

BELL CREEK NATURE PRESERVE
LAND MANAGEMENT AND LAND USE PLAN
FCT Award Number 96-010-P7A

1.0 GENERAL INFORMATION

1.1 Location of the Bell Creek Nature Preserve

The Bell Creek Nature Preserve (Preserve) is located east of McMullen Road, south of Boyette Road in Riverview, Florida. The Preserve occupies Sections 22, 26, and 27, in Township 30 South, and Range 20 East in southern Hillsborough County, south of the Alafia River and west of Bell Creek. Land use surrounding the Preserve is mainly medium density residential, with some institutional (school) and some commercial land uses included. Other Hillsborough County and State conservation lands are located to the northeast, southeast, and east of the Preserve. Figure 1 shows the location of the Preserve, as well as the other public lands in the vicinity. Appendix A provides the legal description, easements, and other legal documents for the Preserve.

1.2 History of the Preserve

Hillsborough County acquired the original 60 acres of the Preserve for \$816,000 in May 1990. In November 1995, the County completed the purchase of an additional 395 acres for \$1,450,000 from MacRiley Homes. The County conveyed a portion of the Preserve (mostly altered lands) to the Hillsborough County School Board for the construction of Marion Rodgers Middle School. In September 1997, the County Real Estate department completed the acquisition of 141 acres from Murlin and Myra Hansen for \$1,350,000. The County received a grant of \$1, 290,058 from the Florida Communities Trust for 50% of the cost of the remainder of the Hansen and MacRiley Homes properties (FCT Project Number 96-010-P7A). *Grant funding from FCT was used to acquire the Preserve and this Management Plan is a revision of the 1997 Management Plan which was developed to ensure that the Preserve will continue to function in accordance with the Grant Award Agreement and in furtherance of the purpose of the grant application.*

Phase 1 environmental assessments were conducted for the two larger land purchases that comprise the Bell Creek Nature Preserve. The first site assessment was conducted on the MacRiley Homes, Inc. tract in 1995 (Meryman Environmental, Inc.) and determined that, with the exception of some piles of solid waste, the site did not contain any toxins, hazardous materials or other potential environmental problems. The solid waste was removed prior to purchase by the County.

The second site assessment was conducted in 1997 (SES, Inc.) on the 160-acre Hansen tract. This assessment determined that the site contained numerous piles of household trash and construction debris, but there were no visible environmental impairments on the site.

Figure 1 location map

Figure 2 historic aerial

The Bell Creek Nature Preserve has been impacted by historic land uses such as logging, cattle grazing, road construction, partial development of a subdivision within the Preserve boundaries which included wetland dredging, road, and home development, and construction of a spray field.

Upon acquisition of additional acreage in the mid-1990's, Hillsborough County established a small office complex and site security residence to serve the public, centralize it's management operation of environmentally sensitive lands, and provide additional management, restoration and protection to the Bell Creek Nature Preserve.

The Hillsborough County Parks, Recreation and Conservation Department has been responsible for stewardship of the Preserve from initial acquisition to present, has maintained the ongoing prescribed burn program, maintained an ongoing invasive plant and animal program; installed, repaired, and posted boundary fencing; applied for grant assistance and removed derelict fences with assistance from the AmeriCorps program and Youth Environmental Services (YES) of Wimauma. .

From 1998 to present, the County installed a two-acre facility which includes an unpaved parking area, kiosk, bike racks, picnic tables, perimeter fencing, a security residence (currently occupied by a park ranger), a marked hiking trail, and Florida Communities Trust acknowledgement signs. Ongoing environmental restoration plantings have been conducted in the past and a series of trash removal events have taken place. The County also developed a brochure which is currently publicized through its web site.

The future land use of the Preserve is Natural Preservation. This plan is a revision of the original 1997 management plan produced by HDR Engineering.

1.3 The Purpose of the Bell Creek Nature Preserve

The Bell Creek Nature Preserve was purchased in part by the Environmental Lands Acquisition and Protection Program (ELAPP). ELAPP was established in 1987 by a referendum which provided for the collection of a 0.25 mil tax for four years for the purchase of environmentally sensitive lands. Since its inception, ELAPP has identified over 108 sites as meeting ELAPP criteria for protection or acquisition. Over fifty sites have been acquired to date, resulting in the preservation of over 44,000 acres.



The purpose of acquiring the Bell Creek Nature Preserve was to provide protection for natural plant communities and associated protected species, extend a greenway, preserve a wildlife corridor that was being lost to development, and provide numerous passive recreational opportunities. *The Bell Creek Nature Preserve will continue to be managed only for the conservation, protection and enhancement of natural resources, and for public outdoor recreation that is compatible with the conservation, protection and enhancement of the site.* The existing recreational uses are restricted to passive activities, such as hiking and nature study, compatible with management of the Preserve's natural resources. The Preserve provides walking trails through different habitat areas with mature trees and a varied understory, as well as open areas dominated by grasses and herbaceous species. The trails are marked and signage clearly state that the Preserve is only open during daylight hours. The Preserve is easily accessible to the general public. Entry signage, brochures, and trails are already in place at the entrance to the Preserve, off of McMullen Road. No significant changes are proposed for the Preserve for the life of this plan.

1.4 The Management Objectives for the Preserve Include the Following:

1. Continue active habitat management activities such as prescribed burns and invasive species control.
2. Continue specific management strategies for listed species present to protect and perpetuate the species populations.
3. Continue work with neighbors and volunteers such as Marion Rodgers Middle School, Boyette Springs Subdivision, and Shadow Run Subdivision for cleanup and security and encourage a sense of shared responsibility for the benefit of the Preserve.
4. Maintain the site security residence at the entrance of the Preserve at McMullen Road and provide site security such as perimeter fencing.
5. Continue management programs such as mapping invasive species locations, and inventorying and monitoring wildlife and habitat conditions.
6. Address budget issues for long-term management of the Preserve. Continue to pursue grant funding.
7. Maintain public access in a manner compatible with the protection of resources.
8. Continue environmental education programs in the Preserve.

The Preserve assists Hillsborough County in implementing the goals, objectives and policies of the Recreation and Open Space (ROSE), Future Land Use (FLUE), and Conservation and Aquifer Recharge (CARE) elements of County's Comprehensive Plan

(www.theplanningcommission.org/hillsborough/comprehensiveplan). The preservation of wildlife habitats and the development of public recreation and environmental conservation activities on the project site will help to accomplish or further enhance the following plan goals and objectives:

- Preserve, conserve, restore, and appropriately manage the natural resources of Hillsborough County to maintain or enhance environmental quality for present and future generations (CARE Goal).
- Maintain or improve the ecological integrity of natural lakes, ponds, and streams, and provide for multiple uses such that existing water quality, fisheries habitat, scenic and recreational opportunities, and other natural and community benefits can be maintained, improved and where feasible, restored (CARE Objective 6).
- Maintain populations of threatened and endangered species and species of special concern occurring in Hillsborough County; and where feasible and appropriate, increase the abundance and distribution of such species (CARE Objective 14).
- Correct existing deficiencies and prevent future inadequacies to an efficient system of open space, park, and recreational facilities proportionately distributed to meet the needs of the populations.
- Increase the provision, protection, and enhancement of open spaces by public agencies and private enterprises (ROSE Objective 3, Policy 3.8).
- Continue to implement a program to allow appropriate utilization and protection of natural resources (ROSE Objective 11, Policy 11.2).
- Consider the needs of existing urban and suburban areas and newly developing urban areas when providing and programming needed public facilities (FLUE Policy D-6.3).
- Meet the standards for county parks and recreational facilities as specified in the Capital Improvements Element (CIE Policy 1.C.1.f).
- Apprise the Florida Communities Trust of all site management decisions that deviate from those listed in this management plan through the continuation of the preparation and submittal of annual stewardship reports.

The Bell Creek Nature Preserve is identified in all literature and advertising as acquired with funds from the Florida Communities Trust and operated as a natural conservation and outdoor passive recreation area.

1.5 Adjacent Land Uses and Potential Conflicts

The Bell Creek Nature Preserve is in a location that is exhibiting exponential growth. Residential subdivisions, commercial areas, and expanding road networks, surround the Preserve on all sides. Because of this, the staff at the Preserve is faced with problems of illegal dumping, vandalism, stray or abandoned pets and exotic animals, and the difficulties associated with prescribed burning in densely inhabited areas. For these reasons, the County has a live-on site security resident. This individual patrols the Preserve frequently. The help of the Sheriff's Office is enlisted for more serious infractions.

2.0 NATURAL RESOURCES

2.1 Soil Resources

2.1.1 Soils Distribution

According to the United States Department of Agriculture/Natural Resource Conservation Service (formerly Soil Conservation Service) Soil Survey of Hillsborough County (USDA 1989), there are twelve different classifications of soils found in the Bell Creek Nature Preserve. Table 1 lists the soils and the surface area they cover within the Preserve. Figure 3 highlights the soil types and shows their distribution throughout the Preserve.

Table 1 Bell Creek Nature Preserve Soils Distribution		
Map Number	Soil Type	Acreage
3	Archbold fine sand	27.49
5	Basinger, Holopaw, and Samsula soils	66.45
7	Candler fine sand	61.29
21	Immokalee fine sand	33.28
27	Malabar fine sand	36.26
29	Myakka fine sand	93.45
33	Ona fine sand	16.45
41	Pomello fine sand	59.15
46	St. Johns fine sand	27.09
53	Tavares-Millhopper fine sands	9.21
60	Winder fine sand, frequently flooded	30.07
61	Zolfo fine sand	11.79
99	Open water	1.94
	Total Acreage	473.92

USDA Natural Resource Conservation Service, Soil Survey Graphic (SSURGO) Database for Hillsborough County, Florida, 2004.

FIGURE 3 SOILS

2.1.2 Soils Description

Archbold fine sand (3). This soil has developed thick beds of very loose fine sand, and is nearly level and found on low ridges in flatwoods. The soil is extremely low in organic matter and mineral nutrients and is strongly acidic. The soils drain quickly and contain little moisture, even during the rainy season. Vegetation supported by these soils is those found in sand pine scrub/xeric oak plant communities. This soil type comprises 5.80% of the Preserve and is found in three locations in the western extent of the Preserve.

Basinger, Holopaw, Samsula soils (5). This soil type makes up 14.02% of the total surface soil cover and is found in six locations in the western portion of the Preserve. This soil complex supports either freshwater marshes or mixed hardwood swamps in the Preserve. Vegetation in the marshes includes broom sedge, sugarcane plumegrass, Carolina willow, primrose willow, bluestem, pickerelweed, panic grass and maidencane. The vegetation in the hardwood swamps includes loblolly bay, swamp bay, red maple, swamp azalea, golden club, and many species of ferns.

Candler fine sand (7). This soil is nearly level to gently sloping and excessively drained. It is typically found in turkey oak/sandhill communities with native vegetation including turkey oak, blue jack oak and sand live oak. Unfortunately most of this habitat on the east side of the Preserve was cleared for development of a spray field. A native example of the soil type, found near Boyette Springs subdivision, contains native pine flatwoods. This soil type comprises 12.93% of the Preserve.

Immokalee fine sand (21). This soil is nearly level and poorly drained and is typically found in the flatwoods. The soil normally supports typical flatwoods vegetation such as longleaf and slash pine in the canopy, with lopsided Indian grass, gallberry, saw palmetto, pineland three-awn and wax myrtle in the understory. Immokalee fine sand comprises 7.03% of the total surface soils and is located in three locations in the western portion of the Preserve.

Malabar fine sand (27). The Malabar fine sand soils are usually found in depressions within pine flatwoods. The native vegetation on this soil type includes cabbage palm, longleaf pine, slash pine, saw palmetto, and wax myrtle. Malabar fine sands comprise 7.66% of the total surface soils in the Preserve and are found in three locations in the western portion; all on the perimeter of wetlands.

Myakka fine sand (29). This soil type is the most common in the Preserve with approximately 19.73% of the surface soils. This soil is found in six locations in the Preserve. This soil type is nearly level and poorly drained, and supports pine flatwoods with longleaf and slash pine in the canopy and saw palmetto, gallberry, running oak, and wax myrtle in the understory but in the Preserve, portions of these areas were cleared while some remain in the natural plant communities described above.

Ona Fine Sand (33). This soil type is found in four locations in the central portion of the Preserve and comprises approximately 3.47% of the total surface soils. In its natural state it supports mesic pine flatwoods, with typical flatwoods vegetation such as longleaf and slash pine in the canopy and lopsided Indian grass, gallberry, saw palmetto, pineland three-awn and wax myrtle in the understory. Approximately 50% of the Ona Fine Sand in the Preserve still supports a majority of native vegetation.

Pomello fine sand (41). This soil is moderately to poorly drained and strongly acidic. The natural vegetation community on this soil is pine flatwoods. The soil normally supports typical flatwoods vegetation such as longleaf, sand and slash pine in the canopy, with lopsided Indian grass, live oak, gallberry, saw palmetto, pineland three-awn and wax myrtle in the understory. This soil occupies 12.48% of the surface soils in the Preserve and is found in two elongated locations in the western portion.

St. Johns fine sand (46). This soil is nearly level and poorly drained and is found on low-lying plains in the flatwoods. The vegetation usually found on includes flatwoods species such as longleaf and slash pines, saw palmetto, wax myrtle, gallberry, running oak, and pineland three-awn. This soil type, comprising 5.70% in the eastern and southern portions of the Preserve, has some representative natural plant communities still present.

Tavares-Millhopper fine sands (53). This soil type is found in nearly level, gently sloping, moderately well-drained areas in the uplands and low ridges in the flatwoods. The vegetation found on undisturbed Tavares-Millhopper fine sand soils includes sandhill species such as turkey oak, live oak, bluejack oak, longleaf pine, creeping bluestem, panicum, lopsided Indian grass, and pineland three-awn. There is one location of this soil type along the southern edge of the former spray field. This area comprises 1.94% of the total surface soils on the Preserve.

Winder fine sand, frequently flooded (60). This soil type comprises 6.33% of the total surface soils in the Preserve and is found in one location in the eastern portion, associated with the east-west spring-fed tributary and Bell Creek along the eastern boundary... This soil type typically supports Carolina willow, red maple, cabbage palm and sweet gum, as well as buttonbush, saw grass, smartweed, and sedges in the understory.

Zolfo fine sand (61). This soil classification comprises 2.49% of the surface soils within the Preserve and is found in one location on the southern boundary, and in two very small locations on the western boundary. This soil type supports xeric oak, pine, saw palmetto, and other species found in oak scrub vegetative associations.

Water (99). Open water provides 0.40% of the area within the Preserve and includes the small pond near the main entrance to the Preserve. Two additional open water areas are located near the northern boundary, but these areas were too recent to be shown on the

soils map. These open water areas are included on the map of natural and man-made communities.

2.1.3 Soils Management Measures

Management measures for the Preserve include protecting the natural vegetation to prevent soil erosion, preventing off-road vehicles from accessing the Preserve, and maintaining fire breaks. The goals and objectives of the management plan will preserve the integrity of the native soils by preserving the native vegetation communities on the Preserve and by taking action to prevent erosion. There are no facilities or actions proposed in this ten-year plan that would require impacts to soils with the exception of the maintenance of the existing fire breaks and the removal of exotic vegetation. Any future management measures not included in this plan that require earthwork will implement Best Management Practices prior to construction to preserve the character of the ecosystems (http://www.na.fs.fed.us/spfo/pubs/n_resource/wetlands/index.htm). There are no known oil, gas, phosphate or other mineral resources on the Preserve.

2.2 Natural and Man-made Communities

2.2.1 Mapping Process

The discussion of ecological communities describes the distinct vegetation associations on the Bell Creek Nature Preserve. The vegetation community areas were estimated and then mapped by interpretation of aerial photography (2007 full color photography at a scale of 1" = 150') with limited ground truthing, and with input from Conservation Services staff. These communities were then digitized and converted to GIS shape files to be used for planning and informative purposes. The system employed in this plan of classifying the natural communities was developed by the Florida Natural Areas Inventory (FNAI). The premise of this system is that physical factors such as geology, climate, soils, hydrology, and fire determine the species composition of an area and that areas which are similar with respect to these factors will tend to have natural communities with similar species compositions.

Appendix B provides a list of the plant species found to date on the Bell Creek Nature Preserve. The six natural and two man-made vegetation communities identified are listed in Table 2 with the total area that each community occupies within the Preserve.

2.2.2 Vegetation Community Descriptions

The following paragraphs describe the six distinct communities and Figure 4 shows their estimated extent and location within the Preserve. As stated previously, the mapping was completed with limited ground truthing and the locations of the plant communities and descriptions of the vegetative cover are approximations. As part of the 10-year management process, the Conservation Services Section will continue ground-truthing

and refining the delineation of plant community types, continue the photo-monitoring program, as well as continue to update the flora and fauna species lists.

Table 2 Bell Creek Nature Preserve Natural Vegetation Communities and Land Cover Types		
Vegetation Community	Acres	%
Bay swamp	29.42	6.21
Freshwater marsh	62.81	13.25
Hydric hammock	32.36	6.83
Xeric oak hammock	57.27	12.08
Old field	96.60	20.38
Sand pine scrub	56.07	11.83
Pine flatwoods	116.13	24.50
Floodplain forest	17.52	3.70
Pond	2.37	0.50
Open water	1.87	0.39
Developed Area	1.51	0.32
Total acres	473.92	100.00

Pine flatwoods. The pine flatwoods comprise 24.50% of the Preserve with the largest expanses of it in the northeastern portion. The pine flatwoods generally support an open canopy of longleaf pine and slash pine with an understory of saw palmetto and various grasses and other herbaceous species. The abundance of wire grass varies with the density of the saw palmetto and the canopy coverage. Cabbage palms are present in the subcanopy, and the shrub layer supports gallberry, wax myrtle, fetterbush, and St. John's wort. Portions of the flatwoods have been burned on a regular basis and these show a sparse ground cover of saw palmetto and herbaceous species.

Management measures for pine flatwoods. The proper management of pine flatwoods includes such measures as conducting prescribed burns every two to four years (Myers *et al.*, 1990), controlling exotic vegetation, roller-chopping, and preventing adverse impacts to the soil and native vegetation. Minor changes in the flat topography can have significant impacts to the character of the habitat by changing drainage patterns. Other management measures include preventing wildfires, off-road vehicles, and other forms of vandalism.

Figure 4 vegetation communities.



This photo shows the high quality pine flatwoods in the northwestern portion of the Preserve. This area has been burned successfully by prescribed fire in spite of its close proximity to a residential subdivision.

Xeric oak hammock. There are three xeric oak hammock areas in the Preserve; one near the entrance on McMullen Road, one on the southern boundary and one on the boundary shared with Marion Rodgers Middle School. These areas comprise 12.08% of the Preserve. The canopy supports predominantly sand live oak, sand pine, and the understory is predominantly saw palmetto. Fire suppression has allowed these areas to develop and some areas along the boundaries are overgrown and pose a fire hazard (Conservation Services staff, personal communication, 2008).



This xeric oak hammock was burned to open up the canopy for the continued establishment of listed species such as Florida golden aster, Curtiss's milkweed, and gopher tortoise.

Management measures for xeric oak hammock. Xeric hammocks are the advanced successional stage of sandhill or sand pine scrub habitat in which fire has been excluded for 30 or more years ([http://www.fnai.org/PDF/Natural Communities Guide.pdf](http://www.fnai.org/PDF/Natural_Communities_Guide.pdf)). When fires do occur they are usually intense, killing most of the tree canopy, and the habitat may revert to its former open character. The xeric oak hammock on the southwest side of the Preserve had a manual hardwood removal in August 2009, and the hammock north of Marion Rodgers Middle School was burned with very dry, hot weather in 2006. Much of the hardwood hammock in the Preserve has been eliminated, and no further actions are proposed for the lifetime of this plan. The management measures for the xeric hammock habitat have been to control invasive exotic vegetation and to maintain security in the Preserve to prevent illegal dumping, excavations, and trespass. These management measures are ongoing.

Old field. There are three areas that would be considered old field within the Preserve. The field on the southeastern boundary was historically cleared for pasture but now supports a significant population of gopher tortoise, a threatened species in Florida. The tortoise burrows are so prevalent that they can be readily observed in aerial photography. This field is vegetated predominantly by common pasture grasses, a favorite forage material for the tortoises.



This photo was taken in the eastern end of the Preserve. This field has numerous gopher tortoises that enjoy eating the pasture grasses. The paved road in the Preserve is occasionally used by the residents in the adjacent subdivision for special events such as hay rides.

The second field is located on the northern boundary within the eastern portion of the Preserve. This area is a former spray field and the spray berms and some of the infrastructure are still present. This area is covered primarily with common grasses. A ditch/swale is located in the middle of the field but it appears to discharge to the low area on the eastern end of the field.

The third old field is a large area in the center of the Preserve. This area is popular with families of Florida Sandhill Cranes who build nests in the large freshwater marsh adjacent to the old field. This old field area also supports Catesby's pine lily and gopher tortoises.

Management measures for old field. Management measures for the old field areas include regular prescribed burns, control of invasive exotic animals and vegetation, selective mowing, monitoring the recruitment of native species, and installing native species. These management measures are ongoing. Some planting of trees and groundcover has already been undertaken with mixed success. It is intended to keep the fields open to support the protected species that rely on them for habitat, such as the gopher tortoise, Florida sandhill crane, Southeast American Kestrel, and Catesby's pine lily.

Pond. A 2.37 acre pond is located in the western portion of the Preserve, near the entrance and parking area. This pond was excavated from wetlands by previous owners. The spoil from the excavation was distributed around the northern and western edge of the pond and it now supports flatwoods vegetation such as slash pines and palmetto. The littoral edge of the pond supports native grasses and forbs which provide essential habitat and water quality treatment.



This pond provides a scenic picnic area for visitors to the Preserve and a table is available adjacent to the pond.

Management measures for the pond. Keeping the pond free of nuisance exotic vegetation is the main management measure. The pond is periodically monitored for exotic animal impacts. Feral hogs and nutria can decimate the vegetation and cause water quality problems, and channeled apple snails can eliminate the vegetation in a matter of a few days. See Section 5.2 for more information on these and other exotic species. The pond is also being visually monitored for any noticeable changes in water quality, and management of the Preserve continues to restrict boat traffic because of the

small size and potential for water quality degradation. These management measures are also ongoing.



Portions of the sand pine scrub are regenerating, as can be seen from the numerous young pine trees in this area.

Sand pine scrub. The sand pine scrub community is located within the southern portion of the Preserve and it comprises almost 12% of the total acreage. The canopy is predominantly sand pine with some hardwood species and slash pine. The understory varies with open areas and other areas with a dense understory of saw palmetto. Sand pine scrub is an endangered and rare habitat in Florida and the required habitat for many listed species. The Preserve was purchased, in part, to preserve this habitat and dependent species such as the Florida golden aster.



This sand pine scrub area was burned several years ago in a hot prescribed fire and many of the sand pine trees subsequently died.

Management measures for sand pine scrub. Prescribed burns are important for the maintenance of this vegetation community. The natural fire cycle is usually a catastrophic fire every 20 to 80 years or longer, which allows the sand pines to complete a life cycle (http://www.fnai.org/PDF/Natural_Communities_Guide.pdf). Given the Preserve's location adjacent to residential areas, the concerns for safety have taken precedence over the prescribed burn regime for this community. Management measures for the scrub have included the control of invasive exotic vegetation such as cogon grass, which thrives in the low nutrient levels in the soil and is a direct threat to listed species in this Preserve. In 2009, the County implemented hardwood and pine tree reduction in extremely overgrown areas on the southwest side of the Preserve; these will be followed by prescribed burns. According to recent studies (Lambert and Menges, 1996), the optimal fire cycle for sand pine scrub is every ten years. Excessive vehicular traffic in these areas is being discouraged. The sensitive lichens and other ground cover species, and the roots of the sand pine trees are extremely susceptible to damage from soil compaction (http://www.fnai.org/PDF/Natural_Communities_Guide.pdf).

Freshwater marsh. There are four freshwater marsh areas in the Preserve, all located within the western half of the site. The large marsh adjacent to McMullen Road is characterized by a perimeter of dense brush such as primrose willow, while the other marsh areas are more open. The central marsh shows the classic concentric rings of different species of vegetation which follow the gradient to the center of the marsh.



This photograph was taken on the western edge of the large, central marsh, with the surrounding pine flatwoods in the background. The grasses and herbaceous species in the foreground provide important habitat for many birds, small mammals, and herpetophiles.

Management measures for freshwater marsh. Fire plays an important role in maintaining the character of freshwater marshes. Fire limits the invasion of woody vegetation, and reduces the accumulation of peat. Fire also increases the nutrients in the soil by burning dead, undecayed vegetation matter. The natural fire cycle in freshwater marshes is one to three year intervals for shallow wetlands, and three to five years for

deeper marshes. Natural fires usually occur in the summer when the soil moisture is high and vegetation is growing (Myers *et al.*, 1990). Maintenance of hydrology is of the utmost importance to protection of wetlands in the Preserve.

Hydric hammock. The hammock is located in the eastern and central portion of the Preserve and consists of a spring-fed tributary to Bell Creek. The previous management plan (HDR, 1997) described this area as a deep shade slough with a canopy of broad leaved hardwood species such as loblolly bay, swamp bay, and water oaks, and an understory predominantly vegetated by several different species of ferns. Wild grape and blackberry vines cover many of the open spaces. Portions of this slough are deeply incised with steep slopes.



This photo was taken on the southern edge of the hydric hammock. The change in topography is evident with the slope grading toward the top of the photograph. The understory is dense with ferns and tree saplings.

Management measures for mesic hardwood hammock. Management measures for this vegetation community includes the control of invasive exotic vegetation, especially vines such as skunk vine, air potato and old world and Japanese climbing fern. These vines can act as fire ladders and bring fire into the community with catastrophic results (Myers *et al.*, 1990). Other management measures currently in place include the prevention of erosion by maintaining vegetative cover, controlling feral hog populations, site security measures to limit vehicular trespassing, maintenance of water quality by limiting development in the area of the spring-fed tributary and Bell Creek. Several trash cleanups have occurred in and adjacent to this ecosystem.

Bay Swamp. The bay swamp (or baygall as described by the FNAI) is a hydric forest with a canopy dominated by swamp bay, sweet bay and red maple. This community is located in a depression in the center of the Preserve. It has steep side slopes and there is seepage of groundwater from the slopes. The understory is predominantly ferns and

other shade tolerant forbs. Vines are thick on the slopes and include wild grape, poison ivy, and Virginia creeper.

Management measures for bay swamp. Bay swamps rarely dry out enough to burn and the natural fire cycle is 50 to 100 years. Repeated or extremely hot fires may change the character of the community by consuming all or some of the organic peat soil. (http://www.fnai.org/PDF/Natural_Communities_Guide.pdf) Bay swamps are also highly susceptible to encroachment by invasive plant species which thrive in the moist, rich soil. Frequent surveillance is necessary to prevent an infestation. The bay swamp on the south side of the east-west paved road (Figure 4) appears to be impounded and should be considered for restoration if funding opportunities arise.

Floodplain forest. The floodplain forest is located on the eastern edge of the Preserve and is associated with Bell Creek. The canopy in this community is dominated by hardwood species tolerant of periodic inundation, such as laurel oak, water oak, swamp bay, red maple, sugarberry, and others. The understory includes ferns, forbs, and shrubs such as Virginia willow, button bush, fetter bush, and others.

Management measures for floodplain forest. This is not a fire-dependent community due to the moisture that is usually present. When fires do occur, usually during droughts, the results are usually catastrophic. The maintenance of the natural hydrologic cycle is critical to this community, and artificial impoundments can be as damaging as droughts. On site maintenance for the control of invasive species in this community is ongoing.

Open water. Two excavated areas are present near the northwestern corner of the Preserve. These two borrow pits were present on the property when it was purchased by the County and it is uncertain what their function was. No plans to restore the pits are being considered at this time, because wetland creation is proposed between the two pits. The County continues to keep these two areas free of obstruction (occasional illegal dumping).

Developed areas. The developed areas include the small area in which the Conservation Services Office and maintenance facilities are located, and a strip of land adjacent to the Marion Rodgers Middle School. The Conservation Services office uses environmentally friendly designs as much as possible. The parking area is mulched because of the presence of endangered plants around the perimeter, and concrete and other impervious services are kept to a minimum. In addition, the native vegetation is preserved or enhanced and only native plants have been utilized in landscaping.

Management measures for all natural and man-made communities. In order to properly manage the vegetation communities, it is necessary to conduct periodic surveys to determine the content and health of these communities. The Conservation Services staff conducts surveys of the vegetation annually at minimum, to determine what listed plant species are present, and if the current management efforts are adequate for the preservation, restoration, or protection of the listed species or plant community. In order

to comply with the conditions of the FCT Grant Award Agreement, the protection and long term viability of the individual communities on the Preserve is essential. The County is committed to a photo-monitoring program of natural communities and habitat restoration in the Preserve.

2.3 Water Resources

2.3.1 Aquatic Preserves and Outstanding Florida Waters

Bell Creek is not an Outstanding Florida Water, nor is it in an Aquatic Preserve (62-302-700 Florida Administrative Code).

2.3.2 Water Quality

Bell Creek lies within the Alafia River Watershed and extends from its headwaters east of Balm Boyette Road, nine miles north to discharge into the Alafia River. The creek traverses Lake Grady, and receives discharges from Pellham Branch and Boggy Creek before discharging to the Alafia River, draining almost 20 square miles. See FEMA floodzone map in Appendix J.

The Alafia River Watershed drains approximately 254 square miles in Hillsborough County and contains 30 named rivers, streams and canals and 11 named lakes and canal. There are also numerous springs along the river. Water quality in the river is considered good throughout 47% of the basin, and fair in 14%, with the remainder of the basin unknown. The water quality trend is considered to be stable or improving in 36% of the basin. Only 15% of the watershed is considered wetlands, and these are predominantly within the river's floodplain. A map of the watershed prepared by the Hillsborough County Stormwater Department can be viewed online at <http://maps.wateratlas.usf.edu/hillsborough/index.asp?watershedid=1&themenam=WaterResources>.

In 1999, the Hillsborough County Stormwater Department contracted a consulting firm to prepare a watershed management plan for the Alafia River Watershed. In 2001, the consultants presented their findings and made numerous recommendations to improve water quality, flood control, water supply and natural systems. It was determined that the lower reaches of Bell Creek, downstream from the Preserve, are considered an impaired water body due to high levels of fecal coliform, low dissolved oxygen, and high nutrient concentrations. However, one recommended project would benefit the Bell Creek Nature Preserve as well as improve water quality. Stormwater inlets that were installed when the property was intended for development are still in place adjacent to Donneymoor Road. Filling these inlets would reduce the organic waste discharging to the creek and would also prevent potential injury to visitors to the Preserve. The drains are currently covered with pieces of concrete slab, but a more permanent solution would be preferred. For more information, the watershed management plan can be accessed at <http://www.hillsborough.wateratlas.usf.edu/watershed/>.

The Southwest Florida Water Management District prepared the Alafia River Comprehensive Watershed Management Plan (SWFWMD, 2001) which discussed the water quality, flooding, water supply and natural systems concerns for the watershed. They identified the main issues within the watershed with respect to natural systems and proposed projects and strategies to address those issues.

The Environmental Protection Commission of Hillsborough County is monitoring the water quality at several stations on Bell Creek, including one at the intersection of the creek and Rhodine Road. This information is provided to the County Stormwater Department for their assessment and inclusion in the water atlas (<http://www.hillsborough.wateratlas.usf.edu/watershed/>) mentioned above.

2.3.3 Water Resource Management Measures

Management measures which have been taken in the past ten years to improve water quality in the Preserve include the following:

- Removing buried debris and trash from the Preserve. Previous illegal dumping had been considerable in the area.
- Selective use of chemical herbicides according to label.
- Avoiding soil disturbances in the Preserve, only undertaking such activities when absolutely necessary.
- Repairing damage caused by children from adjacent subdivisions excavating holes in the natural areas.
- Fencing, posting and on site security in the Preserve which greatly decreased the amount of vehicular traffic through the Preserve and associated wetlands.
- Implementing Best Management Practices during construction of the Bell Creek Office Compound or other disturbance of the soils or vegetation.
- Restricting land use for the small pond to fishing (i.e., no boat traffic or launching permitted).
- Monitoring of the construction of Marion Rodgers Middle School and reporting of problems to law enforcement authorities.
- Conducting volunteer and staff functions to plant native species in altered areas.

Future improvements for water quality include the following:

- Restoration of wetlands near Boyette Road, a Hillsborough County Public Works project for over two acres (see Restoration section for more detail). This is expected to occur within the next five years.
- Restoration of hydrology of the bay swamp along the south boundary of the Preserve. The project is currently not funded and thus funding and time frame is to be determined.
- Continued site security, particularly to prevent illegal access, an ongoing activity.
- Continued implementation of Best Management Practices during any construction, also ongoing.

- Continued restriction of boat traffic in small pond, also ongoing.

This management plan is being modified in part for the purpose of improving water quality in the Bell Creek watershed by deleting the proposed park near the creek on the south east side of the Preserve.

2.4 Fish and Wildlife Resources

2.4.1 Existing Conditions

The Bell Creek Nature Preserve provides almost 500 acres of a mosaic of wildlife habitats, as well as forming an important link in the wildlife corridor for the Alafia River and south to the Balm Boyette Scrub Nature Preserve, Rhodine Scrub Nature Preserve and other preserves in the area. The previous land management plan (HDR, 1997) stated that the Preserve provides suitable habitat for 23 amphibians, 53 reptiles, 158 species of birds, and 41 species of mammals. Lists of the flora and fauna known to occur as a result of surveys in the Bell Creek Nature Preserve are provided as Appendix B.

The Preserve does not lie within a Strategic Habitat Conservation Area (SHCA) but there are some SHCAs adjacent to the northeastern boundary. The SHCAs have all been developed with the exception of approximately 60 acres of the Bell Creek floodplain. This parcel is owned by Hillsborough County but is not part of the Bell Creek Nature Preserve.

2.4.2 Management Measures for Fish and Wildlife

Formal surveys have been conducted on the herpetofaunal species on the site, and informal surveys on birds and mammals have been conducted over the last ten years. Gopher tortoise burrows in the open areas near Shadow Run subdivision have been mapped and these populations are monitored. These surveys are conducted seasonally to include the use of the site by migrant species and those species only active on a seasonal basis to provide a truly comprehensive list of the species present. GPS is used to mark the locations of important populations. Preliminary plant and animal surveys have been conducted on the Preserve by staff to produce the lists that are provided in Appendix B. The informal surveys will continue in perpetuity and as new species are observed, the list will be updated.

The main management measures for the protection and conservation of wildlife on the Preserve are the prescribed burn program to enhance and manage the habitat, restoration of altered habitat, and the control of nuisance exotic vegetation and animals. These management measures are conducted in the Preserve on an as-needed basis, and as prioritized by the Conservation Services staff. Other measures include maintaining site security to prevent trespassing, poaching, dumping, arson, and other illegal activities.

2.5 Special Status Species

Information regarding the special status species on Bell Creek Nature Preserve was obtained from the Conservation Services staff, local experts, and relevant literature. State and/or federally listed plant and animal species observed on the Preserve include those listed in Table 3. According to the Florida Fish and Wildlife Conservation Commission (FFWCC) website (<http://myfwc.com/eagle/eaglenests/Default.asp>), there are no bald eagle nests on the Bell Creek Nature Preserve, but there are nests approximately 10 miles west of the Preserve near Tampa Bay, and two at least three miles east of the Preserve. The bald eagle is no longer listed in the state of Florida.

Table 3 Special Status Species Observed in the Bell Creek Nature Preserve			
Species		Ranking	
Common Name	Scientific Name	FED (3)	STATE (1,2)
Birds			
White Ibis	<i>Eudocimus albus</i>		SSC
Southeast American Kestrel	<i>Falco sparverius paulus</i>		T
Florida Sandhill Crane	<i>Grus canadensis pratensis</i>		T
Wood Stork	<i>Mycteria americana</i>	E	E
Mammals			
Sherman's fox squirrel	<i>Sciurus niger shermani</i>		SSC
Reptiles and Amphibians			
American alligator	<i>Alligator mississippiensis</i>	SAT	SSC
Eastern indigo snake	<i>Drymarchon corais couperi</i>	T	T
Red rat snake	<i>Elaphe guttata</i>		SSC
Gopher tortoise	<i>Gopherus polyphemus</i>		T
Florida gopher frog	<i>Rana capito</i>		SSC
Plants			
Curtiss' milkweed	<i>Asclepias curtissii</i>		E
Florida golden aster	<i>Chrysopsis floridana</i>	E	E
Catesby's pine lily	<i>Lilium catesbaei</i>		T
Sandhill spiny pod	<i>Matelea pubiflora</i>		E
Giant orchid	<i>Pteroglossaspis ecristata</i>		T
Leafless beaked ladies tresses	<i>Sacola lanceolata</i>		T

Notes: 1) <https://www.flrules.org/Default.asp>
 2) http://www.fl-dof.com/forest_management/plant_conserve_list.html
 3) <http://www.fws.gov/endangered/wildlife.html>

The individual habitat needs for each species are discussed in the following paragraphs. Future surveys should determine the locations of foraging, roosting, and nesting areas of the protected species. The knowledge gained in the surveys will allow the planning for future facilities in areas that won't disturb the protected species. ELAPP policies regarding the management of special status species are provided in Appendix C.

2.5.1 Descriptions of Special Status Species

White Ibis. The White Ibis has been observed on numerous occasions foraging on the Preserve for insects, crayfish, and small amphibian and reptiles. Ibis will also eat fish when abundant. There are no known nesting colonies of White Ibis on the Preserve, but one of the most important nesting colonies is located at the mouth of the Alafia River approximately six miles to the west. Nesting Ibis require freshwater foraging areas because their fledglings cannot tolerate salt and will decline and die if salt is ingested (Rodgers *et al.*, 1996).

Management measures for White Ibis. The shallow wetland areas in the Preserve provide foraging areas for the White Ibis, especially during breeding season. These wetlands support fish populations which are concentrated during the dry season when the water recedes. The White Ibis and other wading birds forage on the fish and expend less energy for the effort. The old field areas also provide foraging habitat for insects and other prey.

Management measures for this species include keeping feral animals out of the Preserve, maintaining water quality to support fish populations, controlling exotic vegetation, and preserving the natural vegetation on the site. All these measures are currently being provided and will continue to be provided in perpetuity.

Southeast American Kestrel. The Kestrel is an inhabitant of open spaces where they feed on insects, small rodents, and reptiles. While the northern races are abundant and are frequently observed in central Florida as migrants and winter residents, the locally breeding sub-species has undergone recent statewide population declines and is currently listed as threatened, and considered to be very rare in Florida (Rodgers *et al.*, 1996).

Management measures for Southeast American kestrel. The primary reason for the decline of this bird is the loss of nesting habitat. They prefer to nest in longleaf pine snags in open areas with low herbaceous cover (Rodgers *et al.*, 1996). Prescribed burns are also conducted to keep the habitat open.

Florida Sandhill Crane. Sandhill Cranes require freshwater marshes for nesting, specifically herbaceous wetlands of a minimum of 0.5 acre. The large, centrally located, freshwater marshes are suitable for Sandhill Crane nesting and nesting pairs have been documented within the Preserve. These cranes feed mainly on seeds and berries but

have also been known to eat insects, invertebrates and small vertebrates. Florida Sandhill Cranes begin nesting in late winter or early spring and fledge in the late summer.

Management measures for the Florida Sandhill Crane. The greatest threats to Sandhill Cranes are loss or degradation of habitat and human interference. The habitat in the Preserve is conserved in perpetuity but this does not prevent the potential for human interference. The Sandhill Crane is becoming more accustomed to human activity in the vicinity of active nests, but management activity such as prescribed burns and nuisance vegetation treatment should be postponed around active nests during nesting season.



Wood Stork. Wood Storks are birds of freshwater and brackish wetlands, primarily nesting in cypress or mangrove swamps. They feed in freshwater marshes, narrow tidal creeks, or flooded tidal pools. Wood Storks use a specialized feeding behavior called tactolocation, or grope feeding. A foraging Wood Stork wades through the water with its beak immersed and partially open. When it touches a prey item, a Wood Stork snaps its mandibles shut, raises its head, and swallows what it has caught. Storks will often stir the water with their feet, a behavior which appears to startle hiding prey. Tactolocation allows Storks to feed at night and use water that is turbid or densely vegetated. However, the prey must be concentrated in relatively high densities for Wood Storks to forage effectively (<http://www.fws.gov/verobeach/images/pdflibrary/wost.pdf>). Particularly attractive feeding sites are depressions in marshes or swamps where fish become concentrated during periods of falling water levels. The Wood Stork has been observed foraging in the Preserve.

Management measures for the Wood Stork. The Bell Creek Nature Preserve provides foraging and roosting habitat for the Wood Stork, but no known nesting habitat. Management of foraging habitat includes the preservation of existing natural wetlands on site, including hydrology, and limiting human interference. All of these management measures are currently being addressed and will continue in perpetuity.

Sherman's fox squirrel. The Sherman's fox squirrel is one of three subspecies of fox squirrels that occur in Florida. The Sherman's fox squirrel is found in the Florida panhandle from northern counties to the Tampa Bay area over to Lake Okeechobee. Fox squirrels south of this region are Big Cypress fox squirrels. These squirrels are larger than the common gray squirrel and are declining due to the loss of their specific habitat areas to development. These squirrels require mature, fire maintained long-leaf pine-turkey oak sandhill and flatwoods community types. Acorns from turkey oak and live

oak, as well as long-leaf pine seeds are the major components of the fox squirrel diets, but they also eat fungi, other nuts, bulbs, vegetative buds, and insects. They build leaf nests in large oaks, and typically have two breeding periods per year, with only 2 to 3 young per season (Humphrey, 1992).

Management measures for the Sherman's fox squirrel. The Sherman's fox squirrel requires heterogeneous, natural sandhill habitat to preserve a viable population (Humphrey, 1992). The habitat should be burned every two to three years to regulate the turkey oak and maintain the long-leaf pines. The Preserve provides some habitat for the Sherman's fox squirrel, but they have not been observed in the last few years and may have disappeared from the vicinity (Conservation Services staff, 2008).

American alligator. Alligators have been observed in the Preserve by staff and visitors over the years. It is not known how many alligators are present at this time. The American alligator is the largest reptile in North America. The alligator can be distinguished from the endangered American crocodile by its short, rounded snout and darker color. Adult alligators can reach 18 feet in length, but the average length and weight is 13 feet and 450 to 600 pounds. An alligator's tail accounts for half the length. Male alligators are generally larger than females. Alligators can be found in rivers, swamps, marshes, bogs, lakes, ponds, creeks, canals, and bayous. They can tolerate some salt water (Moler, 1992).

Alligators eat just about anything, including lizards, fish, snakes, turtles, small mammals, birds, crustaceans, and even small alligators. They hunt for prey underwater and often swallow their meal whole. Alligators that have been fed by humans lose their fear and become a potential hazard, which usually results in the destruction of the "nuisance" alligator.

Management measures for the American alligator. Protecting the alligators on the Preserve will require protection from poaching, protection of nesting areas if any are found, avoiding impacts to water quality, and preventing human interference. Alligators which have lost their fear of humans and are considered a nuisance will be removed by the Florida Fish and Wildlife Conservation Commission.

Eastern indigo snake. The eastern indigo snake is a large, docile, non-venomous snake that has declined in numbers over the last 100 years due to the loss of habitat, pesticide use, and collection for pet trade. The snake is a commensal species with a number of burrowing animals, using their burrows for egg-laying and denning. The preferred diet of the eastern indigo snake includes frogs, other snakes, toads, salamanders, small mammals, and birds. The eastern indigo snake can be found in many habitat types from wetlands and mesic habitats to xeric pinelands and scrub (<http://library.fgcu.edu/caloo/indisnk.pdf>).

Management measures for the eastern indigo snake. According to existing literature, the eastern indigo snake needs a mosaic of habitat types for survival. Studies also

suggest that there is a close association with gopher tortoise burrows, particularly in the southeastern U.S. Conducting the prescribed burns, protecting gopher tortoise burrows, controlling the invasive exotic vegetation, and preventing or controlling the influx of exotic animals such as feral pigs, are measures that would help protect the eastern indigo snake and its habitat. The habitat size needed for the protection of the species is unknown, however, some suggest that as much as 1000 hectares is needed for a viable population. This cannot be accomplished with the small size of the Bell Creek Preserve, but in combination with sites such as the Rhodine Scrub, Fish Hawk, and Balm-Boyette Scrub Nature Preserves, enough habitat exists. Thus, every effort should be made to complete the wildlife corridor (See Figure 1). The USFWS recovery plan for this species is located at www.fws.gov/southeast/vbpdfs/species/reptiles/eisn.pdf.

Red rat snake. This snake is found throughout peninsular Florida, west to Louisiana and north to southern New Jersey. It is found in pinelands, hardwood hammocks, swamps and agricultural fields. It is a non-venomous snake that feeds on frogs, rodents, lizards, and birds and their eggs. It can climb trees and burrow into the ground and can be found under rocks and logs. It is popular with collectors who prize it for its beauty and docile nature, and it can live up to 22 years in captivity (<http://www.flmnh.ufl.edu/herpetology/fl-guide/Elapheguttata.htm>).

Management measures for red rat snake. This snake adapts to all habitats and conditions, but is very susceptible to poaching or collecting. The best management measures for this snake would be to protect its habitat and prevent it from being collected.

Gopher tortoise. The gopher tortoise lives in extensive subterranean burrows in dry upland habitats such as longleaf pine sandhill, xeric oak hammocks, scrub, pine flatwoods, dry prairies, and coastal dunes. Tortoises can also live in man-made environments, such as pastures, old fields, and grassy roadsides. To be suitable for gopher tortoises, the habitat must have well-drained sandy soils for digging burrows, herbaceous food plants, and open sunny areas for nesting and basking. Periodic natural fires play an important role in maintaining tortoise habitat by opening up the canopy and promoting growth of herbaceous food plants such as grasses and other herbs (http://www.myfwc.com/WILDLIFEHABITATS/SpeciesInfo_GopherTortoise.htm).

Gopher tortoise burrows remain at a fairly constant temperature and humidity level year-round, thus providing shelter for the tortoise during periods of extreme temperatures, drought, and fire. Tortoise burrows also afford refuge to other animals including listed species such as the eastern indigo snake, Florida pine snake, gopher frog, Florida mouse, and gopher cricket.

In 2007, the Florida Fish and Wildlife Conservation Commission (FWC) took action to upgrade the status of gopher tortoise from “species of special concern (SSC)” to “threatened.” The species has been under siege due to the rampant development throughout the state and currently, little habitat remains for the tortoise. In addition, the

SSC status allowed developers to apply for a permit to conduct an “incidental take”. This permit allowed developers to entomb or bury the tortoises alive on the site in return for making a payment to a mitigation fund. The FWC estimates that approximately 200,000 tortoises were entombed in this manner. The reclassification will provide some protection for the tortoise in that an “incidental take” will no longer be permitted. The revised management plan prepared by the Florida Fish and Wildlife Conservation Commission for the threatened gopher tortoise is currently available online at http://www.myfwc.com/docs/WildlifeHabitats/GT_Mgmt_Plan.pdf.

Management measures for gopher tortoise. Initial actions taken in the Preserve from the time of land acquisition to the present include the following: Areas where the burrows occur have been restricted against all vehicular traffic by perimeter fencing, posting, and frequent site security patrols to prevent the crushing of active burrows. Prescribed burns are continuing in these areas to keep the herbaceous layer fresh and low, and will continue. Egg and hatchling predation are being reduced as much as possible. Human interference has been a serious problem in the Preserve, and continuous effort has been made by staff and the Hillsborough County Sheriff's Department to limit vandalism of burrows and the habitat as well as the tortoises themselves. The migration of tortoises out of the Preserve has also presented a problem, as several tortoises have been hit and killed by vehicles on McMullen Road.

In 2009, Conservation Services staff continued management measures for the gopher tortoise, which included extensive survey work in preparation for logging and hardwood reduction work. All active burrows were flagged and marked clearly to minimize the impact of machinery in the area of the burrows. It is anticipated that the targeted habitats will be re-surveyed in approximately one year to ascertain the success of the hardwood reduction and logging efforts. .

Florida gopher frog. This medium sized, boldly spotted frog has a chunky appearance and a somewhat warty skin with bronze-colored longitudinal ridge on each side behind the eye. It has irregularly shaped dark spots on a cream, gray or brown background. Its call resembles a deep snore. It prefers dry, sandy uplands, especially sandhill and scrub which also have isolated wetlands or large ponds within a mile. It also is found in dry pine flatwoods, xeric hammock and disturbed areas in a symbiotic relationship with the gopher tortoise (http://www.fnai.org/FieldGuide/pdf/Rana_capito.PDF).

Management measures for Florida gopher frog. The Preserve must be surveyed to find out more about the population size and location. Managing the habitat for healthy gopher tortoise population and maintaining the hydrology and health of the isolated wetlands in the Bell Creek Preserve will benefit the Florida gopher frog (Kaiser, personal communication, 2009). Prescribed fires are especially important for this species (http://www.fnai.org/FieldGuide/pdf/Rana_capito.PDF).

Curtiss' milkweed. This perennial plant is an endemic of the scrub areas of central peninsular Florida. It thrives on the bleached, excessively drained sandy soils along with

Chapman and myrtle oaks, and other scrub species. The plants grow individually and widely spaced so that an acre of scrub may have only one solitary plant (<http://www.natureserve.org/explorer/servlet/NatureServe?searchName=Asclepias+curtissii>).

Management measures for Curtiss' milkweed. The main reason for the decline of this species is habitat loss. Many of the scrub areas where this species is found have been developed into subdivisions or citrus groves with the exception of a few areas that have been preserved. Measures to protect this species include conducting prescribed burns, keeping hikers from trampling the plants by routing trails away from known habitat, and discouraging collectors from gathering the remaining plants. The locations of known populations should be marked using GPS and photo-monitored for protection (<http://www.natureserve.org/explorer/servlet/NatureServe?searchName=Asclepias+curtissii>).

Florida golden aster. The Florida golden aster is a perennial herb which resembles many other asters in Florida with the exception of the densely haired leaves. The wooly, almost white appearance of the leaves makes this yellow-flowered species stand out among the many other aster species in the area. The aster is known to only a few sites in the central Florida area, and the original 60 acres of the Preserve was purchased essentially for the preservation and enhancement of the Florida



golden aster population (<http://www.fws.gov/verobeach/images/pdflibrary/chfl.PDF> and <http://www.fws.gov/northflorida/Species-Accounts/Fla-Golden-Aster-2005.htm>).

Management measures for Florida golden aster. Staff from the Hillsborough County Parks, Recreation and Conservation Department have been integrally involved in the protection of the Florida golden aster in the Bell Creek Preserve as well as other nature preserves in southern Hillsborough County for almost 20 years, and lead the state in the recovery of this species. Hillsborough County staff has assisted numerous research projects involving Florida golden aster, including Ms. Laurie Markham's Master's thesis on the genetic variation of the species (<http://chuma.cas.usf.edu/~coch/Cochrane/Research/Laurie.pdf>), the 2006 status survey of Florida golden aster conducted by the Florida Natural Areas Inventory (Johnson *et al.*, 2006), and seed collection for the Center for Plant Conservation at Bok Tower Gardens

(<http://www.boktowergardens.org/conservation/local-habitats>). Staff also contributed to the USFWS management and recovery plan for the Florida golden aster, which is available at <http://www.fws.gov/verobeach/images/pdflibrary/chfl.PDF>.

The Florida golden aster requires the well-drained, sandy soils of sand pine scrub, and prefers minimally disturbed soils, such as that excavated by gopher tortoises or armadillos. Fire is an important management tool to ensure that sites remain open and sunny for the asters. According to recent studies (Lambert and Menges, 1996), the optimal fire cycle for sand pine scrub is every ten years, and in transitional or sandhill areas, fires every 1 to 10 years.

Cogongrass is a serious threat to the Florida golden aster in the Bell Creek Nature Preserve. Cogon grass spreads vegetatively and can aggressively crowd the aster out of its native habitat. In addition, cogon develops a large amount of biomass which burn significantly hotter than a fire would under normal circumstances. The hotter fires will destroy the Florida golden aster and its seed reserve (USFWS, 1999).

Conservation Services conducts regular prescribed burns on the Preserve and monitors and treats infestations of invasive plant species in order to protect the Florida golden aster. Staff has been using GPS units to record locations for each Florida golden aster population in the Bell Creek Preserve and monitors these populations to determine the success of habitat maintenance and restoration. The location of recent sand pine logging and hardwood reduction efforts in the Preserve were targeting the areas of highest known aster populations.

Catesby's lily. Catesby's lily, or pine lily, is a state-listed, threatened lily that is found in pine flatwoods, especially in spring and fall following fires. The lily prefers moist, sunny habitat on slightly acid soils (Huffman and Werner, 2000).

Management measures for Catesby's lily. The Catesby's lily requires frequent fires to survive. If the habitat is severely overgrown, the lily will decline. Recent experiments have determined that in habitats that are overgrown with woody species, the lily will respond more favorably to a combination of roller chopping of the overgrown vegetation and burning afterwards, than to burning only (Huffman and Werner, 2000)



The Conservation Services staff has identified a Catesby's Lily management area which is prescribed burned regularly. Plants have been located with GPS and are inspected annually by staff, particularly during their flowering time in September.

Sandhill spiny pod. This perennial vine from the milkweed family is found in southeast Georgia and peninsular Florida. It is very rare and only found on the deep white, sandy ridges of turkey oak sandhill communities. It flowers between April and early June with olive to red-brown petals on fragile vines with tiny heart-shaped leaves. It resembles other species in this genus so much that it is difficult to identify unless it is flowering (<http://www.georgiawildlife.org/assets/documents/matepu.pdf>).

Management measures for the sandhill spiny pod. This species depends on open, sunny, sandy areas to survive, so regular prescribed burns or hardwood removal is necessary (<http://www.georgiawildlife.org/assets/documents/matepu.pdf>). Individual populations should be located with GPS and monitored annually.

Giant orchid. The giant orchid is found in moist flatwoods that have an open canopy and are frequently burned (Coile, 2003).

Management measures for giant orchid. As with other listed plant species in the Preserve, the giant orchid is dependent upon periodic fires to keep the habitat open. In addition, exotic plants can crowd out these species in a very short period of time. In order to protect the giant orchid, the Conservation Services staff conducts prescribed burns on a regular basis and monitors and treats exotic vegetation infestations.

Leafless beaked ladies tresses. This large, usually orange-red orchid is found throughout Florida, as well as in the Caribbean, Central America, and northern South America. It is found in groups in open, sunny wet meadows and open mesic flatwoods (<http://www.wildflorida.info/species.php?k=p&id=288>).

Management measures for the leafless beaked ladies tresses. While this orchid is not specifically fire dependent, it does require open sunny areas for flowering and pollination. Prescribed burns are recommended to keep this plant population healthy. Plants need to be located by GPS and monitored annually by staff.



2.5.2 Management Measures for All Special Status Species

Management measures for all protected species in the Preserve include the management of exotic vegetation and animals, the maintenance of natural hydroperiods and drainage patterns, the restriction of vehicular traffic and inappropriate recreational uses, the apprehension and prosecution of poachers and trespassers, and periodic monitoring to assess the status of the various species. Dogs are allowed of the Preserve, but they must be kept on a hand-held leash at all times. In areas where the public is allowed

access, they should be educated so that they know to avoid disturbing the flora and fauna and that their carelessness with trash, cigarettes, and other debris could contribute to the decline of these protected species. Wildlife surveys on an annual basis are recommended to determine the presence and monitor the status of the protected species on the Preserve. Additional GPS tracking of burrows, nests, territories, and the location of listed plant populations is recommended for resident species or important foraging areas. As stated previously, ELAPP's specific resource management policies are provided as Appendix C.

Any element occurrences will be reported to the Florida Natural Areas Inventory on the website format (<http://fnai.org/fieldreportingforms.cfm>). An example of the form used for reporting listed species and other elements is provided in Appendix B.

3.0 CULTURAL RESOURCES

3.1 Definition of Terminology

There are five widely accepted categories of cultural resources: 1) archeological resources; 2) historic structures; 3) cultural landscapes; 4) ethnographic resources; and 5) museum collections. In the Bell Creek Nature Preserve, only archaeological or historic resources are likely to be present. As defined in the National Historic Preservation Act and its implementing regulations in *36 Code of Federal Regulations* (CFR) 800, historic properties are those buildings, Area of Potential Effects, sites, districts, artifacts, and remains that are related to culturally important places and events, and that are listed in or eligible for inclusion in the National Register of Historic Places. The significance of historic properties is assessed by the property's ability to meet the following four criteria for inclusion in the National Register of Historic Places (36CFR60.4):

- Association with events that made a substantial contribution to the patterns of our history;
- Association with the lives of persons important in our past;
- Sites that embody characteristics of a type, period, or methods of construction or that represent the work of a master, possess high artistic value, or represent a distinguishable entity; or
- Have yielded, or may be likely to yield, information important to prehistory or history.

Properties may be eligible for the National Register of Historic Places for contribution at the national, state, or local level. In order for a structure to be listed in the National Register of Historic Places, it must possess historic integrity of those features necessary to convey its significance, such as location, designs, setting, workmanship, materials, feeling, and association in accordance with National Register guidelines.

3.2 Potential Cultural Resources

According to the previous management plan (HDR, 1997), there are recorded archaeological sites located in the vicinity of the Preserve. Since similar topography and habitats exist on the Preserve, unknown archaeological sites are likely present.

Hillsborough County applied for State grant funding to perform a cultural resource survey of the entire preserve in 2007, but the grant was not funded. Until funding is available to do the entire Preserve, Hillsborough County will perform cultural resource surveys of any area within the Preserve that is proposed for development prior to the initiation of earthwork or other ground disturbing activities. All planned activities involving known cultural resources will be closely coordinated with the Department of State, Division of Historical Resources in order to prevent the disturbance of significant sites. Management of the onsite cultural resources will comply with the provisions of the Florida Historical Resources act, specifically §267.061(2)(a) and (b), Florida Statutes.

3.3 Management Measures for Cultural Resources

The Conservation Services staff is working with the local Florida Public Archaeology Network (<http://www.flpublicarchaeology.org/>) to learn more about the protection, identification and interpretation of cultural resources in the Preserve. Any areas exposed after prescribed burns, wildfires, excavation (by animals or human) will be examined for cultural resources. Any significant resources identified will be interpreted for the public, under the supervision of and coordination with the Division of Historic Resources. The collection of artifacts or the disturbance of archaeological and historic sites on the Preserve will be prohibited unless prior authorization has been obtained from the Department of State, Division of Historical Resources. The management of the archaeological and historic resources will comply with the provisions of Chapter 267, Florida Statutes, Sections 267.061 2(a) and (b). Best Management Practices for Protecting Archaeological Sites are provided as Appendix D. Should any evidence of new archaeological or cultural resources be located in the Preserve, the Division of Historical Resources will be notified immediately.

Hillsborough County was recently contacted by the National Park Service with a request to put a kiosk in the Bell Creek Nature Preserve. The purpose of the kiosk is to inform citizens about Florida history and the Desoto Trail. FCT was notified and approved the installation of the kiosk.

Hillsborough County recently sent an employee to Archaeological Resource Monitoring Training in Tallahassee. This individual has been trained to enter and update information in the Master Site File if needed.

4.0 RECREATIONAL RESOURCES AND FACILITIES

4.1 Existing Recreational Facilities

Existing recreational resources and facilities in the Preserve include the following (see Figures 5a and 5b):

- A parking area with 12 parking spaces at the main entrance off of McMullen Road
- Walk-through gates on Donneymoor Road, Balmoralfief Road, Brushfield Drive, and Boyette Road.
- Perimeter fencing to demarcate the boundary of the Preserve.
- A parking area. The parking spaces were created within a wooded area, with the trees acting as barriers to contain the vehicles in the parking spaces.
- A kiosk with a map and brochures of the Preserve,
- The main office of the Conservation Services Section, which has a reception area and educational materials for the public from 8-5 M-F. There are three out-buildings associated with the office, including a shop, storage barn, and chemical shed.
- Site security residence.
- A five-mile marked day-use hiking trail.
- A bike rack.
- A dumpster in the McMullen Road parking area.
- FCT acknowledgement signs located at the McMullen, Boyette, and Donneymoor entrances.
- A paved asphalt road and three house pads (remaining from the former, partially completed subdivision) which runs from the south side of Marion Rodgers Middle School to Shadow Run Subdivision. There are no sidewalks or telephone lines associated with this road, but there are remnants of underground stormwater drainage facilities.

The Preserve is open for hiking, birding and nature study seven days a week during daylight hours.

4.2 Proposed Recreational Facilities

The original management plan (HDR, 1997) proposed active recreation facilities within the open areas in the Preserve, including baseball fields, soccer fields, concession areas, restrooms, parking areas, and additional roads. These plans were presented at a public meeting and met with unfavorable reactions from some of the residents in the adjacent subdivision. These residents were concerned about the noise, traffic, lights and other problems often associated with public parks. As the Conservation Services staff became more aware of the natural resources on the site it was determined that the open areas where the facilities were planned were important habitat for listed species such as gopher tortoises, Sandhill Cranes, Florida golden aster, and Catesby's pine lily. The active recreation facilities plans have been dropped from consideration and the plan is to maintain the Preserve as more of a resource-based, passive use area.

Figures 5a and 5b Facilities

The County intends to continue educational programs in the Preserve on a regularly scheduled basis. These programs are to be primarily coordinated with the staff at Marion Rodgers Middle School for events such as the Great American Teach-In but may include outside user groups such as local environmental organizations, or tour groups from local recreation centers. The educational programs will be led by staff or volunteers from the community. In addition, the Shadow Run Homeowner's Association has been using the Preserve for spring and/or fall festivals. These activities take place only on the paved road from Donneymoor northwest to the school.

The County maintains three acknowledgment signs identifying the Preserve as being purchased with funds from "Florida Communities Trust". Any replacement to these signs shall be at least 3' x 4' in size and include the FCT logo and the years the Preserve was acquired. The signs are located at the three entrance areas.

Although no stormwater ponds are planned for the Preserve, if any are installed in the future they will be designed to provide recreational open space or wildlife habitat in a park-like setting, with shallow slopes and without fences. Should any utility lines be permitted to traverse the site in the future, they shall be buried to maintain the natural, wilderness feeling of the Preserve.

Any proposed modifications of this management plan and/or any alterations or improvements to the Preserve that are not addressed in this management plan require prior Florida Communities Trust review and approval.

4.3 Permits Required for Development and Maintenance of the Preserve

No development or restoration work is planned for the duration of this management plan and therefore, no permits will be required for the development or restoration projects which are not planned. If additional development or restoration work were planned, the County would apply for all the appropriate permits, including those from the Florida Department of Environmental Protection, the Southwest Florida Water Management District, the US Army Corps of Engineers, the Environmental Protection Commission of Hillsborough County, as well as county permits for site preparation, building and operation and maintenance, etc., dependent upon what kind of development or restoration was planned at that time.

4.4 Greenways and Trails

Figure 6 shows the Preserve in relation to the existing and proposed trails throughout Hillsborough County (<http://www.hillsboroughcounty.org/parks/greenways/>). As can be seen from the figure, there are no proposed or existing trails that incorporate the Bell Creek Nature Preserve. A proposed bike lane will be located along Boyette Road on the northern boundary of the Preserve. There are some paved roads (south of the middle school) within the Preserve that can be used by bicyclists, but are not maintained for bicycle riding. Bicycles are not prohibited in the Preserve, but their use is not encouraged in sensitive habitat.

FIGURE 6 GREENWAYS AND TRAILS

5.0 RESOURCE MANAGEMENT

5.1 Site Security

A site security resident lives at the entrance of the Preserve off of McMullen Road (Figure 5). The residence is adjacent to the office, equipment storage and maintenance facility of the Conservation Services staff. The resident is required to patrol the Preserve to observe any irregularities such as fencing gaps, signs of trespass and poaching and other illegal activities. The resident is also required to coordinate with the Sheriff's Department and Wildlife Officers from the Florida Fish and Wildlife Conservation Commission when violations occur. The site security agreement is provided in Appendix A with the other legal documents.

The Preserve will be re-posted within 12 months of approval of the updated management plan with the updated park ordinance number.

5.2 Exotic Species Management

Exotic, "alien" or "non-native" species refer to plants, animals, fungi or other organisms that have been accidentally or purposefully introduced to an area outside of their origin. Exotic species can come from another continent, another part of a country or even from another watershed. Organisms evolve with other species that moderate their population (for example, plant pests and diseases). When an organism is taken out of its original environment and placed in another, species that help keep it in check may not be a part of this new environment (<http://mdc.mo.gov/nathis/exotic/>).

5.2.1 Invasive Exotic Plants

What has been done:

Over the past years from 2000 to 2009, the following exotics have been located:

Cogongrass, natalgrass, Japanese and Old World Climbing ferns, primrose willow, balsam apple, Brazilian pepper, skunk vine, air potato, camphor, chinaberry, wedelia, cypress vine, Caesarweed, latex vine, Chinese tallow, queen palm, and lantana.

With the exception of primrose willow, all species listed have been treated. None of these exotics represent a large infestation; most are small and scattered. Right now the site is still in a maintenance stage. An estimate of 2-3 days to treat and re-treat all exotics on the site has been determined.

Challenges:

Cogongrass is growing in close proximity to endangered Florida golden aster plants. It is often difficult to spray cogongrass without accidentally spraying asters. Cogongrass is

also coming up areas which are difficult to access, such as creek corridors south of the spray field, and in an area which was recently timbered on the south side of the Preserve.

What is left to be done:

1. Treat cogongrass on south side of spray field. This area needs to be burned for better access and large shrubs close to the cogongrass should be mechanically treated if possible. Cogongrass may have to be disked.
2. Primrose willow should be sprayed in northern wetlands.
3. Cogongrass must be treated as soon as possible in sand pine scrub areas which were or are going to be mechanically treated.
4. Invasive exotic survey which was started in August 2008 needs to be completed.

Conservation Services staff have been mapping populations of these species and are continually treating and monitoring regrowth (See Figure 7). New species and new infestations can occur frequently and the staff surveys the Preserve on a regular basis to prevent new infestations from becoming established. Sites are treated on an as needed basis, and monitoring for invasive exotics occurs at least once a year.

Exotic plants can be treated by mechanical, physical, chemical or biological methods or combinations of one or more of these methods. Mechanical treatments include the cutting or pulling of the vegetation and often is followed by the use of chemical spraying. Physical treatments include the use of prescribed fire or water impoundment to kill or at least slow the spread of the exotic plants.

Chemical treatments are the most widely used and usually most effective methodology. This involves the use of herbicidal sprays applied from back pack sprayers or even from helicopters.

Biological controls are the slowest methodology of treatment, but when implemented properly, can be the most effective over the long term. Biological control involves the introduction of a natural predator or pathogen that destroys the exotic species. Biological treatment requires long years of testing to ensure that the introduced control does not create problems in the environment. Treatment methodologies for exotic plant species are continually changing as new herbicides and biological controls are developed. There are numerous references available for types of chemical herbicide application and biological treatment and the science is changing all the time. The Conservation Services Team is committed to using the latest technology and the safest methodology available to reduce existing infestations. Some resources on line include:

Figure 7 “Bell Creek Habitat Restoration Needs”.

Center for Aquatic and Invasive Plants Web site <http://plants.ifas.ufl.edu>.

Florida Exotic Pest Plant Council Web site <http://fleppc.org>.

[Identification and Biology of Non-Native Plants in Florida's Natural Areas](#). K.A. Langeland and K. Craddock Burks. 165 pp. 1998. IFAS Publication SP 257.

[Control of Non-Native Plants in Natural Areas of Florida](#). K.A. Langeland and R.K. Stocker. 34 pp. 2001. IFAS Publication SP 242.

[Help Protect Florida's Natural Areas from Non-Native Invasive Plants](#). K.A. Langeland. 1999. IFAS Circular 1204.

The most effective method for the treatment of exotic plant infestations is prevention. This will require periodic monitoring of vulnerable areas in the Preserve and maintenance of all occurrences while they are in the early stage of development. The 2007 list of invasive exotic plant species, prepared by the Florida Exotic Pest Plant Council is provided as Appendix E.

5.2.2 Invasive Exotic Animals

The exotic animals observed on the Preserve to date are feral pigs, nine-banded armadillo, walking catfish, Cuban anole, Indo-Pacific gecko, monk parakeet, domestic/feral cats and dogs, and the Cuban tree frog. Attempts to control the anole, tree frog and some of the other species would be impractical but feral hogs are especially destructive to natural areas in that they root up the soil when foraging. This disturbance may cause potential erosion problems and facilitates the introduction of exotic vegetation. Feral hogs also can be dangerous and have been known to attack people. Hillsborough County has contracted a professional trapper who is actively removing feral hogs. Periodic monitoring to determine the presence of nuisance species is recommended so that removal action may be taken before feral animals breed on site and become a serious problem. Monitoring can be conducted during routine maintenance events, such as mowing, maintaining firebreaks, and exotic vegetation maintenance and during native wildlife surveys. Additional information regarding feral hogs is provided in Appendix E. Monitoring for the presence of invasive animals will occur at a minimum of once per year.

5.3 Prescribed Burns

5.3.1 The importance of fire

Prescribed fire is a land management tool used to restore and maintain fire-dependent ecosystems, enhance forest health, improve wildlife habitat, and prevent dangerous, uncontrolled wildfire by reducing hazardous fuels. Fire promotes healthy ecosystems by clearing out competing vegetation, cycling nutrients into the soil, providing food for wildlife, and stimulating fire-dependent plants to grow and produce seed

(http://www.fs.fed.us/fire/fireuse/rxfire/rx_index.html). Concerns regarding smoke created by prescribed fire are a priority, especially considering the residential areas around the Preserve.

One of the greatest benefits of prescribed fire is that it reduces "fuels" such as the underbrush, branches, pine needles, leaves, and dead plant debris that have built up on the forest floor over time. If fuels are not reduced every few years, wildfires can become intense, hot, and destructive (http://www.fs.fed.us/fire/fireuse/rxfire/rx_index.html).

Because of Florida's long history of lightning fires, many of the state's natural systems are adapted to fire and depend on periodic fire to remain healthy. Prescribed burning is a vital tool for managing pine flatwoods, pine sand hills, and sand pine/oak scrub found in the region. These natural systems shelter many threatened and endangered plant and animal species that rely on fire to survive, such as Florida black bear, Florida scrub-jay, eastern indigo snake, gopher tortoise, and scrub holly. When fire is kept out of these areas, some plant and animal populations decline and eventually disappear (Myers *et al.*, 1990).

Because natural fires can no longer move across the landscape as they did historically, prescribed fire at appropriate intervals is necessary to maintain these unique natural communities. For example, prescribed fire reduces the height of scrub vegetation to a level that is suitable for the Florida scrub jay and opens up sandy areas which allows the jays to store their acorns. Fire also generates fresh seeds, fruits, and native plant growth, providing food for these rare species (Myers *et al.*, 1990). Many people have expressed concern about the safety of wild animals during prescribed fires. Most wild animals migrate to safety during the relatively slow-moving prescribed fires. Some animals take refuge by moving to unburned or previously burned areas. Small animals seek shelter under logs, in old trees, and in burrows like those of the gopher tortoise. Few animals are killed by fire, especially during the growing season when it's warm and most animals are active. Mammals are rarely killed, and ground nesting birds build new nests and benefit from increased numbers of insects after the fire (Myers *et al.*, 1990).

Prescribed fire is also beneficial to the people of Florida. It reduces the severity of wildfires and provides improved wildlife habitat, forest, and grazing land. As Florida's population continues to grow, more and more areas will be developed that will require fire protection services. Prescribed fire is a safe and effective land management tool for reducing the severity of wildfires (Myers *et al.*, 1990).

5.3.2 Management Measures for Fire

The Bell Creek Nature Preserve has an active prescribed burn program, which was implemented in 1992 and continues to the present. The following is a brief summary of the prescribed fire activities that have taken place in the various plant communities in the Bell Creek Nature Preserve from 1999-2009 (Carlisle, 2009).

Open grasslands: Approximately ten (10) burns in the three grassland units, for an average fire return time of 3.3 years for the entire grassland community. Most of the burns were concentrated, however, in the area of the Preserve containing threatened Catesby's lilies (*Lilium catesbaei*), giving this particular unit an average fire return interval of two (2) years. The freshwater ponds in the Preserve have been, for the most part, excluded from burns, due to the high risk of residual smoke on roadways and in surrounding developments, should the organic materials (muck) ignite. This is a problematic management issue throughout the Southeastern United States and will only get worse as the wildland/urban interface continues expanding. Freshwater ponds in the Bell Creek Nature Preserve, as well as throughout the US, will continue to become more eutrophic through the exclusion of fire. Thus, we will continue losing more and more open-water ponds through this process. Some water management districts have mechanically removed built-up muck in their lakes and ponds, but that will, in all likelihood, not be an option on ELAPP sites, due to the lack of funding and, more than likely, the public relations issues concomitant with this kind of land management activity.

Sandhill: The remnant sandhill community in the southeastern corner of the Preserve (at the Donneymoor gate into the Shadow Run development) has seen two (2) fires over the past ten years, giving it an average fire return interval of 5 years. The close proximity to homes, along with varying weather conditions, has prevented more frequent burning. The gopher tortoise (*Gopherus polyphemus*) has thrived in this area and the recent sand pine and hardwood reduction activities in the southwestern parts of the preserve, along with the continued burning and restoration of the sandhill area, should help to open up areas for future generations of tortoises.

Pine flatwoods: The pine flatwoods area(s) in the northwestern part of the Preserve have had at least four (4) prescribed fires in them over the last ten years, thus giving them an average fire return interval of 2.5 years. Continued regular prescribed fire, as well as mechanical fuel reduction of the palmetto understory, will further enhance this remnant flatwoods and provide improved habitat for a number of species, including the gopher tortoise population and the species that live commensally with them.

Sand pine scrub: There has been one (1) prescribed burn in the sand pine scrub area located in the southwestern portion of the Preserve over the last ten years. With the Preserve being in such a heavily-developed wildland/urban interface zone, the heavy fuel loading, due to decades of pre-acquisition fire suppression, subsequent post-acquisition prescribed fire and hurricane damage tree mortality, has prevented further prescribed burning in this area. The sand pine harvesting and hardwood reduction activities that have taken place and are on-going, as of this writing, should greatly enhance the possibilities for future prescribed burning and, as a consequence, increase the species diversity and density of the flora and fauna that was found historically in this type of habitat.

Oak hammock: At least two (2) prescribed fires have been accomplished in the oak hammock unit north of Marion Rodgers Middle School over the last ten years, giving this area an average fire return interval of five (5) years. The first burn met with mixed results, due to fuel and weather conditions. The subsequent burn in May 2006 was highly successful and led to many areas of the oak overstory being opened up, as well as burning off areas of accumulated duff, allowing much more sunlight through the canopy and opening fresh, sandy areas for the endangered Florida golden aster (*Chrysopsis floridana*) to take advantage of and flourish. The close proximity to a critical smoke sensitive area (Marion Rodgers Middle School) and the nature of the fuels (slow-burning oak duff) makes this area very difficult to burn under anything but the most rigid restrictions and weather conditions.

Note: The above listed fire activities are exclusive of all wildfires that have taken place in the Bell Creek Nature Preserve over the past ten years. Wildfires, be they intentionally set, accidental or naturally-occurring, have burned through a few areas of the Preserve, but they constituted such an insignificant amount of acreage and had so little impact on the overall structure of the habitats, that they are not included in this summary.

Prescribed fires are conducted on County Park and preserve lands as resources become available and when climate conditions are appropriate. Preparation for burns includes the preparation of a burn plan, creation of fire lanes, surveying pre-burn site conditions, and notifying homeowners that may be affected by the burn. Some of these responsibilities are shared by the Conservation and Regional Parks staff and some occur with the assistance of the State of Florida Division of Forestry, or specialized contractors. The established burn units for the Preserve are shown in Figure 8. A sample burn plan is included as Appendix F.

One of the management measures for prescribed burning is to increase public awareness regarding the benefits of prescribed fire to wildlife and to the general public. County staff participates in educational events such as the Great American Teach-In to educate students on the benefits of prescribed burns and provides information and updates concerning prescribed burns on the County's website.

5.4 Maintenance Needs

Maintenance activities that are required for the upkeep of the Preserve include:

Mowing	Fence repair
Posting boundaries	Trail repair
Managing invasive species	Maintaining locks and gates
Disking fire lanes	

The maintenance responsibilities are undertaken by the Conservation Services staff with assistance from Hillsborough County Regional Parks staff. Staff members frequently work with volunteers and interns.

6.0 HABITAT RESTORATION

There are several areas in the Preserve in which habitat restoration is proposed, underway, or has taken place in the past (Figure 7 and listed below).

Past restoration efforts include the following:

- The logging of sand pine and removal of oak trees near McMullen Road and the Shadow Run subdivision for the purpose of reducing hazardous fuel loads in the urban interface. The overstory tree removal will also improve gopher tortoise habitat by allowing the development of an herbaceous understory. In addition, it may reduce the migration of tortoises offsite and prevent them from becoming road kill on McMullen Road, which happens frequently (Figure 7). Some revenue (\$5218.17) was generated from the sale of the pine; this money was placed into a special fund which can only be used for restoration. The oak removal was bid out to a contractor. Trees were cut and burned in the Preserve.
- Miscellaneous native plantings and trash pickups with volunteer groups.

Future restoration efforts will include these items:

- Due to the recent widening of Boyette Road which runs along the northern boundary of the Preserve, Hillsborough County is required to mitigate for permanent, unavoidable impacts to wetlands and upland habitats. The County is accommodating the regulatory requirement for mitigation within the Bell Creek Nature Preserve with upland enhancement of oak/pine habitat and with the creation of 2.35 acres of wetlands in a previously disturbed area within the northern portion of the Preserve (Figure 7).

The wetland mitigation will include the removal of four concrete house pads, fill, and any associated rubble left over from the former Summertime Lake Estates Subdivision. The project will restore a Palustrine forested wetland, and an adjacent existing 0.62 acre wetland will be enhanced by the removal of nuisance exotic vegetation. The plan view construction drawings of the proposed wetland restoration site are provided in Appendix G. The mitigation will occur at the same time as the third phase of widening of Boyette Road and is expected to be some time in the next five years.

- The removal of several spoil piles around the small pond in the southwest corner of the Preserve (Figure 7). These piles have been located in this area for a long time and vegetation has become established on them. Conservation Services staff reports that these piles are hazardous because they are composed predominantly of peat excavated during the creation of the pond. During prescribed burns or arson fires, these piles can smolder for long periods of time

and have in the past re-ignited (Figure 7). This project is currently unfunded and thus a time frame is not available.

- Hydrologic restoration of the wetland south of Donneymoor Road, which has been severed from the spring-fed tributary (Figure 7). This project is currently unfunded and a time frame is unavailable.

The County is committed to a photo-monitoring program of natural communities and restoration in the Preserve.

7.0 COMPLIANCE

7.1 ELAPP Policies and Ordinances

On January 7, 1987, the Board of County Commissioners approved an Environmentally Sensitive Land Ordinance (Ordinance 87-1) that took effect upon the passage of a referendum on March 3, 1987. The voters of Hillsborough County passed the Environmentally Sensitive Lands Referendum by a three to two margin, providing for a one-quarter mil tax over a four-year period to purchase sensitive land in Hillsborough County. The tax was projected to raise approximately twenty-one million dollars in revenues over a four-year period for the purchase or protection of these lands. In June 1990, another ordinance was approved (Ordinances No. 90-19, 90-31E, and 93-16) providing (among other things) for the issuance of general obligation bonds not to exceed \$100 million and the levy of ad valorem taxes not to exceed a quarter of a mill in any one year for a period not to exceed 20 years for the purpose of acquiring, preserving, protecting, managing and restoring environmentally sensitive lands, beaches and beach access, parks and recreational lands. In 2008, a third referendum was approved by an overwhelming show of support from voters in the County. Almost 80% of all votes cast in the County voted for the extension of the ELAPP program for another thirty years. The referendum will provide \$200 million for the ELAPP program (Ordinance 08-16).

The Environmental Lands Acquisition and Protection Program (ELAPP) was established for the purpose of acquiring, preserving, and protecting endangered and environmentally sensitive lands, beaches, parks, and recreational lands in Hillsborough County. The purpose of acquiring such lands will be for resource protection; however, all lands shall be open for public use and enjoyment to the extent that the County finds such use compatible with the preservation and protection of these lands (Hillsborough County, 2006). The Environmentally Sensitive Land Ordinances are provided as Appendix H.

In 2008, the Parks Ordinance 97-14 was repealed and replaced with Ordinance 08-17 to provide additional protection to the park and conservation lands of Hillsborough County. The ordinance provides regulations that conformed to those of the state and federal government with respect to public lands. This ordinance is provided in its entirety in Appendix H.

7.2 Compliance with Comprehensive Plans

The Bell Creek Nature Preserve assists Hillsborough County in implementing the goals, objectives and policies of the Conservation and Aquifer Recharge Element, Future Land Use Element, and Recreation and Open Space Element of the County's Comprehensive Plan. The preservation of wildlife habitats and the development of public recreation and environmental conservation activities on the Preserve will help to accomplish or further enhance the goals and objectives described in Section 8.0. A copy of the relevant elements of the County's plan is included as Appendix I, and the plan is available at (www.theplanningcommission.org/hillsborough/comprehensiveplan).

7.3 Easements, Concessions, and Leases

Leases: There are no existing leases in the Preserve, and none are anticipated at this time. *The County will provide the FCT 60 day prior written notice and information regarding any lease.*

Easements: There are two existing easements (see Figure 7).

1. The emergency access from Boyette Road to Marion Rodgers Middle School.
2. The conservation easement granted in 2009 (Appendix A).

The County will provide FCT a 60 day prior notice and information regarding any lease of any interest, the operation of any concession, and any sale or option, the granting of any management contracts, and any use by any person other than in such person's capacity as a member of the general public and no document will be executed without the prior written approval of the FCT. The County will not execute any document without the prior written approval of the FCT.

Concessions: *No concessions are presently being considered for the Preserve and none are planned for the next ten years at a minimum. If such a facility existed or were ever planned on the Preserve, FCT would be notified in advance and fees would be placed in a segregated account solely for the upkeep and maintenance of the Preserve.*

8.0 SUMMARY OF MANAGEMENT GOALS AND OBJECTIVES

Hillsborough County has a centralized management operation for all natural preserve lands which have been acquired by the ELAP program. With the exception of the capital improvement projects, such as fencing, road construction, site security residences, etc., site management expenses are not budgeted on a site specific basis. The program is funded to cover capital equipment, personnel, and operating expenses for the Regional Parks and Conservation Services section of the Hillsborough County Parks, Recreation, and Conservation Department.

In past years, the Conservation Services section budget primarily derived from the revenue set aside for the ELAP Program by the 1990, voter approved referenda.

Conservation Services current, Fiscal Year 2009 Budget, comes from the Countywide General Fund. A new Ordinance (08-16) to extend the program was approved at a referendum by a majority vote of the electorate on November 4, 2008. This Ordinance allows for bond proceeds to be expended to finance capital projects relating to the acquisition, preservation, protection, management and restoration of environmentally sensitive lands. Due to the new Ordinance, future funding sources for the program will be decided during 2009. The current revenue structure does not generate sufficient funding to fully support the current management program, and recent budget cuts have further exacerbated the lack of management and operational funding. Additional funds for personnel are provided by the Phosphate Severance Taxes, since some other ELAPP lands acquired to date have been mined for phosphate (Hillsborough County, 1997).

Additional funds for operation and capital have been secured by earmarking interest revenue from reimbursements received from agencies participating in joint acquisitions. This option is only available for projects which were originally acquired with Ad Valorem proceeds, since reimbursement funds for Bond funded acquisitions must be used to retire the Bonds. Some additional funding for site restoration and maintenance efforts has been secured through grants, and other agencies have entered into restoration partnerships for large scale habitat restoration projects.

The estimated costs to support the goals and objectives of the management plan for the next ten years are listed below. *As stated previously, any site alterations or physical improvements that are not addressed in this plan require prior FCT review and approval.*

TABLE 4 PROPOSED MANAGEMENT GOALS AND OBJECTIVES FOR BELL CREEK NATURE PRESERVE		
OBJECTIVE	SCHEDULE	EST. COST
Restoration for Boyette Road widening wetlands	Ongoing	TBD
Roller-chopping and/or hardwood removal	Ongoing	TBD
Continue invasive species program	Ongoing	TBD
Continue prescribed burn program	Ongoing	\$80,000.00
Maintenance supplies (fence repair, temp. fencing, etc.)	Ongoing	\$7,000.00
Continue the photo-monitoring program	Ongoing	TBD
Conduct cultural resources survey	TBD	TBD
Continue educational programs	Ongoing	TBD
Continue site security	Ongoing	\$20,000.00
Ecological studies	Ongoing	\$10,000.00
	Total	\$117,000.00

The goals and objectives of the Preserve are listed below, not necessarily in a prioritized manner.

Goal #1. Continue to Protect and Manage All Listed Species Populations.

Management activities will continue to protect the habitat of the gopher tortoise, wood stork, Catesby's pine lily, Florida golden aster, Florida Sandhill Crane, and other listed species.

Goal #2. Continue to Conduct Prescribed Burns and Habitat Management.

Continue to conduct prescribed burns in pine flatwoods and continue with other vegetation management measures such as roller-chopping, if necessary to improve habitat conditions and reduce fuel loads for prescribed burns. Create or widen fire lanes along perimeter of Preserve.

Goal # 3. Continue to Control Invasive Exotic Plants and Animals in the Preserve.

Continue to map and survey for invasive plant species, monitoring populations using GIS. Monitoring for invasive plants and animals will occur at least once a year.

Goal #4. Continue Surveys. Continue wildlife and cultural resource survey work in the Preserve. Surveys will emphasize listed species and the continued protection of the natural habitats in the Preserve. Continue to map locations of resources using GIS, and implement management strategies for protection of all resources.

Goal #5. Continue Environmental Education Efforts in the Preserve. Continue environmental education interactions with emphasis on the local schools. Keep the preserve open to the public as much as possible while preserving the integrity of the habitat and protection of wildlife populations.

Goal #6. Continue Site Security Efforts. Continue site security efforts, including fencing and site security residence, and update posted signage around perimeter. Coordinate with the Sheriff's Department to control poaching, dumping, and other illegal activities.

Goal #7. Seek Continued Funding. The existing budget program stipulates that 2% of the Ad valorem or Bond generated funds be allocated to the maintenance of the Preserves. Grants and other unrelated outside sources of funding are aggressively pursued to make up for the budget shortcomings.

Goal #8. Habitat Restoration. Complete construction of Boyette Road mitigation project. Continue to seek funding or means to remove spoil piles near small lake and restore hydrology of bay head near south boundary.

Goal #9. Continue photo-monitoring program. Continue to conduct photo-monitoring of natural systems, restoration areas, listed species populations, and other important

features on the Preserve. These photos should be included in the annual stewardship reports to the FCT.

Goal #10. Continue reports to Florida Communities Trust. The annual stewardship reports will continue to be submitted to the FCT by July 30th annually and the reports will follow the prescribed format.

Any proposed modification of the Management Plan and /or undertaking any site alterations or physical improvements that are not addressed in the Recipient's approved Management Plan requires prior FCT review and approval.

9.0 REFERENCES

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