INVASIVE EXOTIC PLANT SPECIES MANAGEMENT & CONTROL PLAN

For

Village Point Park Preserve

and

Bayfront Park

City of Daphne, Baldwin Co., Alabama

January 2014

by

Wetland Resources
ENVIRONMENTAL CONSULTING

Post Office Box 2694 * Daphne, Alabama 36526 * (251) 928-6157

TABLE OF CONTENTS

Photography by Fred Nation (unless otherwise noted)

INVASIVE EXOTIC PLANT SPECIES MANAGEMENT & CONTROL PLAN For Village Point Park Preserve and Bayfront Park City of Daphne, Baldwin Co., Alabama

INTRODUCTION

Two parks owned by the City of Daphne, Village Point Park Preserve and Bayfront Park, include important natural plant communities that provide coastal habitat for a variety of wildlife species as well as enjoyment for members of the public who utilize the parks. As with many natural areas remaining in an otherwise urban setting, a variety of invasive exotic plant species has gained a foothold. These non-native invaders are displacing native species, resulting in a less diverse plant community and habitat that is less capable of supporting wildlife.

Beginning in 2011, the U.S. Fish & Wildlife Service, through the Service's Southeast Region Coastal Program, provided funding to be used for habitat enhancement and restoration efforts in the parks. Work funded included controlling invasive exotic plants, some minor wetland restoration, replanting appropriate native species when and where appropriate, and developing this plan to guide future management efforts. The Coastal Program website states the following concerning this important conservation program:

> *"The Coastal Program is one of the U.S. Fish and Wildlife Service's most successful and effective cooperative conservation programs. The mission of the Coastal Program is to protect and recover Federal Trust Species (threatened and endangered species, migratory birds, marine mammals, and inter-jurisdictional fish) by supporting voluntary restoration, enhancement and protection of high-priority coastal habitats. The national Coastal Program provides financial and technical assistance to on-the-ground habitat restoration and protection projects through locally-based field coordinators in 24 coastal areas around the nation."*

The city has provided additional funding and in-kind services to assist with efforts to enhance and restore native habitats within Village Point Park Preserve and Bayfront Park. To date, Wetland Resources Environmental Consulting, with the assistance of a work crew, has covered both parks with initial and follow-up control efforts over a period of six years. To keep invasive exotic plants in check, it will be necessary to continue control efforts at least annually. This work is to be done either by city personnel, a qualified contractor, or some combination of the two. The purpose of this plan is to instruct those who will be involved in management and control efforts on proper identification of target invasive exotic species, control methods, herbicide formulations, replanting of natives, and related information. Wetland Resources will continue to be available to provide assistance and consultation as needed.

Figure 1. USGS Topographic Map
(Baldwin Co. Dept. of Revenue; **http://isv.kcsgis.com/al.baldwin_revenue/**)

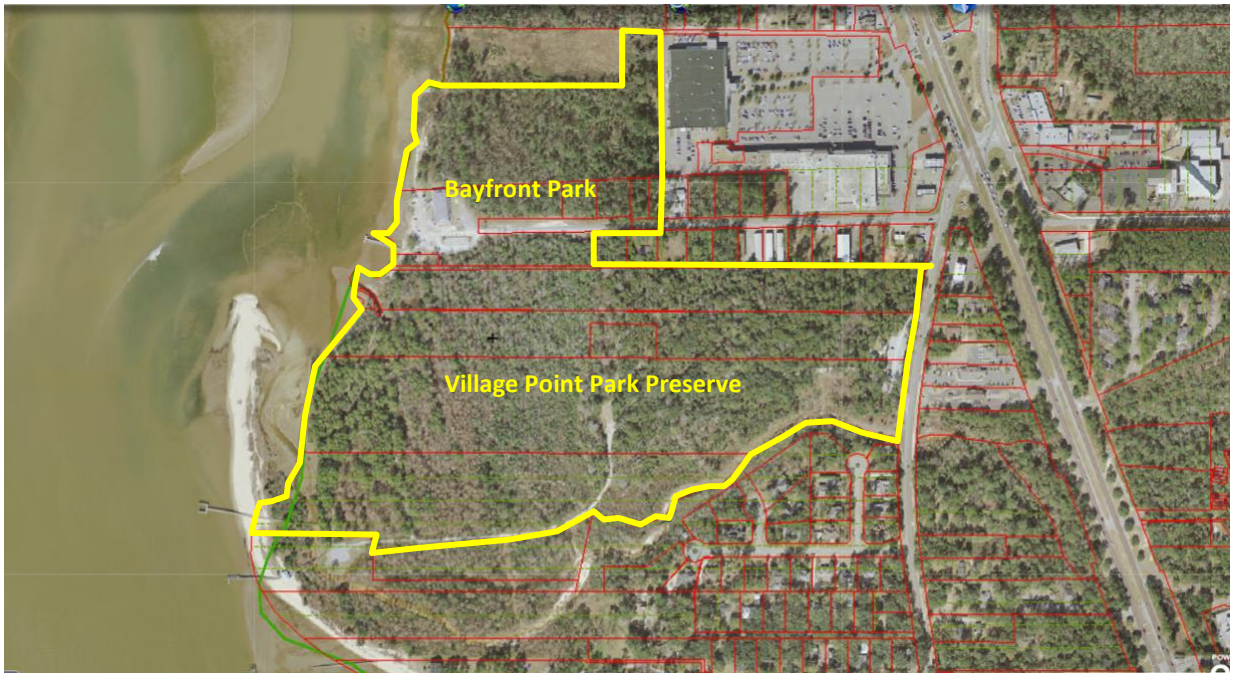


Figure 2. 2009 Aerial Photograph
(Baldwin Co. Dept. of Revenue; **http://isv.kcsgis.com/al.baldwin_revenue/**)

PLAN OBJECTIVES

The primary objectives of this plan are to guide management of these parklands in such a way that:

(1) Restores and sustains appropriate natural plant communities through the control of invasive exotic

plant species and planting of appropriate native plants when and where needed.

(2) Optimizes habitat conditions for wildlife species expected to utilize the habitats present in the parks.

(3) Provides the public with opportunity for passive recreational activities, environmental education, and enjoyment.

PARK DESCRIPTIONS

Village Point Park Preserve. This park is located in Daphne between S. Main St. and the eastern shore of Mobile Bay, west of U.S. 98, just south of Magnolia Place Shopping Center. It is in Section 7, Township 4 South, Range 2 East, Baldwin Co., Alabama. The preserve is approximately 49.1 acres in size. Yancey Branch flows through the south side of the park and into Mobile Bay. A gravel parking lot, restroom facilities, and a large pavilion with picnic tables are located at the park entrance at Main Street. The park includes a pier on the bay, a sandy beach, numerous nature trails, historic D'Olive Cemetery, Jackson's Oak, and several state and national champion trees. The majority of the park is forested uplands and wetlands interspersed by the road and trails.

The area occupied by the park and surrounding land is rich in history. The Village Point Foundation, a non-profit entity formed to acquire and preserve these parklands, shares this quote by Dr. H. H. Holmes on the foundation's website:

> *"As far back as history reaches we have stories of the Indians who roamed the woodlands of what is now Alabama and of their meetings just north of the Daphne of today. It was there that the Tensaws, the Alabamas, and later the Choctaws, the Creeks and the Seminoles, were to meet and plan, in their respective ages, the relationships of their tribes… It was there that a little city with homes of comfort, well laid out streets and lawns, where pioneer settlers dwelt, was built beside the sea a hundred years ago. It was there that Farragut's men landed the troops to join and re-enforce those who marched overland to capture Spanish Fort and Blakeley just to the north. It was there that yellow fever, more than a hundred years ago, laid waste those happy homes. And it was there than an old city lies obliterated by the passing of the century."*

The Jackson Oak at Village Point Park is reportedly the site of an address by Gen. Andrew Jackson to U.S. troops en route to engage Spanish forces in Pensacola, Florida, during the War of 1812.

D'Olive Cemetery, which dates back to the 1800s, is located in the heart of the park. Several headstones are still present. The Alabama Historical Commission provided funding in 2012 for restoration work to be done in the cemetery.

Over a period of years, as development occurred in the watershed of Yancey Branch, tremendous amounts of sediment were deposited in the stream channel, its adjacent wetlands, and other wetlands located within the flood plain but away from the main stream channel. The filling up of wetlands and the stream with sediment resulted in alteration of natural flow patterns, flooding of adjacent properties, and invasion by non-native plants.

In 2006, land disturbance associated with a flood control project resulted in the disconnection of the stream from its adjacent wetlands and flood plain. In an effort to correct these problems, the city contracted with a stream restoration expert to design and build a new stream channel utilizing natural channel design techniques that would restore the meanders to the stream channel and create habitat for aquatic species. The project also included construction of a new, lower, narrower flood plain for the stream. Unfortunately, it was not feasible to raise the streambed enough to reconnect the stream to the

adjacent wetlands. Areas cleared of trees and other vegetation were replanted with appropriate native species and those areas were monitored for a period of time to ensure adequate survival of planted material as well as recruitment of native species.

Most severely invaded by exotic plants are those land disturbance areas associated with the Yancey Branch flood control project, the stream and wetland restoration, and other areas impacted by heavy sedimentation from upstream sources.

Bayfront Park. This park is also located in Daphne west of S. Main St. It is at the west end of Bayfront Dr. and fronts the eastern shore of Mobile Bay. It is in Section 7, Township 4 South, Range 2 East, Baldwin Co., Alabama. Bayfront Park is approximately 28.6 acres in size. Bayfront and Village Point parks are contiguous to each other with Bayfront to the north of Village Point. This park offers access to the bay and amenities, including a pier, a kayak and canoe launch area, a gazebo, the Scardamelia Pavilion, a large parking area, a boardwalk connection to Village Point Park Preserve, and restroom facilities. However, the majority of parklands are natural forested wetlands and tidal marsh.

Forested wetlands are to the north and south of the developed area of the park. Most of the wetland area is of high quality with few invasive exotics or other negative impacts. To the south of the access road into the park is an approximately 30-50 ft. wide strip of land running parallel to the road that had been historically filled with rubble, debris of all kinds, and soil. This strip was also overrun with invasive exotic plants. In 2012, with funding provided by the US Fish & Wildlife Service Coastal Program and the City of Daphne, this area, totaling approximately an acre, was restored to forested wetlands through the excavation of sediment and debris down to an elevation matching that of the adjacent intact wetlands and replanted with native trees and shrubs. Any returning invasive exotic plants should continue to be controlled in this area and native herbaceous wetland species encouraged.

An upland area is located just behind the Magnolia Place shopping center. This area is flat at the top of the hill, then slopes steeply toward the bay into forested wetlands. The edges of the previously disturbed upland were severely invaded by several exotic species. Most of the exotics were small enough that they could be mowed since hand removal was impractical. Initial mowing was done in 2012and is being maintained by the city through periodic mowing. The open area of uplands is a nice spot to place picnic tables and have a view of the bay. To the south of this opening, plans are to construct an amphitheater in what are currently forested uplands.

HOW INVASIVE EXOTIC PLANTS BECOME ESTABLISHED

Competition among plant species is a natural part of any ecosystem, but introduction of exotic species can disrupt intricate balances and relationships evolved over thousands of years among native plants and their communities. Oftentimes, the result is a loss of biological diversity within both the plant and animal communities. There are many examples of disastrous exotic plant invasions that have resulted in losses of native species, changes in community structure and function, and even alteration of the physical structure of an ecosystem. The effects of invasions by exotics depend in large part on which species and which natural communities are involved.

Some generalized characteristics of invasive exotic species include a long life span, high dispersal rates, the ability to reproduce vegetatively (without seeds), and/or produce large numbers of seeds. These plants typically have a short generation time and are usually habitat generalists.

Some characteristics of habitats that are prone to invasion include those that have a similar climate to the place of origin of the invading plant; habitats that have been disturbed by humans; early succession

habitats (for example, clear cuts and abandoned agricultural fields or pastures); and habitats that have low natural diversity. A large contributor to the success of exotic plants is an absence of predators, disease, or other factors that keep populations in check in the plant's native regions.

Like a fever when you have the flu, invasion by exotic plant species typically is just a symptom of a greater underlying problem, usually a disturbed or disrupted habitat or ecosystem. When human bodies are overly stressed, our immune systems are weakened and we become vulnerable to "invasion" by foreign bodies that cause disease. Similarly, when some type of stress weakens a natural system, it is prone to invasion by exotics that can make the natural system "sick." Careful observation will reveal that, in most cases, exotic plant species establishment and invasion is primarily associated with disturbed habitats. The disturbance, which stresses the system, may be quite subtle or readily recognizable. Some forms of disturbance that open the door to invasion by alien plant species include ditching, stream channelization, or severe erosion that results in a change in the natural hydrology of the surrounding land; unnaturally high levels of sediment accumulation in flood plains and riparian areas; soil disturbance caused by timber harvesting, agriculture or even food plot establishment; overgrazing by livestock; a prescribed fire regime that is out of sync with the ecosystem being managed; and activities associated with development.

Healthy, intact, fully functioning ecosystems are surprisingly resistant to invasion by exotic species. For example, it is not uncommon to find plant communities made up almost exclusively of exotics growing within or just outside of road rights-of-way; highly disturbed situations where the natural hydrology has been altered through the excavation of ditches, the soil has been disturbed during road construction, and native vegetation has been removed and typically replaced with non-native grasses. If the adjacent habitat is relatively undisturbed and the plant community is intact, you will seldom find non-native species becoming established beyond the zone of influence of the roadside ditch or the area that has been disturbed. The plants that compose healthy, intact communities are so busy competing with each other that there is no room, or niche, for invasion by exotics. If exotic species become established at all, they are typically just a minor component in an otherwise diverse plant community and will remain so until a disturbance occurs that disrupts the natural balance.

PREVENTING EXOTIC PLANT INTRODUCTION AND INVASION

Following is a list of recommended considerations and measures that will help prevent introduction and establishment of invasive exotic plants in the parks.

- Do not use known invasive exotic species for landscaping purposes; use natives where feasible.
- If pine straw is used in landscape beds, inspect the straw for contamination with Japanese climbing fern and cogongrass. A better alternative is pine bark mulch. It lasts longer and carries less risk of harboring invasive species.
- Monitor landscape beds for invasive exotic species regularly and remove or treat with herbicide any that are discovered.
- If mowing equipment is used in areas outside the parks where cogongrass or torpedo grass is known to occur, clean the equipment thoroughly to remove seeds and rhizomes before bringing it into the parks.

- Avoid and minimize soil disturbance. If it is necessary to disturb soil for any reason, restore the area to pre-disturbance elevations and contours and apply annual seed and mulch for stabilization purposes. Disturbed areas should be monitored carefully for invasive exotic plant establishment until native vegetation has been either planted or returned on its own.

- Do not dump or create soil or aggregate piles in the parks. These tend to be invasive exotic plant magnates. Brief, temporary storage of piles until the material can be used as intended (i.e., placing gravel or fill to repair roads or parking areas) is fine, but long-term placement of piles should be avoided.

TARGET SPECIES AND CONTROL PRESCRIPTIONS

This section describes target invasive exotic plants known to occur within the parks, provides information and photographs to aid in the identification of these species, offers general prevention and control recommendations, and lists specific control procedures for each. ***Note the following definitions:***

FOLIAR TREATMENT means application of herbicide to the leaves of a target plant.
BASAL TREATMENT means application of herbicide to the lower trunk or stem of the plant between the ground and approximately 12 in. above ground.
STEM INJECTION means cutting into the bark with a machete or hatchet at intervals recommended on the product label and applying herbicide to the cut surface.
CUT SURFACE TREATMENT means cutting down a target plant near its base and immediately treating the stump with herbicide.
HAND REMOVAL means pulling up vegetation by hand or digging it up with a shovel or trowel when it is possible to remove the entire root system.

Always read the entire label of any herbicide to be used and carefully follow instructions concerning personal protection equipment and safety, as well as proper application rates and techniques. Also consult the label of surfactants and dye concerning recommended rates.

Chinese Tallowtree; Popcorn Tree (*Triadica sebifera*)

This deciduous, fast-growing tree can get as tall as 60 ft. and in some situations form pure stands. Leaves are broadly ovate (egg-shaped with stem attached to broad end) to diamond-shaped and turn bright yellow and scarlet in the fall. Abundant white waxy popcorn-like seeds appear in the fall. Seeds, high in fat and protein, are consumed and spread by birds and other wildlife. Saplings as young as 3 yr. can produce viable seed and remain reproductive for up to 100 yr. to produce 100,000 seeds per year. Infestations intensify by prolific surface root sprouts. Seeds in the soil are able to germinate for up to 2 to 7 yr.

General Recommendations:

- Tallowtree mulch and leaf litter should not be used for landscape beds or other purposes since it inhibits the germination of native seeds and likely contains viable tallowtree seeds.
- Young plants should be removed before they begin producing seeds.
- Small seedlings and young saplings can be pulled by hand and with a weed wrench in moist soil conditions and if infestation is not too dense to make hand removal impractical.

Specific Control Procedures:

Large Trees and Saplings (greater than 4 in. in diameter). These control procedures can be used effectively any time of year *except March and April*. Cut down trees and large saplings to within a couple

inches of the ground using a chainsaw or hand saw, then ***immediately*** apply one of the following herbicides to stump tops and sides:

- Garlon 4 as a 20% solution in basal oil
- Garlon 3A as a 20% solution in basal oil
- Glyphosate mixed in water as a 20-50% solution + blue indicator dye
- Undiluted Pathfinder II (a pre-mixed, oil-based triclopyr product)

Dense Infestations of Seedlings and Small Saplings. These control procedures should be used *July through October*. Thoroughly wet all leaves with the following:

- Garlon 4 as a 2% solution in water + a non-ionic surfactant + blue indicator dye

Chinese Tallowtree or Popcorn Tree

(Much of the above information is taken from, and/or based on, the USDA Forest Service publication, *A Management Guide for Invasive Plants in Southern Forests*; by James H. Miller, Steven T. Manning, and Stephen F. Enloe; April 2013.)

Camphor Tree (*Cinnamomum camphora*)

This tree is an evergreen up to 60 - 100 ft. in height, with trunks up to 2 ft. in diameter and a round, spreading crown formed by large branches radiating from mid-tree. Leaves are glossy, lance-shaped, and have a camphor odor when crushed, cut, or bruised. Twigs are slender, green-to-reddish brown. Abundant clusters of spherical, black fruits are present in fall to winter, and are spread by animals, water, and gravity. This tree also colonizes by root sprouts and may be found in dense thickets.

Camphor Tree

General Recommendations:

- Young plants should be removed before they begin producing seeds.
- Small seedlings and young saplings can be pulled by hand and with a weed wrench in moist soil conditions and if infestation is not too dense to make hand removal impractical. If the entire root is not removed, re-sprouting is likely.

Specific Control Procedures:

Large Trees (greater than 4 in. in diameter). These control procedures are most effective *June through September*. Do one of the following:

- Make stem injections using undiluted Garlon 3A in cut-spacings specified on the herbicide label.
- Cut the tree down with a chainsaw or hand saw, then ***immediately*** apply Garlon 3A as a 30% solution mixed in basal oil, vegetable oil, or mineral oil to the stump tops.
- Cut the tree down with a chainsaw or hand saw, then ***immediately*** apply Garlon 4 as a 25% solution, mixed in basal oil, vegetable oil, or mineral oil, to the stump tops.

Saplings. During *June to September*, for saplings up to 4 in. in diameter:

- Apply a basal spray for trees up to 4 in. in diameter using Garlon 4 as a 30% solution in a labeled basal oil product, vegetable oil or mineral oil. Solution should be applied from ground level to approximately 12 in. above ground all the way around the stem.

Seedlings and Small Saplings (less than 4 in. in diameter). Thoroughly wet all leaves with one of the following:

- Glyphosate as a 2% solution in water + non-ionic surfactant + blue indicator dye
- Garlon 3A as a 2% solution in water + non-ionic surfactant + blue indicator dye
- Garlon 4 as a 2% solution in water + non-ionic surfactant + blue indicator dye

(Much of the above information is taken from, and/or based on, the USDA Forest Service publication, *A Management Guide for Invasive Plants in Southern Forests*; by James H. Miller, Steven T. Manning, and Stephen F. Enloe; April 2013.)

Silktree; Mimosa (*Albizia julibrissin*)

This species is a relatively small tree, 10 to 50 ft. tall, in the pea family. It reproduces by abundant seeds as well as root sprouts. It has traditionally been, and is currently, planted as an ornamental for its fast growth and abundant showy, fragrant pink and white flowers in spring and summer. The fruits are flat peapods that hang from the tree through winter. Leaves, which are lost in winter, are composed of small leaflets that produce a somewhat feathery look. Seedpods float to spread along waterways and ditches. They also seem to be spread by wildlife and possibly by mowing along roadways. Seeds remain viable for many years.

Silktree or Mimosa

General Recommendations:

- Young plants should be removed before they begin producing seeds.
- Small seedlings and young saplings can be pulled by hand and with a weed wrench in moist soil conditions and if infestation is not too dense to make hand removal impractical. If the entire root is not removed, re-sprouting is likely.

Specific Control Procedures:

Trees (greater than 4 in. in diameter). These control procedures can be used effectively any time of year *except March and April*. Cut trees and large saplings down within a couple inches of the ground using a chainsaw or hand saw, then **immediately** apply to stump tops and sides:

- Garlon 3A as a 20% solution in basal oil, vegetable oil, or mineral oil.

Saplings (up to 4 in. in diameter). Apply a basal spray to young bark using one of the following:

- Garlon 4 as a 20% solution in basal oil, vegetable oil or mineral oil. Solution should be applied between the ground surface and approximately 12 in. above ground, all the way around the stem.
- Undiluted Pathfinder II, spraying all the way around the stem between the ground surface and approximately 12 above ground.

Resprouts and Seedlings. From *June to August*, thoroughly wet all leaves with the following:

- Glyphosate at 2% solution in water + non-ionic surfactant + blue indicator dye; or

From *July to September*, thoroughly wet all leaves with the following:

- Garlon 3A as a 4% solution in water + non-ionic surfactant + blue indicator dye.

(Much of the above information is taken from, and/or based on, the USDA Forest Service publication, *A Management Guide for Invasive Plants in Southern Forests*; by James H. Miller, Steven T. Manning, and Stephen F. Enloe; April 2013.)

Chinese Privet (*Ligustrum sinense*) and other *Ligustrum* species

Chinese privet and several other ornamental species of *Ligustrum* are shrubs to small trees in the olive family that have been, and continue to be, used extensively in landscaping. All have leaves that are opposite from each other on the stem. Chinese privet has thin, semi-evergreen, somewhat small leaves. Other species have thicker, evergreen, larger leaves. Chinese privet is thicket-forming, shades out native shrub and herbaceous species, and prevents native tree and shrub recruitment. Chinese privet is one of the most widely spread invasive plants in the South, while other *Ligustrum* species are less common. All have showy clusters of small white flowers in spring that yield abundant clusters of small egg-shaped, dark purple berries during fall and winter. Chinese privet colonizes by root sprouts and seeds and is spread widely by birds and other animals. Seeds are thought to be viable for only 1 year. Many shallow surface roots may sprout when the parent plant is top-killed.

Japanese Privet

Chinese Privet fruit being eaten and dispersed by an American Robin.

General Recommendations:

- Young plants should be removed before they begin producing seeds.
- Small seedlings and young saplings can be pulled by hand and with a weed wrench in moist soil conditions and if infestation is not too dense to make hand removal impractical. If the entire root is not removed, re-sprouting is likely.

Chinese Privet in flower

Chinese Privet with unripe fruit

Specific Control Procedures:

Foliar Application. If within reach, *Ligustrums* can be effectively controlled by applying herbicide to the leaves. Note that *summer* foliar applications of glyphosate may not be as effective as other times and require a higher percent solution. Otherwise, thoroughly wet all leaves with the following:

- Glyphosate as a 3% solution in water + a non-ionic surfactant + blue indicator dye.

Basal Treatment. For stems too tall for foliar sprays and when safety to surrounding vegetation is desired, apply a basal spray of:

- Garlon 4 as a 20% solution in basal oil, vegetable oil, or mineral oil. Apply solution to the stem between the ground and approximately 12 in. above ground all the way around the stem.
- Undiluted Pathfinder II. Apply solution to the stem between the ground and approximately 12 in. above ground all the way around the stem.

Cut Surface Treatment. For best results, cut surface treatment should be done any time of year *except March and April*. For large stems and when safety to surrounding vegetation is desired, cut with a chainsaw or hand saw and ***immediately*** treat stump tops and sides with one of the following:

- Garlon 3A as a 20% solution in water + a non-ionic surfactant + blue indicator dye
- Glyphosate as a 20% solution in water + a non-ionic surfactant + blue indicator dye

(Much of the above information is taken from, and/or based on, the USDA Forest Service publication, *A Management Guide for Invasive Plants in Southern Forests*; by James H. Miller, Steven T. Manning, and Stephen F. Enloe; April 2013.)

Hen's Eyes; Coral Ardisia (*Ardisia crenata*)

This evergreen erect shrub, typically 2 to 6 ft. tall, forms multi-stemmed, bushy clumps. It is very shade tolerant and has shiny dark green leaves with distinct thick, wavy margins. Flowers are white to pink and form along the main stem. Fruits are clusters of bright red berries that hang from long stems and are retained on the plant through winter and beyond. This plant is spread by animal-dispersed seed and can form dense infestations. A carpet of seedlings can typically be found below parent plants. Plants produce fruit within 2 yr.

Coral Ardisia

General Recommendations:

- Young plants should be removed before they begin producing fruit.
- Plants containing fruit should be bagged and sent to the landfill; fruit should not be discarded on the ground.
- Small seedlings and small mature plants can be pulled by hand in moist soil conditions and if infestation is not too dense to make hand removal impractical. If the entire root is not removed, re-sprouting is likely.

Note the dark, evergreen leaves with scalloped margins. Red fruits are held on mature plants essentially year-round.

Immature, green fruit can be seen on the plant in the photo to the left.

Hen's Eyes or Coral Ardisia

Specific Control Procedures:
Foliar Treatment. Thoroughly wet all leaves with one of the following:

- Glyphosate as a 5% solution in water + non-ionic surfactant + blue indicator dye
- Garlon 4 as a 5% solution in water + non-ionic surfactant + blue indicator dye

Basal Treatment. In *fall*, apply a basal spray of the following:

- Garlon 4 as a 20% solution in basal oil, vegetable oil, or mineral oil.

Cut Stem Treatment. Cut stems and ***immediately*** treat the stump tops with the following:

- Garlon 4 as a 20-25% solution in basal oil, vegetable oil, or mineral oil.

(Much of the above information is taken from, and/or based on, the USDA Forest Service publication, *A Management Guide for Invasive Plants in Southern Forests*; by James H. Photo by Gena Todia Manning, and Stephen F. Enloe; April 2013.)

Nandina; Sacred Bamboo (*Nandina domestica*)

This popular ornamental, evergreen, erect shrub grows up to 8 ft. tall and has multiple stems somewhat resembling bamboo. Glossy dark green to reddish leaves are pinnately (resembling a feather) to bipinnately compound. Early summer terminal clusters of tiny white to pinkish flowers yield dangling clusters of red berries in fall and winter. This plant colonizes by root sprouts and is spread by animal-dispersed seeds.

Nandina or Sacred Bamboo with mature fruit

Nandina or Sacred Bamboo with immature fruit

General Recommendations:

- Young plants should be removed before they begin producing fruit.
- Plants containing fruit should be bagged and sent to the landfill, or cut off the fruiting end of the plant and bag it; fruit should not be discarded on the ground.
- Seedlings and small plants can be pulled by hand in moist soil conditions and if infestation is not too dense to make hand removal impractical. If the entire root is not removed, re-sprouting is likely.

Specific Control Procedures:
Foliar Treatment: In *August to October*, thoroughly wet all leaves with the following:

- Glyphosate as a 1% solution in water + a non-ionic surfactant + blue indicator dye.

Basal Treatment: Any time of year, apply a basal spray treatment of one of the following:

- Garlon 4 as a 20% solution in basal oil, vegetable oil, or mineral oil.
- Undiluted Pathfinder II.

Cut Stem Treatment. Cut stems and ***immediately*** treat the stump tops with the following:

- Glyphosate as a 20% solution in water + non-ionic surfactant + blue indicator dye.

(Much of the above information is taken from, and/or based on, the USDA Forest Service publication, *A Management Guide for Invasive Plants in Southern Forests*; by James H. Miller, Steven T. Manning, and Stephen F. Enloe; April 2013.)

Japanese Honeysuckle (*Lonicera japonica*)

This woody vine is semi-evergreen to evergreen, high climbing and trailing to 80 ft., branching and often forming arbors in forest canopies and/or groundcover under canopies. It has ovate to oblong opposite leaves that are green above and whitish underneath. Both surfaces are smooth to rough-hairy. Vines root at the nodes when covered by leaves or duff, which makes control difficult. Japanese honeysuckle occurs as dense infestations along forest edges and rights-of-way, as well as under dense tree canopies and as arbors high in canopies. It is shade tolerant and has large woody rootstocks. It spreads mainly by vines rooting at the nodes and less by animal-dispersed seeds. It infrequently seeds within forest stands and has very low germination rates. Seed survival in the soil is less than 2 yr. This species is still planted in wildlife openings as deer browse and invades surrounding lands where it is planted.

General Recommendations:
- If hand-pulled, bag and dispose of plants and fruit in a dumpster or burn.
- Treat when new plants are young to prevent seed formation.
- Pull, cut, and treat with herbicide when fruit are not present (spring through early summer).
- Hand pull when soil is moist to ensure removal of all stolons and roots.

Specific Control Procedures:
Foliar Treatment. For best results, *July to October, or during warm days in winter*, treat leaves with one of the following:

- Glyphosate as a 2% solution in water + a non-ionic surfactant + blue indicator dye.
- Garlon 3A as a 3- 5% solution in water + a non-ionic surfactant + blue indicator dye.
- Garlon 4 as a 3- 5% solution in water + a non-ionic surfactant + blue indicator dye.

Cut Stem Treatment. Cut large vines just above the soil surface and ***immediately*** treat the freshly cut stem with one of the following:

- Glyphosate as a 20% solution in water + a non-ionic surfactant + blue indicator dye.
- Garlon 3A as a 20% solution in water + a non-ionic surfactant + blue indicator dye.

Japanese Honeysuckle

(Much of the above information is taken from, and/or based on, the USDA Forest Service publication, *A Management Guide for Invasive Plants in Southern Forests*; by James H. Miller, Steven T. Manning, and Stephen F. Enloe; April 2013.)

Japanese Climbing Fern (*Lygodium japonicum*)

This vine is a true perennial fern that climbs and twines and can grow up to 90 ft. long. It often forms mats that cover shrubs and trees. Leaves are lacy and finely divided along thin, wiry stems that range from green to orange to black in color. In sheltered areas, fronds (leaves) may remain green through winter; otherwise, fronds typically die back and turn tan to brown in winter. New growth appears in mid to late spring from underground slender, dark brown to black, wiry rhizomes (roots), which must be killed to eradicate the plant. This fern spreads by rhizomes and by wind-dispersed spores.

General Recommendations:

- If pine straw is to be used for mulch, check to be sure it is not contaminated with climbing fern.
- Use of pine bark mulch instead of pine straw is an option that minimizes the risk of introducing climbing fern into landscape beds.
- Plant material with fertile fronds should be bagged and sent to the landfill.
- Herbicide treatments and hand removal should be timed to occur when plants are young to prevent spore formation.

Specific Control Procedures:

Hand Removal. When only an occasional plant is present, these can be dug up with a shovel, taking care to remove the entire root system, bagged, and sent to a landfill. If fertile fronds are present, these should be removed and bagged as well.

Foliar Treatment. In *July to September* before spore release, thoroughly wet all leaves to as high as safe with the following:

- Glyphosate as a 2% solution in water + a non-ionic surfactant + blue indicator dye.

Sterile Frond **Fertile Frond**

Japanese Climbing Fern

(Much of the above information is taken from, and/or based on, the USDA Forest Service publication, *A Management Guide for Invasive Plants in Southern Forests*; by James H. Miller, Steven T. Manning, and Stephen F. Enloe; April 2013.)

Japanese Holly Fern (*Cyrtomium falcatum*)

Japanese Holly Fern has been grown and sold as a popular landscaping plant throughout the southeast since the 1800s. It is increasingly found escaping into natural habitats and is recognized as invasive

throughout much of the area into which it has been introduced, both within the US and elsewhere. This plant is an upright mound-forming fern with glossy pinnae (leaflets) that resemble holly leaves. Mounds can be 3 ft. in diameter and up to 2 ft. high. Pinnae are sharply toothed and leathery on thin, arching branches.

This fern is typically evergreen in our area. Fertile fronds have light green patches of spores (sori) on the underside of the pinnae that darken as they mature. This plant can tolerate a range of light conditions and prefers moist, well-drained soils. It has been observed in shady forested wetlands in Village Point Park.

Photos by Fred Nation

Japanese Holly Fern

General Recommendations:

There is not much information available about controlling Holly Fern by mechanical or chemical means. Since this plant has a shallow root system and only occurs sporadically in the park, the best control method may be to dig it up when encountered, being careful to get the entire root system, and bag the plant material for landfill disposal.

(The above information is adapted from a 2012 National Park Service, National Capital Region Exotic Plant Management Team, Washington, DC Invasive Plant Alert publication. Written by Eric Hazelton, edited by Mark Frey and Amanda DuPrey.)

Kudzu (*Pueraria montana*)

Kudzu is a well-known deciduous twining, trailing, mat-forming, woody vine in the pea family. It grows 35 to 100 ft. long and forms dense infestations along forest and roadside edges, in old fields, and other sunny disturbed habitats. Leaves have three leaflets with variable lobes. Slender tight clusters of white and violet pea-like flowers appear in midsummer. Dangling flat peapods form in fall. Pods fall unopened,

and seed are variable in viability across the region. Kudzu spreads by vines rooting at the nodes and by wind-, animal-, and water-dispersed seeds. Large semi-woody tuberous roots reach depths of 3 to 16 ft. The target of control on older plants is a knot- or ball-like root crown on top of the soil surface where vines and roots originate.

Kudzu

General Recommendations:

- Treat with herbicide when plants are young to prevent spread.
- Root crowns can be removed with mattocks, hoes, and saws; removal of the tuberous taproot is not required for control.

Specific Control Procedures:

Foliar Treatment. In *July to early September* for successive years, thoroughly wet all leaves, including those on climbing vines, as high as possible with one of the following:

- Milestone VM as a 0.5% solution in water + blue indicator dye.

Or, for partial control and no soil activity, repeatedly apply one of the following *during the growing season*:

- Garlon 4 as a 4% solution in water + a non-ionic surfactant + blue indicator dye
- Glyphosate as a 4% solution in water + a non-ionic surfactant + blue indicator dye

Cut Stem Treatment. Cut large vines and immediately apply to the cut surface the following:

- Milestone VM as a 10% solution in water

Basal Treatment. In *January to April*, to control vines less than 2 in. in diameter, apply one of the following to stems between the ground and approximately 12 in. above ground:

- Garlon 4 as a 20% solution in basal oil or vegetable oil.
- Undiluted Pathfinder II.

(Much of the above information is taken from, and/or based on, the USDA Forest Service publication, *A Management Guide for Invasive Plants in Southern Forests*; by James H. Miller, Steven T. Manning, and Stephen F. Enloe; April 2013.)

Chinese Wisteria (*Wisteria sinensis*) and Japanese Wisteria (*W. floribunda*)

These woody vines are deciduous, high-climbing, twining, or trailing with long, pinnately compound leaves (resemling a feather) and showy dangling clusters of lavender flowers that appear in spring before leaves. Chinese and Japanese wisterias are difficult to distinguish from each other due to hybridization. Both spread by twining and covering shrubs and trees as well as by runners that root at nodes when vines are covered by duff or leaf litter. Seeds are dispersed by water along riparian areas. The large size of the seeds is a deterrent to animal dispersal. Exotic wisteria (and many cultivars) is still sold and planted. Exotic wisteria can be distinguished from American wisteria (*W. frutescens*) by the timing of flowering in relation to leaf-out. American wisteria blooms June to August after leaves have developed. American wisteria lower clusters are much smaller and more compact than those of the exotic wisterias.

Chinese Wisteria

American Wisteria

General Recommendations:

- Treat young plants with herbicide to prevent seed formation.
- Pull, cut, and treat when pods are not present.
- Hand-pull new seedlings when soil is moist, ensuring removal of all roots.

Specific Control Procedures:

Foliar Treatment. In *July to October* for successive years when regrowth appears, thoroughly wet all leaves (until runoff) with one of the following:

- Garlon 4 as a 4% solution in water + a non-ionic surfactant + blue indicator dye.

- Glyphosate as a 4% solution + a non-ionic surfactant + blue indicator dye.

Chinese Wisteria

Basal Treatment. Treat the length of surface vines within reach anytime *except March and April* with one of the following:

- Garlon 4 as a 20-% solution basal oil or vegetable oil (avoid the bark of desirable trees).
- Undiluted Pathfinder II (avoid the bark of desirable trees).

(Much of the above information is taken from, and/or based on, the USDA Forest Service publication, *A Management Guide for Invasive Plants in Southern Forests*; by James H. Miller, Steven T. Manning, and Stephen F. Enloe; April 2013.)

Sweet Autumn Virginsbower (*Clematis terniflora*)

This climbing, deciduous to semi-evergreen, perennial vine has leaves that are across the stem from each other (opposite) with 3 leaflets per leaf. Flowers occur in late summer through fall and are white with 4 petals. Showy fruits with long, silvery-gray, feather-like hairs are produced in profusion. This species is spread by wind-dispersed seed. It is commonly found invading forest edges, rights-of-way and urban areas along streams and roads. It grows vigorously over other vegetation, forming dense blankets that block sunlight to the plants underneath. It prefers full sun but can tolerate partial shade. Sweet autumn virgins-bower was introduced into the United States as an ornamental vine and is still widely sold in the nursery trade.

General Recommendations:

- Treat young plants with herbicide to prevent seed formation.
- Pull, cut, and treat when seeds are not present.
- Hand-pull new seedlings when soil is moist, ensuring removal of all roots.

Sweet Autumn Virginsbower

Specific Control Procedures:

Foliar Treatment. In *July to October* for successive years when regrowth appears, thoroughly wet all leaves (until runoff) with one of the following:

- Garlon 4 as a 4% solution in water + a non-ionic surfactant + blue indicator dye.
- Glyphosate as a 4% solution + a non-ionic surfactant + blue indicator dye.

Basal Treatment. Treat the length of surface vines within reach anytime *except March and April* with one of the following:

- Garlon 4 as a 20-% solution basal oil or vegetable oil
- Undiluted Pathfinder II (avoid the bark of desirable trees).

(Information on *C. terniflora* was found at **www.invasives.org**; control procedures are adapted from the USDA Forest Service publication, *A Management Guide for Invasive Plants in Southern Forests*; by James H. Miller, Steven T. Manning, and Stephen F. Enloe; April 2013.)

Cogongrass (*Imperata cylindrica*)

This grass is a very aggressive, colony-forming, dense erect perennial that grows 1 to 6 ft. tall. It has tufts of long leaves hiding short stems, yellow-green blades, each with an off-center mid-vein and finely serrated margins. Flowers and seeds are fluffy and silver-plumed. They appear in spring and sporadically year-round, typically associated with some sort of disturbance, such as mowing or burning. Seed are dispersed by wind and on contaminated clothing, equipment, and products such as pine straw mulch and fill material from borrow pits where it occurs. Dense stands of dead grass persist through winter and are a severe fire hazard. Cogongrass burns hot even when green. Infestations form dense rhizome mats, making eradication difficult. Older infestations are more difficult to control than new patches.

Cogongrass Seed Head

General Recommendations:

- Diligently monitor for new occurrences of cogongrass and treat new patches as soon as feasible while grass is green and actively growing.
- Do not use or transport fill dirt, rock, hay, or pine straw from infested lands.
- Seed production can be stopped by mowing, burning, or herbicide treatments in early stages of flowering or shortly before flowering.
- Clean seed and rhizomes from equipment and personnel working in infestations before leaving the infested site.

Cogongrass

Specific Control Procedures:

Foliar Treatment. When grass is *actively growing* and at least 1-2 ft. high, or for older growth, treat from *June to September*, thoroughly wet all leaves with one of the following:

- Arsenal AC* as a 1% solution in water + a non-ionic surfactant + blue indicator dye. Repeat applications in subsequent years may be required for patch eradication.

- Glyphosate at 2-5% + Arsenal AC at 1% in water + a non-ionic surfactant + blue indicator dye. This treatment will accelerate burn-down of actively growing shoots but may not improve rhizome kill.
- Glyphosate as a 2-5% solution in water + a non-ionic surfactant + blue indicator dye. Two applications per growing season (just before flowering in spring and again in late summer to regrowth) are typically necessary. For eradication, apply in successive years when regrowth is present until no live rhizomes are observed.

**Arsenal AC is soil active, meaning that it can be taken up by the roots of non-target plants and cause damage or death.*

(Much of the above information is taken from, and/or based on, the USDA Forest Service publication, *A Management Guide for Invasive Plants in Southern Forests*; by James H. Miller, Steven T. Manning, and Stephen F. Enloe; April 2013.)

Torpedo Grass (*Panicum repens*)

This perennial grass that can grow up to 3 ft. tall. Plants have long, creeping rhizomes with sharp-pointed (torpedo-like) tips. Leaves are linear, flat or folded, up to 10 in. long, 0.3 in. wide with a whitish,

Torpedo Grass

waxy covering. Flowering occurs nearly year round. Flowers develop in branched, open inflorescences that are about 3-7 in. long. Torpedo grass is native to Africa and Eurasia and was introduced into the United States around 1876. It can occur in a wide variety of habitats. Plants are usually found in damp soils of riparian zones, but can also be found in pastures, lawns, and on sand dunes. This species is salt-tolerant.

(The above information is based on information as found on the BugwoodWiki.)

General Recommendations:

- Diligently monitor for new occurrences and treat as soon as feasible.

- Do not use or transport fill dirt, rock, hay, or pine straw from infested lands.
- Seed production can be stopped by mowing, burning, or herbicide treatments in early stages of flowering or even shortly before flowering.
- Clean seed and rhizomes from equipment and personnel working in infestations before leaving the infested site.
- If this grass is growing in or very near water, herbicide labeled for aquatic application should be used.

Specific Control Procedures:
Foliar Treatment. When grass is *actively growing* and at least 0.5-1 ft. high, or for older growth, treat from *June to September*, thoroughly wet all leaves with the following:

- Glyphosate as a 2-5% solution in water + a non-ionic surfactant + blue indicator dye. Two applications per growing season (just before flowering in spring and again in late summer to regrowth) are typically necessary. For eradication, apply in successive years when regrowth is present until no live rhizomes are observed.

(Control procedures are adapted from the USDA Forest Service publication, *A Management Guide for Invasive Plants in Southern Forests*; by James H. Miller, Steven T. Manning, and Stephen F. Enloe; April 2013.)

Vasey Grass (*Paspalum urvillei*)

This erect, course, tufted perennial grass grows up to 7 ft. tall, sometimes branching. Leaf blades usually about 2 ft. long by 0.8 in. wide and are hairy at the base. Panicles (flower/seed heads) are erect, with 20 or so spikes (racemes) per stem, densely arranged. Seeds are round and flat. This grass is native to South America. It is commonly found in disturbed habitats.

Vasey Grass

General Recommendations:

- Learn to distinguish this grass from other native grasses that look similar.
- Seed production can be stopped by mowing, burning, or herbicide treatments in early stages of flowering or even shortly before flowering.
- If this grass is growing in or very near water, herbicide labeled for aquatic application should be used.

Specific Control Procedures:

Foliar Treatment. When grass is *actively growing* and at least 0.5-1 ft. high, or for older growth, treat from *June to September*, thoroughly wet all leaves with the following:

- Glyphosate as a 2-5% solution in water + a non-ionic surfactant + blue indicator dye. Two applications per growing season (just before flowering in spring and again in late summer to regrowth) may be necessary.

Giant Reed (*Arundo donax*)

This plant is a tall, erect, perennial cane- or reed-like grass, up to 20 ft. tall. It is one of the largest of the herbaceous grasses. It has fleshy, almost bulbous, creeping root stocks that form compact masses from which arise tough, fibrous roots that penetrate deeply into the soil. The culms (stems) reach a diameter of 0.3 to 1.5 in. and commonly branch during the second year of growth. Culms are hollow, with thick walls that are divided by partitions at the nodes. The nodes vary in length from 4 to 12 in. The leaves are conspicuously two-ranked, 2 to 3 in. broad at the base and taper to a fine point. The bases of the leaves are cordate (heart-shaped) and more or less hairy-tufted. The flowers are borne in large plume-like terminal panicles between March and September. Giant reed is native to the countries surrounding the Mediterranean Sea.

Immature Flower Head

Giant Reed

General Recommendations:

- Diligently monitor for new occurrences of giant reed and treat new patches as soon as feasible with appropriate herbicide or hand removal.
- Pull and/or treat before seeds are formed.
- Hand-pull or dig new seedlings when soil is moist, ensuring removal of all roots.

Specific Control Procedures:

Hand Pulling. This method may be used to destroy seedlings or plants up to 6 ft. tall. Plants or seedlings are best pulled after a rain when the soil is moist. It is important to remove all roots, since resprouting may occur from root fragments left in the ground. Plants should be pulled as soon as they are large enough to grasp but before they produce seeds. The site should be monitored for any resprouting.

Hand Digging. The removal of rootstocks by hand digging is labor intensive but an effective method of eliminating small infestations of giant reed. Root removal must be thorough to be effective. The site should be monitored for any resprouting.

Foliar Treatment. When grass is *actively growing* and at least 1-2 ft. high, or for older growth, treat from *June to September*, thoroughly wet all leaves with one of the following:

- Arsenal AC* as a 1% solution in water + a non-ionic surfactant + blue indicator dye. Repeat applications in subsequent years may be required for eradication.
- Glyphosate at 2-5% + Arsenal AC at 1% in water + a non-ionic surfactant + blue indicator dye. This treatment will accelerate burn-down of actively growing shoots but may not improve rhizome kill.
- Glyphosate as a 2-5% solution in water + a non-ionic surfactant + blue indicator dye. Two applications per growing season (just before flowering in spring and again in late summer to regrowth) are typically necessary. For eradication, apply in successive years when regrowth is present until no live rhizomes are observed.

**Arsenal AC is soil active, meaning that it can be taken up by the roots of non-target plants and cause damage or death.*

(The above information is based on work by *Marc C. Hoshovsky, Global Invasive Species Team, The Nature Conservancy*, in an article titled "Arundo donax", as found on the BugwoodWiki. It is also based on information adapted from the USDA Forest Service publication, *A Management Guide for Invasive Plants in Southern Forests*; by James H. Miller, Steven T. Manning, and Stephen F. Enloe; April 2013.)

Rattlebox (*Sesbania punicea*)

This member of the pea family is a deciduous shrub or small tree that grows up to 12 ft. tall. It has leaves with 10-40 small, dark-green leaflets in opposite pairs. Each leaflet is oblong and ends in a tiny pointed tip. The flowers, shaped like typical pea flowers, appear in clusters in spring and early summer and are reddish-orange in color. The seed pods are longitudinally 4-winged, oblong, and held on short stalks. The tip of the pod is sharply pointed. Rattlebox is native to South America.

Rattlebox Seed Pods and Flowers

General Recommendations:

- Young plants should be pulled by hand or with a weed wrench when soil is moist.
- Young plants should be removed before they begin producing seeds.

Specific Control Procedures:

Large Plants. These control procedures can be used effectively any time of year *except March and April*. Cut down stems to within a couple inches of the ground using a chainsaw or hand saw, then ***immediately*** apply one of the following herbicides to stump tops and sides:

- Garlon 4 as a 20% solution in basal oil
- Garlon 3A as a 20% solution in basal oil
- Undiluted Pathfinder II (a pre-mixed, oil-based triclopyr product)

Rattlebox

(The above information is based on work by *Barry Rice, Global Invasive Species Team, The Nature Conservancy,* as found on the BugwoodWiki. It is also based on information adapted from the USDA Forest Service publication, *A Management Guide for Invasive Plants in Southern Forests*; by James H. Miller, Steven T. Manning, and Stephen F. Enloe; April 2013.)

Wild Taro (*Colocasia esculenta*)

This plant is an herbaceous perennial plant that originates from a large, short, solid, vertical underground stem and can grow up to 4 ft. tall. Leaves are arrowhead shaped, up to 2 ft. long and 1.6 ft. wide, and velvety on the upper surface. Stems attach to the bottom of the leaf toward the center, rather than at the leaf margin, as is the case with several similar-looking, native wetland plants. Typically, on the top of the leaf at the point of stem attachment is a purplish spot. This plant spreads vegetatively through horizontal underground stems, above-ground stems, and vegetative fragments. Fruit are small berries, but are rarely produced. Wild taro can tolerate a wide range of wet to dry sites. It easily invades wetland edges, swamps, blackwater streams and riverine forests. It can form dense stands that outcompete native plants. It is native to Africa and was first brought to the Americas as a food crop for slaves. In 1910, this species was promoted as an alternative crop to potatoes by the USDA. Controlling this species can be difficult.

General Recommendations:

- Wet areas in the parks should be monitored for new infestations of this plant. Any found should be dealt with immediately.

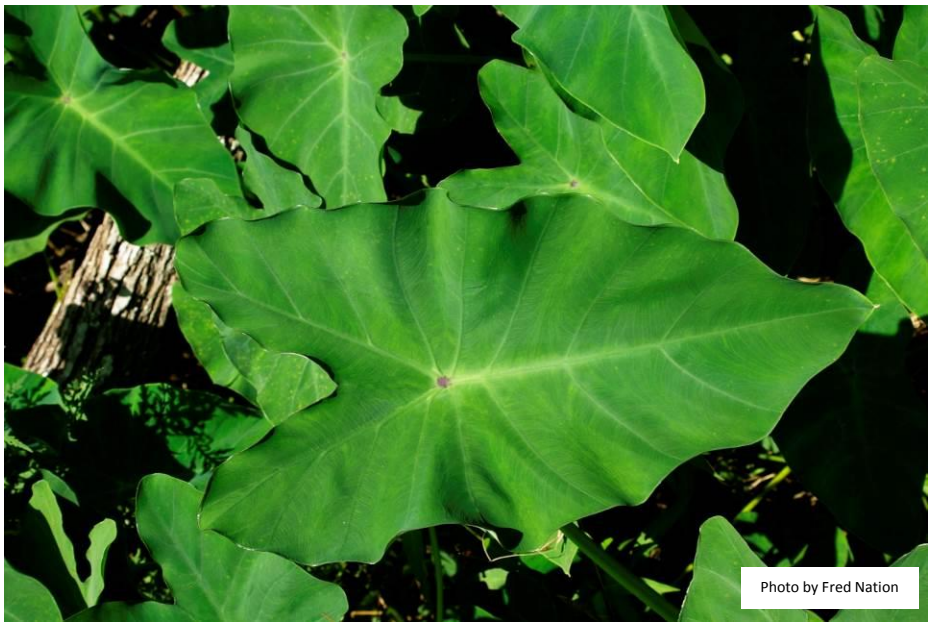
Specific Control Procedures:

Hand Digging. Young plants should be hand dug, with care taken to remove the entire root system. Plants should be bagged and disposed of in a landfill. Older, more well-established plants can also be dug up, but this method can be quite labor-intensive and more difficult to remove all of the roots.

Foliar Application. Anytime the plants are green and actively growing, thoroughly wet the leaves and stems with the following herbicide formulation:

0.5% 2,4-D amine
0.5% glyphosate product labeled for aquatic use
0.5% - 1% D-limonene
Silicone surfactant (consult label for rates)
Blue indicator dye

Wild Taro



Wild Taro – note the purplish spot on the top of the leaf

(The above information is based on information as found on the BugwoodWiki. Herbicide formulation is as recommended by Dr. Kenneth Langland, University of Florida, email communication.)

REESTABLISHMENT OF NATIVE PLANT COMMUNITIES

In areas where dense infestations of exotic plants have been killed or removed, it may be necessary or desirable to plant native species to ensure the establishment of an ecologically appropriate plant community.

A basic principle used for plant species selection is to assess a nearby undisturbed natural community that is on similar soils, at essentially the same elevation, and with matching hydrologic conditions. Plants found in the undisturbed natural area can be used to create a plant list for the area being restored.

Another important rule of thumb is to refrain from introducing native plant species into the parks that are not known to occur there naturally.

It is also critical to place the right plants in the right habitats. For example, a live oak, which typically grows in well-drained uplands, should not be planted in a wet bottomland. Conversely, bald cypress, which is common in park wetlands, should not be planted in upland areas of the parks. While bald cypress can grow just fine in uplands and is often used as a landscape tree, if the goal is to restore and maintain appropriate natural communities, then bald cypress belongs only in the wetlands.

Planting should be done in fall and winter and when soil is moist.

On the following pages are lists of trees and shrubs known to occur in the parks and that are generally available from nurseries that grow native plants.

Wetland Communities	
Scientific Name	**Common Name**
Acer rubrum	Red Maple
Alnus serrulata	Hazel Alder
Carpinus caroliniana	Ironwood; American Hornbeam
Cephalanthus occidentalis	Buttonbush
Chamaecyparis thyoides	Atlantic White Cedar
Chionanthus virginicus	Fringetree
Cyrilla racemiflora	Titi
Gordonia lasianthus	Loblolly Bay
Hamamelis virginiana	Witch-Hazel
Ilex coriacea	Baygall Holly
Ilex vomitoria	Yaupon
Illicium floridanum	Florida Anise
Itea virginica	Virginia Sweetspire
Leucothoe axillaris	Coastal Doghobble
Liquidambar styraciflua	Sweetgum
Liriodendron tulipifera	Tuliptree; Yellow Poplar
Lyonia lucida	Fetterbush
Photinia pyrifolia	Red Chokeberry
Magnolia grandiflora	Southern Magnolia
Magnolia virginiana	Sweetbay Magnolia
Morella cerifera	Wax Myrtle
Nyssa biflora	Swamp Tupelo
Osmanthus americanus	American Olive
Persea palustris	Swamp Red Bay
Pinus elliottii	Slash Pine
Quercus pagoda	Cherry Bark Oak
Sabal minor	Dwarf Palmetto
Salix nigra	Black Willow
Taxodium ascendens	Pond Cypress
Taxodium distichum	Bald Cypress
Viburnum nudum	Possumhaw

Upland Communities	
Scientific Name	**Common Name**
Aesculus pavia	Red Buckeye
Alnus serrulata	Hazel Alder
Callicarpa americana	American Beautyberry
Carya glabra	Pignut Hickory
Carya tomentosa	Mockernut Hickory
Castanea pumila	Chinquapin
Chionanthus virginicus	Fringetree
Diospyros virginiana	Persimmon
Euonymus americanus	Strawberry Bush
Fagus grandifolia	American Beech
Hamamelis virginiana	Witch-Hazel
Ilex opaca	American Holly
Ilex vomitoria	Yaupon
Juniperus virginiana	Eastern Redcedar
Licania michauxii	Gopher-Apple
Liquidambar styraciflua	Sweetgum
Magnolia grandiflora	Southern Magnolia
Morella cerifera	Wax Myrtle
Morus rubra	Red Mulberry
Nyssa sylvatica	Blackgum
Osmanthus americanus	American Olive
Oxydendrum arboreum	Sourwood
Persea borbonia	Red Bay
Quercus alba	White Oak
Quercus falcata	Southern Red Oak
Quercus hemisphaerica	Darlington Oak
Quercus virginiana	Live Oak
Rhus copallinum	Winged Sumac
Vaccinium arboreum	Sparkleberry
Vaccinium elliottii	Elliott's Blueberry

APPENDIX A

Schedule of Plan Implementation

SCHEDULE OF PLAN IMPLEMENTATION

2014

Jan	Wetland Resources will conduct training of city staff that will be responsible for monitoring and controlling invasive exotic plants in the parks.

2014 - 2018

Apr	Treat and/or dig **wild taro**. Basal treatment of **kudzu**. Dig any **Japanese holly fern** if found (any time of year).
Jun	Foliar application to **cogongrass**, **torpedo grass**, **Vasey grass**, **giant reed**, and **mimosa**. Basal treatment of **Chinese wisteria**.
Sep	Basal treatment, hand-pull, and/or cut surface treatment of **camphor tree** and **mimosa**. Foliar application to **kudzu**.
Sep-Oct	Foliar application to **Chinese tallowtree** seedlings, **Japanese climbing fern**, **Japanese honeysuckle**, and **nandina**. Basal treatment and/or cut surface treatment of **Chinese tallowtree** saplings and large trees, **Chinese privet** and other **Ligustrums**, and **rattlebox**.
Oct-Nov	Foliar application to **sweet autumn virgin's bower**, **cogongrass**, **torpedo grass**, **Vasey grass**, and **giant reed**. Basal treatment of **coral ardisia**; hand-pulling of **coral ardisia** seedlings. Treat and/or dig **wild taro**. Assess areas where dense infestations of exotics have been removed and determine if planting is necessary. If so, order plants.
Dec-Jan	Planting, as determined necessary.

2019

Jan-Feb	Update this management plan.

APPENDIX B

Herbicide Mixing Table

Chemical Amounts to Mix by Percentage and Volume

Prescribed % Mix		1 gal	3 gal	25 gal
0.5%	**=**	**0.7 0z**	**2.0 oz**	**16 oz**
1%	**=**	**1.3 oz**	**3.8 oz**	**32 oz**
2%	**=**	**2.6 oz.**	**7.7 oz**	**64 oz**
3%	**=**	**3.8 oz**	**11.6 oz**	**96 oz**
4%	**=**	**5.1 oz**	**15.4 oz**	**128 oz**
5%	**=**	**6.4 oz**	**19 oz**	**160 oz**
6%	**=**	**7.7 oz**	**23 oz**	**192 oz**
10%	**=**	**13 oz**	**38 oz**	**320 oz**
20%	**=**	**26 oz**	**77 oz**	**640 oz**

To calculate prescribed %:

128 oz in a gallon, so 128 x __% x __ gal required.

Example:
For 3 gallons of a 2% mixture, the calculation is 128 x 0.02 = 2.56 oz x 3 gal = 7.68 oz of herbicide.