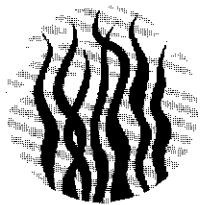


# A Q U A P H Y T E



UNIVERSITY OF FLORIDA  
CENTER FOR AQUATIC PLANTS  
INSTITUTE OF FOOD AND AGRICULTURAL SCIENCES



With Support From  
The Florida Department of Natural Resources  
The U.S. Army Corps of Engineers, Waterways Experiment Station,  
Aquatic Plant Control Research Program

Volume 11 Number 1 Spring 1991

GAINESVILLE, FLORIDA

ISSN 0893-7702

## Second Training Video Available for Herbicide Applicators

### How To Determine Areas and Amount of Aquatic Herbicide to Use

Understanding and using mathematical equations is an everyday requirement for aquatic herbicide applicators. Applicators must also know these equations in order to pass Florida's certified pesticide applicators certification examination, aquatics category. This 35-minute video tutorial was designed to help Florida's aquatic herbicide applicators better understand and use mathematical equations in their work.

Dr. Ken Langeland, IFAS Extension Specialist in Aquatic Plants, is the instructor for the program, which closely follows and complements Chapter 9 of his newly published *Training and Reference Manual for Aquatic Herbicide Applicators* (see page 3).

Langeland uses field examples to teach:

- the mathematics for determining area,
- laying out plots, and
- calculating PPM concentrations and tank mixes.

VHS, S-VHS or PAL copies of this program may be purchased for \$10.60 (\$10.00 for non-Florida residents) payable to the University of Florida. Order from: IFAS Publications Office, IFAS Building 664, University of Florida, Gainesville, Florida 32611-0001, (904) 392-1764.

## Aquatic Plants Extinct in Israel To Live Again

The Tel Aviv University Botanic Gardens, under the directorship of Dr. Moshe Agami, have established a conservation program aimed at saving Israel's endangered flora, especially the water plant species. They are employing the method of *ex situ* conservation (maintenance of plant species outside their natural habitat, in the Gardens' gene banks, which store the genetic stocks of different flora strains in a man-made controlled habitat).

The white water lily (*Nymphaea alba*) and the blue water lily (*Nymphaea caerulea*) are examples of two water plants which are being conserved at the Botanic Gardens. Both these populations of water lilies were unique because each marked in Israel, respectively, the southernmost and

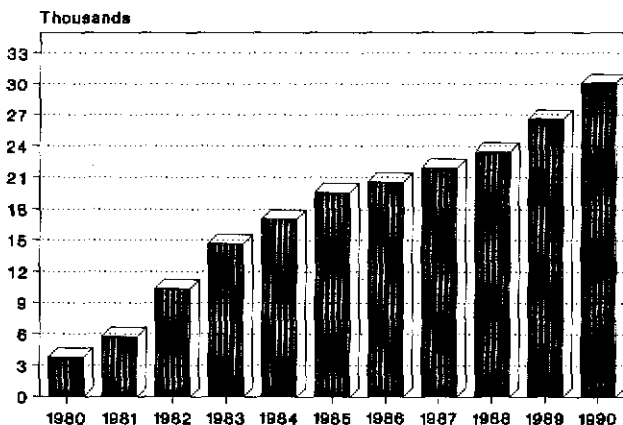
[See EXTINCT on page 9]

## APIRS Database Grows To 30,000 Items

During the past ten years, the aquatic plant database has grown ten times - from 3,000 items in 1981 to 30,000 in 1991. That's thirty thousand research articles, books, and reports about freshwater macrophytes.

The database is used by hundreds of researchers, regulators, managers and students. If you too are interested in searching the database by species, keyword, subject, author or whatever, contact us:

Aquatic Plant Information Retrieval System (APIRS)  
Center for Aquatic Plants  
University of Florida, IFAS  
7922 N.W. 71st Street  
Gainesville, Florida 32606, (904) 392-1799



## More Aquatic Plant Videotape Programs Available

### Identification Program - Floating and Floating Leaved Plants

This aquatic plant identification videotape features 13 of the most common floating and floating leaved plants in Florida. It is the first of four programs which will enable non-botanists to identify 80 of the most common aquatic plants in Florida.

Aquatic plants are described in everyday language and shown in field and closeup situations. Important identifying characteristics are shown and described. For those who want to know more, an accompanying index card lists other sources of aquatic plant identification information.

Users of these programs include high school and college students, waterfront homeowners, fishermen and other recreational water users, and, of course, managers of Florida's lakes and rivers.

The second identification program will be **Emerged Plants**, featuring 25 emerged aquatic plants common in Florida. It should be available in June.

VHS, S-VHS or PAL copies of this program may be purchased for \$10.60 (\$10.00 for non-Florida residents) payable to the University of Florida. Order from: IFAS Publications Office, IFAS Building 664, University of Florida, Gainesville, Florida 32611-0001, (904) 392-1764.

### AQUATIC HERBICIDE CALIBRATION INFORMATION

$$\text{GPA (Gals/Acre)} = \frac{\text{GPM (Gals/Min)}}{\text{Acres/Min}}$$

$$\text{PPA (Pounds/Acre)} = \frac{\text{Pounds/Min}}{\text{Acres/Min}}$$

$$\text{Acres/Min} = \frac{2 (\text{Swath (Ft)} \times \text{Speed (MPH)})}{1000}$$

$$\text{Speed (MPH)} = \frac{\text{FPM}}{88}$$

$$\text{Acres/Tank} = \frac{\text{Tank Vol (Gals)}}{\text{GPA}}$$

$$\text{Acre} = 43,560 \text{ sq. ft.}$$

$$\text{Acres Feet in Plot} = \text{No. Acres} \times \text{Avg. Depth (ft.)}$$

$$\text{Acre Foot} = 1 \text{ acre of water 1 foot deep} = 43,560 \text{ ft}^3 = 2.7 \text{ million lbs. of water}$$

$$1 \text{ PPM (Parts per Million)} = 2.7 \text{ lbs. Active Ingredient per Acre Foot}$$

### Calibration Cards Are Free

Credit card-sized laminated reference cards are now available to aquatic herbicide applicators. The cards include the most commonly used equations for field applications, as well as several important telephone numbers. These cards are free and may be ordered from the Center for Aquatic Plants, (904) 392-9613.

## APM Spotlight



### MR. TERRY WARSON



- **Job Title:** Lead Aquatic Plant Technician, Citrus County Aquatic Services, Lecanto, Florida. Recipient, FAPMS 1990 Applicator of the Year Award.
- **Duties:** Supervise aquatic plant harvesting operations, conduct plant surveys and identify plants, and answer questions from public.
- **Biggest Challenge:** "I want to help build the fisheries in Citrus County back up to what it once was."
- **Personal Goal:** As a "lover of all wildlife" and an avid hunter/fisherman, Warson would like to become an outdoor sports writer.
- **Community Activities:** Board member, Citrus County Lake Improvement and Sports Association. Among other things, the organization raises fingerling bass for release in public waters.
- **Unwinds With:** Wife, Maggie. This outdoors couple "do everything together", including surface arrowhead hunting, a favorite pastime.

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

## Put An Aquatics Manual On Your Desk!

The all-new *TRAINING AND REFERENCE MANUAL FOR AQUATIC HERBICIDE APPLICATORS* has been published and is available for sale. This is *the manual* for those who manage aquatic plants and for those who wish to study for Florida's certified pesticide applicators certification examination, aquatics category. The manual was edited and prepared by Dr. Kenneth Langeland, UF/IFAS Extension Specialist in Aquatic Plants.

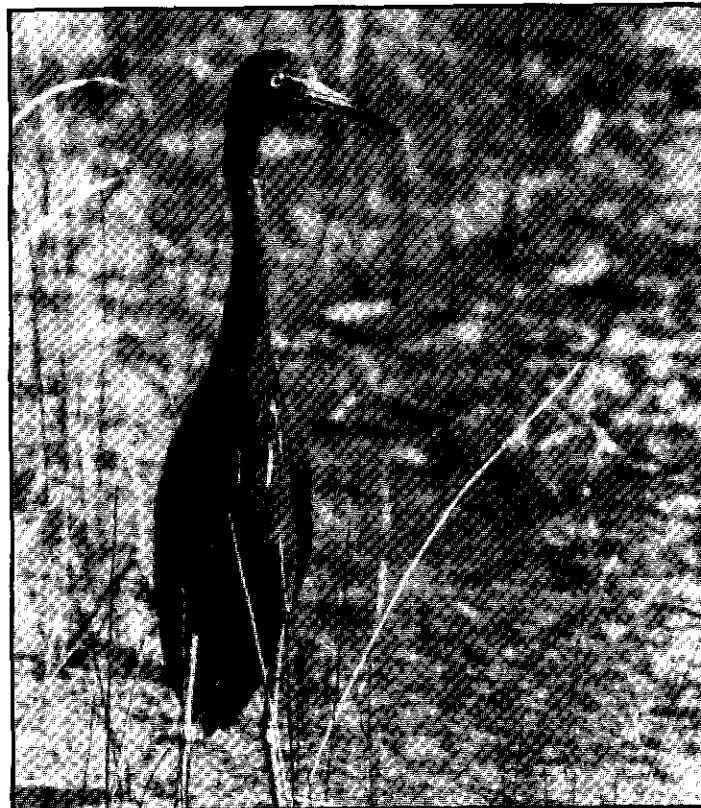
Chapters include:

- History of Aquatic Plant Management
- Aquatic Plant Management Decision Making
- Laws Pertaining to Aquatic Plant Management
- Herbicide Technology
- Herbicide Safety
- Adjuvants in Aquatic Plant Management
- Equipment Selection and Methods of Application
- Applying the Right Amount of Herbicide
- Other Methods of Aquatic Plant Management
- Environmental and Public Health Relationships
- Aquatic Plant Identification

Manuals (Publication # SM-3) are available for sale from IFAS Publications Office, IFAS Building 664, University of Florida, Gainesville, Florida 32611-0001, (904) 392-1764. The cost is \$7.00, including postage. Make checks payable to "University of Florida".

Chapter 9 of this manual, **Applying the Right Amount of Herbicide**, has been put to videotape. Applicators and their supervisors should consider obtaining this videotape program, which was designed to help applicators better understand and use mathematical equations in their work. See page 1 for details.

## Research Review and Short Course



The little blue heron (above) helped illustrate Mr. Mark Hoyer's talk (UF/IFAS Department of Fisheries and Aquaculture) on the relationship between aquatic macrophytes and aquatic avian fauna at the Florida Aquatic Plant Research Review Meeting and the Advanced Short Course. The meetings, held March 12-13 at the TREEO Center in Gainesville, were filled to capacity by almost 150 attendees. The events were sponsored by the UF/IFAS Center for Aquatic Plants.

The advanced short course covered the use of adjuvants and included talks on sinking agents, drift control, and other adjuvant products currently being used in aquatic plant management programs. Those who attended both days of the meeting were able to earn up to 12.5 CEU credits in right-of-way, aquatic or research and demonstration categories of certification.

## RETIRING? MOVING?

## PLEASE DON'T THROW IT AWAY!

The Aquatic Plant Information Retrieval System (APIRS) will be happy to accept your reprints, books and reports. **ANYTHING ABOUT ANYTHING** about aquatic plants will be cataloged and entered into the Aquatic Plant Database and made available to your fellow researchers. Contact APIRS at the address on page 16.

**CENTER FOR AQUATIC PLANTS  
INSTITUTE OF FOOD AND AGRICULTURAL SCIENCES  
UNIVERSITY OF FLORIDA  
7922 N.W. 71ST STREET  
GAINESVILLE, FLORIDA 32606  
(904) 392-9613**

**Dr. Joseph Joyce, Director**

## Florida Natural Areas Inventory - Rare and Endangered Aquatic Plants

The Florida Natural Areas Inventory (FNAI) recently completed a statewide "matrix" of specially protected rare and endangered plants and vertebrates in Florida. It is published in *Matrix of Habitats and Distribution by County of Rare/Endangered Species in Florida*, 1990, J.W. Muller, Coordinator, FNAI, Tallahassee (904/224-8207).

The matrix includes the following aquatic plant species that are federally- and/or state-listed. Also shown here are the Florida counties in which the plants occur:

***Balduina atropurpurea* (Purple balduina)**

- Nassau

***Bumelia thornii* (Buckthorn)**

- Calhoun, Gadsden, Jackson, Jefferson, Liberty, Marion, Putnam, Wakulla

***Campanula robinsiae* (Brooksville bellflower)**

- Hernando

***Coelorachis tuberculosa* (Piedmont jointgrass)**

- Baker, Brevard, Calhoun, Franklin, Hernando, Highlands, Lake, Marion, Martin, Orange, Putnam, Seminole, Volusia, Washington

***Crataegus phaenopyrum* (Washington thorn)**

- Wakulla, Washington

***Cryptotaenia canadensis* (Canada hornwort)**

- Gadsden, Jackson, Liberty

***Drosera intermedia* (Spoon-leaved sundew)**

- Bay, Calhoun, Escambia, Franklin, Gulf, Highlands, Leon, Levy, Marion, Okaloosa, Putnam, Santa Rosa, Walton

***Halophila johnsonii* (Johnson's seagrass)**

- Brevard, Dade, Indian River, Martin, Palm Beach, St. Lucie

***Harperocallis flava* (Harper's beauty)**

- Franklin, Liberty

***Hymenocallis coronaria* (Stream-bank spiderlily)**

- Putnam, Walton

***Hymenocallis henryae* (Panhandle spiderlily)**

- Gulf, Liberty, Walton

***Hypericum edisonianum* (Edison's ascyrum)**

- Desoto, Glades, Highlands

***Hypericum lissophloeus* (Smooth-barked St. John's-wort)**

- Bay, Washington

***Juncus gymnocarpus* (Coville's rush)**

- Okaloosa, Walton

***Lilaeopsis carolinensis* (Carolina lilaeopsis)**

- Bay, Escambia, Okaloosa, Walton

***Lilium iridollae* (Panhandle lily)**

- Escambia, Leon, Okaloosa, Santa Rosa, Walton

***Linum westii* (West's flax)**

- Baker, Calhoun, Franklin, Gulf, Jackson, Liberty

***Lythrum curtissii* (Curtiss' loosestrife)**

- Bay, Calhoun, Franklin, Gadsden, Levy, Liberty

***Lythrum flagellare* (Lowland loosestrife)**

- Charlotte, Collier, Dade, Desoto, Glades, Hendry, Lee, Manatee, Okeechobee, Osceola, Sarasota

***Macranthera flammea* (Hummingbird flower)**

- Bay, Calhoun, Escambia, Franklin, Jackson, Leon, Liberty, Okaloosa, Santa Rosa, Walton

***Medeola virginiana* (Indian cucumber-root)**

- Gadsden, Leon, Santa Rosa

***Myriophyllum laxum* (Piedmont water-milfoil)**

- Escambia, Franklin, Gulf, Jackson, Jefferson, Leon, Liberty, Osceola, Pasco, Putnam, Santa Rosa, Taylor, Volusia, Wakulla, Walton

***Nuphar luteum* ssp *ulvaceum* (West Florida cowlily)**

- Calhoun, Jackson, Okaloosa, Santa Rosa

***Nymphaea jamesoniana* (Sleeping-beauty water-lily)**

- Charlotte, Citra, Desoto, Hillsborough, Lee, Levy, Sarasota

***Oxypolis filiformis* ssp *Greenmanii* (Giant water-dropwort)**

- Bay, Calhoun, Gulf

***Panicum abscissum* (Cutthroat grass)**

- Broward, Hendry, Highlands, Osceola, Polk

***Panicum nudicaule* (Naked-stemmed panic grass)**

- Escambia, Santa Rosa

***Peltandra sagittifolia* (Spoon-flower)**

- Baker, Calhoun, Clay, Columbia, Duval, Escambia, Gilchrist, Hardy, Highlands, Hillsborough, Jefferson, Lake, Levy, Marion, Nassau, Okaloosa, Orange, Pine, Polk, Putnam, Santa Rosa, Taylor, Union, Volusia, Walton

***Physocarpus opulifolius* (Eastern ninebark)**

- Calhoun, Jackson

***Physostegia godfreyi* (Apalachicola dragon-head)**

- Bay, Calhoun, Franklin, Gulf, Liberty, Walton

***Physostegia leptophylla* (Slender-leaved dragon-head)**

- Citrus, Clay, Desoto, Dixie, Duval, Flagler, Franklin, Hillsborough, Jackson, Levy, Osceola, Polk, Putnam, Volusia, Wakulla

***Pinguicula ionantha* (Violet-flowered butterwort)**

- Bay, Franklin, Gulf, Liberty, Walton

***Pinguicula planifolia* (Chapman's butterwort)**

- Bay, Calhoun, Escambia, Franklin, Gulf, Jackson, Leon, Liberty, Santa Rosa, Walton, Washington

***Polygonum meisnerianum* (Mexican tear-thumb)**

- Alachua, Jefferson, Leon

***Potamogeton floridanus* (Florida pondweed)**

- Escambia, Santa Rosa

***Rhexia parviflora* (A meadowbeauty)**

- Bay, Calhoun, Franklin, Gulf, Liberty, Okaloosa

***Rhexia salicifolia* (Panhandle meadowbeauty)**

- Bay, Calhoun, Leon, Wakulla, Walton, Washington

***Rhynchospora crinipes* (Hairy-peduncled beak-rush)**

- Santa Rosa

***Rhynchospora punctata* (Pineland beak-rush)**

- St. Johns

***Rudbeckia nitida* (St. John's-susan)**

- Bay, Clay, Manatee, St. Johns

***Salix floridana* (Florida willow)**

- Alachua, Columbia, Jackson, Jefferson, Lafayette, Lake, Levy, Marion, Orange, Putnam, Seminole, Suwanee

***Salpingostylis coelestina* (Bartram's ixia)**

- Baker, Bradford, Clay, Duval, Putnam, St. Johns, Union

***Sarracenia rubra* (Sweet pitcher-plant)**

- Escambia, Okaloosa, Santa Rosa, Walton

***Sium floridanum* (Florida water-parsnip)**

- Dixie, Jackson, Levy

***Vicia ocalensis* (Ocala vetch)**

- Lake, Marion

***Xanthorhiza simplicissima* (Yellow-root)**

- Gadsden, Walton

***Xyris drummondii* (Drummond's yellow-eyed grass)**

- Bay, Escambia, Gulf, Liberty, Santa Rosa

***Xyris isoetifolia* (Quillwort yellow-eyed grass)**

- Bay, Gulf, Washington

***Xyris longisepala* (Karst pond xyris)**

- Bay, Leon, Walton

***Xyris scabrifolia* (Harper's yellow-eyed grass)**

- Bay, Calhoun, Escambia, Franklin, Gulf, Liberty, Washington

## DISTINGUISHED AUTHOR VISITS

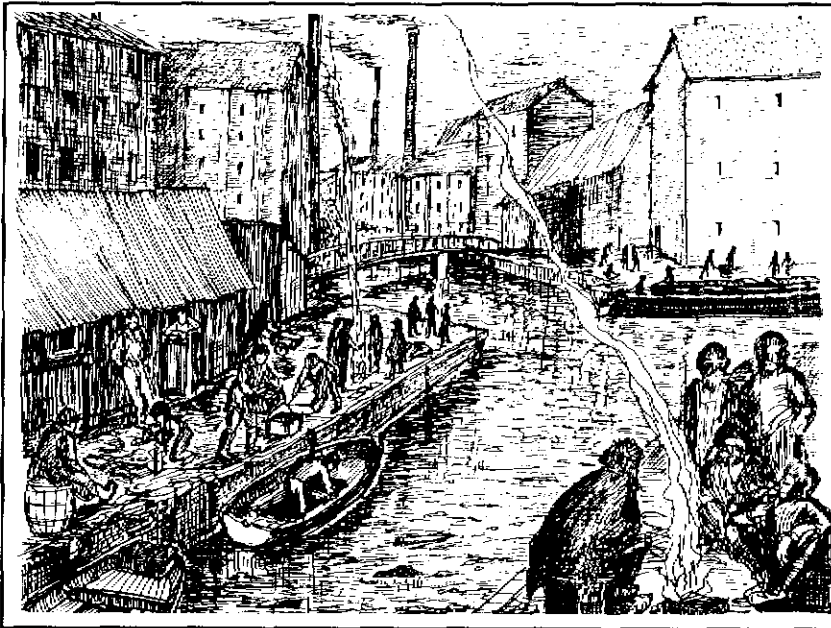


Illustration by Mrs. Y. Bower

**DR. SYLVIA HASLAM**, author of numerous books and articles on river vegetation, has been visiting Florida since November, courtesy of the University of Florida Botany Department, chaired by Dr. D.A. Jones.

Dr. Haslam has been working intensively in the **APIRS** library, reviewing the current literature on river ecology, *Phragmites*, a species on which she has written extensively, and recent U.S. wetlands research, particularly delineation, construction for water purification, and mitigation; she is impressed with American wetlands studies which are "very different to, as well as much more extensive than, European work."

In addition to her research, the author has been working on a new book, **HOW MUCH IS WRONG WITH YOUR RIVER?**, geared to naturalists and non-professional observers of aquatic systems. She has also written the first draft of another book, **RIVERS, REEDS AND HISTORY**.

In addition, Dr. Haslam has been visiting local rivers, meeting aquatic and wetland botanists, and attending seminars here at the university.

Dr. Haslam took all of her degrees from the University of Cambridge, including the career achievement degree of Doctor of Science, awarded in 1988. She has held university teaching posts in Malta as well as in Britain, and research posts at Cambridge. She returns to the Botany School at Cambridge in mid-April.

Dr. Haslam's most recently completed work is **RIVER POLLUTION: AN ECOLOGICAL PERSPECTIVE** (Belhaven Press, London and New York, 1990). This book contains a very interesting historical review of river pollution, including both ancient and modern illustrations of and poems about rivers. It discusses domestic and industrial pollution and its effects on plants, animals and ecosystems as a whole. Although the philosophy expressed in the book is universal, specific examples and data are taken from Europe. The book is intended "both for river specialists, and for undergraduates and those with a general interest in pollution."

In press is Dr. Haslam's **THE HISTORIC RIVER** (Cobden of Cambridge Press, Cambridge). Other books by the author include **BRITISH WATER PLANTS**, 1975; **RIVER PLANTS**, 1978; **RIVER VEGETATION: ITS IDENTIFICATION, ASSESSMENT AND MANAGEMENT**, 1981; **VEGETATION IN BRITISH RIVERS**, 1982; and **RIVER PLANTS OF WESTERN EUROPE**, 1987.

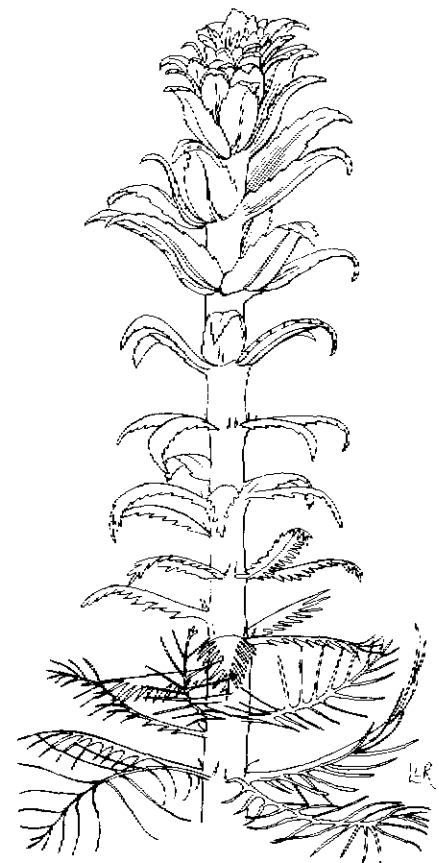
# Aquatics

**AQUATICS** Magazine is an informative, four-color quarterly magazine, the official publication of the Florida Aquatic Plant Management Society (FAPMS). It features articles on aquatic plants and their control, particularly in Florida.

Special features deal with techniques of controls, new developments from industry, articles from regulatory agencies, discussions of legislative and administrative actions which affect aquatic plant management and progress reports from the research community.

**AQUATICS** is edited by Mike Bodel of the South Florida Water Management District.

**AQUATICS** is included with membership in the FAPMS. To join the society, send \$10.00 per year to Victor Ramey, Treasurer, FAPMS, Rt. 1, Box 217-A, Micanopy, Florida 32667.



*Myriophyllum heterophyllum*  
Variable-leaf milfoil

## BOOKS/REPORTS

**WATER PLANTS FOR MISSOURI PONDS** by J.R. Whitley, B. Bassett, J.G. Dillard and R.A. Haefner, Missouri Department of Conservation, 1990. 151 pages.

(Order from Missouri Department of Conservation, Box 180, Jefferson City, Missouri 65102. \$9.00 includes postage, plus \$.56 for Missouri residents.)

Large color photographs, excellent drawings, readable and interesting text, handsome un-cluttered design and very good quality production make this one of the best books of its type. (And it's certainly a bargain.) Sixty-eight aquatic plants are treated and include historical uses, ecological and commercial values, cultivation methods and suitability for ponds.

Though written with a Missouri emphasis, this book will be appreciated by water users in other states: naturalists and other outdoorsmen, water gardeners and anyone else interested in the natural history of freshwaters.

**HYDRILLA - A CONTINUING PROBLEM IN FLORIDA WATERS**, by K.A. Langeland, University of Florida IFAS Center for Aquatic Plants, 1990. 22 pages.

(Order free copies from Florida water management districts or from the Center for Aquatic Plants, 7922 N.W. 71st Street, Gainesville, Florida 32606.)

This is an update of the booklet, *HYDRILLA*, by W.T. Haller (1976). It includes chapters on the distribution, description, identification, biology, importance and management of Florida's number-one noxious aquatic weed, *Hydrilla verticillata*.

**FISHING NAUTRAL LAKES**, by D. Sternberg, The Hunting and Fishing Library, 1991. 160 pages.

(Order from The Hunting and Fishing Library, 5900 Green Oak Drive, Minnetonka, Minnesota 55343, (1-800-328-3895). \$19.95.)

Extraordinary photography enhances this authoritative book on fishing in natural warmwater and "two-story" lakes (those with both warmwater and coldwater fish). The first section explains the complex set of physical and chemical factors of

different natural lakes, and the trophic and depth changes that lakes can undergo.

The second, much larger, section concentrates on fishing techniques for specific gamefish, using seven lakes as "specific case studies to represent the fishing situations anglers are most likely to encounter." (Hydrilla-choked Lake Istokpoga is the case study for Florida bass lakes.) Each case study includes lake physical data, different habitat photos, high-altitude photos, maps, and more. Baits, lures, techniques and equipment are described and pictured for each specific lake type: far north, "two-story", midwestern walleye, bass panfish, Florida bass, and oxbow lakes.

**WETLAND ECOLOGY AND MANAGEMENT: CASE STUDIES**, edited by D.F. Whigham, R.E. Good and J. Kvet, Kluwer Academic Publishers, 1990. 180 pages.

(Order from Kluwer Academic Publishers Group, P.O. Box 989, 3300 AZ Dordrecht, THE NETHERLANDS. US\$ 95.00.)

This is a collection of 19 papers, most of which were presented at the 2nd International Wetlands Conference in Trebon Czechoslovakia, June 1984. The objectives of the book are to demonstrate that wetlands provide a variety of uses for man, and that a range of approaches will be required to protect their valuable functions.

The first section contains papers ranging from a conceptual approach to wetlands protection strategies in New Jersey, through a series of ecological observations from wetland reclamation projects in the USSR, to experimental data relating to the effects of fire and nutrients on marshes.

The other sections included papers from Europe, Africa, Asia and Australia covering coastal, lacustrine and riverine wetlands and peatlands. A wide variety of experimental methods and analyses have been included in this diverse assemblage of study sites and projects.

Although the scope of this book is perhaps a little too diverse for those seeking information on a specific type of wetland and management, it would be ideal for those requiring a broader

appraisal of the variety of wetland research in progress throughout the world. As such it would provide a particularly good introduction to wetland studies for those entering the field.

A. Fox

**PROCEEDINGS OF THE 1ST ANNUAL CONFERENCE OF THE SOCIETY FOR ECOLOGICAL RESTORATION**, edited by H.G. Hughes and T.M. Bonnicksen, Society for Ecological Restoration, 1990. 593 pages.

(Order from Society for Ecological Restoration, The University of Wisconsin Arboretum, 1207 Seminole Highway, Madison, Wisconsin 53711, (608) 262-9547.)

This is the proceedings of the January 16-20, 1989 meeting in Oakland, California. Sixty-two papers are divided into 14 major sections ranging from the very general to the very specific. Many of the papers have to do with restoration of wetlands, streams and lakes.

**IRRIGATION PLANNING AND PREVENTION OF BILHARZIA; 1990 COSTS, Handbook One**, by W.R. Jobin, Blue Nile Associates, 1990.

(Order from Blue Nile Associates, P.O. Box 542, Foxboro, Massachusetts 02035-0004, (508) 543-6634. \$48.00.)

This very interesting "handbook" works to resolve a deadly dichotomy: on one hand, construction of water control systems is essential to the development of national food supplies in developing countries; on the other hand, constructing these systems also greatly facilitates the spread of parasitic diseases that kill and debilitate millions of people and livestock.

Bilharzia, malaria, liver fluke and other tropical diseases are carried by certain species of snails and mosquitoes. These vectors are spreading via poorly designed or inadequately maintained water control systems.

This book "details practical engineering methods to prevent the snails from colonizing irrigation canals and reservoirs." In addition to presenting design criteria, the author also demonstrates that aquatic weed

control is an essential weapon in the fight against these diseases.

**HABITAT MANAGEMENT FOR MIGRATING AND WINTERING WATERFOWL IN NORTH AMERICA**, edited by L.M. Smith, R.L. Pederson and R.M. Kaminski, Texas Tech University Press, 1989. 560 pages.

(Order from Texas Tech University Press, Marketing, Lubbock, Texas 79409-1037, (800) 832-4042. \$25.00 (cloth).)

This bargain-of-a-book includes state-of-the-art information on habitat management for nonbreeding waterfowl in North America. It is an excellent general reference for wetland and water managers whose aquatic plant-, mosquito- and water-control activities could affect migrating and overwintering water birds.

Twenty chapters "address waterfowl ecology and management for key habitats in the Atlantic, Mississippi, Central and Pacific flyways." Wetland types and aquatic plant species are discussed in detail in relation to waterfowl needs in these four main flyways.

**ECOSYSTEMS OF FLORIDA**, edited by R.L. Myers and J.J. Ewel, with forward by M.H. Carr, University of Central Florida Press, 1990. 765 pages.

(Order from University Presses of Florida, 15 N.W. 15th Street, Gainesville, FL 32611, (904) 392-1351. \$75.00 hard, \$29.95 soft.)

This Florida reference book begins with introductory sections about ecosystem classification, climate, soils and biogeography of Florida. The second section includes chapters on pine flatwoods and dry prairies, scrub and high pine systems, temperate hardwood forests and South Florida's rocklands. Part III is about freshwater wetlands and aquatic ecosystems, with chapters on swamps, marshes, lakes, rivers and springs. The last section is about Florida's coastal ecosystems, dunes and maritime forests, salt marshes, mangroves, inshore marine habitats and coral reefs.

The concluding chapter of this book is a call to Floridians to continue and expand their efforts to prevent

further destruction of Florida's ecosystems. The editors discuss four major threats to conservation and ecosystem management: land conversion, fire exclusion, exotic species and water use demands.

**APPLICATION OF WETLAND VALUATION THEORY TO COMMERCIAL AND RECREATIONAL FISHERIES IN FLORIDA**, by F. W. Bell, Report No. 95, Florida Sea Grant College, 1989. 118 pages.

(Contact F.W. Bell at the Department of Economics, Florida State University, Tallahassee, FL 32306.)

This highly technical economics report derives economic values for estuarine wetlands in relation to commercial and recreational marine fisheries in Florida. The author uses the "marginal productivity theory" in this analysis.

The author estimates the average value of an acre of Florida salt marsh to be \$2,276 (Florida west coast) and \$9,811 (Florida east coast), in 1984 dollars.

**EFFECT OF HERBICIDE APPLICATIONS ON THE MICRODISTRIBUTION AND POPULATION CHARACTERISTICS OF LARGEMOUTH BASS IN GUNTERVILLE RESERVOIR, ALABAMA**, by M.B. Bain and S.E. Boltz, Auburn University, Tennessee Valley Authority, 1990. 41 pages.

(Contact D.H. Webb, Project Officer, Aquatic Biology Department, Tennessee Valley Authority, P.O. Box 1010, Muscle Shoals, Alabama 35660.)

In this controlled study, 29 bass were monitored at several sites using radiotelemetry. At two sites, Eurasian watermilfoil (*Myriophyllum spicatum*) was treated with 2,4-D, hydrilla (*Hydrilla verticillata*) was treated with diquat and copper. The authors found that: "Overall, the results of this study provide no evidence that herbicide applications changed largemouth bass abundance, altered population size structure, affected fish condition, or induced movement and redistribution of largemouth bass."

**LES JARDINS AQUATIQUES, UN REVE, UN DEFI, UNE DECOUVERTE!** by J.-M. Jurdant, Vander Publ., 1987. 320 pages. (In French.)

(Order from Jiffy Plant International, 63 Rue de Grimohaye, B-1350 Limal, BELGIUM.)

This lavishly produced large-format book is about the history, design and construction of aquatic gardens. It is illustrated with hundreds of color photos.

An excellent feature of this book is a plant selection chart that is useful for all temperature zones. Included are sections about varieties of water lilies, lotus plants and irises, complete with color selection charts and vivid photographs. Chapters on aquatic trees, frogs, snails and waterfowl, and the selection and care of koi complete this impressive book.

**CONSTRUCTED WETLANDS IN WATER POLLUTION CONTROL, Proceedings of the International Conference on the Use of Constructed Wetlands in Water Pollution Control, held in Cambridge, UK, 24-28 September 1990**, edited by P.F. Cooper and B.C. Findlater, Pergamon Press, 1990. 605 pages.

(Order from Pergamon Press, Headington Hill Hall, Oxford OX3 0BW, England.)

In recent years, the use of aquatic plant-based systems for sewage, mining and industrial wastewater treatment has received much attention. Nowhere has more research work on the subject been done than in Europe, where scientists collaborate to establish design and operations standards for these novel systems.

This conference brought together European and other experts in the field for the second time. In this proceedings, seventy papers and posters presented at the conference are included.

Papers are in several sections: Principles, Nitrogen and Phosphorus Removal, Sewage Treatment, Sludge Treatment, Agricultural Waste Treatment, Treatment for Small Populations, Industrial Waste Treatment, Mining Waste Treatment, and Design Guidelines. Numerous case histories are also described.



## NEW REGULATION: D.E.R. DREDGE AND FILL AND CATTAIL

The Florida Department of Environmental Regulation (DER) is responsible for the regulation of dredge and fill activities in the state. Chapter 17-312 of DER's rules and regulations specifies requirements for these activities.

Among the "general permits" granted by DER is one which directly relates to aquatic plant management. This new general permit became effective in December of 1990. Here is the text of this new permit:

### 17-312.819 General Permit for the Limited Dredging of Sediment for Aquatic Plant Management Purposes

(1) A general permit is hereby granted to any person engaged in limited dredging of sediment for aquatic plant management purposes, provided:

(a) This general permit shall apply to only those activities that have a valid Rule 16C-20, F.A.C., permit for aquatic plant control already issued by the Florida Department of Natural Resources in which the conditions for limited dredging have been set forth in the supplemental conditions of the Rule 16C-20 F.A.C., permit. For the purposes of this general permit, a valid Rule 16C-20, F.A.C., permit shall hereinafter be referred to as a valid Department of Natural Resources Aquatic Plant Control Permit;

(b) Sediment removal for aquatic plant management purposes shall be limited to only those lakes with naturally occurring sand bottoms, and only those vegetated areas within lakes, to their landward extent, that have a minimum of eighty percent areal coverage of *Typha* spp. (cattail) within the project area;

(c) Only unconsolidated, flocculent detrital material from decaying vegetation shall be removed under this general permit. The depth to which the detrital material may be removed shall be as determined by the Department of Natural Resources through a site inspection during the review of a Department of Natural Resources Aquatic Plant Control Permit, but in any event shall not exceed three feet of sediment, and in no case shall the removal include the natural mineral soil material which underlays the detrital material;

(d) Sediment removal shall not occur where the water depth above the unexcavated sediments exceeds three feet, or from areas which are located more than two hundred feet waterward of the existing water line, at the time of the Department of Natural Resources Aquatic Plant Control Permit application site inspection;

(e) The distance along the shoreline from which sediment may be removed shall not exceed five hundred linear feet;

(f) All spoil material shall be deposited in an upland spoil site which is located and designed so as to prevent the escape of spoil material into waters of the State. The deposition of material into the upland spoil site shall either be through direct deposit, or following initial deposition into self-contained trucks for transfer to the upland spoil site, or as the final step following the use of a temporary stockpile site. Temporarily stockpiled material may be located within the landward extent of waters of the State for a period not to exceed twenty four hours, and must be located within unvegetated areas or within areas from which sediments are identified to be removed in the Department of Natural Resources Aquatic Plant Control Permit. Temporary spoil stockpile sites shall not be located in areas of standing water, and must be placed and contained to prevent run-off into any areas of standing water;

(g) Dredged sites required by the Department of Natural Resources to be revegetated shall be planted according to specifications as defined in the Department of Natural Resources Aquatic Plant Control Permit. Only indigenous plant species obtained from a nursery source approved by the Department of Natural Resources shall be planted. Dredged sites required by the Department of Natural Resources Aquatic Plant Control Permit to be revegetated shall be planted at a minimum of fifty percent areal coverage within each revegetation area. The installation of vegetation required by the Department of Natural Resources Aquatic Plant Control Permit shall be completed within one year following notice to use this general permit. Within the project area, at least sixty percent areal coverage of the planted species or of other plant species which are listed in Rule 17-301.400, F.A.C., and which are found to be acceptable by the Department of Natural Resources Aquatic Plant Control Permit, shall be achieved within two years following installation of the required

vegetation. The restored site shall also be managed in a manner where cattail and other undesirable plants, as determined by the Department of Natural Resources and specified in the Department of Natural Resources Aquatic Plant Control Permit, shall not be allowed to constitute more than ten percent areal coverage during the term of the valid Department of Natural Resources Aquatic Plant Control Permit;

(2) This general permit is subject to the general conditions of Rules 17-4.530 and 17-4.540, F.A.C. and the following specific conditions:

(a) All sediment and cattail removal operations must conform to conditions imposed by the Department of Natural Resources Aquatic Plant Control Permit, and must be performed in a manner which does not cause violations of State water quality standards;

(b) The permittee shall use best management practices, such as properly installed and maintained turbidity curtains or similar devices, at all times during the execution of permitted activity to prevent violations of State water quality standards;

(c) Additional dredging activities are not authorized by this general permit and shall not occur except as authorized by statute or Department rule;

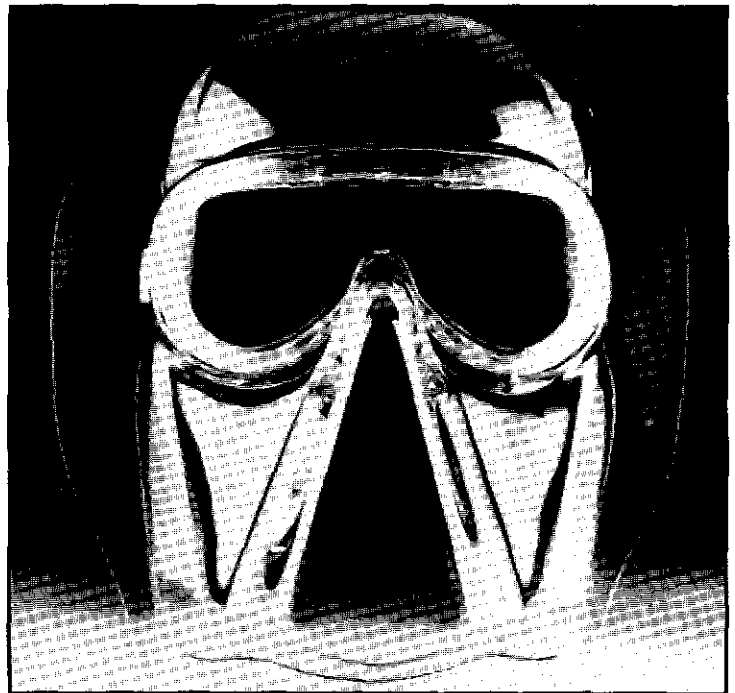
(d) There shall be no filling or backfilling of any kind associated with the work other than incidental sediments which may be attached to vegetation which is planted pursuant to the valid Department of Natural Resources Aquatic Plant Control Permit;

(e) Dredging activities, when they occur on state-owned bottom land, shall be in accordance with the rules promulgated under the authority of the Board of Trustees of the Internal Improvement Trust Fund by the Division of State Lands, Department of Natural Resources.

Specific Authority: 403.814, 403.912, F.S.

Law Implemented: 403.061, 403.062, 403.087, 403.813, 403.814, 403.817, 403.912, 403.913, F.S.

History: New: 12-17-90.



### Darth Vader Applicator

This is the "Space Face", a new shield that covers the forehead, eyes, nose, mouth, ears and chin. For more information, contact Millenium Safety Products, Austin, Texas, (512) 346-3876.