

Alachua County Invasive Plant Inventory and Property Owner Education Project on Lake Santa Fe



Final Report

Submitted to:

ALACHUA COUNTY ENVIRONMENTAL PROTECTION DEPARTMENT

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We also owe thanks to the several different state agencies that provided us with, or allowed us to use, their educational materials in our homeowner's information packets. They are the Bureau of Invasive Plant Management of the Florida Department of Environmental Protection (FDEP), the Center for Aquatic and Invasive Plants at the University of Florida Institute of Food and Agricultural Sciences (IFAS), the Southwest Florida Water Management District (SWFWMD), and the St. Johns River Water Management District (SJRWMD). Special mention is given to Wendy Wilber of IFAS Florida Yards and Neighborhoods (FYN) Program for her important contributions of special adaptations of informational materials developed for our use in the homeowners' packets of this project.

Tom Ward, a wetlands biologist who lives on the lake, contributed much to the writing of this report and to the development of the project's materials and methods. He also served as a volunteer in the survey. His contributions have been very important to the success of the project and are much appreciated.

We also thank the twelve volunteers who visited the parcels to inventory the invasive exotic plants and to converse with homeowners about the problem of invading pest plants. The volunteers are all listed below.

Tom Allensworth, Melrose
Dana Bagwell, Gainesville
Mary Blake, Gainesville
Alison Blakeslee, Waldo
Diana Gijsselaers, Gainesville
Nanette Griscti, Earleton
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Cathy Parlapiano, Earleton
Jim Reed, Earleton
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Alicia Windham, Earleton



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PROJECT GOALS AND SUMMARY

The project had two main goals. The first was to ascertain the extent of the invasive exotic plant problem on the Alachua County side of Lake Santa Fe (Appendix A). The second was to educate people on the lake about the threat of these nuisance plants and about responsible waterfront landscaping practices.

The targeted shoreline study area was defined as the water's edge to approximately 75 feet upland of the ordinary high water (OHW) line, which on Lake Santa Fe is 141 feet above mean sea level (MSL). With Current Problems, Inc. volunteers conducting the plant inventory, the survey assessed the encroachment of ten selected plants along the shoreline of Lake Santa Fe and its adjacent swamps within Alachua County. These ten plants were known to be, or thought to be, established on the lake. Several characteristics of each parcel's natural features were also noted: landscape type, tree canopy coverage, shoreline vegetation, and beach zone type.

Education played an important role in the project, as we took the opportunity to educate project volunteers, property owners, and members of the community about the threat of invasive exotic plants to the ecosystem surrounding the lake. Information regarding responsible waterfront landscaping practices was also included. Volunteer training, property owner visits, workshops, community events, and the distribution of educational materials all played a role.



Cathy Parlapiano

INTRODUCTION

The mission of Current Problems, Inc./Adopt A River is to help preserve and protect North Florida's waters for both humans and wildlife. Wetlands play an extremely important role in maintaining the quality of our surface waters. Thus, the quality of the water entering the estuaries is important to both human and sea life. In Alachua County, surface water also directly enters our aquifer through siphons and sinks in the landscape. For these reasons, Current Problems, Inc. is most interested in healthy, functioning shoreline ecosystems. In our part of North Florida, healthy wetlands and well-vegetated buffers along developed shorelines are critical. The control of the introduction of exotic invasive plant species is also important.

Healthy functioning shoreline ecosystems, including well-vegetated buffer zones, are needed around all waterways to promote water quality and quantity and to provide adequate wildlife habitat. Reports from studies conducted by Mark Brown of the University of Florida's Center for Wetlands (as well as those of others) are very explicit about the needs of our aquatic ecosystems for adequate shoreline vegetation and buffer zones.

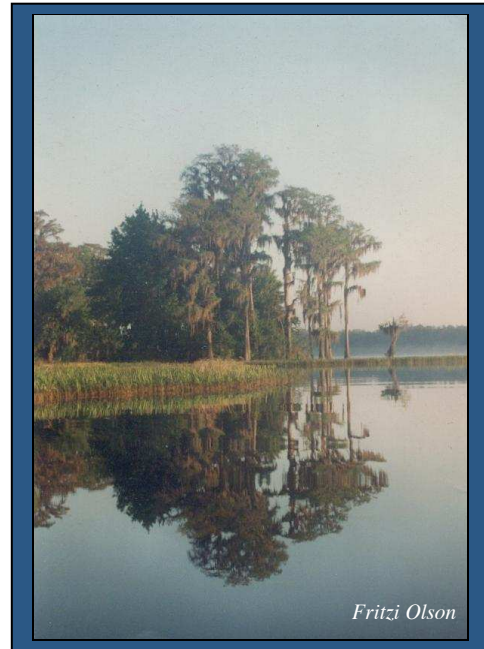
Lake Santa Fe

Located in the northeastern corner of Alachua County, Lake Santa Fe marks the headwaters of the Santa Fe River. It is a darkwater lake bordered by swamps featuring dahoon holly, red maple, and mixed bays furthest landward and pond cypress and black gum closer to the open water, along with buttonbush and other shrubs in the understory. Dense maidencane grass with scattered clumps of sawgrass, rushes, or lillies and other emergent species line the shore. While much of the lakefront is inhabited by humans, the water quality of the lake has remained quite good in part because of the many wetland areas along its shoreline that have not been destroyed through development. These wetland areas provide wildlife habitat as well. Bald eagles, great egrets, great blue herons, little blue herons, green herons, snowy



egrets, wood ducks, sandhill cranes, swallowtail kites, red-shouldered hawks, wintering loons and countless song birds call the land around Lake Santa Fe home. Occasionally even a brown or white pelican visits the lake. Bear, deer, otter and many other species of animals live around the lake. A colony of beavers inhabits nearby Lake Alto Swamp. A canal built for commerce in the second half of the 1800's connects Lake Alto with Lake Santa Fe. Beavers built a dam near the Santa Fe end of the canal a few years ago, which was maintained until water levels began to rise in the spring of 2003.

Rainfall is the main source of water for the approximately 6,000 acre lake. No streams, and little runoff, feed into the water body. When the lake is within its normal range of water levels, it is the headwaters of the Santa Fe River. As the water leaves the lake on its sheet flow journey through the huge Santa Fe Swamp, it is further cleansed by the time the river channel first emerges. In like manner, water from Lake Alto and its adjacent swamp joins the river a short distance downstream. It is therefore of utmost importance that these two large wetlands as well as those along the lakes' shorelines continue to be healthy, functioning systems if the aquatic ecosystem and water quality of the lakes, the Santa Fe River, the Suwannee River, and even the estuary at the Gulf of Mexico are to be preserved.



The Problem of Invasive Exotic Plants

Edward O. Wilson (1997) noted that “Extinction by habitat destruction is like death in an automobile accident: easy to see and assess. Extinction by the invasion of exotic species is like death by disease: gradual, insidious, requiring scientific methods to diagnose.”¹

According to the federal interagency National Invasive Species Council (NISC) “An ‘invasive species’ is...a species that is 1) non-native (or alien) to the ecosystem under consideration **and** 2) whose introduction causes or is likely to cause economic or environmental harm or harm to human health” (NISC 2001). Introductions can be either deliberate or unintentional and either legal or not. Species are described as alien, emerging, exotic, introduced, naturalized, noxious, nuisance, or nonindigenous. More colorful terms like biological pollution, green cancer, and biological wildfire describe their impact. Recently, usage of “invasive species” (or simply “invasives”) has become commonplace, though without a common definition.²

Humans have been moving species, both intentionally and unintentionally, around the world for centuries. The transport of livestock, crop plants and goods by colonists resulted in the inadvertent introductions of many noxious weeds and pest insects, and some of the agricultural species themselves became invasive. Because of modern, high-speed transport systems and extraordinarily complex global economic patterns, people are now moving species at unprecedented rates across the globe's borders and ecosystems.

The impacts of invasive species are highly diverse and often difficult to quantify and compare. Some are economic, such as the clogging of drainage pipes by zebra mussels or damage to agricultural crops by a vast range of exotic pest species. They can directly affect ecosystems, severely reducing habitat structure and diversity. For example, by the late 1990s, huge mats of water hyacinth (*Eichhornia crassipes*) covered approximately 90% of Lake Victoria's shoreline, depriving local (and, ironically, invasive) fish species and other

¹ Union of Concerned Scientists. (November 2001). *The Science of Invasive Species*. [Online]. Available: http://www.ucsusa.org/global_environment/invasive_species

² Ibid.

organisms of oxygen and sunlight (Bright 1998). On the other hand, invasive species can wipe out individual populations and species through direct competition or predation. Regardless of whether plants are introduced intentionally or accidentally, invasive species can: 1) prey on, parasitize, outcompete, or hybridize with native species to the point of extirpation or extinction, and 2) disrupt the function of native communities and ecosystems.³

Invasive exotic plant species crowd out, shade out, and otherwise take over the existing native species in an area. With the disappearance of the native plants comes the disappearance of the wildlife species that depend on these plants, for gone are their sources of food and shelter. An invasive vine may smother out all else over time, including the canopy trees, leaving a land more prone to erosion, leading to sedimentation of surface waters, and thus affecting the macroinvertebrate and fish populations. Some exotics are poisonous. For example, in Japan, Chinese Tallow leaves are used to poison fish. An aquatic exotic may thrive so well that desirable plants are shaded out by the formation of dense mats of the invading species, as noted in the Lake Victoria example. As plants die, oxygen levels may plummet. The fish leave, along with other aquatic organisms, no longer able to find the food or oxygen they need to survive. The birds and mammals that relied on the waterway for food leave to find new food sources. It is a vicious cycle. A Florida example is the water lettuce mats on the Ichetucknee River. The plant took over to the point that apple snail no longer found places to lay eggs, as the wild rice beds were crowded out. With the population of the apple snail decimated, the limpkins left. Only very recently has the limpkin returned, after much work to gain control of the water lettuce has allowed the wild rice to recover and thus, the apple snail as well.

During the 1999-2000 fiscal year, more than \$17 million in federal, state, and local funds were spent to treat mostly aquatic plants on almost 42,000 acres in Florida. The State's Bureau of Invasive Plant Management estimates that about \$25 million will be needed in fiscal year 2001-2002 (Florida DEP 2000).⁴ The state also spends millions of dollars in efforts to control Torpedo Grass, especially around Lake Okeechobee. Chinese Tallow is an expensive nightmare to Paynes Prairie near Gainesville, and most everyone is aware of the Maleleuca and Brazilian Pepper invasions of the already beleaguered Everglades. It is said that the state of Florida loses more acres to invasive exotic species each year than to development, an impressive statement considering Florida's current rate of growth.

Currently in Florida, invasive species make up approximately 31% of the total plant species throughout the state. The problem has become serious enough that all citizens need to become more aware of this important issue. Invasive exotic species slowly alter and undermine the foundations of an ecosystem, causing changes in entire gene pools and communities of species, alterations of soil and water chemistry, changes in ecosystem functions and productivity. In other words, invasion of exotic species causes a complete restructuring of the ecosystems that support entire socio-economic structures of our world. Florida citizens need to understand that the manifestations of invasive exotic species will ultimately have dire effects on the social, economic, and ecological foundation of the state.⁵

³ Ibid.

⁴ Ibid.

⁵ South Florida Ecosystem Restoration Task Force & Working Group. (2003). *Weeds Won't Wait*. [Online]. Available: http://www.sfrestore.org/documents/Weeds_Won't_Wait/index.htm.

Motivation for This Project

The problem of invasive exotic plants is recognized worldwide, and Florida seems to be especially impacted. The shoreline of Lake Santa Fe, considered to be Alachua County's premier lake and designated an Outstanding Florida Waterway (OFW), is no exception, especially with the ever-increasing development occurring around this popular body of water.

Our concern is the threat of invasive exotic plants that are encroaching on these wetlands and the developed shoreline as a result of man's intrusion on Lake Santa Fe. If these species are allowed to gain a strong foothold and spread unchecked, eventually overtaking the vital wetlands referred to above, no longer will the flow of water from the lake to the Gulf of Mexico be of the same quality that exists today, and no longer will the swamps and lake be havens for much of North Florida's wildlife.

The appearance of several invasive exotic plants had been noted around the lake. Residents' landscaping practices had also caused concern. The lowered water level, caused by a multi-year drought, had encouraged people to further denude their shorelines and thus created new opportunities for invasives to become easily established. An informal survey conducted by Tom Ward on Little Lake Santa Fe (2002) indicated that 65% of the homeowners had cleared, mowed, or converted to sand more than the ten-foot path allowed by Alachua County.



A shoreline that has been cleared of vegetation and converted to a sand beach

Given the prolific propagation rate of invasive pest plants, and the predominant use of landscaping practices not in the best interests of a healthy lake ecosystem, we saw a need to determine the extent of invasive exotic plants around the lake, and to educate the residents about the threat of these pest plants as well as encourage residents to consider changes in their lawn landscape and shoreline maintenance habits.

THE PLANTS

The Selected Plant Species

Air Potato	<i>Dioscorea bulbifera</i>
Camphor	<i>Cinnamomum camphora</i>
Chinese Tallow	<i>Sapium sebiferum</i>
Coral Ardisia	<i>Ardisia crenata</i>
Japanese Climbing Fern	<i>Lygodium japonicum</i>
Sesbania or Spanish Gold	<i>Sesbania punicea</i>
Torpedo Grass	<i>Panicum repens</i>
Wandering Jew	<i>Tradescantia fluminensis</i>
Wedelia	<i>Wedelia trilobata</i>
Wild Taro & Elephant Ear	<i>Colocasia esculenta</i> & <i>Xanthosoma sagittifolium</i>

Water Hyacinth, *Eichhornia crassipes*, was not included because the FDEP Bureau of Invasive Plant Management already addresses the problem. New populations of Cattail, *Typha latifolia*, were noted because of interest expressed by the Bureau.

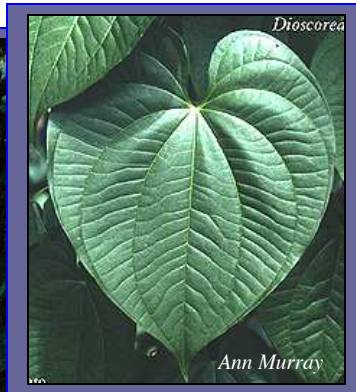
The Photo Gallery

A photo gallery and brief description of the chosen plant species follows to assist the reader in his understanding of the project.



Air Potato

Dioscorea bulbifera



Air potato is a rapidly growing vine that grows to 60-70 feet, engulfing entire tree canopies. It is capable of shading out even large trees. Native to tropical Asia; introduced to Americas from Africa during the slave trade. Dark green, heart-shaped leaf.

Produces aerial tubers (bulbils) reminiscent of the potato, hence its common name. Even the smallest of these sprout new, thriving plants. Large tuber underground. Very difficult to eradicate. Often introduced to new locations with fill dirt. Included in Florida Noxious Weed List, the Florida Department of Agriculture and Consumers Services (FDACS) prohibits it from sale or possession.

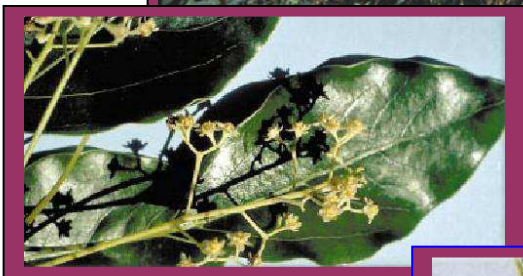


Camphor

Cinnamomum camphora



Large, evergreen shade tree with a spreading crown. Introduced in Florida in late 1800's. Native to China and Japan. The leaves are a dark, shiny green having an aroma of camphor or menthol when crushed. Listed as a Florida Exotic Pest Plant Council Category I species. Very weedy. The black berries spread seeds through birds eating the fruit. Displaces native species in mesic hammock and pine land forests.



Ken Langeland



Ken Langeland



Donald Hall

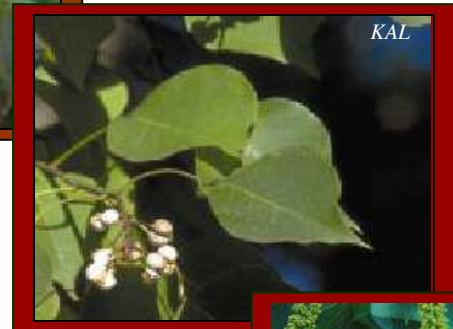
Chinese Tallow

Sapium sebiferum



Also called popcorn tree because of its large, white berries. Leaves toxic to fish and children. Considered an attractive ornamental shade tree, it grows and spreads rapidly, thriving in both upland and wetland situations and along shores of water bodies. Tallow is difficult to eliminate and tends to take over areas by out-competing natives. Serious problem in Paynes Prairie. Has a tendency to invade septic systems. Spread by birds and stormwater run-off. Included

in Florida Noxious Weed List. The Florida Dept. of Agriculture and Consumers Services prohibits the plant.



Carl Dennis, Auburn University, www.invasive.org

Coral Ardisia

Ardisia crenata



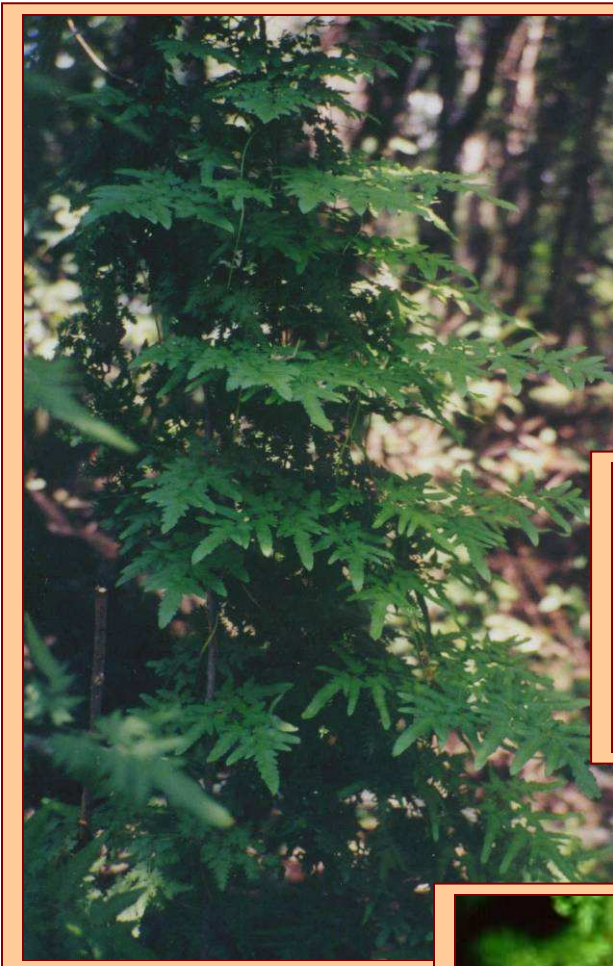
Small shrub easily distinguished by prolific clusters of red berries and the scalloped and serrated edges of its waxy, dark green leaves. Thickets overtake swamp and woodland floors, shading out seedlings of native plant species. Berries spread by birds, stormwater run-off, and careless disposal of trimmings.

Prefers moist soil.
Introduced in early
1900's from Japan or
India.



Japanese Climbing Fern

Lygodium japonicum



Delicate, lacy looking vine native to eastern Asia, introduced to Florida in 1920. Grows 10-15 feet up on forest plants and blankets forest and swamp floors. Spread by spores riding winds; control is difficult. Preferring damp areas, it grows well in disturbed sites along fences and roadsides as well as swamps, marshes, and woodlands – even beaches.



Ted Bodner, Southern Weed Science Society,
www.invasive.org

Spanish Gold
Sesbania punicea

Shrub native to South Africa planted for its showy sprays of red flowers. Also called Rattlebox because of its purple seedpods that rattle when dry. Likes wet but not submerged locations in marshes, lake shorelines, drainage ditches, and disturbed sites. Can develop into dense thickets on a shoreline. It is a deciduous tree that can reach 12 feet in height.



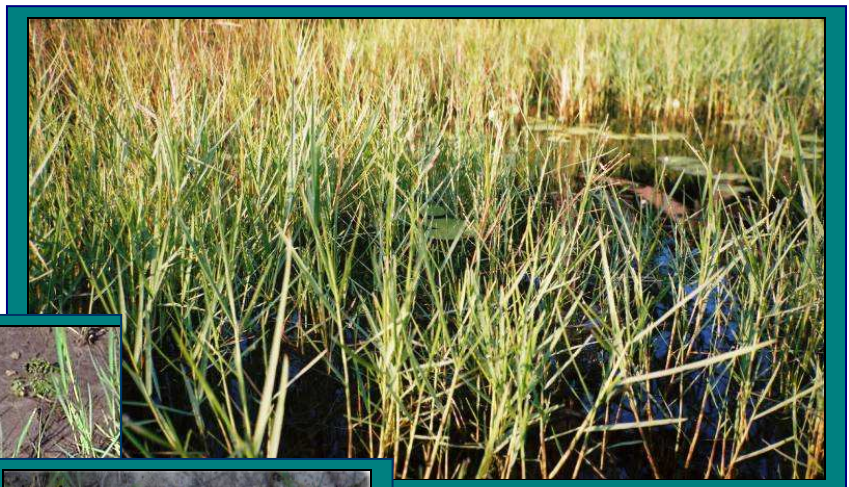
Spanish gold
Sesbania punicea
Photo by Vic Ramo
Copyright 2002 Univ. Florida

Torpedo Grass

Panicum repens

A serious pest plant in Florida costing the state millions of dollars each year. Especially a problem on Lake Okeechobee. Grows in dense colonies along shorelines, displacing native, beneficial grasses and other aquatic plants. Though originally brought in from

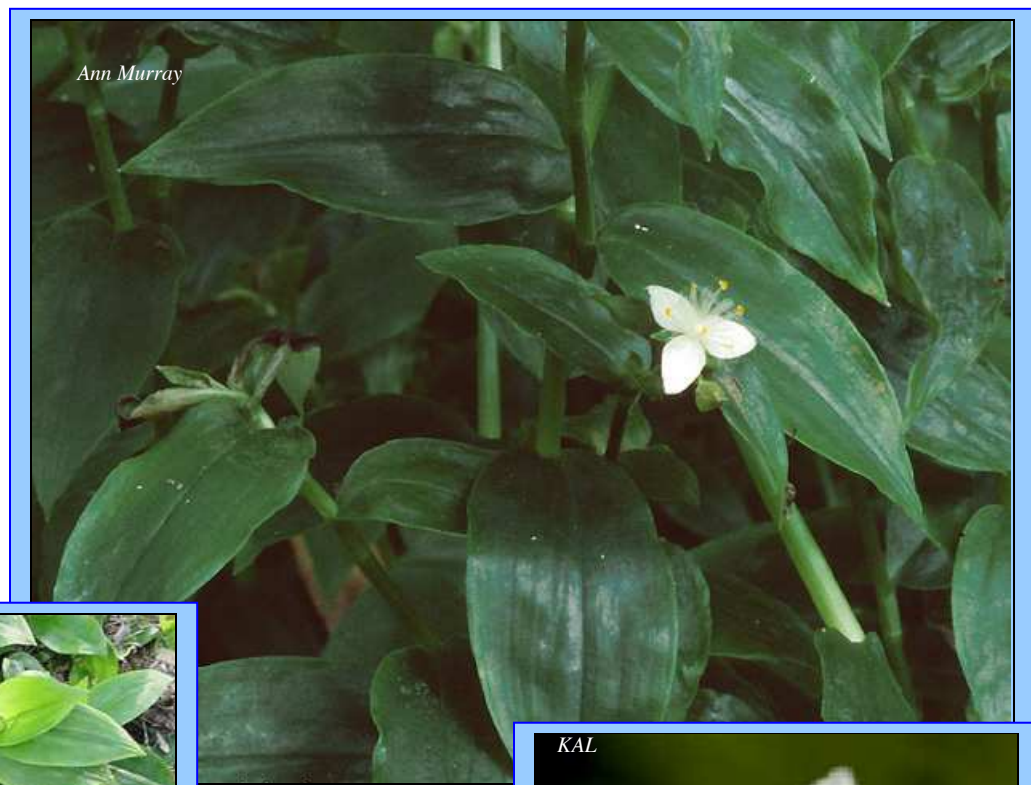
Europe for cattle forage, it was discovered to make poor cattle feed. As a shoreline grass it is worthless as fish or waterfowl habitat. Difficult to identify, may be confused with maidencane and other beneficial grasses. Spreads by torpedo-like rhizome that is hard like a nail. Spreads easily along lakeshores and canal banks once given the opportunity to sprout.



Wandering Jew

Tradescantia fluminensis

The Green Wandering Jew was grown as a house or patio plant. A ground covering plant with white flowers that grows in dense mats, smothering native ground covers and seedlings of all other vegetation. Wandering Jew poses such a problem for native species that a study done by the University of Florida Institute of Food and Agricultural Sciences suggests that removing this plant from creek banks and forests brings back nearly vanished native species (Hoover, 1999). Thrives most everywhere, though preferring moist shady areas. Spreads easily by stem fragments. Very difficult to control; nearly impossible to eradicate. Introduced from tropical South America.



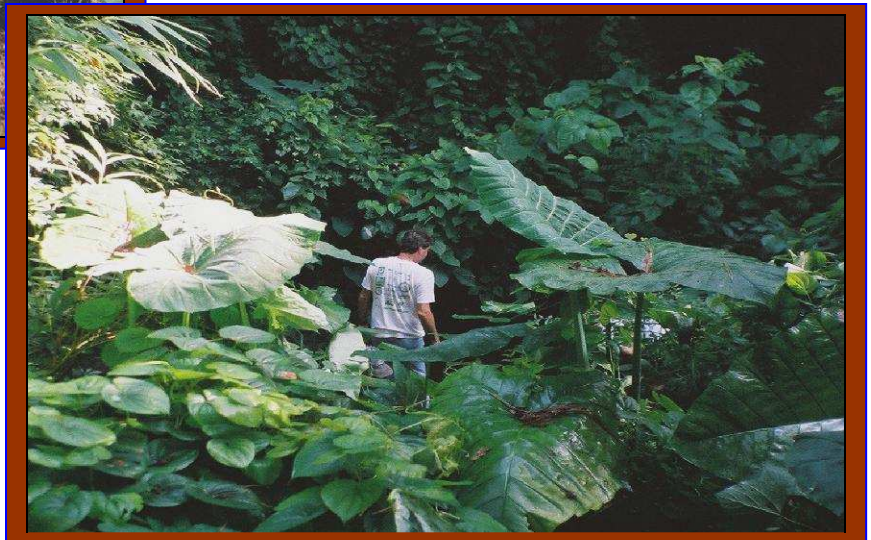
Wedelia
Wedelia trilobata

Another groundcover that grows in thick, dense mats. Having a pretty, bright yellow, daisy-like flower, it reproduces by seed and stem fragments. Capable of blanketing whole shorelines, including riprap. Takes mowing well. Grown as an ornamental, but difficult to keep under control or to eradicate. Originally from West Indies.



Wild Taro & Elephant Ear

Colocasia esculenta & *Xanthosoma sagittifolium*



Wild Taro was introduced as a food crop to substitute for potatoes in 1910. Originally from Asia and India. Found both in and out of water along shorelines, marshes, canals, and ditches. Grows very densely, rapidly displacing native species entirely. Leaves are arrowhead-shaped, dark green, velvety, and water repellent. Can be confused with smaller Arum species, a

very beneficial plant. Also confused with Elephant ear, *Xanthosoma sagittifolium*, which is also a non-native and problem plant. Both species spread easily by rhizome, pieces of the corm and petiole, and seeds. Difficult to eradicate.

Other Species Noted



Mimosa
Albizia julibrissin



Caesar's Weed
Urena lobata



Cogon Grass
Imperata cylindrica



Boston or Sword Fern
Nephrolepis cordifolia



Shrub Lantana
Lantana camara



Winged Yam
Dioscorea alata



Tropical Soda Apple
Solanum viarum

THE INVASIVE EXOTIC PLANT INVENTORY

Methods and Definitions

Study Area

The individual shoreline inventory study area of each parcel to be surveyed was defined the water's edge to approximately 75 feet upland of the ordinary high water (OHW) line, which on Lake Santa Fe is 141 feet above mean sea level (MSL). On Lake Santa Fe, the OHW line can be approximately determined in several ways. In developed areas a slight berm exists that is indicative of this elevation. In wetland areas, it is safe to use the height of the dominant water lines seen on the trees. The water line on docks is another good indicator. Most all docks seem to be built roughly eighteen inches above the 141 foot elevation, serving as still another guideline to follow if no other indicators were available.

Choice of Plant Species

The aforementioned list of ten plants was chosen with the advice of staff members of the Alachua County Environmental Protection Department (ACEPD) and Joe Hinkle of the FDEP Bureau of Invasive Plant Management. While we knew there were likely more than ten species to be found, we also felt that ten was the maximum we could expect volunteers to successfully manage.

Methods/Procedures

In May of 2002, a letter notified all property owners that the invasive exotic plant survey would be conducted during the months of July, August, September, and October 2002. The project was fully explained in this mailing in an effort to foster acceptance of the upcoming visits (Appendix B).

Volunteers were told to approach each parcel on their list by land, water, or beach, depending on what conditions allowed at the time. Appendix C includes the procedures, field survey form, and other inventory tools used by the volunteers. The volunteers were expected to visit each parcel in their assigned area to check for the specified plant species, mark the locations of infestations on maps, record the population category of each species, and make note of any other infestations of interest (such as cattails, cogon grass). They were also encouraged to collect samples of any plant that appeared to be invasive but which they could not identify and take them to ACEPD so that identification could be made.

Parcel Characteristics

Each parcel was evaluated for its landscape type, tree canopy, shoreline vegetation, and beach with several categories by which to judge each. Landscape type consisted of three categories: (1) natural, (2) minimally disturbed, and (3) manicured or mowed lawn. *Natural* was defined as meaning no development at all. *Minimally disturbed* described a parcel developed enough to allow for a house and little else. *Manicured or mowed lawn* refers to just that.

Tree canopy estimates consisted of four categories, each denoting a range of percentage of canopy coverage of the area surveyed. A rating of (1) indicated coverage of 0-25%, (2) 25-50%, (3) 50-75%, and (4) 75-100%.

Shoreline vegetation was classified as (1) Swamp, (2) good buffer zone, and (3) lawn to water. Finally, the beach zone was rated as (1) swamp, (2) sand and grass, (3) white sand fill, no grass, and (4) grass beds. A fifth category, (5) canal, was added to describe the canal situation.

Inventory Classes

For the plant inventory (1) signified a single plant of the species, (2) indicated two to five plants, and (3) designated infestations, which for our purposes was defined as more than 5 plants of a given species. Volunteers were also asked to indicate whether the species was planted (P) or volunteer (V).

Analysis of the Inventory Data

The number of parcels actually visited totaled 320, with 34 not visited for various reasons. The data sheets are included in the Appendix D.

Lakewide View of the Presence of Invasive Plants

In analyzing the data, first the most often noted species were determined. The following table and accompanying chart illustrate that the most commonly found species was Wild Taro (count also included Elephant Ear), found in 23.1% of the parcels inventoried. Chinese Tallow was found in 20.6% of the parcels, and Camphor in 16.9%. Those noted the least were Wedelia at 4.1%, Japanese Climbing Fern at 3.8% and Torpedo Grass at 3.4%.

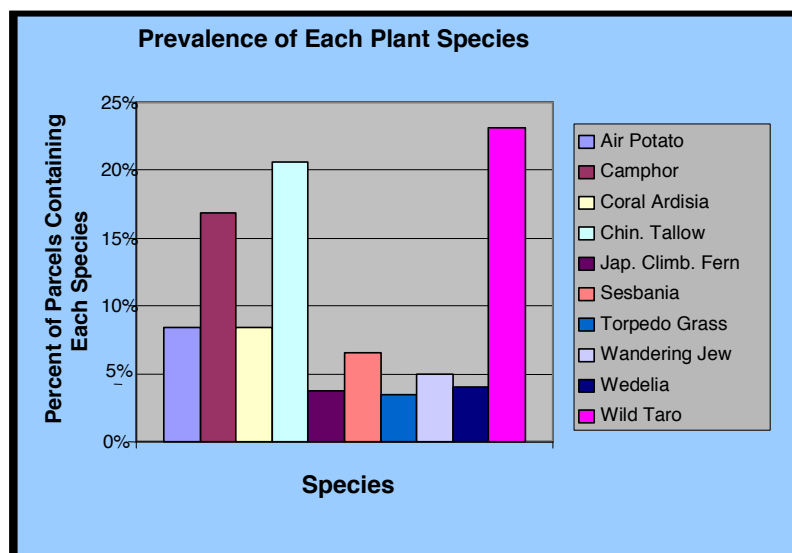


Figure 1. Prevalence of the Individual Plant Species

Table 1: Percentage of Parcels with Invasives by Species

Category	Air Potato	Camphor	Coral Ardisia	Chinese Tallow	Japanese Climbing Fern	Sesbania	Torpedo Grass	Wandering Jew	Wedelia	Wild Taro
1. Individual	0.3%	4.4%	0.3%	5.9%	1.6%	1.3%	0.0%	0.9%	0.3%	1.6%
2. Few	4.4%	9.7%	3.1%	9.1%	1.6%	1.9%	2.2%	1.9%	1.9%	5.0%
3. Infestation	3.8%	2.8%	5.0%	5.6%	0.6%	3.4%	1.3%	2.2%	1.9%	16.6%
Total	8.4%	16.9%	8.4%	20.6%	3.8%	6.6%	3.4%	5.0%	4.1%	23.1%

Camphor, Chinese Tallow, and Wild Taro are found most often. Wild Taro, Chinese Tallow and Coral Ardisia are found most often as infestations.

Taking a lakewide view, one can see by referring to Table 1 and Figure 1, that Wild Taro was the species occurring as an infestation most often, infesting 16.6% of the parcels. Chinese Tallow and Coral Ardisia occurred as infestations on 5.6% and 5.0% of the parcels respectively.

Pest Plant Populations and Neighborhoods

In terms of total numbers, invasives were found on approximately 50% of the parcels surveyed. However, the neighborhoods varied substantially as to the presence of invasive plants. Referring to Table 2, those neighborhoods having the highest percentage of parcels containing invasive pest plants were Earleton and Melrose Bay, with 100% and 88% respectively. The other Earleton area neighborhoods, named as NE 111 Road (75%), Millionaire's Row (67%), and South Earleton (75%) were also high on the list. Dogwood Lane, adjacent to Melrose Bay, ranked high as well, with 73% of the parcels having invasives. Top of Little Lake had 67% of its parcels showing invasive plants, with neighboring Martins Island also fairly high on the list. In other words, the greatest concentrations of parcels with exotic invasive plants are clustered in three main areas – Earleton, Melrose, and the far north end of the lake. The southwest corner ranks fourth.

Neighborhoods (refer to Table 2) showing the least presence of invasives include Alto Canal, Santa Fe Pass, Bonnet Estates, SR 26 Ramp, and Sylvan Shores. Also low on the list are the South End, Bonnet Lake, and North Bird Beach, all with 25%. Such figures can be misleading however, unless one remembers that these percentages refer to the *number* of parcels and not the percent of the area. For example, the area called the South End is noted at 25% because *one parcel in the four* had invasives present. In terms of area, it would be even less impressive, for one small infestation of Japanese Climbing Fern was found in the entire area, which is quite large - many times larger than four average-size lots. Maps 2 and 4 (Appendix A) offer a visual reference to the size of the south end parcels.

Tables 3 through 12 serve to show the relationship between the presence of and the population characteristics of each species to the various neighborhoods. Please note that these comparisons are made by numbers of parcels and not area of shoreline. Maps 5, 6, and 7 (Appendix A) mark parcels in which infestations were noted.

Table 2. Percentage of Parcels with Invasives by Neighborhood

Neighborhood	# of Parcels with invasive species present	Total Parcels	% With Invasives
Earleton	8	8	100%
Melrose Bay	15	17	88%
NE 111 th Road	6	8	75%
South Earleton	6	8	75%
Dogwood Lane	11	15	73%
Millionaire's Row	6	9	67%
Top Little Lake	16	24	67%
Southwest Corner	34	58	59%
Martins Island	15	26	58%
Gator Cove	7	13	54%
South Bird Beach	8	15	53%
Totem Pole Road	12	23	52%
Blueberry Bay	7	14	50%
Bonnet Lake	1	4	25%
North Bird Beach	4	16	25%
South End	1	4	25%
Alto Canal	2	13	15%
Santa Fe Pass	2	13	15%
Bonnet Estates	1	17	6%
SR 26 Ramp	0	1	0%
Sylvan Shores	0	14	0%
All Parcels	162	320	50.6%

50.6% of the parcels have invasive species present. The biggest concentrations are in Earleton, Melrose Bay, and north end of the Little Lake.

Air Potato

Air Potato is not a serious problem around the lake as yet. The greatest number of infestations was found in the Melrose Bay neighborhood. More often it was found as a few (2-5) plants, most notably in the Southwest Corner, probably indicating its presence is fairly new. Given its ability to reproduce and spread, Air Potato could easily become a serious invader in the near future.

Table 3. Air Potato Populations

Neighborhood	1. Individual Plant	2. Few Plants	3. Infestation	Total
Southwest Corner	1	12	1	14
Melrose Bay			5	5
South Earleton		1	2	3
Dogwood Lane			2	2
South Bird Beach			1	1
Totem Pole Road			1	1
Martins Island		1		1
Total	1	14	12	27

Air potato is found most often in populations of 2-5 plants.

Camphor

Camphor was third in frequency of representation, true both in the number of neighborhoods in which it was found as well as number of parcels. While found in the greatest number of parcels in the Melrose Bay-Dogwood Lane area, it is also often found in the Southwest Corner. Camphor is quite widespread around the lake, found in 13 of the neighborhoods. Most of the time, i.e. 57%, Camphor is found in populations of 2-5 plants rather than infestations, a result of mowed lawns. Single specimens are also common and for the same reason.

Table 4. Camphor Populations

Neighborhood	1. Individual Plant	2. Few Plants	3. Infestation	Total
Melrose Bay	1	6	4	11
Southwest Corner	3	7		10
Dogwood Lane		6	2	8
Blueberry Bay	2	4		6
Top Little Lake	4	1		5
Millionaire's Row		2	1	3
South Earleton		3		3
Gator Cove	1	1		2
Martins Island	2			2
Earleton		1		1
North Bird Beach	1			1
NE 111 th Road			1	1
Santa Fe Pass			1	1
Total	14	31	9	54

Camphor is third in frequency of representation. It is usually found in populations of 2-5 plants.

Chinese Tallow

Chinese Tallow has the distinction of being found in 16 neighborhoods, more than any other species on the survey's list of plants. It ranks second only to Wild Taro as to the number of parcels where found. At this time, Chinese Tallow is found most often as 2-5 plants in any given parcel. Like with Camphor, mowing keeps the species in check on these parcels. The infestations are found where the plants are not subject to mowing – along canal banks, for example, or edges of undeveloped property. The two adjacent neighborhoods at the north end of the lake, Martins Island and Top of Little Lake contained the bulk of the Tallow found. Tallow was also found in a substantial number of the parcels in the Southwest Corner. The plant seems to grow in most any situation that offers the opportunity for sprouting – upland, wetland, even newly exposed beaches.

Table 5. Chinese Tallow Populations

Neighborhood	1. Individual Plant	2. Few Plants	3. Infestation	Total
Southwest Corner	4	8		12
Martins Island	5	1	5	11
Top Little Lake	1	5	5	11
Melrose Bay	1	3	2	6
Millionaire's Row	3	1		4
Earleton			3	3
South Earleton	1	2		3
Gator Cove		3		3
Alto Canal		1	1	2
Dogwood Lane	1		1	2
North Bird Beach	1	1		2
Blueberry Bay	1	1		2
Totem Pole Road		2		2
Bonnet Lake	1			1
Bonnet Estates		1		1
Santa Fe Pass			1	1
Total	19	29	18	66

Chinese Tallow is found in more neighborhoods than any other species, noted most frequently in the neighborhoods of the north end of the little lake and the southwest corner of the big lake.

Coral Ardisia

For now, Coral Ardisia remains mostly in the parcels where planted on the Alachua County side of the lake, although infestations are known to have spread and prospered on the Bradford County side. The species was found most often in the Southwest Corner and NE 111th Road neighborhoods. It is of interest to note that of the 27 parcels where found, Coral Ardisia was found in populations of more than 5 plants (the definition of infestation) 59% of the time. In the case of these lawns, infestations cannot be attributed to spread of the plant, but rather to homeowners planting it liberally, often as short hedges. The abundance of berries produced by all these plants does offer great opportunity for spreading in the future, however, as witnessed on the aforementioned Bradford County parcels.

Table 6a. Coral Ardisia Populations

Neighborhood	1. Individual Plant	2. Few Plants	3. Infestation	Total
Southwest Corner		9	2	11
NE 111 th Road	1		4	5
Melrose Bay			3	3
South Earleton			3	3
North Bird Beach			2	2
Millionaire's Row		1	1	2
Martins Island			1	1
Total	1	10	16	27

Coral Ardisia is usually found in infestations.

Also of interest to note is that nearly half of the parcels in which Coral Ardisia was found are classified as a category 3 landscape type, or mowed and manicured yard (See Table 6b), again indicating it is a desirable plant to many (or at least was at the time of planting).

Table 6b. Coral Ardisia and Landscape Type

Landscape Category	1. Individual Plant	2. Few Plants	3. Infestation	Total
1. Natural		2	2	4
2. Minimally disturbed	1	7	2	10
3. Manicured & Mowed Lawn		1	12	13
Total	1	10	16	27

The infestations are most often found in manicured landscapes, an indicator of its use for hedges.

Japanese Climbing Fern

Japanese Climbing Fern is not well established on the lake at this time, but given its propensity for spreading in the wind, finding the fern at all is worrisome. The plant appeared to be young wherever it was found. As seen in Table 7, an infestation was found only twice, and even these were quite small. Some months after the completion of the survey, still another newly established plant was found in South Earleton growing on cypress knees and beginning to climb up the Spanish Moss hanging from a low limb.

Table 7. Japanese Climbing Fern Populations

Neighborhood	1. Individual Plant	2. Few Plants	3. Infestation	Total
Southwest Corner	5	4		9
Santa Fe Pass			1	1
South End			1	1
North Bird Beach		1		1
Total	5	5	2	12

Japanese Climbing Fern is not yet well established or widespread on the lake.

Sesbania

Table 8a indicates a definite pocket of Sesbania infestation in the Earleton neighborhoods. In fact, the population is so well established that along one stretch of the shoreline, nothing else grows anymore. Judging from the Earleton example, Sesbania completely overtakes the shoreline vegetation at water's edge. While the species is not yet widespread, wherever found it propagates rapidly in the area, turning into an infestation after several growing seasons if not subjected to mowing. Note that in over half of the parcels in which Sesbania was found, it ranked as an infestation, or more than five plants.

Table 8a. Sesbania Populations

Neighborhood	1. Individual Plant	2. Few Plants	3. Infestation	Total
Earleton		1	5	6
South Earleton		2	3	5
Martins Island	2	1		3
North Bird Beach		1	1	2
Millionaire's Row	2			2
NE 111 th Road			1	1
Santa Fe Pass			1	1
Top Little Lake		1		1
Total	4	6	11	21

Most of the Sesbania populations and infestations are found in the Earleton area.



Earleton's Sesbania has taken over in one area of shoreline

Observation showed that most Sesbania was growing in the dry grass beds along the lakeshore, and although the data cannot illustrate this, it does indicate that all but one parcel in which Sesbania was found has a beach zone with grass beds, either category 2 or 4. Refer to Table 8b.

Table 8b. Sesbania and Beach Zone Characteristics

Beach Zone	1. Individual Plant	2. Few Plants	3. Infestation	Total
1. Swamp				0
2. Sand/Grass	3	2	4	9
3. White Sand Fill				0
4. Grass Beds		4	7	11
5. Canal	1			1
Total	4	6	11	21

Torpedo Grass

It is tempting to not include Table 9. Torpedo Grass proved to be extremely difficult for the volunteers to correctly identify. The parcels in the North Bird Beach neighborhood were surveyed by a wetlands biologist. Therefore, in the table below, only the finding of the plant in the North Bird Beach area is thought to be valid. This plant has been noted on a long stretch of the Bradford County shoreline of the big lake by this same biologist. However, eight months after the completion of the survey, two new infestations of Torpedo Grass have been discovered at the north end of the Little Lake, likely blown up by the southwest winds that prevail and precede approaching cold fronts. Recently, new stands were noted in Melrose Bay.



New torpedo grass sprouts on exposed newly lake bottom

Table 9. Torpedo Grass Populations

Neighborhood	1. Individual Plant	2. Few Plants	3. Infestation	Total
Southwest Corner		7	1	8
Dogwood Lane			2	2
North Bird Beach			1	1
Total	0	7	4	11

**Torpedo Grass is difficult to identify, making the data collected probably unreliable.
The species has been found to recently be spreading, not indicated in this table.**

Wandering Jew

Much of the Wandering Jew found was noted in concentrations of more than 5 plants. Because the similar looking blue dayflower plant is common in the area, Wandering Jew often proved difficult for some to correctly identify. Because a single Jew plant (or even 2-5) is almost never seen (and noticed even less), one has to wonder if those instances noted were in fact the day flower instead. The data in Table 10 should be considered questionable. However, the table does successfully illustrate that the species is not widespread along the lakeshore, being noted in only 6 neighborhoods, correctly identified or not.

Table 10. Wandering Jew Populations

Neighborhood	1. Individual Plant	2. Few Plants	3. Infestation	Total
Southwest Corner	2	4		6
South Earleton			3	3
Martins Island	1		2	3
North Bird Beach		1	1	2
Melrose Bay			1	1
NE 111 th Road		1		1
Total	3	6	7	16

Wandering Jew is not found to be a problem at this time.

Wedelia

Like Wandering Jew, Wedelia is also not a widespread plant. However, wherever it is found, it usually exists as an infestation – either because the homeowner cannot control it or because it was planted with the idea of creating a good groundcover, and spreading was thus encouraged.

Table 11. Wedelia Populations

Neighborhood	1. Individual Plant	2. Few Plants	3. Infestation	Total
Southwest Corner	1	4		5
Dogwood Lane			2	2
Martins Island			1	1
Melrose Bay			1	1
NE 111 th Road			1	1
South Bird Beach			1	1
North Bird Beach		1		1
Millionaire's Row		1		1
Total	1	6	6	13

Few populations of Wedelia are found on Lake Santa Fe.

Wild Taro

Wild Taro is the most prolific invasive of them all, showing up on 74 of the parcels surveyed. The table illustrates that most of the Taro exists as infestations, 72% of the time. While Wild Taro wins the honor of being cited most often, it ranks second to Chinese Tallow in neighborhood representation. However, as the result of a sudden explosion of the species toward the end of the survey period, it is quite likely Wild Taro is now the more widespread of the two. Many neighborhoods already have a number of infestations established, as illustrated by Table 12. The sudden and recent increase in population promises to be a problem in the near future, for Taro quickly overtakes the native grasses so needed for fish and waterfowl habitat along the lakeshore. It is also very difficult to successfully eradicate. Wild Taro was most often found in the grass beds or just upland.



Wedelia and Wild Taro head for the swamp

Table 12. Wild Taro (includes Elephant Ear) Populations

Neighborhood	1. Individual Plant	2. Few Plants	3. Infestation	Total
Southwest Corner	3	10	5	18
Totem Pole Road	1		10	11
Melrose Bay			8	8
Earleton			7	7
Martins Island	1	1	5	7
South Bird Beach		1	5	6
Gator Cove		1	3	4
Dogwood Lane			3	3
Top Little Lake		1	2	3
Millionaire's Row			2	2
NE 111 th Road			2	2
Alto Canal			1	1
North Bird Beach		1		1
South Earleton		1		1
Total	5	16	53	74

Wild Taro (including Elephant Ear) is the most prolific of them all, and spreading fast.

It was interesting to note the “pockets” of invasion by species. Maps 5, 6, and 7 (Appendix A) locate the infestations found of each species. “Hot spots” of a few particular species are quite easy for the viewer to spot. Specifically note the abundance of Chinese Tallow in the Top of Little Lake neighborhood and the Sesbania dominating in Earleton. Wild Taro is the most serious intruder and gaining fast, with pockets of infestation thriving in the Totem Pole Road and adjacent Southwest Corner neighborhoods. Taro is very widespread, seeming to show up everywhere to infest the shoreline. Recent observations would give rise to suspicion that Torpedo Grass is doing the same. Taro’s “look-alike,” Elephant Ear, is also rampant.

Parcel Characteristics and Invasives

The survey also took note of the characteristics of parcel landscape type, tree canopy coverage, shoreline vegetation, and beach zone type (Table 13a).

Landscape Type

By far the greatest percentage of parcels fell into the *mowed and manicured lawn* category (3), accounting for 66% of the parcels surveyed. Those classified as *minimally disturbed* (2) made up 21%, and only 13% were rated in the *natural* (1) category. However, it should be noted that the above refers to the number of parcels. In terms of area or length of shoreline, the figures would be different, for most parcels in the *natural* category are very large parcels with lengthy shorelines. The *manicured and mowed lawn* parcels, on the other hand, tend to be substantially smaller in area and especially in shoreline length.

Table 13a. Classification of Parcels by Landscape Type and Prevalence of Invasive Species within Each Category

Landscape Category	Number of Parcels Surveyed	% of Total Parcels Surveyed	Number of Parcels with Invasives	% of Total Parcels in Category with Invasives
1. Natural	40	13%	18	45%
2. Minimally disturbed	68	21%	49	72%
3. Manicured & Mowed Lawn	212	66%	95	45%
Total	320	100%	162	

The greatest percentage of parcels fall into the *mowed and manicured* (3) category. Those rated as *minimally disturbed* (2) are hardest hit by pest plant invasion, 72% of the parcels.

A look at landscape types where the invasive plant species were most often found tells us that the parcels most heavily impacted by invasive intrusion are those classified as category 2, *minimally disturbed*. While manicured lawns have the highest percentage of the total number of lots found with invasives (Table 13b), this is merely an indication that most of the parcels are of the manicured type and that invasives are being introduced on them. (It is important to again remember that large and small parcels carry the same weight or emphasis in this project.) It might be added that species in this situation are generally introduced intentionally by planting or unintentionally with fill or sod, and usually no effort is made to eradicate them.

Table 13b. Percent of the Total Number of Parcels with Invasives Found within Each Category of Landscape Type

Landscape Category	Parcels without Invasives	Parcels with Invasives	% of Total Parcels with Invasives
1. Natural	22	18	11%
2. Minimally disturbed	19	49	30%
3. Manicured & Mowed Lawn	117	95	59%
Total	158	162	100%

The greatest number of invasives found was in mowed and manicured landscapes, a result of the fact that this type of landscape is by far the most numerous.

Tree Canopy

The tree canopy coverage was classified by percentage of the area in shade. Refer to Table 14a. Once again the reader needs to remember that the percentages are based on the number of parcels, and not area or length of shoreline. 34% of the parcels rank in category 4, which is the largest category. The fact that many of these parcels are quite large makes such a ranking of even greater importance and indicates that much of the shoreline is well shaded. And yet, when looking at the total percentages by combining categories 3 and 4 and categories 1 and 2, only 54% of the parcels can be considered to have a canopy coverage of 50% or greater, with 46% having less than 50% coverage. Nearly half the parcels have lost roughly half of their tree canopy along the lakeshore. Fortunately the most heavily canopied half (i.e., those parcels with 50-100% coverage) contains the very large parcels categorized as natural landscapes.

Table 14a. Classification of Parcels by Tree Canopy Coverage and the Prevalence of Invasive Exotics within Each Category

Tree Canopy Coverage	Number of Parcels Surveyed	% of Total Parcels Surveyed	Number of Parcels with Invasives	% of Total Parcels in Category with Invasives
1. 0 – 25%	90	28%	42	47%
2. 25 – 50%	56	18%	36	64%
3. 50 – 75%	64	20%	35	55%
4. 75 – 100%	100	34%	49	45%
Total	320	100 %	162	

Much of the shoreline is well shaded, since the largest parcels fall into category 4.
Invasives affect the largest percentage of parcels found in the mid-ranges.

Table 14a also illustrates that parcels in the mid-ranges of tree canopy coverage were most often found with invasive plants; about what one would expect as such range offers the opportunity for more species to thrive successfully than either of the more limiting extremes of coverage. In terms of the total number of parcels containing invasives, however, categories 1 and 4, the sunniest and shadiest, were the most represented because parcels in these two categories are also the most numerous (Table 14b).

Table 14b. Percent of the Total Number of Parcels with Invasives Found within Each Category of Tree Canopy Coverage

Tree Canopy Coverage	Parcels without Invasives	Parcels with Invasives	% of Total Parcels with Invasives
1. 0 – 25%	48	42	26%
2. 25 – 50%	20	36	22%
3. 50 – 75%	29	35	22%
4. 75 – 100%	61	49	30%
Total	158	162	100%

Shoreline Vegetation

Shoreline vegetation was rated by three categories: (1) swamp, (2) good buffer zone, or (3) lawn-to-water. While 41% of the parcels had a good buffer zone, a close 36% were found to be in the lawn-to-water category. This means more than a third of the lakeshore parcels have removed the vegetation along the shoreline. Only 24% of the parcels are still found with the swampland vegetation that once bordered the entire lake along the shoreline. Refer to Table 15a.

Table 15a. Classification of Parcels by Shoreline Vegetation Characteristics and the Prevalence of Invasive Exotics within Each Category

Shoreline Vegetation	Number of Parcels Surveyed	% of Total Parcels Surveyed	Number of Parcels with Invasives	% of Total Parcels in Category with Invasives
1. Swamp	76	24%	31	41%
2. Good buffer zone	130	41%	79	61%
3. Lawn to water	114	36%	52	46%
Total	320	100 %	162	

More than a third of the parcels exhibit lawn-to-water shorelines. Invasives found in category 3 are most probably intentionally planted or if not, allowed to thrive purposely.

Invasives were found most frequently in the lawns having good buffer zones.

Shorelines rated as lawn to water (3) contained invasives 46% of the time, while the plants were found least often, 41% of the time, along shorelines characterized by swamp vegetation (4). Since most all but lawn grass is removed on category 3 shorelines, those



Lawn demonstrating good buffer zone

with little vegetation, it is likely that invasive plants found here are left intentionally, or at least no effort is made to remove them. Unfortunately, invasives were found most often in the parcels with a good buffer of vegetation. Of the 130 parcels rated to have a good buffer zone, 61% had invasives present. Looking at the total number of parcels with invasives present (Table 15b), shorelines with good buffers still rank highest, with 48% of the parcels containing invasives falling into category 2. While only an assumption, it would seem a valid guess to assume most of the invasives found in good buffer zones are Wild Taro, since Taro is the most prolific of the species inventoried and prefers to grow near the waterline as well, unlike most of the species inventoried. Indeed, a look at Table 15c indicates half the Taro found is on parcels with adequate buffers – though this certainly is not proof that all Taro is in fact growing along the shoreline zone.

Table 15b. Percent of the Total Number of Parcels with Invasives Found within Each Category of Shoreline Vegetation

Shoreline Vegetation	Parcels without Invasives	Parcels with Invasives	% of Total Parcels with Invasives
1. Swamp	45	31	19%
2. Good buffer zone	51	79	49%
3. Lawn to water	62	52	32%
Total	158	162	100%

The greatest number of parcels with invasives present is rated as having a good buffer zone of vegetation. Parcels with good buffers are also the most numerous type.

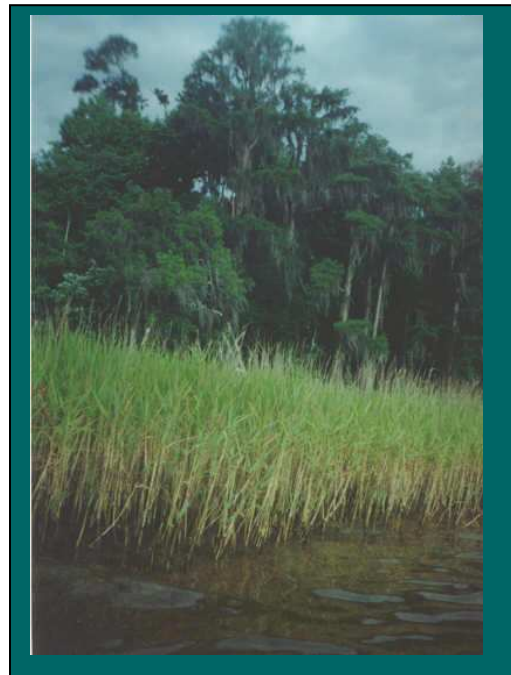
Table 15c. Presence of Wild Taro by Shoreline Vegetation Category

Shoreline Vegetation	1. Individual Plant	2. Few Plants	3. Infestation	Total
1. Swamp	2	3	10	15
2. Good buffer zone	2	9	26	37
3. Lawn to water	1	4	17	22
Total	5	16	53	74

Beach Zone

Four categories were used to classify the beach zone of each parcel: (1) swamp, (2) sand/grass, (3) white sand fill, (4) grass beds, and (5) canal, which was added to separate out the canal parcels since their situation is so dissimilar to the beach zone fronting the lake. Table 16a shows that parcels with beach zones consisting of all or part grass beds are most common, accounting for 68% of the total.

Those with grass beds present are also the type to most likely contain invasives as well, 78% of the time (categories 2 and 4 lumped together). Looking at Table 16a, parcels having beachfronts classified as swamp (1) or white sand fill (2) have invasives present the least.



Maidencane grass beds are common on the lake

Table 16a. Classification of Parcels by Beach Zone Type and the Prevalence of Invasive Exotics within Each Category

Beach Zone Type	Number of Parcels Surveyed	% of Total Parcels Surveyed	Number of Parcels with Invasives	% of Total Parcels in Category with Invasives
1. Swamp	46	14%	17	37%
2. Sand/grass	114	36%	69	61%
3. White sand fill	29	9%	9	31%
4. Grass beds	101	32%	58	57%
5. Canal	30	9%	9	30%
Total	320	100%	162	

Most of the properties around Lake Santa Fe are characterized with dense grass beds along the beach zone.

In terms of the total number of parcels in which invasives were present, the categories sort out the same way by percentage, with the beach zones characterized by grass beds again containing invasives the most – about what one would expect, given that parcels in categories 2 and 4 are make up the majority. See Table 16b.

Table 16b. Percent of the Total Number of Parcels with Invasives Found within Each Category of Beach Zone Type

Beach Zone Type	Parcels without Invasives	Parcels with Invasives	% of Total Parcels with Invasives
1. Swamp	29	17	11%
2. Sand/grass	45	69	43%
3. White sand fill	20	9	5%
4. Grass beds	43	58	36%
5. Canal	21	9	5%
Total	158	162	100%

Although statistics were not kept in a manner to show what area of the parcel contained each species, it was noted through observation that the plant species most likely to be found in the grass beds were Wild Taro and Sesbania. Those found in swamp zones were most likely to be Wild Taro or Chinese Tallow. Beaches characterized by white sand fill are devoid of any vegetation as a rule because of the owner's efforts to intentionally keep it as such. Only the occasional Taro plant is left, or a few new (but surely short-lived) seedlings of Tallow, Ardisia, or Camphor emerge and exist until mowed, pulled, plowed, or sprayed (all these methods are common), or the water level returns to a normal range of depth.

Other Remarks

An analysis could be made of the parcel characteristics for each plant, as was done in Table 15c in the case of Wild Taro and shoreline vegetation. In fact, a graduate student did just that with the data for a class project. However, such analysis does not have much validity at this point in time. For the most part, invasive species are relatively new around the lake and exist as a result of where they were first planted. And so the conditions under which they are found depend largely on this fact rather than other influences. With the continuing spread of the plants, this will possibly become a less and less important consideration over time, and then property conditions may play a more pivotal role in influencing the locations where each species is most often found, especially the infestations.

Wedelia populations provide a perfect example. In the places where it was found, it was obviously purposely planted as an attractive ground cover, chosen for its nice foliage and pretty yellow, daisy-like flowers. Coral Ardisia offers another good example. Most locations of Coral Ardisia are those in which it was considered a desirable landscaping plant and planted intentionally. The rest of the plants are on parcels nearby. The species presence has not been long enough in time to allow Coral Ardisia to spread to sites all around the lake that might provide optimal conditions for the growth of serious infestations.

Almost no volunteers noted whether a species appeared to be planted or volunteer, in spite of being instructed to do so. Thus, we have no statistics regarding these two criteria.

The data offer a clear picture of the extent of the problem and the plants causing the most concern at this point in time. The data also appears to indicate the connection between the presence of nuisance plants and their spread to disturbed but not manicured property and even manicured lawns having a good shoreline buffer rather than a lawn to water situation. Maps 5, 6, and 7 (Appendix A) denote individual infestation locations by parcel and expose pockets of particular species infestations.

Plants known to be exotic invasive species but not included in our survey were also discovered. These species are listed below:

Boston or Sword Fern	<i>Nephrolepis cordifolia</i>
Caesar's Weed	<i>Urena lobata</i>
Cogon Grass	<i>Imperata cylindrica</i>
Lantana	<i>Lantana camara</i>
Mimosa	<i>Albizia julibrissin</i>
Tropical Soda Apple	<i>Solanum viarum</i>
Winged Yam	<i>Dioscorea alata</i>

Castor Bean, *Ricinus communis*, was discovered during the writing of this report and is the direct result of a road paving project on NE 132nd Avenue. The drainage ditches of the road are taking seeds to the shoreline where they are now sprouting.



**New Castor Bean at outfall of road drainage ditch.
This is the result of a recent road paving project.**

While Cattail, *Typha latifolia*, is not an exotic, it can be an invasive nuisance. Often they indicate a rise in the nutrient level of the water body. Being a rather low nutrient lake, cattails are not a tremendous problem on Lake Santa Fe at this time. Nevertheless, a few new plants found a good opportunity to sprout on the newly exposed bottom brought about by falling lake levels. As mentioned in the Section II, the Bureau of Invasive Plant Management requested that locations of new stands be indicated on the maps.

Discussion

Problems Encountered with Methods and Definitions

Near historic low water levels created challenges not anticipated in earlier planning. Originally it had been anticipated all properties would be approached by water, but as the water level receded, this often became impossible even by kayak because of a peat shelf unique to the lake or the presence of deep muck. When unable to gain access to properties by land, volunteers surveyed as best they could by walking along the newly exposed beaches, or by using binoculars from a boat as near shore as could be navigated (and sometimes this was not very close).

Low water also caused difficulty in determining the location of the shoreline. For example, is water's edge the present location or that which would be considered a more normal location? The problem was magnified by the fact that water continued to go down and rather rapidly at that, by a matter of feet horizontally. What was the water's edge one week was not the same the following week.

Oftentimes a parcel was a mix of more than one category, which caused problems in rating the properties consistently. Generally, a compromise had to be made in each case, attempting to give weight to the more important or predominant category. Room for interpretation of the categories also contributed to inconsistencies. Inconsistency in ranking the different landscape characteristics proved to be a problem partly because of room left for interpretation among so many different minds, and also because of less than

perfect terms and definitions that did not necessarily fit all the existing conditions. Much discussion had taken place to avoid all this, and yet it was quickly discovered that success had not been achieved in preventing this problem. As a result, the relationships between the presence of invasive plants and landscape categories are likely somewhat inaccurate. Fortunately, the inventory itself was not affected because counting plants left no room for interpretation.

Difficulties with plant identification suggest that certain plants perhaps should have not been chosen for the inventory (a discussion of this problem follows in the Volunteers and Education section of the report). The fact that a list of ten plants was specified increased difficulty for volunteers. A smaller list would have been better suited for a volunteer force. Since Torpedo Grass is so very difficult for the novice to identify, it should probably have not been included in this survey.

Observations

Much of the shoreline (approximately 50%) was surveyed by the coordinator, which proved to be an advantage in that it allowed her to make good observations and to form a “feel” for the overall situation. Being well acquainted with the lake was also an advantage.

Water levels have definitely had an effect on where species were found. This is especially true in the beach zone. Many beach zones that were dry would be several feet under water in times of normal lake levels, and certainly most of the species would not be found in deeper water. Examples are Chinese Tallow, Sesbania, and even Wild Taro found in some situations now. None of the plants in these now exposed beach zones would have sprouted in the first place if the lake levels had been within the normal range.

It was interesting to note the existence of “pockets of infestations” of the various species in different locations around the lake. Often such infestations are the result of the first plants being intentionally planted as landscape plants before they were understood to be invasive. A few species were widely spread and observed everywhere for the most part. Some were purposely planted, while others were introduced by fill brought in for mounded septic systems or lot leveling. Others had no obvious source of introduction. A few species were fairly confined to one or two locales. Maps 5, 6, and 7 (Appendix A) help the reader spot the “pockets.”

There were a couple of surprises. One was the discovery of Tropical Soda Apple early in the survey; the other, Cogon Grass. We were not particularly expecting to find either. Other pest plants not on the list were present, but expected.

Towards the end of the survey period (October), new Cattail stands began to appear at locations where the bottom had been newly exposed. Most of these occurred right at water’s edge. Such location of the new Cattails is far enough below the normal waterline that some of the plants may succumb to wave action or even drowning, assuming the lake recovers to normal levels in the near future; but they may also survive, for Cattails are tough.



A young Cattail plant emerges on newly exposed lake bottom.

Another observation made about the same time, was the sudden appearance of Wild Taro around the lake. We had seen Taro and Elephant Ear, but most were upland from the water and probably planted purposely at some point. The plants that appeared in October were different. They were everywhere; they were all Taro; and they were all at what appeared to be roughly the same elevation. The guess is that seeds or pieces of tuber were dropped at this elevation the previous spring or late winter. This presence of Wild Taro definitely created a rather serious new problem and practically overnight.

This may be occurring now with the spread of Torpedo Grass too. Time will tell. It is possible for the introduction of just a few plants to eventually populate an entire shoreline with the species. While writing this report, two new infestations of Torpedo Grass were discovered in an area of the lake where there had previously been none. In both cases, a barren beach caused by lowering water levels gave the plant the opportunity it needed to establish itself. The rising water in recent months provided the perfect situation for it to grow fast. Hopefully the homeowners will succeed in stopping the spread of Torpedo Grass in this area. More than likely, known patches of Torpedo Grass in the Santa Fe Pass area are the source. Winds preceding cold fronts in the winter probably provided the transportation to the new locations. New populations were also discovered in Melrose Bay even more recently. This recent spreading is worrisome because take-over of the maidencane beds by the encroaching Torpedo Grass might severely impact fish and waterfowl habitat and populations. The discovery of spreading Torpedo Grass does not bode well for the lake's welfare.



A recent Torpedo Grass arrival



Sesbania bloom

The observation that highly manicured lawns had little problem in controlling invasive nuisance plants came early on. Even if the owners cultivate such plants, they are kept under tight control through mowing and weeding— *in that parcel*. This common situation plays havoc everywhere else and illustrates the need for homeowner education. These plants invade natural lands adjacent to such properties (or even those some distance away). However, truly undisturbed land seems fairly resistant to the encroachment of these plants. Worse hit are those parcels whose owners attempt to use the most desirable of landscaping practices, or

those that were once disturbed (even long ago) and allowed to grow back with no management. The trick is to convince the owner that his property is a seedbed for the entire area, and that even if he can control the spread on his property, he cannot control their spread onto others. The data and observations seem to support this concept and may be useful in the future to demonstrate to property owners the validity of the argument. A good example is the spread of *Sesbania* in Earleton. The plants have migrated from the main, original infestation, moving both north and south along the shore. Another such example is beginning to become apparent at the north end of the little lake, where an owner dearly loves her *Sesbania* plants. New plants are already showing up down shore.

The Castor Bean introduced in the past year is a concern, too, for this species has completely colonized parts of the shore on lakes in the Orlando area. In general, un-mowed and heavily concentrated grass beds, even though left high and dry now, were free of invasive plant seedlings. New seedlings of Chinese Tallow, Coral Ardisia, Camphor, and Torpedo Grass seemed to always be found on mowed, plowed, or newly exposed beaches, although the Tallow would be occasionally found in the dry grass beds. This was not particularly true of the *Sesbania* or Wild Taro, both of which moved right into the grass beds with no trouble whatsoever. Very young Japanese Climbing Fern was found on a mowed beach, but it also seemed to be newly established at any of the locations at which it was found, such as on fencing and forest or swamp trees. It would appear that this species is a relatively recent arrival to the lake.



**A new Taro plant appears
in the maidencane.**

While not in the scope of this survey, we also became painfully aware of the extensive removal of shoreline vegetation in the interest of obtaining the well-kept American lawn or an unobstructed, first-class view. The stripping of shoreline vegetation was exacerbated and encouraged by the low water level extremes that allowed (perhaps for the first time) the easy removal of near-shore vegetation, especially maidencane, other shoreline grasses, and new seedlings of woody vegetation like cypress and buttonbush. Such woody vegetation species can only regenerate themselves during these times of extreme lows. The opportunity does not come often – maybe every 50 years. Such removal of shoreline vegetation also allows for the easier infiltration and spread of invasive nuisance plants as well.

WORKING WITH VOLUNTEERS AND HOMEOWNER EDUCATION

Introduction

Current Problems, Inc. is known on Lake Santa Fe for its role in conducting a lake-wide cleanup effort each spring, as well as other waterway cleanups in the North Central Florida area. Having the good will of residents because of this association helped make it easier to successfully work with the property owners.

Current Problems, Inc. relies on volunteers for most of the work it does, this project being no exception. However, these volunteers already had an established relationship with the water body. Most resided on the lake and surveyed their own neighborhood or one nearby. Two volunteers were frequent users of the lake and personally knew many of the residents. Our strategy was that this relationship would result in a greater degree of success for this project.

It is difficult to gain the cooperation of property owners in a project of this nature when either a stranger or agency employee is seeking access to their parcels. By recruiting project volunteers from the neighborhoods, we had far greater success in gaining access to the properties and speaking with the residents. The project coordinator, who also lived on the lake, found that simply owning property on the lake usually made her acceptable to owners even if she lived far from their particular neighborhood. Time and again the first question asked was, "Do you live on the lake?" Generally, volunteers were well received and perceived as being well-intentioned and wanting to help. Requests to inventory the parcels met little resistance with two significant exceptions. One canal neighborhood near Melrose was very antagonistic, causing the volunteer to become uncomfortable enough to abandon her efforts there. Access was also denied to the Buck Johnson property along the south end of the lake, a very large undeveloped and undisturbed tract of land that is mostly comprised of wetlands.

As stated earlier in the Project Summary, education was a major goal of the project. Volunteer training, visits with residents, a workshop open to the community, and the distribution of informational materials all contributed to achievement of this goal. While project volunteers were given a training workshop, they learned much in the process of conducting the inventory as well as while visiting with residents.

Methods of Working with Volunteers and Homeowner Education

As noted earlier, a letter notified all property owners that the invasive exotic plant survey would be conducted during the months of July, August, September, and October of 2002. The project was fully explained in this mailing to promote acceptance of the volunteers' visits.

Training Volunteers

Two workshops were held for the purpose of training the volunteers. Examples of the selected plant species as well as plants similar in appearance were on hand. A plant chart was distributed; procedures were discussed and provided in written form; data sheets were distributed and explained; a list of parcels was assigned; and both parcel and aerial photomaps of the assigned parcels were provided. Representative copies of each are found in Appendix C. A thorough discussion on each species pointed out identification tips, the problems caused by the plant, methods of removal, and alternative species to plant. Also discussed was the need to obtain proper permitting for the removal of any vegetation below the 141 foot MSL line and for prohibited plant species (e.g., water hyacinth) or for any planting below the 141 foot line. Resources for further information were suggested, such as ACEPD, IFAS, Exotic Pest Plant Council (EPPC), and the FDEP Bureau of Invasive Plant Management. Information packets for property owners were also distributed at this time (Appendix E).

Volunteers were asked to talk with the residents about the problems associated with these invasive pest plant species in an effort to increase citizen awareness and to enlist their help in controlling their spread. The packet containing information about invasive exotic plants and good waterfront landscaping practices was to be given to each resident visited, or mailed to those with whom we were only able to contact by telephone.

Development of Information Packet

The homeowner's information packet was primarily made up of existing materials provided by various agencies. Contributing agencies included the St. Johns River Water Management District, the Southwest Florida Water Management District, IFAS, and the Bureau of Invasive Plant Management. The IFAS Extension Office Florida Yards and Neighborhoods (FYN) program adapted several of their materials to this project, including the FYN brochure, a booklet discussing the nine principles of good landscaping practices, and a booklet about the ten plant species selected for the project's survey. In the electronic version of the report, most of the packet materials are included, though not all were available.

Education of Lake Dwellers and the Lake Region Community

During parcel visits, property owners (when present) learned what plants were on their property, how to get rid of unwanted pest plants, and what harm these plants caused. Owners were also presented with the packet of information containing materials about invasive plants and responsible waterfront landscaping practices.

A well-attended waterfront landscaping workshop was offered in Melrose for interested citizens of the Lake Region community. Examples of the targeted invasive nuisance plants were identified and discussed for participants. Wendy Wilber, of the IFAS Florida Yards and Neighborhoods program, gave a PowerPoint presentation on the principles of good landscaping practices adapted for waterfront properties. The information packets were also distributed to those in attendance.

Articles about the project and its purpose were printed in the Gainesville Sun, Current Problems, Inc. newsletter "The Strainer" and Santa Fe Lake Dwellers newsletter "Along the Waterfront." The information packets were also distributed at the Lake Dwellers' Annual General Meeting and a social held in January. A storyboard about the project was exhibited at these two events as well as the Farm & Forest Festival in Gainesville. The Bonnie Melrose Lakefest presented yet another opportunity to distribute the information packets.

Discussion

Volunteer Use

By now, numerous studies have been published regarding the use of volunteer-conducted studies and the validity of the data they collect. Perhaps the one of the best known volunteer monitoring program is Florida's own Lakewatch program, founded in 1986 by University of Florida professor Dan Canfield. Referring to a 1991 study, an article in the *Volunteer Monitor* (Winter 2003, p. 11) states that "results for all parameters were found to be equivalent whether samples were collected by volunteers or professionals". The article further mentions three studies recently published in *Lake And Reservoir Management* that evaluated the program's methods and volunteers.³ A copy of the Lakewatch article can be downloaded from <http://lakewatch.ifas.ufl.edu>. Other articles summarizing studies that demonstrate the successful use of volunteer data can be found in "Dredging Impacts: Volunteer Data Clarify the Story" (*Volunteer Monitor*, Summer 2002, p. 12), "Success Stories from Alabama Bacteria Monitors" (*Volunteer Monitor*, Spring 2000, p. 24), "Macroinvertebrate Data: Volunteers vs. Professionals" (*Volunteer Monitor*, Summer 2000, p. 1), and "Update: Toxic Phytoplankton Monitoring" (*Volunteer Monitor*, Summer 2000, p. 20).

Most of the programs relying on volunteer data have over time perfected their training and methods to improve reliability and validity of the data gathered. Two articles in the Winter 2003 issue of the *Volunteer Monitor*, "Virginia SOS Modified Method, Improves Reliability"⁴ and "Lakewatch Volunteers & Methods Pass Muster,"⁵ serve to illustrate the point. No doubt we too could improve the effectiveness of an invasive plant survey conducted by volunteers with adjustments to our methods and training over an extended period of time.

³ Amy Richard, "LAKEWATCH Volunteers & Methods Pass Muster" *The Volunteer Monitor* (Winter 2003): 11-13.

⁴ Eleanor Ely, "Virginia SOS Modifies Methods, Improves Reliability" *The Volunteer Monitor* (Winter 2003): 6-9

⁵ Amy Richard, "LAKEWATCH Volunteers & Methods Pass Muster" *The Volunteer Monitor* (Winter 2003): 11-13.

The Fall 2000 issue of the *Volunteer Monitor* contains an article entitled “A Story of Success--And a Warning” that is particularly relevant to our project. The value of training volunteers to find and identify invasive plants and the importance of a citizenry well educated on the issue of invasive exotic plants are illustrated through the examples given. In one case, because of a trained volunteer’s efforts, a new but small infestation of an aquatic invasive weed was discovered and successfully eradicated. Another example demonstrates the consequences of a lack of knowledge about an invasive pest plant. A very large infestation had become established because a time period of six years had lapsed between the citizen’s first observation of the species and a clinic in which she discovered its identity and the fact that it was a serious nuisance plant.⁶ A copy of the article is found in Appendix F.

The use of volunteers offers many advantages. Certainly volunteer labor allows for lower costs. Since volunteers learn both through their training and activities, involving them presents a wonderful opportunity to educate a group of motivated and highly interested citizens. The more we educate the public, the better for our ecosystems, for people will undoubtedly continue to search for invasive plants and educate others about them long after the project ends. The examples highlighted in the preceding paragraph are case in point. As noted previously, volunteers would probably be more readily welcomed than would agency staff attempting to achieve the same purpose.

On the other hand, the use of volunteers definitely presents its challenges. At times it seemed like the work would never be completed, as volunteers found they had difficulty finding time to make the parcel visits to which they had committed. One even lost his supplies but was too embarrassed to admit it.

As noted in the discussion of inventory methods, less than perfect definitions of landscape feature categories allowed too much room for interpretation in the minds of the thirteen volunteers. The problem caused volunteers to question their judgment and possibly affected the data and resulting relationships.



**Look -alike leaves:
Air Potato and Brown-Eyed Susan**

Plant identification obviously becomes more of an issue with volunteer labor than with the trained botanist. Torpedo Grass proved very difficult for volunteers to identify. Species similar in appearance to the targeted plants caused confusion. A good example is the similarity in foliage of Wandering Jew and Blue Day Flower. A near look-alike to the novice is Brown-Eyed Susan, *thunbergia alata*, whose leaf looks

⁶ Amy P. Smagula, “A Story of Success – And a Warning” *The Volunteer Monitor*, (Fall 2000). Available at: <http://www.epa.gov/volunteer/fall00/13story.html>.

almost exactly like Air Potato to the untrained eye. Elephant Ear gets confused with Wild Taro, and they were inventoried together as one species to alleviate the problem of distinction by volunteers.

Practically none of the volunteers noted whether a species appeared to be purposely planted or had sprouted voluntarily. Perhaps this was one detail too many to remember, or perhaps it did not seem important. Careful notation of these two phenomena may have helped to better illustrate the spread of pest plants from intentionally planted specimens.

Another problem that became obvious as data sheets came in was a definite reluctance on the part of volunteers to meet with property owners. Conducting the plant inventory and site survey was one thing; interacting with the residents was obviously another. Thus it became imperative to disseminate the information through the other means previously mentioned. Some of this reluctance was the result of waiting until the end of our timeframe to survey the parcels and therefore being unable to contact owners. Many property owners could not be contacted because they are infrequently on their properties. Others stated they simply were not interested in changing their landscaping habits, even if they were grateful for the invasive plant information we offered. However, shyness, distaste for calling strangers, or fear of rebuff, along with time constraints seemed to be the main reasons for the volunteers lack of success in meeting with property owners.

Education

As mentioned in the Plant Inventory section, the survey might have seemed a less overwhelming task with fewer plants for the volunteers to learn. Ten plants are probably too many for most lay people to successfully manage.

The volunteer workshops were very instructive, but volunteers were of a variety of educational backgrounds. For this very reason, we stressed that volunteers refer residents to experts from the appropriate agencies to learn about using herbicides or eradicating particularly difficult plants.

Despite these limitations, homeowner education still occurred since the target plants were identified, the packet of information was supplied to all who were visited, and residents were directed to the proper agencies for additional assistance. A few of the volunteers with better backgrounds in botany or wetlands science were able to have more in-depth conversations with property owners.

The folder of informational materials about invasive exotic pest plants and good waterfront landscaping practices was designed specifically for this project. As stated earlier, the packet consisted of a variety of materials gathered from several agencies, allowing for the use of existing publications, rather than the development and production of new ones. The three customized publications from the Florida Yards and Neighborhoods program suited the needs of our project well. The packets were attractive and contained a wealth of information for the property owner. Whenever we took our information packets to events to be distributed, they were eagerly taken. People do seem to be interested in learning about the problem of invasive pest plant encroachment.

In the inventory analysis discussion, it was noted that invasives kept under control in highly manicured lawn situations did nothing to prevent the spread of these pest plants. More emphasis was needed to adequately address this important issue. Homeowner education is very important to rectify the situation of controlled invasive plant specimens in manicured yards that provide a seedbed to the entire area. It is also a “hard sell.” The homeowner is reluctant to embrace this concept. No one wants to remove much loved plants, especially large shade trees, even if they are classified as invasive. Presenting a stronger case for such a scenario in our conversations with residents, and in the information packets, should have been more highly prioritized.

Since Torpedo Grass proved so difficult for the novice to identify, it should probably have not been included. It is similar in appearance to many beneficial grasses and grows alongside desirable species. Because of this, some property owners may mistakenly remove plants that provide excellent fish habitat, shelter, and shoreline erosion prevention.

CLOSING REMARKS

What's next?

The information packet has already been reworked and broadened as the result of an Exotic Pest Plant Council grant. It now includes information about more nuisance plant species common to the Lake Region, as well as additional booklets, flyers, and fact sheets. As before, it is geared towards lakefront property owners. Current Problems, Inc. hopes to produce another version more specific to urban streams in the greater Gainesville area.

If funding becomes available, the Bradford County shoreline should be assessed as well. It is known from direct observation that serious pockets of Air Potato exist on the Bradford shoreline, for example. Coral Ardisia is another prevalent problem on the Bradford side. Education regarding waterfront landscaping practices is needed along the Bradford shoreline, in part because the County lacks an environmental protection department and strict codes to protect surface water quality and wetlands. The shoreline situation there is worse than in Alachua County. While many Bradford residents have obtained our information packet, a more aggressive effort to reach the parcel owners on that shoreline would be desirable.

The observation of shoreline vegetation destruction that came while conducting the plant inventory of this project spawned the interest of implementing another project designed to encourage shoreline revegetation and restoration. The importance of healthy, functioning shoreline ecosystems for the protection of surface water quality, the motivation for the invasive exotic plant survey and education project, suggests and justifies such a "healthy shorelines" initiative. An outstanding Canadian program, Living by Water, could serve as an excellent guide with which to establish such a program here in order to enhance the level of citizen awareness and understanding of the buffer concept. Fish and wildlife, as well as water quality and quantity, would benefit by increased interest and action on the part of citizens to restore or preserve shoreline ecosystems along our lakes, ponds, rivers, streams, sinks, springs, swamps and marshes.

In addition to the Alachua County Environmental Protection Department, this data will be made available to the Bureau of Invasive Plant Management, as it is responsible for the herbicide program to control aquatic plants on the lake. They have already been advised of the Wild Taro population explosion and may implement a spray program to control that species. The Santa Fe Lake Dwellers Association will also be advised of our findings with the hope that they will assist in educating the residents of the lake and encouraging a change in landscaping habits. Current Problems, Inc. will continue working to increase awareness of the problem through presentations, workshops, distribution of materials, and storyboards throughout North Central Florida.

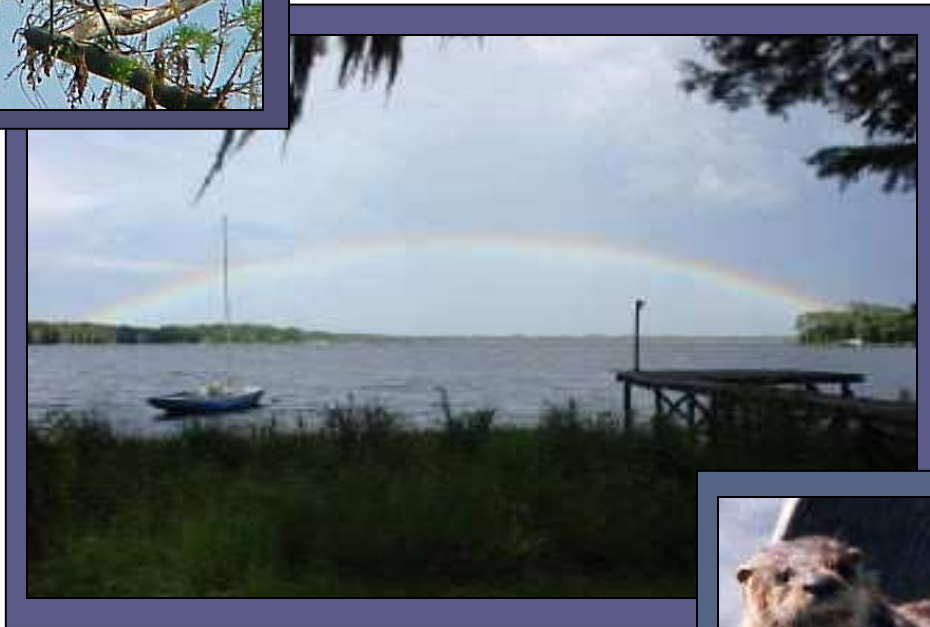
A short version of the report will be written in the form of an article to be forwarded for possible publishing in the Volunteer Monitor, EPA's "News-notes", the Florida Lake Management Society newsletter, and the Suwannee River Water Management District newsletter "RiverFronts". The article will be printed in the Current Problems, Inc. newsletter, "The Strainer".

Value

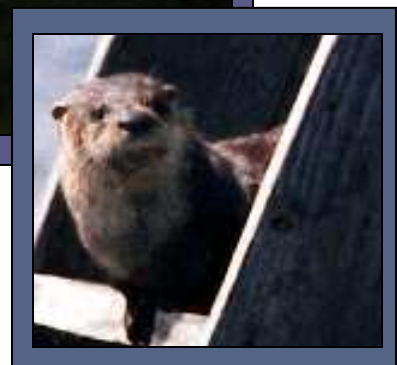
Projects such as the Lake Santa Fe plant inventory play a valuable role by filling “holes and gaps” which government agencies are unable to tackle. In this case, data and a resulting snapshot of the exotic pest plant situation on one of the county’s two lakes designated as OFW’s was created for use by state and local agencies – a picture for which none of them could have spent time or operating funds. The effort to educate the property owners on the lake raised citizen awareness in a manner well beyond state or county agencies’ time and funding capabilities. Resources are not available for such a localized and intensive education project. The possibility that the project spawned a new, worthwhile program to protect waterway banks and shorelines is an added plus.



Tom Ward



Allison Blakeslee



Cathy Parlapiano

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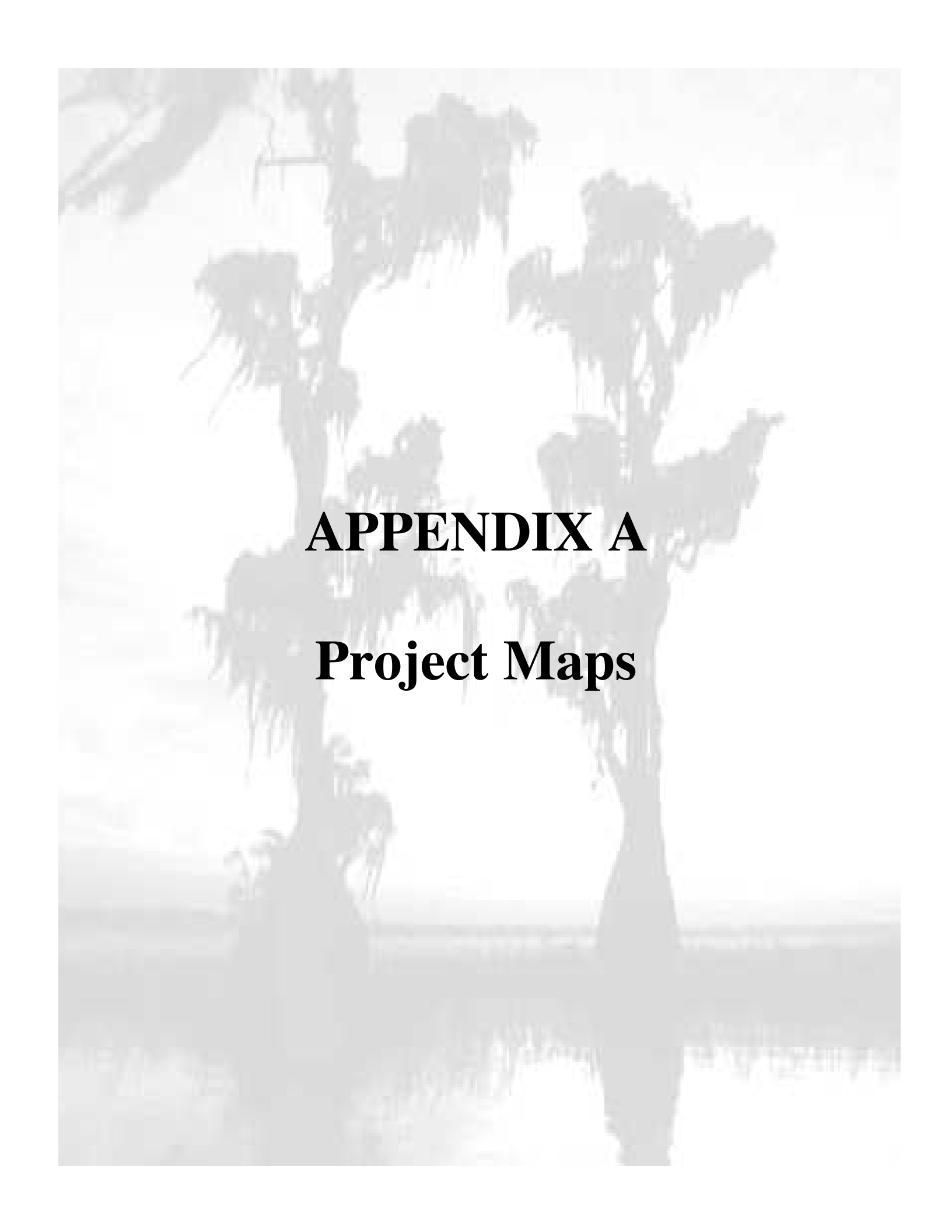
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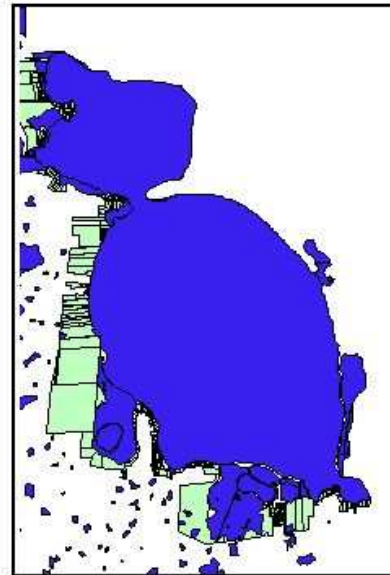
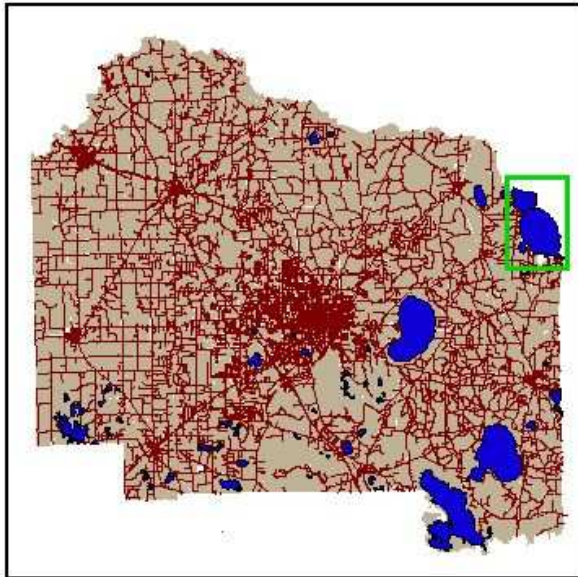
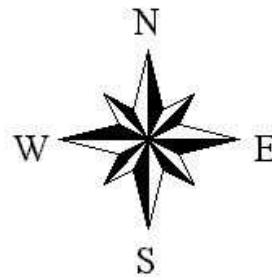


APPENDIX A

Project Maps

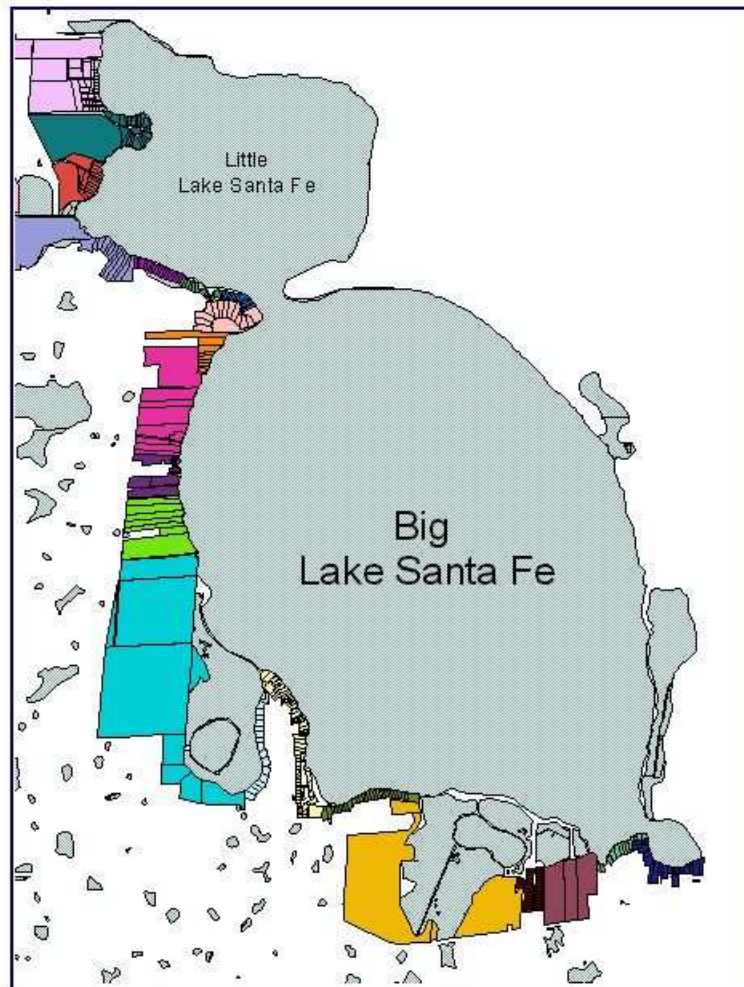
Lake Santa Fe

Location of Project

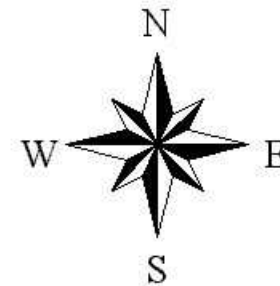


Map 1. Lake Santa Fe – Location of the Project

Neighborhoods of Lake Santa Fe



- Melrose bay.shp
- Dogwood lane.shp
- Ramp.shp
- Sylvan shores.shp
- South end.shp
- Totem pole road.shp
- Sw corner 1.shp
- Bonnet estates.shp
- Bonnet lake1.shp
- S. earleton.shp
- Earleton.shp
- Millionaires row a.shp
- Ne 111 road.shp
- Gator cove 3.shp
- Santa fe pass.shp
- S bird beach.shp
- N bird beach.shp
- Blueberry bay.shp
- Alto canal.shp
- Martins island.shp
- Top of little lake.shp
- Hy24pp.shp

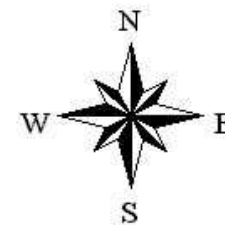


Map 2. Neighborhoods of Lake Santa Fe

Neighborhoods of Little Lake Santa Fe

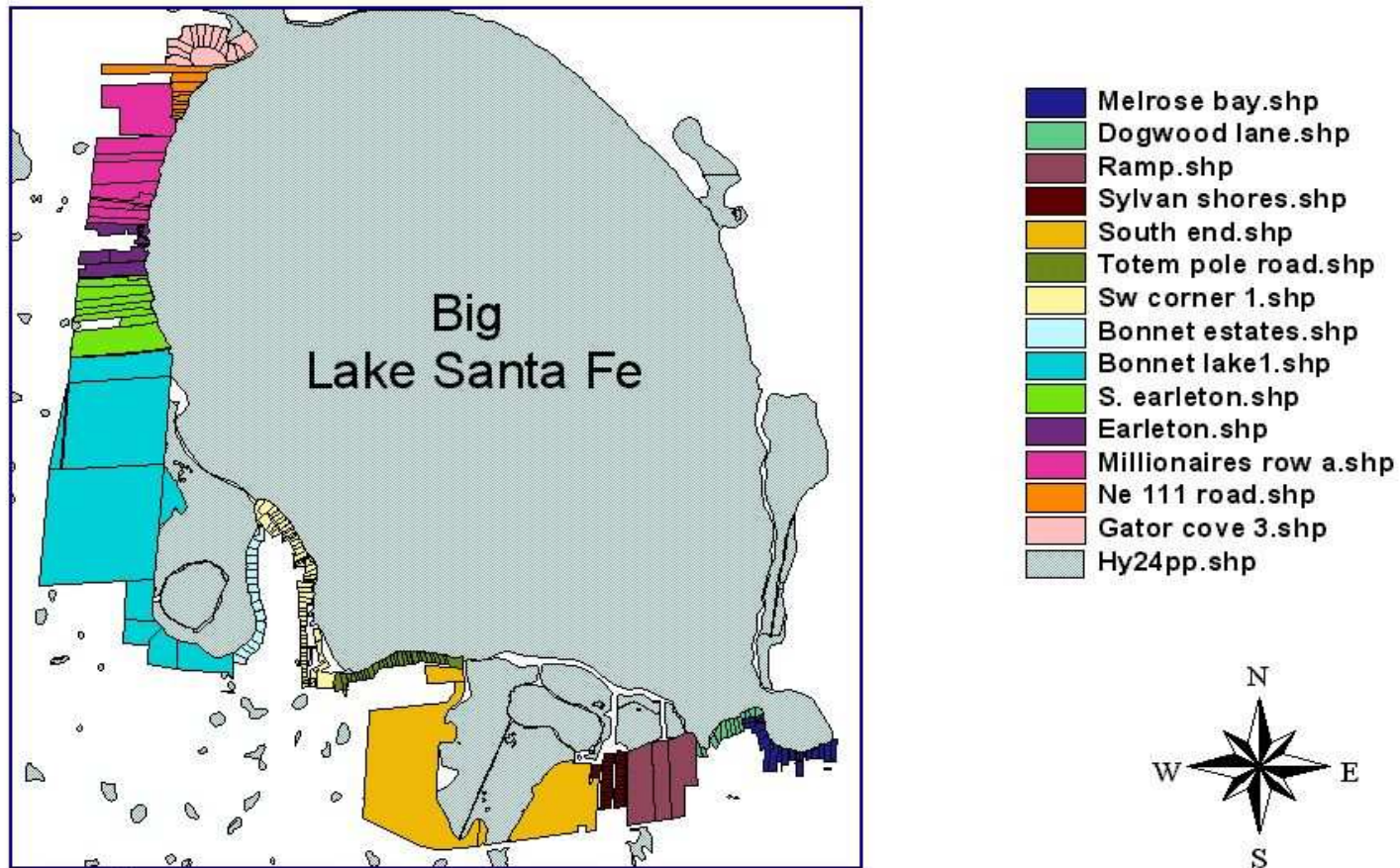


- Gator cove 3.shp
- Santa fe pass.shp
- S bird beach.shp
- N bird beach.shp
- Blueberry bay.shp
- Alto canal.shp
- Martins island.shp
- Top of little lake.shp
- Hy24pp.shp

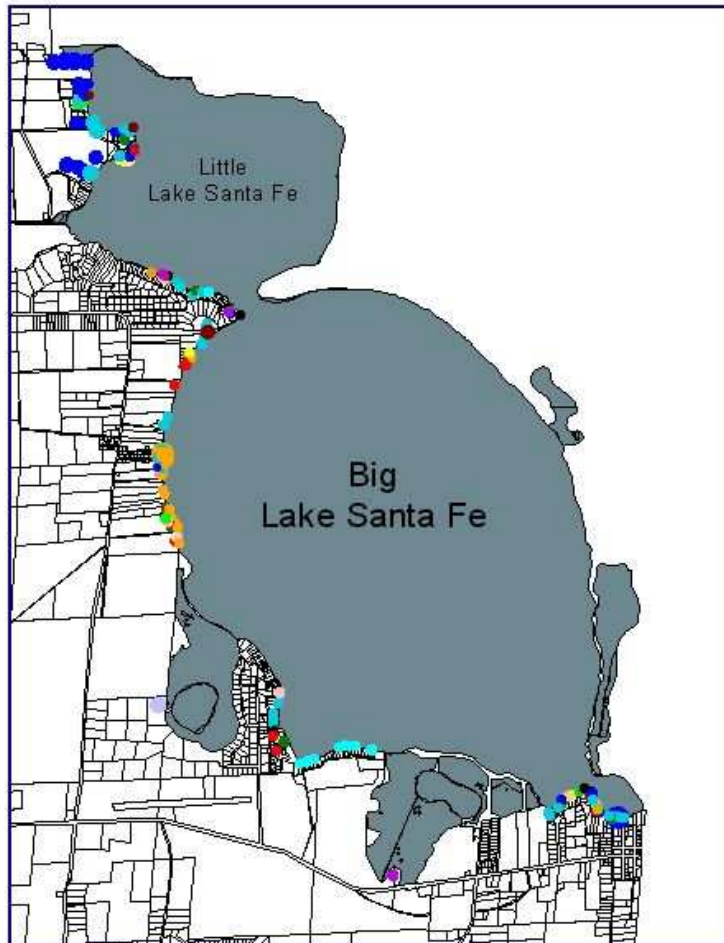


Map 3. Neighborhoods of Little Lake Santa Fe

Neighborhoods of Big Lake Santa Fe

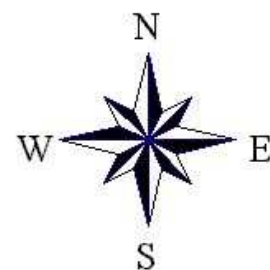


Map 4. Neighborhoods of Big Lake Santa Fe



- Air Potato
- Camphor
- Chinese Tallow
- Coral Ardisia
- Japanese Climbing Fern
- Sesbania
- Torpedo Grass
- Wandering Jew
- Wedelia
- Wild Taro
- Cogon Grass
- Tropical Soda Apple
- New Cattails

Invasive Plant Infestations on Lake Santa Fe Alachua County Side



Map 5. Invasive Plant Infestations of Lake Santa Fe

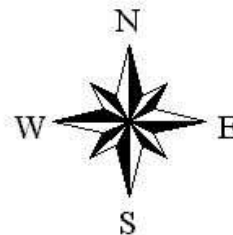
Infestation Pockets of Note on the Little Lake



Chinese Tallow

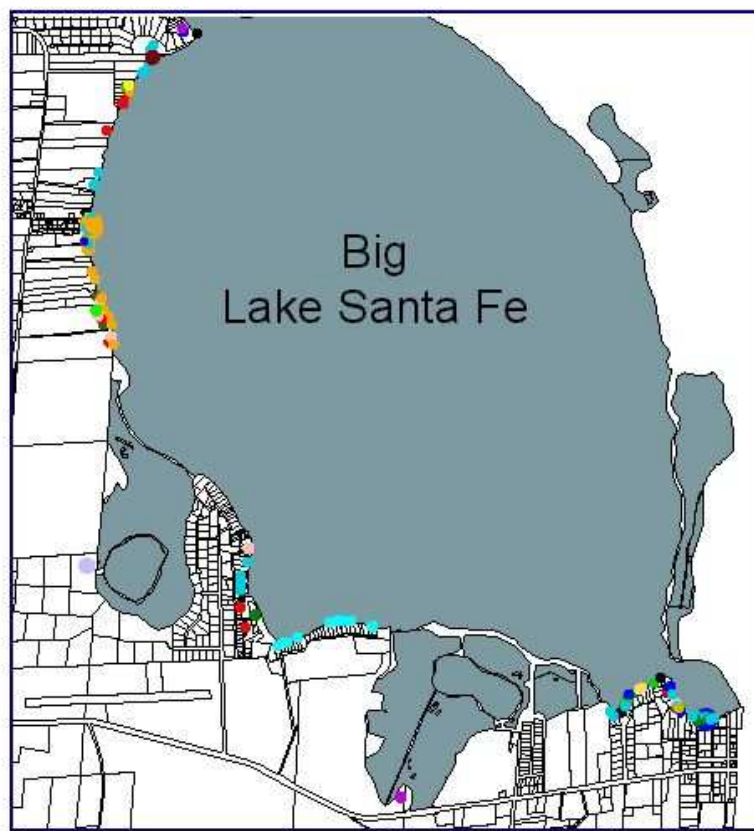


Wild Taro



Map 6. Pockets of Chinese Tallow and Wild Taro/Elephant Ear Infestations on Little Lake Santa Fe

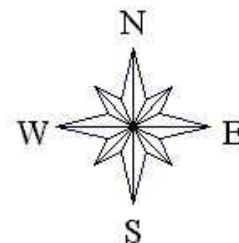
Infestation Pockets of Note on the Big Lake



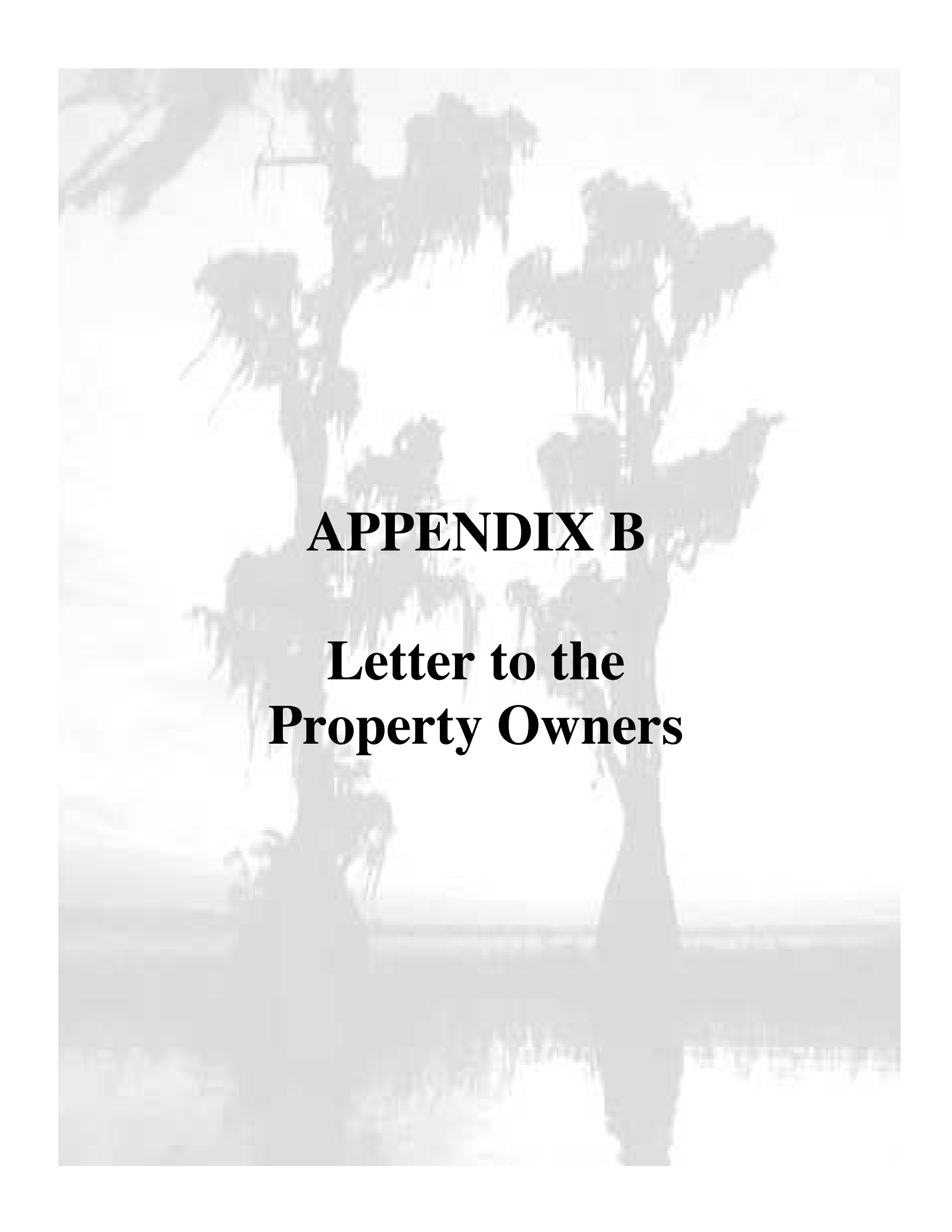
Sesbania



**Wild Taro and
Elephant Ear**

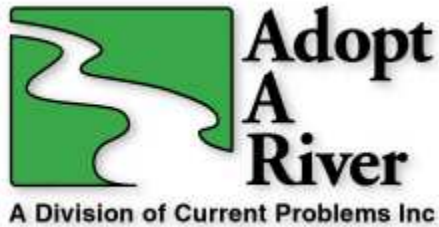


Map 7. Pockets of Sesbania and Wild Taro/Elephant Ear Infestations on Big Lake Santa Fe



APPENDIX B

Letter to the Property Owners



PO Box 357098
Gainesville, FL 32635-7098
352-264-6827 Phone
352-264-6852 Fax

May 31, 2002

Dear Lake Santa Fe Property Owner,

Current Problems/Adopt A River is looking forward to implementing a new project this summer on Lake Santa Fe. For those of you who don't know, Adopt A River is a grass roots non-profit organization dedicated to the preservation and protection of North Florida's waters. Every April, it is Adopt A River that conducts the cleanup for the Santa Fe Lakefest held at Melrose Bay. Now our volunteers are about to embark on another activity that will benefit the residents of this wonderful lake.

Statewide and nationally, the problem of exotic invasive plants is becoming more and more of a concern. We know residents on Lake Santa Fe, which is designated an Outstanding Florida Waterway, would not want to see their beloved lake's ecosystem overtaken by these pest plants. Adopt A River would like to increase awareness among property owners about this problem, as well as to inventory several species in order to learn the extent of exotic invasive encroachment that exists.

Invasive pest plants force out beneficial native plants, destroying much needed habitat for wildlife and fish. Healthy functioning ecosystems along the lakeshore do much to ensure a high level of water quality in our lake. Furthermore, problems on the lake ultimately affect the Santa Fe and Suwannee rivers as well as the estuary at the Gulf of Mexico. Plants allowed to spread unchecked on Lake Santa Fe will spread throughout this aquatic system, causing problems all along the way. It is important we keep our shorelines healthy for the welfare of our lake, the rivers, the Gulf, even our springs and aquifer.

To alert residents to this pest plant situation, pairs of volunteers will be visiting each parcel on weekends from July through October. We're looking forward to chatting with each resident to point out invasive species we see near the shoreline, suggest removal techniques, and give each resident a packet of selected useful information regarding the problems caused by invasive exotic species to our lake community. Also included will be information concerning good shoreline and waterfront property landscaping practices.

In September, we are planning to sponsor a waterfront landscaping workshop presented by the Florida Yards & Neighborhoods program of IFAS. The workshop will be held in the Melrose. All interested participants should give us a call at 352-264-6827 to reserve a place. There is no fee for the workshop, and we want to encourage everyone to attend. Mark it on your calendar today!

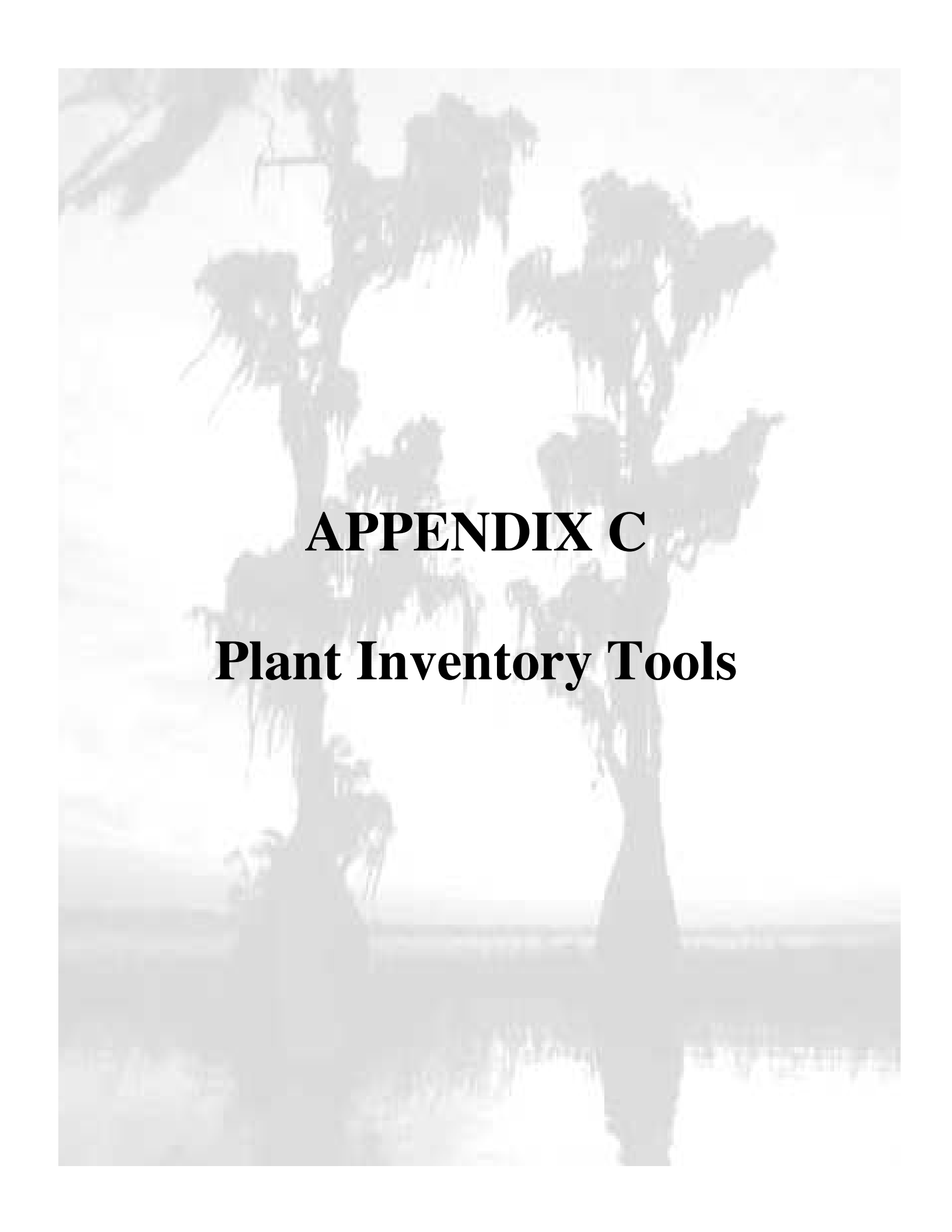
The volunteers assigned to your parcel will be giving you a call to arrange for a visit on a date that is convenient for you. Most of the visits will be made by boat, unless the “tide” continues to go out to the point of making this mode of transportation impossible. We hope you will welcome this opportunity to learn more about the natural system surrounding Lake Santa Fe. We look forward to seeing each of you and making new friends.

If you think you would like to participate in this project as a volunteer, a training workshop for the group will be held at the Melrose Library on Saturday, June 22, 10:00 am. Volunteers will see samples of the plants to be targeted in the inventory, learn procedures to be used, and receive materials. Of course you will not be expected to help every weekend, but rather, asked to commit to visiting the number of parcels you feel you can comfortably manage within the four months that we will be working. Whether you have one morning or every weekend to offer, your help is wanted. Please call me at 352-264-6827 to add your name to the list or to ask any questions you may have.

Hope to see you in the coming months!

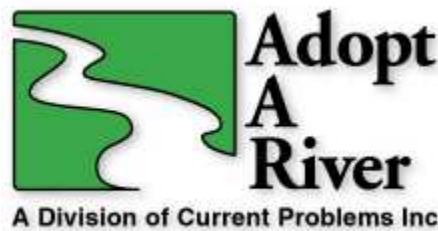
Kind regards,

Fritzi S. Olson
Executive Director



APPENDIX C

Plant Inventory Tools



PROCEDURES FOR INVASIVE PLANT SURVEY

1. Contact property owner to arrange a day to visit or to get permission to go on property. Tell them Adopt A River is doing this project, what we are doing and why.
2. Determine 141' MSL line best as can; look for plants below this line and 75' approximately upland
3. Field sheets—
 - A. Inventory—be sure to fill in all spaces; space for comments
 - B. Maps—mark infestations on aerial map with plant's initials; photograph if particularly interesting (optional)
 - C. Note any new cattail populations
4. Unknown plants—
 - A. Take a sample and bring to Fritzzi or Alachua County Environmental Protection Dept. for identification (optional)
 - B. Photograph—send copy to Fritzzi
 - C. Call Tom Ward(475-9553)—he will go check it out if you give him location and description
5. Mail in field sheets and maps when full; please do not wait. This will make life much easier for me!
6. Visit with property owner/resident
 - A. Point out any invasives found
 - B. Explain why they are bad
 - C. Suggest methods of control if person is interested, but do not try to be the expert!!! Be quick to refer them to the Extension Office or Bureau of Invasive and Aquatic Plants
 - D. Give the owner one of our packets. Tell them it contains information regarding invasives and good shoreline and waterfront property landscaping practices.
 - E. Tell the owner/resident we will be offering a landscaping workshop for interested participants in September. Mark next to their name if they are interested in being notified about the time and location.
 - F. Offer them a "WaterWise" coupon.
 - G. Thank the owner for participating in the project
7. Shoot for September finish. Absolute deadline is end of October.
8. Weekend days are suggested for your visits, but any day is fine if it works for you and the property owner
9. Please call Fritzzi if you have questions, need supplies, or any other reason. Work is 352-264-6827; home is 468-2670. E-mail is aar@currentproblems.org.



Lake Santa Fe Invasive Exotic Plant Survey

July through October, 2002

Volunteer _____

Phone: _____

E-mail: _____

PO Box 357098, Gainesville, FL 32653
352-264-6827 phone/ 352-264-6852 fax

Parcel #	Owners Name	Landscape Type	Tree Canopy	Shoreline Vegetation	Beach	Resident Visit ?	Date

Landscape Type:

1. Natural

2. Minimally disturbed

3. Manicured & mowed lawn

Tree Canopy Coverage:

1. 0-25%

2. 25-50%

3. 50-75%

4. 75-100%

Shoreline Vegetation:

1. Swamp

2. Good buffer zone

3. Lawn to water

Beach:

1. Swamp

2. Sand & grass

3. White sand fill;no grass 4. Grass beds

Parcel #	Air Potato	Camphor Tree	Coral Ardisia	Chinese Tallow	Japanese Climbing Fern	Sesbania	Torpedo Grass	Wandering Jew	Wedelia	Wild Taro	Other

(P) planted intentionally

(V)volunteer

Plant count: 1. Individual plant

2. 2-5 individual plants

3. infestation (viable population that is obviously spreading)—note square footage

Please note any new cattail infestations

Comments:

**P
L
A
N
T
C
H
A
R
T**



AIR POTATO



**JAPANESE CLIMBING
FERN**



TORPEDO GRASS



SESBANIA



CHINESE TALLOW



CORAL ARDISIA



CAMPHOR TREE



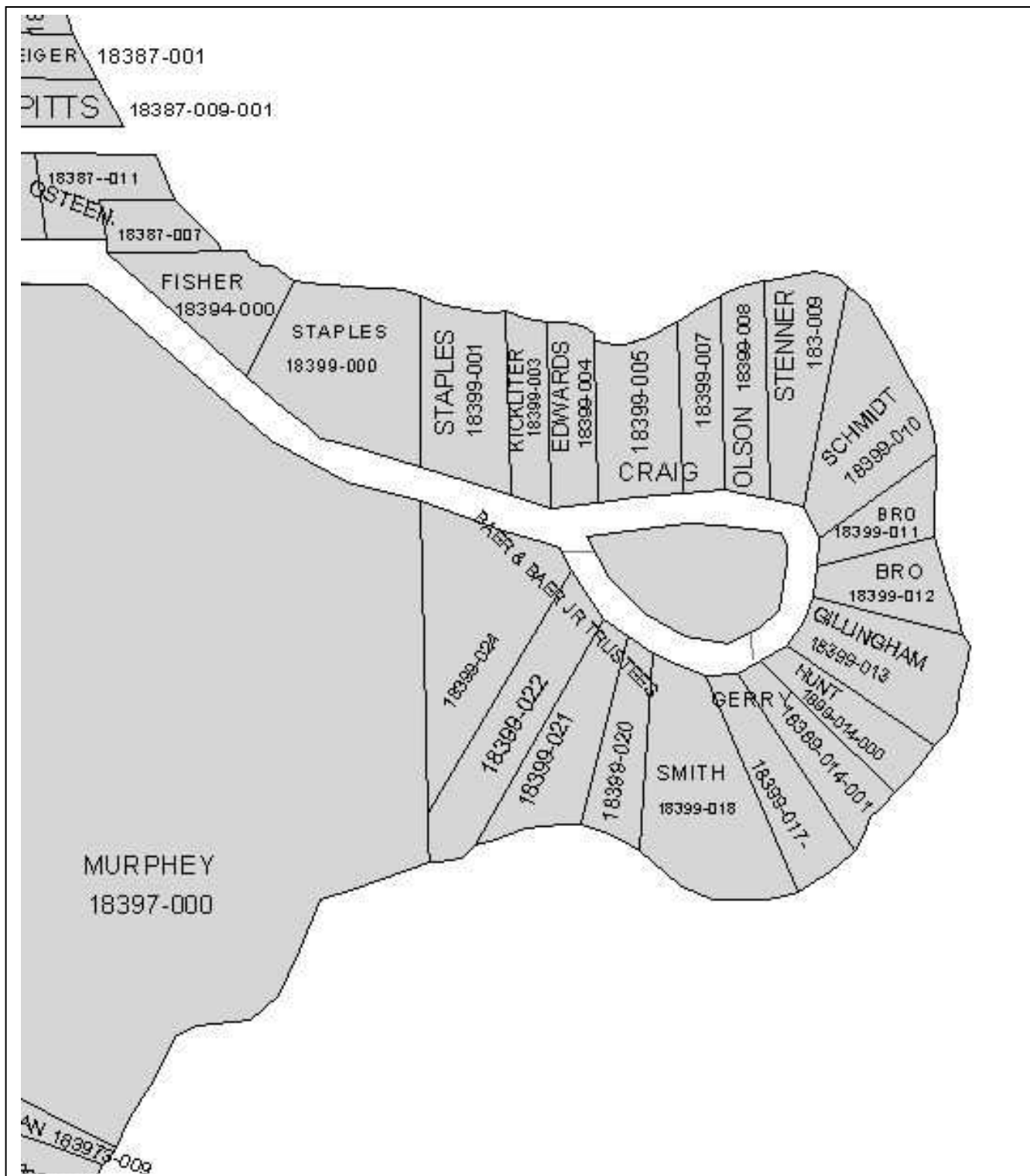
WANDERING JEW



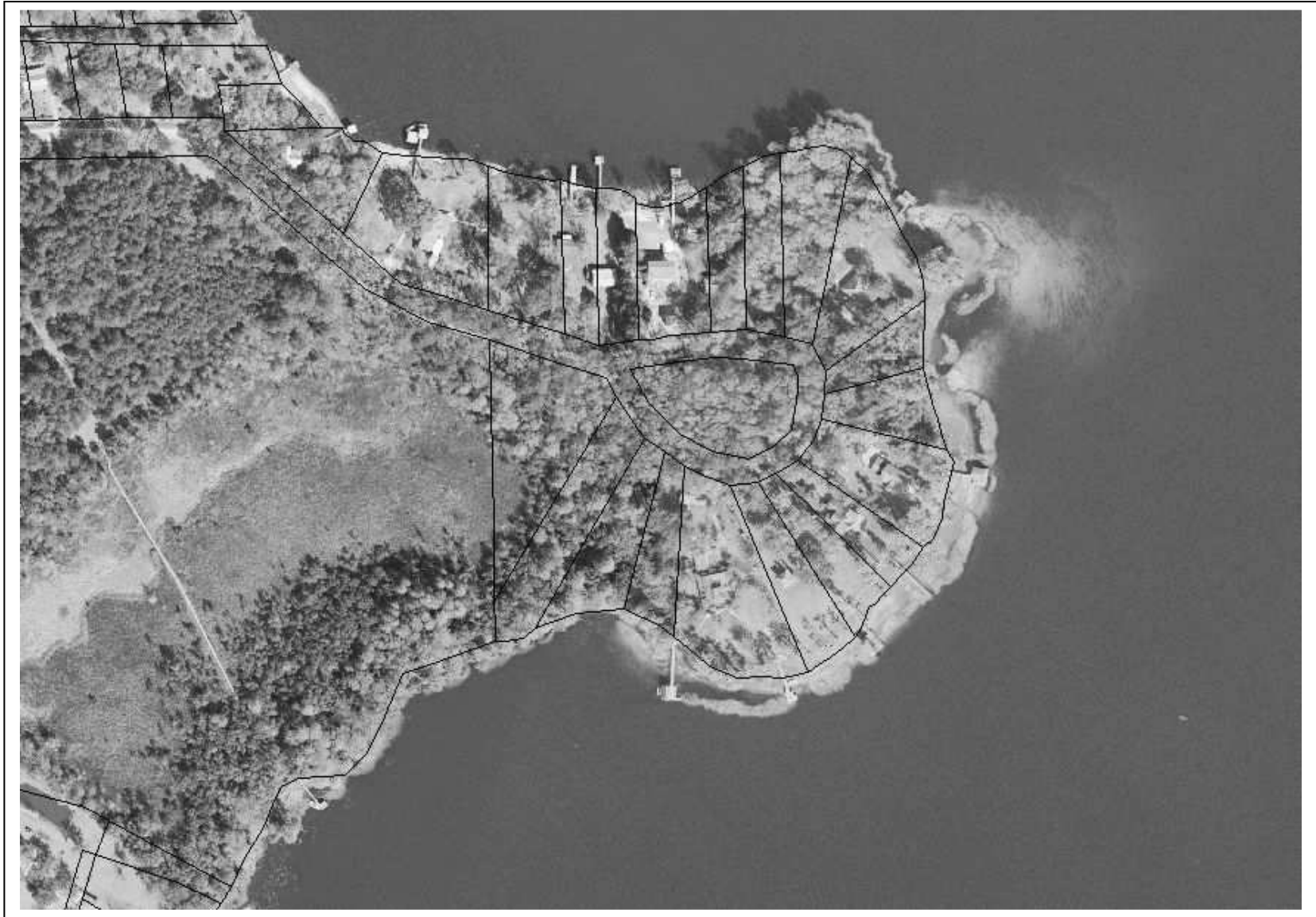
WILD TARO



WEDELIA



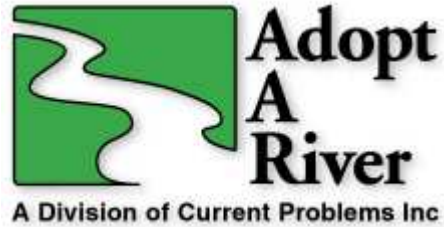
Martins Island Parcel Assignment Map



Martins Island Aerial Map

**Martins Island Neighborhood
Property Owner Information**

PARCEL ID	LAST NAME	FIRST NAME	ADDRESS	CITY	STATE	ZIP
18394-000-000	FISHER	W R	PO BOX 267	WALDO	FL	32694-0267
18397-000-000	MURPHEY	MILLEDGE	1815 NW 7TH PL	GAINESVILLE	FL	32603-1222
18398-000-000	STAPLES	MARCIA B	20628 NE 132ND AVE	WALDO	FL	32694-4445
18399-000-000	MCMANUS	SARAH	GENERAL DELIVERY	WALDO	FL	32694-9999
18399-001-000	STAPLES	MARCIA B	20628 NE 132ND AVE	WALDO	FL	32694-4445
18399-003-000	KICKLITER	GENE M	1923 16TH ST N	SAINT PETERSBURG	FL	33704-3919
18399-004-000	EDWARDS	D J	1102 NW 4TH ST	GAINESVILLE	FL	32601-4255
18399-005-000	CRAIG	JIM	20804 NE 132ND AVE	WALDO	FL	32694-4446
18399-007-000	CRAIG	J A G	MARTINS ISLAND	WALDO	FL	32694-4446
18399-008-000	OLSON	FRITZI S	20810 NE 132ND AVE	WALDO	FL	32694-4446
18399-009-000	STENNER	HELEN	826 BORDEAU AVE W	JACKSONVILLE	FL	32211-6311
18399-010-000	SCHMIDT	PETER R	20924 NE 132ND AVE	WALDO	FL	32694-4446
18399-011-000	BRO	PATRICIA	375 SHERIDAN RD	WINNETKA	IL	60093-2626
18399-012-000	BRO	KENNETH	375 SHERIDAN RD	WINNETKA	IL	60093-2626
18399-013-000	GILLINGHAM	WADE	20917 NE 132ND AVE	WALDO	FL	32694-4434
18399-014-000	HUNT	DONA	20909 NE 132ND AVE	WALDO	FL	32694-4434
18399-014-001	GERRY	H C	PO BOX 52	EARLETON	FL	32631-0052
18399-017-000	GERRY	H C	PO BOX 52	EARLETON	FL	32631-0052
18399-018-000	SMITH	J R	20825 NE 132ND AVE	WALDO	FL	32694-4434
18399-020-000	BAER		2604 SW 8TH DR	GAINESVILLE	FL	32601-9005
18399-021-000	BAER		2604 SW 8TH DR	GAINESVILLE	FL	32601-9005
18399-022-000	BAER		2604 SW 8TH DR	GAINESVILLE	FL	32601-9005
18399-024-000	BAER		2604 SW 8TH DR	GAINESVILLE	FL	32601-9005

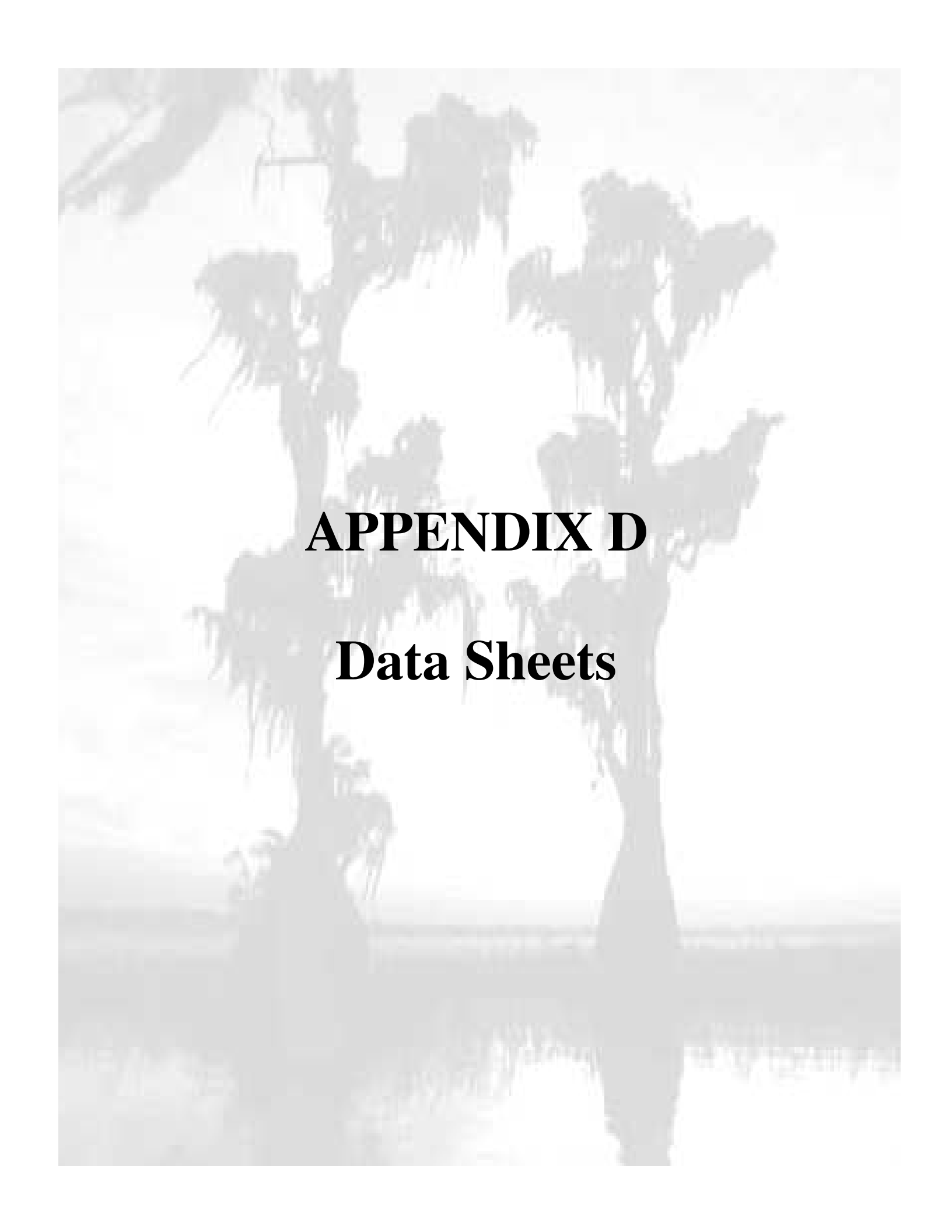


WAIVER

As a volunteer for Current Problems, Inc. in the Lake Santa Fe Invasive Plant Survey, I, _____ agree to hold Current Problems, Inc and its officers and agents free and harmless from any claim or expense that may arise due to participation in this program.

Signed: _____

Date: _____



APPENDIX D

Data Sheets

Lake Santa Fe
Invasive Plant Inventory Data Sheets

#	Parcel #	Neighborhood	Landscape Type	Tree Canopy	Shoreline Vegetation	Beach Zone	Air Potato	Camphor	Chinese Tallow	Coral Ardisia	Japanese Climbing Fern	Sesbania	Torpedo Grass	Wandering Jew	Wedelia	Wild Taro	Exotics?	Other Species Found
1	18388-000-000	top little lake	1	4	1	4	0	0	0	3	0	0	0	0	0	0	yes	
2	18386-002-000	top little lake	2	4	2	5	0	0	0	0	0	0	0	0	0	0	no	
3	18386-003-000	top little lake	3	1	3	2	0	0	0	2	0	0	0	0	0	0	yes	
4	18386-005-000	top little lake	3	4	2	5	0	0	0	3	0	0	0	0	0	0	yes	
5	18386-008-000	top little lake	3	1	2	3	0	0	0	0	0	0	0	0	0	0	no	
6	18386-009-000	top little lake	3	1	3	3	0	1	0	2	0	0	0	0	0	0	yes	
7	18386-010-000	top little lake	2	4	1	4	0	1	0	3	0	0	0	0	0	0	yes	
8	18386-011-000	top little lake	3	3	2	5	0	0	0	3	0	0	0	0	0	0	yes	
9	18387-001-000	top little lake	3	4	2	4	0	0	0	0	0	0	0	0	0	0	no	
10	18387-005-000	top little lake	3	2	2	4	0	0	0	1	0	0	0	0	0	0	yes	
11	18387-008-000	top little lake	2	4	2	5	0	0	0	0	0	0	0	0	0	0	no	
12	18387-008-001	top little lake	3	4	2	5	0	0	0	2	0	0	0	0	0	0	yes	
13	18387-008-002	top little lake	3	4	2	5	0	0	0	2	0	0	0	0	0	0	yes	
14	18387-009-000	top little lake	2	4	2	5	0	0	0	3	0	0	0	0	0	0	yes	
15	18387-009-001	top little lake	2	4	2	4	0	0	0	0	0	2	0	0	0	2	yes	
16	18387-012-000	top little lake	3	4	3	5	0	0	0	0	0	0	0	0	0	3	yes	tropical soda apple
17	18387-013-000	top little lake	2	2	2	2	0	1	0	0	0	0	0	0	0	0	yes	
18	18387-014-000	top little lake	2	4	2	2	0	1	0	0	0	0	0	0	0	3	yes	taro on canal
19	18387-016-000	top little lake	2	4	2	4	0	2	0	0	0	0	0	0	0	0	yes	
20	18387-017-000	top little lake	3	1	3	5	0	0	0	0	0	0	0	0	0	0	no	
21	18387-018-000	top little lake	3	1	3	5	0	0	0	0	0	0	0	0	0	0	no	
22	18387-019-000	top little lake	3	1	3	3	0	0	0	0	0	0	0	0	0	0	no	
23	18387-020-000	top little lake	3	1	3	5	0	0	0	2	0	0	0	0	0	0	yes	
24	18387-021-000	top little lake	2	4	3	5	0	0	0	0	0	0	0	0	0	0	no	
25	18387-002-000	martins island	3	4	2	5	0	0	0	0	0	0	0	0	0	0	no	
26	18387-003-000	martins island	3	4	2	5	0	0	0	0	0	0	0	0	0	0	no	wisteria
27	18387-004-000	martins island	3	3	2	5	0	1	0	0	0	0	0	0	0	0	yes	large camphor
28	18387-006-000	martins island	3	4	2	5	0	1	0	3	0	1	0	0	0	2	yes	lg camphor; taro & ee
31	18394-000-000	martins island	2	4	2	4	0	0	0	1	0	2	0	0	0	3	yes	
32	18397-000-000	martins island	1	4	1	4	0	0	0	3	0	0	0	0	0	0	yes	
33	18398-000-000	martins island	3	2	2	2	0	0	0	1	0	1	0	0	0	0	yes	
34	18399-001-000	martins island	3	2	2	4	0	0	0	0	0	0	0	0	0	0	no	
35	18399-003-000	martins island	3	1	2	2	0	0	0	0	0	0	0	0	0	0	no	
36	18399-004-000	martins island	3	1	2	2	0	0	0	3	0	0	0	0	0	3	yes	
37	18399-005-000	martins island	3	1	3	3	0	0	0	0	0	0	0	0	0	0	no	
38	18399-007-000	martins island	3	2	2	4	0	0	0	0	0	0	0	0	0	3	yes	
39	18399-008-000	martins island	2	4	1	4	2	0	0	2	0	0	0	1	0	0	yes	purple lantana
40	18399-009-000	martins island	2	4	1	4	0	0	0	1	0	0	0	0	0	3	yes	
41	18399-010-000	martins island	3	3	2	2	0	0	0	1	0	0	0	0	0	3	yes	
42	18399-011-000	martins island	2	4	1	2	0	0	0	0	0	0	0	0	0	0	no	
43	18399-012-000	martins island	2	4	1	2	0	0	0	0	0	0	0	0	0	0	no	
44	18399-013-000	martins island	3	4	3	2	0	0	3	3	0	0	0	0	0	1	yes	
45	18399-014-000	martins island	3	1	2	2	0	0	0	1	0	0	0	0	0	0	yes	
46	18399-014-001	martins island	3	1	3	2	0	0	0	3	0	0	0	0	0	0	yes	
47	18399-017-000	martins island	3	1	3	2	0	0	0	0	0	0	0	3	0	0	yes	
48	18399-018-000	martins island	3	2	2	2	0	0	0	0	0	0	0	3	3	0	yes	
49	18399-020-000	martins island	1	4	1	4	0	0	0	0	0	0	0	0	0	0	no	

Lake Santa Fe
Invasive Plant Inventory Data Sheets

#	Parcel #	Neighborhood	Landscape Type	Tree Canopy	Shoreline Vegetation	Beach Zone	Air Potato	Camphor	Chinese Tallow	Coral Ardisia	Japanese Climbing Fern	Sesbania	Torpedo Grass	Wandering Jew	Wedelia	Wild Taro	Exotics?	Other Species Found
50	18399-021-000	martins island	1	4	1	4	0	0	0	0	0	0	0	0	0	0	no	
51	18399-022-000	martins island	1	4	1	4	0	0	0	0	0	0	0	0	0	0	no	
52	18399-024-000	martins island	1	4	1	4	0	0	0	0	0	0	0	0	0	0	no	
53	18393-003-000	alto canal	3	4	3	3	0	0	0	0	0	0	0	0	0	0	no	
54	18393-004-000	alto canal	3	4	3	3	0	0	0	0	0	0	0	0	0	0	no	
55	18393-005-000	alto canal	3	3	3	3	0	0	0	0	0	0	0	0	0	0	no	
56	18393-005-001	alto canal	3	2	3	3	0	0	0	0	0	0	0	0	0	0	no	
57	18393-006-000	alto canal	3	3	3	3	0	0	0	0	0	0	0	0	0	0	no	
58	18393-007-000	alto canal	3	3	3	3	0	0	0	0	0	0	0	0	0	0	no	
59	18393-008-000	alto canal	3	3	2	4	0	0	0	0	0	0	0	0	0	0	no	
60	18393-009-000	alto canal	3	4	3	2	0	0	0	0	0	0	0	0	0	0	no	
61	18393-009-002	alto canal	3	2	3	3	0	0	0	0	0	0	0	0	0	0	no	
62	18393-009-010	alto canal	3	2	3	3	0	0	0	3	0	0	0	0	0	3	yes	
63	18393-010-000	alto canal	3	4	3	3	0	0	0	0	0	0	0	0	0	0	no	
64	18393-012-000	alto canal	3	3	2	4	0	0	0	0	0	0	0	0	0	0	no	
65	18393-013-000	alto canal	3	3	2	2	0	0	0	2	0	0	0	0	0	0	yes	
68	18395-001-000	blueberry bay	3	2	3	3	0	0	0	0	0	0	0	0	0	0	no	
69	18395-002-000	blueberry bay	3	2	3	3	0	0	0	0	0	0	0	0	0	0	no	
70	18395-003-000	blueberry bay	3	2	2	2	0	2	0	0	0	0	0	0	0	0	yes	
71	18395-004-000	blueberry bay	3	4	3	2	0	2	0	0	0	0	0	0	0	0	yes	
72	18395-005-000	blueberry bay	3	3	3	3	0	0	0	0	0	0	0	0	0	0	no	
73	18395-006-000	blueberry bay	3	2	2	3	0	1	0	0	0	0	0	0	0	0	yes	
74	18395-007-000	blueberry bay	3	4	2	4	0	0	0	0	0	0	0	0	0	0	no	
75	18395-008-000	blueberry bay	2	4	2	4	0	2	0	2	0	0	0	0	0	0	yes	
76	18395-009-000	blueberry bay	2	4	2	4	0	1	0	0	0	0	0	0	0	0	yes	
77	18395-010-000	blueberry bay	1	4	1	4	0	2	0	0	0	0	0	0	0	0	yes	
78	18395-011-000	blueberry bay	2	4	2	4	0	0	0	0	0	0	0	0	0	0	no	
79	18395-061-000	blueberry bay	3	4	2	4	0	0	0	0	0	0	0	0	0	0	no	
80	18395-100-010	blueberry bay	3	4	1	1	0	0	0	1	0	0	0	0	0	0	yes	
81	18413-000-000	blueberry bay	1	4	1	4	0	0	0	0	0	0	0	0	0	0	no	
82	18396-001-000	birdbeach north	3	1	3	2	0	0	0	0	0	0	0	0	0	0	no	
83	18396-002-000	birdbeach north	3	1	3	2	0	0	0	0	0	0	0	0	0	0	no	
85	18396-005-000	birdbeach north	3	3	2	4	0	1	0	1	0	2	0	2	2	0	yes	
86	18396-006-000	birdbeach north	3	1	3	2	0	0	0	0	0	0	0	0	0	0	no	
87	18396-007-000	birdbeach north	3	1	3	2	0	0	0	0	0	0	0	0	0	0	no	
88	18396-008-000	birdbeach north	3	2	3	2	0	0	0	0	0	0	0	0	0	0	no	
89	18396-009-000	birdbeach north	3	1	3	2	0	0	0	0	0	0	0	0	0	0	no	
90	18396-010-000	birdbeach north	3	1	2	4	0	0	0	0	0	0	0	0	0	0	no	
91	18396-011-000	birdbeach north	3	3	2	2	0	0	0	0	0	0	0	0	0	0	no	
92	18396-012-000	birdbeach north	3	1	2	4	0	0	0	0	0	0	0	0	0	0	no	
93	18396-013-000	birdbeach north	3	1	2	4	0	0	0	0	0	3	0	0	0	0	yes	crotolaria
94	18396-014-000	birdbeach north	3	2	3	2	0	0	0	0	0	0	0	0	0	0	no	
95	18396-015-000	birdbeach north	3	2	3	2	0	0	0	0	0	0	0	0	0	0	no	
96	18396-016-000	birdbeach north	3	1	3	3	0	0	0	0	0	0	0	0	0	0	no	
97	18396-017-000	birdbeach north	3	4	3	4	0	0	3	0	2	0	0	0	0	0	yes	
98	18396-018-000	birdbeach north	3	4	3	2	0	0	3	2	0	0	3	3	0	2	yes	
99	18396-019-000	bird beach south	3	3	2	2	0	0	0	0	0	0	0	0	0	0	no	

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100	18396-020-000	bird beach south	3	1	2	2	0	0	0	0	0	0	0	0	0	3	yes	
101	18396-021-000	bird beach south	3	1	3	2	0	0	0	0	0	0	0	0	0	0	no	
102	18396-022-000	bird beach south	3	2	1	1	0	0	0	0	0	0	0	0	0	0	no	
103	18396-023-000	bird beach south	3	2	2	1	0	0	0	0	0	0	0	0	0	3	yes	sword fern, winged yam
104	18396-024-000	bird beach south	3	1	2	2	0	0	0	0	0	0	0	0	0	0	no	
105	18396-025-000	bird beach south	3	3	1	1	0	0	0	0	0	0	0	0	0	0	no	
106	18396-025-001	bird beach south	3	3	1	1	0	0	0	0	0	0	0	0	0	0	no	
107	18396-026-000	bird beach south	3	3	1	2	0	0	0	0	0	0	0	0	0	2	yes	sword fern
108	18396-026-001	bird beach south	3	1	2	2	0	0	0	0	0	0	0	0	0	3	yes	
109	18396-027-000	bird beach south	2	1	1	1	0	0	0	0	0	0	0	0	0	3	yes	
110	18396-028-000	bird beach south	2	2	2	2	3	0	0	0	0	0	0	0	0	0	yes	sword fern
111	18396-028-001	bird beach south	2	3	2	2	0	0	0	0	0	0	0	0	0	3	yes	sword fern
112	18396-030-000	bird beach south	3	1	2	2	0	0	0	0	0	0	0	0	0	0	no	
113	18396-031-000	bird beach south	3	1	3	2	0	0	0	0	0	0	0	0	3	0	yes	wt front yard
114	18396-000-000	sf pass	3	4	2	2	0	0	0	0	0	0	0	0	0	0	no	
115	18396-032-000	sf pass	3	2	3	3	0	0	0	0	0	0	0	0	0	0	no	
116	18396-033-000	sf pass	3	3	2	2	0	0	0	0	0	3	0	0	0	0	yes	
117	18396-034-000	sf pass	3	4	3	4	0	0	0	0	0	0	0	0	0	0	no	sword fern
118	18396-035-000	sf pass	3	3	1	4	0	0	0	0	0	0	0	0	0	0	no	
119	18396-036-000	sf pass	3	4	2	4	0	0	0	0	0	0	0	0	0	0	no	
120	18396-037-000	sf pass	3	4	2	4	0	0	0	0	0	0	0	0	0	0	no	
121	18396-038-000	sf pass	3	4	2	4	0	0	0	0	0	0	0	0	0	0	no	
122	18396-039-000	sf pass	3	3	2	4	0	0	0	0	0	0	0	0	0	0	no	
123	18396-040-000	sf pass	3	4	2	2	0	0	0	0	0	0	0	0	0	0	no	
124	18396-041-000	sf pass	3	3	2	2	0	0	0	0	0	0	0	0	0	0	no	
125	18396-043-000	sf pass	3	4	2	2	0	0	0	0	0	0	0	0	0	0	no	
126	18466-100-012	sf pass	2	4	1	2	0	3	0	3	3	0	0	0	0	0	yes	young tallow and camphor
127	18466-100-001	gator cove	1	4	1	1	0	0	0	0	0	0	0	0	0	0	no	
128	18466-100-002	gator cove	1	4	1	1	0	0	0	0	0	0	0	0	0	0	no	
129	18466-100-003	gator cove	1	4	1	1	0	0	0	0	0	0	0	0	0	0	no	
130	18466-100-004	gator cove	1	4	1	1	0	0	0	0	0	0	0	0	0	2	yes	
131	18466-100-005	gator cove	1	4	1	1	0	0	0	0	0	0	0	0	0	0	no	
132	18466-100-006	gator cove	1	4	1	1	0	0	0	0	0	0	0	0	0	0	no	
133	18466-100-007	gator cove	1	4	1	1	0	0	0	0	0	0	0	0	0	3	yes	
134	18466-100-008	gator cove	2	3	1	1	0	0	0	0	0	0	0	0	0	3	yes	
135	18466-100-009	gator cove	2	3	2	4	0	2	0	2	0	0	0	0	0	0	yes	
136	18466-100-010	gator cove	1	4	2	4	0	1	0	0	0	0	0	0	0	0	yes	
137	18466-100-011	gator cove	2	3	2	4	0	0	0	2	0	0	0	0	0	0	yes	
139	18514-000-000	gator cove	1	4	1	1	0	0	0	0	0	0	0	0	0	0	no	lg cattail stand--1200ft
140	18515-001-000	gator cove	2	4	1	1	0	0	0	2	0	0	0	0	0	3	yes	
141	18515-002-000	earletone-ne 111 rd	2	4	2	4	0	0	1	0	0	0	0	0	0	3	yes	
142	18516-000-000	earletone-ne 111 rd	3	4	2	2	0	0	0	0	0	0	0	0	0	0	no	
143	18517-000-000	earletone-ne 111 rd	3	1	3	2	0	0	0	0	0	0	0	0	3	0	yes	
144	18518-000-000	earletone-ne 111 rd	3	4	2	4	0	0	3	0	0	0	0	0	0	0	yes	
145	18518-001-000	earletone-ne 111 rd	3	3	2	2	0	3	3	0	0	3	0	2	0	3	yes	
146	18519-001-000	earletone-ne 111 rd	3	4	2	2	0	0	0	0	0	0	0	0	0	0	no	
147	18519-002-000	earletone-ne 111 rd	3	4	2	4	0	0	3	0	0	0	0	0	0	0	yes	

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148	18519-003-000	earleton-ne 111 rd	3	4	2	4	0	0	3	0	0	0	0	0	0	0	yes	
149	18472-002-000	earleton-millionaire's row	3	4	2	4	0	0	0	0	0	0	0	0	0	0	no	
150	18474-001-000	earleton-millionaire's row	3	3	3	4	0	0	0	0	0	0	0	0	0	0	no	
151	18476-000-000	earleton-millionaire's row	3	2	3	2	0	0	0	0	0	0	0	0	0	0	no	
152	18476-001-000	earleton-millionaire's row	3	1	3	2	0	0	0	1	0	0	0	0	0	0	yes	
153	18480-000-000	earleton-millionaire's row	3	2	2	2	0	2	2	1	0	1	0	0	0	0	yes	
154	18480-002-000	earleton-millionaire's row	2	3	2	1	0	0	3	2	0	0	0	0	0	0	yes	
155	18480-003-000	earleton-millionaire's row	3	2	2	2	0	3	0	0	0	0	0	0	2	3	yes	
156	18480-003-001	earleton-millionaire's row	3	1	3	4	0	0	0	0	0	0	0	0	0	3	yes	
157	18480-010-002	earleton-millionaire's row	3	2	2	2	0	2	0	1	0	1	0	0	0	0	yes	
159	18475-000-000	earleton	3	1	3	2	0	0	0	3	0	0	0	0	0	3	yes	
160	18478-000-000	earleton	3	3	2	4	0	2	0	0	0	3	0	0	0	3	yes	
161	18483-000-000	earleton	3	1	3	4	0	0	0	0	0	3	0	0	0	3	yes	young taro all along bank
162	18490-100-000	earleton	3	3	3	4	0	0	0	0	0	2	0	0	0	0	yes	
163	18495-000-000	earleton	3	3	2	4	0	0	0	0	0	3	0	0	0	3	yes	
164	18534-000-000	earleton	2	4	1	4	0	0	0	3	0	3	0	0	0	3	yes	
165	18535-000-000	earleton	2	4	1	4	0	0	0	3	0	3	0	0	0	3	yes	
166	18536-000-000	earleton south	3	2	2	2	0	0	0	0	0	0	0	0	0	0	no	
167	18537-002-000	earleton south	1	4	1	4	0	0	0	0	0	0	0	0	0	0	no	
169	18537-004-000	earleton south	3	1	3	2	2	0	0	0	0	3	0	0	0	0	yes	
170	18537-005-000	earleton south	1	4	2	4	0	0	0	2	0	3	0	0	0	0	yes	
171	18537-007-000	earleton south	3	1	2	2	0	0	0	2	0	0	0	0	0	2	yes	
172	18538-000-000	earleton south	3	3	3	2	3	2	3	1	0	2	0	3	0	0	yes	
173	18541-000-000	earleton south	3	1	3	2	0	2	3	0	0	2	0	3	0	0	yes	
174	18543-002-000	earleton south	3	2	3	2	3	2	3	0	0	3	0	3	0	0	yes	1 tropical soda apple
177	18648-001-014	bonnet lake	1	4	1	4	0	0	0	0	0	0	0	0	0	0	no	cesar weed, cogon grass
178	18648-001-015	bonnet lake	2	4	1	4	0	0	0	0	0	0	0	0	0	0	no	
180	18651-001-005	bonnet lake	2	4	1	4	0	0	0	1	0	0	0	0	0	0	yes	
181	18651-001-006	bonnet lake	2	4	1	4	0	0	0	0	0	0	0	0	0	0	no	
183	18651-020-009	bonnett estates	2	3	1	1	0	0	0	0	0	0	0	0	0	0	no	
184	18651-020-010	bonnett estates	1	4	1	1	0	0	0	0	0	0	0	0	0	0	no	
185	18651-020-011	bonnett estates	1	4	1	1	0	0	0	0	0	0	0	0	0	0	no	
186	18651-020-012	bonnett estates	3	1	1	1	0	0	0	0	0	0	0	0	0	0	no	lots of tallow near road
187	18651-020-013	bonnett estates	3	1	1	1	0	0	0	0	0	0	0	0	0	0	no	lots of tallow near road
188	18651-020-014	bonnett estates	2	4	1	1	0	0	0	2	0	0	0	0	0	0	yes	caesar
189	18651-020-015	bonnett estates	1	4	1	1	0	0	0	0	0	0	0	0	0	0	no	
190	18651-020-016	bonnett estates	2	3	1	1	0	0	0	0	0	0	0	0	0	0	no	
191	18651-020-017	bonnett estates	3	3	1	1	0	0	0	0	0	0	0	0	0	0	no	
192	18651-020-018	bonnett estates	3	2	1	1	0	0	0	0	0	0	0	0	0	0	no	
193	18651-020-019	bonnett estates	3	3	1	1	0	0	0	0	0	0	0	0	0	0	no	
194	18651-020-020	bonnett estates	3	3	1	1	0	0	0	0	0	0	0	0	0	0	no	
195	18651-020-021	bonnett estates	1	4	1	1	0	0	0	0	0	0	0	0	0	0	no	
196	18651-020-022	bonnett estates	3	4	1	1	0	0	0	0	0	0	0	0	0	0	no	
197	18651-020-023	bonnett estates	3	4	1	1	0	0	0	0	0	0	0	0	0	0	no	
198	18651-020-024	bonnett estates	3	1	1	1	0	0	0	0	0	0	0	0	0	0	no	
199	18651-020-025	bonnett estates	1	4	1	1	0	0	0	0	0	0	0	0	0	0	no	
200	18655-000-000	sw corner	3	1	2	3	0	0	0	0	0	0	0	0	0	0	no	

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201	18657-001-000	sw corner	3	1	3	2	0	0	0	0	0	0	0	0	0	0	no	
202	18658-000-000	sw corner	3	1	2	2	0	0	0	0	0	0	0	0	0	0	no	
203	18659-000-000	sw corner	2	3	2	4	0	0	0	0	0	0	0	0	0	0	no	
204	18659-001-000	sw corner	2	1	2	2	0	0	0	0	0	0	0	0	0	0	no	
205	18659-002-000	sw corner	3	1	3	4	0	0	0	0	0	0	0	0	0	0	no	
206	18660-000-000	sw corner	3	1	3	2	0	0	0	0	0	0	0	0	0	0	no	
207	18661-000-000	sw corner	3	1	3	2	0	0	0	0	0	0	0	0	0	0	no	
208	18662-000-000	sw corner	3	1	3	2	0	0	0	0	0	0	0	0	0	0	no	
209	18663-000-000	sw corner	3	1	3	2	0	0	0	0	0	0	0	0	0	0	no	
210	18664-000-000	sw corner	3	1	3	2	0	0	0	0	0	0	0	0	0	0	no	
211	18665-000-000	sw corner	3	1	3	2	0	0	0	0	0	0	0	0	0	0	no	
212	18666-000-000	sw corner	2	2	2	2	0	0	0	1	0	0	0	0	0	0	yes	
213	18667-000-000	sw corner	3	1	2	2	0	0	0	0	0	0	0	0	0	0	no	
214	18668-002-000	sw corner	3	1	3	2	0	0	0	0	0	0	0	0	0	0	no	
215	18668-002-001	sw corner	2	1	2	2	0	0	0	0	0	0	0	0	0	0	no	
216	18668-003-000	sw corner	3	1	2	2	0	0	0	0	0	0	0	0	0	0	no	
218	18668-003-001	sw corner	3	1	3	2	0	0	0	0	0	0	0	0	0	0	no	
219	18669-000-000	sw corner	3	2	2	2	0	0	0	0	0	0	0	0	0	0	no	
220	18652-001-000	sw corner	1	4	1	1	0	1	0	0	0	0	0	0	0	3	yes	
221	18652-001-001	sw corner	3	1	3	2	0	0	0	0	0	0	0	0	0	2	yes	
222	18652-003-000	sw corner	3	3	1	1	0	0	0	0	0	0	0	0	0	0	no	
223	18652-004-000	sw corner	3	2	3	1	0	0	0	0	0	0	0	0	0	3	yes	
224	18671-000-000	sw corner	3	1	3	2	0	0	0	0	0	0	0	0	0	2	yes	
225	18672-000-000	sw corner	3	3	3	2	0	0	0	0	0	0	0	0	0	3	yes	
226	18673-000-000	sw corner	3	3	2	2	0	0	0	0	0	0	0	0	0	2	yes	
227	18673-001-000	sw corner	3	2	3	4	0	0	0	0	0	0	0	0	0	0	no	
228	18673-002-000	sw corner	3	1	3	4	0	0	0	0	0	0	0	0	0	0	no	
229	18673-003-000	sw corner	3	1	3	1	0	0	0	0	0	0	0	0	0	0	no	
230	18673-004-000	sw corner	3	1	3	4	0	0	0	0	0	0	0	0	0	0	no	
231	18673-005-000	sw corner	3	1	3	2	0	0	0	0	0	0	0	0	0	3	yes	
232	18677-000-000	sw corner	3	3	3	3	0	0	0	0	0	0	0	0	0	0	no	
233	18678-000-000	sw corner	3	3	3	1	0	0	0	0	0	0	0	0	0	3	yes	
234	18652-000-000	sw corner	2	2	3	2	2	0	3	1	0	0	0	0	0	0	yes	
235	18652-010-000	sw corner	1	3	1	2	0	0	0	0	1	0	2	0	2	0	yes	
236	18652-011-000	sw corner	2	2	3	2	0	0	2	2	2	0	0	0	0	0	yes	
237	18652-012-000	sw corner	2	2	3	2	2	0	0	0	0	0	0	0	0	0	yes	
238	18652-013-000	sw corner	3	1	3	3	0	2	0	2	0	0	0	2	0	2	yes	
239	18652-014-000	sw corner	2	2	2	1	2	0	0	2	0	0	2	0	0	2	yes	
240	18652-015-000	sw corner	2	2	1	2	0	2	2	0	2	0	0	0	2	0	yes	
241	18652-016-000	sw corner	3	2	3	2	0	0	0	2	0	0	3	0	0	0	yes	
242	18652-016-001	sw corner	1	2	2	2	2	0	0	0	0	0	0	2	0	2	yes	
243	18652-016-002	sw corner	1	3	1	1	2	2	3	0	2	0	0	1	0	1	yes	
244	18652-019-000	sw corner	2	2	2	2	2	0	2	1	1	0	0	0	0	1	yes	
245	18652-020-000	sw corner	3	1	1	2	2	2	0	0	0	0	2	0	0	0	yes	
246	18652-020-001	sw corner	2	2	3	2	0	0	2	2	1	0	0	0	0	0	yes	
247	18652-021-000	sw corner	2	3	2	1	2	0	0	0	0	0	0	2	0	2	yes	
248	18652-023-000	sw corner	1	2	2	1	0	2	0	0	0	0	0	0	0	0	yes	

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249	18652-024-000	sw corner	2	2	2	2	2	1	2	0	1	0	2	0	0	1	yes	
250	18652-027-000	sw corner	2	2	3	2	1	0	0	2	0	0	0	0	1	0	yes	
251	18652-028-000	sw corner	2	3	3	3	0	0	2	2	0	0	2	0	2	0	yes	
252	18652-029-000	sw corner	2	3	2	2	2	0	0	0	0	0	0	2	0	0	yes	
253	18652-032-000	sw corner	2	2	2	4	0	0	2	0	0	0	0	0	0	2	yes	
254	18652-038-000	sw corner	1	3	1	4	2	1	0	0	0	0	0	0	0	2	yes	
255	18652-038-001	sw corner	1	3	1	4	2	2	2	1	0	0	0	1	0	0	yes	
256	18652-038-002	sw corner	1	3	1	1	3	0	2	2	0	0	2	0	0	0	yes	
257	18652-038-003	sw corner	2	3	2	2	0	0	0	0	1	0	0	0	2	0	yes	
258	18687-000-000	sw corner	2	2	2	2	0	2	0	0	2	0	2	0	0	2	yes	
259	18688-001-000	totem pole road	3	4	1	4	0	0	0	0	0	0	0	0	0	1	yes	1 caeser
260	18688-002-000	totem pole road	3	3	2	4	0	0	0	0	0	0	0	0	0	3	yes	
261	18688-003-000	totem pole road	3	1	3	4	0	0	0	0	0	0	0	0	0	3	yes	
262	18688-004-000	totem pole road	3	1	2	4	0	0	0	0	0	0	0	0	0	0	no	1 mimosa
263	18688-005-000	totem pole road	3	1	1	4	0	0	0	0	0	0	0	0	0	0	no	
264	18688-006-000	totem pole road	3	1	3	4	0	0	0	0	0	0	0	0	0	3	yes	
265	18688-007-000	totem pole road	1	1	2	4	0	0	0	0	0	0	0	0	0	0	no	
266	18688-009-000	totem pole road	3	1	3	3	0	0	0	0	0	0	0	0	0	0	no	
267	18688-010-000	totem pole road	2	1	2	4	3	0	0	0	0	0	0	0	0	0	yes	
268	18688-011-000	totem pole road	2	1	2	4	0	0	0	0	0	0	0	0	0	0	no	
269	18688-012-000	totem pole road	2	4	1	4	0	0	0	0	0	0	0	0	0	0	no	
270	18688-013-000	totem pole road	3	1	3	4	0	0	0	0	0	0	0	0	0	0	no	
271	18688-014-000	totem pole road	1	4	1	4	0	0	0	0	0	0	0	0	0	0	no	caesar weed-750 sq ft
272	18796-000-000	totem pole road	3	4	2	4	0	0	0	0	0	0	0	0	0	0	no	
273	18796-001-000	totem pole road	2	4	1	4	0	0	0	0	0	0	0	0	0	3	yes	
274	18688-015-000	totem pole road	3	1	3	4	0	0	0	2	0	0	0	0	0	3	yes	
275	18688-016-000	totem pole road	3	1	2	4	0	0	0	2	0	0	0	0	0	3	yes	
276	18688-018-000	totem pole road	3	1	3	2	0	0	0	0	0	0	0	0	0	3	yes	
279	18689-001-000	totem pole road	3	1	2	2	0	0	0	0	0	0	0	0	0	3	yes	
280	18689-002-000	totem pole road	2	2	2	2	0	0	0	0	0	0	0	0	0	0	no	
282	18689-004-000	totem pole road	2	3	1	4	0	0	0	0	0	0	0	0	0	0	no	
283	18689-005-000	totem pole road	2	1	2	4	0	0	0	0	0	0	0	0	0	3	yes	
284	18689-006-000	totem pole road	1	3	1	4	0	0	0	0	0	0	0	0	0	3	yes	
285	18784-001-000	south end	1	4	1	4	0	0	0	0	3	0	0	0	0	0	yes	
286	18784-002-000	south end	1	4	1	1	0	0	0	0	0	0	0	0	0	0	no	
287	18787-000-000	south end	1	4	1	4	0	0	0	0	0	0	0	0	0	0	no	
288	18787-001-000	south end	2	3	1	4	0	0	0	0	0	0	0	0	0	0	no	
295	18772-006-000	sylvan shores	3	4	3	5	0	0	0	0	0	0	0	0	0	0	no	
300	18772-011-000	sylvan shores	3	4	3	5	0	0	0	0	0	0	0	0	0	0	no	
301	18772-012-000	sylvan shores	3	1	2	5	0	0	0	0	0	0	0	0	0	0	no	
302	18772-013-000	sylvan shores	3	4	3	5	0	0	0	0	0	0	0	0	0	0	no	
303	18772-014-000	sylvan shores	3	3	2	5	0	0	0	0	0	0	0	0	0	0	no	
304	18772-015-000	sylvan shores	3	4	2	5	0	0	0	0	0	0	0	0	0	0	no	
305	18772-016-000	sylvan shores	3	4	3	5	0	0	0	0	0	0	0	0	0	0	no	
306	18772-017-000	sylvan shores	3	3	2	5	0	0	0	0	0	0	0	0	0	0	no	
307	18772-018-000	sylvan shores	3	3	3	5	0	0	0	0	0	0	0	0	0	0	no	
308	18772-019-000	sylvan shores	3	3	3	5	0	0	0	0	0	0	0	0	0	0	no	

Lake Santa Fe
Invasive Plant Inventory Data Sheets

#	Parcel #	Neighborhood	Landscape Type	Tree Canopy	Shoreline Vegetation	Beach Zone	Air Potato	Camphor	Chinese Tallow	Coral Ardisia	Japanese Climbing Fern	Sesbania	Torpedo Grass	Wandering Jew	Wedelia	Wild Taro	Exotics?	Other Species Found
309	18772-020-000	sylvan shores	3	4	3	5	0	0	0	0	0	0	0	0	0	0	no	
310	18772-021-000	sylvan shores	3	4	3	5	0	0	0	0	0	0	0	0	0	0	no	
311	18772-022-000	sylvan shores	3	3	3	5	0	0	0	0	0	0	0	0	0	0	no	
312	18772-023-000	sylvan shores	3	4	2	5	0	0	0	0	0	0	0	0	0	0	no	
316	18756-001-000	dogwood lane	2	1	2	2	3	2	0	0	0	0	0	0	0	0	yes	
317	18756-002-000	dogwood lane	2	1	2	4	0	0	0	0	0	0	0	0	3	0	yes	
318	18756-003-000	dogwood lane	3	1	3	2	0	2	0	0	0	0	0	0	3	0	yes	
319	18756-004-000	dogwood lane	3	1	3	2	0	0	0	0	0	0	0	0	0	0	no	
320	18756-005-000	dogwood lane	3	2	3	2	0	0	0	0	0	0	0	0	0	0	no	
321	18756-006-000	dogwood lane	3	2	3	2	0	3	0	0	0	0	0	0	0	0	yes	
322	18756-007-000	dogwood lane	3	2	3	3	0	0	0	0	0	0	0	0	0	0	no	
323	18756-008-000	dogwood lane	3	2	3	3	0	0	0	1	0	0	3	0	0	0	yes	
324	18756-009-000	dogwood lane	3	2	3	2	0	0	0	0	0	0	0	0	0	0	no	
325	18776-010-000	dogwood lane	3	4	3	2	0	3	0	0	0	0	0	0	0	0	yes	
326	18776-011-000	dogwood lane	2	2	2	2	3	2	0	0	0	0	0	0	0	3	yes	
327	18776-013-000	dogwood lane	3	3	2	2	0	2	0	3	0	0	0	0	0	3	yes	
328	18776-014-000	dogwood lane	3	2	2	2	0	2	0	0	0	0	0	0	0	3	yes	
329	18706-001-000	melrose bay	2	4	2	4	3	2	0	3	0	0	0	0	0	3	yes	sword fern-200
332	18741-000-000	melrose bay	3	1	3	4	3	2	0	0	0	0	0	0	0	3	yes	
333	18741-001-000	melrose bay	3	1	3	4	0	0	0	0	0	0	0	0	0	0	no	
334	18755-000-000	melrose bay	3	1	3	4	0	2	0	0	0	0	0	0	0	0	yes	
335	18755-001-000	melrose bay	3	1	3	2	0	3	0	3	0	0	0	0	0	0	yes	
336	18756-009-001	melrose bay	3	4	2	4	0	0	0	2	0	0	0	0	0	0	yes	
337	18756-009-002	melrose bay	3	4	2	4	0	2	0	0	0	0	0	0	0	0	yes	english ivy-200
338	18756-017-000	melrose bay	3	4	2	4	0	0	3	0	0	0	0	0	0	3	yes	sword fern-400
339	18756-018-000	melrose bay	1	4	1	4	3	2	3	0	0	0	0	0	0	0	yes	english ivy-300
340	18759-000-000	melrose bay	3	2	2	2	0	0	0	0	0	0	0	0	0	0	no	
341	18760-000-000	melrose bay	3	1	2	4	0	3	3	1	0	0	0	3	3	3	yes	sword fern-200
342	18764-000-000	melrose bay	3	1	3	3	3	3	0	2	0	0	0	0	0	3	yes	
343	18764-001-000	melrose bay	3	1	3	3	3	3	0	0	0	0	0	0	0	3	yes	
344	18765-000-000	melrose bay	3	3	3	4	0	0	0	2	0	0	0	0	0	0	yes	
345	18767-000-000	melrose bay	3	4	2	2	0	0	0	0	0	0	0	0	0	3	yes	
346	18768-000-000	melrose bay	3	3	3	4	0	1	0	0	0	0	0	0	0	0	yes	
347	18768-001-000	melrose bay	3	4	2	4	0	2	0	0	0	0	0	0	0	3	yes	
349		ramp	2	4	2	1	0	0	0	0	0	0	0	0	0	0	no	
351	18762-001	dogwood lane	2	2	2	2	0	2	0	0	0	0	0	0	0	0	yes	
352	no #	dogwood lane	3	2	2	2	0	0	0	0	0	0	3	0	0	0	yes	
354	no #	earleton	3	3	3	3	0	0	0	0	0	0	0	0	0	3	yes	

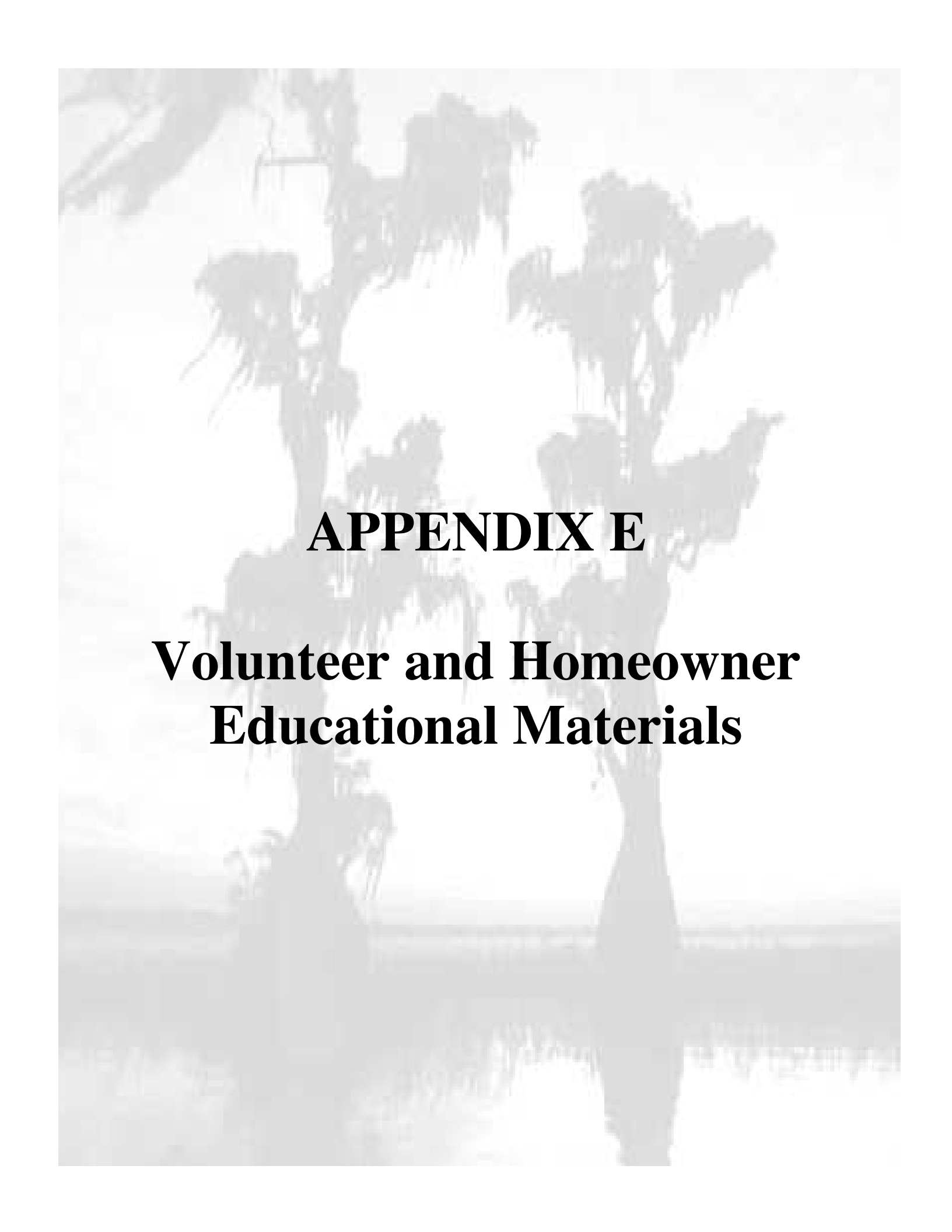
Landscape Type:
1 = Natural
2 = Minimally Disturbed
3 = Manicured & Mowed Lawn

Tree Canopy Coverage:
1 = 0 - 25%
2 = 25 - 50%
3 = 50 - 75%
4 = 75 - 100%

Shoreline Vegetation:
1 = Swamp
2 = Good buffer zone
3 = Lawn to water

Beach Zone Type:
1 = Swamp
2 = Sand & grass
3 = White sand fill/no grass
4 = Grass beds
5 = Canal

Plant Count:
1 = Individual Plant
2 = 2 - 5 Individual Plants
3 = Infestation
(viable population that is spreading)



APPENDIX E

Volunteer and Homeowner Educational Materials

Invasive Plant Survey Workshop

June 22, 2002

Sign in –

Name, address, phone, e-mail, prefer to work in own neighborhood or not? Where prefer to work if not on lake or in Bradford?

Map – place name where live; if not on lake put name in middle of lake

Introduction to the project

Purpose, objectives

Tim – the plants

Identification, reasons bad, control suggestions

Me – procedures, materials

1. contact owner
2. visit parcel or use binoculars
3. inventory plants – 75' from OHW
note new cattail infestations
4. mark infestations on map
5. point out plants to owner (if interested), explain the harm plant causes, suggest control method
6. mention September 14 workshop by IFAS—take name, etc if interested
7. give them the information packet
8. send in sheets to me as fill; do not wait until end
9. you have through October to finish, but shoot for September
10. call whenever you need supplies, or have any questions

1. maps – pass around example of assignment maps
2. show big maps I will mark
3. field inventory sheets
4. plant chart (write own notes in box)
5. folder presentation – you may have to stuff some
6. shirts or name tags?

You are invited to attend a special workshop on
Florida Waterfront Landscaping

Saturday
Sept 14

10:00 - 12:30



Melrose
Library

We hope to see you there!

Sponsored by Current Problems, the Alachua County Cooperative Extension Service &
The Institute of Food and Agricultural Sciences, University of Florida



*Let the Grass
&
Baby Cypress Grow!*

Please Don't Mow!

Water conservation is always in season!

To order your free copy of
WaterWise Florida Landscapes,
fill in the requested information and
mail in this postage-paid card.

Name _____

Mailing address _____

State _____

Zip code _____

City _____

Thank you for your interest in conserving our vital water supply!
St. Johns River Water Management District • P.O. Box 1429 • Palmdale, FL 32179-1429
(800) 451-7106 • (352) 325-4342 • Internet: <http://201.state.fl.us>

W A T E R W I S E

Florida Landscapes



**Landscaping to Promote Water Conservation
Using the Principles of Xeriscape™**

from Florida's water management districts

Florida Yards & Neighborhoods

Florida-friendly landscaping emphasizes nine major principles that can create and maintain beautiful lawns and gardens:

Right Plant, Right Place

Plants selected for your site will require minimal amounts of water, fertilizer and pesticides.

Water Efficiently

Irrigate only when your lawn and landscape need water. Efficient watering is the key to a healthy Florida Yard and reducing runoff.

Fertilize Appropriately

Less is often best. Over-utilization of fertilizers can be hazardous to your yard and the environment.

Mulch

Maintaining a 2-3" layer of mulch will help retain soil moisture, prevent erosion, and suppress weeds.

Attract Wildlife

Plants in your yard that provide food, water and shelter can conserve Florida's diverse wildlife.

Control Yard Pests Responsibly

Unwise use of pesticides can harm people, pets, beneficial organisms and the environment.

Recycle

In a Florida Yard grass clippings, leaves, and yard trimmings are recycled on site to provide added nutrients to the soil and to reduce waste disposal.

Reduce Stormwater Runoff

Water running off from your yard can carry soil, debris, fertilizer and pesticides that can harm water quality. Reduction of this runoff will help prevent nonpoint source pollution.

Protect the Waterfront

Waterfront property, whether on a bay, river, stream, pond or beach, is very fragile and should be protect as a natural treasure.



To learn more about creating and maintaining attractive, healthy landscapes that protect Florida's natural resources, contact:

Wendy Wilber
Alachua County Extension Service
352 955 2402
wlw@gnv.ifas.ufl.edu
<http://alachua.ifas.ufl.edu>
or

Florida Yards & Neighborhoods
statewide office at (352) 392-7938
E-mail: fyn@gnv.ifas.ufl.edu
and

Visit our Website at:
<http://hort.ufl.edu/fyn>

The Cooperative Extension Service is a partnership between the University of Florida and your local county government.



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The Institute of Food and Agricultural Sciences is an Equal Employment Opportunity--Affirmative Action Employer authorized to provide research, educational information and other services only to individuals and institutions that function without regard to race, color, sex, age, handicap or national origin.

Florida-Friendly Landscaping

Creating and maintaining attractive landscapes to enhance our community and to protect Florida's natural environment.

FLORIDA
YARDS &
NEIGHBORHOODS

Adopt
A
River
A Division of Current Problems Inc

Protect Florida's Natural Resources

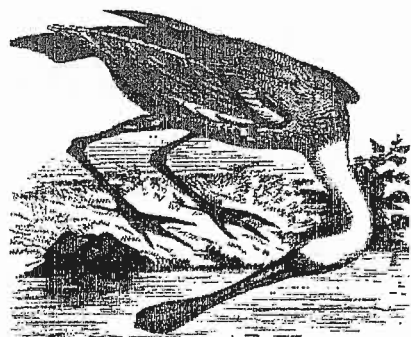
.....for generations to come.

The natural beauty of Florida continues to attract many people--some to visit and to stay as residents. From the sandy coasts that encircle our state to the inland forests and prairies that contain lakes, rivers and streams, we use and enjoy Florida's natural resources for outdoor activities such as boating, fishing, hiking and camping.

Florida's rapid population growth brings demanding challenges. Some of the natural environment that attracted us in the first place is damaged and dwindling at an unprecedented rate.

As our communities have grown, there has been a tremendous pressure placed upon water resources. An amazing natural system of recharge areas and springs links the above and below ground water sources (aquifers) that sustain Florida's vital ecosystems--and provide us with water.

In the past, we have not been as careful as we should have been in order to protect the natural beauty of Florida for the future.



Our Yards and Community Landscapes *The first line of defense.*

The good news is that we are learning from our past mistakes. Today we realize that we can take important steps to prevent further destruction of Florida's natural resources and to rebuild the state's valuable ecosystems.

Whether we take care of our own yard or contract a professional service, we can play an important role in minimizing the potentially harmful effects of urbanization on our natural resources.



How our landscapes and maintenance practices fit into the picture...

During Florida's rainstorms, water rushes over the land carrying debris and dissolved nutrients to natural or man-made waterways. The water and its contents is called *stormwater runoff*.

Fertilizers and chemicals that we add to our landscapes can be washed away by rain, or excessive irrigation, into storm drains, or percolate down through the soil into the aquifer. Oil and residue on roads, driveways and parking areas also end up in waterways through this route. The water from the storm drains flow into ponds, rivers, lakes and bays, causing pollution problems for the natural environment and water quality.

Take the First Step!

Help is just a phone call away.

Every year, thousands of people turn to their county's Cooperative Extension Service for information, instruction and advice from specially-trained Master Gardeners and horticulture staff. The Extension Service can show you ways to design and maintain a yard that uses less water, fertilizer and pesticides.

Florida Yards & Neighborhoods is a public education and participation program available through many county Cooperative Extension Services. To find out more about this program or other Florida-friendly approaches to an attractive, healthy landscape, contact your local county Cooperative Extension Office, call the number of the statewide office on the back of this brochure, or visit our website at:

<http://hort.ufl.edu/fyn>





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EXTENSION

Institute of Food and Agricultural Sciences

Fact Sheet #44-A, June 2002

Alachua County

2800 NE 39th Avenue

Gainesville, FL 32609

Tel: (352) 955-2402 / SUN: 625-2402

Fax: (352) 334-0122

E-mail: alachua@mail.ifas.ufl.edu

TDD/TTY: (352) 955-2406

SELECTED INVASIVE EXOTIC PLANTS IN THE LAKE SANTA FE AREA

Over the years many plants have been brought into Florida from foreign countries for landscaping and other purposes. Some of these exotic plants have spread and invaded natural areas where they have displaced native plants. Factors like insect and diseases that kept them in check in their country of origin do not exist here, so they can flourish. These plants are referred to as "invasive exotics" and they are changing the face of Florida and Alachua County. Because of the rampant spread and naturalization of these plants, we are losing native plant communities and wildlife habitat. Here is a description of some of the worst exotic invasive plants and a list of other invasive plants. Please avoid planting them and remove any that you may already have in your landscape.

Air-Potato

Dioscorea bulbifera

Air-potato is a non-native, invasive vine in Florida. Covered with large green leaves, it can quickly grow 60 - 70 feet in length which is long enough to grow over and shade out large trees. A member of the yam family (*Dioscoreaceae*), air potato produces large numbers of aerial tubers, which are potato like growths attached to the stems. These tubers grow into new plants. It is commonly recognized as a pest plant throughout Florida.



Popcorn Tree or Chinese Tallow Tree

Sapium sebiferum

This tree grows and spreads rapidly, is difficult to eliminate, and tends to take over large areas by out competing native plants. Chinese Tallow thrives in well drained uplands as well as bottomlands, and on the shores of water bodies. It is growing rampantly in Paynes Prairie State Preserve.



Coral Ardisia *Ardisia crenata*

Is an evergreen shrub that has dark green waxy leaves with scalloped edges. Ardisia produces clusters of coral red berries. It grows from about 2 to 6 feet tall, and is an under story plant in moist woods. Birds eat the berries and disperse them in natural areas. It has escaped from cultivation and has become established in natural communities. Thickets of Ardisia quickly form and displace native ground covers.



Japanese Climbing Fern *Lygodium japonicum*

This climbing fern is bright green with a lacy leaf. The twining fronds will grow to 90 feet long. The Japanese Climbing Fern will form tangled masses over ground covers, shrubs, and smother vegetation in natural areas. It climbs mature trees and can act as a ladder for wildfire. The spores of the fern are easily spread by wind.



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Upon request, this fact sheet is available in alternate formats for persons with print related disabilities.

Taro, Wild Taro *Taro esculenta*

This perennial is herbaceous. Taro has arrowhead shaped leaves that are dark green and velvety. It can be an immersed plant, though it will thrive in a wide range of dry to wet sites. Taro is easily dispersed by movement of fragments of the plant. Only a portion of the root (corm), and leaf is needed to establish a new plant. It has naturalized along streams, marshy shores, canals, and ditches. It displaces native shoreline vegetation.



Torpedo Grass *Panicum repens*

Torpedo grass is a perennial grass that grows in wet and upland sites. It has a sharp pointed torpedo like growing tip which makes it easy to identify. In shallow water or moist sites, it can form a dense colony. Torpedo grass grows rapidly, spreads easily along canal banks, and along lake shores. It may be confused with the native maidencane grass. The maidencane has wide leaf blades and the flower head is not openly branched. Torpedo grass reproduces by underground rhizomes, especially if the grass is tilled and broken apart.



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Wedelia ***Wedelia trilobata***

This flowering ground cover is well adapted to many sites in Alachua County. It was originally used for soil erosion control and has escaped into natural areas especially in moist sites. It creeps and roots at the nodes of the plants. It blooms yellow orange daisy like flowers and has deeply lobed leaves. This plant will make a thick mat of vegetation and is difficult to remove once it has been introduced to the landscape.



Green Wandering Jew ***Tradescantia fluminensis***

The Green Wandering Jew was grown as a house or patio plant. It has escaped into natural areas and will form a dense mat that will smother native ground covers and seedlings of other plants. It is easily spread by stem fragments. It does best in shady moist areas but will also thrive in sunny spots as well. This weed is difficult to control once established.



Camphor Tree ***Cinnamomum camphora***

This is a large evergreen tree with a spreading crown. The leaves have an aroma of camphor or menthol when crushed. The leaves are a shiny green and the tree bears black berry like fruit. Birds often spread the seeds of these trees by eating the fruit. It can disturb natural habitat in mesic hammock or pine woods. Camphor tree seedlings are often seen in fence row and roadsides.



Sesban ***Sebania punicea***

Also known as rattle box, the Sesban is frequently found in ditches, roadsides, and waste places. It has escaped cultivation, and can infest wetland areas. The Sesban has sprays of red flowers and persistent seed pods that rattle. It is a deciduous tree that reaches 12 feet. It is a perennial and will return in the same site every growing season.



For more information on invasive plants go to:
<http://fleppc.org>

Other invasive exotics to avoid:

Cat's Claw Vine - *Macfadyena unguis-cati*
Chinaberry - *Melia azedarach*
Chinese Privet - *Ligustrum sinense*
Nandina - *Nandina domestica*
Shrub Lantana - *Lantana camara*
Sword Fern - *Nephrolepis cordifolia*
Tropical Soda Apple - *Solanum viarum*

Wendy L. Wilber
Extension Agent - Urban Horticulture
E-Mail: WLWilber@mail.ifas.ufl.edu
Web Site: Alachua.ifas.ufl.edu

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University of California - Davis
University of Florida, Center for Aquatic & Invasive Plants
University of Florida/Institute of Food & Agricultural Sciences



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June 18, 2002

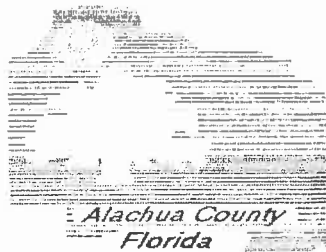
Dear Consumer:

This booklet contains highlights on 9 principles of environmentally friendly landscaping and has been provided by the Alachua County Extension Service, Florida Yards & Neighborhoods (FYN) Program and the Institute of Food and Agricultural Sciences.

For further information about landscaping or upcoming seminar dates for the Florida Yards & Neighborhoods (FYN) Program, please contact the Alachua County Extension Service, at (352) 955-2402.

Sincerely,

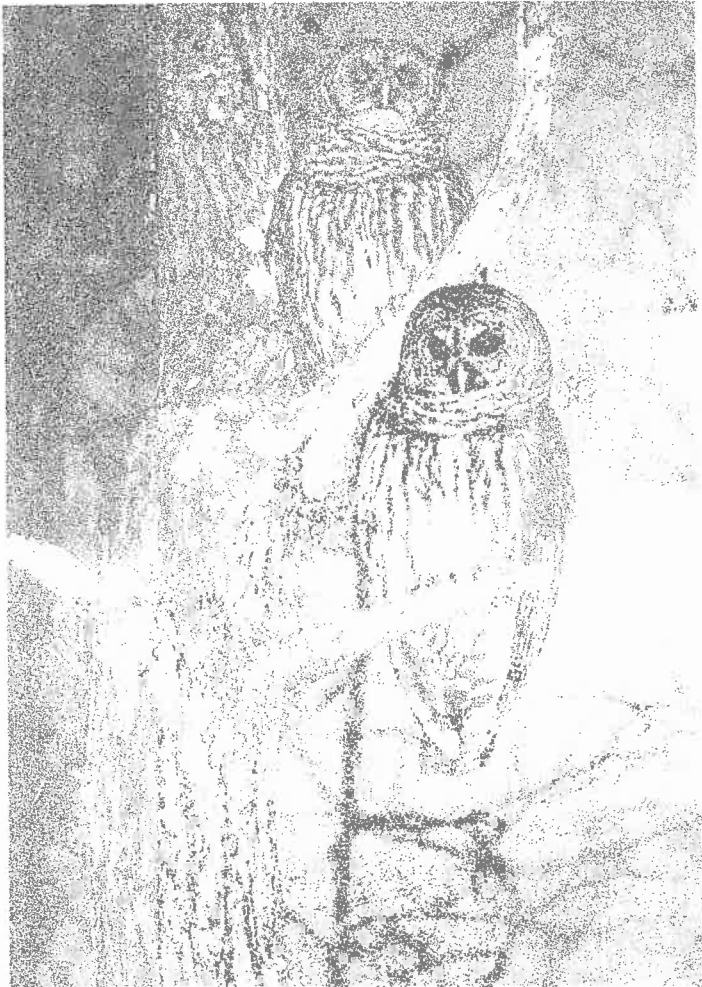
Wendy L. Wilber
Extension Agent - Urban Horticulture
WLWilber@mail.ifas.ufl.edu



FLORIDA
YARDS & NEIGHBORHOODS

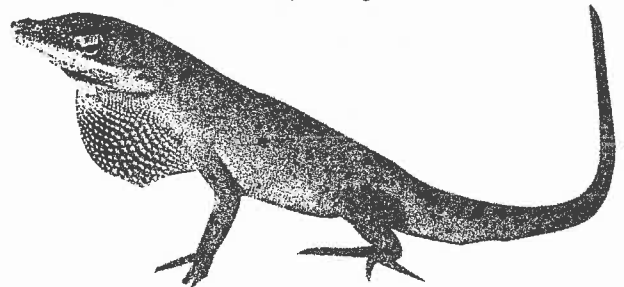
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Wildlife



Providing food, water, and shelter can increase the number and diversity of wildlife in your yard.

- Plant native or low maintenance vines, shrubs and trees that provide cover, nesting areas, and food.
- Provide a water source, such as a bird bath or a small pond.
- Provide wildlife shelters such as a bat house, bird house, brush pile or a dead tree.
- Learn to identify common species of wildlife in your yard.

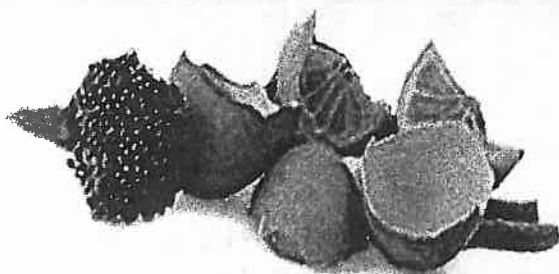


Recycle

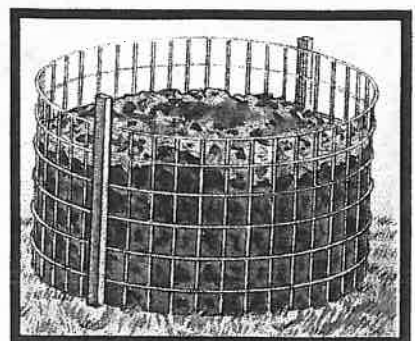


Recycling yard waste can promote soil fertility, improve soil structure, texture, and water holding capacity, and help to loosen and aerate compacted soil.

- Leave grass clippings on the lawn to recycle nitrogen.
- Use fallen leaves and pine needles as mulch under trees and shrubs.
- Create and maintain a compost pile with kitchen scraps and yard waste (no animal products please).



Composting recycles household garbage, considerably reducing our impact on landfills.



Fertilize Appropriately

Many trees and landscape plants demand little or no fertilizer once established and mature. Excess fertilizers can run off yards into waterways. Nutrients can pollute drinking water, cause algal blooms, and increase proliferation of the wrong shore plants.

- Fertilize only as needed to maintain the health of lawns and landscape plants.
- Use slow-release fertilizers with micro-nutrients. Buy fertilizers that contain 30% or more nitrogen in slow-release forms.
- Use iron (ferrous sulfate or chelated iron) instead of nitrogen to make your lawn green in the summer.
- Do not exceed the rate of 1 pound nitrogen per 1,000 square feet per application.

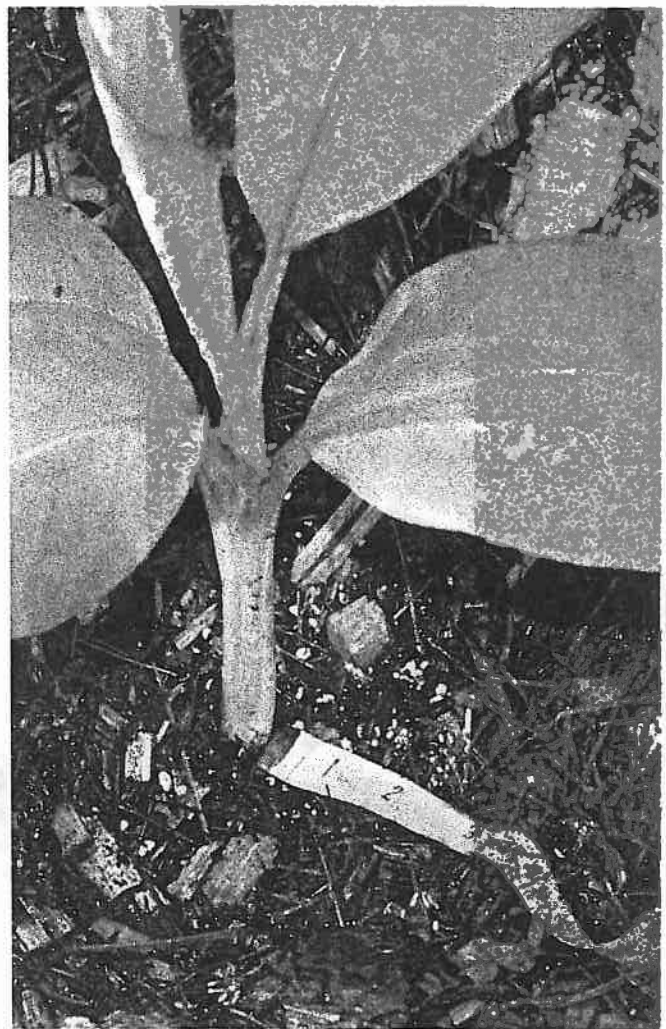
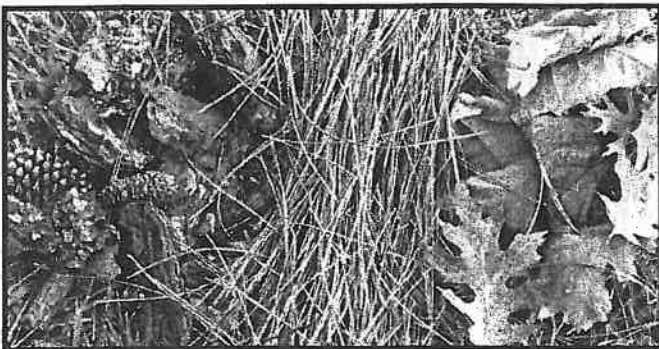


GUARANTEED ANALYSIS	
Total Nitrogen (N)	12.00%
5.7% Ammoniacal Nitrogen	
6.3% Urea Nitrogen*	
Available Phosphate (P ₂ O ₅)	10.00%
Soluble Potash (K ₂ O)	5.00%
Boron (B)	0.02%
Total Copper (Cu)	0.05%
0.01% Water Soluble Copper (Cu)	
Total Iron (Fe)	0.10%
0.02% Water Soluble Iron (Fe)	
Total Manganese (Mn)	0.05%
0.01% Water Soluble Manganese (Mn)	
Molybdenum (Mo)	0.0005%
Total Zinc (Zn)	0.05%
0.01% Water Soluble Zinc (Zn)	

Mulch

Mulch helps to control weeds and reduce erosion, water loss, and stormwater runoff. It also improves soil structure and fertility. Mulch can replace turf or ground covers in areas that are shaded or difficult to mow.

- Keep 2-3 inches of mulch over the roots of trees, shrubs, and plant beds.
- Replenish mulch once or twice a year, as needed to maintain a 2-3 inch depth.
- Create self-mulching areas under trees where leaves can remain on the ground.
- Avoid using cypress mulch.
- Choose recycled mulch or by-product alternatives (i.e. Melaleuca, leaves, Pine needles, or bark).

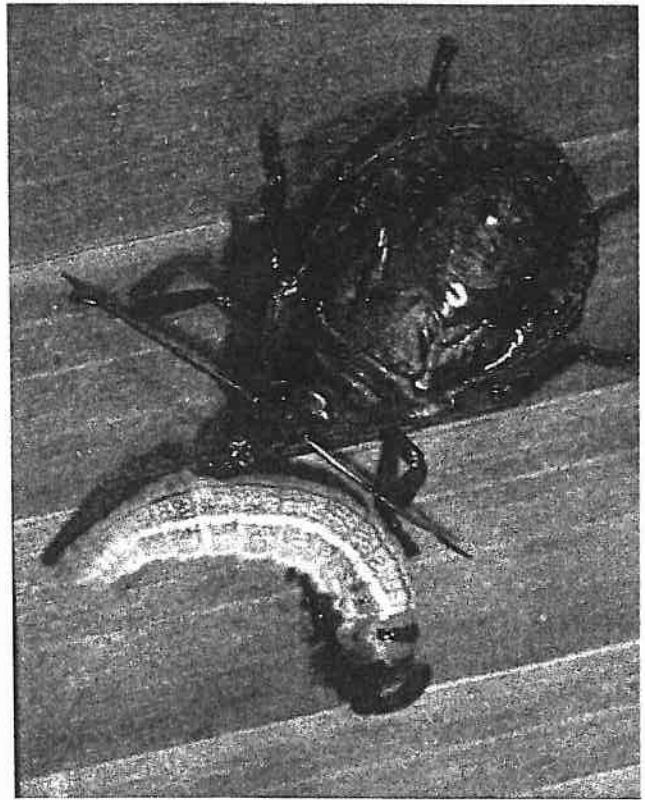


Keep mulch 2 inches from the base of plants to avoid disease.

Manage Yard Pests

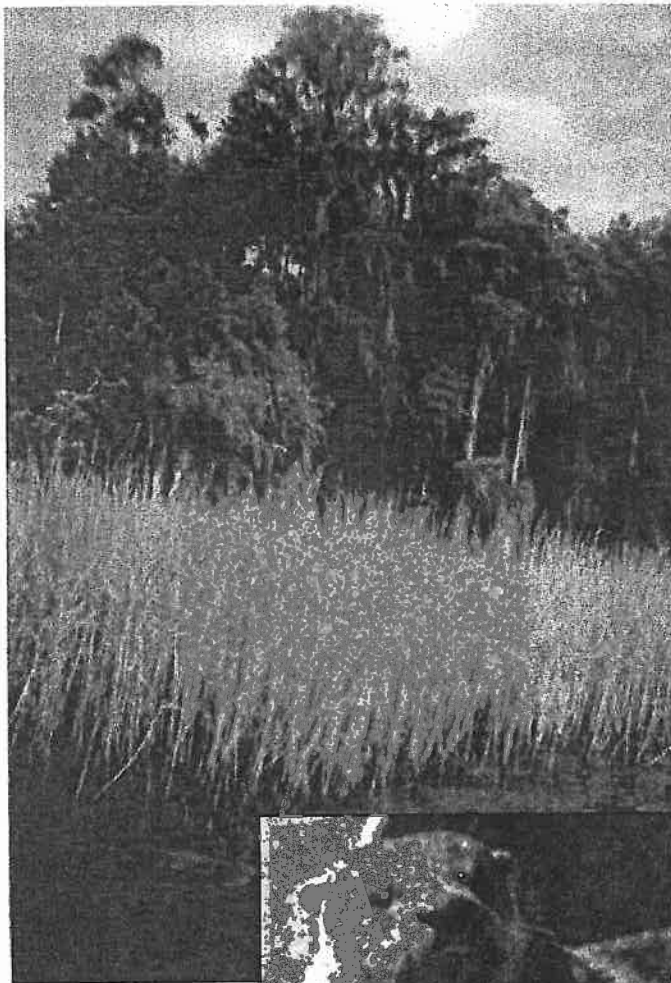
It is unrealistic, and even unwise to strive for an insect, disease, and weed-free yard. Instead:

- Avoid routine applications of pesticides; do not use within 30 feet of water body.
- Check plants regularly for signs of problems.
- Pruning off infected areas, hand-removing insects, and selecting the right plant for the right place are effective.
- Treat only affected areas rather than spraying your entire lawn or yard.
- Use environmentally friendly pest controls such as horticultural oils, *Bacillus thuringiensis* (BT) and insecticidal soaps.
- Avoid over-fertilizing and over-watering; excessive growth makes plants more attractive to pests.
- Butterflies and moths were once caterpillars.



These are just a few of many beneficial insects found in Florida Yards.

On The Waterfront



Waterfront property owners realize the special contribution our waterways make to their quality of life. They also understand how fragile these natural treasures can be.

- Protect your native shoreline plants. Never remove any vegetation without seeking proper permits and guidelines.
- Establish a 10-30 foot "no fertilizer, no pesticide" zone along your shoreline.
- Remove invasive exotic aquatic plants by cutting, pulling, or raking.
- Plant a border of low-maintenance or native plants between your lawn and shoreline to absorb nutrients.
- Where feasible, plant native aquatic vegetation along your shoreline to provide wildlife habitat.
- Decrease wave action by allowing shoreline grasses to grow.

Stormwater Runoff

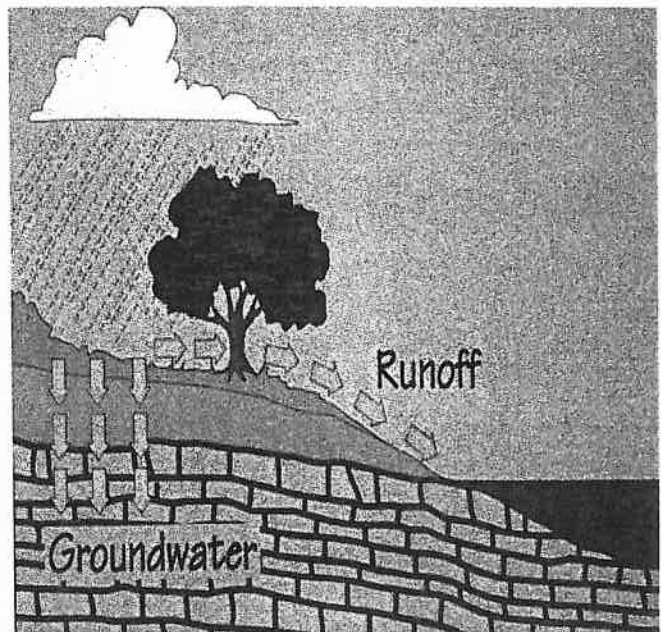


Because water can wash off our yards, it is important to reduce the amount of pollutants on our property.

- Sweep grass clippings, fertilizer and soil from driveways and streets back onto the lawn.
- Remove trash from ditches and boat ramps.
- Clean up oil spills and leaks on the driveway. Use cat litter to absorb oil.
- Pick up after pets. This will reduce bacteria and nutrient pollution entering the surface waters.

Reduce pollution of rivers and lakes by keeping rain and sprinkler water on our yards, and out of surface waters.

- Direct downspouts and gutters to drain onto the lawn, plant beds or containment areas.
- Use porous surfaces for walkways, patios and driveways.
- Create or maintain swales (low areas) to catch, hold, and filter stormwater.
- Collect and store rain from your roof in a rain barrel or cistern.
- Preserve or restore wetlands; they filter nutrients and abate floodwaters



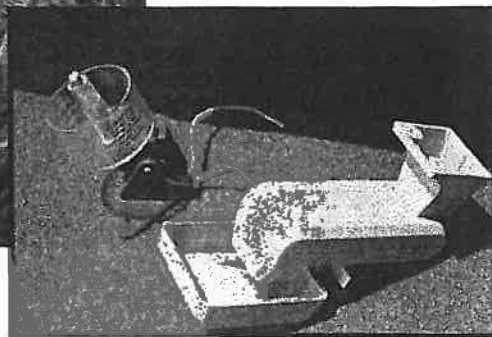
Water Efficiently

A truly efficient way to use water in the landscape is to design and maintain a yard that thrives predominantly on rainfall once plants are established.

- Water your lawn and other plants only when they show signs of stress. (Comply with any existing water restrictions in your community).
- Mow lawns high to encourage a deeper, more drought and pest tolerant root system.
- Cut no more than 1/3 the height of grass blades with each mowing.
- Design or modify your sprinkler system to water lawn areas separately from plant beds, which usually require less water.
- Use low volume irrigation such as a drip or micro-spray system to water plant and flower beds more efficiently.
- Calibrate your sprinklers to apply 1/2 to 3/4 inch of water per application.
- Put a rain gauge in your yard to track rain fall and avoid unnecessary watering.
- Connect an automatic rain shut-off device to your sprinkler system.
- Set the shut-off device to 1/2 inch so it will override your system's timer when enough rain has fallen.



Automatic rain shut-off devices help to conserve water.



Right Plant, Right Place

Reduce the need for water, fertilizer, pesticides and pruning by using plants suited to the site condition in your yard.

- Determine how much grass you need for children, pets, and other recreation.
- Group plants according to their maintenance needs. For example, group plants with low-water needs separately from lawn areas.
- Use low-maintenance or native ground covers, shrubs, mulch and other porous surfaces where possible.
- Preserve existing tree canopy.
- Reduce yard waste by choosing plants that will not require frequent pruning when they reach maturity.
- Save energy by using trees and shrubs to shade the air conditioner compressor and eastern and western walls of your home.
- Help stop the spread of invasive exotic plants by removing them from your yard. Examples include: Coral Ardesia, Wild Taro and Chinese Tallow.



Benefits and Detriments of Aquatic and Wetland Plants

Benefits of Native Plants

Native aquatic and wetland plants benefit ecosystems in many ways:

Submersed plants pump oxygen into the water for animals such as fish.

Aquatic and wetland plants provide hiding places and nurseries for animals.

Aquatic and wetland plants provide surface area for small organisms such as algae and grass shrimp that are then eaten by larger organisms.

Aquatic and wetland plant parts are eaten by fish, waterbirds, and other animals.

Aquatic and wetland plants stabilize shorelines, reducing erosion.

Aquatic and wetland plants absorb excess nutrients and other forms of pollution.

Detriments of Aquatic and Wetland Weeds

Non-native and native aquatic and wetland plants can become "weeds":

Aquatic and wetland weeds can replace native plants, depriving native animals of their natural habitats and food supplies.

Aquatic and wetland weeds can cover water bodies and wetlands, preventing oxygenation and "suffocating" fish and other animals.

Aquatic and wetland weeds can prevent the use of water bodies for fishing swimming, and other recreation.

Aquatic and wetland weeds can disrupt navigation by both small and large vessels.

Aquatic and wetland weeds can greatly slow or even stop water flow, disrupting flood control and irrigation systems.



Aquascaping: Planting and Maintenance¹

Debbie Butts, Jemy Hinton, Craig Watson, Ken Langeland, David Hall and Mike Kane²

Introduction

The aesthetic and wildlife habitat value of ponds and water retention areas can be greatly enhanced by establishing and managing certain desirable plants. Undesirable plants and lack of management will result in an unsightly area and perhaps a health hazard. Aquascaping is the term used to describe the planting of aquatic and wetland plants. A good way to describe aquascaping is landscaping in and around water. Florida has seen a recent surge of interest in aquascaping from both home owners and developers. Whether dealing with a large or small, natural or man made (detention, fish, etc.) pond, there are certain guidelines that should be followed in order to reduce future management problems.

This circular addresses planting and maintenance, the two areas that account for most of the problems people encounter in aquascaping.

Planting

Site selection and preparation are the first steps toward successful aquascaping. Unless there is no choice (as in the case of some retention ponds), avoid planting an aquascape in an area that isn't suited for it. Examples of unsuitable sites are those where the water level is extremely seasonal, or where runoff from industry or agriculture will damage the aquascape. Even if you have a perfect site for an

aquascaping project, the following steps should be taken well in advance of the first planting.

- 1) Determine where the normal, or average, water line will be. This is especially important in detention pond plantings because the water line will vary in many cases. Although some wetland plants will tolerate dry and wet seasons, there are many that will die if they are kept too wet or too dry. In cases where the water varies, determine where the water will be for the majority of the year, and designate this as your average water level. This may require the assistance of agencies such as the Natural Resource Conservation Service (formerly Soil Conservation Service), the Water Management District for your area, or simply observe the area for at least a year before you plant. You may also want to locate the pond near a source of well water, in order to maintain the water level during dry periods.
- 2) Measure water depth and area of the site to be aquascaped, paying special attention to the shoreline and shallow areas where most work will take place. Without proper measurements, it is hard to determine the quantity and types of plants that will be required. As you are measuring the depth, it is a good idea to place stakes that represent different depths. Later, these measurements will assist in deciding the quantity and types of plants you need, and during planting will let you know the boundaries in which to plant them.

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1. This document is Circular 912, one of a series of the Department of Fisheries and Aquatic Sciences, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Published May 1991; reviewed May 1997. Please visit the FAIRS Web site at <http://hammock.ifas.ufl.edu>.
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- 3) If desired, excavation can create planting zones that originally did not exist in the area. Soil and rocks removed to deepen one area can be used to create shallow areas elsewhere, or can be incorporated into landscaping around the pond. Deepening the margins around the edge of a pond can help manage plants that might invade into the water (e.g., Torpedo Grass or Water Primrose). Detention ponds designed for stormwater management must be designed according to Florida Department of Environmental Protection (FDEP) or Water Management District (WMD) guidelines. Therefore, always check with DEP, Stormwater Management Section (904/488-0782), and local regulatory agencies before beginning any excavation.
- 4) Develop a detailed plan that includes types and numbers of plants needed. The accuracy and detail of your measurements will play a key role in the planting plan. For ease in planning, divide the aquascape into three major planting zones: shoreline, shallow water, and deep water (Figure 1). The table at the end of this bulletin lists some plants that can be used, including the zone in which they will grow and suggested planting densities. A well thought out plan will allow you to proceed quickly during the actual planting, and will help ensure survival of the plants.

Obtaining Plants

Many aquatic plants are collected from the wild for aquascapes. Always obtain permission from the property owner before collecting aquatic plants from private lands. Collection of aquatic and wetland plants may require a

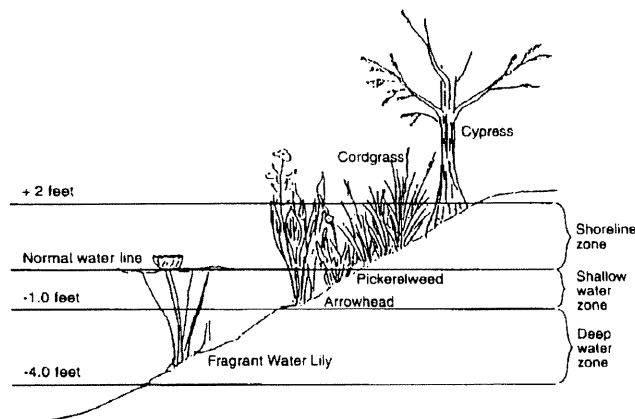


Figure 1. Planting zones.

permit from the Florida Department of Environmental Protection (DEP). In addition, possession of certain aquatic and wetland plants is prohibited by DEP because of their potential to be weeds (Table 2). Before collecting aquatic or wetland plants, contact a DEP regional biologist at one of the following locations (Table 1):

Table 1. DEP regional biologists

Tallahassee	904-487-2600
Lake City	904-758-0464
Floral City	904-726-8622
Tampa	813-744-6163
Bartow	941-534-7074
Orlando	407-275-4004
West Palm Beach	561-791-4720

If there is difficulty in contacting a DEP regional biologist, your county Cooperative Extension Service will assist.

Table 2. Aquatic plants prohibited by rules of the Florida Department of Environmental Protection Chapter 62C-52.¹

SCIENTIFIC NAMES	COMMON NAMES
<i>Alternanthera philoxeroides</i>	Alligator weed, green lead plant
<i>Casuarina spp.</i>	Australian pine
<i>Crassula helmsii</i>	Swamp stonecrop
<i>Eichhornia spp.</i>	Water hyacinth
<i>Hydrilla verticillata</i>	Hydrilla, Florida elodea, star grass, oxygen grass
<i>Ipomoea aquatica</i>	Water spinach
<i>Ipomoea fistulosa</i>	
<i>Lagarosiphon spp.</i>	African elodea
<i>Limncharis flava</i>	Sawah flowing rush
<i>Lithrum salicaria</i>	Purple loosestrife
<i>Melaleuca quinquenervia</i>	Melaleuca
<i>Mimosa pigra</i>	Giant sensitive plant, cat's-claw
<i>Monochoria hastata</i>	

<i>Monochoria vaginalis</i>	
<i>Myriophyllum spicatum</i>	Eurasian water milfoil
<i>Nechamandra alternifolia</i>	
<i>Oryza rufipogon</i>	Wild red rice
<i>Pontederia rotundifolia</i>	Tropical pickerelweed
<i>Salvinia</i> spp. (excluding <i>S. minima</i>)	
<i>Schinus terebinthifolius</i>	Brazilian pepper
<i>Sparganium erectum</i>	Exotic bur reed
<i>Stratiotes aloides</i>	Water aloe, soldier plant
<i>Trapa</i> spp.	Water chestnut
<i>Vossia cuspidata</i>	Hippo grass
¹ Plants are added and deleted from Chapter 62C-52 periodically	

Correct identification of plants collected in the wild will be important to ensure that only desirable plants are introduced into the aquascape. Be certain that problem plants such as hydrilla or duckweed are not introduced. All sediment should be washed from the roots to minimize transfer of unwanted plant seeds and fragments. *The Identification Manual for Wetland Plant Species of Florida* (SP 35), *Florida Freshwater Plants* (SP 189), *Aquatic Plant Identification Deck* (SM 51), and aquatic plant identification videotapes will be helpful for identifying aquatic plants. SP 35, SP 189, SM 51 and videotapes are available for sale from IFAS Publications, Building 664, University of Florida, Gainesville FL 32611. Videotapes can also be borrowed from county Cooperative Extension Service offices.

Wet newspaper, plastic bags, and boxes should be used to ensure that your plants are not damaged by drying between gathering and planting. Extra care should be taken to avoid damaging roots and rhizomes when digging plants.

Several nurseries in Florida sell aquatic and wetland plants. Although it will be more expensive initially, it is advisable to obtain plant material from a nursery rather than from the wild for several reasons. Nursery-grown plants are usually of higher quality than are wild plants and are available in a variety of containers and sizes. Nursery-grown plants appear to transplant better and fill in planted areas faster than do those collected from the wild. Purchase of plant material from a reputable nursery will minimize the potential for introduction of undesirable plants. When choosing a nursery from which to purchase plant material, ask for references and check to see if previous customers were satisfied. Purchase of plant material

from a reputable nursery should save money over the long term. The *Florida Aquatic Plant Locator*, available from the Florida Department of Agriculture and Consumer Services (904/488-4033), will be useful for locating aquatic and wetland plant suppliers.

Several aquatic and wetland nurseries are producing some of their plants using a technique called tissue culture propagation, or more commonly, micropropagation. Micropropagation is defined as the rapid multiplication of disease-free plants on a sterile, defined, culture medium in glass or plastic culture vessels under controlled conditions of light and temperature. Plants are usually cultured in a production laboratory where strict sanitary practices are followed. Micropropagation of aquatic and wetland plants offers several advantages over using traditional propagation techniques including: elimination of the need for growers to maintain large stock beds; year-round production and availability of selected species; establishment of different genetic lines of the same species that are adapted to specific environmental conditions; and production of vigorous and highly branched plants, which may increase survival and establishment when planted out.

In the future, micropropagation may make available additional aquatic and wetland species that are not used presently for aquascaping because they are too difficult to propagate using traditional methods. Micropropagated plants are sold in liners or other containers and are handled in the same manner as other nursery grown plants. Additional information on micropropagation is available in OHC 15 *Handling and Establishment of Plantlets From Tissue Culture Laboratories*.

Whether from the wild or from a nursery, plants should be handled with great care to avoid injury. The largest threats to them are drying and heat, so all planting should be conducted in the early morning or late afternoon to avoid the hot midday sun. Plants should be kept in the water until planted, including those to be placed in the shoreline zone. While these plants have leaves and stems that grow above the water, their roots will dry out quickly when exposed to the air. Do not leave plants in the trunk of a car or in the back of a truck where they will overheat.

Planting aquatic plants is similar to planting terrestrial plants: make a hole big enough for their roots to be completely covered, place the plant into the hole and cover with soil. When planting, start with plants in the deep water zones and work back up the banks. It is best to get the planting done as quickly as possible to avoid heat and drying, even though this can increase mistakes. For large projects, a crew trained and familiar with the project should be used.

It is advisable to plant clumps of like plants on the smallest centers that are economically possible, and leave areas of open water between these clumps. Clumps of like plants will create

attractive concentrations of color, and the open water will allow attractive reflections and varied habitat. This type of planting will also minimize the potential for colonization of unwanted plants among the clumps and allow for maintenance of weeds in the open areas with minimum impact to the desired vegetation.

Maintenance

While a well-planted aquascape will ensure initial success, it will be necessary to include regular maintenance for continued success. Early maintenance should include replacement of any plants that have died and management of undesirable aquatic plants or weeds that find their way into the aquascape. Steps to control undesirable plants are most important because Florida has an abundance of aquatic plants. Many of these aquatic plants have been introduced from other countries and have become weeds that will quickly take over an aquascape if left alone.

During the first year after planting, any undesirable plants should be manually removed as much as possible to minimize their establishment. Herbicides should be used sparingly during this time because new plantings may be more sensitive to herbicides than they might be when they are mature.

After the aquascape is established, herbicides may be used more heavily. This will probably be necessary as more undesirable aquatic plants become introduced and established. Several herbicides are registered by the United States Environmental Protection Agency (EPA) for application to aquatic sites. Only herbicides that are registered by the EPA and the Florida Department of Agriculture and Consumer Services for use in aquatic sites can be used legally. If only woody vegetation is in the aquascape, triploid grass carp can be used to keep the water free of herbaceous vegetation. A permit from the Florida Game and Fresh Water Fish Commission is necessary before obtaining grass carp.

Common undesirable aquatic plants that occur in aquascapes include various species of filamentous algae, Torpedo Grass, Cat-tails (*Typha* spp.) and Proliferating Spikerushes (*Eleocharis* spp.). If it is done on a routine basis, experienced applicators can selectively control many undesirable plants in aquascapes with minimum harm to desirable plants by careful herbicide selection and application, as well as other methods. This selective control is time consuming and expensive. However, regular maintenance is far more desirable than waiting until a small problem becomes large. Certain aquatic weeds, such as Proliferating Spikerushes, are very difficult to control, and some death or damage to the desirable plants may have to be accepted. Additional information on control of undesirable aquatic and wetland

plants is available in Circular 707 *Weed Control in Aquaculture and Farm Ponds*.

Pondowners may find it best to obtain the services of a commercial aquatic plant management firm to maintain the aquascape. Don't wait too long. Updated lists of Commercial Applicators can be obtained from the DEP Regional Aquatic Plant Biologists or the Cooperative Extension Service office in your county.

Regulations

Regulations concerning collection of aquatic plants and the necessity of using only registered herbicides has already been discussed. The FDEP and WMDs also have promulgated criteria associated with several other aspects of the construction and maintenance of certain aquatic and wetland sites used for stormwater management. These include but are not limited to restrictions relative to minimum size, length to width ratios, storage volume, and erosion sediment and sediment control during construction. Questions pertaining to pond construction, aquascape planting, and maintenance in these situations can be answered by contacting the FDEP, Stormwater Management Section in Tallahassee, or the regional WMD in which you are located, as follows:

Northwest Florida WMD 904/539-5999

Southwest Florida WMD 904/796-7211

St. Johns River WMD 904/329-4500

Suwannee River WMD 904/362-1001

South Florida WMD 407/686-8800

Counties and local governments may also have guidelines or policies pertaining to planting and management of stormwater management ponds and created wetlands, as well as public safety and flood control criteria. Your local public works director or drainage engineer should be contacted if there are questions.

Management of aquatic plants with herbicides or any mechanical means in certain sites may require a permit from DEP. A DEP regional biologist or the Cooperative Extension Service in your county can help you determine if a permit is required. Although a license is not currently required to purchase or apply any aquatic herbicides, IFAS urges everyone who applies herbicides to become a Certified Aquatic Pesticide Applicator. The Cooperative Extension Service will provide information pertaining to certification training.

Discussion

Aquascaping can provide an aesthetic as well as monetary increase in the value of a property (with a relatively small investment). In addition, when Florida native plants are used, a habitat for aquatic animals can be established that will provide hours of pleasure for people in the area. However, if inferior quality plants are used for planting, if the planting is not done properly, or if a regular maintenance schedule is not employed, the end result can be more of a problem than an asset. Always be sure that your aquascaping is done according to current state and local policies. Good luck in your endeavors to enhance Florida's Natural Resources.

FOR FURTHER INFORMATION on specific topics such as aquatic plant biology, physiology, ecology, utilization, or management, the reader is encouraged to contact:

Aquatic Plant Information Retrieval System

University of Florida, IFAS
7922 NW 71st Street
Gainesville, Florida 32653 USA
904/392-1799

SHORELINE PLANTS

Species	Planting Density	Comments
Bald Cypress <i>Taxodium distichum</i>	10' on center	*Grows to 50' or more. Tolerates flooding and drought. Deciduous tree. Reproduces by seeds. Can grow in permanent water.
Blue Flag Iris <i>Iris hexagona</i>	1' to 2' on center in clumps	Blue showy flowers in early spring. Grows 2' to 5'. Attractive green herbaceous foliage. Perennial. Reproduces by seed or division. Can grow in permanent water.
Button Bush <i>Cephalanthus occidentalis</i>	5' on center	*Deciduous shrub or small tree. Grows to 25'. Unusual 1" to 2" round balls of flowers in summer. Fruits eaten by wildlife. Reproduces freely from seed. Can grow in permanent water.
Cardinal Flower <i>Lobelia cardinalis</i>	1' on center in clumps	Herbaceous perennial grows to 4'. Many deep red flowers from July to September. Cannot tolerate drying. Reproduces by seeds. Will grow in permanent water.
Cinnamon Fern <i>Osmunda cinnomomea</i>	2' on center	*Deciduous fern. Grows to 3'. Succulent. "Fiddleheads" and cinnamon-colored spore-bearing leaves add interest in the spring. Reproduces by spores and rhizomes. Can only endure intermittent flooding.
Cordgrass <i>Spartina bakeri</i>	2' on center	Tufted 3' to 6' grass. Reproduces by seeds or clump fragmenting.
Fetterbush, Shiny Lyonia <i>Lyonia lucida</i>	5' on center	Evergreen shrub. Grows to 10'. Shiny, leathery foliage. Waxy urn-shaped flowers are pale to dark pink in spring. Reproduces by seeds. Can only endure flooding for short periods.
Florida Elm <i>Ulmus floridana</i>	10' on center	*Deciduous tree. Grows to 60'. Dark green foliage turning bright yellow in fall. Excellent shade tree. Reproduces by seeds. Endures intermittent flooding.
Golden Canna <i>Canna flaccida</i>	1' to 2' on center	Herbaceous perennial. Grows to 2' to 4'. Showy yellow flowers from spring through fall. Reproduces by seeds and rhizomes. Endures intermittent flooding.
Hackberry, Sugarberry <i>Celtis laevigata</i>	15' on center	*Deciduous tree. Grows to 50' or more, with spreading foliage. Rusty red persistent berries. Very trashy. Reproduces by seeds. Can not take much flooding.
Loblolly Bay <i>Gordonia lasianthus</i>	10' on center	Evergreen tree. Grows to about 65'. Showy white fragrant flowers during the summer. Reproduces by seeds. Cannot take constant flooding.
Meadow Beauty <i>Rhexia</i> spp.	1' on center	Herbaceous perennial. Grows 1' to 2' tall. Flowers showy, delicate, pale to dark pink. Reproduces from seeds. Can grow in permanent water.
Pop Ash <i>Fraxinus caroliniana</i>	10' on center	*Deciduous tree to 40'. Winged fruit in late summer to fall. Reproduces from seeds. Can grow in permanent water.
Red Anise <i>Illicium floridanum</i>	5' on center	Aromatic evergreen shrub or small tree. Grows to 25'. Brilliant red, star-shaped flowers in spring. Reproduces by seeds. Does not like flooding or drying.
Red Cedar <i>Juniperus silicicola</i>	10' on center	Evergreen. Grows 20' to 40'. Tree with Aromatic heartwood. Reproduces by seeds. Tolerates drought. Endures intermittent flooding on occasion.

Red Maple <i>Acer rubrum</i>	10' on center	*Deciduous tree. Grows to 40' or more. Spreading branches, foliage with good fall color. Flowers in early spring. Flowers and fruits greenish, brownish, or bright red. Reproduces by seeds. Endures intermittent flooding.
Royal Fern <i>Osmunda regalis</i>	1' to 2' on center	Extremely attractive, ornamental, rhizomatous, perennial fern. Lacy evergreen fronds. Reproduces by spores. Endures intermittent flooding.
St. John's Wort <i>Hypericum</i> spp.	1' to 2' on center	Small evergreen shrubs. Grows to 3' to 8' depending on species. Showy yellow flowers late spring to fall. Reproduces by seeds. Endures intermittent flooding.
Soft Rush <i>Juncus effusus</i>	2' to 3' on center	Grows into a 3' to 6' rush. Reproduces by seeds and rhizomes. Endures extensive flooding.
Swamp Bay <i>Persea palustris</i>	10' on center	Evergreen shrub or small tree to 40'. Leaves aromatic. Reproduces from seeds. Does not like much flooding.
Swamp Dogwood <i>Cornus foemina</i>	5' to 8' on center	*Deciduous shrub or small tree. Grows to 15'. Flat-topped terminal flower clusters in spring followed by bluish fruits which are prized by birds. Reproduces by seeds. Endures intermittent flooding.
Swamp Hibiscus <i>Hibiscus coccineus</i>	1' to 2' on center or as a specimen.	Grows into a 4' to 6' shrub. Showy, large red flowers in spring and summer. Reproduces by seeds. Endures intermittent flooding.
Swamp Tupelo, Black Gum <i>Nyssa sylvatica</i> var. <i>biflora</i>	10' to 20' on center	*Deciduous tree. Grows to 130'. Flowers are excellent nectar source. Dark blue fruits eaten by mammals and birds. Brilliant autumn color. Reproduces by seeds. Can grow in permanent water.
Sweet Gum <i>Liquidambar styraciflua</i>	10' on center	*Brilliant green foliage often turns shades of purple in fall. Grows to 50' or more. Leaf and seed pod litter in fall is heavy. Reproduces by seeds. Can take a little flooding.
Sweetbay Magnolia <i>Magnolia virginiana</i>	10' on center	Evergreen tree. Grows to 80'. Large, white flowers in spring. Silvery leaf under sides are showy in a breeze. Reproduces by seeds. Endures intermittent, long standing water.
Tickseed <i>Coreopsis</i> spp.	1' on center	Perennial sunflower with rich yellow ray flowers anytime from spring to fall. Reproduces by seeds. Can grow in standing water.
Virginia Willow <i>Itea virginica</i>	5' on center	Evergreen shrub or small tree to 10'. Compact terminal flower spikes in spring. Burgundy winter color. Reproduces by seeds and suckers. Endures intermittent flooding.
Wax Myrtle <i>Myrica cerifera</i>	5' on center	Evergreen shrub or small tree. Grows to 20'. Waxy blue fruits on female plants. Leaves aromatic when crushed. Reproduces prolifically from seeds and by suckers. Endures long-standing water.

SHALLOW WATER PLANTS

Arrowhead <i>Sagittaria</i> spp.	2' to 3' on center	Showy white flowers year round. Reproduces by rhizomes and seeds.
Swamp Lily <i>Crinum americanum</i>	2' to 3' on center	Showy green foliage and white fragrant flowers year round. Reproduces by seeds.

Pickeralweed <i>Pontederia cordata</i>	2' to 3' on center	Waxy, sagittate foliage with blue, spiked blooms throughout year. Reproduces by rhizomes and seeds. Commonly available from nurseries.
Bur-marigold <i>Bidens laevis</i>	3' on center	Grows to 4' in water. Bright yellow flowers in late fall and winter. Reproduces by seeds.
Golden Club <i>Orontium aquaticum</i>	2' to 3' on center	Velvety bluish-green clusters of leaves. Yellow flowers on club-shaped, stalked spikes. Reproduces by seeds.
Spikerush <i>Eleocharis celloso</i> <i>E. interstincta</i>	3' on center	Attractive light green upright stems. Dense growth habit has been shown to retard growth of weeds. Recommended for monoculture plantings. Reproduces by seeds and rhizomes.
Southern Bulrush, Giant Bulrush <i>Scirpus californicus</i>	6' on center	Light green erect stems. Grows to 10'. Yellow-brown scale flowers at tops of stems add color in spring. Reproduces by seeds and rhizomes. Can spread into deep water.
Softstem Bulrush, Giant Bulrush <i>Scirpus validus</i>		

DEEP WATER PLANTS

Species	Planting Density	Comments
Fragrant Water Lily <i>Nymphaea odorata</i>	3 to 5 plants every 25'	Day blooming, fragrant white flowers except in winter. Spreads by rhizomes and seeds.
American Lotus <i>Nelumbo lutea</i>	3 to 5 plants every 25'	Very showy yellow blooms and persisting woody seed pods. Blooms in summer. Spreads quickly by seeds and can easily become a pest.
Spatterdock <i>Nuphar luteum</i>	3 to 5 plants every 25'	Flowers yellow, not showy. Can be a pest as it spreads even into deep water by seeds and rhizomes.

PLANTS TO AVOID

Species	Zone	Comments
Melaleuca <i>Melaleuca quinquenervia</i>	Shoreline and shallow water	South Florida's most noxious woody pest plant.
Bog-mat or Mud-midget <i>Wolffiella spp.</i>	Floating plants	Extremely invasive, occluding all other plants. Sluggish waters.
Brazilian Pepper <i>Schinus terebinthifolius</i>	Shoreline	Extremely invasive. Crowds and shades out other plants.
Cat-tail <i>Typha spp.</i>	Shoreline and shallow water	Extremely invasive. Crowds out all other plants.
Duckweed <i>Lemna spp.</i>	Floating plant	Extremely invasive. Infests any quiet water and completely occludes all other plants.
Giant Duckweed <i>Spirodela spp.</i>	Floating plants	Extremely invasive occluding all other plants. Infests quiet water.
Hydrilla <i>Hydrilla verticillata</i>	Shallow water, deep water	Unightly submersed plant that is the number one aquatic weed problem in the southeastern states.
Australian Pine <i>Casuarina equisetifolia</i>	Shoreline	Extremely invasive exotic. Crowds and shades out other plants.
Proliferating Spikerushes <i>Eleocharis spp.</i>	All zones	Very difficult to control and unsightly.

Torpedo Grass <i>Panicum repens</i>	Shoreline and shallow water	Rhizomes invade other plants crowding them out. Very difficult to control.
Waterhyacinth <i>Eichhornia crassipes</i>	Floating aquatic herb	Introduced pest which can completely cover pond surface.
Water-meal <i>Wolffia spp.</i>	Floating plants	Forms solid layer on water surface. Sluggish water.
Water Spangles, Water Fern <i>Salvinia minima</i>	Shoreline and Floating Fern	Infests quiet or sluggish water. Can completely cover pond surface.
Waterlettuce <i>Pistia stratiotes</i>	Floating aquatic herb	Can completely cover surface of quiet or slow moving water.
*Deciduous trees may cause problems because they drop all of their leaves at the same time every year.		

You Can Help Prevent the Spread of Invasive Plants

Before building & choosing plants for your water garden

Build your water garden away from natural waterways.

- *When planning your water garden, choose a site that is isolated from any potential flooding situations (i.e., a lowland area adjacent to a river is likely to flood). Remember, use of invasive plants in a water garden that is near a lake, river, stream, or even a retention basin could increase the risk for spread of those species.*

Familiarize yourself with invasive plants of regional and national concern.

- **Most Wanted and The Federal Noxious Weed** (http://plants.usda.gov/plants/cgi_bin/topics.cgi?earl=noxious.cgi) lists are good starting points. The web sites listed on the back and your state natural resource agency are also valuable information resources.

Consider using regionally native or non-invasive exotic plants.

- *There are many non-invasive plants that can be used in place of an invasive species to achieve the same effect—whether balancing pH, providing vertical interest, or adding a particular color.*

Use invasive plants **only** outside of their hardiness zone.

- *Those plants whose temperature and precipitation requirements are far outside the limits of your agricultural zone are less likely to become invasive if they escape to natural waterways.*

When buying aquatic plants.

Choose a reputable nursery (whether you shop at a store, through a catalogue, or via the Internet).

- *Ask if the vendor is aware of what species are regionally and federally restricted.*
- *Verify that the plant identifications and their scientific names (i.e., genus and species) are correct. Common names are sometimes used interchangeably for several different species, so you could accidentally buy an invasive species labeled with a harmless pseudonym.*

Ensure that your purchases are free of any hitchhikers.

- *Rinse plants in a bucket of tap water until they are clean. The dirtier the plant, the more likely it is to have hitchhikers. Be on the lookout for snails and plant fragments. Use a light colored bucket to help you see the hitchhikers.*
- *If it seems likely that your plant has hitchhikers, use a chlorine dip. Dip the plant in a 10% chlorine solution, swish it around, and then shake it off. After 30 seconds, rinse the plant with tap water. This method will not harm emergent plants such as *Sagittaria* spp. (arrowhead), but is not recommended for submerged plants such as *Vallisneria spiralis* (wild celery).*

By disposing of aquatic plants.

Dispose of aquatic plants if they are 1) in a habitat where they could spread into nearby waterways, or 2) in a water garden that is being emptied for the winter.

- *Completely dry or freeze the plants, and then add them to the household garbage that **does not** get composted. Composting should be avoided because many seeds can withstand drying and freezing. An alternative method of disposal is to burn the plants if backyard burning or trash incineration is an option.*

By expanding your efforts

Inform others about the problems of invasive aquatic plants and the methods to prevent their spread.

Volunteer to help remove invasive plants from vulnerable natural areas. Call Adopt A River, Watershed Action Volunteers, the DEP Bureau of Invasive & Aquatic Plants, or your extension office about volunteer opportunities.

Excerpted from Sea Grant Publication IISG-01-22, which was produced by Illinois-Indiana Sea Grant as part of a national invasive aquatic plant outreach initiative. This initiative is a cooperative effort of the Connecticut, Illinois-Indiana, Minnesota and North Carolina Sea Grant College Programs with the Center for Aquatic and Invasive Plants at The University of Florida.



Invasive plants are becoming a widespread problem in aquatic and wetland habitats throughout North America. Once introduced, these noxious or harmful plants can displace native plants, which are important sources of food and shelter for wildlife. Ecological processes, such as oxygen production, may also change because invasive plants can affect water chemistry and flow. Unrestricted invasions can block drainage pipes, impede navigation, and hinder commercial and recreational fishing. For these reasons, state and federal agencies are spending millions of dollars each year to control the spread of invasive plants and reverse their impacts in affected habitats.

In many cases, invasive plants are exotic or nonnative. Species native to North America, however, may also become invasive when transported to another region. Regardless of origin, invasive aquatic plants (and invasive fish and invertebrates!) can be accidentally spread by plant enthusiasts such as water gardeners and aquarium hobbyists.

As a plant enthusiast, you can help prevent the spread of invasive species by acting on the information presented in this brochure.

Characteristics of Invasives

Most invasive species have certain traits that make them successful in habitats that they invade. Invasive aquatic and wetland plants generally:

- ◆ tolerate a wide range of environmental conditions including soil and water acidity, water and air temperature, water salinity, water level fluctuations, and dissolved oxygen;
- ◆ reproduce early, often, in large numbers, and in multiple ways (e.g., by fragmentation, seeds, and rhizomes);
- ◆ grow rapidly;
- ◆ resist management control efforts.

Vectors of Spread

Mother Nature

Invasive plants are generally spread to natural waterways accidentally. These unintentional introductions are more likely if a water garden or a retention basin containing invasive plants is built near a natural body of water. The natural waterway may flood into the artificial pond and carry away the contents, or the artificial pond may flood and have its contents swept away into the natural waterway. In addition, seeds and plant fragments of invasive plants can be spread by wind or by wildlife traveling between artificial and natural waterways.

Plant Enthusiasts

Water gardeners and aquarium hobbyists can unintentionally spread potentially harmful plants when they 1) share specimens among friends, neighbors, and gardening and aquarium clubs, or 2) dispose of aquatic plants by releasing them into a natural waterway. Invasive plants are also spread when gardeners moving to warmer climates take plants with them that would otherwise have been controlled in colder climates (i.e., killed during winter). Instead, these plants thrive and become invasive in their new warmer habitat. Some plant enthusiasts even sneak novel plants into the country illegally. By introducing these exotic plants, they run the risk of causing great harm. (Note: plants that are brought into the country should be declared with quarantine officials.)

HYDRILLA: an example of a good plant gone bad

Hydrilla (*Hydrilla verticillata*), also known as water thyme, is a well-known aquarium plant native to parts of Asia and Africa. It was first found growing wild in Florida in 1960. Since then, it has spread as far north as Connecticut and as far west as California. Hydrilla tolerates a wide range of nutrient and pH levels, and persists in low sunlight. It also can reproduce through fragmentation, turions (buds that form in leaf axils), and subterranean turions (commonly called “tubers”). These plant parts can take root in the sediments, and provide the beginnings for a whole new plant. As the plant grows toward the surface, it branches more frequently forming dense mats. These mats create inhospitable habitat for other plants and animals, and hinder activities such as boating and swimming. They can also clog water intake pipes and restrict water flow in irrigation canals. Methods to control hydrilla, including mechanical harvesting and herbicides, are costly. Florida alone spends millions annually in hydrilla management.



Florida Department of Environmental Protection

WEED ALERT

Water-hyacinth

(*Eichhornia crassipes*)



A beautiful flower, but a major invasive weed species since the late 1890's

Water-hyacinth - This native of South America is now considered a major weed species in more than 50 countries. The floating water-hyacinth was introduced into Florida in the 1880s and covered more than 120,000 acres of public lakes and navigable rivers by the early 1960s. Since then, intensive management efforts coordinated by the Florida Department of Environmental Protection and the U.S. Army Corps of Engineers have reduced water hyacinth to approximately 2,000 acres statewide.

The growth rate of water-hyacinth is among the highest of any known plant. In Florida, water-hyacinth populations can double their size in as little as 2 weeks by sending off short runner stems that develop new plants (daughter plants). Water-hyacinth also has the ability to reproduce by seeds.

Why water-hyacinth must be managed:

Water-hyacinth blocks waterways and limits boat traffic, recreation, flood control and wildlife use. By producing a dense canopy at the water surface, this exotic pest plant shades out native submersed plant species and can uproot native emergent species that are important to wildlife.

Environmental damage caused by water-hyacinth populations:

- ▶ Water-hyacinth mats lower dissolved-oxygen concentrations, damaging fish populations.
- ▶ One acre of water-hyacinth can yearly deposit as much as 500 tons of rotting plant material on the bottom of a waterway.
- ▶ Water-hyacinth mats can increase flooding in rivers and canals by forming dams.
- ▶ Water-hyacinth mats provide ideal breeding environments for mosquitoes.
- ▶ Water-hyacinth populations decrease biodiversity in Florida.



Dense water-hyacinth mat in a Florida waterway

Because of its aggressive growth rate, water-hyacinth is illegal to possess in Florida without a special permit.

Water-hyacinth *Eichhornia crassipes*

Synonymy: Eichhornia speciosa, Piaropus crassipes, Piaropus mesomelas, Pontederia crassipes, Heteranthera formosa.

Water-hyacinth is a floating plant that has clusters of leaves with spongy stalks arising from a base of dark purple feathery roots. The leaf clusters are often linked by smooth horizontal stems (called stolons). Linked plants form dense rafts in the water and mud.



Leaves: leaves formed in rosettes; petioles to 30cm (12 in) or more, spongy, usually inflated or bulbous, especially near the base; leaf blades roundish or broadly elliptic; glossy green to 15cm (6 in) wide.



Flowers: single spike of several (8 to 15) showy flowers above rosette, to 30cm (12 in) long. Flowers lavender-blue with a yellow blotch, to 5cm (2 in) wide, somewhat 2-lipped; 6 petals, 6 stamens.



Fruit: 3-celled capsule with many minute, ribbed seeds; seeds form in submerged, withered flowers.



Photos and illustration courtesy of:
Center for Aquatic and Invasive
Plants, University of Florida

LOOK FOR FIRST:

Large spike of lavender-blue flowers
Spongy, bulbous leaf stalks
Large rounded glossy leaves

Distribution - origin in tropical Brazil, but has become naturalized in many warm parts of the world: Central America, North America, Africa, India, Asia, Australia, and New Zealand.





Florida Department of Environmental Protection

WEED ALERT

Hydrilla (*Hydrilla verticillata*)



Hydrilla at Wakulla Springs, Florida, photo by Vic Ramey

Hydrilla - This submersed plant native to Africa and Southeast Asia is a major aquatic weed throughout most of the world's warmer climates. Hydrilla was introduced into Florida in the early 1950s and by the early 1990s occupied more than 140,000 acres of public lakes and rivers. Intensive interagency management has reduced the above ground portions of hydrilla to under 50,000 acres. However, once established, hydrilla produces reproductive tubers numbering in the millions per acre in the soils of Florida waterways. These tubers still impact nearly 140,000 acres and represent hydrilla's regrowth potential if not continually managed immediately after sprouting. Researchers have not discovered methods to prevent or minimize tuber formation.

Hydrilla can grow an inch or more per day and can be found in water only a few inches deep to the deepest parts of Florida's lakes and rivers. In Florida, hydrilla produces dense canopies covering entire surfaces of waterbodies within one or two years after it becomes established. Hydrilla disperses quickly throughout a waterway by stem fragments, buds, runners, and tubers.

Why hydrilla must be managed:

Hydrilla blocks waterways and limits boat traffic, recreation, flood control, and wildlife use. Almost 80% of hydrilla's biomass is in the upper 2 feet of the water column producing a dense canopy near the water surface. This exotic pest plant shades out native submersed plant species, reduces oxygen levels, and degrades water quality.

Environmental damage caused by hydrilla:

- ▶ Hydrilla canopies lower dissolved oxygen concentrations reducing aquatic life.
- ▶ Hydrilla decay doubles the amount of sediments that accumulate in a waterbody.
- ▶ Dense hydrilla infestations can restrict water flow resulting in flooding along rivers and canals.
- ▶ Hydrilla canopies produce ideal breeding environments for mosquitoes.
- ▶ Dense hydrilla canopies shade out native submersed vegetation lowering biodiversity.
- ▶ Hydrilla infestations restrict recreational activities such as boating, swimming, and fishing.



Dense hydrilla mat in a south Florida waterway

Because of its aggressive growth rate, never transplant hydrilla from waterway to waterway, and please clean all boats and trailers, live wells, and diving gear of plant material before entering or leaving a waterbody. Possession of hydrilla is illegal in Florida without a special permit.

Synonymy: None.

Hydrilla *Hydrilla verticillata*

Hydrilla is a submersed, much branched, perennial herb, usually rooted but frequently with fragments seen drifting in the water. Stems can be more than 35 feet long. Hydrilla once was used as an aquarium plant, and has become a weed of economic importance. *Hydrilla verticillata* is the only species in this genus.



Leaves: submersed; in whorls of 3 to 8, 2-4 mm (0.1-0.2 in) wide and 6-20 mm (0.2-0.8 in) long, bearing coarse (visible) teeth along the margins and usually 1-4 small conical bumps along the underside of the midrib, which is often red.



Stems: slender with much branching and up to 10.6 m (35 ft.) long; eventually form dense tangled masses at the water surface.



Flowers: female flowers solitary, on long stalks, with 3 sepals and 3 petals, each about 4 mm (0.3 in) long, whitish or translucent, floating at the water's surface.

Other Characteristics:

two types of special vegetative propagules: turions – fattened leaf buds at stem nodes, green, about 1.25 cm (1/2 in) wide; tubers – small (to 1cm long), off-white, swollen ends of underground stems.

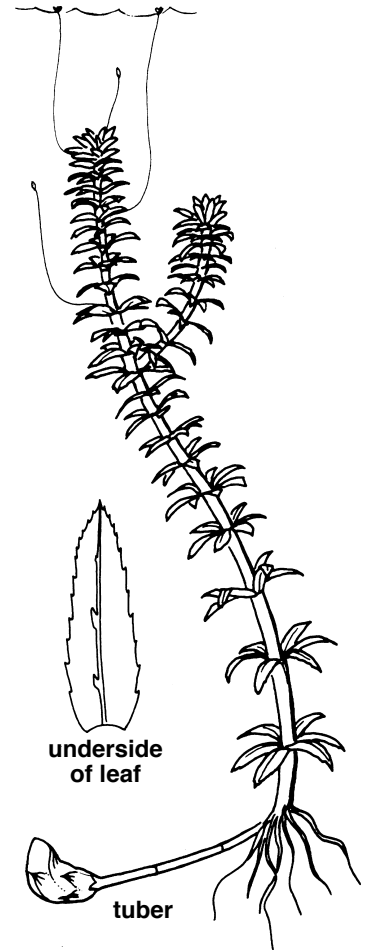


Photo and Illustration courtesy of: Center for Aquatic and Invasive Plants, University of Florida

LOOK FOR FIRST:

Submersed leaves in whorls of 4 to 8

Saw teeth on leaf margins

Leaf underside usually with one or more bumps on midrib

Tubers

Distribution: origin in Old World, widely distributed in warmer regions of Africa and Asia, found locally in Northern Europe, introduced into South and Central America, U.S., and Australia.





Florida Department of Environmental Protection

WEED ALERT

Water-lettuce

(Pistia stratiotes)



Water-lettuce

Why water-lettuce must be managed:

Water-lettuce populations often form large expanses of dense, impenetrable floating mats limiting boat traffic, recreation, flood control, and wildlife use. These dense canopies at the water surface shade out native submersed plant species and can uproot native emergent plants that are important to wildlife.

Water-lettuce - This floating plant native to South America is considered to be one of the worst weeds in the subtropical and tropical regions of the world. In Florida, it was first recorded in 1765; its introduction is linked to early shipping commerce between Florida and South America. Today, water-lettuce is commonly found in the central and southern portions of the state, but new infestations of water-lettuce have been found in North Florida's spring-fed rivers and lakes. Because of intensive statewide management efforts, water-lettuce populations are maintained at low population densities.

Under optimal environmental conditions, water-lettuce can double its population size in less than three weeks. Seed production makes this plant resilient to adverse environmental conditions such as freezing temperatures and drought.



Dense water-lettuce mat in the Florida Everglades.

Environmental damage caused by water-lettuce populations:

- ▶ Water-lettuce mats can lower dissolved oxygen concentrations reducing aquatic life.
- ▶ Dense populations may lower water levels because water-lettuce increases evaporation rates over open water areas.
- ▶ Water-lettuce mats can restrict water flow increasing flooding along rivers and canals.
- ▶ Dense water-lettuce populations produce ideal breeding environments for mosquitoes.
- ▶ Water-lettuce populations crowd out native plants and animals (lowers biodiversity).

Because of its aggressive growth rate, water-lettuce is illegal to possess in Florida without a special permit.

Water-lettuce

Pistia stratiotes

Synonymy: None.

This species (the only one in its genus) commonly forms dense floating mats, with many rosettes of fuzzy-soft, pale-green leaves. New leaf clusters form readily from stolons (runner stems) offset from the larger rosettes.



Leaves: in rosettes occurring singly or connected to others by short stolons. Leaves often spongy near base, densely soft pubescent with obvious parallel veins; blades slightly broader than long, widest at apex, to 15 cm (6 in) long.



Roots: long, feathery; bearing long root caps (brown coverings over root tips).



Flowers: inconspicuous, clustered on small fleshy stalk nearly hidden in leaf axils, with single female flower below and whorl of male flowers above.



Fruit: arising from female flower as a many-seeded green berry.



LOOK FOR FIRST:

Floating pale-green rosettes
Long, feathery roots below
Green runner stems

Distribution: Pantropical of uncertain origin, thought to be introduced to Florida by Spanish commerce or other early settlers.





Florida Department of Environmental Protection

WEED ALERT

Water-spinach

(Ipomoea aquatica)



Water-spinach flower



Water-spinach - This introduction from Southeast Asia is a popular cultivated green vegetable in China, India, Malaysia, Africa, Brazil, the West Indies, and Central America. Due to its aggressive growth rate, water-spinach has great potential to invade moist cultivated areas, such as rice and sugar cane fields, and wet areas such as the Everglades, natural lakes and rivers, drainage canals, and ditches. In Florida, isolated populations have been found floating and creeping horizontally along shorelines and over water for long distances, especially in canals and lakes.

Why water-spinach must be managed:

A single water-spinach plant can branch profusely with stems growing to over 70 feet long. This fast growth rate, approximately 4 inches per day, represents a significant threat to flood control and native plant habitats, especially in central and south Florida.

Environmental damage caused by water-spinach populations:

- ▶ Water-spinach creates impenetrable masses of tangled vegetation obstructing water flow in drainage and flood control canals.
- ▶ Water-spinach infests lake, pond, and river shorelines, displacing native plants that are important for fish and wildlife.
- ▶ Water-spinach forms dense impenetrable canopies over small ponds and retention basins creating stagnant water conditions that are ideal breeding environments for mosquitoes.



Dense water-spinach mat in a Florida pond.

Because of its aggressive growth rate, never plant water-spinach in Florida's ponds, lakes, rivers and canals. The possession of water-spinach is prohibited without a special permit.

Water-spinach *Ipomoea aquatica*

Synonymy: *Ipomoea reptans*, *Ipomoea repens*, *Convolvulus reptans*.

Water-spinach is a creeping, herbaceous vine that is cultivated in some cultures as a vegetable. It is recognizable as a member of the “morning-glory” family.



Leaves: alternate, simple, with smooth petioles 3-14 cm (1-6 in) long; leaf blades generally arrowhead shaped but variable, smooth (rarely hairy), to 17 cm (7 in) long, with tips pointed; blades held above water when stems floating.



Stems: herbaceous, trailing, with milky sap and roots at the nodes; usually to 3 m (9 ft) long but can be much longer.



Flowers: showy, white, or pale pink to lilac; broadly funnel shaped, “morning-glory” like; solitary or in few-flowered clusters at leaf axils.



Fruit: an oval or spherical capsule, woody at maturity, about 1 cm (1/2 in) wide, holding 1-4 grayish seeds, these often short-hairy.



Illustration courtesy of Center for Aquatic and Invasive Plants, University of Florida

LOOK FOR FIRST:

Vine growing on or near the water's edge

Arrowhead-shaped leaves

“Morning-glory” funneled flower



Distribution: Native to China, but widely cultivated and naturalized in Africa, Asia, Australia, Pacific Islands, and South America.

TORPEDOGRASS

Scientific name:	<i>Panicum repens</i>
Origin:	(Old World) Africa, Asia, Australia, Europe
Introduction:	Early 1900s, as a forage grass
Aquatic community:	Emergent
Habitat:	Dry land to shallow water. Can survive depths greater than 6 feet, also can exist as a floating mat.
Distribution:	Found in the United States along the gulf coast from Florida to Texas; found statewide in Florida.



Torpedograss invading native spikerush and water lily habitat in Lake Okeechobee.

Environmental and Economic Concerns

- Torpedograss is the most widely dispersed invasive exotic plant in Florida. It is found in more than 80 percent of Florida's public lakes and rivers.
- When torpedograss reaches a high density, diverse native plants are displaced by the exotic plant's thick, monotypic growth form. Impacted areas no longer provide productive habitat for sport fish and other wildlife.
- Torpedograss has displaced more than 16,000 acres of native plants in Lake Okeechobee since the early 1970s and has the potential to cover much of the lake's 100,000 acre marsh.
- Torpedograss grows in most of the south Florida flood control and agricultural canal systems and is the most frequently controlled aquatic plant in Florida's water delivery systems.
- Torpedograss is listed as one of the worst agricultural weeds. It is a serious weed of 19 crops in 27 countries and is listed by the Florida Exotic Pest Plant Council as one of the 65 most invasive exotic plants in Florida.
- Torpedograss resists control via specialized underground stems called rhizomes. Numerous dormant buds occur along rhizomes and are not affected by herbicide treatments. Buds sprout when the rhizomes are cut or the plant is stressed by burning. New growth is more susceptible to control agents.



The spread of more than 16,000 acres of torpedograss in Lake Okeechobee has seriously degraded sport fish and other wildlife habitat.

Management of Torpedograss

- Control of torpedograss can be obtained by using systemic herbicides that are translocated into the plant's rhizome. However, repeat applications often are necessary to attain long-term control.
- Torpedograss spreads most rapidly under moist soil and shallow water conditions. Flooding (greater than 1.5 feet) may prevent the growth of new torpedograss but it does not appear to inhibit the growth of established plants.
- Research conducted by the South Florida Water Management District (SFWMD) has shown that torpedograss can be controlled when fire is used to reduce live and accumulated dead plant biomass, after-which a single application of the herbicide imazapyr (ArsenalTM) is used to treat 4-6 inch tall regrowth. Approximately cost is \$180 per acre.
- University of Florida and SFWMD research has shown that four repeated treatments with the herbicide glyphosate (RodeoTM) during a two year period also kills most of the torpedograss rhizomes. Treatment cost is more than \$600 per acre.
- Research evaluating water level impacts and the influence of plant competition on the establishment and growth of torpedograss is being conducted by scientists at the Waterways Experiment Station of the United States Army Corps of Engineers and SFWMD staff. Results from these studies will be incorporated into operational protocols.
- The Florida Department of Environmental Protection (DEP) is funding Florida's first large-scale torpedograss management effort. More than 2,000 acres of dense monotypic torpedograss and small outlier islands are being treated in Lake Okeechobee by SFWMD staff and its contractors. Additional treatments are being planned.



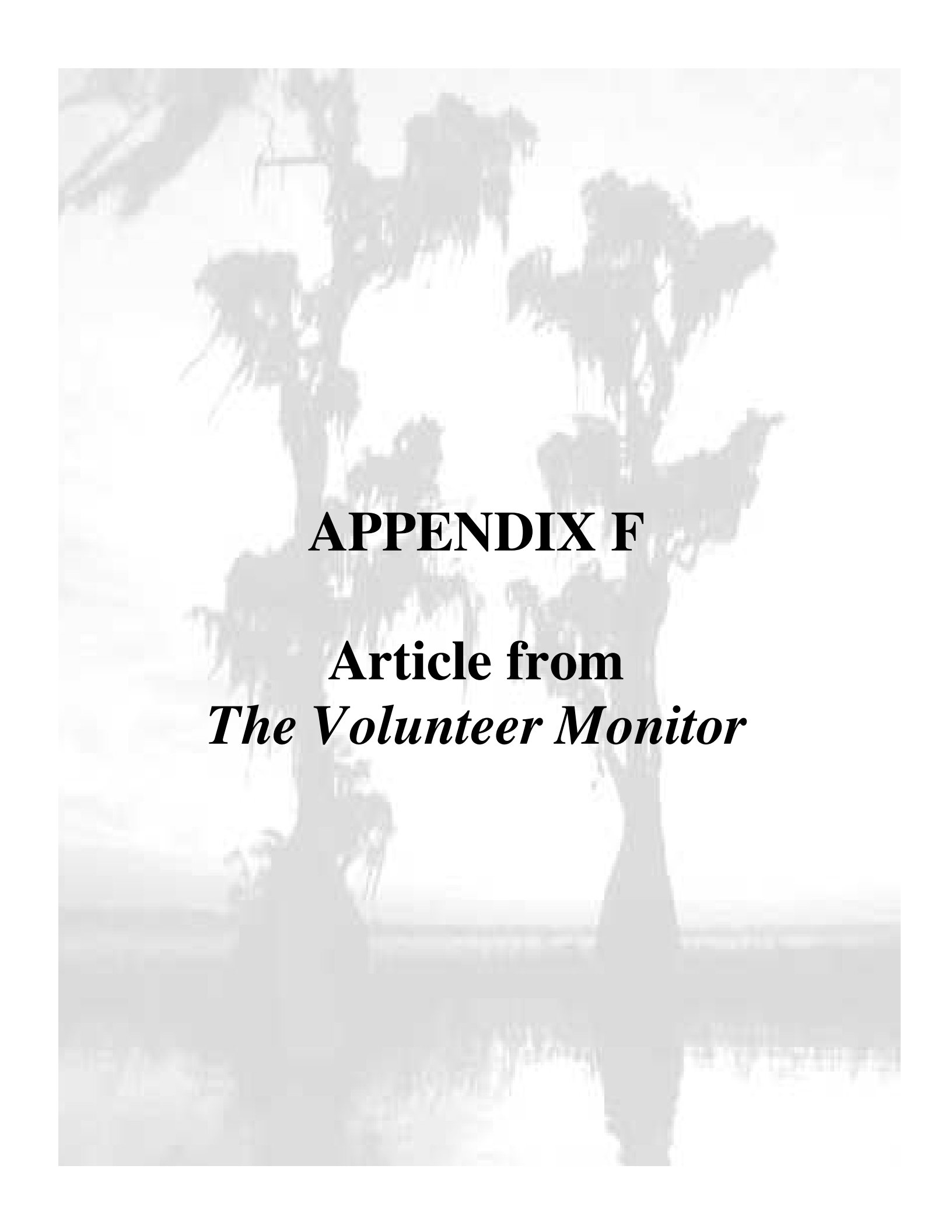
Prescribed burning of torpedograss in Lake Okeechobee. Fire reduces plant biomass and stimulates new growth that will be treated with herbicide.



Herbicide being applied to torpedograss by helicopter.



sfwmd.gov
South Florida Water Management District
3301 Gun Club Road • P.O. Box 24680
West Palm Beach, FL 33416-4680
561-686-8800 • FL WATS 800-432-2045
www.sfwmd.gov



APPENDIX F

Article from
The Volunteer Monitor

The **V**olunteer **M**onitor

The National Newsletter of Volunteer Water Quality Monitoring
Vol. 12, No. 2, Fall 2000



Note: This information is provided for reference purposes only. Although the information provided here was accurate and current when first created, it is now outdated.

A Story of Success--And a Warning

During the summer of 1999, Bill Martin, a regular Weed Watcher on Mascoma Lake in western New Hampshire, noted the growth of a new plant in his lake. Being familiar with exotic-species literature developed by the New Hampshire Department of Environmental Services (DES), Martin immediately brought a sample of the plant to the state laboratory for identification. The verdict: Eurasian watermilfoil (*Myriophyllum spicatum*), an invasive exotic aquatic plant.

This finding was of particular concern because Mascoma Lake is used as a drinking water supply. If milfoil were to get out of control on this lake, it could not be managed with chemical herbicides.

Martin was able to tell state biologists the location and relative abundance of the plant. With this information, state divers immediately decided to go to Lake Mascoma to hand-pull this exotic species of milfoil. Fortunately, the patches of milfoil were small.



Eurasian watermilfoil (Myriophyllum spicatum)

But when battling an exotic species, you can't declare victory after the first skirmish--or the second, or the third. Like any monitoring effort, Weed Watching never stops. During spring and summer 2000, Martin and his team of volunteer Weed Watchers continued to monitor the shallows of Lake Mascoma, using buoys to mark locations where they spotted new or persistent patches of exotic milfoil. State divers returned several times to hand-pull the plants. The encouraging news is that each time the divers return, the beds are smaller and less dense.

It will take several consecutive summers to be sure that we have the milfoil under control. We are even hopeful that eventually we may be able to eliminate all the milfoil from the lake, thanks to early detection by a vigilant volunteer.

On the other hand ...

In 1996, a resident along the Cocheco River in western New Hampshire noted some plant growth near her boat landing. Not having seen any literature on invasive species, she did not report the growth.

Six years later, the same individual attended a DES training session for volunteer water quality sampling and saw pictures of exotic milfoil. Stunned by the realization that the plant was the same as those she had seen growing near her dock, she informed me of the discovery.

State biologists went to investigate and found that the plant, which was identified as variable milfoil (*Myriophyllum heterophyllum*), covered several large areas along a mile-long stretch of the river bottom. If this plant had been recognized and hand-pulled six years earlier, the infestation could likely have been thwarted.

Weed Watchers can make a difference!

--Amy P. Smagula