

A Q U A P H Y T E

A NEWSLETTER ABOUT AQUATIC, WETLAND AND INVASIVE PLANTS

Center for Aquatic and Invasive Plants

with support from

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Assessing Non-Native Plants in Florida's Natural Areas

What does one do when the ornamental horticulture department of a university is researching and promoting the use of a non-native plant to commercial growers and landscapers, while other departments of the same university are researching and advocating the control and eradication of the very same species? In the non-academic arena, commercial growers and landscapers are outraged over the perceived threat to their livelihood, while land managers and environmentalists are adamant about protecting their remaining natural areas from invasive plant species. To help solve this problem, members of the University of Florida's Institute of Food and Agricultural Sciences (IFAS) Invasive Plants Working Group came up with an assessment protocol for non-native plants in Florida. The protocol is an attempt to reconcile these different factions, to make sure that labels of invasiveness can be defended to the satisfaction of everyone concerned, and to allow those who hold a stake in the issue to be involved in a reasonable approach to its resolution. *KB*

The remainder of this article was adapted from one published in the Fall 2000 issue of Wildland Weeds, a quarterly publication of the Florida Exotic Pest Plant Council, and University of Florida Cooperative Extension Service publication SS-AGR-79, by A.M. Fox, D.R. Gordon, J.A. Dusky, L. Tyson, and R.K. Stocker. For further information, contact amfox@gnv.ifas.ufl.edu.

The IFAS Assessment of Non-Native Plants in Florida's Natural Areas (hereafter referred to as the IFAS Assessment) was developed in 1999 by a subcommittee of the IFAS Invasive Plants Working Group (A.M. Fox, J.A. Dusky, and R.K. Stocker of the University of Florida; D.R. Gordon of The Nature Conservancy; and L. Tyson of Santa Fe Community College).

Wilcove et al. (1998) reported that invasive species are second only to habitat loss in the U.S. as the leading threat to threatened and endangered species. U.S. federal government recognition of these issues was emphasized by President Clinton's Executive Order on Invasive Species (1999). However, it is important to acknowledge that only a small percentage of introduced species create a problem in natural areas (Lippincott 1996), and that quantifiable ecological and economic impacts caused by invasive plants range from negligible to catastrophic.

Around the world there is a concerted effort to develop predictive models, primarily for species not yet present in a particular area. Many of them appear to be efficient at identifying potential problem species, especially based on information such as whether a species has been a problem elsewhere. A concern about many of these models has been that they are often overly restrictive, in some cases falsely accusing up to 20% of plants that have never (at least in the studied timescales) been found to be invasive (Reichard and Hamilton 1997). Managers of natural areas may not consider this to be much of a flaw, but this is unacceptable to the many people who believe that supplies of plants for food, fiber, and landscaping should not be unnecessarily restricted.

The invasive "no-brainers" are typically well-established and little-disputed species, many of which are already subject to state and/or federal regulation. On the other hand, it is recognized that there are many exotic crops, for example, that do not survive without human intervention in the form of fertilizers, irrigation, etc. Controversy, however, haunts the middle ground and usually surrounds those commercially important species that are either just starting to escape or that appear in natural areas but with unknown or poorly documented impacts.

Since 1984, the Florida Exotic Pest Plant Council (FLEPPC) has been classifying certain plants as Category I: "species that are invading and disrupting native plant communities in Florida" based "...on the documented ecological damage caused"; or as Category II: "species that have shown a potential to disrupt native plant communities". The lists serve a variety of purposes (see "Florida's most invasive plant list" at <http://www.fleppc.org/>) with the precautionary objective to alert managers of natural areas to currently, or potentially, problematic species.

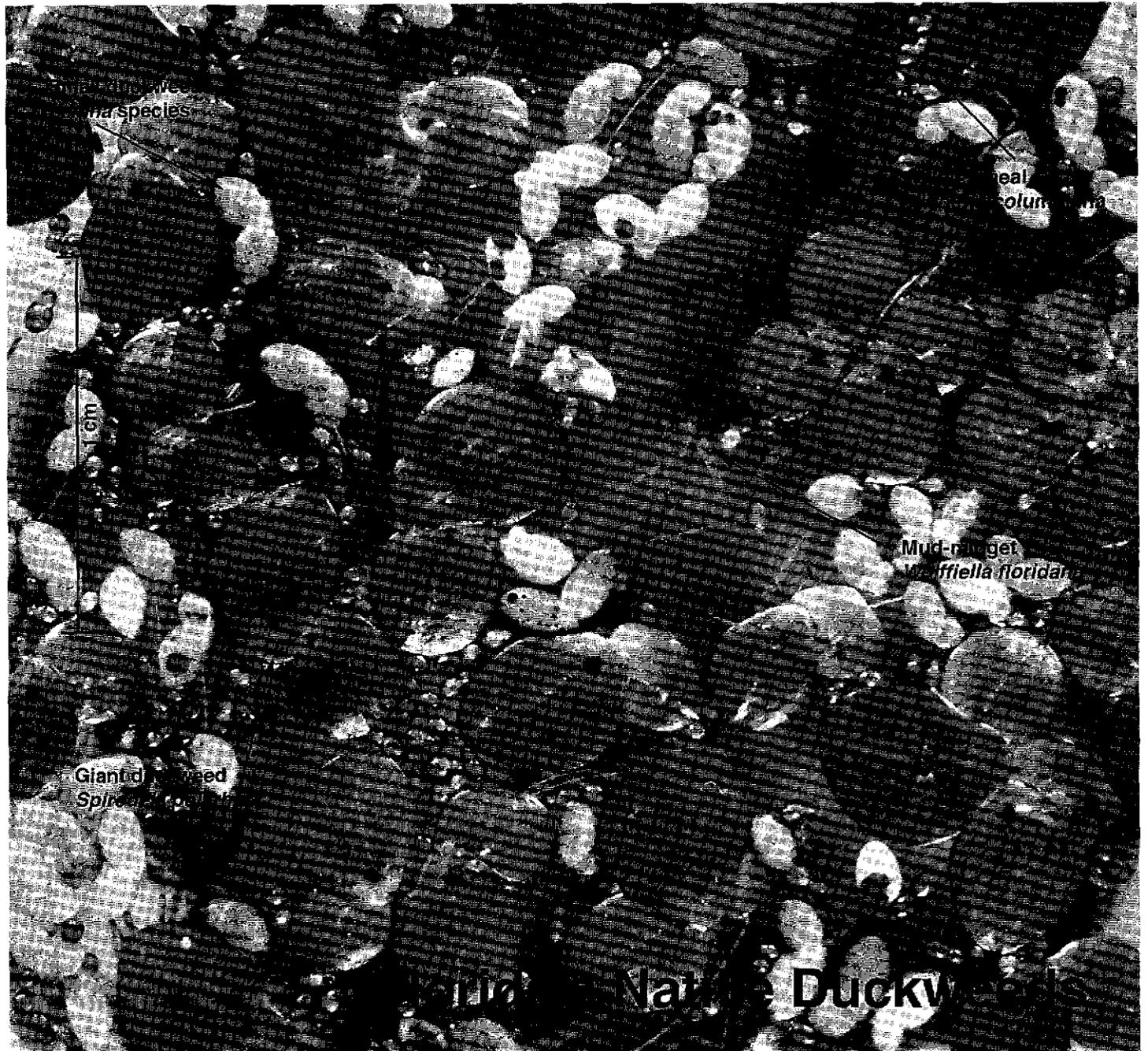
Things become more controversial when these lists are adopted for other purposes, such as the development of local laws banning the use of certain non-native plants. With a large gap between the FLEPPC lists and state and federal regulations (on the 1999 lists, only 25 out of 65 Category I species, and 3 out of 60 Category II species, are government-regulated), it is not surprising that proactive local organizations have embraced the Category I list.

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Florida's Native Duckweeds

Duckweeds are common plants in Florida. Although very small, they are nonetheless sometimes quite noticeable, as when they cover a pond with dense masses. Oftentimes, our small floating plants, even *Salvinia* and some algae, are referred to as "duckweeds". However, the term "duckweed" is the accepted common name for the Lemnaceae, the monocotyledonous family composed of the genera *Spirodela*, *Lemna*, *Wolffia* and *Wolffiella*.

This picture compares the Florida duckweeds. Note the centimeter-measure in the picture, remembering that 2.5 cm equals one inch. As can be seen, these are very small flowering plants indeed; in fact, water meal (*Wolffia* spp.), at 1 to 1.5 mm long, is the smallest flowering plant on earth!



Photos and text by Vic Ramey

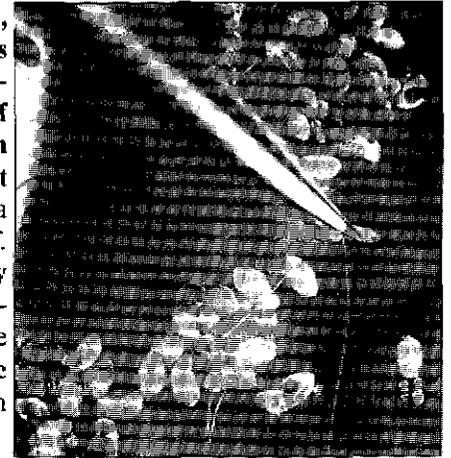
As the name suggests, ducks eat duckweed (as do turtles, fish and other aquatic animals). In Florida, they are all native plants, except for one. (The images and drawings shown here are representative of the kinds of resources available from APIRS of the University of Florida Center for Aquatic and Invasive Plants.)

Giant duckweed, *Spirodela polyrhiza*, is the largest of the Florida duckweeds. Even so, 5 or 6 of them placed end-to-end would be only an inch long. This floating plant has a single rounded leaf, but it usually occurs connected to two or three other plants. Each plant usually has several roots (up to nine) hanging beneath its leaf. The underleaf surface of giant duckweed is dark red. A single, noticeable red dot appears on the tops of many of the leaves of this native plant.

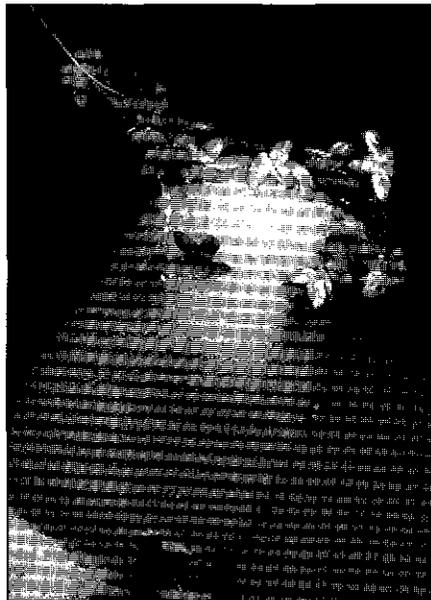


Spirodela polyrhiza

Small duckweed, *Lemna valdiviana*, is another common native duckweed of Florida. It is much smaller than giant duckweed and has a single shoe-shaped leaf. Small duckweed usually occurs as two-to-several plants joined at the base, with a thin single root hanging beneath each plant.



Lemna species



Landoltia punctata

A non-native duckweed in Florida, *Landoltia punctata* is the new name for *Spirodela punctata*. Mats of duckweed found in Florida often are comprised primarily of this exotic species. *Landoltia punctata* easily might be confused with the native giant duckweed, *Spirodela polyrhiza*, but it looks more like a large *Lemna* species. *Landoltia punctata* is smaller than giant duckweed. It also is comprised of a single

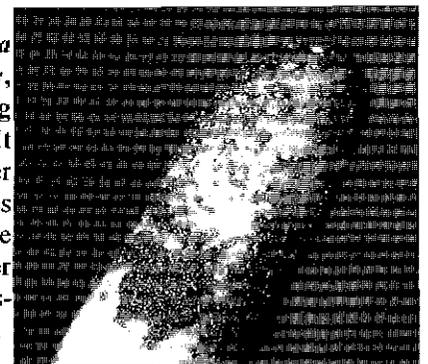
leaf, but usually occurs as two plants attached together. The leaves are shoe-shaped (like *Lemna*). It has 2-5 roots descending from its leaf. (Unfortunately, the common name for this plant is "dotted duckweed". This is confusing when applied to this plant because while there are distinct red dots on the native giant duckweed, there are no obvious dots on this species. The term "dotted" used here refers to the barely visible pointed bumps (puncts) on the leaf surface of *Landoltia punctata*.)



Wolffia floridana

Mud-midget, *Wolffia floridana*, forms star-like colonies of plants in the still water. Each plant has several narrow, elongate fronds, 5-10 mm long. Mud-midget plants float just beneath the surface of the water.

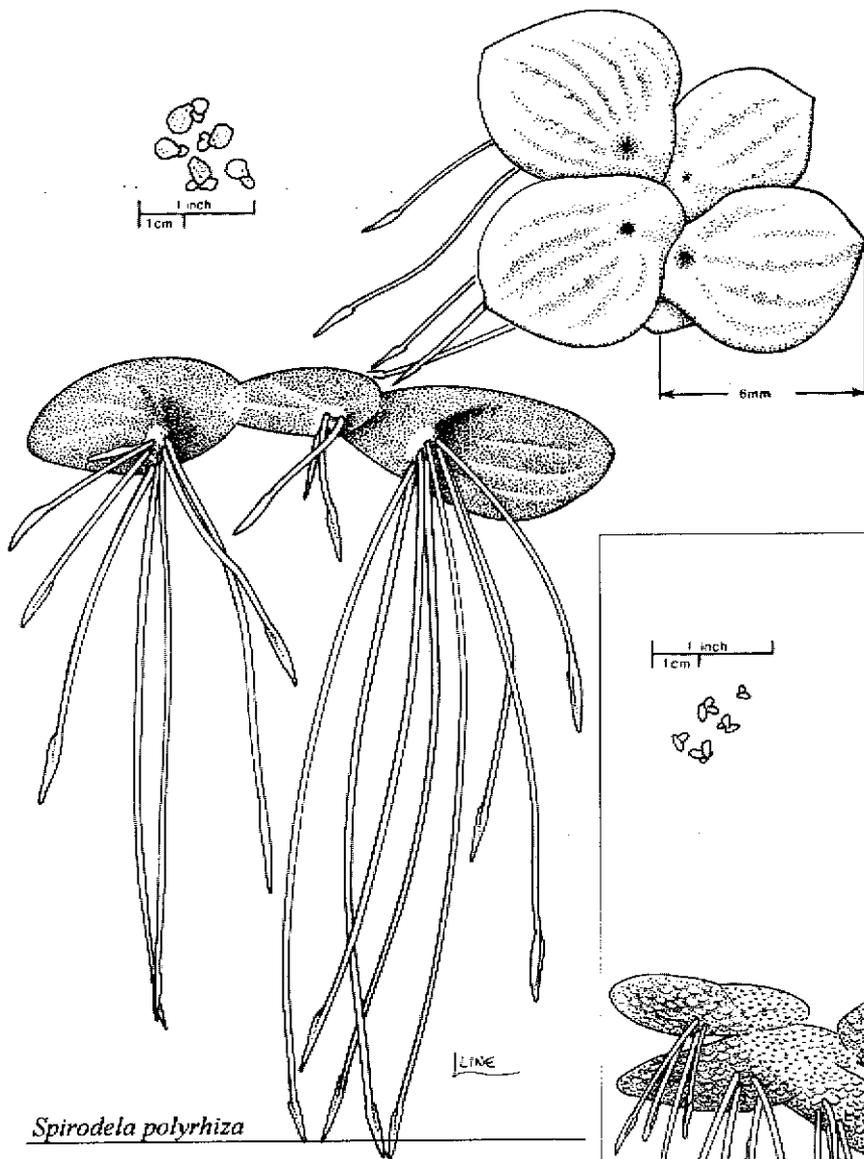
Water meal, *Wolffia columbiana*, is very tiny, the smallest flowering plant in the world. It often is mixed with other duckweeds, but sometimes forms a pure stand. The individual spherical water meal plants are barely discernible to the naked eye.



Wolffia columbiana

For a factsheet, U.S. distribution map and comparison table of the native *Spirodela polyrhiza* and the non-native *Landoltia punctata* (*Spirodela punctata*) go to the U.S. Geological Survey, Nonindigenous Aquatic Species program: http://nas.er.usgs.gov/plants/docs/sp_punct

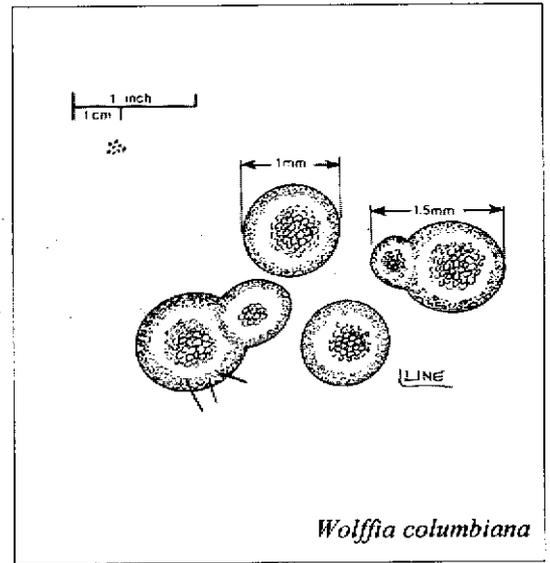
New! Line Drawings Available



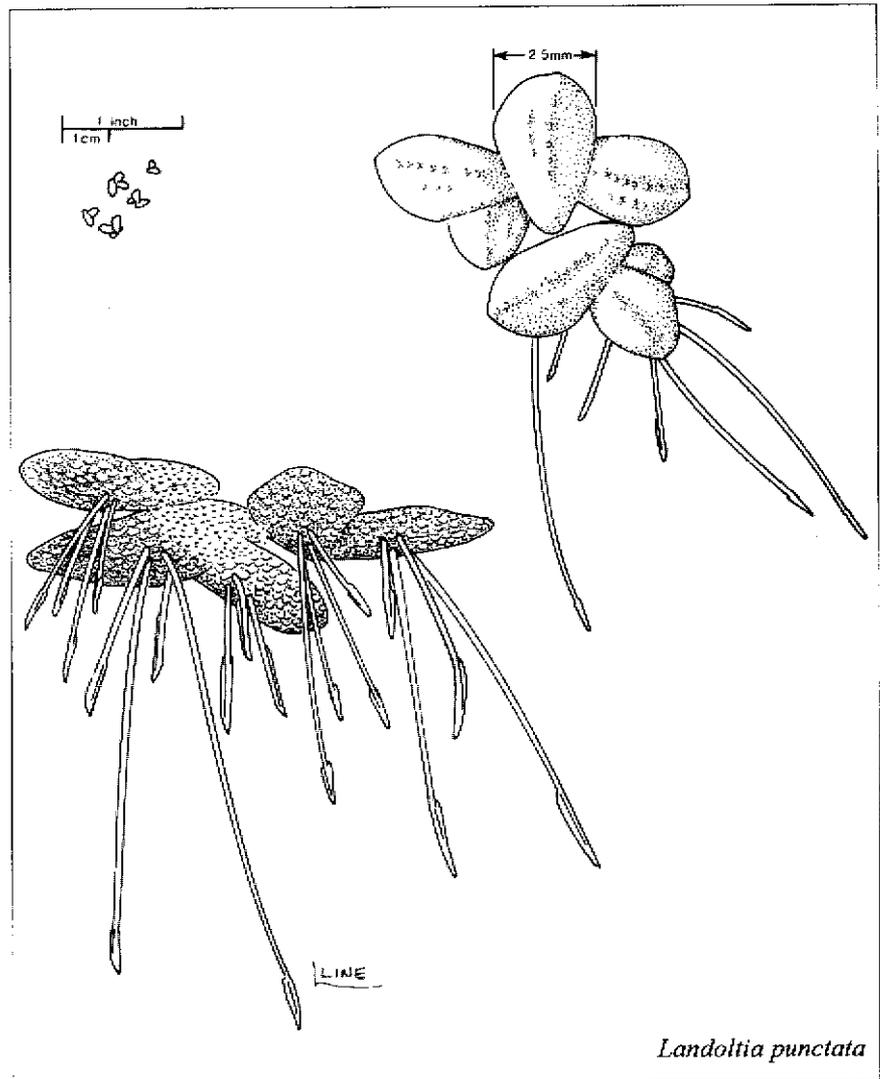
Spirodela polyrhiza

Quote of note: "In Northern Zimbabwe, *Wolffia cylindracea* is unique in that it is able to survive the yearly dry period of 5-7 months in the form of turions. However, the turions must first be embedded in the heavy mud by trampling animals, such as elephants, buffaloes and other large herbivores who visit the seasonally dry pans. This is probably the reason why similar *Wolffia* species did not develop in other regions where such animals are missing." *E.Landolt, 1997 Bull. Geobot. Inst. ETH, 63:25-31.*

See *Wolffiella floridana* on back page.



Wolffia columbiana



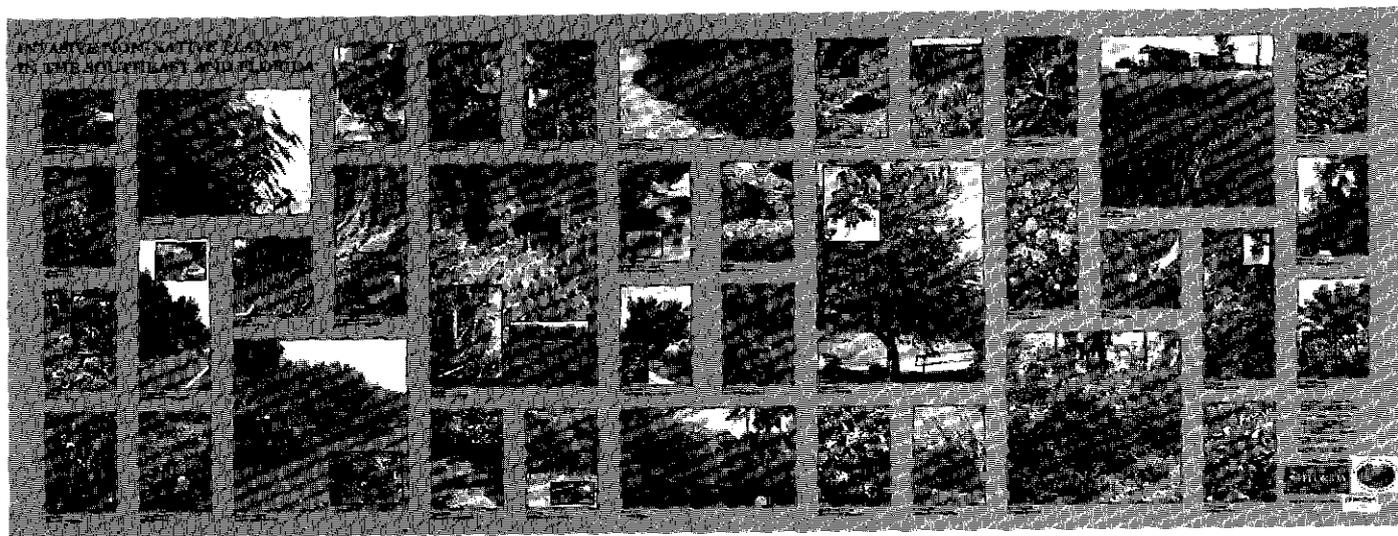
Landoltia punctata

These line drawings were just completed by Laura Line, Center for Aquatic and Invasive Plants, University of Florida. With proper attribution, and for non-profit purposes, please feel free to use these line drawings for manuals, brochures, reports, proposals, web sites...

NEW!
PHOTO-MURAL
INVASIVE NON-NATIVE PLANTS IN THE SOUTHEAST AND FLORIDA

A Collaborative Effort:
 APIRS, Center for Aquatic and Invasive Plants, University of Florida
 Bureau of Invasive Plant Management, Florida Department of Environmental Protection
 Elf Atochem North America

Laminated Teaching Copies Now Available to Teachers and Trainers



Here is a very large, 3 feet by 8 feet, photo-mural of invasive non-native plants, including 10 species found only in Florida (so far) and 27 found elsewhere in the southeastern U.S. All plants are depicted in strikingly attractive color photographs, some more than one square foot in size. Check our web site for the list of plants depicted: <http://plants.ifas.ufl.edu/murallis.html>

At the request of teachers and enviro-trainers, this photo-mural was produced to be an attention-grabbing teaching tool for science classes and management agency training, and for homeowners' forums, ecology clubs, environmental advocacy groups and others concerned about the onslaught of non-native plants in the southeast and Florida.

The photo-mural will be available in two forms:

- as fully laminated copies available on loan to teachers who request them
- and as unlaminated copies for sale to anyone, for approximately \$25 each, plus S/H.

As of this time, only the laminated teachers' loaner copies are available, on a first-come/first-served basis. We expect to have unlaminated copies for sale in the first quarter of 2001.

If you are a Florida or Southeastern U.S. teacher who wants to borrow a laminated copy for time-limited teaching purposes, please contact us now at varamey@nersp.nerdc.ufl.edu and we will work out the logistics with you. If you might like to purchase copies, (for approximately \$25 each, plus S/H), please contact us now so that we can put you on the list of those to contact when more copies are available: varamey@nersp.nerdc.ufl.edu

Or write: APIRS Photo-Mural, Center for Aquatic and Invasive Plants, 7922 NW 71 ST, Gainesville, FL 32653.

Please do not telephone us about the photo-mural at this time; we are happy to take e-mails and letters from teachers who want to borrow them and from others who want to be notified when they become for sale.

Continued from Page 1

Such regulations have alarmed ornamental horticulturists and landscape designers, who question why some commercially important species such as heavenly bamboo (*Nandina domestica*), and lantana (*Lantana camara*) are on the Category I list. Their concerns are magnified because, while distribution maps are available on the FLEPPC website, *systematic, written criteria and documentary evidence on which the FLEPPC lists are based are not available.*

Purpose and Objectives of the IFAS Assessment

The primary purpose of the IFAS Assessment is to provide a mechanism to be used within the University of Florida to develop consistent descriptions of, and recommendations for, the use and management of non-native plants in Florida. Secondary objectives are to provide a level of information that is intermediate between simple presence or absence on a list and all the data that are available on any given species; and to identify the frequent data-gaps in our knowledge of these species which would assist in setting research priorities. It is also hoped that the IFAS Assessment will provide a tool to help resolve some of the conflicts between FLEPPC and the Florida Nurserymen and Growers Association (FNGA).

The requirements for the IFAS Assessment were that it have precisely defined criteria that are defensible by faculty, all evidence and decisions should be documented and archived for anyone to review, and it should only be used on species already present in the state. Far less is published about most invasive species than desired for an assessment, and anecdotal information can be difficult to defend without further substantiation. Thus, we have defined documentary evidence as being either published and quantitative, or as written observations from three biologists, any of whom could be contacted for confirmation. This process would not be a sufficient replacement for formal (and much more costly and complex) risk-benefit analysis, such as is performed in the development of state regulations prohibiting the use of a species.

The IFAS Assessment has five major sections: one to define if a species is invasive in Florida; and one for each of four indices - ecological impacts; potential for expansion; difficulty of management; and commercial value; closing with the conclusions. The assessment is intentionally broader than just determining whether a species is invasive (e.g., the latter two indices provide important information that does not address that issue), and there is no intention to offset commercial value against ecological impacts.

Invasiveness is very broadly defined in Section I as the establishment of self-sustaining plant populations that are expanding within a natural plant community with which they had not previously been associated (Vitousek et al. 1995). To be declared as being invasive, a plant must be documented in natural areas where there has not been significant human disturbance, or it must have survived restoration of the natural communities. The ecological impacts are evaluated in Section II based on the worst known site(s), without or before any control effort. Scores are assigned to six items in this section that address disruption of ecosystem processes, impacts on threatened or endangered species,

competitive displacement, changes in community structure, and hybridization with native species. This impact score is increased if the species can invade a broad range of habitats. In areas that a plant has invaded, an assessment of high or low potential for further expansion (one of very few "predictive" questions) is based, in Section III, on the number of new sites reported to be infested in the last five years. Difficulty of management and commercial value are assessed, and result in scores based on 10 and 4 items, in Sections IV and V respectively. A species is considered more difficult to manage if non-target damage is hard to avoid, if access and methods of control are costly, if there are large or dispersed areas to be managed, or if the likelihood of regrowth and re-colonization is high. Commercial value turned out to be the most challenging index because there is no tracking of state-wide sales receipts by species. Nobody, including representatives from FNGA, was very satisfied with the rather vague items in this section related to retail sales and importance to nursery growers or farmers. Thus, an analysis of the economic impact of potentially invasive plants in the ornamental nursery industry has been proposed as an important area for future research.

Conclusions

For all indices other than ecological impacts, the scores for a species are assigned to a high or low category. Scores for ecological impacts, the index which drives the development of conclusions, are assigned to low, medium, high, or very high categories. Based on the permutations of these categories for each index, one of the following conclusions is designated for a species:

Not considered a problem invasive species at this time

(low impacts and potential for expansion)

Caution, prevent escape of this plant

(low impacts but high potential for expansion)

Avoid use of this plant (medium to high impacts)

Do not use this plant (high to very high impacts)

While this language has no regulatory authority and is obviously superseded by any state or federal prohibitions, it is intended to provide consistent guidance.

All species will be reassessed as new information becomes available (especially in relation to new sites or impacts) and at least every 10 years. Plants with "Caution" or "Avoid" conclusions are to be reassessed every two years. Additionally, some of the plants assigned to "Avoid" will be recommended for a formal risk-benefit analysis. Typically these plants will have medium to high ecological impacts and high commercial value, and the risk-benefit analysis should be conducted promptly. Species that are rated with very high impacts, that score highly on all indices, or that have a combination of medium to high impacts, high potential and low value, will not be recommended for use.

In developing the IFAS Assessment, over 20 species were tested without the formal collection of documentary evidence. This range of species represented all categories for each index and all conclusions. In their formal assessment, it takes a substantial effort to collect and document the appropriate data for each species and we have several part-time staff dedicated to this task.

AQUATICS - still thriving after all these years

With the recent surge in interest in exotic and invasive species of the terrestrial sort, many researchers and managers have headed upland from their lakes, rivers and wetlands. Let it be known that the Aquatic Plant Management Society and its regional chapters are still alive and thriving with plenty of aquatic plants to take care of.

The **Aquatic Plant Management Society, Inc. (APMS)** is an international organization of scientists, educators, students, commercial pesticide applicators, administrators, and concerned individuals interested in the management and study of aquatic plants. The membership reflects a diversity of federal, state, and local agencies; universities and colleges around the world; corporations; and small businesses.

Originally known as the Hyacinth Control Society, Inc. when founded in 1961, the APMS is a respected source of expertise in the field of biological, mechanical, and chemical aquatic plant management and aquatic plant science. The Society has grown to include chapters in Florida, Texas, South Carolina, the Midsouth, Midwest, Northeast, Western, and the Nile Basin. Through these affiliates, annual meetings, newsletters, and the **Journal of Aquatic Plant Management**, members keep abreast of the latest developments in the field.

The objectives of the Society are to assist in promoting the management of nuisance aquatic plants, to provide for the scientific advancement of members of the society, to encourage scientific research, to promote university scholarship, and to extend and develop public interest in the aquatic plant science discipline. For more information on the APMS and its chapters, go to <http://www.apms.org>

CLASSIC BOOK NEWLY AVAILABLE:

C.D. Sculthorpe's The Biology of Aquatic Vascular Plants

In the late Sculthorpe's words, this book is a "monograph treating all aspects of the comparative biology of freshwater and marine vascular plants." Although written primarily for undergraduate and graduate students, the author hoped the book also would be useful to teachers and researchers in the field of aquatic biology.

Koeltz Scientific Books recently announced that they had "found a large quantity of unbound copies in their warehouse," and had bound them up to sell. This book was out of print for some years and is considered a classic in its field. Contents include: *The Salient Features of Aquatic Vascular Plants and the Aquatic Environment*; *A Link with Land Plants: The Structure and Physiology of Emergent Foliage*; *Life in two Environments: The Structure & Physiology of Floating Leaves*; *Life in the Water: The Structure and Physiology of Submerged Organs*; *Life in the Substrate: The Structure and Physiology of Underground Organs*; *The Free-Floating Habit*; *Vegetative Polymorphism and the Problem of Heterophylly*; *Sexual Reproduction and Natural Affinities*; *Vegetative Reproduction and Perennation*; *Some Aspects of the Geography of Aquatic Vascular Plants*; *The Growth of Hydrophyte Communities and Their Interaction with the Aquatic Environment*; *The Problem of Aquatic Weeds*; *The Control of Aquatic Weeds*; *The Aesthetic and Economic Value of Aquatic Vascular Plants*; *Bibliography* (58 p.). 2nd edition. 1971. (Reprint 1985)

The book costs 128.00 DM (US\$ 69.00), plus shipping. Contact Koeltz for more information at koeltz@t-online.de

New Florida Web Projects -

The **Florida Environments Online (FEOL)** project has merged eight research bibliographies on Florida's biotic communities into one searchable database. The bibliographies were compiled by scientists and state agencies throughout Florida and cover the following subjects: ornithology; fish; herpetology; geology; literature useful to the study of Florida plants; fresh water; ecosystems; and agricultural history. The total number of records will eventually number more than 13,000. Although some records have yet to be entered, the system is currently available online through WebLUIS (the Library User Information Service of the State University System of Florida). Access can be gained through the library websites of any of Florida's state universities.

The FEOL database is part of a larger project, **Linking Florida's Natural Heritage (LFNH)**, that allows students, researchers, and the public to query museum specimen databases, library catalogs, and other citation databases for taxonomic and topical information. Collections included in the project are Everglades Online, Florida Environments Online, the FORMIS Ant Bibliography (29,000 references), the Sea Turtle Bibliography (12,000 references), the State University System of Florida library catalogs (more than ten million references (on all subjects)), the Florida Museum of Natural History's ichthyology and herpetology specimen collections (143,000 cataloged lots and 149,000 specimens, respectively), the Tall Timbers Research Station bird specimen collection (3,900 specimens), and a core collection of several hundred key publications selected for digitization. The LFNH project on Florida species and ecosystems is available at <http://susdl.fcla.edu/lfnh/>

Books/Reports

INTERACTIONS BETWEEN FISH AND AQUATIC MACROPHYTES IN INLAND WATERS - A REVIEW, by T. Petr. 2000. 185 pp.

(Order from FAO Sales and Marketing Group, 00100 Rome, Italy. USD \$ 24.00 + S/H. E-mail: publications-sales@fao.org)

This review updates what is known in the scientific literature about how plants affect freshwater fishes, and vice versa. More than 500 references are listed in this review. Thirteen chapters deal with topics such as aquatic macrophytes as fish habitat, the place of macrophytes in the food chain, fish densities and macrophytes, and the effects of aquatic plant management on fish.

BIODIVERSITY IN WETLANDS: ASSESSMENT, FUNCTION AND CONSERVATION. Volume 1., edited by B. Gopal, W.J. Junk and J.A. Davis. 2000. 354 pp.

(Order from Backhuys Publishers, Postbus 321, 2300 AH Leiden, The Netherlands. USD \$98.00 + S/H; WWW: <http://www.backhuys.com>)

This is one of only a few books devoted to biodiversity in wetlands. Fourteen contributions deal with plant and animal biodiversity and significant efforts to promote biodiversity in rivers, wetlands and floodplains of Asia, Europe, Africa and South America; one is about bacterial biodiversity in wetlands.

WATER GARDEN PLANTS & ANIMALS - THE COMPLETE GUIDE FOR ALL AUSTRALIA, by N. Romanowski. 2000. 112 pp.

(Order from ISBS, 5804 NE Hassalo St, Portland, OR 97213-3644. USD \$34.50 + S/H. Phone: 503-287-3093; WWW: <http://www.isbs.com>)

This interesting, full-color book contains brief but useful information about how to use water lilies and bog plants, and fishes and frogs in water gardens in Australia. Varieties of hybrid water lilies and lotuses, and many kinds of other aquatic plants that might grow in deeper or shallower water gardens are pictured and somewhat described.

INVASIVE SPECIES IN A CHANGING WORLD, edited by H.A. Mooney and R.J. Hobbs. 2000. 457 pp.

(Order from Island Press, POB 7, Dept 2PR, Covelo, CA 95428. USD \$55.00 cloth; \$30.00 paper + S/H. Phone: 800-828-1302; WWW: <http://www.islandpress.org>)

This latest book on the subject of biodiversity-in-peril is comprised of 17 chapters by different authors, the chapters defining the dimensions of the problem, societal impacts (health and economics) and describing regional examples (in South Africa, Germany, New Zealand and Chile).

One of the most illuminating chapters discusses "assessing the extent, status and dynamism of plant invasions: current and emerging approaches," by R.N. Mack. In it, he shows why it is not possible to provide explicit answers to questions such as, "Across and within what specific political boundaries are these invasions occurring?", "How abundant are the invaders?", "Which areas or habitats are next at risk of invasion?", and "Are the invasions expanding, remaining static or contracting?"

In the past, the answers to such questions were provided in qualitative descriptions, such as in Darwin's observations of variegated thistle. Then chronologies of herbarium records were used, such as in Beger's mapping of the invasion of the plant *Senecio vernalis* in the 1920s.

Grid-based systematic floristic surveys are discussed next, such as the national projects undertaken in Europe since the 1970s. Qualitative assessments and quantitative estimates are used; remote sensing is a method; permanent plots is another. In this chapter, Mr. Mack points out the strengths and limitations of all these approaches to understanding plant invasions.

The summary by the editors states that "land use modification is providing new fertile grounds for invasives, and enhanced trade, the delivery vehicle for them." They conclude that increased awareness and education about invasive plants and animals will increase the appreciation of the value of local species and ecosystems and an increased desire to maintain them. "The alternative is a vastly more homogeneous world lacking local uniqueness."

WETLANDS, WATER AND THE LAW--USING LAW TO ADVANCE WETLAND CONSERVATION AND WISE USE, by C. Shine and C. de Klemm. 1999. 332 pp.

(Order from IUCN Publications Services Unit, 219c Huntingdon Rd, Cambridge CB3 0DL, United Kingdom. USD \$22.50 plus S/H. WWW: <http://www.iucn.org> E-mail: info@books.iucn.org)

IUCN is The World Conservation Union, a partnership founded in 1948 which now has more than 900 members, including states, agencies, and non-governmental organizations in 138 countries.

This book ("IUCN Environmental Policy and Law Paper No. 38") describes how laws and institutions "can work for (or against) wetland conservation and wise use," with special emphasis on the main legal issues involved in implementing the Ramsar Convention. Major sections discuss the "legal profile" of wetlands; national planning for wetland conservation; "site-specific" management; managing wetlands in "bioregions"; managing processes that damage wetlands; and the components for legal frameworks for regional and international cooperation.

BIOLOGICAL CONTROL OF WEEDS--A WORLD CATALOGUE OF AGENTS AND THEIR TARGET WEEDS, compiled and edited by M.H. Julien and M.W. Griffiths. 1999. 223 pp.

(Order from Oxford University Press, 198 Madison Ave, New York, NY 10016. WWW: <http://www.oup-usa.org> \$50.00 plus S/H.)

This is the fourth edition of this book, first published in 1982. It is "a comprehensive listing of world-wide, classical biological control attempts on weed targets...all available published records have been carefully checked by its authors..."

According to this edition, the countries most active in classical biological control of weeds are the U.S.A., Australia, South Africa, Canada and New Zealand. The authors state that after 100 years, there are only eight examples, world-wide, of damage to non-target plants, "none of which has caused serious economic or environmental damage..."

This edition makes use of a new table format which makes it much easier to use to its fullest potential.

AQUATIC AND WETLAND PLANTS OF NORTHEASTERN NORTH AMERICA. Volume One: Pteridophytes, Gymnosperms and Angiosperms: Dicotyledons. Volume Two: Angiosperms: Monocotyledons, by G.E. Crow and C.B. Hellquist. 2000. V. 1: 536 pp. V. 2: 456 pp.

(Order from The University of Wisconsin Press, 2537 Daniels St, Madison, WI 53718; 773-368-1550. \$90.00 per volume, cloth.) WWW: <http://www.wisc.edu/wisconsinpress/>

This is the latest comprehensive and reliable aquatic/wetland taxonomic-floristic work to be published in the United States, taking its place along side Godfrey and Wooten (southeastern plants), and Correll and Correll (southwestern plants). Crow and Hellquist cover the region from Minnesota to Missouri, eastward to the Atlantic from Newfoundland to Virginia.

These large-format identification books treat 1,139 species of native and naturalized aquatic and wetland plants of freshwaters, salt marshes and tidal waters. The species represent 295 genera in 109 families of vascular plants. The keys use as little technical language as possible so as to be useful to as many users as possible.

Each volume includes large numbers of line drawings. The drawings were taken from many published sources, old and new; their printed quality here is somewhat variable, but all are useful.

The work includes a comprehensive glossary of plant terms, and a glossary of habitat terms. (A "muskeg" is "a widely used term for peatlands of Canada and Alaska with the characteristics of northern bogs; especially common in boreal and subarctic regions.")

Continued from Page 6 -

As results are compiled, they will be made available online. As a large number of species are assessed, we will test the structure and questions in the IFAS Assessment. We expect that the assessment will continuously evolve both from these internal evaluations and from external input, hence the long-term objective of having an interactive web-based version rather than just the printable format currently available.

There is no doubt that for many species on the FLEPPC Category I list, similar conclusions will be reached via the IFAS Assessment. For other species there will seem to be a reduced level of concern based on our stringent criteria and requirements for documented evidence. This may seem alarming to managers of natural areas, but we anticipate that this could provide the impetus to gather more evidence, especially for species with expanding ranges, so that problem species are quickly reassessed and recognized. The precautionary approach of the FLEPPC lists is important for the managers of natural areas and should be continued. The IFAS Assessment is intended to complement this system and it is hoped that many people will contribute information on their least-favorite plants.

References:

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Here is a sampling of the research articles, books and reports which have been entered into the aquatic plant database since Spring 2000.

The database has more than 52,000 citations. To receive free bibliographies on specific plants and/or subjects, contact APIRS using the information on the back page or use the database online at <http://plants.ifas.ufl.edu/>

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Odds 'n' Ends

Harmful Nonnative Weed Control Act of 2000. U.S. Senate Bill S. 3222, introduced by Sen. Larry Craig (with 7 co-sponsors so far), seeks to raise federal money and to require the Secretary of the Interior to "provide assistance [through the States] to eligible weed management entities to control or eradicate harmful, nonnative weeds on public and private lands." The bill was referred to the Committee on Energy and Natural Resources; it is expected to be re-introduced to the new Congress in 2001, with possible hearings in the winter. Individuals can read and track the bill through: <http://thomas.loc.gov/home/c106query.html> or contact Myra Hyde, mhyde@beef.org

The World Biodiversity Database (WBD) is now 10 years old. A project of ETI (Expert Center for Taxonomic Identification), the WBD now has information on about 120,000 species. The ETI Biodiversity Center, supported by UNESCO, the Dutch government and the University of Amsterdam, seeks nothing less than to make it possible to use the Internet to identify plants and animals from all over the world. Visit their web site: <http://www.eti.uva.nl>

Vascular Plant Type Catalog. The New York Botanical Garden is working to become the first major herbarium to place online information about and photographs of its (90,000) vascular plant type specimens. The web site is clean and easy to use; the hi-resolution pictures are very well done: <http://www.nybg.org/bsci/hcol/vasc/>

Biological Invasions Journal. This very interesting new scientific journal, as described in the last issue of *AQUAPHYTE*, has to do with plant and animal invaders. The first several issues of *Biological Invasions* are now online, and downloadable as PDF files "by licensed institutions", including Volume 1, Issue 2/3, which has several articles about invading aquatic plants, such as an excellent article by D.H. Les and L.J. Mehrhoff on the "methods of introduction, avenues and means of dispersal, and extent of invasiveness" of 18 aquatic plants in southern New England: <http://www.wkap.nl/jrnltoe.htm/1387-3547>

AQUA-QUIP. Inland Lake Harvesters is a Wisconsin company making a line of equipment including aquatic plant harvesters, shuttle barges, shore conveyors and trailers. In business since 1983. <http://www.inland-lake.com>

Water Hyacinth on Lake Malawi. This is a news story about the water hyacinth infestation of Africa's third largest lake, the plant's threat to the lake's biodiversity, and the methods used to manage the plant since 1996. <http://ens.lycos.com/ens/nov2000/2000L-11-08-11.html>

University Scholars Program of the University of Florida supports an online *Journal of Undergraduate Research*. Research by these outstanding students includes several of interest to our readers: *Simulation of Rodeo Overspray Damage to Maidencane, Three Square and Soft-Stem*, by Nora Fosman (<http://web.clas.ufl.edu/CLAS/jur/0004/fosmanpaper.html>); *An Evaluation of Fungal Isolates for the Biological Control of Waterhyacinth, Eichhornia crassipes*, by Alison Walker (<http://web.clas.ufl.edu/CLAS/jur/0005/walkerpaper.html>); *Phosphorus and Nitrogen Flux from Lake Okeechobee Sediments* by Valerie K. Ensenat (<http://web.clas.ufl.edu/CLAS/jur/0006/ensenatpaper.html>); and *Propagation of Ludwigia repens in Florida Springs*, by John McKay (<http://web.clas.ufl.edu/CLAS/jur/0011/mckay.html>)

Something a little different. A Danish company, Gartneriet Timmermann A/S, recognizes the intrinsic beauty of certain wetland plants that others do not, and has found a market for them. They sell greenhouse-grown decorative displays of plants such as *Scirpus cernuus*, *Eleocharis geniculata*, and species of *Carex* and *Acorus*. <http://www.timmermann.dk>

Plant Names Database. The International Plant Names Index (IPNI) is a database of the names and associated basic bibliographical details of all seed plants. The database includes citations for 1.3 million species. IPNI is sponsored by The Royal Botanic Gardens, Kew; The Harvard University Herbaria; and the Australian National Herbarium. <http://www.ipni.org/> or the mirror site in the U.S. <http://www.us.ipni.org/>

MEETINGS

11TH INTERNATIONAL CONFERENCE ON AQUATIC INVASIVE SPECIES.

October 1-4, 2001. Hilton Alexandria Mark Center, Alexandria, VA.

This conference deals with aquatic animal and aquatic plant invaders, and will feature talks on prevention, rapid response, and management; global and regional environmental impacts; habitat/ecosystem changes; monitoring and information exchange; education and outreach initiatives; ballast water and shipping; and control technologies. Abstracts are due by December 17, 2000.

Contact: Conference Administrator, 800-868-8776, E-mail: profedge@renc.igs.net
WWW: <http://www.aquatic-invasive-species-conference.org>

2ND ANNUAL MEETING, NORTHEAST AQUATIC PLANT MANAGEMENT SOCIETY.

January 16-17, 2001. Suffern, NY.

More than 100 people attended the first annual meeting of this new society last year.

Contact: Gerry Smith, Program Chair, NEAPMS, c/o ACT, Inc., 11 John Road, Sutton, MA 01590; Phone: (508) 865-1000; E-mail: gsmith@aquaticcontroltech.com

22ND ANNUAL MEETING, SOCIETY OF WETLAND SCIENTISTS. URBAN WETLANDS: PROTECTING AND ENHANCING THE RESOURCE.

May 21-June 1, 2001. Chicago, IL.

The theme of this year's meeting is managing urban wetlands.

Contact: WWW: <http://www.sws.org> or E-mail Dr. Michael Miller: miller@geoserve.isgs.uiuc.edu

SECOND INTERNATIONAL CONFERENCE ON PLANTS AND ENVIRONMENTAL POLLUTION.

November 15-19, 2001. National Botanical Research Institute, Lucknow, India.

This conference is sponsored by the International Society of Environmental Botanists. Various conference themes include Climate Change and Agricultural Production; Environmental Pollution and Biodiversity; Environmental Biotechnology; Plant Response to Environmental Pollution; Environmental Impact Assessment; and Environmental Education, Legislation and Economic Impact.

Contact: WWW: <http://www.icpep.org> or E-mail: nbri@w1.vsnl.net.in

AQUATIC WEED SHORT COURSE.

May 14-18, 2001. Fort Lauderdale, Florida.

The Aquatic Weed Short Course in Ft. Lauderdale is designed for field and office personnel alike, and attendees earn CEUs at the same time. This short course has come to be known as *the* educational forum for freshwater enviro-workers in Florida.

Contact: Dr. Vernon Vandiver at (954) 577-6316. WWW: <http://www.ifas.ufl.edu/~conferweb/aw>

28TH ANNUAL MEETING, ECOSYSTEMS RESTORATION AND CREATION.

May 10-11, 2001. Tampa, Florida.

This is a national forum for the exchange of results of scientific research in the restoration, creation and management of freshwater and coastal wetland systems, as well as upland systems. Topics include freshwater and marine wetland systems; uplands systems; marsh, mangrove and seagrass restoration; upland and mixed ecosystem restoration; mitigation, permitting and regulatory policies; mine reclamation; and management techniques.

Contact: F.J. Webb, Hillsborough Community College, Plant City Campus, 1206 N. Park Road, Plant City, FL 33566. (813) 757-2104; E-mail: webb@mail.hcc.cc.fl.us

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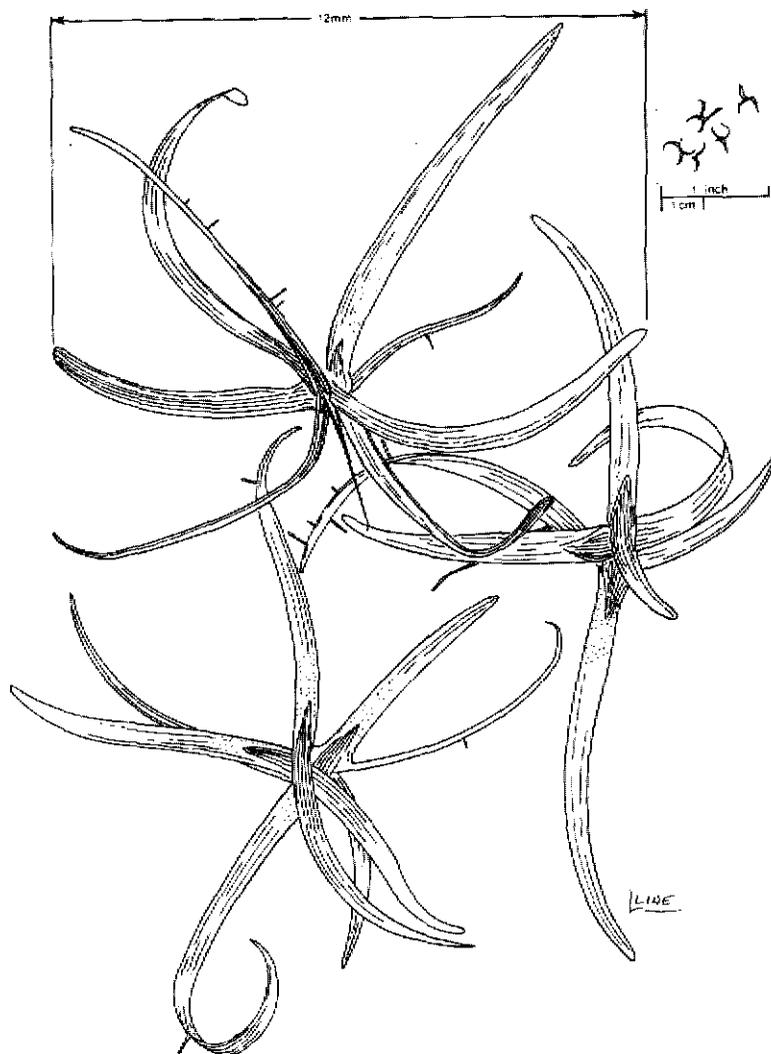
**EDITORS: Victor Ramey
Karen Brown**

AQUAPHYTE is sent to managers, researchers and agencies in 71 countries around the world. Comments, announcements, news items and other information relevant to aquatic plant research are solicited.

Inclusion in *AQUAPHYTE* does not constitute endorsement, nor does exclusion represent criticism, of any item, organization, individual, or institution by the University of Florida.



Wolffiella floridana



See page 4 for more new line drawings of the Lemnaceae.