwis". There is no password, so press return. The gopher address is: "gopher://thorplus.lib.purdue.edu:70//11/databases/AquaNIC"

For more information email Mark Einstein at MEINSTEI@HUB.ANSC.PURDUE.EDU or voice 317-494-4862.

**IPMnet**

This resource is formally known as the Global IPM Information Service, and, you guessed it, is about Integrated Pest Management information. It includes an online newsletter, IPMnet NEWS, edited by A.E. Deutsch.

To sign up, e-mail to [DEUTSCHA@BCC.ORST.EDU](mailto:DEUTSCHA@BCC.ORST.EDU)

**Plant Path On-Line**

For plant pathologists, e-mail to [APSNET@SCISOC.ORG](mailto:APSNET@SCISOC.ORG)

**FREE,  
Florida Resources in Environmental Education**

For information, call 800-542-FREE between 8:30 and 5:30 EST.

**Ecosystem Management  
and Environmental Education BBS**

This BBS is maintained by the Florida Department of Environmental Protection and is a free service to anyone "concerned about our environment". You will find educational text files, educational software, DEP Rules and Regs, online conferences and other online services.

To dial up the database, call 904-922-7108, and set your communications software to 8 data, no parity, 1 stop bit.

To contact the BBS, e-mail to [DEPINFO@DEP.STATE.FL.US](mailto:DEPINFO@DEP.STATE.FL.US)  
The system operator (SYSOP) is Jim Lewis at 904-488-9334 voice.

**Wetland Values Database**

This database contains nearly 15,000 bibliographic records of "literature pertinent to wetland values and functions", intended to help US Fish & Wildlife Service's efforts to delineate wetlands.

To search this database, contact the Wetlands Values Database Administrator of the USFWS/National Wetlands Inventory, 9720 Executive Center Drive, Suite 101, St. Petersburg, FL 33702-2440, 813-893-3624.

**Some Internet URLs**

Users of the Internet, who have "graphical browsers" (such as NetScape, Internet-in-a-Box, and Chameleon) are able to directly access the graphical "home pages", databases and other information services of thousands of government agencies, universities and corporations. Graphical home pages make it much easier for most computer users to "navigate" through the myriad resources of the Internet, as compared to text-only "gopher" access.

To call graphical interfaces, users must have their "addresses". These are termed "URLs", for Universal Resource Locators. Listed below are URLs for some information suppliers that may be of interest to *AQUAPHYTE* readers:

**US Army Corps, Waterways Experiment Station**  
<http://www.wes.army.mil>

**University of Florida, IFAS**  
<http://gnv.ifas.ufl.edu>

**Canadian IPM Information**  
<http://www.env.gov.bc.ca>

**US Environmental Protection Agency**  
<http://www.epa.gov>

**US Department of the Interior**  
<http://info.er.usgs.gov>

**Library of Congress**  
<http://www.loc.gov>

**National Science Foundation**  
<http://www.nsf.gov>

**US Fish & Wildlife Service**  
<http://www.fws.gov>

**US Wetlands inventory**  
<http://www.wi.fws.gov>

-V.R.

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**Botanical Pronunciations**

According to Allen J. Coombes, author of *The Dictionary of Plant Names*, whatever the origin of a scientific name, Latin or Greek, it should be pronounced as if it were Latin, *except* where the name derives from personal or place names, in which case the name should be pronounced according to the original word, with a Latin pronunciation for any endings.

Coombes says these are the preferred pronunciations for some aquatic plants:

a-lis-ma lan-kee-o-lah-tum - *Alisma lanceolatum*  
boo-to-mus um-bel-ah-tus - *Butomus umbellatus*  
ka-lee-tri-kee - *Callitriche*  
ke-ra-to-fil-lum day-mer-sum - *Ceratophyllum demersum*  
e-keen-o-klo-a - *Echinochloa*  
iek-horn-ee-a kras-i-pays - *Eichhornia crassipes*  
hid-ril-la ver-ti-ki-lah-ta - *Hydrilla verticillata*  
i-pom-oy-a - *Ipomoea*  
la-ga-ro-see-fon - *Lagarosiphon*  
nas-tur-tee-um - *Nasturtium*  
ne-lum-bo loo-tee-a - *Nelumbo lutea*

new-far - *Nuphar*  
pen-i-say-tum - *Pennisetum*  
po-li-go-num - *Polygonum*  
po-ta-mo-gay-ton - *Potamogeton*  
spar-teen-a - *Spartina*  
tee-fa - *Typha*

To purchase: *Dictionary of Plant Names* by A.J. Coombes. 1985. Timber Press, 133 SW 2 AVE, Suite 450, Portland, Oregon 97204; 503/227-2878; 1-800-327-5680. ISBN 0-88192-023-1. 207 pp. \$10.95 + S/H.

## FROM THE DATABASE

Here is a sampling of the research articles, books and reports which have been entered into the aquatic plant database since November, 1994.

The database has more than 40,000 items. To receive free bibliographies on specific plants and/or subjects, contact APIRS at the address shown on the mail label on page 16.

To obtain articles, contact your nearest state or university library.

**Abernethy, V.J.; Sabbatini, M.R.; Murphy, K.J.**

Response of *Elodea canadensis* and *Myriophyllum spicatum* to shade, cutting and competition in experimental culture: ecological implications.

9TH INTERNAT. SYMP. ON AQUATIC WEEDS, 12-16 SEPT. 1994, TRINITY COLLEGE, DUBLIN, IRELAND, EUROPEAN WEED RES. SOC., PP. 1., 1994.

**Akcin, G.; Guldede, N.; Saltabas, O.**

Zinc removal in strongly basic solutions by water hyacinth.

J. ENVIRON. SCI. HEALTH A28(8):1727-1735, 1993.

**Andersen, F.O.; Olsen, K.R.**

Nutrient cycling in shallow, oligotrophic Lake Kvie, Denmark.

HYDROBIOLOGIA 275/276:267-276, 1994.

**Angerstein, M.B.; Lemke, D.E.**

First records of the aquatic weed *Hydrophila polysperma* (Acanthaceae) from Texas.

SIDA 16(2):365-371, 1994.

**Aoyama, I.; Nishizaki, H.**

Uptake of nitrogen and phosphate and water purification by water hyacinth *Eichhornia crassipes* (Mart.) Solms.

WAT. SCI. TECH. 28(7):47-53, 1993.

**Aweke, G.**

The water hyacinth (*Eichhornia crassipes*) in Ethiopia.

BULL. SEANC. ACAD. R. SCI. OUTRE-MER MEDED. ZITT. K. ACAD. OVERZEESE WET. 39(3):399-404, 1994.

**Bartgis, R.L.**

The endangered sedge *Scirpus ancistrochaetus* and the flora of sinkhole ponds in Maryland and West Virginia.

CASTANEA 57(1):46-51, 1992.

**Batzer, D.P.; Resh, V.H.**

Wetland management strategies that enhance waterfowl habitats can also control mosquitoes.

J. AM. MOSQUITO CONTROL ASSOC. 8(2):117-125, 1992.

**Bendix, M.; Tornbjerg, T.; Brix, H.**

Internal gas transport in *Typha latifolia* L. and *Typha angustifolia* L. I. Humidity-induced pressurization and convective throughflow.

AQUATIC BOTANY 49(2-3):75-89, 1994.

**Best, E.P.H.**

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