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About Aquaphyte

This is the newsletter of the Center for Aquatic and Invasive Plants and the Aquatic, Wetland and Invasive Plant Information Retrieval System (**APIRS**) of the University of Florida Institute of Food and Agricultural Sciences (IFAS). Support for the information system is provided by the Florida Department of Environmental Protection, the U.S. Army Corps of Engineers Waterways Experiment Station Aquatic Plant Control Research Program (APCRP), the St. Johns River Water Management District and UF/IFAS.

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AQUAPHYTE is sent to more than 2,500 managers, researchers, and agencies in 71 countries. 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.

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Wildlife, Wetlands and Those "Other Plants"

by Victor Ramey, Center for Aquatic and Invasive Plants, University of Florida

[Here is a link](#) to info and pics about the plants in this article.

There are thousands of men and women whose job it is to venture into the wetlands and do work on behalf of the environment. Their job is to "manage" or "preserve" or "restore" swamps and woodlands, marshes and prairies, rivers and lakes, to promote biodiversity, and to encourage the growth of native plants and animals in an effort to preserve our ecosystems.

These "front-line" environmental field workers typically are the ones who take the soil and water samples, who count the plants and animals, and who use the herbicides and tractors. They are the ones who first notice when a single plant species is taking over, or when a duck species does not return the next year; they are the ones who report to the rest of us what's happening in the real world. Therefore, they need to know as much as possible about the wetlands they work in. These workers must know about the conspicuous invaders and the reclusive rarities, and also those "other plants" that are so important to the health and functioning of wetland ecosystems. They need to know about the grasses, sedges and rushes.

Grasses, sedges and rushes are often thought of, and frequently listed as "other plants" by workers in the "natural resource management" world. This is because grasses, sedges and rushes are difficult to identify, they don't get much press, and there are very many species.

Even professional managers of wetlands, mostly non-botanists, often cannot tell a rush from a sedge or a beneficial native grass from an unchecked invader. This is actually very understandable. Nature managers must focus on "invasions" by hundreds of new species and are less able to pay attention to the "other plants".

Consider also the "common name problem": short things are "sedges" (whether they are or not); tall things are "big grasses."

We could have a problem here.

One reason why managers should pay close attention to the grasses, sedges and rushes that grow in their marshes, lakes and rivers is that these plants are very important to the diets of many waterfowl such as ducks and geese. If the necessary grasses, sedges and rushes disappear from a wetland or lake or river, so could many of the kinds of birds and other animals that depend on them for food and shelter. Natural resource management personnel, especially field workers, must be able to recognize native and non-native grasses, sedges and rushes in order to control only the non-native invasive plants and to promote the growth of these native plants that wild animals depend on.

This article lists some of the published research about several of the specific grasses, sedges and rushes that are preferred foods of ducks, geese and other waterfowl. The research cited here was identified in the **APIRS** database of the University of Florida. Though this database is about aquatic, wetland and invasive plants, it naturally includes much information about the animals that use them.

For the birds

Actually, it's *not* just for the birds. Research shows that the wild grasses, sedges and rushes of our wetlands are eaten and otherwise used by all kinds of animals including mammals as diverse as deer, rabbits, moose, cattle, alligators, beavers and boar. And, of course, birds.

Like other classes of animals, the birds include some species that are mostly vegetarian, some that are mostly carnivorous, and some that eat both plants and animals. Among the waterfowl, for example, wetland plant matter is very important to the diets of American widgeon, ring-necked ducks, redheads, gadwalls, mallards, pintails, wood ducks and canvasbacks; plant parts also are important to the diets of fulvous whistling ducks, green- and blue-winged teal, black ducks, spoonbill ducks, coots, moorhen, soras, Canada geese, snow geese, greylag geese, sandhill cranes, mourning doves, white-winged doves and other birds. Certain wetland grasses, sedges and rushes are also important as habitat and nesting materials. For example, American woodcocks have a special affinity for switch cane habitat (*Arundinaria*

gigantea), and clapper rails prefer to nest in black needle rush (*Juncus roemerianus*) (46).

Management objectives

The literature shows that there are many issues that wetlands managers must deal with, such as development, pollution, recreational uses ("consumptive" uses such as hunting and "non-consumptive" uses such as tourism), and non-native species invasions. All of these challenges also affect the wetland's populations of grasses, sedges and rushes, and the animals that depend on them.

"The first step to accomplishing the goal of marsh management for wildlife is to conduct a food habit study to determine if the best plants are growing in the marshes," according to H.F. Percival. To help answer this question for a South Carolina wetland, researchers investigated the conditions necessary for the growth of important wildlife plants such as soil nutrition, soluble salts concentrations and water level (40).

It is surprising how much wildlife food is produced in an acre of productive wetland. In a 1951 study by J.R. Singleton of the east Texas gulf coast, researchers found that in a single acre, *Scirpus robustus* produced an average of about 300 lbs. (dry weight) of seeds per acre per year; *Echinochloa walteri* produced about 800 lbs. of seeds per acre, *Cladium jamaicense* and *Polygonum hydropiperoides* each produced about 600 lbs. of seeds per acre, *Leersia oryzoides* produced about 150 lbs. of seeds per acre, *Rhynchospora corniculata* produced about 900 lbs. of seeds per acre, and each acre produced about 5 tons of plant corms (44).

Among their other responsibilities, wetland resource managers must control non-native invasive plants, lest they take over a wetland and replace native wildlife food plants. For example, F.A. Johnson noted that in central Florida, the very invasive torpedograss (*Panicum repens*) can become "dense enough to discourage waterfowl use". However, managers need to realize that when they are herbiciding, burning, chopping and otherwise controlling undesirable plants, they may also be killing very important grasses, sedges and rushes. According to Reid et al., "herbicide use has reduced grasses in the field" (46). When managers are controlling those familiar invaders such as cat-tail (*Typha*), silk reed (*Neyraudia reynaudiana*), elephant grass (*Pennisetum purpurea*) and para grass (*Brachiaria mutica*), they should take care that their herbicides and flames are not also killing those unfamiliar "other plants."

Food plants and birds

Birds are known to consume all parts of grasses, sedges and rushes, including tubers, rhizomes, stems, foliage, inflorescences and seeds. Therefore, work on the nutritional value and digestibility of wild plant parts has been conducted on *Scirpus americanus*, *Spartina* spp., *Juncus gerardi* and other grasses, sedges and rushes. (26).

In one unmatched study of mallard duck diets from 1918, W.L. McAtee reported collecting animals in 22 states and finding that mallards are mostly vegetarian, with more than 90% of their food being plant parts. Sedges (*Scirpus cubensis* and *Scirpus fluviatilis*), and *Fimbristylis*, *Cyperus* and *Cladium* comprised about a quarter of the mallard diet; with grasses (*Zizania aquatica*, *Echinochloa*, *Panicum* and *Spartina*) making up another 13%. The remainder of the mallard diet consisted of "smartweeds, 10%; pondweeds 8%; duckweeds 6%, coontail, 6%; wild celery 5%; sagittaria 5%; with the rest being acorns and berries" (30).

While some species of ducks eat more animals than plants, and some eat more plants than animals, for others the ratio depends on the habitat, food availability, and seasonality.

Seasonality in bird diets has been documented for several waterfowl species. Some kinds of ducks eat more animals during breeding/nesting season, and the same ones might prefer plant seeds during migration. For example, blue-winged teal change their diets seasonally, from eating aquatic invertebrates (such as gnats and small snails) in the breeding season, to eating mostly plant seeds during fall and winter (33). This may be due to the fact that animal foods provide more protein, possibly needed for egg development, etc., while plant seeds, rich in carbohydrates, provide more "quick energy" needed for flying.

In a study of gut contents of Wisconsin redhead ducks (*Aythya americana*), researchers found 34 animal species and 30 plant species. Seeds predominated in pre-laying birds; *Scirpus* seeds and *Potamogeton* tubers were the primary components of laying redheads (22).

Duck diets change not just seasonally, but also according to location and food availability. For example, a study found that canvasbacks in Louisiana ate lots of grasses, sedges and rushes (17), but in another study in Maryland they ate mostly

widgeongrass (*Ruppia* spp.) and *Potamogeton perfoliatus* (41).

Redhead ducks are so-called "diving ducks", so one might presume that redheads eat only underwater plants and animals. However, a study in North Dakota found that as much as 30% of the redhead duck diet was plant material, most of which was *Scirpus* seeds (11%), and seeds from a variety of other emergent plants including *Eleocharis* and *Echinochloa*. In fact, overall, redhead ducks ate more emerged plant food than submersed plant food (48).

Grasses sedges and rushes are important foods even to very aquatic birds, such as the bottom-sifting shoal-water spoonbill duck (*Spatula clypeata*). In one study, 16% of the spoonbill diet was *Scirpus*, *Carex* and *Cladium*, 11% was *Potamogeton* and 8% was *Panicum* spp. (31).

The most important "staging area" for migrating greater snow geese (*Chen caerulescens*) is a 3750-ha *Scirpus americanus* marsh, where rhizomes, shoots and stems make up about half their entire diet during the several weeks of both migration seasons (5).

Coots (*Fulica atra*) also are major wetland plant consumers. In one study on a Polish lake, two-thirds of the coot diet was plant parts and one-third was animals. Even though coots spend much of their time swimming and diving, the second-most important plant in the coot diet was *Phragmites australis* (after the bottom-growing *Chara* spp) (8).

Grow more grasses, sedges and rushes

In 1917, McAtee called for more dealers to grow and offer plants and seeds of various species of bur-reeds, pondweeds, cord grasses, bulrushes, saw grass, and sedges in order to supply wildlife managers who wanted to grow the right plants for birds (29).

In this booklet, McAtee tells managers how to propagate *Zizania aquatica* because wild rice, "in every stage of its growth is eaten by one or another of the North American ducks and geese, and practically all ducks feed on its ripened grain." It is "the staple fall food of many ducks in the numerous rice marshes of eastern U.S." This booklet also explains how to propagate chufas (*Cyperus esculentus*) and wild millet (*Echinochloa crus-galli*) (29).

Information abounds

Natural resource managers, including those workers who maintain and protect wetlands, lakes and rivers, should remember the importance of the "other plants" in their charge. Managers should learn about the grasses, sedges and rushes, and promote these and other plants that are essential to so many species of birds and other animals.

GRASSES, SEDGES AND RUSHES USED BY WATERFOWL --CITED RESEARCH ARTICLES

The following is a list of some of the feeding studies of water birds taken from the **APIRS** database:

Arundinaria gigantea stands -- a preferred habitat of American woodcock (Straw et al, (46))

Brachiaria extensa seeds -- a major part of the diet of fulvous whistling ducks in Louisiana ricefields. (20)

Carex spp. -- common snipe habitat (Arnold, (46))

Carex subspathacea -- a favorite food of geese (11)

Cladium jamaicense seeds -- very important to wintering gadwalls in Louisiana (39); a major food of ducks in SE Texas (44); a major food of mallards in the US (30)

Cyperus spp. -- a major part of the diet of fulvous whistling ducks in Louisiana (20); tubers are a major part of canvasback diet in Mississippi River Delta (17)

Distichlis spp. -- a food of sandhill cranes (46); among favorite food of gadwalls in Utah (13); eaten by mourning doves (46)

Echinochloa spp. -- eaten by mourning doves (46)

Echinochloa crus-galli -- a preferred food of pintail ducks in California (9), (10); a preferred food of green-winged teal (10); a major food of mallard ducks in the US

(30)

Echinochloa walteri -- a major food of ducks in SE Texas (44)

Eleocharis spp. -- a favorite food of gadwalls in Utah (13), and of ruddy ducks (48)

Eleocharis cellulosa -- a major food plant of ducks in Texas (44)

Eleocharis equisetoides and *E. quadrangulata* -- important foods to overwintering waterfowl in South Carolina (40)

Eleocharis parvula -- leaves eaten by wintering gadwalls in Louisiana (39); a major food plant of ducks in Texas (44)

Eleocharis quadrangulata -- a major food of ducks in Texas (44)

Fimbristylis spp. -- a major food of mallard ducks (30)

Juncus roemerianus -- favored clapper rail nesting habitat (Eddleman and Conway, (46))

Leersia spp. -- a major part of diet in 3-year study of redhead ducks in Wisconsin. (22)

Panicum spp. -- preferred food of mourning doves and white-winged doves (46); a major food of mallard ducks (30)

Paspalum distichum -- used by greylag and barheaded geese (36)

Phalaris arundinacea -- a major food of ring-necked ducks in Minnesota (16)

Phragmites communis -- a major plant food of coots in Poland (8)

Rhynchospora spp. -- a major food of fulvous whistling ducks in Louisiana (20)

Scirpus spp. -- a major component of the diet of ruddy ducks (48) and common moorhen (Griej, (46)), soras (Melvin and Gibbs, (46)), seeds very important to overwintering gadwalls in Louisiana, to redheads in Wisconsin (22); a major food of spoonbill ducks (31)

Scirpus acutus -- among favorite foods of gadwalls in Utah (13)

Scirpus americanus -- rhizomes and seeds a major part of diet in canvasbacks in the Mississippi River Delta (17)

Scirpus cubensis -- a major food of mallard ducks in US (30)

Scirpus fluviatilis -- a major food of mallard ducks in US (30)

Scirpus littoralis and *Scirpus maritimus* -- tubers eaten by wintering greylag geese in Spain (1)

Scirpus robustus and *Scirpus validus* -- important foods to overwintering birds in South Carolina. (40)

Scirpus subterminalis and *Scirpus torreyi* -- constituted 30% of the fall food diet of black ducks in Maine (34)

Setaria spp. -- preferred food of mourning doves and white-winged doves in southwestern U.S. (46)

Zizania aquatica -- "eaten by practically all ducks" (29); a favorite food of soras in upper midwest U.S. (Melvin and Gibbs, (46)); a major food of mallard ducks in U.S. (30); a major food of black ducks and wood ducks (29)

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Although the **APIRS** database collects literature on aquatic, wetland and invasive plants, this necessarily includes peripheral subjects such as animals which use these plants for food, habitat, nesting, etc. For example, the database contains over 1,000 references with the following keywords: (duck or ducks or birds or waterfowl or avian or geese or goose). (**NOTE:** if you use duck\$, you will retrieve a few hundred duckweed articles that don't necessarily pertain to ducks.) If you combine this search with (food\$ or feed\$ or diet\$ or consum\$ or graz\$ or herbiv\$), you will retrieve over 300 references. With (habitat or host plant\$ or nest\$ or breed\$) - over 680 references. With ((primary production) or productivity) - over 180 references that might report on the effects of herbivory on productivity, or the effects of productivity on bird habitat, foods, etc.

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NEW IDENTIFICATION TOOL!

Grasses, Sedges and Rushes of Wetlands Identification Deck -- With notes about wildlife use

A handy new identification tool, similar to the very popular *Aquatic Plants Identification Deck*, is "at the printer" and is expected to be for sale in April, 1999. The *Grasses, Sedges and Rushes of Wetlands Identification Deck* is a stack of 3" X 4" laminated cards, bound with two rings to open as a book. The deck is sturdy enough to withstand extensive field use in a wetland environment. It has identification text and line drawings on one page facing color photographs of the plants on the other.

Written by Victor Ramey, with the cooperation of botanist and noted wetland plant expert, David Hall, this ID deck treats 84 species of the most common and/or important grasses, sedges and rushes that occur in wetlands, including 22 non-native species. Each plant is well-described in terms that are readily understood by non-botanists. The ID deck is illustrated with 150 color photographs and 70 line drawings by Ann Murray, and is indexed according to scientific names, common names, and inflorescence shapes.

Incidental notes on each plant include its documented use by ducks, geese, swans and other waterfowl, since native grasses, sedges and rushes provide food, shelter and nesting habitat to many kinds of birds and other wildlife. The deck will teach managers, field personnel, students, and other wetlands enthusiasts to distinguish between the exotic elephant grass and native panic grasses, exotic para grass and native maidencane, and to identify and distinguish between 80 other grasses, sedges and rushes from *Amphicarpum muhlenbergianum* (blue maidencane) to *Zizaniopsis miliacea* (giant cut grass).

Each *Grasses, Sedges and Rushes of Wetlands Identification Deck* (Publication Number SP255) is \$12 plus S/H. It will be available from the University of Florida,

IFAS Publications, 1-800-226-1764. Please note that this item will not be available until April, 1999!

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The Literature on Seagrasses

A seemingly little known nugget of information within the Aquatic and Wetland (and now Invasive) Plant Information Retrieval System (APIRS) is the literature collection on seagrasses.

Probably due to our increasingly complex yet still not completely accurate name, few people seem to realize that we also collect the literature on our saltier friends, the seagrasses. This little-used body of literature on seagrasses constitutes approximately 10% of our collection, or approximately 5,000 references. We plan to increase the visibility of the seagrass collection to broader circles of researchers with hopes of increasing the use of the collection and possibly finding financial support to continue it. Please feel free to share this newsletter with any colleagues working on any aspect of seagrasses.

For those who work in the marine environment, here is a list of the number of references in the **APIRS** database on some of the various species of seagrass. The first number given indicates the number of citations where the species name is found *in the text but not the title* of the reference; the second number indicates the number of citations where the species name is found *in the title* of the reference (e.g., more specific or relevant references). Of course, many references refer to more than one species of seagrass.

Zostera - 670 (text), 510 (title) (total=1,180)

Ruppia - 627, 130 (total=757)

Thalassia - 479, 131 (total=610)

Halodule - 429, 67 (total=496)

Syringodium - 307, 33 (total=340)

Halophila - 294, 77 (total=372)

Cymodocea - 195, 62 (total=257)

Posidonia - 176, 238 (total=414)

Enhalus - 92, 5 (total=97)

Phyllospadix - 58, 17 (total=75)

Amphibolis - 55, 18 (total=73)

Thalassodendron - 48, 17 (total=65)

Total records in this list: 4,736

Sample keywords that can be used in combination with these plant species include 'host plants' (over 700 references), 'physiology/ photosynthesis' (over 650 references), 'reproduction' (over 300 references), 'fish\$' (over 300 references), and 'epiphytes' (over 250 references). Any keyword may be used when searching the **APIRS** database.

The **APIRS** collection contains hard copies of over ninety percent of the references listed in the database, and is available for the free use of researchers. In exchange, we expect those researchers to contribute reprints of their published work to **APIRS**. To access the database, go to our website at <http://aquat1.ifas.ufl.edu/> and click on the **Online APIRS Database** link. You must have a telnet application specified in your Internet browser. To request free searches of the database, contact Karen Brown at kpb@gnv.ifas.ufl.edu or use the address on the back page of this issue. Bibliographies can be printed and mailed, or sent via e-mail.

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Johnson's Seagrass Listed as Threatened

Agents of the National Marine Fisheries Service have issued a final rule (63 FR 49035) listing Johnson's seagrass, *Halophila johnsonii*, as a threatened species under the Endangered Species Act, with the conclusion that it is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Johnson's seagrass has one of the smallest geographic distributions of any seagrass; it is found only in lagoons on the southeastern coast of Florida.

Halophila johnsonii is dioecious (contains flowers of only a single sex on one plant). However, the male flower has never been recorded in the field or in laboratory culture. The absence of male flowers supports the hypothesis that sexual reproduction is absent in this species. Scientists have not observed new *Halophila* plants growing from root or stem fragments. Rather, the plant extends by branching and by growth of the rhizomes. This limited reproductive capacity further threatens the ability of the rare plant to survive human-induced or natural disturbances. Because it is most abundant amidst the heavy boating traffic of south Florida coastal area inlets and channels, potential threats to the diminutive seagrass include dredging activities, boat propellor and anchor damage, and storm events.

Identifying characteristics of *H. johnsonii* include smooth linear leaves with entire margins. Leaves are 10-20 mm long on long petioles and occur in pairs at each node. The plant has a creeping rhizome and sessile female flowers. The plant tolerates broad ranges of salinity, temperatures, and water levels. It is found on sandy intertidal shoals where it is exposed to drying, intense sunlight and extreme temperature changes during low tide. It also is found in deeper channels with swift, eroding currents.

Johnson's seagrass is one of twelve species of the genus *Halophila*. Most *Halophila* species are less than four inches tall, shallow rooted, and have two to three orders of magnitude less biomass per unit area compared to all other seagrasses. In contrast to the restricted range of Johnson's seagrass, other members of the genus have a

pantropical range. In addition, *Halophila* seagrasses cover the greatest range of water depths for seagrasses. They have been found growing in water depths of more than 100 feet deep, as well as in shallow estuaries and intertidal shoals. These seagrasses are known to provide a food source to green sea turtles, West Indian manatees, and dugongs.

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NOTE: The **APIRS** database contains 27 references on *Halophila johnsonii*.

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Odds n' Ends

Sprayer Technology News, an online bi-monthly magazine for the agricultural chemical applicator, has quite a bit of good, useful information. The current issue, for example, includes articles about the necessity of agitating the spray mix (and why), news about low rate spray technology, what it is about surfactants, and even how to take off your spray gloves. Recommended for those in the bizness. <http://www.spraytec.com>

Everglades restoration plan. The goal of the Central and Southern Florida Project Comprehensive Review Study, the "restudy", is to develop plans to spend several billion dollars to restore the Everglades and Florida Bay ecosystems, while providing for the other water-related needs of the region and the 5 million people who live there. The final plan is to be presented to Congress by July 1, 1999. The "draft implementation plan" and much more information about this huge restructuring of south Florida's landscape is online at: <http://www.restudy.org>

Korean Wetland Alliance, is a South Korean "umbrella organization committed to wetland conservation through research, education and action," and, apparently, is also very committed to political lobbying. The web site includes reports about all aspects of the wetlands of South Korea, including plants and animals that live in them, and maintains an online forum. <http://ecoserve.kfem.or.kr/wetland/>

Noxious Times. This is the online newsletter of the California Interagency Noxious Weed Coordinating Committee, and includes information about specific weeds and their control, legislation, and activities of the Committee. Nothing fancy (in fact, the type is almost too small to read); just lots of information: <http://pi.cdfa.ca.gov/noxioustimes/>

Minnesota Lakes Association is a statewide organization of more than 10,000 shoreland property owners. Its web site includes an online bibliography of 600 lake management and planning resources, and dozens of articles and publications about lakes, aquatic plants, lake improvement projects, freshwater festivals, advisories,

grants information... <http://www.mnlakesassn.org>

Friends of Lake Apopka, founded in 1991, is a citizen advocacy group dedicated to the "continued restoration of Lake Apopka", a large lake north of Orlando, Florida. The web site documents restoration work, nearby land purchases, has a history section which includes newspaper articles, and otherwise provides a forum for citizens who are concerned for the lake. <http://www.fola.org>

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Salvinia molesta found in U.S.

The famously disruptive floating plant, giant salvinia (*Salvinia molesta*), has finally been discovered established in the United States, covering significant areas of rivers in the states of Texas and Louisiana. Efforts are underway to eliminate these infestations. In an effort to identify new infestations of this very aggressive **aquatic weed**, and to help speed the deployment of management actions against the plant, the U.S. Geological Survey has issued a special alert to aquatics managers: **REPORT SUSPECTED SIGHTINGS**.

Giant salvinia has oblong floating leaves, ½ to 1-½ inches, often folded and compressed into upright chains. Leaf surfaces have white bristles or hairs joined at the tips to form a “cage”, visible with a hand lens. Bristles give a velvety appearance and repel wetting.

Please report suspected giant salvinia occurrences to your state department of wildlife or environmental protection, *and also* please report to the U.S. Geological Survey. Ms. Colette Jacono, a biologist with the USGS, is mapping new occurrences and also acting as a clearing house of identification and occurrence information. In addition, informative flyers are available from her for distribution to water and wetland management agencies, fish camps, sports organizations, homeowners associations and others likely to encounter giant salvinia.

For more information, contact Ms. Jacono (toll free) at 1-877- 786-7267, or view their web site at: <http://nas.er.usgs.gov/ferns>

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Center for Aquatic and Invasive Plants Meetings

May 15-18, 2008; Palmetto, Florida - www.fnps.org

28th Annual Florida Native Plant Society Conference Uplands to Estuaries: Celebrating Florida's Native Plant Heritage

May 20-22, 2008; Imperial Palace Casinos, Biloxi, Mississippi - <http://www.se-eppc.org>

10th Annual Southeast EPPC Conference

June 23-27, 2008; International Weed Science Society, Vancouver, Canada - <http://iws.ucdavis.edu/5intlweedcong.htm>

International Weed Science Society

Aquatic Weed Management

Contacts:

Mike Netherland, USA | mdnether@ufl.edu

Kevin Murphy, UK | k.murphy@bio.gla.ac.uk

June 23-26, 2008; University of Florida, Gainesville, Florida - <http://www.conference.ifas.ufl.edu/soils/wetland082/site.htm>

Biogeochemistry of Wetlands: Science and Applications Short Course

August 25-26th, 2008; LSU Energy, Coast, and Environmental Building, Baton Rouge, Louisiana - <http://www.sce.lsu.edu/conference>

Sustainable Management of Deltaic Ecosystems: Integration of Theory and Practice

September 7-12, 2008; Daniel Boone National Forest, Olympia Springs, Kentucky - http://tfce.uky.edu/wri_2008.htm

2008 Eastern Regional Wetland Restoration Institute

September 23-25, 2008; Austin Carey Memorial Forest Education Building, Gainesville, Fl. - <http://soils.ifas.ufl.edu>

Hydric Soils Short Course - Specialized Training for Wetland Specialists

UF/IFAS

October 21-23 , 2008; Austin Carey Memorial Forest Education Building, Gainesville, Fl. - <http://soils.ifas.ufl.edu>

Hydric Soils Short Course - Specialized Training for Wetland Specialists

UF/IFAS

November 12-14, 2008; Stellenbosch, South Africa http://academic.sun.ac.za/cib/events/Elton_CIB_symposium.htm

Fifty Years of Invasion Ecology - the Legacy of Charles Elton

Centre of Excellence for Invasion Biology, Stellenbosch University

November 18-20 , 2008; Austin Carey Memorial Forest Education Building, Gainesville, Fl. - <http://soils.ifas.ufl.edu>

Hydric Soils Short Course - Specialized Training for Wetland Specialists

UF/IFAS

June 23-26, 2009; Guadalajara, Jalisco, Mexico <http://www.paleolim.org/index.php/symposia/>

11th International Paleolimnology Symposium

August 23-27, 2009; Stellenbosch, South Africa www.emapi2009.co.za or rich@sun.ac.za

The 10th International Conference on the Ecology and Management of Alien Plant Invasions (EMAPI)

Centre for Invasion Biology (CIB), Department of Botany & Zoology, [Stellenbosch University](http://www.sun.ac.za)



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Books, Manuals, and Online Resources

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FROM THE DATABASE

Here is a sampling of the research articles, books and reports which have been entered into the aquatic plant database since September 1998. The database has more than 48,000 citations. To receive free bibliographies on specific plants and/or subjects, contact **APIRS** at 352-392-1799 or use the database online at <http://aquat1.ifas.ufl.edu/database.html>

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

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Effect of acrolein on *Potamogeton pectinatus* L. in irrigation channels.

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Some responses to our last issue:

“The interesting article on the edibility of *Trapa bispinosa* reminded me of something I saw during a recent trip to the Landesmuseum in Zurich, Switzerland. A display of the foods used by the ancient Celtic tribes and Swiss lake-dwellers of the area included a *Trapa* nut, apparently *T. natans*.”

Dr. Susan Sprecher, U.S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg, Mississippi.

“It was funny reading about the fruits of *Trapa natans* from Burma made into rosaries and sold in Italy, because I remembered that *Trapa natans* is an invasive plant proliferating in one of the lakes in North Italy.”

Dr. Francisco Comín, Universitat de Barcelona, Spain.

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Welcome

The **UF/IFAS Center for Aquatic and Invasive Plants** is a multidisciplinary research, teaching and extension unit directed to develop environmentally sound techniques for the management of aquatic and natural area weed species and to coordinate aquatic plant research activities within the State of Florida. The Center was established in 1978 by the Florida legislature. Directed by **Dr. William Haller**, the Center utilizes expertise from many departments with UF/IFAS and its Agricultural Research and Education Centers throughout Florida.

The mission of the **CAIP Information Office** is to inform and educate all stakeholders about the impacts and management of invasive plants.



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