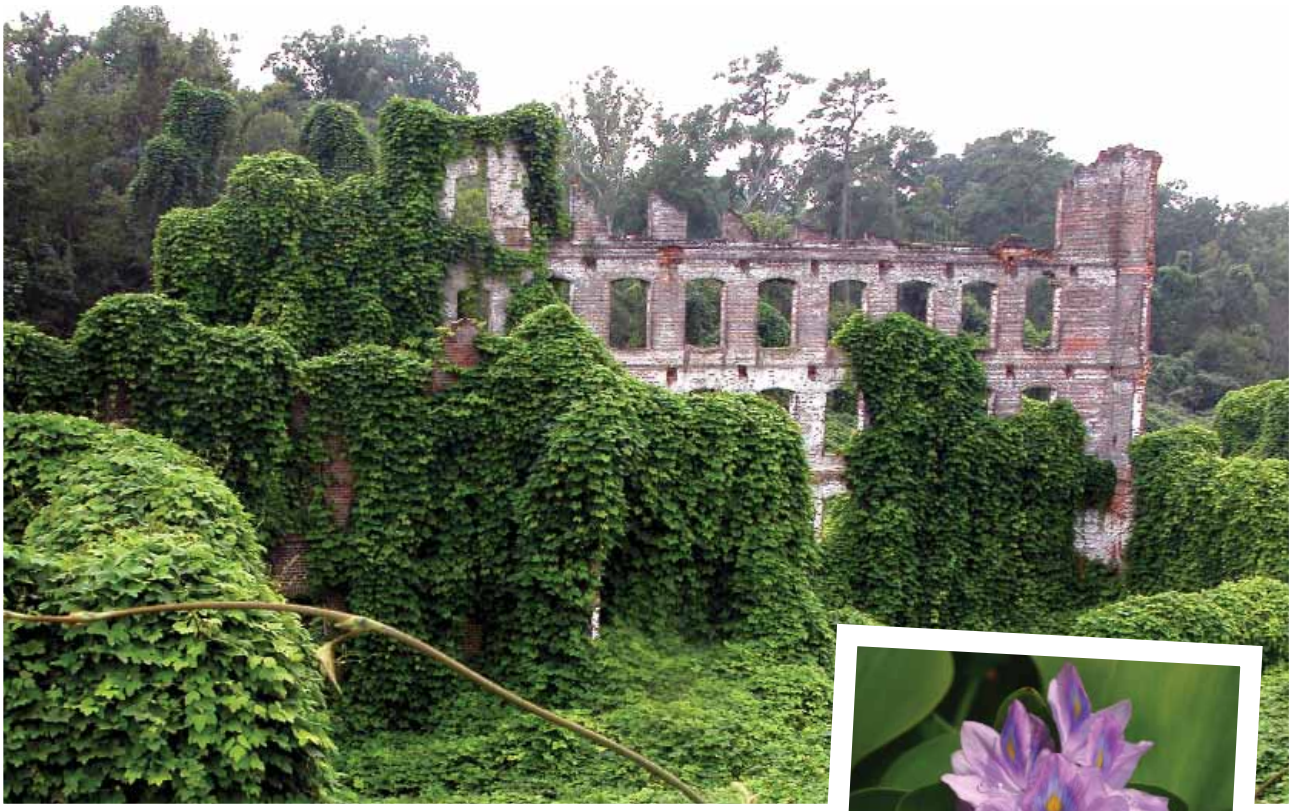
Wildland Weeds

WINTER 2006



JOHNNY RANDALL, NC BOTANICAL GARDEN

WILFREDO ROBLES, MSU

▲ Kudzu (*Pueraria montana*); ▶ Water hyacinth (*Eichhornia crassipes*)

Announcing the 2007 SE-EPPC Photo Contest

The SE-EPPC is having their second annual photo contest at the 2007 SE-EPPC Conference in Athens, Georgia. Winners will be announced during the annual conference (you do not have to be present to win) and highlighted on the SE-EPPC webpage. Unless otherwise noted, all images will be added to **www.invasive.org** photo archive and made available for educational and non-commercial use.

Submission of digital images can be made electronically by emailing bugwood@uga.edu. Slides, negatives (2"x2") or digital images (on a CD or other media) can be submitted either in person at the SE-EPPC Annual Conference in Athens, Georgia on March 20, 2007, or by mailing them to the address below (slides and negatives will be returned to the photographers after the contest). Digital photos should be submitted in as large a format/file size and as uncompressed as possible.

Mail slides or CDs to:
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CATEGORIES

- **SPECIMEN**
  Close up of an invasive plant
- **INFESTATION**
  Landscape photo of infestations
- **MANAGEMENT**
  Chemical, Mechanical or Biological
- **SERIES**
  (2-7 slides) where a single picture just won't tell the whole story (for example, before and after shots of control efforts)
- **HUMOR**
  Capture the lighter moments
- **OTHER**
  For subjects that don't conveniently fit into another category

Wildland Weeds

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The mission of the Florida Exotic Pest Plant Council is to support the management of invasive exotic plants in Florida's natural areas by providing a forum for the exchange of scientific, educational and technical information.

An exotic plant has been introduced to Florida, either purposefully or accidentally, from a natural range outside of Florida. A naturalized exotic plant is one that sustains itself outside of cultivation (it is still exotic; it has not "become" native). An invasive exotic plant not only has become naturalized, but it is expanding its range in Florida plant communities.

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On the Cover:
Heavenly bamboo (*Nandina domestica*) shows off its seasonal colors. This common landscape plant is a FLEPPC Category I species and an ALIPC Watch list A species (see centerfold).

Monitoring Ground Treatments of Old World Climbing Fern (*Lygodium microphyllum*) on the Arthur R. Marshall Loxahatchee National Wildlife Refuge: A Follow-up Report

by Mark. A. Barrett[1], Laura A. Brandt[1], and Bill Thomas, Jr.[2]

Introduction

In 2003, Thomas and Brandt reported on monitoring of ground treatments of Old World climbing fern (*Lygodium microphyllum*) at Arthur R. Marshall Loxahatchee National Wildlife Refuge (hereafter Refuge). The study examined the effects of ground treatment on percent cover of *L. microphyllum* and native vegetation over 3 years post-treatment. This report provides additional information for tree islands monitored 3 and 4.5 years post-treatment.

The Refuge, a northern remnant of the greater Everglades, comprises around 59,894 ha and includes wet prairie, slough, sawgrass marsh and tree islands. Wet prairie and slough habitats are dominated by thousands of tree islands, a unique natural resource that is being degraded by heavy infestation of *L. microphyllum*. Based on Systematic Reconnaissance Flights, *L. microphyllum* is estimated to impact approximately 25,200 ha of the Refuge (Woodmansee 2005). The heaviest infestations of *L. microphyllum* primarily occur on tree islands in the north-central marsh interior.

Although various methods of treatment (e.g., aerial application) are currently being employed at the Refuge, *L. microphyllum* infestation remains a widespread problem and a serious threat to tree island health. Finding cost-effective and successful methods to control infestations of *L. microphyllum* and other invasive species is a high management priority. This report provides supplemental data on the effectiveness of ground treatments on *L. microphyllum*, including impacts to, and regrowth of, *L. microphyllum* and native plant species on tree islands over time following the initial treatment efforts that occurred in 1999.

Methods

The following methodology was summarized from Thomas and Brandt (2003). Treatments of *L. microphyllum* were performed by a contractor (Enviroglades, Inc.) during August – December 1999. Approximately 140 tree islands (125 ha) in the north-central interior of the Refuge, moderately to severely infested with *L. microphyllum*, underwent ground treatments. Treatments consisted of cutting the ascending portion of the fern at waist or knee level followed by a foliar spray application (5% solution of glyphosate plus surfactant in water) to the remaining portion of the *L. microphyllum* rooted in the ground, i.e., 'poodle cut' technique. Small infestations were simply foliar sprayed and left intact. To prevent additional spread of spores, the ascending portion of the fern biomass was left on site clinging to native vegetation. Re-treatments occurred during November 2000 – January 2001.

Ten of the treated tree islands were selected for study post-treatment and monitored until 2004. Tree islands were selected by generating random points on a grid map of the 125 ha area, and selecting the nearest treated tree island. A 4m x 5m quadrat was placed in the center of each island to collect data on percent coverage

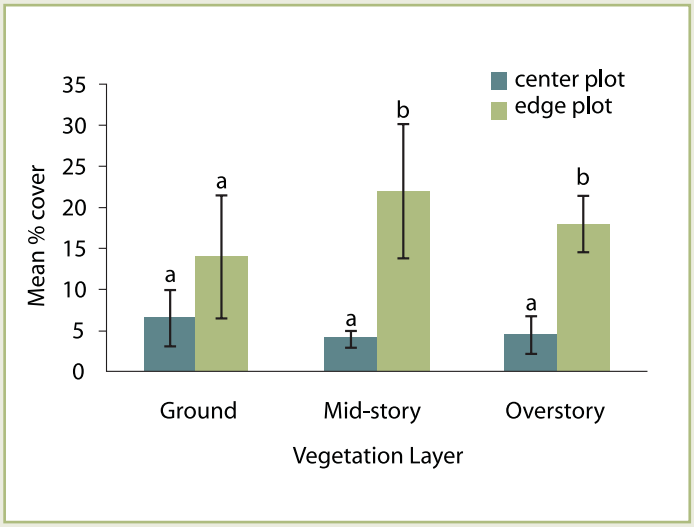

Figure 1. Mean (+ SE) percent cover of *L. microphyllum* in center plots versus edge plots on five tree islands on A.R.M. Loxahatchee NWR at 4.5 years post-treatment. Different letters indicate significant difference ($P < 0.10$) from Mann-Whitney U tests within ground, mid-story and overstory layers.

Vegetation layer	3 yr post-treatment min	max	M [a]	F [b]	4.5 yr post-treatment min	max	M	F
Lygodium microphyllum								
Ground	0	40	5	90	<5	30	<5	100
Mid-story	0	10	<5	60	0	10	5	70
Overstory	0	10	0	30	0	5	0	30
Native plant species								
Ground	13	73	30	---	10	85	26	---
Mid-story	<5	40	10	---	<5	33	24	---
Overstory	18	90	45	---	13	88	44	---

[a] median percent cover value for plant species in each layer
[b] F (percent frequency) = number of plots with *Lygodium* present in a layer / 10 plots

Table 1. Comparison of the range in percent cover, median percent cover and percent frequency of *L. microphyllum* and native species on 10 tree islands on A.R.M. Loxahatchee NWR. The table contains results for three vegetation layers at 3 and 4.5 years post-treatment.

[1]*U.S. Fish and Wildlife Service, A.R.M Loxahatchee NWR, Boynton Beach, FL;* [2]*U.S. Fish and Wildlife Service, J.N. Ding Darling NWR, Sanibel Island, FL*
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of live *L. microphyllum* and native vegetation in the ground (0-1 m), mid-story (1-2 m), and overstory layers (>2 m). Coverage for all plant species was visually estimated to the nearest 5%. The group of 10 islands was sampled twice annually for 4.5 years. This report, however, only examines data collected from 3 years post-treatment to 4.5 years post-treatment. For a summary of data collected prior to 3 years post-treatment, see Thomas and Brandt (2003).

At 3 years post-treatment, five additional sample plots were added near the edges of five of the 10 original islands that appeared to be experiencing significant regrowth of *L. microphyllum*. New quadrats on tree island edges were sampled twice annually for 1.5 years starting at 3 years post-treatment. *L. microphyllum* appears to establish at the edge and progress towards the center of tree islands. To examine this speculation, data from center plots were compared to data from edge plots using Mann-Whitney U tests on the five islands. Statistical analyses were conservatively evaluated at the $P = 0.10$ significance level due to small sample size.

Results and Discussion

For the 10 sample plots between 3 and 4.5 years post-treatment, percent frequency of *L. microphyllum* increased from 9/10 to 10/10 plots in the ground layer and 6/10 to 7/10 plots in the mid-story layer, but remained at 3/10 plots in the overstory (Table 1). By 4.5 years post-treatment, percent cover (median value) of *L. microphyllum* slightly decreased in the ground layer, slightly increased in the mid-story layer, and remained the same in the overstory layer (Table 1). Percent cover (median) of native species slightly decreased in the ground and overstory layers, but more than doubled in the mid-story layer (Table 1). Furthermore, the number of native plant species tended to increase in each vegetation layer by 4.5 years post-treatment. In general, from 3 years to 4.5 years post-treatment on the 10 study islands, the mean ± SE change in coverage of all vegetation layers combined was negative 6.5 ± 2.3% for *L. microphyllum* and positive 1.2 ± 7.9% for native plant species.

For comparison of mean cover of *L. microphyllum* between edge and center plots on five tree islands, infestation at 4.5 years post-treatment tended to be higher in edge plots than center plots (Figure 1). Cover of *L. microphyllum* in edge and center plots was not significantly different in the ground layer ($U = 13.5$, $P = 0.310$), but was significantly different in the mid-story ($U = 20.5$, $P = 0.095$) and in the overstory ($U = 25.0$, $P = 0.007$). Therefore, estimates of *L. microphyllum* cover in center plots are likely underestimating the degree of re-infestation on tree islands.

Conclusions

It appears that ground treatment on tree islands is effective in controlling *L. microphyllum* to a certain degree and that the native plant community on these treated islands is recovering over a 4.5 year period. Infestation levels showed greater increase in edge plots than in center plots, possibly due to quantity and availability of sunlight for growth or spore germination. Future monitoring should take into account the spatial patterns of re-infestation. Tracking infestation in the mid-story and overstory is most critical because

EXTRA! EXTRA!

Hot CD burning its way to number one!!!

Included in this issue is the chart-topping CD containing the hot, new
"FLEPPC Chinese Tallow Management Plan for Florida"
and the ever-popular, and newly updated,
"FLEPPC Brazilian Peppertree Management Plan for Florida."
Thanks to Cheryl McCormick-Rote, chair of the Chinese Tallow Task Force and
Jim Cuda, chair of the Brazilian Peppertree Task Force for spearheading these projects.
Extra copies of this CD are available for the asking from Mike Bodle at mbodle@sfwmd.gov.

Editor's Note: FLEPPC Invasive Species Task Force Chairs provide an ongoing forum to share information about the biology, distribution and control of the selected species. Each Task Force is directed to develop a statewide management plan for the species. These documents are dynamic and are to be revised and updated as new information arises. Management plans generally are distributed via *Wildland Weeds* magazine and the FLEPPC website (www.fleppc.org). Task Force Chairs serve as the primary point of contact to the general public, policy makers and the media on matters related to the selected species. They spearhead efforts to generate fact sheets, brochures, control guides and management plans for the general public and for resource managers. They also may organize workshops and/or regional field trips.

spore dispersion (mainly by wind) occurs primarily at these heights (Lott et al. 2003). A critical point for re-treating islands is when *L. microphyllum* reaches 25-30% cover in the mid-story (near the island edge) to limit potential spread of spores and to suppress infestations to manageable levels. Using center plots as estimates, *L. microphyllum* cover was not > 25% in the mid-story or overstory layers by 4.5 years post-treatment on any island (10 plots). However, using edge plot estimates, four of five islands had > 25% cover of *L. microphyllum* in one of these two layers. Extrapolated to the total islands treated (n = 140), this would account for approximately 112 islands (80%) having > 25% cover of *L. microphyllum* on the island edge in either the mid-story or overstory by 4.5 years post-treatment. Based on the above conclusions, it is recommended that tree islands be re-treated prior to 4.5 years post-treatment to limit re-infestation extent.

Despite the apparent short-term effectiveness of ground treatments, it is an expensive and time-consuming method (Thomas and Brandt 2003), especially in a large area that has limited access like the Refuge. It may not be feasible, therefore, to employ ground treatments as the primary method across the extent of the Refuge. It is likely more cost-effective to supplement ground treatments with aerial treatments in identified locations throughout the Refuge, as long as non-target damage is not considered severe. Aerial application could be principally utilized in areas that are not readily accessible by airboat or where ground treatments were deemed not to be cost effective. Initial aerial treatments should be followed-up with ground treatments for long-term control of *L. microphyllum* infestations. Inspections of current control methods using aerial-ground combination and ongoing research on an array of treatment types at the Refuge will help provide the information necessary to make effective management decisions in controlling *L. microphyllum* on tree islands.

Acknowledgements

We would like to thank everyone who assisted with field vegetation sampling. Special thanks go to the Florida Department of Environmental Protection - Bureau of Invasive Plant Management for providing funding for treatment of *L. microphyllum* on tree islands in the Refuge interior.

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Additional Report of *Lygodium microphyllum* Mats as a Potential Problem for Wildlife

by Jeffrey T. Hutchinson, UF / IFAS, Center for Aquatic and Invasive Plants

Anyone who has attempted to walk through a dense rachis mat of Lygodium fern (*Lygodium microphyllum*) knows it can be very difficult, even when using a chainsaw to cut a trail. Darby and McKercher (*Wildland Weeds*, Fall 2002) suggested that heavy infestations of Old World climbing fern could be dangerous to wildlife after the discovery of white-tail deer bones entangled in the rachis mat of the fern. In September 2006, while conducting herbicide trials on Old World climbing fern in a maple swamp at the Lakeland Wastewater Facility (Polk County), I discovered the empty shell of a male painted turtle (*Chrysemys* spp.). There was no sign of predation on the shell. Old World climbing fern coverage along the area where the turtle was found was >95%, indicating its movement may have been fatally hindered by the rachis mat.

The turtle apparently had been crawling underneath the fern canopy along a small wildlife trail towards a small wetland about 5 m away when it became entangled in the rachis mat. Multiple rachis stems ascending from rhizomes could easily entangle a turtle's legs, neck, carapace, plastron or a combination of these, resulting in death from exhaustion or starvation. Areas within 15-20 m to the north and south of the site did not contain any Old World climbing fern and were dominated by clumping ferns such as cinnamon *(Osmunda cinnamomea)* and royal *(Osmunda regalis)*, with many open areas in which a turtle could easily traverse.

Areas with heavy infestations of Old World climbing fern frequently have well-defined wildlife trails and tunnels utilized by wild hogs, raccoons, and possibly small mammals (Daniel W. Clark, M. S. Thesis, Univ. of Florida, 2002). While large mammals can probably forage or move about in heavy infestations of Old World climbing fern when not threatened by predators or fast moving fires, it is unlikely that slower moving, less mobile species such as turtles could navigate through the thick rachis mat. Additionally, the extremely high temperatures of fires involving Old World climbing fern could result in increased mortality as wildlife becomes trapped in the rachis as they attempt to flee or seek refuge in burrows, wetlands, etc. Other possible effects include the alteration of habits and movement patterns due to the almost impenetrable rachis, and a decrease in wildlife utility due to the competitive displacement of native plant and animal species used for food and habitat.

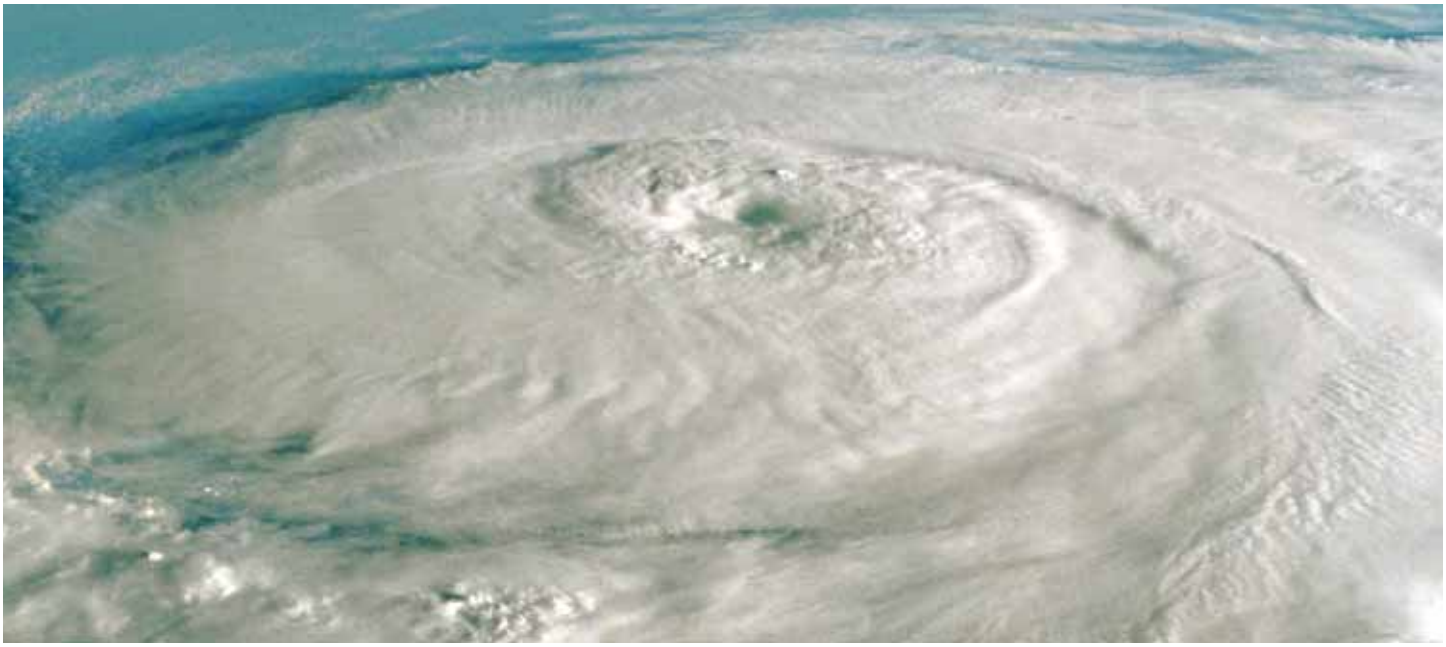
Though observations are limited, this and Darby and McKercher's report offer some evidence that Old World climbing fern can potentially result in wildlife mortality. No other documentation is known. However, knowing the difficulty humans have in walking through Old World climbing fern, it is likely that, at a minimum, heavy infestations of the fern have a deleterious effect on the movements of some species of wildlife.

For more information, contact the author at jthutchinson@ifas.ufl.edu

MSEPPC Program: Effects of Hurricanes on Invasive Species

by Lisa Yager. The Nature Conservancy, Camp Shelby Field Office, CSTS-ENV, Building 6678, Camp Shelby, MS 39407, lyager@tnc.org

On June 27, 2006, the Mississippi Exotic Pest Plant Council sponsored a program addressing the effects of hurricanes on invasive species. This topic had particular relevance to Mississippi since Hurricane Katrina brought such widespread destruction when it came ashore at the Mississippi/Louisiana state line on August 29, 2005. One of the most damaging storms on record and a strong Category 3 hurricane, Katrina had hurricane force winds extending 125 miles from the center and a storm surge which extended 3.7 miles inland. However, hurricanes are a regular and natural event within the southeastern United States and many land managers can expect to be impacted. Four speakers (Gary Ervin, Dearl Sanders, Riley Hoggard, and Randy Westbrooks) spoke about the potential effects of Katrina and other hurricanes on invasive species spread and establishment. Following are summaries of three of the presentations.



Managing Invasive Species in the Face of Natural Disaster: Obstacles and Opportunities

by Gary N. Ervin

Storms such as hurricanes and tornados provide obstacles for invasive plant control as they provide opportunity for the establishment of new weed populations through wind and water movement of plant propagules, or by transport of propagules in and on vehicles that assist in recovery efforts (e.g., Hodkinson & Thompson 1997). Less immediately obvious, such storms may affect landscape habitat properties (e.g. resource availability and heterogeneity) which may allow for an increase in invasive plant establishment.

Research in forests following hurricanes and experimental canopy destruction provides insight into the potential effects these storms can have on the spread of invasive species. Work in the Harvard Experimental Forest (Harvard University) demonstrated a significant shift in both resource availability and variation among resources in microhabitats created by experimentally damaged canopy trees. For example, light availability increased threefold in damaged plots and was twice as variable as in undisturbed forests (Carlton & Bazzaz 1998). After Hurricane Fran struck North Carolina in 1996, Boutet & Weishampel (2003) found the height of forest canopies to be reduced considerably. This reduction would have increased light availability in the understory. They also found significant increases in spatial variability in the canopy. Such increases in resource and microhabitat variability are expected to enhance the ability of colonizing species to establish in disturbed areas, including potentially invasive weeds. Work in herbaceous wetlands where soils had been disturbed by tillage showed exactly such a pattern (Ervin unpublished). Variability in the plant litter layer and soil microtopography both decreased with time after disturbance, as did the number of non-native and invasive plant species. Statistical analyses demonstrated a close positive correlation between microhabitat heterogeneity and exotic species richness, at scales from 25m^2 to 812m^2.

The disturbance of forest canopies by storms can provide new pathways for dispersal of invasive species. This effect would be expected to be greatest when the timing of damage corresponds with the timing of natural propagule maturity and dispersal. For example, Yager et al. (2005) showed that wind can disperse spikelets of cogongrass (*Imperata cylindrica*) considerably farther through relatively open, savanna-like habitats than through pine forests with a dense shrub mid- or understory. This is particularly troublesome considering cogongrass seed matures around the time that Mississippi and adjacent states annually experience tornados, some of which can cause large-scale forest damage.

While storm disasters with their ensuing chaos and destruction may present obstacles to invasive plant management, land managers should learn from recent and previous disasters to improve our abilities to rapidly respond to new threats created by large, destructive storms. Ramsey et al. (2001) used remote sensing to accurately estimate forest canopy damage in southern Louisiana following Hurricane Andrew in 1992. Such approaches could be implemented easily with the modern accessibility of land cover and meteorological data. Results then could be coupled with maps or models of species distribution across a region of interest to predict areas where particular species would be most likely to establish following a storm, and management efforts could be focused in those areas. These activities represent the essence of the Early Detection-Rapid Response approach advocated by Westbrooks (2004) and others and may be the most efficient means of reducing risk after natural disasters.

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Observations Concerning the Spread of Non-native Plants in the Wake of Hurricane Events

by Riley Hoggard

The northern Gulf coast has experienced a number of tropical storm events in recent years, specifically Hurricane Ivan in 2004 and Hurricanes Dennis, Katrina, and Rita in 2005. With a number of park sites along the Florida, Mississippi, Louisiana, and Texas coasts, The National Park Service has experience in restoration following storms, plus realistic expectations of additional plant infestations. Examining the spread of non-native species following the earlier storms provides some insight on what to expect along the Mississippi coast in the wake of Hurricane Katrina.

Following Hurricane Ivan, Gulf Islands National Seashore observed a substantial spread of torpedograss *(Panicum repens)*. The highly invasive grass was observed mainly along the northern shorelines of the barrier islands and the southern shorelines of the mainland where a sizeable margin of it became established between the water and the uplands. Drainage ditches and other areas that would have been inundated with persistent storm surge seemed also to be particularly susceptible to torpedograss establishment. In areas where a natural understory remained, torpedograss has rarely been seen.

The spread of previously existing cogongrass *(Imperata cylindrica)* appears to have been facilitated through the loss of both canopy and understory, as well as the ground disturbance resulting from cleanup and restoration activities. Chinese tallow (*Sapium sebiferum*) re-infested previously treated sites and infested new sites with even minimal canopy loss or mechanical disruption.

Certain non-natives are being watched but not actively controlled such as rattlebox (*Sesbania punicea)*. Following Hurricane Opal in 1995, rattlebox infestations were short lived with no observable change in the native plant cover. Mobile Bay experienced a major rattlebox infestation following Opal that only persisted for about two years. With no control, rattlebox disappeared without displacing any of the natives and Mobile Bay has essentially been clear of rattlebox since.

In anticipation of the spread of Chinese tallow into Hurricane Katrina canopy-damaged and blow-down areas, Jean Lafitte National Historical Park has undertaken a policy of preemptive strikes. Using crews of volunteers, employees, and National Park Service Exotic Plant Management Teams, the park has begun to remove existing tallow trees from multiple sites within the Barataria Preserve in an effort to remove the source material.

The spread of non-native plants is facilitated and enhanced by tropical storm events. Unfortunately, this spread can be over hundreds of miles. A case-in-point is Padre Islands National Seashore. Several weeks after Hurricane Katrina, the park's south Texas beaches were covered with the rotting vegetative matter of giant cut grass (*Zizaniopsis miliacea)*. Cut grass is used extensively in Louisiana, especially around New Orleans, on flood control levees to stabilize the soil and prevent erosion. Although no new cut grass growth has been observed on Padre's beaches, is it just a matter of time?

Riley Hoggard. National Park Service, Gulf Islands National Seashore, 1801 Gulf Breeze Parkway, Gulf Breeze, FL 32563, Riley_Hoggard@nps.gov

What Katrina and Rita May Send You (other than $3 gas)

by Dearl E. Sanders

The destruction that hurricanes Katrina and Rita brought to the Gulf Coast in 2005 has been well documented on national television and in the press. Following the devastation, help came from around the nation. Federal troops, utility crews, law enforcement, fire fighters, NGO's and FEMA contractors from around the country poured into the states of Louisiana and Mississippi and continue to do so. After the storms, millions of downed trees were salvaged by timber crews from throughout the nation, especially the west. One of my concerns and a concern to others is the fact that most of this help arrived by vehicle and will depart by vehicle, while passing through some of the south's most heavily infested areas of invasive plants. Due to a severe shortage of clean water in the aftermath of the hurricanes, vehicles were not washed off prior to their departure. Since they had been in and through heavily weed and seed infested areas, and since vehicles have so many areas for seeds and weed fragments to stick, this will likely speed up the unwanted movement of invasive plants to areas of the US where they currently do not occur. Usually invasive plants move in a fairly slow and predictable manner across the landscape. This unprecedented movement of vehicles into and out of infested areas may allow some of these plants to "jump" large areas to their new homes.

Most Likely to Move

Anyone in the world with a TV or newspaper is now familiar with the areas of New Orleans and the Mississippi coast. These areas, especially St. Bernard Parish, are heavily infested with cogongrass (*Imperata cylindrica)*. Cogongrass has spread steadily from southern Alabama across the mid-south since the early 1930's. It is a perennial grass with rhizomes and is identified by its silvery plume-type seed head in early spring and an off center midrib. Wherever introduced, it has predominated most non-cultivated areas, including roadsides, pine plantations, pastures, etc. It is able to outcompete all of our southern forage and native grasses. It is nonpalatable to livestock and represents a major fire threat.

The area of south Mississippi near where Katrina came ashore is home to Tropical soda apple (*Solanum viarum)*. This member of the nightshade family has spread from Florida into south Mississippi. It is a large thorny relative of horsenettle *(Solanum carolinense)*, produces thick hedges, and is difficult to control.

Itchgrass (*Rottboellia cochinchinensis*) is a common roadside pest in southwest Louisiana where Rita flooded approximately 2,500 square miles. It is a prolific seed producing annual covered with fiberglass-like hairs. Nonpalatable to livestock, it readily colonizes both crop and non-crop areas. Seed is produced in jointed segments in an unusual spike type seed head. These jointed segments also float, which tends to increase its movement and attachment to vehicles in flooded situations.

J. J. MULLAHEY, UF

Tropical soda apple, *Solanum viarum.*

Chinese tallow (*Sapium sebiferum*) is a rapid growing weedy tree with milky sap. It is well established in south Louisiana and coastal Texas. It has become the predominant woody species in large areas of southwest Louisiana. It is a prolific seed producer and is not controlled by mechanical means. Cutting produces numerous sprouts, with repeated cutting producing solid stands of the tree.

A number of invasive aquatic plants are found in both the Katrina and Rita impacted areas. Some, such as giant salvinia (*Salvinia molesta*), are a national threat. Others, such as red rice (*Oryza sativa*), represent a serious threat to rice producing areas in California. All of these invasive aquatic plants, with the exception of salvinia, produce seed. Washing contaminated vehicles near drains, ditches, or other areas with access to water will certainly increase the likelihood of these plants becoming established in new areas.

What to Do

Most states have a quarantine official in the respective state's department of agriculture, natural resources, environmental quality, etc. It is recommended that all equipment that was moved out of the impacted areas be cleaned as soon as possible. These staging areas, equipment yards, firehouses, etc. should be inspected regularly for the presence of any plant that looks unusual or out of place. If something is discovered, contact the state quarantine official or an appropriate weed scientist within the state for proper identification. If an invasive species is discovered, ask for a complete and immediate control and monitoring program. Recommendations for controlling these weeds are available from the Louisiana State University AgCenter (www.lsuagcenter.com) or Mississippi State University (www.msucares.com).

Dearl E. Sanders, LSU AgCenter, Idlewild Research Station, dsanders@agcenter.lsu.edu

The beauty of Sonar* is measured by what it does not do.

A beautiful lake can turn ugly once invasive aquatic weeds like hydrilla or Eurasian watermilfoil take over. But before you introduce non-selective grass carp or launch a mechanical harvesting program, consider what Sonar Aquatic Herbicide does not do.

Sonar does not eliminate desirable vegetation. SePRO has the technology to manage application rates and monitor the treatment progress to ensure that invasive species are removed with minimal effect on native plants and the lake's ecosystem. After treatment, desirable native species are allowed to thrive and often become more abundant, creating a more diverse habitat.

Sonar does not harm fish or waterfowl nor carry any restrictions for using treated water for swimming, fishing, boating or drinking—when used according to label directions—which is unique among aquatic herbicides.

The one thing Sonar does do is restore a lake to its more natural, pristine condition. Sonar has been used by wildlife groups to successfully restore numerous aquatic habitats. In addition, a lake treated with Sonar often requires fewer re-applications than lakes treated with other aquatic herbicides. That's because results can last for more than just one season.

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SePRO Corporation Carmel, IN 46032

Sonar*

Restores Aquatic Habitats

FLEPPC Education and Outreach Small Grants

Request for Proposals - FY 2007 • **Proposal Due Date:** March 1, 2007

Program Description and Eligibility

The Florida Exotic Pest Plant Council is soliciting grant proposals for non-native invasive plant education and outreach projects in the State of Florida. The intent of these grants is to provide funding to organizations or individuals who wish to educate the public about non-native invasive plants and their effects on the environment and economy of Florida. Proposals will be accepted from individuals, public or private nonprofit organizations, and academic institutions.

Evaluation Criteria

Award preference will be given to proposals that meet the following criteria:

- Involve a plant or plants listed on the FLEPPC 2005 List of Invasive Species (www.fleppc.org);
- Educational message will reach a large segment of the community;
- Include partnerships (please specify type and degree of involvement for partner entities);
- Demonstrate matching funds or in-kind contributions;
- Increase local community awareness of non-native plants through local charettes, volunteer events, web site development, and distribution of educational materials;
- Evaluate the project success through process or outcome evaluation;
- Heighten community awareness about non-native invasive plant identification, control, and prevention;
- First time applicants and new projects, although repeat applicants will still be considered.

Application instructions and further information may be found on the FLEPPC website (**www.fleppc.org**). Grants may not be used to fund capital expense items (sprayers, chain saws, machinery, herbicide) or to fund control or large-scale herbicide application activities. Requests for funding should not exceed $1,000.00 and all funds awarded are to be used within 1 year of receipt. If full funding is not available, partial funding may be awarded.

Applicant/organization must present a summary of results at the FLEPPC Annual meeting (poster or presentation) or provide a summary article for Wildland Weeds, the FLEPPC quarterly magazine.

The FLEPPC Education Committee will review all grants and award letters will be sent via electronic mail by May 1, 2007.

FOR FURTHER INFORMATION, contact Leesa Souto, Director of Public Education
Email: Lsouto@mail.ucf.edu • Phone: 321-722-2123 • Fax: 321-722-3585 (call first)

Alabama Invasive Plant Council

"Rescuing and Preserving Our Natural Heritage"

List of Invasive Plants by Cultural Use Categories

by James H. Miller, USDA Forest Service R&D, Nancy J. Loewenstein and Curtis J. Hansen, Auburn University

Shortly after formation of the Alabama Invasive Plant Council (ALIPC) in 2003, a committee dedicated to assessment and listing of invasive plants was convened – the ALIPC Invasive Plant Listing Committee. Committee members were drawn from the wide diversity of expertise of the Council, which welcomes participation by all land-use and water-use managers, owners, stewards and agencies. *Alabama's 10 Worst Invasive Weeds* were named through review and consensus in the later part of 2003. The list was published in a brochure (www.se-eppc.org/pubs/alabama.pdf), which also conveyed information on ALIPC's purpose and a membership application (over 8,000 copies of this brochure have been distributed). This led to the inherently more difficult task of developing an expanded invasive plant list, especially given the wide diversity of ALIPC's membership and Board of Directors and their traditional individual specialty focus. Considering neighboring land-use and shared invasive plant problems became a learning experience as we worked towards compromises to minimize overall impacts.

In order to include the expert viewpoints of the range of stakeholders, we developed a spreadsheet based on cultural use categories (e.g. natural areas, urban, managed forests, wildlife habitats, rights-of-way, aquatic and wetland, pasture, row crops and nurseries), with two "watch" lists. In addition, plants utilized as crops or ornamental species in a given land use type, were indicated with a 'C' or 'O', respectively, to indicate interactions between planted and invading species. For each species within a use type, a severity ranking was developed and assigned. Plants were included on the list and ranked based on expert opinion and on their meeting a list of criteria (see below) using a modified version of "The Evaluation of Non-native Plant Species for Invasiveness in Massachusetts (Final Report, May 3, 2005)" by the Massachusetts Invasive Plant Advisory Group (http://www.newfs.org/conserve/docs/MIPAG040105.pdf accessed October 30, 2006.)

Approach

The expanded non-native invasive plant list for the state of Alabama was developed by the ALIPC Invasive Plant Listing Committee comprised of individuals representing a variety of stakeholders within the state of Alabama (see acknowledgements). Input was also obtained from various plant, fisheries and wildlife experts, and from the ALIPC Board of Directors. The sequence of developments follows:

May 2004 – A spreadsheet showing the 400 species inventoried as invasive plants in the Southeast (http://www.invasive.org/seweeds.cfm) was distributed to ALIPC members at the annual meeting in a questionnaire format. Input was requested on which species were considered invasive in Alabama. While the response to this request was low, some valuable insights were obtained and conflicting opinions revealed.

Oct. 2004 – The ALIPC Listing Committee drafted an invasive plant list, based on the input received from the questionnaire and on their professional experience. The list contained approximately 100 species that drew further from an inventory of invasive plants by county in Alabama's herbaria compiled by Hansen and Loewenstein. Using the TN EPPC model, plants were ranked using three "severity" and two "watch" categories.

Nov. 2004 – The draft list was presented to the ALIPC Board, and generated heated discussion. Some board members objected to the inclusion of several widely planted species and they further recommended that the list be limited to 40 species. The list was returned to the committee for further work.

Spring and summer 2005 – The list committee devised a cultural use categorization approach to address differences in use versus invasion, and to highlight the various habitats that are impacted by invasive plants. Inputs from ALIPC members, plant and wildlife experts and the ALIPC board were again solicited via email, and responses were incorporated into the next version. The revised list was again sent for review by the ALIPC board and membership for continued refinement.

Nov. 2005 – The "Top 50 Worst Invasive Plants" list was submitted to the ALIPC Board, once again generating heated debate focused on the inclusion of Bermuda grass (*Cynodon dactylon*), bahia grass (*Paspalum notatum*), tall fescue (*Lolium arundinaceum*), crabgrass (*Digitaria* sp.) and purple nutsedge (*Cyperus rotundus*). It was expressed that crabgrass and purple nutsedge are so widely occurring, to the point of diluting ALIPC efforts, while other species, planted for soil stabilization, have no readily available substitutes. Compromise discussions among and across stakeholder groups followed. More transparent and structured objectives and criteria for listing species were developed based loosely on guidelines employed by the State of Massachusetts to address concerns regarding the exact purpose of this list. The Board passed a resolution precipitated by these debates that gives the Board final approval authority of the ALIPC Invasive Plant List.

Feb. 2006 – The revised list of invasive plants with deletions, a statement of listing objectives (based on TN EPPC), and criteria for plant evaluation were approved by the ALIPC Board. During this board meeting, an annual procedure for nominating plants for inclusion or removal was developed and approved. The procedure will be initiated with a call for nominations to all membership in mid-summer. Suggested additions or deletions will go to the Listing Committee for research and study, and these will be presented to the Board at the winter meeting for discussion. A majority approval vote by the Board will be required to make the suggested change to the invasive plant list. These will then be presented to the membership at the Annual Conference.

Alabama Invasive Plant Council List of Invasive Plants by Cultural Use Categories		Urban and Interface	Managed Forests	Natural Areas and Parks	Wildlife Habitat/ Food Plots	Rights-of-Way	Aquatic-Wetland / Riparian	Pastures/ Orchards	Rowcrops/ Nurseries
TREES									
tree-of-heaven	*Ailanthus altissima*	2,O	1	1		1			
silktree	*Albizia julibrissin*	2,O	2	1		1			
chinaberrytree	*Melia azedarach*	2,O	W	2		2			
princesstree	*Paulownia tomentosa*	1,O	2	2					
callery pear "Bradford" *	*Pyrus calleryana*	2,O	W	2		O			
tallowtree	***Triadica sebifera***	2,O	1	1	1		1		
SHRUBS									
thorny olive	*Elaeagnus pungens*	2,O	2	2	2,C	2,O			
autumn olive	*Elaeagnus umbellata*	W,O	2	1	C				
glossy privet	*Ligustrum lucidum*	W,O	2	2		2			
Chinese privet	***Ligustrum sinense***	1,O	1	1	1	1	2	1	W
Bell's honeysuckle	*Lonicera X bella*	W,O	2	2	C	2			
Amur honeysuckle	*Lonicera maackii*	W,O	W	1	C				
multiflora rose	***Rosa multiflora***	2,O	W	1	1	2		1	
tropical soda apple	***Solanum viarum***		W	2	W	W		1	
VINES									
Chinese yam	*Dioscorea oppositifolia*	2,O	2	1		2	2		
English ivy	*Hedera helix*	1,O	2	1					
Japanese honeysuckle	*Lonicera japonica*	1,O	1	1	C	2	1		
Japanese climbing fern	***Lygodium japonicum***	2	1	1	2		1		
kudzu	***Pueraria montana var. lobata***	1	1	1	1,C	1		1	
Chinese wisteria	*Wisteria sinensis*	1,O	2	1		1			
GRASSES, GRASS-LIKES, AND CANES									
giant reed	*Arundo donax*	W,O		W		2	W		
cogongrass	***Imperata cylindrica***	W	1	1	1	1	1	1	W
Nepalese browntop, Japanese stiltgrass	*Microstegium vimineum*	2	1	1		1	1		
torpedo grass	*Panicum repens*	1		2		2	2	1	
golden bamboo	*Phyllostachys aurea*	2,O	2	2		1			
Johnsongrass	*Sorghum halepense*	2	2	2	1	1		1,C	1
FORBS (Broadleaf Plants)									
nodding plumeless thistle, musk thistle	*Carduus nutans*			2		1		1	
elephant ears, coco yam	*Colocasia esculenta*	2,O					2		
tropical spiderwort, benghal dayflower	*Commelina benghalensis*		W			W	W		2
hairy crabweed, mulberry weed	*Fatoua villosa*	2							2
shrubby lespedeza	*Lespedeza bicolor*		2	2	C	2,C			
Chinese lespedeza	*Lespedeza cuneata*	2	2	2	C	2,C		2,C	
purple loosestrife*	*Lythrum salicaria*			2			2		
Asiatic dewflower, wartremoving herb	*Murdannia keisak*				W		2		
chamber bitter	*Phyllanthus urinaria*	1		W	W	W	W	2	W
sicklepod, Java-bean	*Senna obtusifolia*	2	1	2	1	2			1
blessed milkthistle	*Silybum marianum*			2				2	
AQUATIC and WETLAND PLANTS									
alligatorweed	***Alternanthera philoxeroides***	W		1	1		1		1
common water hyacinth	*Eichhornia crassipes*	W					1		
hydrilla, waterthyme	***Hydrilla verticillata***	W					1		
parrot feather watermilfoil	*Myriophyllum aquaticum*	W					1		
Eurasian water milfoil, spike watermilfoil	***Myriophyllum spicatum***	W					1		
common reed* (grass)	*Phragmites australis*	W					1		
water lettuce	*Pistia stratiotes*	W					1		
giant salvinia, kariba-weed	*Salvinia molesta*	W					1		
Watch list A: Recently appearing in Alabama as free living infestations									
garlic mustard (forb)	*Alliaria petiolata*	W	W	W		W			
hen's eyes, coralberry (forb)	*Ardisia crenata*	W	W	W					
bushkiller (vine)	*Cayratia japonica*	W							2
Oriental bittersweet (vine)	*Celastrus orbiculatus*	W,O	2	W					
Canada thistle (forb)	*Cirsium arvense*			2		2		W	
bull thistle (forb)	*Cirsium vulgare*					W		W	
water yam (vine)	*Dioscorea alata*	W,O		W			W		
air yam (vine)	*Dioscorea bulbifera*	W,O		W			W		
Japanese privet (shrub)	*Ligustrum japonicum*	W,O	2	W		W	W		
Morrow's honeysuckle (shrub)	*Lonicera morrowii*	W,O	W	W		W			
Beale's barberry (shrub)	*Mahonia bealei*	2,O	W	W	C,W				
nandina, sacred bamboo* (shrub)	*Nandina domestica*	W,O	W	2			W		
Japanese knotweed (shrub)	*Polygonum cuspidatum*		W	W		W			
Macartney rose (shrub)	*Rosa bracteata*	W	W	W				2	
Cherokee rose (shrub)	*Rosa laevigata*	W	W	W		W			
Watch list B: Invasive in adjacent states or planted in Alabama									
Chinese silvergrass, silverplume grass* (grass)	*Miscanthus sinensis*	O	W	W					
wetland nightshade, scrambling nightshade (shrub)	*Solanum tampicense*			W			W		

O = Ornamental
C = Crop
W= Watch
1 = Extensive and dense infestations in AL or severe invasive in an adjacent state
2 = Scattered and localized infestations in AL
Bold indicates Alabama's Worst 10
* Invasiveness may vary by subspecies and variety.

The Purpose and Objectives for Listing and Categorizing Invasive Plants in Alabama

The intent of this list is to:

1. Rank plants based on their invasive characteristics;
2. Foster early detection of invasive plants so that landowners, managers, and stewards can implement a rapid response to prevent them from becoming established and spreading;
3. Educate the general public, resource managers, landowners, and plant growers in an effort to eliminate the use of invasive plants in landscaping, restoration, and enhancement projects.

This list has no regulatory authority but provides useful information to help guide agencies, private landowners, and water managers in making responsible decisions about plant use and management decisions. The Council acknowledges that most introduced species are harmless. However, it also stresses that many species do escape cultivation, pasturage, landscaping, and water gardens and have the potential to spread and become ecological disasters.

Criteria for Evaluating Plant Species for Invasiveness in Alabama

Category 1:

1. The plant species is non-native to Alabama.
2. The plant has the potential for rapid growth, high seed or propagule production and dissemination, and establishment in natural communities or in managed areas where it is not desired.
3. The plant persists in free living infestations (without cultivation).
4. The plant is widespread in Alabama or is at least common in a region or habitat type(s) in the state.
5. It occurs in dense stands of numerous individuals in minimally managed areas or in managed areas where it is not desired.
6. It is able to out-compete other species in the plant community, thereby impacting native plant biodiversity and/or ecosystem function.

Category 2:

7. The plant meets criteria 1-3.
8. It occurs as localized infestations within one or more habitat or land-water use types across the state.
9. It occurs as scattered individuals within at least one habitat or land-water use type.

Watch list A:

10. The plant meets criteria 1-3.
11. The plant has recently appeared as free living populations within Alabama, or
12. It is invasive in nearby states but its status in Alabama is unknown or unclear, and/or
13. It has the potential, based on its biology and its colonization history in the Southeast and elsewhere, to become highly invasive in Alabama.

Watch list B:

14. The plant meets criteria 1-2.
15. The species is planted in Alabama.
16. The plant has a documented history of invasiveness in other areas of the Southeast and/or is listed by the Global Invasive Species Program as a world-class invasive plant for habitats similar to those in the Southeast.

Alabama Invasive Plant Council's List of Alabama's Invasive Plants by Cultural Use Categories

The Importance of this Type of Listing

The invasive plant listing approach used by ALIPC makes transparent the inter-relationships and interactions between invasive plants among land-use and water-use sectors. It shows both the invaded categories of lands and waters that incur productivity and diversity losses, and the continued use and establishment of some of these plants, by other sectors. This starkly portrays the invasive plant dilemma that plagues our society. The spreadsheet indicates that research and development is needed to identify and produce alternative species, in adequate supplies, so that invasives will not be needed or used. It is also a warning to managers regarding those plants they may have traditionally planted that can impact neighbors for perpetuity. Finally, this type of listing reveals where education is needed and those categories of land-use and water-use that require the most focused efforts. The developing watch lists are essential in this scheme to alert the early detection and rapid response efforts to prevent entry and spread, the recognized wisest approach to management of non-native invasive plants. Engagement of the entire membership of the Alabama Invasive Plant Council and that collective information base through email has been invaluable to this process. Major hurdles in understanding other's views and appropriately communicating opposing views have been met and overcome to this point in creating the list. These 'lessons learned' and the Council's several forums should continue to provide the context for progress towards a broader understanding and assessment of the problems, and cooperative strategies for addressing, the collective threat of invasive plants..

ACKNOWLEDGMENTS

The ALIPC Invasive Plant Listing Committee during this episode was comprised of: Chair: Dr. James H. Miller, USDA Forest Service R&D; Vice Chairs: Dr. Nancy Loewenstein, School of Forestry and Wildlife Sciences, Auburn University and Curtis Hansen, Curator, John D. Freeman Herbarium, Auburn University; Erwin Chambliss, USDA Forest Service R&D; Caroline Dean, Alabama Wildflower Society; Ted Devos, Alabama Wildlife Federation; Dr. John Everest, Alabama Cooperative Extension, Auburn University; Brian Hardin, Alabama Farmers Federation; Mike Link, DuPont Corporation; Dr. C. Smoot Major, University of South Alabama; Ben Moore, USDA Natural Resources Conservation Service; Howard Peavey, Alabama Department of Transportation; Gena Todia, Wetland Resources, LLC; Additional expert opinion was provided by: Alvin Diamond, Jr., Troy University; Dr. Gary Hepp, School of Forestry and Wildlife Sciences, Auburn University; Joe Jernigan, Alabama Wildlife and Freshwater Fisheries; Dr. Ralph Mirarchi, School of Forestry and Wildlife Sciences, Auburn University; Fred Nation, Weeks Bay National Estuary; Dr. David Teem, Department of Agronomy, Auburn University; Jeff Thurmond, USDA Natural Resources Conservation Service

The authors thank their employers for their continued support of this project.

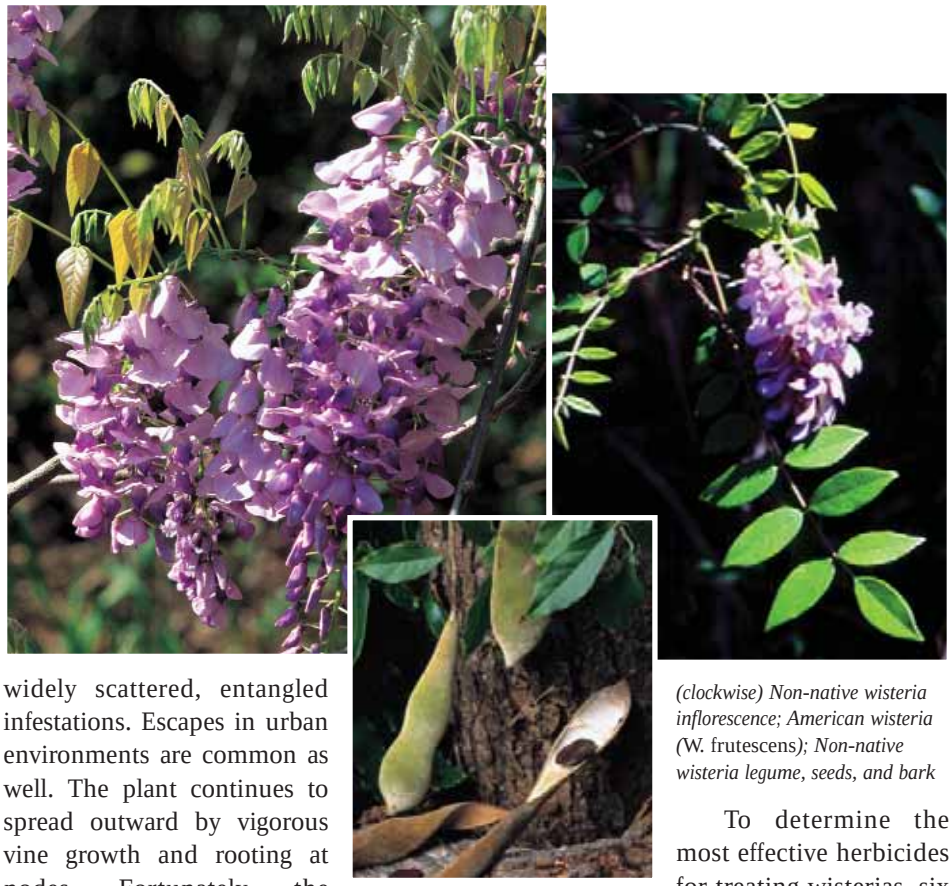
Non-Native Wisteria Control with Herbicides

by James H. Miller, Southern Research Station, USDA Forest Service, Auburn University, AL 36849

Chinese wisteria (*Wisteria sinensis* (Sims) DC) is a deciduous, perennial, leguminous woody vine that is invasive throughout much of the Eastern U.S. A related wisteria that invades the same range is Japanese wisteria (*W. floribunda* (Willd.) DC). It is difficult to distinguish Chinese from Japanese wisteria due to similar leaves, flowers, and probable hybridization. There are indications that hybrids of the two are the norm and not the exception (personal communications: Dr Jennifer Trusty, Auburn University). Interesting enough, Chinese wisteria twines clockwise (lower left ascending to upper right) while Japanese wisteria twines counter-clockwise, supposedly because of the well known north-south hemisphere differences in water draining and vine twining. This may be a remnant of continental drift after species differentiation in opposite hemispheres.

American wisteria (*W. frutescens* (L.) Poir.) is our native species that also occurs throughout the Eastern U.S. It inhabits mostly hardwood bottomlands and wetland margins, at rare times forming expansive entanglements. The American species can be distinguished from the exotic species by having pubescence on stems and leaves, a hairless legume, and the growth habit of climbing but not running. The oriental species lack leaf pubescence in late season and produce velvety, fuzzy legumes. Both Japanese and American wisterias' dangling inflorescence bloom from top to tip, while Chinese wisteria essentially blooms all at once before or just at leaf emergence.

The oriental invasive wisterias were imported into the U.S. in the early 1800s as ornamentals and continue to be sold with many varieties, even though their invasiveness is widely recognized. Traditional plantings at now abandoned farm homes have yielded oriental wisterias occurring across the eastern region in widely scattered, entangled infestations. Escapes in urban environments are common as well. The plant continues to spread outward by vigorous vine growth and rooting at nodes. Fortunately, the legumes (pods) and seeds are large and heavy, which restricts dispersal by birds and mammals. Legumes are 2.5 to 6 inches long and about 1 inch wide, with flat seeds about the size of a dime to a nickel. Some short distance movement of seeds along streams and rivers can lead to new infestations along waterways.



*(clockwise) Non-native wisteria inflorescence; American wisteria (*W. frutescens*); Non-native wisteria legume, seeds, and bark*

Vine entangled patches of non-native wisterias may exceed several acres and restrict plant and animal diversity, access, and forest productivity and recreation. Tall trees can be overtopped or strangled and their downfall exacerbates entanglements by vine over-growth. These dense infestations are exceedingly difficult to treat, while herbicide foliar sprays offer one viable option if suitable application equipment is available to project sprays into patches.

To determine the most effective herbicides for treating wisterias, six herbicides were tested in an experiment using a randomized complete block design with three replications of each treatment (Table 1). The test site was at a severe, uniform infestation in east central Alabama that was two to three acres in size. Plant traits gave indication that this was Chinese wisteria, although this is now questioned owing to recent correlative genetic analyses from many infestations (personal communication, Dr. Jennifer Trusty). Vine diameters often exceeded two inches, climbing into trees, while only areas with ground infestations were used. Plot size was 10 x 10 ft. One rate (near maximum labeled) for each herbicide was tested at two timings of application, July and September, to gain a primary test of efficacy. All plots were re-treated using the initial rate one year after the first

Herbicide Trade name (*active ingredient*)	Rate per acre	% solution
Tordon K (*picloram*)*	0.5 gal	1.25
Garlon 4 (*triclopyr*)	1.5 gal	3.75
Accord (*glyphosate (41%)*)	2.0 gal	10
Arsenal AC (*imazapyr*)	0.25 gal	0.625
Transline (*clopyralid*)#	21 fluid oz	0.41
Escort (*metsulfuron*)	4 dry oz	na

Table 1. Herbicides and rates tested as both treatment and re-treatment.
* Tordon K is not registered for use in Florida.
# Transline is only labeled for use on kudzu (*Pueraria montana*) in certain counties of Florida.

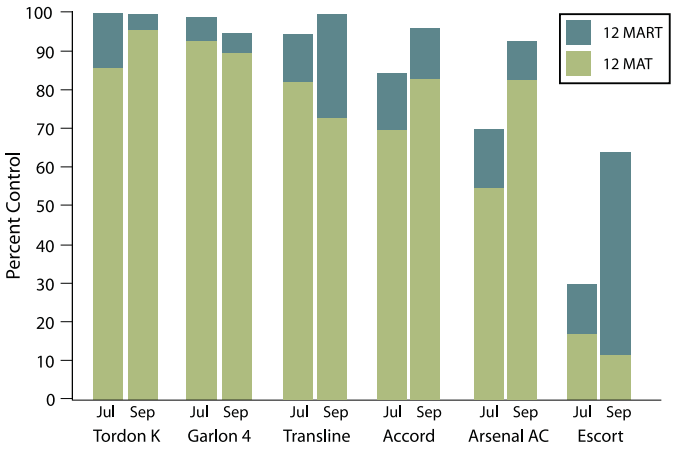


Figure 1. Percent control of non-native wisteria with six herbicides 12 months after treatment (MAT) and 12 months after re-treatment (MART) with July and September timings.

treatment, irrespective of the degree of control or regrowth. All applications were made with a CO_2-pressurized sprayer with 40 gallons per acre of herbicide-water mixture except for Accord that was applied at 20 gallons per acre according to label instructions. A 0.25-percent Entry II surfactant was added to all. Percent cover (essentially volume) of wisteria was assessed and recorded 12 months after treatment (12 MAT) and 12 months after re-treatment (12 MART) and judged relative to untreated check plots in each block.

What was learned

Effective herbicides that provided greater than 90 percent control 12 months after treatment (12 MAT) were Tordon K applied in September and Garlon applied at both timings (Figure 1). Greater than 80 percent control was gained by Arsenal and Accord applied in September and Transline applied in July. Escort was not effective, averaging 15 percent control after initial treatments and was the only herbicide judged significantly different from the other treatments by an analysis of variance and mean separation (analyses not shown).

These results suggest that Arsenal was more effective when applied in September as compared to July, although a single test is not conclusive. It was noted that abnormal vine regrowth and diminutive, yellow leaves characterized Arsenal and Accord symptoms 12 months after treatment, indicating that activity was still progressing even when re-treatments were applied. After re-treatments, near eradication was achieved with Tordon K at both timings and Transline in September, although these did not significantly differ from other herbicides except for Escort in July.

This test found that a range of herbicides can be effectively used for wisteria control depending upon the situation and the necessary safety to surrounding vegetation and revegetation. It should be recognized that invasive plants demand high levels of efficacy by any treatment to be successful in eradication and rehabilitation. High rates and/or repeated applica-

Wisteria control study site before treatments

Tordon K plot the summer after treatment

Transline plot the second summer after retreatment

Non-native wisteria can climb into tall trees

tions of Tordon K, Garlon, Transline, and Accord (a.k.a., Roundup, glyphosate and others) in mid- to late summer and Arsenal in late summer gave near eradication with two applications 12 months a part. The active eradication of individual wisteria infestations at this time could, because of the limited spread rate, be an effective strategy in ridding the land of these invasive species.

Tordon K, Transline and Garlon were not effective in controlling Chinese privet (*Ligustrum sinense* Lour.) that was present on the test site. Therefore, the invasive privet was released from competition with wisteria, indicating unsuitability of this treatment on co-invaded locations. Accord or a glyphosate herbicide would be a more effective treatment when both invasive species occur in mixtures. All tested treatments resulted in reestablishment of early successional plants 12 MAT, while the least species and regrowth occurred on Garlon plots. Tordon K and Transline herbicides are recognized as specific for control of legumes and foster establishment of aster species, while concerns for entry of these two herbicides into surface and ground waters have limited their use. Applications made away from surface waters and on non-sandy soils should be safe and offer effective eradication treatments for invasive wisteria.

As with most invasive eradication programs, wisteria infestations will require several treatments, surveillance for regrowth and spot treatments where needed. Then non-invasive plants should be encouraged or established to safeguard the site from re-invasion. In landscapes and gardens, American wisteria offers a suitable alternative to replace invasive wisteria because it looks similar, blooms longer, and tends to be less aggressive. Other "alter-native" vine species are yellow jessamine (*Gelsemium sempervirens* (L.) St.-Hil.), pipevine (*Aristolochia macrophylla* Lam.), crossvine (*Bignonia capreolata* L.), and trumpet honeysuckle (*Lonicera sempervirens* L.). All of these are fortunately more available now from plant outlets. *Keep the natives coming, growers…and plant natives to stop further invasions*!

A Recipe for Success

Exotics Control and Native Plant Restoration on Givney Key, Matlacha Pass NWR, a Satellite of J.N. 'Ding' Darling NWR

by Bill Thomas, Jr.[1], Patrick Martin.[1], Jason Hanley[1] and Leah Elwell[2]

On September 9, 2006, 18 people participated in the restoration of Givney Key, a 0.8 acre island of Matlacha Pass NWR. The island is used by a diverse array of colonial wading and water birds for nesting and loafing activities. During the pre-project site visit in June 2006, it was estimated that the island supported 450 to 700 pairs of nesting white ibis (nests were in varying stages of development) and approximately 250 to 300 loafing magnificent frigate birds. Project participants included the Florida Chapter of the Federation of Fly Fishers (FFF; [8]), the FWS Region 4 Invasive Species Strike Team (R4 ISST; [2]), J.N. 'Ding' Darling NWR staff (3) and volunteers (5). The project was completed in approximately eight hours (144 person hours). All personnel were transported to Givney Key via boats provided by the FWS, FFF or volunteers. Due to the extent and magnitude of exotic plant control and native plant restoration activities, and for overall project efficiency, the smallest and most easily accessible island, Givney Key, was selected for exotic plant control and restoration efforts. The R4 ISST arrived at Givney Key several hours in advance of the main group to clear Hurricane Charley-downed mangroves and other vegetative debris to access upland ridges and prepare sites for native plants. The magnitude of exotic plant infestations and downed and dead debris on the island was absolutely brutal for such a small-scale project. In addition, the heat index was well above 100 degrees for the entire day.

FFF, refuge staff and volunteers planted 153 native plants including ground, shrub and tree (overstory) species common to or representative of coastal island habitats. Ground species (0-1m) planted included ambrosia (*Ambrosia hispida*), bay bean (*Canavalia maritima*), railroad vine (*Ipomoea pes-caprae*), saltwort (*Batis maritima*), bushy sea oxeye daisy (*Borrichia frutescens*), and seacoast marsh elder (*Iva imbricata*). These species were planted on exposed shell or beach ridges above maximum high tide line to avoid exposure to salt water decreasing chances for mortality. Snowberry (*Chiococca alba*) was the only shrub species planted (1-2m), although its branches often extend into the overstory layer. Tree or overstory (>2m) species included bay cedar (*Suriana maritima*), green buttonwood (*Conocarpus erectus*), gumbo limbo (*Bursera simaruba*), Jamaican caper (*Capparis cynophallophora*), Jamaican dogwood (*Piscidia piscipula*), mastic (*Mastichodendron foetidissimum*), red mangrove (*Rhizophora mangle*), red stopper (*Eugenia rhombea*), sea grape (*Coccoloba uvifera*), seven-year apple (*Casasia clusiifolia*), strangler fig (*Ficus aurea*) and wild olive or privet (*Forestiera segregata*). When tree species reach maturity they will provide additional nesting substrate in addition to the red mangroves and other species such as buttonwood and strangler fig that survived Hurricane Charley and remain largely intact.

The R4 ISST treated all exotic plant species using cut stump or groove 'n squirt treatment techniques applying Garlon 4®

In late Fiscal Year (FY) 2005, J.N. 'Ding' Darling National Wildlife Refuge (the Refuge) and the Federation of Fly Fishers (FFF) entered into a Cooperative Agreement to provide funding, personnel and services for exotic plant control activities and native plant restoration on 'satellite nesting islands' of Matlacha Pass and Pine Island NWRs. A grant in the amount of $8,694 was secured through the U.S. Fish and Wildlife Service (FWS) Ecological Service's FY05 Coastal Grant program for habitat restoration. The FFF were to match the funding with in-kind services: administrative coordination and support, and equipment or personnel for exotics removal and/or planting of native plants. The majority of grant money was used to purchase native plants from the Sanibel-Captiva Conservation Foundation (SCCF) native plant nursery for the satellite island project, to secure and grow red mangrove seedlings for the remaining nesting islands which were to be treated by a contractor through the FWS Region 4 Invasive Species Strike Team (R4 ISST) program, with the remainder paying for salary and project oversight of the FFF conservation coordinator.

Project objectives identified in the grant proposal were:

- To preserve and restore the rich natural habitats within the J.N. 'Ding' Darling National Wildlife Refuge Complex (NWR) for support of healthy fish and wildlife populations including improving conditions on satellite islands for wading and water bird nesting activities.
- To remove exotic vegetation from satellite islands within the Refuge complex.
- To engage anglers in management activities that will benefit natural resources, particularly the fish species that provide so much recreational enjoyment.
- To promote awareness among anglers and the general public regarding the impacts of exotic plant species and the application of appropriate management techniques to ensure successful habitat restoration efforts.

[1]U.S. Fish and Wildlife Service, J.N. 'Ding' Darling NWR, Wildlife Drive, Sanibel, Florida, 33957; [2]Federation of Fly Fishers, 215 East Lewis Street, Livingston, Montana, 59047

and Stalker® with a hand sprayer to the exposed cambium. In all, 45 stems (1-12 inches in diameter breast height [dbh]) of five different Category 1 state-listed invasive exotic plants were treated. In addition, any other exotic plant species were treated. Species targeted included Brazilian pepper (*Schinus terebinthifolius*) (primary [20]; 0.2 acres); carrotwood *(Cupaniopsis anacardioides)* (2); earleaf acacia (*Acacia auriculiformis*) (5); papaya (*Carica papaya*) (3); seaside mahoe (*Thespesia populnea*) (3); and umbrella tree (*Schefflera actinophylla*) (12). The actual infested area of all exotics treated was 0.4 acres, nearly ½ the gross project area. Exotic plant infestation on Givney Key was visually estimated at nearly 50%, with the northeastern portion containing the greatest concentration. Large Brazilian pepper trees were treated and left standing to provide nesting platforms for wading and water birds until planted tree species reach sufficient height, mass and canopy cover to be suitable for nesting purposes.

Methodology

Numbered aluminum tags were placed on 84 plants (55%) for monitoring purposes. In addition, recorders gathered information on individual plant genus/species, common name, assigned tag number and species classification: ground, shrub or tree (overstory). The information collected will be used for subsequent monitoring purposes and for final data evaluation. A representative sample of ground (40), shrub (5) and tree species (39) were tagged. Survival of native plants will be evaluated after one year, i.e., September 2007.

Native Plant Survival (NPS) will be evaluated using the following formula:

$$NPS = \frac{\text{\# of tagged plants alive}}{\text{total \# of tagged plants}} (\%) \text{ X Total \# of Plants Planted (N = 153)}$$

to determine the estimated total number of native plants of all types that survived.

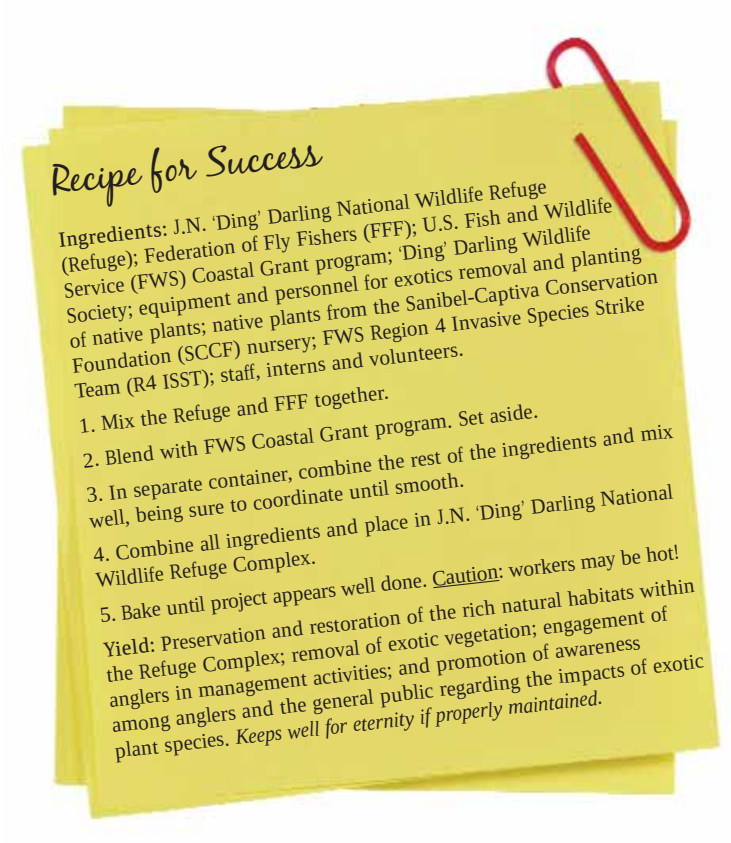
Personnel will determine if plants are 'alive' or 'dead' by using a thumb or fingernail scratch test to expose either the green, soft (alive) cambium or brittle (dead) cambium. Evaluations will be of a qualitative nature. A twig or branch snap test also may be employed to determine whether a plant is alive or dead. Either test should yield the needed information even if an individual plant is in a state of dormancy.

Management Implications

The results of this study have implications on planning future island restoration projects on the remaining coastal islands within satellite refuges of J.N. 'Ding' Darling NWR. Monitoring exotic plant control and native plant restoration activities are key components of island restoration. If planted native species thrive and survive to maturity on this small-scale project, it is likely that the remainder of the similar satellite nesting islands will experience the same benefits from exotic plant control operations and native plant restoration activities barring any extreme environmental conditions such as extended droughts or tropical storms. Island restoration will ultimately help support wading and water bird nesting activities following the extensive damage to existing native plant communities, composition and structure inflicted by Hurricane Charley. Also, re-introduction and establishment of native plants to exposed areas will likely create shade that will aid in surpressing the germination and establishment of exotic and invasive exotic plants thus reducing costs associated with managing infestations of those plants. The success of this project will also reinforce the knowledge that conservation groups and volunteers can assist budget-limited local, state and federal conservation agencies with exotics control and habitat restoration activities. The ultimate goal is to restore the ecological function and integrity of coastal islands through implementation of standard management techniques available for restoration efforts: alternative fund sources, i.e., grants, exotics control, native plant restoration and enlisting the aid of volunteers.

Author Bill Thomas points out a large, treated Brazilian pepper tree.

The event held to restore 0.8 acre Givney Key, Matlacha Pass NWR, was a tremendous success with only a few logistical snags encountered. All invasive exotic plant species were treated by the R4 ISST in Early Detection and Rapid Response (EDRR) fashion, and operations coincided well with native plant tagging, data recording and native planting activities by the FFF, refuge staff and volunteers. The September project date was selected in order to take advantage of the 'rainy' season to optimize native plant establishment and ultimately, plant survival. It was also determined



prior to coordinating the Givney Key restoration project that remaining satellite nesting islands identified in the original grant would be more suitable for completion by employing the services of an experienced exotic plant control/native plant restoration contractor due to the sheer number of islands, overall project coordination involved, and the enormous amount of exotic plant control and native plant restoration work needed. The remaining satellite nesting islands (3 islands; ~13 acres) will be completed using an independent and experienced contractor, Aquatic Vegetation Control, Inc., Riviera Beach, Florida, selected through the R4 ISST program. Funding for remaining island restoration efforts was secured through the R4 ISST FY06 Call/Request for (Exotics) Proposals program (February 2006).

Acknowledgements

The Refuge would like to thank everyone who participated in this successful project including Leah Elwell, Conservation Coordinator for the Federation of Fly Fishers (FFF); the Florida FFF Chapter who organized local FFF staff and provided boats for transportation of volunteers; Capt. Pete Greenan, President of the FFF Florida Chapter for his dedication to Refuge exotics control and habitat restoration projects; the SCCF native plant nursery for growing and supplying the native plants for the project; Cheryl Parrott and Christie Sampson (UFL – 'Gator' interns) for assistance in project coordination; the 'Ding' Darling Wildlife Society for providing lunch and drinks; and staff and volunteers who assisted with tagging and planting native plants. Special recognition and appreciation are directed to Jason Hanley, R4 ISST Assistant, who single-handedly transported plants to 'Givney Key' several days prior to the event, and gathered all equipment necessary to ensure a safe and successful project.

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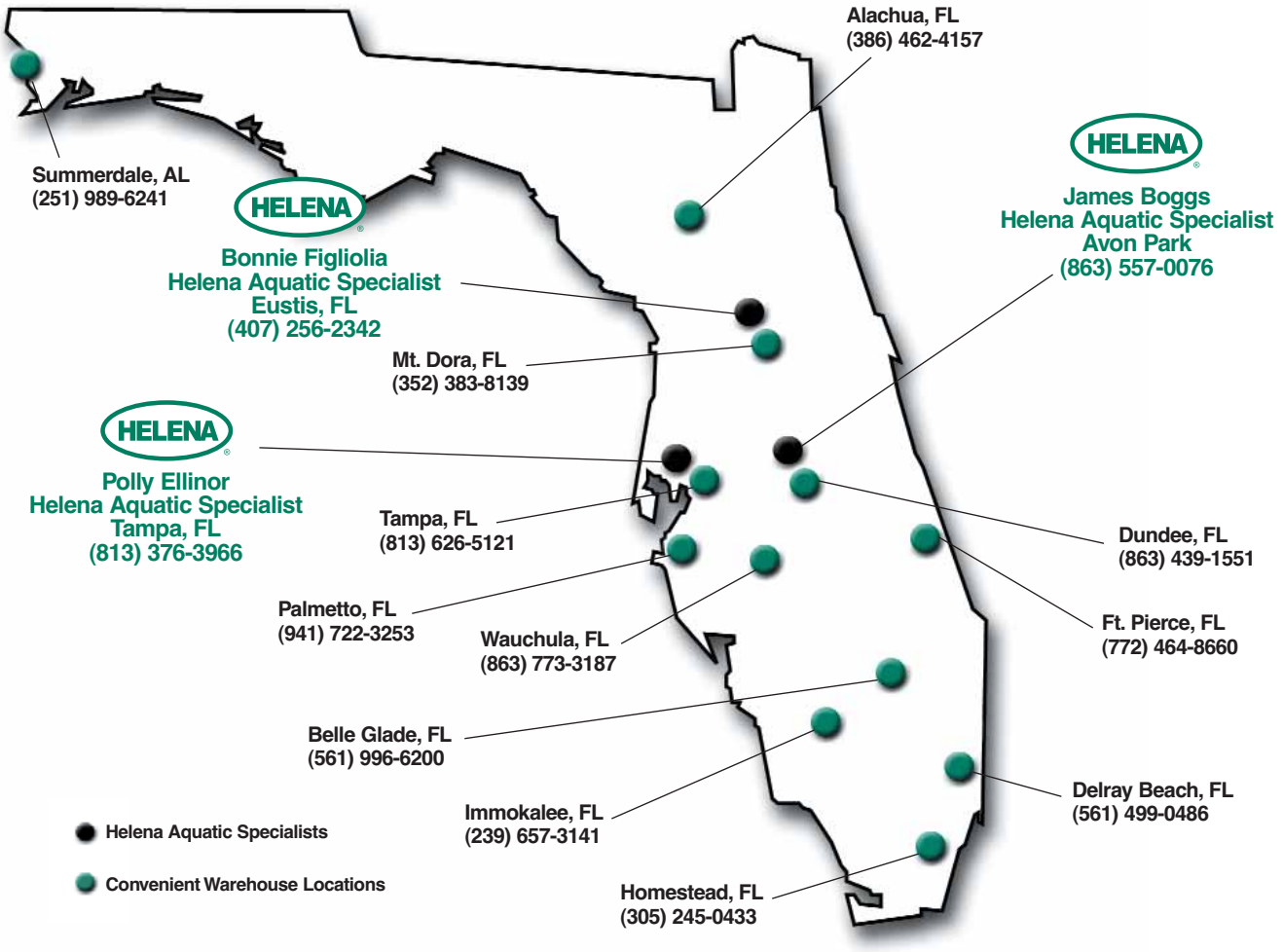

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Dr. Larry R. Nelson (1949 – 2006)

Dr. Larry Robert Nelson, 56, passed away unexpectedly at his home on August 26, 2006. Larry was a forest vegetation management expert and deeply involved with invasive plant management in the South as an educator and researcher. He was a native of Canton, Ohio and a graduate of Ohio University with a B.S. in Botany, Duke University with a M.S. in forest pathology, and Auburn University with a Ph.D. in tree physiology. Larry had been at Clemson University since 1984 and was an Associate Professor and Extension Specialist in the Department of Forestry and Natural Resources. He was well-known throughout the South for his involvement in invasive plant management and for the outreach programs that he developed on invasive plant identification and management for foresters and natural resource managers. Along with his graduate students, Larry had active research programs on control of kudzu, privet and bamboo. Recently, through his efforts, the South Carolina Exotic Pest Plant Council was reorganized into an active state EPPC. He was a member of the Southern Weed Science Society, Weed Science Society of America, South Carolina Forestry Association and past chair of the S.C. Forestry Council. Larry's good nature and humor will be sorely missed by his family, colleagues and the public he served.

— David J. Moorhead, Tifton, GA

REQUEST FOR PROPOSALS FOR INVASIVE PLANT RESEARCH

Deadline: February 27, 2007

The Florida Exotic Pest Plant Council (FLEPPC) annually funds a small number of research grants/scholarships for students conducting studies related to invasive exotic plant management in Florida.

The deadline for proposal submission is February 27, 2007. Funding is limited to $2,500. per project. The proposal should include a summary of the research project and its relationship to Florida exotic plant management problems. Plant species involved in the study must be one or more of the Category I or Category II exotic pest plant species listed by FLEPPC (www.fleppc.org). The applicant should provide complete contact information and a detailed budget, with an explanation of how the funding will be used. Examples include (but are not limited to) travel funds for field work, funds for research equipment or supplies (or temporary use of specialized equipment), stipend for applicant's project work time not otherwise supported, travel funds for presentation of the research, etc. In developing the budget, funds requested are to be used for the direct costs of conducting research on the proposed project and are not to be used for indirect costs incurred by the student's university.

Proposals will be evaluated and ranked on the critical management need for scientific results in the area of study and on the clarity of the submitted request.

Basic eligibility requirements:
To be eligible for funding, applicants must be an undergraduate or graduate student enrolled at an accredited institution of higher learning anywhere within the United States. However, the research must be on a Florida invasive plant listed by FLEPPC as Category I or II (http://www.fleppc.org). An accompanying letter of recommendation from a faculty advisor is strongly encouraged.

Send proposals by e-mail, fax, or mail to:
John C. Volin, Chair
Research Committee, FLEPPC
Florida Atlantic University
2912 College Ave.
Davie, FL 33314
jvolin@fau.edu
FAX - (954) 236-1099
office - (954) 236-1115

Proposals are due by 5:00 p.m. February 27, 2007.

Internodes

Mark your calendar

- Weed Science Society of America 47th Annual Meeting, February 4-8, 2007, San Antonio, Texas. www.wssa.net
- NIWAW-8 (National Invasive Weeds Awareness Week), Feb. 25-March 2, 2007, Washington, DC. www.nawma.org
- SE-EPPC Annual Symposium, co-hosted by the Georgia Exotic Pest Plant Council, March 20-22, 2007, Athens, GA. www.gaeppc.org
- Association of Southeastern Biologists 68th Annual Meeting, April 18-21, 2007, Columbia, SC. http://www.asb.appstate.edu/index.php
- Florida Native Plant Society 27th Annual Conference, April 19-22, 2007, Gainesville, FL. www.fnps.org
- FLEPPC 22nd Annual Symposium, April 30-May 3, 2007, Cocoa Beach, FL. www.fleppc.org
- 2007 Aquatic Weed Control Short Course, University of Florida-IFAS, Aquatic, Upland and Invasive Weed Control; Aquatic Plant Identification, May 14-18, 2007, Coral Springs, FL. http://conference.ifas.ufl.edu/aw
- Annual Florida Lake Management Society Conference, held in conjunction with the NALMS SE Regional Conference, June 4-7, 2007, Naples, FL. http://flms.net
- Aquatic Plant Management Society 47th Annual Meeting, July 15-18, 2007, Nashville, TN. www.apms.org
- Mid-Atlantic EPPC biannual symposium, co-sponsored with the Morris Arboretum, August 15-16, 2007, Philadelphia, PA. http://www.ma-eppc.org/
- 9th International Conference on the Ecology and Management of Alien Plant Invasions, September 17-21, 2007, Perth, Australia. www.congresswest.com.au/emapi9/

News Release from TNC

ALTAMONTE SPRINGS, FL — Florida's Department of Transportation (FDOT) has joined an effort promoted by The Nature Conservancy to control invasive species, agreeing, among other things, to encourage the use of alternative plants in landscape projects. The Department is the first government agency in the country to sign on.

The FDOT refined the Voluntary Codes of Conduct developed for government agencies and will incorporate them in their statewide policy for roadside landscaping and other related business practices. The codes were developed as part of the 2001 St. Louis Declaration, an assemblage of horticulture industry leaders and environmentalists who recognized the need for a collaborative response to the number one threat to biodiversity — invasive species that escape from gardens and landscapes and overtake native plants. The Conservancy is working to implement the codes.

In Florida, the Florida Nursery, Growers and Landscape Association suggested that the most effective approach to reduce the commercial reliance on invasive species is to reduce demand for those species. FDOT is one of the largest consumers of plants in the state. The Lowe's home improvement chain in Florida has also agreed to a set of Voluntary Codes of Conduct.

In adopting the codes, FDOT agreed to identify known invaders, develop specifications to lessen their impacts, provide staff training on invasive plant identification and management, dispose of unwanted invasives using appropriate safeguards, and support the development of environmentally sound methods to manage invasive plants. FDOT also agreed to phase out the use of invasive plants and encourage plant nurseries to increase availability of non-invasives, and will develop an effective, enforceable plan to manage and remove invasive plants from the right-of-way.

BASF Awards Invasive Vegetation Management Matching Grants

Twenty organizations across the U.S. will receive matching grants to fund programs designed to fight the spread of terrestrial and aquatic invasive plants. The grants, totaling approximately $200,000, were awarded by BASF Professional Vegetation Management.

The goal of the Invasive Vegetation Management Matching Grant Program is to aid organizations in meeting matching funding requirements for federal or foundation grants, specifically to support the use of herbicides in an integrated vegetation management program. BASF funding will be utilized as part of the non-federal match for federal or foundation grants such as the National Fish and Wildlife Foundation's Pulling Together Initiative (PTI) Program.

Grants were awarded to a diverse group of organizations, ranging from government bodies to conservation and wildlife organizations; however, each recipient is focused on the control and/or management of terrestrial or aquatic invasive plants.

A wide variety of invasive plants will be targeted for control using integrated vegetation management techniques. Aside from herbicide treatments, some of the programs will include mechanical and bio-control treatments.

Just a few of the projects funded:

- Arthur R. Marshall Loxahatchee National Wildlife Refuge – Boynton Beach, Fla. The refuge is owned by the State of Florida and leased to the U.S. Fish and Wildlife Service. This project will provide for the aerial herbicide treatment of 300 acres of dense melaleuca over an area of about 10,000 acres in the central portion of the refuge.
- LSU AgCenter/SeaGrant and LDWF – Louisiana The goal of this rapid response project is to eradicate paragrass *(Brachiaria mutica)* in Louisiana with prompt action. Only two properties in the state – both crawfish farms – are known to be infested: 220 acres in St. Martin Parish (light infestation) and 550 acres in Iberia (very heavy infestation). Control initiatives will keep the grass from spreading further in Louisiana.
- Marion County Invasive Species Management Council – Marion County, Fla. This project addresses strategic cogongrass *(Imperata cylindrica)* control in central Florida. Outlier populations and prioritized private properties adjacent to vulnerable portions of Ocala National Forest, the Cross Florida Greenway, Rainbow River State Park, Silver River State Park, and other public lands will be treated in cooperation with natural area and road right-of-way control efforts.
- National Wild Turkey Federation – Southern Mississippi This project will treat cogongrass *(Imperata cylindrica)* on the Desoto National Forest and adjacent private landowners' [property] in order to gain control at the early stage of infestation. About 600 acres has been targeted.
- The Nature Conservancy – Greenville County, S.C. This project includes control of Chinese silvergrass *(Miscanthus sinensis)*, Chinese privet *(Ligustrum sinense)* and multiflora rose *(Rosa multiflora)* in the Blue Wall Preserve, a 550-acre property owned by The Nature Conservancy.
- Wildlife Mississippi – Mississippi and Alabama
  The project will focus on controlling bermudagrass *(Cynodon dactylon)*, bahiagrass *(Paspalum notatum)* and fescue *(Festuca arundinacea)* on approximately 750 acres of habitat for rare, threatened, endangered and declining species that are dependent on native prairie communities in the Black Land Prairie of Mississippi and Alabama. *continued on page 31*

Invasive Plant Control, Inc. *controls invasives species throughout the United States. Clients range from the National Park Service to non profit land managers. IPC strives to build a strong relationship with each and every client. In the eastern US many states are working on the same species from state to state. Our work with the Central Savannah River Land Trust is an excellent example the benefits of a strong partnership. The following interview with Hazel Langrall, Program Manager for the Central Savannah River Land Trust highlights some of the accomplishments this organization has achieved.*

Who is the Central Savannah River Land Trust?

The Central Savannah River Land Trust's mission is to preserve the central Savannah River basin's natural landscape for the generations to come. The CSRLT is a non-profit 501(c)3 organization based in Augusta, GA and servicing the five Georgia counties that make up the Central Savannah River Area (CSRA). The Land Trust partners with local governments, private landowners, and real estate developers to advocate land conservation and smart growth principles and offer assistance in long-range land planning. To date, the Land Trust has permanently protected over 3,000 acres of wetlands, mature hardwood forests, blackwater creeks, and riverfront land throughout the CSRA.

What is the Central Savannah River Land Trust's involvement with invasives?

The CSRLT has received several grants from the US Fish & Wildlife Service to restore a natural habitat to the Butler Creek Nature Corridor – a 10 mile, 800 acre ribbon of bald cypress and bottomland hardwood forest and wetlands following one of the area's finest blackwater creeks. Many of the Corridor's acres are infested with Chinese privet, a hedgy shrub that was left by early settlers of the region and which has grown into a dense thicket, preventing native understory growth. The CSRLT began contracting with IPC in 2004 to help with treating this invasive species where the ecological damage was the worst. To date, the CSRLT and IPC crews have restored approximately half of the infested area. Native understory plants and tree saplings can now be seen in the treated areas and the region is beginning to flourish again as it once did.

Who are the key players IPC, Inc. and the CSRLT partner with in Augusta?

The land being restored by the CSRLT and IPC is owned by Augusta-Richmond County and jointly managed by the Land Trust and the County. The Land Trust has also partnered with civic organizations, the neighboring military base (Fort Gordon), and local volunteer groups to treat the area. The American Hiking Society and Pollard Lumber Company granted the CSRLT the means to install the beginnings of a boardwalk trail through the Corridor, giving the community viewing access to the restored acres.






What relationship does the CSRLT have with IPC?

The CSRLT has contracted with IPC to conduct invasive species removal activities.

What are some of the current invasive plants being controlled by IPC, Inc. and the CSRLT?

The main invasive being controlled at this time is Chinese privet. Others include Japanese honeysuckle, Chinaberry, and English Ivy.

For additional information about the Central Savannah River Land Trust visit their website at www.csrlt.org

You can also find this interview online at www.invasiveplantcontrol.com

615.385.4319

WWW.INVASIVEPLANTCONTROL.COM




Internodes *continued from page 29*

Publications

Native Alternatives to Invasive Plants
Brooklyn Botanic Garden's new handbook, is now available. In it, "plant professionals and home gardeners alike will discover hundreds of spectacular native plants for every region, specially chosen as alternatives to the invasive species that are degrading the continent's natural habitats." What a deal at $8.95! http://www.bbg.org/

Survey of Control Measures on Old World Climbing Fern (Lygodium microphyllum) *in Southern Florida*, by J.T. Hutchinson and K.A. Langeland, Florida Scientist 69(4):217-223. 2006.

Competitive Effects of the Invasive Grass Rhynchelytrum repens *(Willd.) C.E. Hubb. on Pine Rockland Vegetation*, by J. Possley and J. Maschinski, Natural Areas Journal 26:391-395. 2006.

What is "invasive" anyway?

The Invasive Species Advisory Committee (ISAC) has submitted a clarification and guidance white paper on the national definition of "invasive species." It covers a number of issues such as weighing societal benefits against environmental problems. It touches upon "gray areas," such as native species that cause harm in some situations but can not be labeled as "invasive" (the definition specifies that the species must be exotic to the area of introduction), and the fact that some exotic species exhibit invasiveness in one region, but not another. Online at: http://www.invasivespeciesinfo.gov/docs/council/isacdef.pdf along with other information on the National Invasive Species Council (NISC) and ISAC.

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