



**DESIGN &  
CONSTRUCTION  
GUIDELINES**

**APPENDIX G  
CAMPUS TREE CARE PLAN  
(2013-2014)  
TAMPA CAMPUS**

PATEL COLLEGE OF GLOBAL SUSTAINABILITY  
OFFICE OF SUSTAINABILITY  
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## APPENDIX G – CAMPUS TREE CARE PLAN

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### SECTION A. PURPOSE

An integral part of Goal II of the [2013-2018 Strategic Plan of the University of South Florida](http://www.ods.usf.edu/plans/strategic) “will, through its high-impact research and innovation, change lives for the better, improve health, and foster sustainable development and positive societal change” (<http://www.ods.usf.edu/plans/strategic>). As recognized in the [USF Climate Action Plan](http://rs.acupcc.org/site_media/uploads/cap/607-cap.pdf) ([http://rs.acupcc.org/site\\_media/uploads/cap/607-cap.pdf](http://rs.acupcc.org/site_media/uploads/cap/607-cap.pdf)) and the [USF Tampa Campus Master Plan](http://tinyurl.com/TampaMasterPlan) (<http://tinyurl.com/TampaMasterPlan>), a vigorous and resilient campus tree infrastructure is vital to meeting this goal. A healthy tree infrastructure improves air quality by sequestering environmental carbon, cools the ambient temperature, prevents soil erosion, facilitates wildlife habitat development, encourages multimodal transportation, improves concentration, and reduces aggressive behavior, among other benefits. Moreover, consistent with the University’s mission as a teaching institution, trees constitute a valuable instructional resource, particularly but not exclusively in biology, environmental science, and landscape architecture.

The USF campus tree canopy has reached a level of maturity for which proactive measures are necessary to perpetuate a healthy and diverse treescape. To foster a healthy tree campus environment, the University must support a campus tree care plan. The need for such a plan has increased over the past few years as new development has begun to test the edges of desired campus density. Although great efforts have been made to preserve existing trees, this is not always possible. Therefore, it is essential to have policies and procedures in place that define how to replace lost trees in a way that will enhance the resiliency of the campus tree infrastructure. The plan outlined here provides such guidance.

The purpose of the [USF Campus Tree Care Plan \(CTCP\)](#) is to establish policies, procedures, and best practices for campus tree management for the Tampa campus of the University of South Florida. The Tampa Campus contains **815 acres** (including subleased lands but excluding the R&D Park) in addition to **735 acres** north of Fletcher Ave., which includes the Ecological Research Area and “The Claw at USF” golf course. Of this total area, **332 acres** of open space are managed by the Grounds Department of USF Physical Plant.

The greater goal of this effort is to create a sustainable campus environment that facilitates student success, creates a sense of place for USF students and employees, and provides security as well as opportunities for active and passive recreation. The specific objectives of the CTCP are to:

- improve the efficiency of USF’s management of its landscape;
- increase the benefits derived from the campus treescape while reducing costs
- support the Tampa Campus Master Plan
- ensure proper species selection, high-quality nursery stock acquisition, and industry consensus planting procedures;
- promote species diversity and proper age structure in the tree population;
- protect high-value campus trees during construction and renovation projects;
- promote tree health and safety by utilizing the International Society of Arboriculture’s best management practices when maintaining campus trees;
- ensure that trees are reasonably replaced when there is mortality due to weather, pest infestations, injury, or construction displacement;
- encourage campus community members to respect and value the campus urban forest;
- create a rich and horticulturally diverse visual landscape that exemplifies the unique composition of Southwest Florida’s native environments, as well as the region’s historical and cultural traditions; and
- develop a comprehensive educational plan to promote educational and training opportunities to USF’s students, staff, faculty, alumni, and neighborhood partners, leveraging the existing resources of the USF Ecological Research Area and the USF Botanical Gardens.

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## **SECTION B. CAMPUS TREE ADVISORY COMMITTEE**

The CTCP has been prepared and is updated annually by the [USF Campus Tree Advisory Committee \(CTAC\)](#), which is composed of faculty, staff, and students from throughout the University along with external consulting arborists from the Tampa Bay community. The 10 members of the 2012-2013 CTAC include:

- Kathy Beck, Natural Resource Coordinator, City of Tampa Parks & Recreation
- Barbara Donerly, Assistant Director of Facilities Planning and Construction, USF
- Gordon Fox, Associate Professor of Integrative Biology, USF
- Shawn Landry, Director of the Florida Center for Community Design + Research, USF
- Joseph Michalsky, Undergraduate Student, USF
- Rob Northrop, Extension Forester, University of Florida/ Hillsborough County Extension
- Shirley Pearsall, Senior Landscape Architect/Project Manager, URS Corporation
- Bryan Van Sant, Project Manager, Physical Plant, USF
- Laurie Walker, Director of the Botanical Gardens, USF
- Kebreab Ghebremichael, Interim Director of the Office of Sustainability, USF [CTAC Chair, 2012-2013]

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## **SECTION C. SUSTAINABLE CAMPUS DESIGN**

Dr. Kiran C. Patel Center for Global Solutions, which opened in January 2011, is the first landscape design project on campus to fully commit to xeric, drought-tolerant, native plants. In late 2011 / early 2012, an additional 2,000 trees (live oaks, cypress, and pine) will be planted across the campus.

In its 2011 Tampa Campus Master Plan update, USF has outlined a cross-campus Greenway, anchored by the USF Botanical Garden at the southwest corner of campus and by the Ecological Research Area in the northeast corner. These two preserves are linked by a “no-build, no-disturb” Greenway belt that protects wildlife, links habitat islands, provides opportunities for recreation, and aggregates storm water for ponds. The Greenway has been incrementally developed through the phased implementation of the long-term storm water management plan, the implementation of related landscape improvements, development of built edges through decisive placement of future buildings along the edges of the Greenway, and completion of circulation routes linking one area of the Greenway to another. These efforts have resulted in joining habitat islands, reducing heat islands, improving students’ direct relationship with local flora and fauna, and providing increased opportunities for both active and passive recreation and improved pedestrian flow. In addition, parts of the Greenway (especially the forestry reserve, recreational forest, and Botanical Garden) actively sequester carbon dioxide and thus provide offsets for the campus’ carbon footprint.

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## **SECTION D. USF TREESCAPE**

A resilient and vigorous treescape is essential to perpetuate the character of the campus and to strive towards a healthy ecosystem. Therefore, the university should:

- strive for a sustainable and resilient treescape that has an uneven age structure and diverse tree species;
- minimize changes to site conditions for established trees, especially native species;
- consider reforestation of areas that have been negatively altered;
- protect existing trees during construction;
- use native or well-adapted species when appropriate;
- select species that are resistant to disease and insects;
- proactively assess existing trees on an annual basis;
- provide required tree maintenance as needed on a regular basis; and
- Employ a certified arborist on staff when feasible. Currently USF is under hiring constraints.

The Landscape Element of the Tampa Campus Master Plan describes general standards for the USF treescape:

“New trees and husbandry of significant existing trees will be an important component of the future campus landscape. Trees should be both functional and attractive and should achieve the following broad guidelines:

- Trees should reinforce the basic structure of the master plan, positively shape open space areas, be functional in defining and unifying streets, paths and open spaces, and provide distinct visual identity to key open space elements such as gateways and plazas and, with amenities, create an atmosphere conducive to collegial interaction.
- Tree, shrub, and hedge plantings should be appropriate to the scale, uses, and microclimate of the University setting. Within the naturalistic greenways, the use of native plants should be the highest priority in plantings, and where possible, community associations should be established to promote attractive and sustainable plantings. In the more formal open spaces, a native plant palette should be augmented with colorful ‘Florida friendly’ non-natives— species that are non-invasive and historically associated with a Florida landscape.

- The dominant landscape character of the campus should be one that combines and contrasts informal and formal naturalism: The informal naturalism of the large open space greenways transition into the more formalized landscapes of the major vehicular and pedestrian axes, gateways and smaller courtyard and plaza spaces closely associated with buildings. The naturalistic approach has the advantage of allowing work to be phased over time and is readily achievable at a maintainable level of perfection, compatible with the remaining islands of native landscape, and widely accepted as an appropriate and desirable aesthetic theme.
- Broad use of plants in rows and large masses rather than in fussy, detailed plantings is recommended in principal open spaces. The use of exotic invasive species should be prohibited. Likewise, the use of a great variety of plants in close proximity for the sake of horticultural interest is not desirable because such an approach undermines the fundamental idea of unity and restraint that is central to the plan.
- To the degree possible, landscape plans should include the use of plant species that are indigenous to the natural plant communities of the region and which promote the use of xeriscape principles. In cases where non-invasive exotic plants are used to enhance the landscape, trees should be limited to those non-invasive species that are able to resist periods of drought and which require little fertilization and use of chemicals.
- Existing non-native invasive plants should be designated for removal from the campus grounds if such exotics are listed on the Exotic Pest Plant Council's list of "Florida's Most Invasive Species." As these species are located on the campus, USF staff shall coordinate with the Florida Department of Environmental Protection and other appropriate governmental entities to ensure the proper removal and disposal of these exotic species. As non-native plants die, to the extent possible they should be replaced by native species.'

"In addition to these broad principles, a number of site specific guidelines concerning new trees should be followed:

- Street trees along the loop road, and ceremonial entry malls off Fowler Avenue and other campus entry roadways should be *Quercus virginiana* (southern Live Oak) and should be planted opposite one another rather than in an alternating staggered pattern. Opposite placement creates a stronger sense of order.
- The Leroy Collins ceremonial entry drive should be planted with a double row of street trees. It should be designed to provide a visual setting for the proposed terminus building and be large enough to ensure easy and economical maintenance. The proposed forecourt in front of the new terminus building should be planted with shade trees and the plaza area adjacent to the buildings should be equipped with walkways, benches, and other special features in order to make it a useable destination for students and faculty.
- Pedestrian corridors including Elm Drive, Sessums Mall, the northern and southern edges of the Central Quadrangle, and the Interdisciplinary Mall should be designed as single landscape units to insure their strength and continuity. Their design should be simple, coherent, and expressive. Tree colonnades should be used to define the corridor edges.
- Planting at building entrances and edges that face streets and campus open spaces should consist of small colorful ornamental trees in a simple groundcover, mulched or lawn "terrace" around the building. In high exposure areas such as building entrances, plant materials should be selected for year round attractiveness.
- Important ceremonial landscapes such as gateways and plazas (including the extended MLK pedestrian plaza) should be designed to include vine-covered pergolas. The use of a consistent vine species— such as bougainvillea for color and jasmine for scent— will unify these signature elements into the larger landscape and serve as a wayfinding element.
- Parking and service areas should be visually separated from major streets and visually and functionally separated from public spaces. Brick walls, fences, and screen plantings are recommended as site treatment options for service areas. New buildings should be designed to orient service areas away from pedestrian circulation and building entries.

Parking lots should be designed to include generously sized landscaped areas— tree islands and medians between parking bays— to provide shade, reduce the heat island effect, offer visual relief,

and function as bio-retention areas, which can serve as an integral part of campus storm water management.”

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## **SECTION E. PLANTING STANDARDS**

The USF Design & Construction Standards, administered by Facilities Planning and Construction, maintains standards for all new plantings:

### **1. Clearing:**

All objectionable growth within the site area planned for building and landscaping improvements shall be cleared. All debris resulting from any clearing, stripping, grubbing, and demolition activities shall be removed from the University at frequent intervals to prevent unsightly accumulation.

### **2. Protecting:**

Trees designated to remain shall be documented on the plans and tagged in the field. The contractor is to be responsible for protecting the top, trunk, and root system of these trees. Protection shall be by barricading with four **4" x 4"** posts with **2" x 4"** rails (two minimum per side), installed at the drip line of the tree. No equipment, stockpiling of materials, work or parking is to be permitted within the barricades. Root zones shall be protected, where determined by arborist or University representative, as necessary by root pruning at outside edge of barricades.

### **3. Stripping:**

Remove all organics, grasses, roots and topsoil to its full depth to the limits of the areas to be graded. Topsoil free of tree roots, brush and other debris can be stockpiled within the site for subsequent landscaping needs. Pile topsoil no more than 4' high. All material in excess of subsequent needs shall be removed from the campus and recycled when possible.

### **4. Planting:**

For each project, procedures for planting all types of trees and shrubs (whether container grown, balled and burlaped, or collected stock, including removal of shipping protections, backfilling, watering, fertilizing, pruning and staking, and application of pre-emergent weed killers) should be outlined before the work begins in consultation with a certified arborist. Instructions shall include but not be limited to the following:

- <http://hort.ufl.edu/woody/documents/EP314.pdf>
- Remove wire and burlap from tops of root balls of trees and large shrubs.
- Treat all girdling roots before planting.
- Do not mound mulch on top of root ball.
- Mulch should be located a distance of **4"-6"** from the trunk.
- Provide mulch ring in 6" high saucer around all trees and large shrubs outside of root ball.
- Prune trees only as directed by owner or owner's representative. All pruning shall be done in accordance with ANSI A300. Pruning shall be done with sharp instruments and under the direction of the campus arborist. No flush cuts are allowed.
- Trees shall be set on undisturbed existing ground at bottom of planting pit.
- Tree planting hole should be shallower than the root ball, allowing the trunk flair to be seen 1" - 2" above the ground surface.
- Large shade trees (> **50'** in height) will have a minimum of **30' x 30'** area and be at least **10'** from the edge of pavement.
- Medium size trees (**30'-50'** in height) will have a minimum of **20' x 20'** area and be at least **6'** from the edge of pavement.
- Small size trees (< **30'** in height) will have a minimum of **10' x 10'** area and be at least **2'** from the edge of pavement.

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## SECTION F. MANAGEMENT GUIDELINES

The following guidelines inform pruning, cleaning, thinning, raising, reducing, mulching, irrigating, and fertilizing trees on campus. For information on palms, refer to the UF-IFAS guidelines.

### Pruning:

In accordance with ANSI A300 Pruning Standards, the pruning schedule shall be dictated by tree species, age, function, and location, and shall be under the direction of a certified arborist:

- Trees less than **7** years old should receive structural pruning on an annual or biennial basis.
- Trees **7-20** years old should receive structural pruning every two to five years.
- Trees **20** years old and older receive maintenance pruning every five to seven years to clean dead, diseased, dying, and defective branches from the crown.
- Trees adjacent to roadways, walkways, signs, and street lights should be annually inspected for safety and clearance issues and maintenance pruned as necessary.
- **Developing a Pruning Plan**  
<http://hort.ufl.edu/woody/documents/plan.pdf>
- **Developing a Preventive Pruning Program, Young Trees**  
[http://hort.ufl.edu/woody/documents/ch\\_12\\_mw04.pdf](http://hort.ufl.edu/woody/documents/ch_12_mw04.pdf)

To encourage the development of a strong, healthy tree, the following guidelines shall be followed when pruning:

- Pruning shall not be conducted without a clear objective or outcome.
- Prune first for safety, next for health, and finally for aesthetics.
- When removing branches, the pruning cut shall not damage the branch bark ridge and branch collar.
- Internode (heading) cuts should not be used except in storm response and crown restoration procedures.
- Branch reduction or thinning should be used to achieve pruning objectives rather than making large (>8" in diameter) branch removal cuts.

### 1. Cleaning:

Cleaning shall be performed to remove dead, diseased, dying, and defective branches, which reduces hazards, promotes health, and improves appearance. Large branches should be removed with the aid of ropes and rigging equipment to minimize the risk of tree injury from falling debris. Native epiphytic plants— such as Spanish moss, other bromeliads, resurrection fern, and native orchids— should not be removed from campus trees except where they present safety hazards. Trees will be treated for pest problems, as needed, via systemic and or contact pesticides.

- **Cleaning the Canopy**  
<http://hort.ufl.edu/woody/documents/cleaning.pdf>

### 2. Thinning:

Thinning shall be performed to reduce the density of branches, which increases light penetration, improves visibility, and decreases wind load:

- Assess how a tree will be pruned from the top down.
- Favor branches with strong, U- shaped angles of attachment. Remove branches with weak, V- shaped angles of attachment and/or included bark.
- Ideally, lateral branches should be evenly spaced on the main stem of young trees.
- Remove any branches that rub or cross another branch, as appropriate to the size and species of tree.
- Make sure that lateral branches are no more than one-half to three quarters of the diameter of the main stem to discourage the development of co-dominant stems.
- **Thinning the Canopy**  
<http://hort.ufl.edu/woody/documents/thinning.pdf>

Do not remove more than one-quarter of the living crown of a tree at one time. If it is necessary to remove more, do it over successive years.

### 3. Raising:

Raising shall be performed to provide vertical clearance from thoroughfares, signs, street lights, and structures:

- Always maintain live branches on at least two-thirds of a tree's total height.
- Removing too many lower branches will hinder the development of a strong main stem.
- Remove basal sprouts and vigorous epicormic sprouts.

- ***Raising or Lifting the Canopy***  
<http://hort.ufl.edu/woody/documents/raising.pdf>

### 4. Reducing:

Reduction shall be performed to decrease the overall height of a tree or to decrease the length of an individual branch. Reduction pruning will be used only when absolutely necessary.

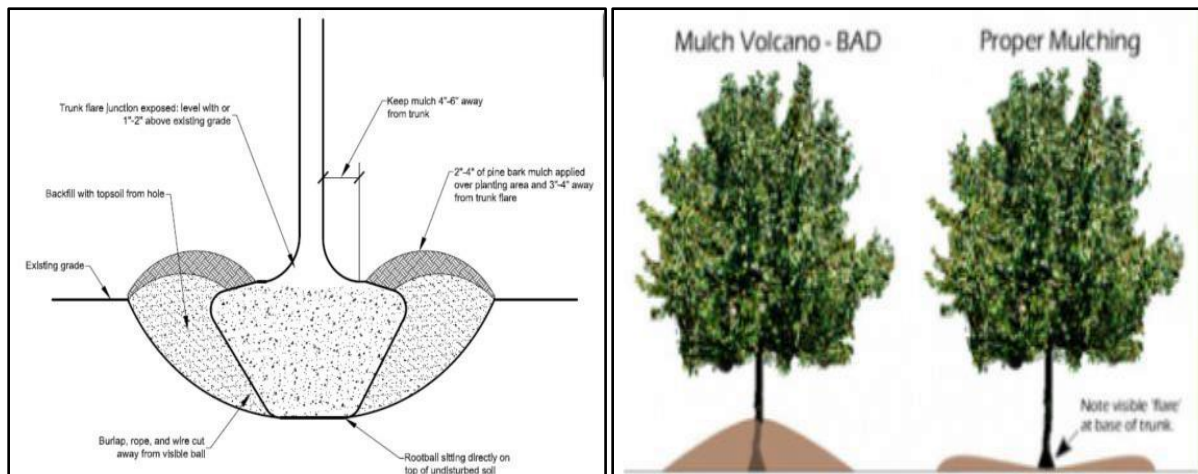
- If it is necessary to remove more than half of the foliage from a branch, remove the entire branch. cuts will be made at a lateral branch that is a least one-third the diameter of the stem to be removed.

- ***Reducing the Canopy Pruning***  
<http://hort.ufl.edu/woody/documents/reducing.pdf>

### 5. Mulching:

A layer of mulch will be applied within the established tree footprint up to every two years. Mulch should not be placed over the root ball of young trees. Periodically, drip lines of larger trees and tree groupings are mulched appropriately, as site conditions dictate, with waste wood chips. The use of cypress mulch is strongly discouraged. Refer to guidelines above on planting for more details. (Consult with USF Facilities Management for current USF preferred mulch)

### 6. Appropriate mulching:



### 7. Irrigation:

Irrigation water shall be distributed using the established UF-IFAS irrigation guidelines, which recommend water on a supplemental basis to allow for overall vigor after establishment or stress.

- ***Tree Establishment Research, What We Know and What We Don't Know***  
<http://hort.ufl.edu/woody/irrigation-research.shtml>
- ***Irrigation Management After Planting***  
<http://hort.ufl.edu/woody/irrigation2.shtml>



Size of nursery stock	Irrigation schedule for vigor <sup>1,3</sup>	Irrigation schedule for survival <sup>2,3,4</sup>
< 2 inch caliper	Daily for 2 weeks; every other day for 2 months; weekly until established.	Twice weekly for 2-3 months
2-4 inch caliper	Daily for 1 month; every other day for 3 months; weekly until established.	Twice weekly for 3-4 months
> 4 inch caliper	Daily for 6 weeks; every other day for 5 months; weekly until established.	Twice weekly for 4-5 months

Notes on Irrigation: (disclaimer on irrigation requirements)

1. Delete daily irrigation when planting in winter or when planting in cool climates. Irrigation frequency can be reduced slightly (e.g. 2-3 times each week instead of every other day) when planting hardened-off, field-grown trees that were root-pruned during production. Establishment takes 3 (hardiness zones 10-11) to 4 (hardiness zones 8-9) to 8 (hardiness zones 6-8) to 12 (hardiness zones 2-5) months per inch trunk caliper. Never apply irrigation if the soil is saturated.
2. Irrigation frequency can be reduced slightly (e.g. to once or twice each week) when planting hardened-off, field-grown trees that were root-pruned during production.
3. At each irrigation, apply 1-2 gallons (cool climates) or 2-3 gallons (warmest climates) per inch trunk caliper to the root ball. Apply it in a manner so all water soaks into the root ball. Do not water if root ball is wet/saturated on the irrigation day.
4. Trees take much longer to establish than regularly irrigated trees. Irrigate in drought the following summer.

## 8. Fertilizing:

There is no regular tree fertilization. Specimen or high-value trees may receive prescription fertilization when severe nutrient deficiencies are diagnosed.

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## SECTION G. TREE REMOVAL

Live trees are generally removed only when required to protect public safety or are detracting from the quality of the landscape. Trees will only be removed after consultation with both Physical Plant and Facilities Planning and Construction.

Storm response and recovery are generally accomplished in-house. In a crisis, the first priority is to remove tree debris that blocks campus thoroughfares, disrupts campus operations, or poses hazards to the campus community. Once these critical needs are addressed, a prioritized recovery plan is implemented during which unsalvageable trees are systematically removed and salvageable, and trees are pruned to restore their health and structure. As the tree planting budget permits, lost trees are strategically replaced to restore the structure and function of the campus urban forest in a reasonable time frame. During storm response and recovery, trees requiring specialized equipment not available in-house are addressed by outside contractors.

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## SECTION H. PROTECTION AND PRESERVATION

On the site survey map, all trees will be identified whose: root systems are likely to be impacted by construction equipment, cut and fill activities, utility corridors, proposed walks and roads, and potential construction staging areas; and whose branches may be damaged by construction equipment. The trees will be placed in one of the categories below:

### 1. Not salvageable:

- All trees that are within the footprint, or in close proximity to the footprint of a proposed building. (Note: alternative footprints to save large, valuable trees must be considered).
- Trees of undesirable species or in very poor health. Examples include, but are not limited to species that have low landscape and educational value, and heavily diseased or damaged

trees that have little chance of recovering desirable form and function, even if protected from construction damage.

**2. Low Priority for Protection:**

- Small trees (< 10" DBH) that fall outside of the building footprint, but are likely to be impacted by construction activities.
- Larger trees outside of the building footprint with relatively low ecological value. Examples include but are not limited to, trees with poor form, species of relatively low landscape and educational value, or trees with inadequate space to accommodate current or future growth even if the site is ameliorated.

**3. High Priority for Protection:**

- Medium (> 10" DBH) to large (> 24" DBH) trees of desirable species with good form, good health, and sufficient room for continued growth.

Avoid locating the general construction site around low and high priority trees where possible by planning all construction activities including new utility corridors, staging areas, new sidewalks and new roads for a minimum clearance of 15' or more away from the base of trees, and not within the edge of the canopy drip line (greater distances are desirable). High priority trees should receive more consideration than low priority trees in planning corridors, staging areas, walks, and roads.

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## **SECTION I. TREE INVENTORY**

In line with the Campus Metabolism Mapping Project conducted by the USF Patel College of Global Sustainability, a digital tree inventory and risk assessment (recording locations, species, DBH, conditions, and other useful information for the campus urban forest) covering the core campus should be developed and the information should be made available online on a dedicated website. The estimated value (in \$USD and CO2 offsets) of all trees should be calculated or estimated, and the social, economic, and ecological functions of the campus treescape should be defined. Inventory valuations can be based on the trunk value method established by the Council of Tree and Landscape Appraisers and the International Society of Arboriculture. The inventory should be updated annually, taking advantage of online software applications such as TreeKeeper and iTree. As budget allows, each tree species on campus should be identified with appropriate signage in areas of high foot traffic.

To assist with USF's Tree inventory and evaluation a project proposal was developed by individuals at USF Facilities and Planning, Office of Sustainability, Florida Center for Community Design and Research and the University of Florida/ IFAS Extension, Hillsborough Extension and, the City of Tampa to implement technology and develop and provide technology and training materials to enable citizen-based tree inventory initiatives, and make this technology available to all college campuses and communities in Florida. The project was awarded funding by the Florida Forest Service with in-kind from USF and the City of Tampa. The technology was developed with tree and forest management in mind and the tasks of the project included:

- Implementation of the OpenTreeMap web application ([www.opentreemap.org](http://www.opentreemap.org)) and mobile data collection tools;
- Development of a visual key of urban tree species found in the Tampa area;
- Creation of training materials that demonstrate the use of the technology and the collection of field data;
- Conducted a student-led testing effort to ensure that students could use the technology and learn to conduct a tree inventory at USF;
- System utilization to inventory neighborhoods within the City of Tampa; and
- Development of plans to train USF students and staff to conduct tree inventory efforts on campus

The project was successfully completed with the launch of the TampaTreeMap.org website. The website is currently open to all potential users who wish to inventory trees within the City of Tampa and the USF campus. Funding to maintain the website system is being provided by the City of Tampa, with assistance by the University of Florida / IFAS Extension, Hillsborough Extension. Principal investigator, Shawn

Landry (USF), is working with Rob Northrop from UF/IFAS to design a training program for City of Tampa neighborhood groups, staff from the City, staff from USF, and students from USF. Funding will be requested of USF in order to support the use of the TampaTreeMap.org tree inventory website and training program. As of the date of this report, over 2,000 individual trees have been inventories within the Tampa and USF areas.

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## **SECTION J. TREE DAMAGE ASSESSMENT**

Assessment of trees for lightning strikes, root problems, and other damage should be performed by a certified arborist at USF. Enforcement of protection measures should be performed by project managers and on-site engineers.

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## **SECTION K. PROHIBITED PRACTICES**

### **1. Bicycles:**

Bicycles may be parked only at bicycle racks. Bicycles (and mopeds) are not allowed to be locked to any tree at any time.

### **2. Signs:**

No signs shall be affixed to any tree without prior approval of Physical Plant through the Space Impact process.

### **3. Topping:**

Topping, heading, hat-racking, or any other form of inappropriate crown/branch reduction pruning shall not be permitted for non-palm species except in emergency situations or in executing a crown restoration procedure.

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## **SECTION L. EDUCATION AND COMMUNICATION**

Currently, the landscape standards are communicated to project managers for inclusion into project specifications. Once approved, this plan will also be provided to USF Facilities Planning and Construction for inclusion into and use within construction projects. Additionally, information and data that accompany this plan will be posted on the Office of Sustainability website. The plan will be distributed to staff members in Physical Plant, including grounds maintenance teams and Facilities Planning and Construction. The plan will also be linked to USF's Climate Action Plan, Action Steps for the Designed Environment.

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## **SECTION M. RESOURCES**

- **Landscape Plants:** Institute of Food and Agricultural Sciences, University of Florida.  
<http://hort.ifas.ufl.edu/woody>
- **Tree Care Information:** Florida Chapter, International Society of Arboriculture.  
<http://www.floridaisa.org>
- **A300 Standards:** Tree Care Industry Association.  
<http://tcia.org/business/ansi-a300-standards>

## EXHIBIT I: BOTANICAL GARDENS

Laurie Walker  
Department of Geography, Environment, and Planning  
USF Botanical Gardens  
Update: May 20, 2014

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### A. INTRODUCTIONS

When the USF Botanical Gardens was established in 1969, the Gardens were little more than wilderness, Lake Behnke was small and marsh-like, Fowler Avenue was a two-lane road and the University Mall did not exist. There were no pine trees, only native live oaks and turkey oaks. Very few people knew this small jewel existed. During the 1970s and 1980s, the Gardens served primarily as a teaching and research facility for the Biology Department at the University and was first located near the Police Station.

In the early 1970s, many of the temperate, subtropical and tropical trees and shrubs seen in the Garden today were planted. The greenhouses were moved from near the police station to their present location on site and the Gardens was fenced. A concrete block structure was built to serve as a potting shed and storage structure. This was later remodeled for use as an office building.

During the late 1970s and 1980s, the palm garden was established and the wetland forest and sand scrub beds were planted. The conservatory was built as a venue for classes and workshops and to display flowering specimens from the Garden's plant collections.

The Gardens experienced tremendous growth beginning in the 1990s, with the building of new structures and demonstration gardens. As a result, many new visitors have discovered the USFBG. The Plant Festivals attract plant enthusiasts from around the state to shop for rare and unusual plants. The Gardens serve as an important outreach component of USF. It is a portal the University with an estimated 35,000 visitors annually. Visitors to the Gardens have come from over 70 cities in Florida, 31 states, and 13 countries.

Today, the Gardens are part of the Department of Environmental Science and Policy in the College of Arts & Sciences. It consists of approximately 7 acres of developed gardens connected to an additional 6-9 acres of greenbelt area to the north on the southwest corner of the USF Tampa campus. The Gardens maintains a living collection of over 3,000 taxa of plants and natural habitats including: fruit trees, grasses, begonias, orchids, bromeliads, palms, aroids, gingers, carnivorous plants, cycads, cactus and succulent plants, an herb and scent garden, wetland forest, temperate forest, subtropical shade garden, and Florida upland scrub and sandhill habitats.

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### B. HISTORY OF THE USF BOTANICAL GARDENS

**ca. 1968** – Garden established by Dr. Robert W. Long, Jr., Chairman of the Department of Botany and Bacteriology with the purpose of serving as a teaching and research facility for the Department. Its first location was near the Police Department. Dr. Richard Mansell named Interim Director for six months during Dr. Long's sabbatical at Harvard University.

**ca. 1969** - Derek Burch hired as first part-time Director/Assistant Professor. The Garden moved to present location. President Allen provides funds for the relocation, construction of facilities including, a block house, greenhouses, a shade house, an irrigation system for 7 acres, and a fence for entire perimeter.

**1969-1974** – Derek Burch establishes basic plantings including rain forest area, temperate forest and fruit tree collection. A student is hired half-time to take care of plants and lead limited tours for school groups and garden clubs

**1975** – Full-time gardener position created. Biology Department creates Botanical Garden Advisory Committee (Dick Mansell, Clinton Dawes, Bruce Williamson and Diane TeStrake). Search for new Director is undertaken.

**1975** – Frederick Essig hired as Director/Assistant Professor.

**1975-1990** – Plantings continue. Computerized plant inventory developed. Palm Garden, Riparian Forest and Florida Scrub displays established. Early plant sales (beginning in 1978) earn about \$2,000 annually. Newsletter established to inform university administrators and public of Garden activities. A small membership group of financial supporters develops.

**1991** – Decision made to increase Garden outreach to public. Volunteer group established with the aid of USF Women's Club and students. First major plant festival organized, based mainly on participation by local plant societies. Newsletter expanded to 4 times/year. Blockhouse renovated into staff office with donation from Dr. and Mrs. Behnke.

**1992-1998** – Board of Advisors established. Volunteer group provides major help in cleaning up Garden and running Plant Festivals; Conservatory renovated to serve as meeting room. New front gate built with gift from Behnkes. Herb Garden, Bromeliad Garden, Carnivorous Plant Bog displays established. Festivals and membership expand rapidly. Half-time curator position created to develop plant collections. Permanent retail plant shop established in 1994. Additional events added: Cactus and Succulent Show, Citrus Celebration, Lavender Festival, Butterfly Festival, Tropical Plant Fair. Program of weekend classes added. Ad hoc community advisory panel convened in 1996 to discuss future of Garden.

**1998** – President Castor agrees to upgrade Botanical Garden into a major community-oriented facility and provides funds for a full-time Director and an operating budget. Garden moved to Environmental Science and Policy Program under the guidance of Dr. Renu Khator. National search undertaken for new Director.

**1999-2000** -- Brad Carter hired as first full-time Director and given mandate to develop a strategic plan for the USF Botanical Garden. Shade garden, carnivorous bog, and welcome entrance from parking area established. Orchid collection receives first of three major donations. Master plan completed.

**2001** – Laurie Walker hired as second full-time Director. Master plan approved by University and included in University master planning.

**2002** – Gardens lose funding from College due to state budget cuts. Challenged to become self-supporting.

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## **C. THE MASTER PLAN FOR THE USF BOTANICAL GARDENS**

The following notes record the recommendations of a planning session held at the University of South Florida on November 8th and 9th, 2000. The purpose of the session was to prepare a comprehensive master plan for the 6-acre University of South Florida Botanical Gardens and the 3.5-acre greenway area along its north border. Prior to the planning session, the garden planning team prepared a facilities program and a survey map of the existing garden property. The facilities program and property survey served as the basis for planning.

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## **D. PLANNING PARAMETERS**

At the outset of the planning session, a number of key parameters were established that guided the subsequent planning approach.

It was established that the location of buildings and parking areas would be confined to the 6-acre existing Botanical Gardens property, and that use of the 3.5-acre area to the immediate north would be limited to trails, temporary structures, natural vegetation and plant displays.

It was established that the 36.5' elevation is the Lake Behnke 100-year flood plan, and that no parking or buildings would be located below this elevation.

It was noted that the existing vehicle entrance is unsafe and could be relocated to the Pine Drive frontage along the south boundary of the Botanical Gardens.

It was agreed that the large specimen dicots, particularly Live Oaks and flowering trees, should be protected to the maximum extent possible in the new plan. Groups of trees were established as more valuable than lone specimens. The palm collection was noted as being easier to move than the large dicots.

It was noted that the lake views available from the Botanical Gardens property should be capitalized on in the plan. The present garden plan does not exploit this site asset.

It was established that it would be highly desirable to have direct linkages between key use areas, including the proposed Conservatory facility and the proposed education Center Building; between the multipurpose room and the event garden; between the Conservatory and its back-up greenhouse; between heavily used demonstration education and display gardens and the main building restrooms; and between the garden shop and the main entrance. It was determined that greater visibility of the Botanical Gardens from the surrounding streets would be desirable.

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## **E. PLANNING RECOMMENDATIONS:**

- 1. Land Use Organization** – It is proposed that the primary Garden buildings be located in the east end of the site, service buildings in the northeast, parking and access along the south edge, the collections and gardens in the center of the property, and natural areas in the far west and far north areas. This arrangement provides the following advantages:
  - Logical safe access from Pine Drive along a prominent public edge.
  - Buildings and parking are located in an area that does not require the removal of large established dicots.
  - Buildings will have good visibility from surrounding public streets.
  - Collections and gardens will be consolidated in a large contiguous area, not bisected or divided by roads or buildings.
  - Views to Lake Behnke will be available from many areas in the Gardens and the Gardens plan as a whole is oriented towards the lake.
  - Service buildings and access are peripheral and separate from the visitor facilities.
  - Natural areas capitalized on existing undeveloped habitats.
  
- 2. Garden Circulation Pattern** – The garden elements are linked by a set of paths that define a loop system. Two axial paths extend from the Gardens main entrance; one that goes north to the Sandhill Natural area and one that goes west to the Forested Wetland area. At the end of each of these axial paths is a small shade pavilion that will be a site for interpretive information and a place for teachers to pause on a tour and talk with students. These are called "teaching pavilions." The two teaching pavilions are connected with a third major path that roughly parallels the shore of Lake Behnke. These three paths frame the core of the collections. The paths would be paved and graded for universal access. To the north and west of the core area paths, trails will be developed into the wetland and the Sandhill community.
  
- 3. Vehicular Access and Parking** – It is proposed that the main entrance to the Gardens be relocated on Pine Drive along the south boundary of the Gardens property. Safe sight distances should be established between the entrance and intersections to the east and west. The plan shows a through-driveway arrangement with two exit and entry points. Two-way flow on the driveway is accommodated in the plan, however, it may be determined that a one-way system is preferred for traffic flow reasons not explored in this study. The two-way system offers greater flexibility and is desirable for that reason. The plan provides a pull-off lane for bus and automobile passenger drop-off, and parking spaces for 47 automobiles, including spaces for the disabled. The parking area is parallel to and close to Pine Drive to keep the parking at the perimeter of the property and make economical use of the land.

It is proposed that the street edge between the Gardens parking and the street curb be planted with distinctive, large flowering trees or palms. This will establish a signature identify for the Botanical Gardens along its most prominent edge. The planting should be a strong, singular, unified gesture that is in keeping with the scale of the Pine Drive corridor and recognizes the speed of viewers. Detailed planting along this edge would not be appropriate; bold strokes are required. It is also recommended that a wall be developed along the road edge to visually screen parked cars and provide security. A wall is preferred over a fence because of the level of quality imparted by a wall.

- 4. Building Complex** – It is proposed that the Education Center, Conservatory, back-up greenhouse and maintenance buildings be located in the east end of the Gardens property. This will minimize the removal of large dicots and consolidate buildings as a barrier between the street and the interior of the Gardens. The proposed configuration established a strong tie between the parking area and the Education Center and the visitor reception area, and defines a large one-half acre area courtyard devoted to gardens, including perennial garden, herb garden, enabling garden, carnivorous plant bog, and the woody plant collections. The courtyard is surrounded on four sides by a colonnade that would be roofed on three sides and an open trellis for vines on the west side. The courtyard would be fully irrigated and made accessible by a regular pattern of garden paths.

In the southeast corner of the complex, a walled Event Garden would be developed in close association with the multipurpose room of the Education Center. This garden will provide a semi-private venue for meetings, seminars, workshops, speaker events and revenue generating events. Its location allows clear access from the parking area, and separation from other Gardens areas that may be used simultaneously by visitors and other groups. The Conservatory would be accessible from the Event Garden.

The Conservatory is proposed as a modular structure that may have a tall ceiling central area with wings subject to climate control. This would allow for the development of partitioned dry, wet, hot and cool areas within the Conservatory. The primary access would be from the west. The yard area to the east of the Conservatory could be used for related outdoor display space or as a service area devoted to Conservatory support. The back-up greenhouse is linked to the Conservatory via the arcade. The area north of the back-up greenhouse is designated for research greenhouses. Maintenance, nursery and production areas are located in the northeast corner of the building complex. A service gate on to Pine Drive to the east would serve these.

- 5. Entrance Patio and Shade Garden** – An entrance patio and shade garden is proposed to the immediate north and west of the main pedestrian entrance to the garden. This area takes advantage of an existing group of large Live Oak trees and a large existing Floss Silk tree. New shade plantings are proposed to frame a narrow view from the patio to Lake Behnke. A glimpse of the lake from this location from under the shade of the large oaks will provide a dramatic and enticing first view into the collections arranged between the lake and the Gardens entrance. The patio will be enlivened with a small water feature that will serve as a focal foreground element upon arrival at the Gardens; and make a sensory link to Lake Behnke in the distance. The Shade Garden path defines an informal circuit from which shade-loving plants can be viewed. Benches should be provided because this will be a popular area to sit during hot periods. The garden opens to the two main axial paths, and on the Vista Lawn to the northwest.
- 6. Demonstration and Children's Area** – A Home Demonstration area and Children's Garden are located along the west axis path, west of the Shade Garden. A large open pavilion for gatherings, classes and workshops is associated with these gardens and will serve as the bases for teaching activities in this part of the Gardens. The area would include fruit trees, vegetable gardens, flower gardens and a variety of educational displays for homeowners such as composting and pest management.
- 7. The Children's Garden for Children** – A dense evergreen hedge is planted along the south edge of this area to prevent children from going into the parking area. The hedge may be developed as a multi-tiered demonstration.

- 8. The Core Area Collection** – It is proposed that the area bounded by the Forested Wetland on the west, Lake Behnke on the north, the Building Complex on the east, and the Shaded Garden and the Demonstration Gardens on the south be developed as the core collection of woody plants. The proposed arrangement is to locate the plants in large beds informally arranged on a gently sloping lawn overlooking the lake. Plantings within the beds would be dense and layered with canopy and understory species. While the collections may include Florida natives, it is recommended that the core area collection focus on non-invasive, non-natives, including dicots, palms and cycads. This focus recognizes that the large Forested Wetland and Sandhill area will be the locations where Florida natives will be accommodated. The central lawn around which the core collections will be arranged is also planned as the site for large group gatherings and events. This area is not large enough to meet the demands of the annual Gardens plant sale. It is, therefore, recommended that future plant sale events be held at an offsite location with appropriated vendor space, parking, restroom facilities, water, security, and shade as may be required.
  - 9. The Vista and Overlook** - It is proposed that successively wider framing plants proceeding from the Shaded Garden to the northwest frame the view from the entrance patio. At the westernmost extent of the view axis on Gardens property, it is proposed that a scenic overlook be developed. The view for the overlook will be directed northwestward to the densely vegetated west shore of the lake, and attempt to avoid focusing on the hospital buildings to the north and Bruce B. Downs Boulevard to the west.
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## EXHIBIT II: FOREST PRESERVE

### USF FOREST PRESERVE WHITE PAPER \*

\* Approved by the USF Board of Trustees as a part of the Campus Tree Care Plan  
Gordon A. Fox, David Lewis, Earl D. McCoy, and Henry Mushinsky  
Department of Integrative Biology  
September 2013

#### A. INTRODUCTION

The USF Forest Preserve (FP) is a major asset to the University. It is used extensively for student and faculty research. More than 70 research papers in the peer-reviewed literature have been focused on the FP, as have more than 20 M.S. theses and Ph.D. dissertations. USF researchers from the departments of Anthropology, Civil Engineering, Geography, Geology, and Integrative Biology have conducted research at the FP in the last 5 years. Undergraduate and graduate classes from Anthropology, Geography, Geology, and Integrative Biology have similarly made use of the FP.

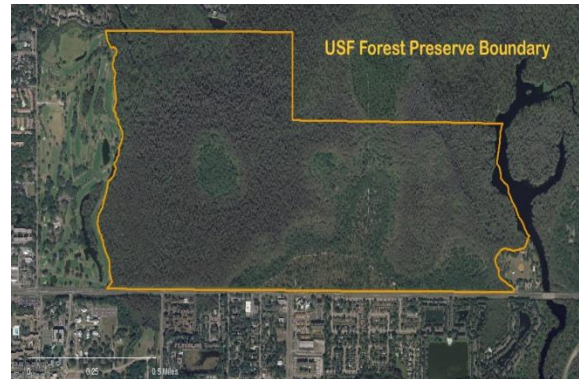


Figure 1. Satellite Image of FP

The FP comprises roughly a square mile of land (Figure 1), located north of Fletcher Avenue, roughly between the Golf Course and Riverfront Park. It has been administered by the Biology (and subsequently, Integrative Biology) Department since 1960s, with the goals of conservation, teaching, and research. Starting in the 1970s, a series of experimental burn plots were established, mainly along Fletcher, and controlled burns were conducted until 2005. Since then it has been difficult to meet the regulatory standards for prescribed fires, and they have not been conducted in the last few years. The FP has been protected for many years by being incorporated in the Master Plan.

#### B. HOW THE FP IS USED

##### 1. TEACHING

The FP provides a resource unlike any other for courses. In the last several years, the FP has been used by these classes:

- Principles of ecology (PCB3043L)
- Population biology (PCB6462C)
- Statistical ecology (PCB6455)
- Wetland environments (EVR4027)
- Ecosystems of Florida (EVR4930)
- Soils in archaeological research (ANG 6115.001)
- Diversity and evolution of plants (BSC4933)
- Hydrogeology field methods (GLY4947L)
- Ecology of plants (BSC4933)
- Ecohydrology (GLY6824)
- Herpetology (BSC 5425)



Figure 2. Dr. Earl McCoy and students.

Moreover, numerous undergraduate students have participated in unstructured coursework, conducting research in the FP. In a typical year, some 15-20 students gain research experience

through this route. The FP has also provided an important resource for student research. A few examples of student research there within the last several years include:

- Maria del Pilar Lopera Blair (Ph.D. student, IB): gene flow and speciation in *Liatris*.
- Neal Halstead. (M.S., IB): fire in an urban habitat island
- Dave Jennings (Ph.D. student, IB): competition between plants and animals
- Stephanie Butera (Honors thesis, Anthropology): decomposition processes and soil chemistry
- Additional research by Ph.D. students from University of California-Davis and Louisiana State University.

## 2. FACULTY RESEARCH

A considerable number of short- and long-term faculty research projects are conducted in the FP. One can get an impression of the breadth of these projects by considering the following, all of which have been conducted within the last several years.

- Dr. Erin Kimmerle (Anthropology): changes in experimental gravesites.
- Dr. Mark Ross (Civil & Environmental Engineering): hydrology of Florida sandhills.
- Dr. Ruiliang Pu (Geography): remote sensing to estimate environmental parameters.
- Dr. Jason Rohr (Integrative Biology): causes of amphibian decline
- Dr. Mark Rains (Geology): water availability to vegetation.
- Shawn Landry (Architecture): urban forests.
- Drs. Earl McCoy and Henry Mushinsky: studies of the gopher tortoise



Figure 3. Experimental grave site research.



Over the years, USF's ability to attract externally funded research grants has been considerably strengthened by the FP. In some cases, the FP itself proved to be the location of funded research, such as in the 2002 NSF grant (for \$2.2 million) to E. D. McCoy and H. Mushinsky on "upper respiratory tract disease and environmentally threatened gopher tortoises." In other cases, research at the FP provided the initial data to support the case for external grants.

Perhaps the most telling measure of the FP's importance for research at USF is the list of more than 70 peer-reviewed publications based on research there.

Figure 4. The sandhill habitat has been the site of much student and faculty research.

## 3. SERVICE

In recent years, the FP committee, together with the Botanical Garden, has organized wildflower walks involving dozens of people from the community. Tampa Audubon Society conducted a segment of its Christmas Bird Count in the FP.

The FP directly abuts Riverfront Park. We have cooperated with the Campus Recreation department to develop a self-guided nature walk through the FP, to educate students.

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## C. THE FUTURE OF THE FP

The FP has, for several decades, been a resource of considerable value to USF as an outdoor classroom, and as the laboratory for many studies. We believe it is possible for the University to get more value from the FP in both of these respects, and in some others as well. The value of the FP in both of these senses stems from the fact that it is a stone's throw from the main campus, yet is large and relatively wild, and has diverse habitats.

Two other aspects of the FP make it particularly valuable for research. First, it preserves the last remaining sizable patch of sandhill habitat in

the area. Many species of animals and plants that depend on this kind of habitat and are present in the FP would otherwise be absent from a

substantial area. Second, the FP is near the edge of a substantial "island" of undeveloped land that is surrounded by increasing urbanization. This presents numerous opportunities for research, teaching, and community outreach. This also means that the FP plays an important role in such ecosystem functions as CO<sub>2</sub> uptake and regulation of runoff, and thus its preservation may be increasingly important to the university.

Finally, the Department of Anthropology has special interest in some areas of the FP. These may be important in future research, but in any event the university has a legal obligation to protect the resource.



**Figure 5. The extensive wetlands in the FP are an important part of USF's interaction with the environment of Tampa Bay, and also provide opportunities for teaching and research.**

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## D. MANAGEMENT ISSUES & RECOMMENDATIONS

There are a number of management issues facing the FP and the university's ability to use it more effectively. Our central recommendations involve institutionalizing USF's support for the FP's mission. Here we outline the particular issues faced by the FP, and recommend ways in which they may be addressed.

### 1. PUBLIC FACE

At present the FP has no public face save some web pages on the IB Department's web site. There is a fence along Fletcher Ave., and the gates have faded signs telling the public that they may not trespass.

- **Recommendation 1:** develop an attractive web site for the FP. A well-maintained website will prove useful for those interested in research or teaching there. It will also be an important avenue by which USF can publicize its preservation of this important resource.
- **Recommendation 2:** install new signage. New signage along Fletcher Avenue and at trails that enter the FP from adjacent properties can be a low-cost way of simultaneously reducing trespassing and publicizing USF's mission.



## 2. MANAGEMENT

Land management issues include physical maintenance of fencing and fire lanes, control of invasive species (including feral hogs as well as such plant pests as *Melaleuca* and cogongrass), and maintenance of signs.

Both trespassing and poaching occur in the FP with some regularity. Much of the trespassing is benign, but it requires regular checking both because USF may face liability issues and because some trespassers may cause fires. Similarly, incidents of poaching have occurred in the FP. Here the principle concern is the safety of those involved in teaching or research.



Figure 6. We need to manage the FP's resources.

- **Recommendation 3:** establish a Director of the FP as part of a faculty position. The Director's job would be to expand and coordinate research and teaching in the FP, seek external funding for the FP, and coordinate the use of the FP in public outreach work. We envision this as constituting a significant part of a faculty appointment.
- **Recommendation 4:** Hire a manager for the FP. At least initially, this can be a half-time position. The manager would report to the Director. The manager will, among other duties, coordinate and conduct much of the regular maintenance work, check many areas for signs of unauthorized use, supervise the maintenance of a database on permitted uses, and prepare and organize prescribed burning.
- **Recommendation 5:** Provide an annual budget for maintenance and management.

## 3. PRESCRIBED BURNING

Fire is a key feature of Florida ecosystems, and this is true in the FP. Many of the habitats in the FP are normally fire-dependent. Moreover, many species – especially the threatened gopher tortoises – depend strongly on frequent fire to maintain appropriate habitat. Without fire, the value of the FP to USF will decline. Moreover, without a fire program, the chance of wildfire – started by lightning strikes, cigarettes or sparks from passing vehicles, or by trespassers – greatly increases, and as fuel accumulates, the potential liability to the university increases as well.



Figure 3. The FP has been one of USF's best-kept secrets. It's time to make it one of our best-known assets.

Faculty in the IB Department have conducted prescribed fire in the sandhill portion of the FP, but in recent years regulations and lack of resources have made this quite difficult to do. Because the FP is in an urban setting, permits for prescribed fires can only be issued under a narrow range of weather conditions. However, burning also requires trained and licensed personnel, and proper equipment – none of which the IB Department nor the university have.

- **Recommendation 6:** Purchase appropriate equipment for maintaining fire lanes, or (more likely) contract with others to provide the equipment.

- **Recommendation 7:** work with urban forestry professionals to inventory the biological resources of the FP and develop a burning plan.
- **Recommendation 8:** contract with others to conduct the prescribed burning.

#### 4. GROWING THE FP'S USE

Key to the success of the FP will be to develop new opportunities. These include interactions between departments to use the FP in new and creative ways, proposals for research grants, proposals for grants to the FP as an institution, development of small courses, public tours, and interactions with other universities and government agencies.

- **Recommendation 9:** provide university resources and connections to the Director. The Director position needs to be meaningful. The University can provide important support in several ways, for example, by collaborating on fund-raising with the Director.
  - **Recommendation 10:** establish an Advisory Board. The board would be composed of representatives of those USF departments with a stake in the FP, as well as representatives from the community. The mission would be to support the Director's efforts to develop new opportunities.
  - **Recommendation 11:** seek membership in national organizations of research stations. Doing so will help establish USF's presence in organized environmental research, and will encourage cross-fertilization of ideas with other universities.
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