

A Q U A P H Y T E

A NEWSLETTER ABOUT AQUATIC, WETLAND AND INVASIVE PLANTS

Center for Aquatic and Invasive Plants

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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.

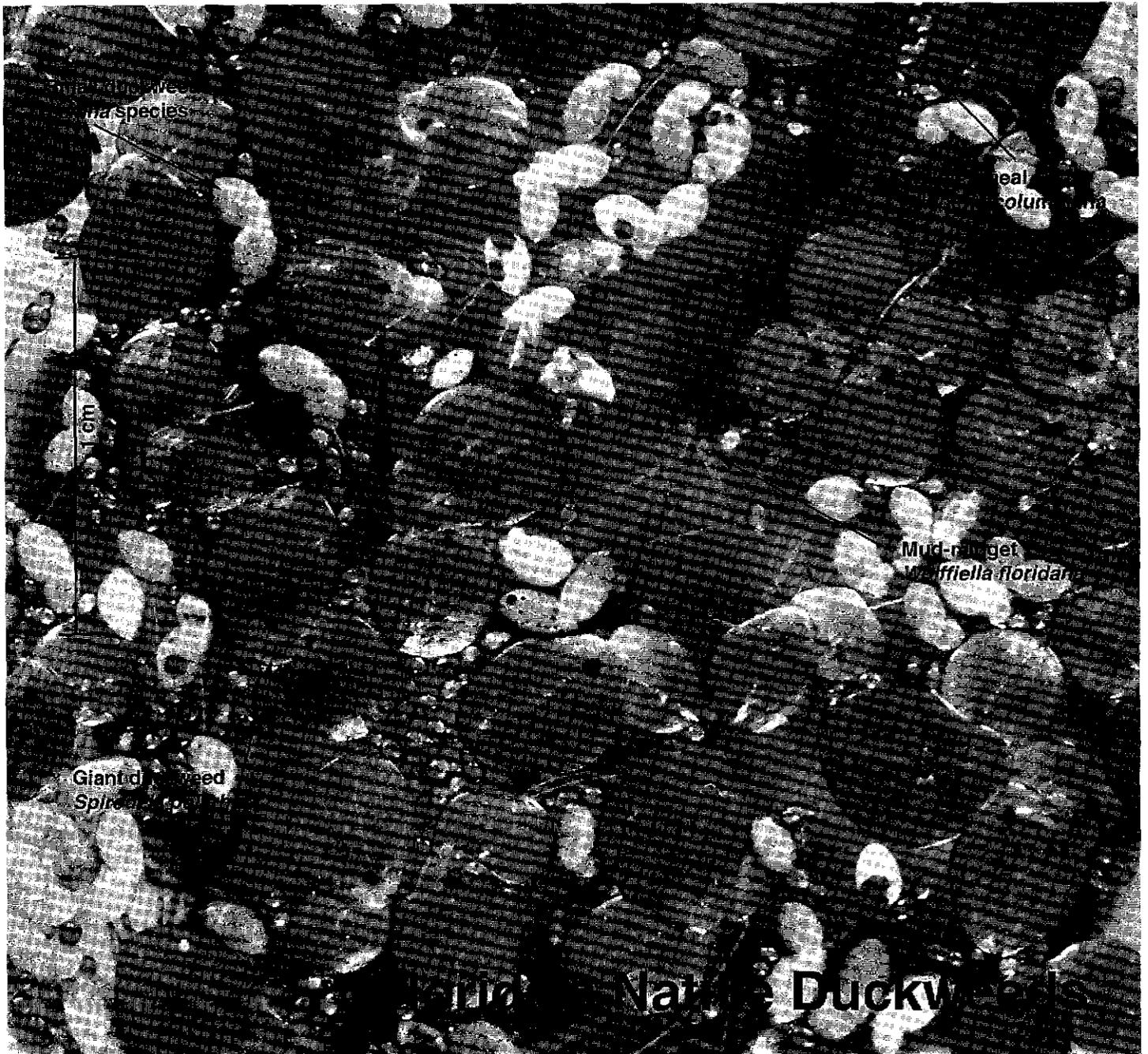
Things become more controversial when these lists are adopted for other purposes, such as the development of local laws banning the use of certain non-native plants. With a large gap between the FLEPPC lists and state and federal regulations (on the 1999 lists, only 25 out of 65 Category I species, and 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

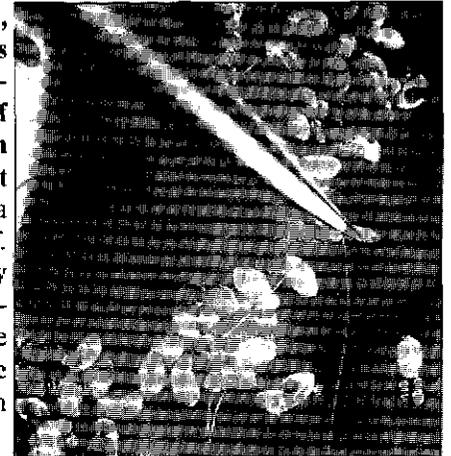
As the name suggests, ducks eat duckweed (as do turtles, fish and other aquatic animals). In Florida, they are all native plants, except for one. (The images and drawings shown here are representative of the kinds of resources available from APIRS of the University of Florida Center for Aquatic and Invasive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

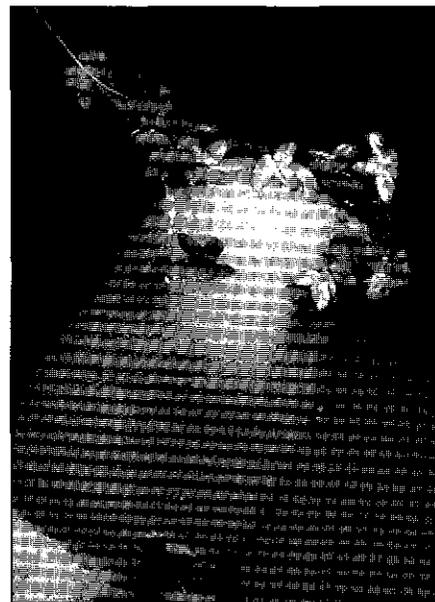


Spirodela polyrhiza

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

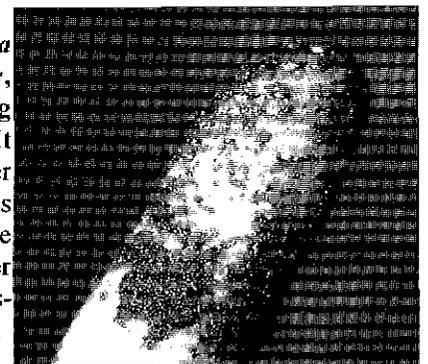
leaf, but usually occurs as two plants attached together. The leaves are shoe-shaped (like *Lemna*). It has 2-5 roots descending from its leaf. (Unfortunately, the common name for this plant is "dotted duckweed". This is confusing when applied to this plant because while there are distinct red dots on 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.

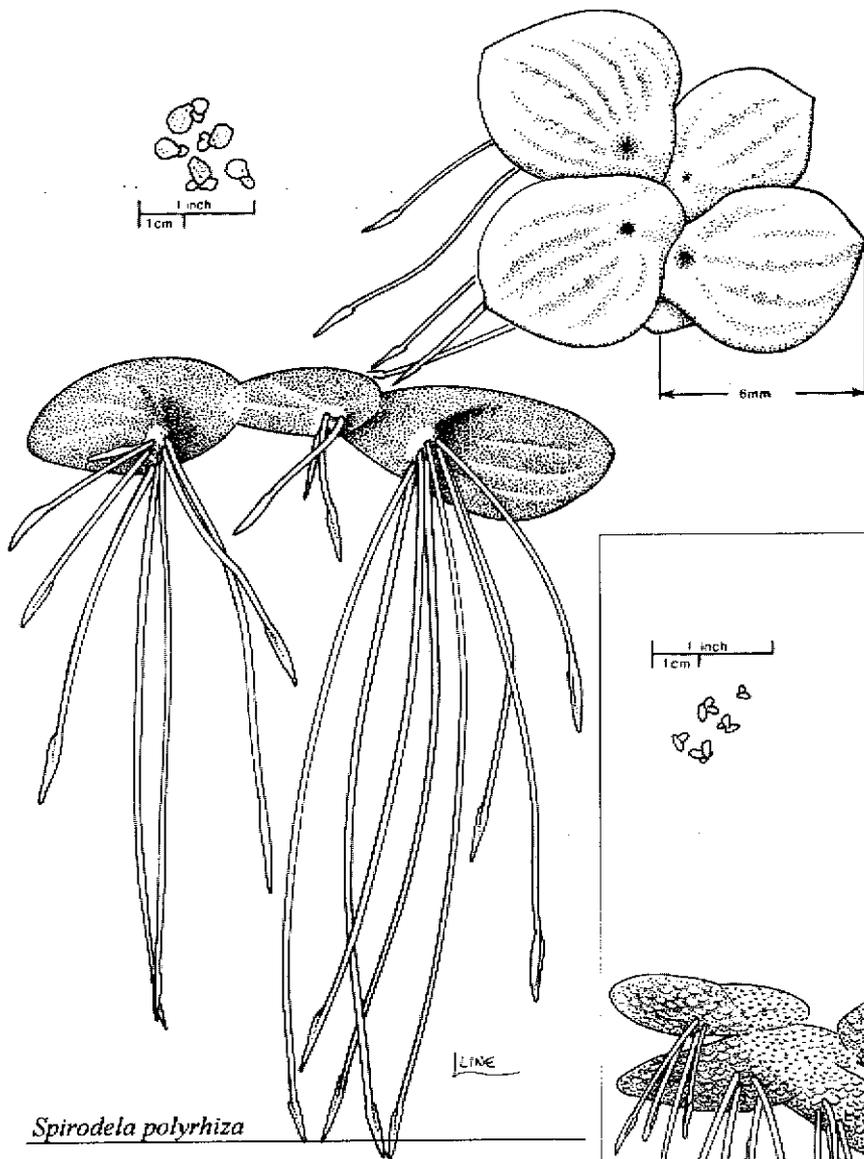
Water meal, *Wolffia columbiana*, is very tiny, the smallest flowering plant in the world. It often is mixed with other duckweeds, but sometimes forms a pure stand. The individual spherical water meal plants are barely discernible to the naked eye.



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

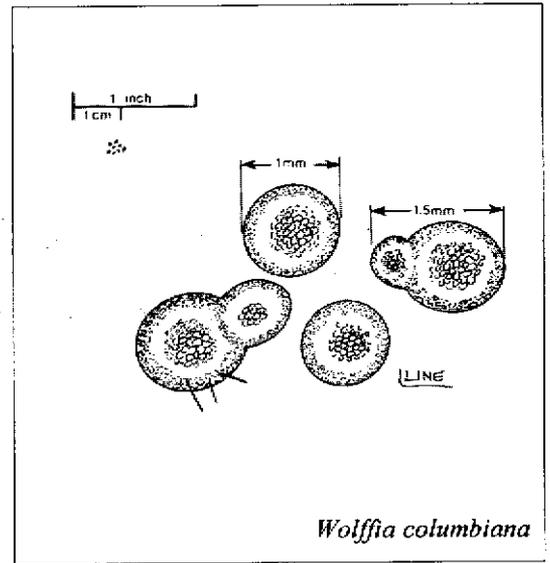
New! Line Drawings Available



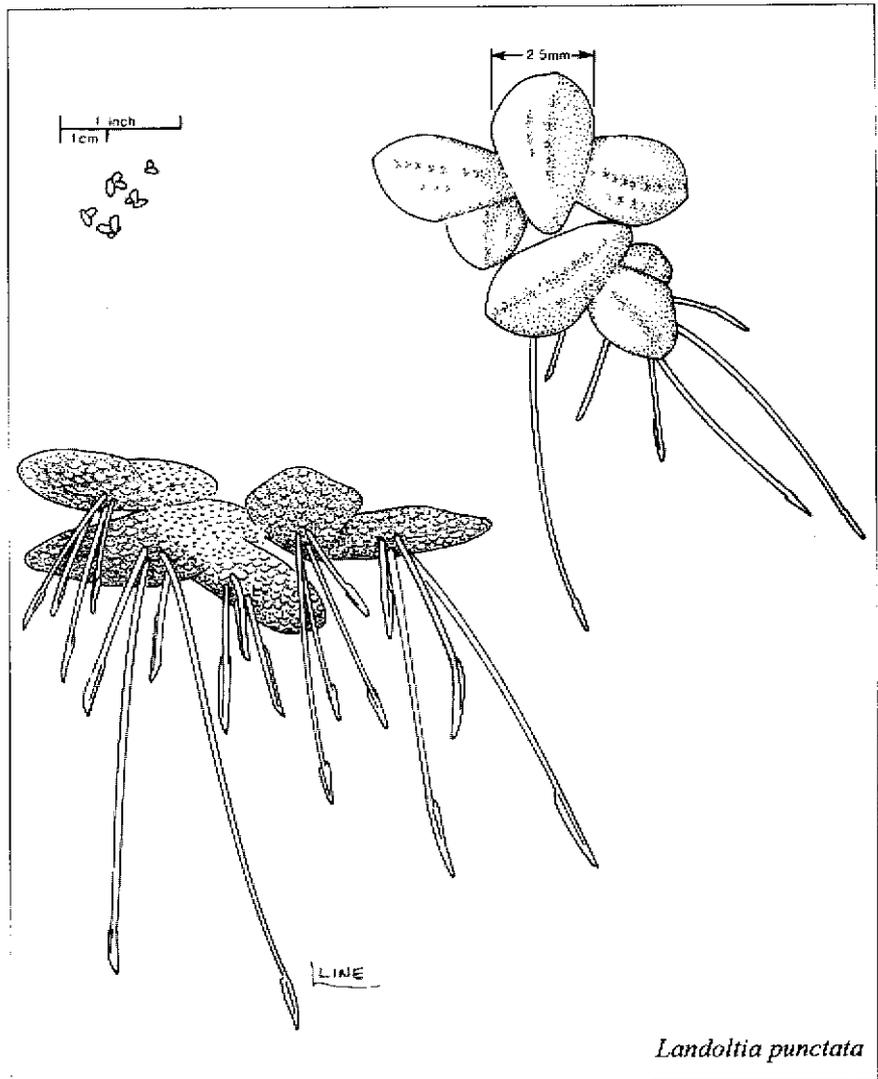
Spirodela polyrhiza

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



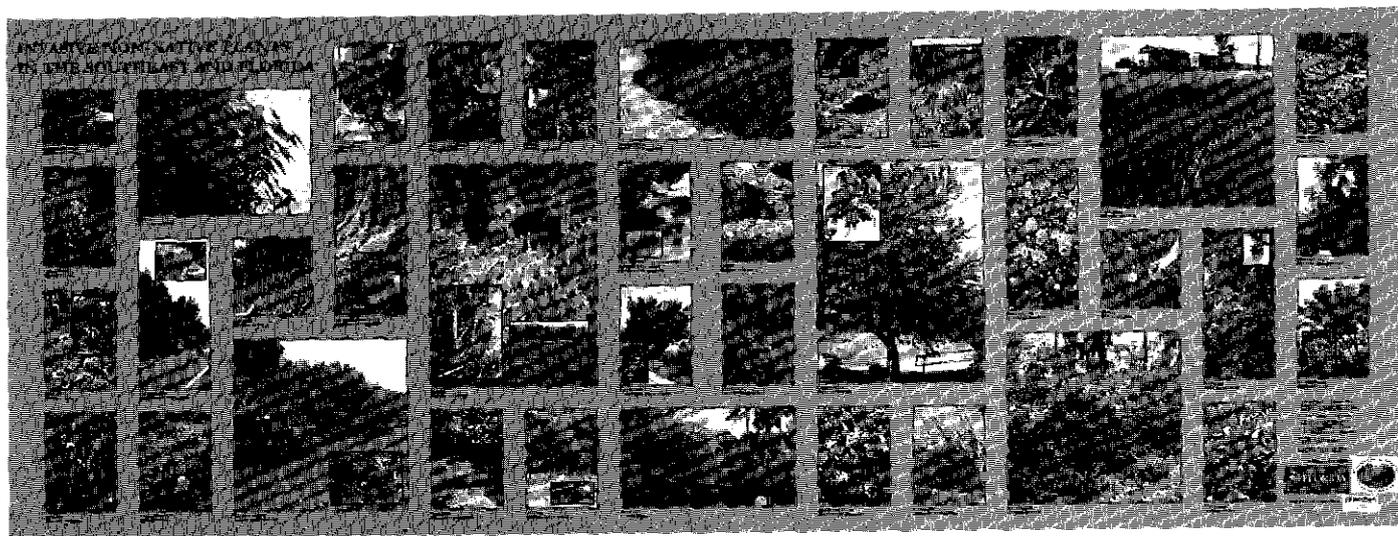
Landoltia punctata

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.

Conclusion - Page 9