

**7.**  
**CONSERVATION**  
**DATA & ANALYSIS**

## **I. Introduction**

The following information is based on the best available data, which was used to analyze existing conditions and make recommendations for changes in the Conservation Element in this and previous updates to the University's Comprehensive Master Plan.

### **A. *Conservation Area Boundaries and Management***

The 2000-2010 Master Plan contained some inconsistencies between what was considered a conservation land use and what was considered a preservation area. For example, some areas like the creeks adjacent to Sorority Row, P.K. Yonge and Diamond Village were considered Conservation Areas, but not preservation areas. In other cases, areas considered preservation were placed in the passive recreation land use category (examples Wilmot Gardens, DASH course). Similarly, some wetlands and water bodies were not designated as a conservation land use. The 2005-2015 Comprehensive Master Plan eliminated these inconsistencies and identified management strategies for those places designated as conservation. Simultaneously, the university engaged in a Conservation Area Land Management Process. The resulting Conservation Land Management Plan (CALM) was incorporated into the Comprehensive Master Plan by reference.

Beginning in the fall of 2003 an ad-hoc working group of University staff, faculty, students and interested community members conducted tours of 25 campus Conservation Areas and 5 passive recreation areas in order to determine their current state and recommend improvements for each area. From these 30 areas that were visited 22 specific area plans have been developed (passive recreation areas were not included and some Conservation Area were grouped together) that outline issues and strategies for each Conservation Area. The core members of this group included: Paula Fussell, Linda Dixon, Alex Holecek, Chuck Hogan, Marty Werts, Erick Smith, Mark Clark, Tom Walker, Meghan Pressley, Fritzi Olsen, Bruce Delaney, Glenn Ketchum, Mark Brown, Gerald Kidder, Nick Vellis, Clay Montague, and Ann Stolda, although others were involved in individual site visits. The recommendations from this working group formed the foundation of the CALM plan and specific area plans.

The conservation land use designation of the Campus Master Plan's future land use map formed the starting point for remapping all land use categories by identifying and protecting those lands that should not be developed. Remapping efforts were based on up-to-date spatial data that illustrated the inaccuracy of many conservation boundaries that were on the adopted future land use map (areas where land use designations conflict with the underlying use of the land or natural features). This new and more accurate data included wetland boundaries, floodplain boundaries, tree canopy coverage, steep slopes, archeological sites and other natural and anthropogenic features that represent logical separation lines between uses. Thus, using this new data the ad-hoc working group, along with staff, began the remapping efforts with the adopted 2000-2010 boundaries serving as the starting point. Through the work of the Conservation Study Committee for 2005 (Mark Brown, Sheri Bryan, Peggy Carr; Mark Clark,; Eva Czarnecka, Joyce Dewsbury, Linda Dixon, Paula Fussell, Chuck Hogan, Mark Hostetler, Gerald Kidder, Erik Lewis, Nancy Menzel, Clay Montague, Mackenzie Moritz, Meghan Pressley, Jack Putz, Erick Smith, Nick Vellis, Tom Walker, Marty Werts) these boundaries were revised, with some areas being added and others being eliminated.

Site visits by the working group lead to the observation, in most cases, that Conservation Areas on campus have not been actively managed. Thus, management issues identified by the group included basic problems of erosion, sedimentation, trash, unauthorized parking, invasive non-native plants and lack of amenities for visitors. In order to address these concerns, the working group came up with a number of management activities that have been included within the specific area plans contained in the CALM plan. Typical activities that were identified include fencing, educational/interpretive signage, invasive non-native plants management, trail marking, and habitat enhancements (plantings and shelters). Additionally, the working group recognized the importance of several Conservation Areas to support environmental research / teaching and identified measures that should be taken to enhance these uses and foster multidisciplinary projects where feasible.

Successful performance will be measured by implementation of management strategies, along with changes to baseline conditions. Therefore, the Data and Analysis report represents the baseline report for the University's Conservation Areas and will serve as the basis for measuring future improvements, habitat quality and flora and fauna abundance and diversity. This update for 2015-2015 builds upon those 2005 efforts.

## **II. Conditions Inventory**

### **A. *Water Resources***

The University of Florida's hydrology is unique from much of the State of Florida in that runoff from storm events, irrigation and surficial aquifer seepage all empty into depressions that ultimately recharge the Floridan aquifer. This is in contrast to the more typical view of Florida hydrology, which is generally characterized by surface water that runs into larger bodies of water that in turn flow to the ocean, or by areas of porous soils that allow water to recharge directly to an aquifer. The watersheds of the University are along the Cody Scarp. This scarp marks a geologic transition zone where the clays of the Northern Highlands physiographic province give way to karst prone limestones and sands of the Gulf Coastal Lowlands. Lands to the west of campus (transition area grading to Gulf Coastal Lowlands) are generally characterized as a mixture of sand and unconsolidated clays that allow for the easy downward movement of water to the Floridan aquifer, with few surface water drainage features. Meanwhile, lands to the north and east of campus consist of remnants of the Northern Highlands province, which are characterized as poorly drained, low recharge, with significant drainage where water instead of recharging the aquifer makes its way via a series of creeks and rivers into the St. Johns River and ultimately the Atlantic Ocean. The University is in the transition zone between these provinces in a zone called a stream to sink watershed. As the name implies, stream to sink watersheds are where surface water flows down gradient and ultimately ends up in a depression or sinkhole. In the University's case the majority of surface water ends up in one of three depressions or sinkholes – Bivens Arm (Alachua Sink), Sargarfoot Prairie (Haile Sink) or Lake Alice (drainage wells).

When looking at water related issues the two major issues are generally thought to be water quality and quantity. However, on campus since the university reuses its wastewater for irrigation quantity is not as big an issue as quality. This is not to say that the University does not focus on water conservation, only that water conservation is focused on potable water it buys from Gainesville Regional Utilities. In order to address the potable water quantity issue, the University mandates the use of low plumbing fixtures in its design standards. While there is discussion of other water savings strategies such as cisterns and recycling stormwater for toilets, there is little evidence that these measures will pass a cost-benefit analysis, particularly when long-term maintenance costs are added. On the water quality issues the University is committed to making its streams, ponds and lakes as clean possible for a dense urban setting.

The State of Florida measures water quality for lakes and rivers/streams using a water quality index Trophic State Index for lake sand WQI index for rivers and streams-Lakes are potentially impaired for nutrients if (1) in lakes with a mean color greater than 40 CUs), the annual mean TSI for the lake exceeds 60, or (2) in lakes with a mean color less than or equal to 40 PCUs, the annual mean TSI for the lake exceeds 40. TSI was used as a threshold for both large and small lakes in the Status Monitoring Network. The TSI classifies lakes based on chlorophyll levels and nitrogen and phosphorus concentrations. It is based on a classification scheme that relies on 3 indicators—Secchi depth, chlorophyll, and total phosphorus—to describe a lake's trophic state. A 10-unit change in the index represents a doubling or halving of algal biomass. The Florida TSI is based on the same rationale, but total nitrogen replaces total Secchi depth as the third indicator. Attempts in previous 305(b) reports to include Secchi depth have been unsuccessful in dark-water lakes and estuaries, where dark waters rather than algae diminish transparency. Note: Both TSI and chlorophyll a are not standards, but thresholds used to estimate the condition of state waters. These thresholds are used in the analysis of Status Network data based on single samples within a basin during a predetermined

index period. The analysis and representation of these data are not intended to infer the verification of impairment as defined in Rule 62-303, F.A.C., in these waters.

**Lake Alice Watershed.** The Lake Alice watershed (basin) covers about 80% of campus, with approximately 1,140 acres of the basin on campus and an additional 381 acres contributing from off campus. Stormwater, reclaimed irrigation water and surficial aquifer seepage from creeks are the major contributors to the lake, which is the ultimate surface destination of water within the watershed. Historical accounts of Lake Alice show a lively past within the internal campus discourse, where different views on how to manage the lake and watershed have held sway over the years. The first accounts of controversy appear around 1946 –1947 when wastewater was diverted from a sinkhole, Sweet Sink, adjacent to the sewage treatment plant, to Lake Alice. This sinkhole, according to historical accounts, was the outlet for high water in the basin. The basis for the diversion from the sinkhole was that effluent discharges entering the sink were showing up in the city’s public supply water system. This diversion of water to the lake led to a major increase in the water entering the lake and to flooding of traditionally non-flood prone areas. The flooding was further compounded by increases in impervious surface, irrigation and cooling waters (historically, Lake Alice was also augmented by the University’s water chilling system and by air-conditioning systems that both discharged large amounts of water into Lake Alice. Over the years these non-beneficial uses of water have been taken off line). Many solutions were contemplated, with a final decision reached to allow Lake Alice to hold more water, while also installing two drainage wells that drain when water levels reach a certain elevation within the lake.

During the years of direct wastewater discharges to the lake, concern was expressed by many campus professionals on the increased nutrient content. It was observed that these nutrients were leading to increased aquatic plant growth and accelerated eutrophication processes within the lake. To deal with the engulfing plant growth of water hyacinths, parrotfeather and coontail, university staff started a maintenance removal program of these plants that is ongoing to this day. Eventually, years later and after much discussion from campus personnel about the impacts that effluent discharges were having on the lake, direct wastewater discharges to the lake were removed.

The current stormwater permit with the St. Johns River Water Management District (SJRWMD) allows the University to increase impervious surfaces within the Lake Alice watershed by an additional 165 acres (as of 10/2013) without additional stormwater facilities being built. This permit does not cover added stormwater from offsite sources in the City of Gainesville, nor from roads maintained by the Florida Department of Transportation.

**Hogtown Creek Watershed.** The Hogtown Creek Watershed covers the majority of incorporated City of Gainesville, however only 315 acres out of 13,440 acre watershed are present on the main campus. Hogtown Creek, the primary drainage conveyer in the watershed, drains into a depression named Sugarfoot Prairie and ultimately into Haile Sink. The two areas on campus that drain into Hogtown Creek are lands up gradient of Elizabeth Creek that runs through the University Arboretum, near the President’s home, and the lands on the western side of campus that drain into the Hogtown Creek Woods area along SW 34<sup>th</sup> Street.

This watershed, as with much of Gainesville, was urbanized before the era of stormwater management and specifically on-site retention and detention. As a result, the creeks in this watershed suffer from high velocities during storm events, which cause in-stream erosion and lead to down-stream sedimentation that elevates the floodplain, potentially flooding structures. Unlike the Lake Alice watershed, new campus development within this watershed must be permitted individually with the SJRWMD, which will require the use of on-site retention or detention. Additionally, the University is looking for ways to cooperate with the City to incorporate new stormwater techniques to help ameliorate the downstream impacts of previous development by incorporation of Low Impact Development techniques where feasible.

**Bivens Arm Watershed.** Bivens Arm Lake is approximately 156 acres in size and the receiving body of this 2,200 acre watershed, 456 acres of which are on campus. The watershed is connected through Paynes Prairie

to the larger Orange Creek Basin that encompasses most of southeastern Alachua County. In 1965 the State of Florida designated the lake area as a wildlife sanctuary. Predominate land uses in the watershed are 25% residential, 21% institutional, 19% transportation and 7% commercial. Tumblin Creek, at 2.3 miles in length, is the main tributary to Bivens Arm Lake. The creek runs through the University's laboratory school P.K. Yonge. This creek empties into a large bottomland hardwood forest near US 441 on the northeast rim of the lake. Before being channelized to accelerate upstream drainage, this creek emptied into a wetland forest that provided water quality treatment through vegetative uptake of nutrients and metals. Other more intermittent tributaries are present to the north of the lake adjacent to the College of Veterinary Medicine facilities and to the west by IFAS's facilities, crops and pastures. Bivens Arm, like Lake Alice suffers from eutrophication from primarily anthropomorphic sources upstream.

In 2012, the Florida Department of Environmental Protection proposed water quality nutrient standards for Bivens Arm. These standards state that Bivens Arm is considered a clear, high alkalinity lake according to long-term data from LakeWatch. Both Total Phosphorus and Total Nitrogen exceed these new standards in the lake. Additionally, in 2009, FDEP verified Bivens Arm on the 303d list as impaired for nutrients, dissolved oxygen, and turbidity. Major sources of phosphorus and nitrogen in the watershed include fertilizers in stormwater runoff. Another source of phosphorus is the naturally occurring phosphatic minerals in the Hawthorn Group formations that are transported during stormflow in the Tumblin Creek watershed.

**Depression Basins (Watersheds).** In the University's Stormwater Management Master Plan a number of smaller watersheds or basins are defined as depressional basins. A depressional basin occurs when all surrounding land flows into a depression. In karst areas (sinkhole areas) these depressions often have an outlet in the form of a sinkhole that drains into an aquifer. However, when groundwater levels are high enough, sinkholes stop being drains and instead act like plugs or in some cases even as discharge points for the aquifer. When this happens the entire depression basin may fill up creating unexpected flooding. If enough water makes it into the system, water will eventually start flowing into an adjacent basin.

In reality, all of the University's watersheds are depression basins, since they all flow into depressions or sinkholes. The Bivens Arm / Tumblin Creek watershed is the only university basin that outlets to an area that can contribute to water that has the potential to make it to the ocean via the surface, but this only occurs during exceedingly heavy rainfall years, when the Floridan aquifer is also full and high.

**Sinks, Ponds, Lakes and Creeks.** While there are numerous small lakes and creeks on campus, only a few are named. The following list of named waterbodies are present on or adjacent to the main campus - Ocala Pond, Gator Pond, Dairy Pond, Liberty Pond, Lake Alice, Bivens Arm Lake, Sweet Pond / Sink, SEEP (Stormwater Enhancement Ecological Project), Presidents Pond, Hume Pond, Golf Course Pond, Deer Pond. The only named creeks on campus are Elizabeth, a tributary of Hogtown Creek, and Tumblin that runs through P.K. Yonge and into Bivens Arm. While many of the creeks on campus were natural drainage features before campus development, many have since been channelized and in some cases re-directed in order to handle campus drainage. These creeks have had their base flows increased by irrigation and other water discharges. Additionally, the increase in impervious surfaces from campus development has resulted in increased storm flow and velocities.

All campus water bodies play a role in stormwater storage and conveyance. On campus, many ponds and sinks work as storage systems that accept stormwater runoff up to a predetermined elevation where an outlet structure has been placed. When water reaches the specified elevation it will begin to flow into one of these outlets that in turn flow into the University's stormwater system. Meanwhile, creeks act as surface stormwater systems in that they convey stormwater to base elevations within the basin. Additionally, many of the stormwater pipes are routed to drain into the creeks, in many cases contributing significant amounts of the creek's flow.

**Santa Fe River Basin - Satellite Properties (Santa Fe River Ranch – Monetochoa Creek – Alachua Slough, Burnett’s Lake Darin, Rocky Creek)** – While the Santa Fe Watershed covers much of the western portion of Alachua County only a small portion of the total watershed of 1,390 square miles is within the County. The basin covers parts of Alachua, Baker, Bradford, Clay, Columbia, Gilchrist, Union, and Suwannee counties. The Santa Fe River watershed is within the Northern Highlands and Gulf Coastal Lowlands physiographic regions. The River Valley Lowlands is an extension of the Gulf Coastal Lowlands. The divide between the Highlands and Lowlands is the Cody Scarp, described as the most persistent topographic break in Florida. It is along this transitional zone between the two physiographic regions that the river, as with virtually all other streams, goes underground.

The Santa Fe River is designated an Outstanding Florida Water by the State of Florida. Water quality data in the basin has shown increasing nitrate levels in some of the springs along the lower Santa Fe, including Hornsby Spring in Alachua County. University satellite properties in this watershed include the Boston Farm/Santa Fe River Ranch, Dairy Unit, and portions of the Beef Unit.

**Orange Creek Basin - Satellite Properties (Watersheds - Hatchett Creek, Paynes Prairie).** The 600-square-mile Orange Creek Basin lies within the lower Ocklawaha River watershed, primarily in Alachua County. This basin encompasses three large lakes totaling 29,000 acres (Newnans, Orange, and Lochloosa), numerous smaller lakes (Bivens Arm, Wauberg), and Paynes Prairie, all of which are connected by urban and rural tributaries. Downstream of Orange and Lochloosa lakes, Orange Creek drains into the lower Ocklawaha River. In 2002, the Florida Department of Environmental Protection (FDEP) verified that all of the 13 major water bodies in the Orange Creek Basin, including Newnans Lake, Lochloosa Lake, and Orange Lake, are impaired and do not meet state water quality standards. TMDLS for these areas have been set by FDEP for these waterbodies and efforts are underway to reach the pollutant reductions needed to meet the State’s water quality standards. University satellite properties in this watershed include the Austin Cary Forest, Millhopper Unit and portions of the Beef Unit.

## **B. *Natural Communities***

The following descriptions of natural community types present on campus are largely taken from the Natural Communities of Florida (FNAI, 1990). While these communities are present on campus, they may bear little resemblance to the descriptions that follow in that campus natural communities are generally disturbed by adjacent urbanization, heavy use from University personal and fire suppression.

**Basin Marsh.** Basin marsh is characterized as an herbaceous or shrubby wetland situated in a relatively large and irregular shaped basin. Basin marshes usually develop in large solution depressions that were formerly shallow lakes. The lake bottom has slowly filled with sediments from the surrounding uplands and with peat derived from plants. Thus, the soils are usually acidic peats. The hydroperiod is generally around 200 days per year. Open areas of relatively permanent water within the marsh, with or without floating aquatic vegetation. They may eventually succeed to Bog, if a muck fire does not reverse succession. Many of the plants and animals occurring in Basin Marshes also occur in Floodplain Marsh, Slough, Swale and Depression Marsh. Large examples of the Depression Marsh, in fact, may be very difficult to distinguish from small examples of Basin Marsh.

- **Plant Species** - Typical plants include common reed, panicum, cutgrass, southern watergrass, pennywort, Spanish needle, redroot, soft rush, American lotus, water primrose, arrowhead, coastal plain willow, saltbush, elderberry, spikerush, knotweed, buttonbush, and dog fennel.

- **Animal Species** - Typical animals include two-toed amphiuma, lesser siren, greater siren, cricket frog, green treefrog, bull frog, pig frog, leopard frog, alligator, eastern mud snake, green water snake, banded water snake, striped swamp snake, black swamp snake, great blue heron, great egret, snowy egret, little blue heron, tricolored heron, bald eagle, and northern harrier.

**Bottomland Forest.** Bottomland Forest is characterized as a low-lying, closed-canopy forest of tall, straight trees with either a dense shrubby understory and little ground cover, or an open understory and ground cover of ferns, herbs, and grasses. Bottomland Forest occurs on low-lying flatlands that usually border streams with distinct banks, such that water rarely overflows the stream channel to inundate the forest. They also occur in scattered low spots in basins and depressions that are rarely inundated, which allow typical upland species to survive. Soils are generally a mixture of clay and organic materials. The water table is high, but Bottomland Forests are inundated only during extreme floods or exceptionally heavy rains.

- **Plant Species** - Typical plants include water oak, live oak, red maple, sweetgum, loblolly pine, white cedar, cabbage palm, diamond-leaf oak, southern magnolia, loblolly bay, swamp tupelo, spruce pine, American beech, dahoon holly, wax myrtle, swamp dogwood, Florida elm, stiffcornel dogwood, and American hornbeam.

- **Animal Species** - Typical animals include marbled salamander, mole salamander, three-lined salamander, slimy salamander, five-lined skink, ringneck snake, gray rat snake, eastern king snake, cottonmouth, wood duck, red-tailed hawk, turkey, yellow-billed cuckoo, screech-owl, great-horned owl, ruby-throated hummingbird, acadian flycatcher, pileated woodpecker, hermit thrush, cedar waxwing, yellow-throated warbler, opossum, gray squirrel, flying squirrel, raccoon, mink, gray fox, bobcat, and white-tailed deer.

**Depression Marsh.** Depression Marsh is characterized as a shallow, usually rounded depression in sand substrate with herbaceous vegetation often in concentric bands. Depression Marshes are similar in vegetation and physical features to, but are generally smaller than, Basin Marshes. Depression Marshes are typical of karst regions where sand has slumped around or over a sinkhole and thereby created a conical depression subsequently filled by direct rain fall, runoff, or seepage from surrounding uplands. The substrate is usually acid sand with deepening peat toward the center.

- **Plant Species** - Typical plants include St. John's wort, spikerush, yellow-eyed grass, chain fern, willows, maidencane, wax myrtle, swamp primrose, bloodroot, buttonbush, fire flag, pickerelweed, arrowheads, and bladderwort. Larger and more permanent Depression Marshes may have many of the same plants and animals listed as typical of Basin Marshes. However, because of their isolation and small size, many Depression Marshes support a very different assemblage of species than that found in larger, more permanent wetlands.

- **Animal Species** - Depression marshes are considered extremely important in providing breeding or foraging habitat for such species as the flatwoods salamander, mole salamander, tiger salamander, dwarf salamander, striped newt, oak toad, cricket frog, pinewoods treefrog, barking treefrog, squirrel treefrog, little grass frog, southern chorus frog, ornate chorus frog, narrowmouth toad, eastern spadefoot toad, gopher frog, white ibis, wood stork and sandhill crane. Depression Marshes occurring as isolated wetlands within larger upland ecosystems are of critical importance to many additional wetland and upland animals.

**Floodplain Marsh.** Floodplain marshes are wetlands of herbaceous vegetation and low shrubs that occur in river floodplains, mainly in Central Florida and along the St. Johns, Kissimmee and Myakka rivers, on sandy alluvial soils with considerable peat accumulation. Emergent grasses, herbs, and shrubs that dominate Floodplain Marshes include sawgrass, maidencane, and buttonbush. Floodplain Marshes are maintained by regimes of fire and water. Fires apparently burn on a one- to five-year basis under natural conditions and maintain the open herbaceous community by restricting shrub invasion; however, severe fires during drought

periods will often burn the mucky peat. Floodplain Marshes are flooded with flowing water for about 250 days annually.

- **Plant Species** - Other typical plants include sand cordgrass, dotted smartweed, arrowheads, pickerelweed, reimagrass, spikerush, bulrushes, bladderpod, common reed, coreopsis, glasswort, seashore dropseed, sea purslane, and water primrose.
- **Animal Species** - Typical animals include cricket frog, pig frog, leopard frog, American alligator, eastern mud snake, banded water snake, striped swamp snake, great blue heron, great egret, snowy egret, little blue heron, tricolored heron, black-crowned night-heron, yellow-crowned night-heron, northern harrier, sandhill crane, raccoon, and river otter.

**Marsh Lakes.** The distinctions between Marsh Lakes and Depression Marshes are quite subtle, because of their successional interrelationships. Depression Marsh is characterized as a shallow, generally round or elliptical depression vegetated with concentric bands of hydrophytic herbaceous plants. Depending upon the depth and slope of the depression, an open water zone with or without floating plants may occur at the center. The open water zone is considered to be a Marsh Lake if it is small in comparison to the surrounding marsh. Otherwise, the system is considered to be a Flatwoods Lake or a Prairie Lake, depending upon the surrounding community. In a Marsh Lake, fire maintains the surrounding open herbaceous community by restricting shrub invasion. The normal interval between fires is 1 to 10 years, with strictly herbaceous marshes burning about every 1 to 3 years, and those with substantial willow and buttonbush having gone 3 to 10 years without fire. Fires during drought periods will often burn the mucky peat and will convert the marsh into a Marsh Lake. The depressions in which Marsh lakes develop are typically formed by solution holes form in the underlying limestone, causing surface sands to slump into a circular depression. Soils in these depressions generally consist of acidic sands with some peat and occasionally a clay lens. Water is derived mostly from runoff from the immediately surrounding uplands. These marshes function as aquifer recharge areas by acting as reservoirs, which release groundwater when adjacent water tables drop during drought periods.

- **Plant Species** - Marsh Lakes are often surrounded by either a sparse, Wet Prairie-like zone or a dense ring of saw palmetto and other shrubs. Typical plants include spikerush, yellow-eyed grasses, St. John's wort, chain fern, coastal plain willow, maidencane, wax myrtle, water primrose, floating heart, buttonbush, fire flag, pickerelweed, arrowhead, bladderworts, bottlebrush threeawn, toothache grass, star rush, bulrushes, sawgrass, and nut sedge.
- **Animal Species** - Many animals utilize marshes primarily for feeding and breeding areas but spend most of their time in other habitats. Other animals are more dependent on marshes, spending most of their time within them. Typical animals include amphiuma, lesser siren, greater siren, cricket frog, green treefrog, bullfrog, pig frog, leopard frog, alligator, eastern mud snake, banded water snake, green water snake, striped crayfish snake, black swamp snake, American bittern, least bittern, great blue heron, great egret, snowy egret, little blue heron, tricolored heron, green-backed heron, black-crowned night-heron, white ibis, glossy ibis, bald eagle, northern harrier, king rail, Virginia rail, sora, limpkin, long-billed marsh wren, yellowthroat, red-winged, blackbird, boat-tailed grackle, and Florida water rat.

**Mesic Flatwoods.** Mesic Flatwoods are more commonly referred to as pine flatwoods (upland pine) and are characterized by their open canopy of widely spaced pine trees with little or no understory, but a dense ground cover of herbs and shrubs. Several variations of Mesic Flatwoods are recognized, the most common associations being longleaf pine - wiregrass - runner oak and slash pine - gallberry - saw palmetto. Mesic Flatwoods occur on relatively flat, moderately to poorly drained terrain. The soils typically consist of 1-3 feet of acidic sands generally overlying an organic hardpan or clayey subsoil. The hardpan substantially reduces the percolation of water below and above its surface. During the rainy seasons, water frequently stands on the hardpan's surface and briefly inundates much of the flatwoods; while during the drier seasons, ground water



is unobtainable for many plants whose roots fail to penetrate the hardpan. Thus, many plants are under the stress of water saturation during the wet seasons and under the stress of dehydration during the dry seasons. Another important physical factor in Mesic Flatwoods is fire, which probably occurred every 1 to 8 years during pre-Columbian times. Nearly all plants and animals inhabiting this community are adapted to periodic fires; several species depend on fire for their continued existence. Without relatively frequent fires, Mesic Flatwoods succeed into hardwood-dominated forests whose closed canopy can essentially eliminate the ground cover herbs and shrubs.

- **Plant Species** - Pant species typical of Mesic Flatwoods include longleaf pine, slash pine, wire grass, saw palmetto, gallberry, St. john-wort, dwarf huckleberry, fetterbush, dwarf wax myrtle, stagger bush, blueberry, gopher apple, tar flower, bog buttons, blackroot, false foxglove, white-topped aster, yellow-eyed grass, and cutthroat grass.
- **Animal Species** - Typical animals of Mesic Flatwoods include: oak toad, little grass frog, narrowmouth toad, black racer, red rat snake, southeastern kestrel, brown-headed nuthatch, pine warbler, Bachman's sparrow, cotton rat, cotton mouse, black bear, raccoon, gray fox, bobcat, and white-tailed deer.

**Seepage Slope.** Seepage Slopes are wetlands characterized as shrub thickets or boggy meadows on or at the base of a slope where moisture is maintained by downslope seepage such that the ground is usually saturated but rarely inundated. They generally occur where water percolating down through the sand hits an impermeable layer, such as clay or rock. Seepage Slope soils are acidic, loamy sands with low nutrient availability that are constantly saturated by seepage except during droughts. They are rarely inundated, although small pools and rivulets are common.

- **Plant Species** - Typical plants include pond pine, slash pine, longleaf pine, titi, fetterbush, myrtle-leaved holly, black titi, ale-berry, large gallberry, dahoon holly, gallberry, white cedar, tulip poplar, wax myrtle, odorless wax myrtle, blueberry, dog-hobble, racemed fetterbush, sweet pepperbush, possumhaw, Virginia willow, laurel greenbrier, wiregrass, pitcher plants, beakrush, cutthroatgrass, orchids, cinnamon fern, chain fern, bluestem, yellow-eyed grass, and an array of insectivorous plants. A large number of orchids, insectivorous plants, showy wildflowers and other plant species associated with this natural community are rare or endemic and considered endangered or threatened.
- **Animal Species** - Typical animals include the pine barrens treefrog, squirrel treefrog, ribbon snake, and cottonmouth.

**Upland Mixed Forest / Mesic Hammock.** Upland Mixed Forests are characterized as well-developed, closed-canopy forests of upland hardwoods on rolling hills. Upland Mixed Forests occur on rolling hills that often have limestone or phosphatic rock near the surface and occasionally as outcrops. Soils are generally sandy-clays or clayey sands with substantial organic and often calcareous components. The topography and clayey soils increase surface water runoff, although this is counterbalanced by the moisture retention properties of clays and by the often thick layer of leaf mulch which helps conserve soil moisture and create decidedly mesic conditions.

- **Plant Species** - Common species of this community type include southern magnolia, pignut hickory, sweetgum, Florida maple, devil's walking stick, American hornbeam, redbud, flowering dogwood, Carolina holly, American holly, eastern hophornbeam, spruce pine, loblolly pine, live oak, and swamp chestnut oak, among others. Other typical plants include gum bumelia, hackberry, persimmon, red cedar, red mulberry, wild olive, redbay, laurel cherry, black cherry, bluff oak, water oak, cabbage palm, basswood, winged elm, Florida elm, sparkleberry, Hercules' club, slippery elm, beautyberry, partridgeberry, sarsaparilla vine, greenbrier, trilliums, beech drops, passion flower, bedstraw, strawberry bush, silverbell, caric sedges, fringe tree, horse sugar, white oak, and blackgum.
- **Animal Species** - Typical animals species of the mesic system include slimy salamander, Cope's gray treefrog, bronze frog, box turtle, eastern glass lizard, green anole, broadhead skink, ground skink, red-bellied snake, gray rat snake, rough green snake, coral snake, woodcock, barred owl, pileated woodpecker, shrews, eastern mole, gray squirrel, wood rat, cotton mouse, gray fox, and white-tailed deer.

**Upland Pine Forest.** Upland Pine Forest is characterized as a rolling forest of widely spaced pines with few understory shrubs and a dense ground cover of grasses and herbs. Pristine areas are dominated by longleaf pine and wiregrass, while areas that suffered agricultural disturbances are dominated generally by shortleaf and loblolly pines and old field grasses and herbs. Upland Pine Forest occurs on the rolling hills of extreme northern Florida. The soils are composed of sand with variable, sometimes substantial, amounts of Miocene clays. The resultant prevalence of clays helps retain soil moisture, creating more mesic conditions than originally would have occurred. Thus, many plants which previously were restricted to valleys and other low areas may now inhabit the Upland Pine Forests.

Fire is a dominant factor in the ecology of this community because it reduces hardwood encroachment and facilitates pine and wiregrass reproduction. Without relatively frequent fires, Upland Pine Forest succeeds to Upland Mixed Forest and eventually to Upland Hardwood Forest. The natural fire frequency appears to be every 3 to 5 years. More frequent fires would likely eliminate pine recruitment, especially when loblolly and shortleaf pines are dominant species. Upland Pine Forest is a fire climax community that is associated with and often grades into Upland Mixed Forest or Upland Hardwood Forest. Gradations between these communities are frequently so subtle that distinctions are usually arbitrary. Upland Pine Forest is often confused with Sandhill. The primary differences between them reside in their soil characteristics and some species of plants and animals. Upland Pine Forests have been substantially degraded throughout their range. The sandy clay soils were prime agricultural lands for plantations as well as for American Indians. Thus, the longleaf pines were logged, the soil was turned, and the wiregrass disappeared. Only isolated tracts of the original longleaf pine-wiregrass association remain, the bulk being replaced by loblolly-shortleaf pine associations. Much of the latter has further succeeded to Upland Mixed or Hardwood Forest because of fire exclusion. The restoration of Upland Pine Forest to its original condition is impeded by the current inability to propagate wiregrass where it has been extirpated.

- **Plant Species** - Common species of this community type include southern red oak, runner oak, bluejack oak, blackjack oak, post oak, sassafras, black cherry, gallberry, persimmon, mockernut hickory, twinflower, huckleberry, dangleberry, goldenrod, Indian grass, partridge pea, goats rue, winged sumac, blueberry, dog fennel, snakeroot, golden-aster, yellow jessamine, broomsedge, asters, pencil flower, bracken fern, greenbrier, fox grape, flowering dogwood, sweetgum, and blackgum.
- **Animal Species** - Typical animals species of the upland pine system include gopher tortoise, eastern fence lizard, eastern diamondback rattlesnake, bobwhite, red-bellied woodpecker, fox squirrel, cotton rat, cotton mouse, gray fox, bobcat, and white-tailed deer.

**Wet Flatwoods.** Wet Flatwoods are characterized as relatively open-canopy forests of scattered pine trees or cabbage palms with either thick shrubby understory and very sparse ground cover, or a sparse understory and

a dense ground cover of hydrophytic herbs and shrubs. Several variations exist between these extremes. Wet Flatwoods occur on relatively flat, poorly drained terrain. The soils typically consist of 1 to 3 feet of acidic sands generally overlying an organic hardpan or clay layer. The hardpan substantially reduces the percolation of water below and above its surface. During the rainy season, water frequently stands on the surface, inundating the flatwoods for 1 or more months per year. During the drier seasons, ground water is less accessible for many plants whose roots fail to penetrate the hardpan. Thus, many plants are under the stress of water saturation during the wet seasons, and under the stress of dehydration during the dry seasons.

Another important physical factor in Wet Flatwoods is fire. Natural fires probably occurred every 3 to 10 years during pre-Columbian times. Nearly all plants and animals inhabiting this community are adapted to periodic fires, and several species depend on fires for their continued existence. Without relatively frequent fires, Wet Flatwoods succeed into hardwood dominated forests whose closed canopy would essentially eliminate the ground cover herbs and shrubs. In fact, much of the variation in community structure is probably associated with fire frequency. Thus, the longer the period of time since the last fire, the more developed will be the understory shrubs. If the understory is allowed to grow for too long, the accumulation of needle drape and the height of flammable understory shrubs will increase the probability of a catastrophic canopy fire.

- **Plant Species** - Typical plants include pond pine, slash pine, sweetbay, spikerush, beakrush, sedges, dwarf wax myrtle, gallberry, titi, saw palmetto, creeping beggarweed, deer tongue, gay feather, greenbrier, bluestem, and pitcher plants.

- **Animal Species** - Typical animals include oak toad, cricket frog, chorus frog, black racer, yellow rat snake, diamondback rattlesnake, pygmy rattlesnake, red-shouldered hawk, bobwhite, opossum, cottontail rabbit, cotton rat, cotton mouse, raccoon, striped skunk, bobcat, and white-tailed deer.

**Xeric Hammock.** Xeric Hammock is characterized as either a scrubby, dense, low canopy forest with little understory other than palmetto, or a multi-storied forest of tall trees with an open or closed canopy. Several gradations between these extremes exist. Xeric Hammock is an advanced successional stage of Scrub or Sandhill. The variation in vegetation structure is predominantly due to the original community from which it developed. In all cases, however, the soils consist primarily of deep, excessively-drained sands that were derived from old dune systems. The scarcity of herbs and the relatively incombustible oak litter preclude most fires from invading Xeric Hammock. When fire does occur, it is nearly always catastrophic and may revert Xeric Hammock into another community type. Xeric Hammock only develops on sites that have been protected from fire for 30 or more years. Xeric Hammocks are often associated with and grade into Scrub, Sandhill, Upland Mixed Forest or Slope Forest.

- **Plant Species** - Typical plants found in Xeric Hammock forest include live oak, sand live oak, laurel oak, turkey oak, blackjack oak, red oak, sand post oak, staggerbush, saw palmetto, sparkleberry, pignut hickory, southern magnolia, redbay, American holly, wild olive, black cherry, fox grape, beautyberry, bluejack oak, Chapman's oak, persimmon, and yaupon.

- **Animal Species** - Animals typically found in this community type include barking treefrog, spadefoot toad, gopher tortoise, worm lizard, fence lizard, black racer, red rat snake, hognose snake, crowned snake, screech-owl, turkey, blue jay, eastern mole, gray squirrel, and eastern flying squirrel.

### **C. *Invasive Non-Native Plants (Invasive)***

Management of invasive plants began in Florida in 1899, when the 55<sup>th</sup> Congress authorized the U.S. Army Corps of Engineers (USACE) through the Rivers and Harbor Act to crush, divert, or remove water hyacinth from access areas of the St. Johns River. In May of 1899, the Florida Legislature prohibited the planting of water hyacinth in waters of the State of Florida. Thus, began Florida's long battle with invasive plants and the beginning of regulations to prevent their expansion. The definition of an invasive species, not necessarily

plants, is exotic – a non-indigenous species, or one introduced to this state, either purposefully or accidentally; a naturalized exotic is defined as escaped into the wild where it reproduces on its own either sexually or asexually; while a native is a species already occurring in Florida at the time of European contact (1500).

The following four sources identify specific invasive non-native plants for the North Florida region: The IFAS Assessment of Non-Native Plants in Florida's Natural Areas, the Department of Agriculture's "Noxious Weed List", the Department of Environmental Protection's "Prohibited Plant List" and the Florida Exotic Pest Plant Council's "Florida's Most Invasive Species List".

Many biologist and botanist consider invasive non-native plants a serious threat to native species, communities, and ecosystems. They can compete with and displace native plants, animals, and other organisms that depend on them, alter ecosystem functions and cycles significantly. However, it is also true that many species now considered natives were invaders at some point in the past and that in certain circumstances only these adaptable and hardy species survive. Most land management of Florida natural areas is based on returning ecosystems to a pre-European colonization (1500s) status. Determining what the status was at that time is generally based on either historical documentation such as survey field notes, diagrams and journals or on soil properties that indicate previous land uses and seed sources.

All of the University's Conservation Areas have been documented to contain invasive exotic plants. Restoration of these and other areas will take active and continuous management.

**Treatment of Invasive Plants.** In order to manage invasive non-native plants in Florida natural areas, land managers primarily use herbicides and / or mechanical harvesting to contain and in time eliminate these alien invaders. Other treatments techniques include biological controls, which uses predators of the plants from there native territory to try and contain their expansion and fire management, which can be effective on plants not adapted to fire dominated ecosystems. The following discussion from the Florida Exotic Pest Plant Council on invasive non-native plant control types provides an overview of each treatment technique.

- **Herbicidal Control** - Many woody plant species can be controlled with herbicides applied in a variety of ways. The most common application methods are foliar spray, stump treatment, basal soil treatment, and basal bark application. In foliar treatments the herbicides are pre-mixed with diluents and sprayed onto the foliage of the plant. Usually the leaves are "sprayed-to-wet" which means applying only enough solution to begin running off the leaf surface. Basal soil treatments can be used with either liquid or dry formulations. The material is broadcast onto the soil under the canopy of the tree. Rainfall carries the herbicide into the root zone of the plant where it is absorbed by the roots. The basal bark application consists of the herbicide solution being applied, most commonly by back-pack sprayer, in a wide band on the stems of the plants near the base. The material is absorbed into the plant and translocated throughout the plant. Another technique is to treat the stump with a herbicide solution immediately after cutting the tree at or near ground level. There are other application methods such as the "frill and girdle", and various direct injection techniques for the control of exotic species. However, these methods are not practical for controlling Brazilian pepper. Aerial application of herbicides can be used in areas that are remote or where there are large monotypic stands.
- **Mechanical Control** - Mechanical control is accomplished through the use of heavy equipment such as bulldozers, front end loaders, root rakes and other specialized equipment. The use of heavy equipment is sometimes not suitable in natural areas. Once undisturbed soils have been unsettled, they are susceptible to invasion by invasive exotic pest-plants. Mechanical control is accepted along ditch banks, utility rights-of-way and other disturbed areas. As follow-up, a herbicide application is highly recommended to prevent regrowth from the remaining stumps. Stumps that fail to be chemically treated will resprout and continue to infest natural areas and wetlands.

- **Biological Control** - involves moving host specific natural enemies from the native range of the weed to its introduced range. The goal is to reduce weed abundance to a level that can be tolerated. Biological control does not eradicate weeds. It simply restores a natural balance between the weed and its enemies. Biological control can be self-regulating since the introduced natural enemies often become part of the ecosystem. Biological control is not a quick fix. The period of time between initiation of a weed bio-control program and when the first natural enemy is released is measured in years. Release must be approved by both state and federal agencies. Releases require propagation of large numbers and distribution in the field followed by monitoring to determine whether establishment has occurred and how effective the natural enemies are.
- **Other** - Plants can be stressed, or even killed, by the physical environment. Temperature and salinity variations, water level fluctuations, and the presence or absence of fire are examples of physical conditions that can dictate vegetation patterns. Land managers use many of these natural limiting factors to manipulate the environment for vegetation management. More often than not, however, nature controls these physical changes and the land manager is forced to take a side seat and observe the changes.

#### **D. Soils**

The following soils descriptions are based on information from the Soil Survey of Alachua County (1985) and are found on the University of Florida main campus.

**Apopka Sand (0-5% slope, Main Campus & Satellite Properties).** This nearly level to gently sloping, well-drained soil is in relatively small areas of the deep, sandy uplands. Slopes are nearly smooth or slightly convex. Typically, the surface layer is dark grayish brown sand about 5 inches thick. The subsurface layer is sand to a depth of 61 inches. In this Apopka soil, the available water capacity is very low to a depth of 61 inches and is medium below. Permeability is rapid in the sandy surface and subsurface layers and moderate in the loamy subsoil. Natural fertility of the soil is low. The organic matter content of the surface layer is usually low. Natural vegetation is turkey, bluejack, post and sand live oak and longleaf pine. The understory is mostly pineland threeawn, indiagrass, some bluestem, panicum and brackenfern.

**Arredondo Fine Sand (5-8% slope, Main Campus & Satellite Properties).** This sloping, well-drained soil is in small areas on sharp breaking slopes and in relatively large areas on long slopes of the uplands. Typically, the surface layer is dark grayish brown fine sand about 5 inches thick. The subsurface layer is yellowish brown fine sand to a depth of 65 inches. The available water capacity is low in the surface and subsurface layers and medium in the subsoil. Organic matter content is low. Natural vegetation of this soil includes slash and longleaf pine, live and water oaks, hickory and dogwood. The understory is shrubs and native grasses, lopsided indiagrass, creeping bluestem and several varieties of panicum are some of the most common of the native grasses.

**Arredondo Urban Land Complex (0-5% slope, Main Campus).** This complex consists of well drained nearly level to gently sloping Arredondo soils and Urban Land. About 50 to 85% of each delineation is open areas of Arredondo soils. These open areas are gardens, vacant lots, lawns or playgrounds. About 15 to 50% of each delineation is urban land. Urban land consists of areas covered with buildings, streets, parking lots, sidewalks and other structures. Typically, the surface layer of Arredondo soils is dark grayish brown fine sand about 6 inches thick. The subsurface layer is brownish yellow to yellowish brown fine sand to a depth of 47 inches. The available water capacity of Arredondo soil is low in the surface and subsurface layer and low to medium in the subsoil. Organic matter content and natural fertility are low. Natural vegetation is slash, loblolly, longleaf pine, live, laurel, water oak, hickory and dogwood. The understory consists of a cover of adapted low growing herbs and shrubs.

**Bivans Sand (2-5% slope, Main Campus).** This gently sloping, poorly drained soil is on relatively broad flats and at the base of the rolling uplands. The areas are irregular in shape and range from about 10 to 55

acres. Typically the surface layer is dark gray sand about 6 inches thick. The subsurface layer is gray sand 9 inches thick. This Bivans soil has a perched water table that is in the surface and subsurface layers and the upper part of soil for 1 to 4 months during most years. Surface runoff is moderate. The available water capacity is low to medium. Permeability is moderate to moderately rapid in the surface and subsurface layers. Natural fertility is low to medium. Organic matter content of the surface layer is moderately low to moderate. Natural vegetation is slash, longleaf, and loblolly pines; live, laurel, and water oaks; and sweetgum, hickory, holly and magnolia. The understory is chiefly waxmyrtle, blackberry, greenbrier, bluestem, low paspalum, pineland threeawn, and dwarf huckleberry

**Bivans Sand (5-8% slope, Main Campus ).** This is a sloping, poorly drained soil on short breaking slopes and along hillsides of the uplands. Typically, the surface layer is dark gray sand about 5 inches thick. The subsurface layer is light brownish gray sand about 5 inches thick. In the Bivans soil, the subsurface layer and upper part of the subsoil are saturated by a perched water table for 1 to 3 months during most years. Permeability is moderate to moderately rapid in the surface and subsurface layers. Natural fertility is low to medium and the organic matter content is moderately low to moderate in the surface layer. Natural vegetation is slash and loblolly pines, live, laurel and water oaks and sweetgum, hickory and magnolia.

**Blichton Urban Land Complex (0-5% slope, Main Campus).** This complex consists of poorly drained, nearly level to gently sloping Blichton soils and Urban land. It is irregularly shaped with relatively small areas. About 50 to 85 percent of each delineation is open areas of Blichton soils. These open areas are gardens, vacant lots, lawns and playgrounds. About 15 to 50 percent of each delineation is Urban land. Urban land consists of areas covered with houses, streets, parking lots, sidewalks, industrial buildings and other structures. Typically, the surface layer of Blichton soils is dark grayish brown sand about 6 inches thick. The subsurface layer is grayish brown to light brownish gray sand about 22 inches thick. In the Blichton soils, the water table is within 10 inches of the surface for about 1 to 4 months during most years. Natural fertility is low. Organic matter content is low to moderate. Natural vegetation is slash, longleaf and loblolly pines, sweetgum, magnolia, hickory, maple waxmyrtle, pineland threeawn and other adapted shrubs and herbs.

**Blichton Sand (2-5% slope, Main Campus & Satellite Properties).** This gently sloping, poorly drained soil is on gently rolling uplands. Slopes are slightly convex. The areas are mostly irregular in shape and elongated and range from 10 to 40 acres. Typically the surface layer is dark grayish brown sand about 6 inches thick. It is about 3 percent nodules of ironstone and fragments and nodules of phosphatic limestone. The subsurface layer extends to a depth of 28 inches. The upper 7 inches is grayish brown sand and it has about 2 percent nodules of ironstone and fragments of phosphatic limestone. In Blichton soil, the subsurface layer and the upper part of the subsoil are saturated by a perched water table for 1 to 4 months during most years. Surface runoff is medium. The available water capacity is low in the sandy surface and subsurface layers and low to medium in the loamy subsoil. Natural fertility is low to medium and organic matter content is moderately low to moderate. Natural vegetation consists of hickory, magnolia, pineland, three awn, slash, longleaf, loblolly pines, sweet gum and bluestem.

**Bonneau Fine Sand (0-5% slope, Main Campus).** This gently sloping, moderately well drained soil is in small to relatively large areas on uplands. Slopes are generally convex. Typically, the surface layer is dark gray fine sand about 9 inches thick. The subsurface layer is brownish yellow fine sand to a depth of 29 inches. The Bonneau soil has a water table that is at a depth of 40 to 60 inches for 1 to 3 months and at a depth of 60 to 72 inches for 2 to 3 months during most years. Surface runoff is slow. Permeability is moderately slow to moderate in the upper part of the subsoil and very slow to slow in the lower part. The available water capacity is low in the sandy surface and subsurface layers. Natural fertility is low in the sandy layers and medium in the loamy subsoil. Organic matter content is low to moderately low in the surface layer. The natural vegetation is chiefly slash, longleaf and loblolly pines, laurel, live, water and red oaks and hickory, dogwood and sweetgum. The understory consists of wild grape, American beautyberry and waxmyrtle.

**Bonneau Sand (2-5% slope, Main Campus).** This gently sloping, moderately well drained soil is in small to relatively large areas on uplands. Slopes are generally convex. Typically, the surface layer is dark gray fine sand about 9 inches thick. The subsurface layer is brownish yellow fine sand to a depth of 29 inches. The Bonneau soil has a water table that is at a depth of 40 to 60 inches for 1 to 3 months and at a depth of 60 to 72 inches for 2 to 3 months during most years. Surface runoff is slow. Permeability is moderately slow to moderate in the upper part of the subsoil and very slow to slow in the lower part. The available water capacity is low in the sandy surface and subsurface layers. Natural fertility is low in the sandy layers and medium in the loamy subsoil. Organic matter content is low to moderately low in the surface layer. The natural vegetation is chiefly slash, longleaf and loblolly pines, laurel, live, water and red oaks and hickory, dogwood and sweetgum. The understory consists of wild grape, American beautyberry and waxmyrtle.

**Candler fine sand (0-5 % slope, Satellite Properties).** This nearly level to gently sloping, excessively drained soil is in the deep sandy uplands. Slopes are nearly smooth to convex. Typically, the surface layer is very dark grayish brown fine sand about 6 inches thick. The underlying layers are fine sand to a depth of 82 inches or more. This Candler soil has low available water capacity. Permeability is rapid. Natural fertility of the soil is low. Natural vegetation is mostly turkey, bluejack, post and scrub live oak and longleaf pine.

**Chipley Sand (flat, Satellite Properties).** This nearly level, somewhat poorly drained soil is in relatively small areas of the broad flatwoods and in both small and large areas on the transition between broad flatwoods and rolling uplands. Typically, the surface level is sand about 12 inches thick. The upper 6 inches is very dark gray and the lower 6 inches is dark grayish brown. The underlying layers are sand to a depth of more than 81 inches. This Chipley soil has a water table that is 20 to 40 inches below the surface for 2 to 4 months during most years. During extremely wet seasons, the water table rises to a depth of 15 to 20 inches for brief periods. Natural vegetation of this soil is slash and longleaf pine and water, laurel, and live oak.

**Kanapaha Sand (0-5% slope, Main Campus).** This soil consists of nearly level to sloping, poorly drained soils that formed in thick beds of sandy and loamy marine deposits. The water table is at a depth of less than 10 inches for 1 to 3 months and at a depth of 10 to 40 inches for 3 to 4 months during most years. Natural fertility is low to medium. Organic matter content of the surface layer ranges from moderately low to moderate. The natural vegetation is chiefly slash and loblolly pine, water, live and laurel oak, sweetgum and holly. The understory is mostly waxmyrtle, low paspalum, pineland threeawn, longleaf uniola, hairy panicum, fringleaf paspalum, huckleberry and some bluestems.

**Kendrick Sand (2-5% slope, Main Campus).** This gently sloping, well-drained soil is in both small and large areas on the gently rolling uplands. These areas are mostly irregularly shaped or elongated and range from about 20 to 200 acres. Typically the surface layer is dark grayish brown sand about 9 inches thick. The subsurface layer is yellowish brown loamy sand to a depth of 26 inches. In this Kendrick soil, the available water capacity is low in the surface and subsurface layers, medium in the upper 5 inches of the subsoil, and medium to high below this depth. Permeability is rapid in the surface and subsurface layers. Permeability is moderate to moderately rapid in the upper 5 inches of the subsoil, moderately slow to moderate in the next 42 inches, and slow in the lower 17 inches. Natural fertility is low in the sandy surface layer and medium in the loamy subsoil. Surface runoff is moderately slow. Natural vegetation of this soil is chiefly slash, loblolly and longleaf pines, oak, dogwood, hickory, magnolia and sweetgum. The understory consists of several varieties if bluestem, lopsided indiagrass, toothachegrass, hairy panicum, fringleaf paspalum, briers, creeping beggarweed, eastern bracken, huckleberry, blueberry, greenbrier, and sedges

**Lochloosa Fine Sand (2-5% slope, Main Campus & Satellite Properties).** This gently sloping, somewhat poorly drained soil is in small and large areas on the rolling uplands. Typically, the surface layer is dark gray fine sand about 7 inches thick. The subsurface layer is yellowish brown loamy sand or sand to a depth of 31 inches. This soil has a water table that is about 30 to 40 inches below the surface for 1 to 4 months during most years. Surface runoff is slow. The available water capacity is low to medium in the sandy surface and

subsurface layers and medium in the subsoil. The natural vegetation of this soil is chiefly slash and loblolly pines, oak, dogwood, hickory, magnolia and sweetgum. The understory consists chiefly of waxmyrtle, wildgrape, dwarf huckleberry, toothachegrass, several varieties of bluestems, low panicums and creeping beggarweed.

**Lochloosa Soil (2-5% slope, Main Campus ).** This gently sloping, somewhat poorly drained soil is in small and large areas on the rolling uplands. Typically, the surface layer is dark gray fine sand about 7 inches thick. The subsurface layer is yellowish brown loamy sand or sand to a depth of 31 inches. This soil has a water table that is about 30 to 40 inches below the surface for 1 to 4 months during most years. Surface runoff is slow. The available water capacity is low to medium in the sandy surface and subsurface layers and medium in the subsoil. The natural vegetation of this soil is chiefly slash and loblolly pines, oak, dogwood, hickory, magnolia and sweetgum. The understory consists chiefly of waxmyrtle, wildgrape, dwarf huckleberry, toothachegrass, several varieties of bluestems, low panicums and creeping beggarweed.

**Mascotte (flat, Satellite Properties).** This soil consists of very deep, poorly and very poorly drained, moderately slowly permeable soils on areas of flats, depressions, and on low stream terraces of the lower Coastal Plain. Natural vegetation consists of creeping and chalky bluestem, indiagrass, low panicums, and pineland threeawn. Longleaf pine, slash pine, sawpalmetto, gallberry, fetterbush, and waxmyrtle are the dominant woody plants on flatwoods sites. Depressional areas are dominated by cypress, slash pine, sand pine, loblolly bay, black gum, red bay, red maple, and sweetbay. The understory includes chalky bluestem, cinnamon fern, club moss, yelloweyed grass, pitcher plant, greenbriar, and sedges.

**Millhopper Sand (0-5% slope, Main Campus & Satellite Properties).** This nearly level to gently sloping, moderately well drained soil is in small and large irregularly shaped areas on uplands and slightly rolling knolls in the broad flatwoods. Typically, the surface layer is dark grayish brown sand about 9 inches thick. The subsurface layer is sand or fine sand about 49 inches thick. This Millhopper sand has a water table that is at a depth of 40 to 60 inches for 1 to 4 months and at a depth of 60 to 72 inches for 2 to 4 months during most years. Natural vegetation of this soil consists of live laurel, post, water oaks, sweet gum, cherry laurel, hickory, slash and longleaf pines. The understory is chiefly lopsided indiagrass, hairy panicum, low panicum, green brier, hawthorn, persimmon, fringeleaf paspalum, hoary tickclover, dwarf huckleberry, chalky and creeping bluestems and pineland threeawn.

**Millhopper Sand (5-8% slope, Main Campus).** This sloping moderately well drained soil is in small areas on narrow breaks and on long slopes of rolling uplands. Typically the surface layer is dark grayish brown sand about 7 inches thick. The subsurface layer is sand about 47 inches thick. This Millhopper soil has a water table that is at a depth of 40 to 60 inches for 1 to 2 months and at a depth of 60 to 72 inches for 2 to 3 months during most years.

**Millhopper Urban Land Complex (0-5% slope, Main Campus ).** This complex consists of moderately well drained, nearly level to gently sloping Millhopper soils and Urban Land. The areas are irregular in shape and range from about 15 to 250 acres. This complex is within the most urbanized areas. About 50 to 85 percent of each delineation is open areas of Millhopper soils. These open areas are vacant lots or are used for gardens, lawns, parks or playgrounds. About 15 to 50 percent of each delineation is Urban land covered with buildings, streets, parking lots, sidewalks and other structures. Typically the surface layer of Millhopper soils is dark grayish brown sand about 9 inches thick. The subsurface layer is yellowish brown to pale brown sand about 49 inches thick. The available water capacity is low in the surface and subsurface layers and low to medium in the subsoil. Natural vegetation of this unit consists chiefly of live, laurel, post and water oaks, sweetgum, cherry laurel, a few hickory, slash and longleaf pines. The understory is chiefly lopsided indiagrass, hairy panicum, low panicum, greenbrier, hawthorn, persimmon, fringeleaf paspalum, hoary tickclover, dwarf huckleberry, chalky and creeping bluestems and pineland threeawn.



**Monteocha Loamy Sand (0-2% slope, Main Campus & Satellite Properties).** This nearly level, very poorly drained soil is in wet ponds and shallow depressional areas in the flat woods. Slopes are less than 2 percent. Typically, the surface layer is black loamy sand about 12 inches thick. The subsurface layer is light brownish gray sand to a depth of 18 inches. The Monteocha soil has a water table that is within 10 inches of the surface for more than 6 months during most years. Natural fertility is medium in the surface layer and low in the subsurface layer and subsoil. Organic matter content is high to very high in the surface layer. The natural vegetation is chiefly cypress. Some swamp tupelo, pond pine, bay and other water-tolerant hardwoods are in some areas. Water-tolerant grasses grow in a few areas. Most of the areas are still in native vegetation.

**Mulat Sand (flat, Satellite Properties).** This nearly level, poorly drained soil is in broad areas of the flatwoods. Typically, the surface layer is sand about 8 inches thick. The upper 5 inches is very dark gray, and the lower 3 inches is dark gray. This Mulat soil has a water table that is at depth of 10 inches for 2 to 4 months and at a depth 10 to 30 inches for about 2 to 4 months of the year. Permeability is moderately rapid in the surface and subsurface layers and slow to moderately slow in the subsoil. Natural fertility is low, and organic matter content of the surface layer ranges from moderate to moderately low. The natural vegetation of this soil is chiefly slash pine. The understory is gallberry, waxmyrtle, pineland threeawn, dwarf huckleberry, brackenfern, bluestem, and panicum.

**Myakka Sand (flat, Satellite Properties).** This nearly level, poorly drained soil is in broad areas of the flatwoods. Typically, the surface layer is dark grayish brown sand about 8 inches thick. The underlying layers are sand to a depth of more than 82 inches or more. This Myakka soil has a water table that is a depth of less than 10 inches for 1 to 4 months and at a depth of 10 to 40 inches for 2 to 4 months during most years. Permeability is rapid to a depth of about 24 inches, moderate to moderately rapid from 24 to 30 inches, and rapid below a depth of 30 inches. Natural fertility and organic content are low. The natural vegetation of this soil is longleaf and slash pines. The understory is sawpalmetto, running oak, gallberry, briars, brackenfern, and other native forbs and grasses.

**Newnan Sand (Flat, Main Campus).** This nearly level, somewhat poorly drained soil is in small to relatively large areas in flatwoods. Typically, the surface layer is dark gray sand about 5 inches thick. The subsurface layer is light brownish gray sand to a depth of 12 inches. This Newnan soil has a water table that is at a depth of 18 to 30 inches for 1 to 2 months during most years and at a depth of 30 to 60 inches for 2 to 5 months. The available water capacity is very low-to-low. Permeability is rapid to a depth of about 12 inches. Natural fertility is low in the sandy upper 56 inches. Most areas are still in natural vegetation, which is chiefly longleaf and slash pines and water oak. The understory is running oak, palmetto, waxmyrtle, huckleberry, brackenfern, blueberry, briars, gallberry, bluestem and pineland threeawn.

**Norfolk Loamy Fine Sand (2-5% slope, Satellite Properties).** This gently sloping, well drained soil is in relatively small areas or the rolling uplands. Typically, the surface layer is dark grayish brown loamy fine sand about 9 inches thick. The subsurface soil extends to a depth of 62 inches. This Norfolk soil has a water table that is at a depth of about 49 inches to 72 inches for 1 to 3 months during most years. Permeability is rapid in the surface layers, moderately slow in the upper part of the subsoil, and very slow to slow in the lower part. Natural fertility is low in the sandy surface and subsurface layers and medium in the sandy clay loam and sandy clay subsoil. The natural vegetation of this soil is chiefly slash and loblolly pines, oak, hickory, dogwoods and sweetgums. The understory consists chiefly of toothachegrass, hairy panicum, fringleaf paspalum, low panicum, blackberry, greenbrier, creeping beggarweed, dwarf huckleberry, and various bluestems.

**Oleno Clay (occasionally flooded, Satellite Properties).** This nearly level, poorly drained soil is in small to relatively large areas on the floodplain of the Santa Fe River. Typically, the surface layer is dark gray clay about 6 inches thick. The subsoil is dark gray and about 26 inches thick. This soil is occasionally flooded with a water table depth of 6 to 18 inches for 6 to 8 months during most years. Permeability is slow in the clayey

surface and subsurface layers. The natural vegetation is chiefly black tupelo, cypress, elm, red maple, holly, sweetgum, sweetbay magnolia, water oak and scattered pine. The understory includes poison ivy, longleaf uniola, greenbriar, dollarwaort, smilax, panicum, and a few saw palmettos.

**Pelham Sand (flat, Satellite Properties).** This nearly level, somewhat poorly drained soil is in small and large areas in the flatwoods. Typically, the surface layer is sand about 7 inches thick. The upper 4 inches is very dark gray and the lower 3 inches is dark gray. The subsurface layer is sand about 22 inches thick. This Pelham soil has a water table that is less than 10 inches below the surface for 1 to 4 months during most years. The water table recedes below a depth of 40 inches during dry seasons. The organic content is moderately low. Natural vegetation includes maple, slash pine, and sweetgum. The understory is chiefly gallberry, waxmyrtle, briers, holly and native grasses.

**Pickney (flat, Satellite Properties).** This nearly level, poorly drained soil is in small and large areas in the flatwoods. The water table occurs at depths of less than 10 inches below the soil surface for more than 8 months during most years. During the drier seasons the water table may recede to a depth of 20 inches. Permeability is rapid. Natural vegetation includes pond pine, baldcypress, sweetgum, water tupelo, black tupelo, and water oak. The understory consists of waxmyrtle, fern, maiden cane, and large gallberry.

**Plummer Fine Sand (flat, Satellite Properties).** This nearly level, poorly drained soil is in broad areas of the flatwoods. Typically, the surface layer is black fine sand about 6 inches thick. The subsurface layer is fine sand to a depth of 42 inches. This Plummer soil has a water table that is at a depth of less than 10 for 1 to 3 months and is at a depth of 10 to 40 inches for about 3 to 4 months during most years. Permeability is moderately rapid to rapid in the surface and subsurface layers and moderate in the subsoil. Natural fertility is low. The natural vegetation of this soil is chiefly longleaf and slash pines. The understory is gallberry, waxmyrtle, pineland threeawn, dwarf huckleberry, brackenfern, bluestem, and panicum.

**Pomona Sand (0-2% slope, Main Campus & Satellite Properties).** This nearly level, poorly drained soil is in small and large areas in the flatwoods. Slopes are nearly smooth and range from 0 to 2 percent. Typically, the surface layer is very dark gray sand about 5 inches thick. The subsurface layer is sand to a depth of 16 inches. In this Pomona soil, the water table is within 10 inches of the surface for 1 to 3 months during most years. The available water capacity is low to medium in the surface and subsurface layers and it ranges from low to high in the subsoil. Permeability is rapid to very rapid in the surface and subsurface layers. Natural vegetation of this soil is a forest of longleaf and slash pine. The understory is sawpalmetto, waxmyrtle, gallberry, bracken fern, pineland threeawn, blueberry, huckleberry, bluestem and running oak.

**Pompano Sand (flat, Satellite Properties).** This nearly level, poorly drained soil is on poorly defined flats in the broad flatwoods and in shallow depressions in the sand, rolling uplands. Typically, the surface layer is very dark gray sand about 5 inches thick. The underlying layers are sand to a depth of 82 inches or more. This Pompano soil has a water table that is less than 10 inches from the surface for 2 to 6 months during most years. Organic content of the surface layer is moderately low to moderate. The natural vegetation of this soil is chiefly slash pine. The understory is gallberry, waxmyrtle, pineland threeawn, dwarf huckleberry, brackenfern, bluestem, and panicum.

**Samsula Muck (0-1% slope, Main Campus).** This nearly level, very poorly drained organic soil is in large and small swamps, marshes and ponded areas in the broad flatwoods. Slopes are usually slightly concave and range from 0 to 1 percent. Areas are either circular, irregular in shape, or elongated. Typically, the surface layer is muck about 35 inches thick. The upper 8 inches is very dark brown and the lower 27 inches is very dark gray. The Samsula soil has water at or on the surface for more than 6 months during most years. The water table is within 10 inches of the surface for most of the remainder of the year, except during long extended dry periods. The available water capacity is very high in the organic layer. The natural vegetation of

the soil is chiefly cypress, Bay, black gum and swamp maple are in some areas. Water-tolerant grasses are in few areas. Most areas of this soil are still in natural vegetation.

**Sparr Fine Sand (flat, Satellite Properties).** This nearly level, somewhat poorly drained soil is in relatively small areas on slight rises of the flatwoods and on nearly smooth to slightly convex slopes of gently rolling uplands. Typically, the surface layer is fine sand about 8 inches thick. The upper 4 inches is dark gray, and the lower 4 inches is dark grayish brown. The subsurface layer is about 40 inches thick. This Sparr soil has a water table that is at a depth of 20 to 30 inches for about 1 to 2 months and at a depth of 30 to 40 inches for about 2 to 3 months during most years. Permeability is rapid to very rapid in the sandy surface and subsurface layers. Natural fertility is low to a depth of about 48 inches and moderate below this depth. Organic matter content is low to moderately low. The natural vegetation consists chiefly of longleaf and slash pines and water, laurel, and live oaks. The understory consists of waxmyrtle, sumac, carpetgrass, pineland threeawn, a few scattered sawpalmetto, dwarf huckleberry, baccharis, low panicum, bluestem, running oak and brakenfern.

**Surrency Sand (Flat, Main Campus).** This nearly level, very poorly drained soil is in ponds and depression areas in the broad flatwoods and in areas of wet prairie on uplands. Typically, the surface layer is black sand about 15 inches thick. The subsurface layer is light gray sand to a depth of 28 inches. This Surrency soil has a water table that is within 10 inches of the surface for about 6 months or more during most years. The available water capacity ranges from low to high in the surface and subsurface layers and from low to medium in the subsoil. Permeability is moderately rapid, to rapid in the sandy surface and subsurface layers and slow to moderately slow in the loamy subsoil. Natural fertility is medium in the surface layer and is low in the subsurface layer and the subsoil. The natural vegetation is chiefly cypress, swamp tupelo, pond pine, bay, and other water tolerant hardwoods are in the same areas. In a few areas water tolerant grasses grow.

**Tavares Sand (0 – 5% slope, Satellite Properties).** This is a nearly level to gently sloping, moderately well drained soil. This soil is deep and sandy. It is on slightly convex slopes in broad areas of flatwoods and along gentle slopes of the rolling uplands. Typically, the surface layer is dark gray sand about 8 inches thick. The underlying layers are sand to a depth of 80 inches or more. In this Tavares soil, the water table is at a depth of 40 to 72 inches for a cumulative period of 6 months or more during most years. Natural fertility is low and organic matter content is low to moderate in the surface layer. The natural vegetation of this soil is chiefly slash and longleaf pines: turkey, post, bluejack, live and water oaks, and native grasses.

**Urban Land Millhopper Complex (0-2% slope, Main Campus).** This complex consists of Urban land intermixed with nearly level areas of Millhopper soils. The areas are irregular in shape and range from 15 to 200 acres. About 50 to 85 percent of each delineation is Urban land. This Urban land consists of areas covered with buildings, streets, parking lots, sidewalks, and other structures. About 15 to 50 percent of each delineation is open areas of Millhopper soils. These open areas are vacant lots, lawns, parks, or playgrounds. The Millhopper soils of this complex have a water table at a depth of 40 to 60 inches for 1 to 4 months and at a depth of 60 to 72 inches for 2 to 4 months during the whole year. The available water capacity is low in the surface and subsurface layers and low to medium in subsoil. Permeability is rapid in the surface and subsurface layers, and it is slow to moderate in the subsoil. Natural fertility is low. Organic matter content is low to moderately low in the surface layer. Natural vegetation of Millhopper soils consists chiefly of live, laurel, post, and water oaks; slash and longleaf pines; sweetgum and cherry laurels. A few hickory trees are in these areas. The understory is chiefly lopsided indiagrass, hairy panicum, low panicum, green brier, hawthorn, persimmon, fringeleaf paspalum, hoary tickclover, dwarf huckleberry, chalky and creeping bluestems, and pineland threeawn.

**Wauchula Urban Land Complex (0-2% slope, Main Campus).** This complex consists of poorly drained, nearly level Wauchula soils and urban land. Slopes range from 0 to 2 percent. Typically, the surface layer of Wauchula soils is black to dark gray sand about 8 inches thick. In the Wauchula soils, the water table is

within 10 inches of the surface for about 1 to 3 months during most years. Natural fertility and organic matter contents are low. Permeability of the sandy surface and subsurface layers is rapid. The natural vegetation is slash and longleaf pines. The understory is palmetto, gallberry, waxmyrtle, pineland threeawn and other adapted shrubs and herbs.

**Wauchula Sand (0-2% slope, Main Campus & Satellite Properties ).** This complex consists of well drained nearly level to gently sloping Arredondo soils and Urban Land. About 50 to 85% of each delineation is open areas of Arredondo soils. These open areas are gardens, vacant lots, lawns or playgrounds. About 15 to 50% of each delineation is urban land. Urban land consists of areas covered with buildings, streets, parking lots, sidewalks and other structures. Typically, the surface layer of Arredondo soils is dark grayish brown fine sand about 6 inches thick. The subsurface layer is brownish yellow to yellowish brown fine sand to a depth of 47 inches. The available water capacity of Arredondo soil is low in the surface and subsurface layer and low to medium in the subsoil. Organic matter content and natural fertility are low. Natural vegetation is slash, loblolly, longleaf pine, live, laurel, water oak, hickory and dogwood. The understory consists of a cover of adapted low growing herbs and shrubs.

**Zolfo Sand (0-2% slope, Main Campus).** This nearly level, somewhat poorly drained soil is on slight rises of the flatwoods and in the rather broad transitional areas between the rolling uplands of the western part of the county and the flatwoods of the eastern part. Slopes are nearly level and range from 0 to 2 percent. Areas are irregular in shape. Typically, the surface layer is dark gray sand about 8 inches thick. The subsurface layer is sand and extends to a depth of 60 inches. The Zolfo soil has a water table that is at a depth of 24 to 40 inches for 2 to 6 months during most years. Surface runoff is slow. The available water capacity is low to medium. Natural fertility is low. Natural vegetation of this soil is slash and longleaf pines and water, laurel and live oaks. The understory consists of waxmyrtle, sumac, gallberry, palmetto, pineland threeawn, bluestem, carpet grass and panicum.

### **III. Federal, State and Regional Environmental Standards and Regulations**

#### ***A. Federal – Environmental Protection Agency – Clean Water Act***

The Federal Clean Water Act of 1972, 33 U.S.C., created much of the basis for today's environmental regulatory framework for development. This legislation gives the U.S. Environmental Protection Authority (EPA) the responsibility for setting national water quality standards to protect public health and welfare, while giving states the job of determining how best to meet those standards. In Florida, the Florida Department of Environmental Protection and Florida's five water management districts administer the implementation and enforcement of the Act, with some oversight maintained by the EPA. By addressing both point and non-point source pollution these agencies both monitor water quality and implement rules that will improve impaired waters.

Under the Clean Water Act (CWA), states are required to develop lists of pollutant-impaired waters. As described in subsection 303(d) of the CWA, impaired waters are those that do not meet water quality standards that states have set for them. For those waterbodies that are listed, the states must develop Total Maximum Daily Loads (TMDLs) of pollutants.

#### ***B. Federal – Fish and Wildlife Service***

The United States Congress has enacted several pieces of legislation that are intended to control certain human activities that, if unregulated, could cause extinction of some species. The United States Fish and Wildlife Service (USFWS) is the agency within the Department of the Interior that enforces most federal wildlife laws. The following list provides a brief description of each federal act that may be of relevance on campus.

### **Lacey Act (1900, 1981)**

This is the first federal law regulating interstate and international commerce in wildlife. "Wildlife" here refers to any wild animal, bird, amphibian, reptile, mollusk, or crustacean, and their dead bodies, skins, eggs, or offspring. In 1981, the Black Bass Act was incorporated into the Lacey Act. The Lacey Act and the Black Bass Act have been amended numerous times, most recently in 2008, adding protection to plants and trees illegally harvested outside the United States.

### **Migratory Bird Treaty Act (1918, 1936, 1972, 1978)**

In 1918, a treaty for the protection of migratory birds was established between Canada and the United States. In 1936, 1972, and 1978, the treaty was expanded to include Mexico, Japan, and the USSR (now Russia). The treaty states that it is unlawful to pursue, hunt, capture, kill, possess for sale, purchase, deliver for shipment, or cause to be exported: any migratory birds including their eggs, nests, and body parts unless allowed by rule or appropriate federal and state permits.

### **Migratory Bird Hunting and Conservation Act (1934)**

This act was created to supplement the Migratory Bird Treaty Act by providing funds for the acquisition of areas as sanctuaries and breeding grounds for the protection of certain birds. Persons who want to hunt migratory waterfowl are required to purchase a Federal Migratory Waterfowl Hunting Stamp (Duck Stamp) in addition to a state hunting license. Funds raised from the Duck Stamp are used to purchase

### **Bald Eagle Protection Act ( 1940, 1994)**

This act protects bald and golden eagles within the United States and its jurisdiction. It prohibits the possession, sale, harassment, purchase, transportation, export and import of bald and golden eagles, including their parts, nests, and eggs. In 1994, the act was amended to establish a policy for collection and distribution of eagle feathers for Native American religious purposes

### **Endangered Species Act (1973)**

The ESA provides for the conservation of threatened and endangered species of fish, wildlife, and plants by federal action and by encouraging state conservation programs. The act authorizes the determination and listing of endangered and threatened species and their habitats. Section 9 of this act prohibits unauthorized taking, possession, sale, and transport of all endangered species or destruction of their habitat and provides authority to acquire land and water conservation funds. Section 7, which applies only to actions of the federal government, prohibits any federal agency from jeopardizing the continued existence of an endangered or threatened species. The ESA has been amended numerous times (<http://www.fws.gov/endangered/esasum.html>).

### **Fish and Wildlife Conservation Act**

This act encourages federal agencies to conserve and promote conservation of nongame fish and wildlife and their habitats to the maximum extent possible within each agency's statutory responsibilities. It is described in 16 U.S. Code 2901-2911.

### **National Environmental Policy Act (NEPA) (1970)**

NEPA requires that an environmental impact assessment be conducted for certain projects in which there is federal participation. Federal agencies conducting actions that significantly affect the quality of the human environment may be required to conduct an environmental impact assessment. An environmental impact assessment predicts the degree to which an action may adversely affect an endangered or threatened species or its habitat.

### **C. State – Department of Environmental Protection**

A number of State laws govern environmental protection within the State of Florida. Most of these laws are administered by the Florida Department of Environmental Protection, with some delegation of responsibilities given to water management districts and local governments.

The 1999 Florida Watershed Restoration Act authorizes the Florida Department of Environmental Protection to create the 303(d) list, which is currently based on the state's 1996 305(b) Water Quality Assessment Report. The "305(b) report" uses a watershed approach to evaluate the state's surface waters and ground waters. This report and list identify "impaired" water segments, with the four most common water quality concerns: coliforms, nutrients, turbidity, and oxygen demanding substances. Listed water segments are candidates for more detailed assessments of water quality and, where necessary, the development and implementation of a TMDL. TMDLs take into account the water quality of an entire water body or watershed and assess all the pollutant loadings into that watershed, rather than simply considering whether each individual discharge meets its permit requirements. The management strategies that emerge from the TMDL process encompass approaches such as regulatory measures, best management practices, land acquisition, infrastructure funding, and pollutant trading. They also include an overall monitoring plan to test their effectiveness.

### **D. State – Fish and Wildlife Conservation Commission and Other State laws regarding Wildlife**

Florida Statutes Chapter 379 provides for the protection of wildlife from activities that may harm or jeopardize species. Sections within this Chapter address topics such as endangered species, police powers of the Florida Fish and Wildlife Conservation Commission (FWC) and its agents, authority of the commission to issue wildlife-related licenses and permits, illegal taking of alligators and crocodiles, illegal feeding of alligators and crocodiles and illegal killing of Florida panthers.

Florida Endangered and Threatened Species Act of 1977 (Section 379.2291, F.S.)

The Florida Endangered and Threatened Species Act of 1977 provides for research and management to conserve and protect threatened and endangered species as a natural resource. Responsibility for the research and management of upland, freshwater and marine species is given to the Florida Fish and Wildlife Conservation Commission (FWC). The act also encourages FWC to develop a public education program dealing with endangered and threatened species.

State Comprehensive Plan (Ch. 187, F.S.)

The State Comprehensive Plan includes goals and policies to conserve wildlife habitat and prohibit the destruction of endangered species and their habitats. Local government comprehensive plans must be consistent with these provisions in the State Plan.

Warren S. Henderson Wetlands Protection Act of 1984 (Sections 403.91-403.929, F.S.)

The Henderson Act regulates activities involving the dredging and filling of wetlands, which includes most construction activities in or adjacent to wetlands. When determining whether to issue a permit under the act, the agency must consider and balance a number of factors, two of which pertain directly to wildlife: First, whether the project will adversely affect the conservation of fish and wildlife, including endangered or threatened species, or their habitats. Second, whether the project will adversely affect the fishing or recreational values or marine productivity in the vicinity of the project.

The Florida Water Resources Act of 1972 (Ch. 373, F.S.)

This act provides authority for all Florida water management districts (there are five in Florida, based on hydrologic basins) and the Florida Department of Environmental Protection to protect the water resources of

the state, including natural resources, fish, and wildlife. Thus far, water management districts have interpreted this statute as providing them with authority to regulate for the benefit of only wetland-dependent wildlife.

The Florida Environmental Land and Water Management Act of 1972 (Sections 380.12 - 380.10, F.S.) This act created the Area of Critical State Concern Program, which establishes a procedure for increased protection of lands of statewide importance, including wildlife refuges, wilderness areas, and critical habitat of threatened or endangered species. The act also establishes the Development of Regional Impact Program, which requires that certain large-scale developments that impact more than one county must undergo more stringent development review, including review of the development's impact on wildlife habitat.

#### Penalties and Effectiveness of Wildlife Laws

Penalties for convictions for violations of these laws range from a maximum of \$500 and/or 60 days imprisonment for first offenses of misdemeanor crimes—or up to \$50,000 and/or one year imprisonment for criminal violations against the federal Endangered Species Act. Although there are many laws protecting wildlife, they are only as effective as their interpretation, implementation, and enforcement.

### ***E. Archeological Sites - Division of Historical Resources, Department of State***

The University of Florida and the Division of Historical Resources (DHR) within the Department of State have signed a Programmatic Memorandum of Agreement (MOA) pursuant to Section 267.061(2), Florida Statutes. Under this agreement, the University identified and mapped known and high probability archeological sites. The University has agreed to take specific actions outlined in the MOA, before commencing maintenance, construction and development activities that may affect known and probable archaeological sites within the confines of campus.

### ***F. Regional – St. Johns River Water Management District / Suwannee River Water Management District***

The environmental resource and surface water permitting program (ERP –Florida Administrative Code – 40B and 40C) of the Suwannee River Water Management District and St. Johns River Water Management District regulates the storage of surface waters, stormwater discharge and wetland resource permitting programs on the University's main campus. Environmental resource permitting is a tool for managing the effects of land use changes on water quantity, water quality, and wetland habitat. The program includes permit application review, compliance activities, outreach to the regulated public, and rule development. Monitoring and research activities that focus on discharges of surface water from agricultural areas also fall under the program. In addition, the program provides for collection of data on wetlands and completion of periodic assessments of wetland status and trends. All building on campus is required to be addressed under an ERP permit.

## **IV. Best Management Practices**

### ***A. Public Participation***

In 2003-2004 an ad-hoc group of interested faculty, staff, students and community stakeholders participated in site tours of all of the University's natural areas led by staff of the Facilities, Planning and Construction Division. The purpose of the tours was to engage interested people from different backgrounds into coming up with creative ideas for management, improvements and alternative uses for all existing and potential natural areas. The following discussion on management goals and best management practices is largely derived from the collaboration that resulted, along with additional input from the Conservation Study Committee for the Campus Master Plan in 2005. Specific recommendations from this working group are to be found within the specific area plans.

**B. Stormwater**

Erosion and sedimentation are two of the primary concerns that are common to many of University’s Conservation Areas. Since the Lake Alice watershed covers 80% of campus, Conservation Areas within this watershed are perhaps of most concern. This is in part due to the fact that Lake Alice has been designated as this watershed’s retention pond. The current permit with the St. Johns River Water Management District (SJRWMD) allows the University to increase impervious surfaces within the watershed by 165 acres as of September 2014, without additional stormwater facilities being built. While this allows the University to maintain a compact core of buildings without large areas dedicated to stormwater treatment, it also leads to an exacerbation of creek erosion and downstream sedimentation to a system that already has fairly severe problems. Thus, even though the SJRWMD’s permit does not require additional stormwater treatment until the threshold is tripped, degradation to these conveyance systems would be reduced if retention / detention and other runoff management techniques were accommodated within the watershed wherever possible.

In order to reduce stormwater runoff and improve water quality in campus natural areas, new technologies should be incorporated into future building sites that will retain and percolate water. Additionally, areas being retrofitted must be looked at as opportunities to incorporate stormwater treatment into landscaping, contouring and paving. Many of the ideas being looked at come from the field of Low Impact Development (LID). This field looks for small ways to incorporate stormwater retention into building and landscaping, depressions, and multifunctional design. Some examples of LID include grassy swales, bio-retention areas, permeable pavement and grading to reduce runoff.

LID Practice	Lower Post Development CN	Increased Time of Concentration	Retention	Detention
Grade slope		X		
Increase roughness		X		
Grassy Swales		X		X
Vegetative filter strips	X	X	X	
Disconnected impervious surface	X	X		
Reduce curb and gutter	X	X		
Rooftop storage		X	X	X
Bioretention	X	X	X	
Revegetation	X	X	X	

The above chart illustrates the reduction in stormwater that can be achieved from different LID approaches (CN = runoff curve number).





This example illustrates a bio-retention (rain garden) stormwater treatment in front of the Southwest Recreation Center.

Another approach that uses the traditional stormwater pond design with an ecological design twist is a large scale bio-retention area, which is a BMP that should be considered in developing areas of campus. This approach to stormwater retention can be found currently at the Stormwater Ecological Enhancement Project (SEEP), adjacent to the Performing Arts parking lot and the Natural Areas Teaching Lab (NATL) Conservation Area. The retention pond was originally constructed in 1988 as a typical wet retention pond with a flat bottom and no attention paid to plant species diversity. In 1995, an initiative to redesign the basin into a more ecologically sensitive manor that befitted its placement next to the NATL was initiated. As articulated by its designers, the primary goal of the SEEP was to increase the diversity of flooding depths and frequency of flooding that will occur, since this is the primary factor regulating species composition in a wetland. To do this, two depressions (one 4-feet, the other 5-foot deep), were dug at the southeastern end of the pond providing a deep, open-water habitat. At the north end a low berm was constructed to temporarily impound 80% of the entering stormwater. This forebay provides the first phase of treatment and was planted with species known to take up heavy metals and remove nutrients. Water from the forebay is then slowly released, first flowing through an area planted to resemble a bottom-land hardwood swamp, moving into a shallow freshwater marsh and then entering the deep-water ponds. The basin was planted with species that resemble those found in wetlands of North Central Florida.

The expected benefits of this type of retention are species diversity, wildlife habitat, aesthetics, water quality, and research potential. All of these benefits have been shown to have merit at the SEEP, however one issue remains that has not been adequately studied. This issue is the potential effects that these ponds have on wildlife, and particularly federally listed species. Since stormwater ponds are designed to treat the noxious constituents found in run-off, they are laden with metals, pesticides and fertilizers all of which can prove harmful to wildlife. The main species of concern that use ponds for foraging are wading birds, such as the federally listed Wood Stork. At present little research has been conducted on what the long-term impacts are on these species from utilizing stormwater detention, roadside swales, and ecologically enhanced ponds. Arguments can be made that these species will utilize wet retention ponds regardless of whether they have

been ecologically enhanced, however it is equally likely that by enhancing them the probability of more productivity (more food) will encourage increased use. Thus, while it is hoped that these ponds are the panacea that is a win-win, additional research is sorely needed.



Pre-SEEP (looking north) – Cattail dominated



SEEP (looking south) – Variety of plant species

### **C. Fire Management**

Many areas now listed as Conservation Areas on campus would look and function in a dramatically different way, if not for the prevention of fire. The predominate systems in campus natural areas are thick, hardwood-dominated forests that are not considered fire dependent systems. However, some of these forested areas would have had a thinner tree canopy, different vegetative dominance and more abundant understory without fire suppression. Currently, the only Conservation Area that is fire maintained is the Natural Areas Teaching Lab (NATL). This area is maintained by various departments' staff that study the effects of burning on flora and fauna and what is needed to bring back a system to pre-suppression conditions. In practice, the reality of trying to use fire as a widespread management tool in urban settings like the University is generally considered by land management professionals as un-manageable and cost prohibitive, due to concerns of smoke on roads and people, along with the liability potential if a burn escapes into adjacent areas. Therefore, while it is recognized that burning is a very important tool in Conservation Area preservation and restoration (maintenance), it is also recognized that given the urban setting of many of campus's Conservation Areas that active fire management is unlikely. Locally, the City of Gainesville has come to similar fire management conclusions on their Bivens Arm Nature Park, which they manage chemically and mechanically, rather than with fire (Bivens Arm Nature Park, 2002).

### **E. Mowing**

Throughout campus, many areas have been traditionally mowed to give a neat and orderly appearance. While this has been the traditional approach, there are some areas where mowing is not necessary and by eliminating some of these areas, the University may save time, money, and energy while enhancing wildlife habitat. In fact, quite often the use of infrequent mowing, decorative fencing and planting of wildflowers can be done in such a way that it both enhances habitat and is aesthetically pleasing. Additionally, in some areas a less frequent mow schedule versus an all out ban on mowing may be more appropriate. As with all operational decisions there are a number of factors that must be considered, before deciding which areas are appropriate for non-traditional approaches. The balance between aesthetics (form) and function will always have to be determined on a case-by-case basis. Public education can improve the acceptance of strategic no-mow areas by explaining the benefits of this approach and recognizing the areas as wildlife habitats



Mowed to the water's edge

Fenced off natural area – no mow area

### **F. *Habitat Enhancement***

One important recommendation for all of the campus Conservation Areas is to enhance habitat wherever practicable. Some of the ideas for enhancement included: nesting boxes for birds, bat houses, planting of wildflowers for bees and butterflies, removal of invasive non-native plants, and the planting of shrubs and trees that are important to local fauna. Some of these recommendations (bird and bat boxes, invasive plant removal) have been carried forward in the specific area plans of the CALM plan document, while others (planting of trees and shrubs) are noted here as an advisory to consider incorporating wildlife friendly planting wherever possible.

### **G. *Public Use***

Conservation lands on campus differ in their potential to accommodate use by the campus community and general public. Some areas are primarily wetland floodplains that without clearing and elevated boardwalks would be inaccessible to most potential users. Other areas have a fair degree of slope that would not be accessible to most people without improvements. If improvements were not made unrestricted access would lead to erosion and disturbance of the natural area. However, some campus Conservation Areas do not have these access limitations and this is where public access improvements will need to be prioritized.

While not specifically identified in the land use designation, the management approach of each Conservation Area will generally fit into one of the three following broad categories – Nature Park, Academic Preserve and Nature Preserve. The Nature Park management approach is where public use is encouraged and physical improvements will be targeted to enhance the visitation experience. Examples of Conservation Areas that fit into the Nature Park category are McCarty Woods, Bartram-Carr Woods and Reitz Ravines. Academic Preserve is the designation that fits Conservation Areas where the basic focus is on the research of natural processes, in these areas teaching and research are encouraged and public use is prohibited or discouraged. The NATL is the obvious example of this category. Improvements and accessibility will be determined by the types of research and teaching being conducted and its compatibility with public use. The final category, Nature Preserve, is reserved for wetland areas, areas of steep slope and areas with known or probable listed species. In these areas physical improvements will be limited to habitat and hydrologic restoration, with public use discouraged. While each Conservation Area will be identified with one of these primary management approaches, there are some Conservation Areas that will contain a combination of these approaches. Presumably, all Conservation Areas will be used to some degree for academic purposes. An example of a Conservation Area that fits into all three categories is Lake Alice. Portions of Lake Alice are very accessible and public use is warranted, many areas within are used for teaching, while some areas are

wet and inaccessible where public use should be discouraged. Each specific area plan will identify which management approach best fits the Conservation Area.

## V. Overview of Conservation Areas

### A. *Main Campus Conservation Areas*

**Bartram-Carr Woods** is the name of a wooded area located between Center Drive and Newell Drive, west and south of the University's Psychology building. This area was identified in previous master plans as Preservation Area 11 (also, portions of this area are referred to by some as Health Center Park), due to the water quality, flood control and erosion abatement benefits the area provided. While these functions are still present, it appears that since that time additional encroachment has occurred and portions of the understory have been taken over by invasive non-native plants that cover most of the ground and are winding up many of the pines and hardwoods. The primary use of the property is as a respite from the hustle and bustle of campus for local office residents and as a pass through, or short cut, for people walking from health center facilities (south) to the main portions of campus (north). Additionally, some departments use the park as an outdoor teaching area, due to its close proximity to the main campus. This Conservation boundary was modified in the 2005-2015 Campus Master Plan to allow a new facility adjacent to the Psychology building, however the overall acreage remained the same at 8.7 acres.

#### Actions Since 2005

The 2005 management plan for Bartram-Carr woods called for a hybrid mixing characteristics of a more traditional park with those of a managed natural area that also lends itself to use as a teaching resource for class observation. This plan called for more formalized trails, including one that would run from north to south for bicycles and pedestrians. Other improvements envisioned in the plan included the planting of native trees and shrubs, treatment of invasive exotic plants, fencing in the park area on the east, planting of native vegetation along Lake Alice Creek, blocking of unneeded paths (particularly the northern one running parallel to the creek), reduction of mowing and the placement of bird and bat house boxes.

Since that plan many of the envisioned activities/improvements have been completed to help realize this concept through both University (Capital Improvements Trust Fund (CITF) and Tree Mitigation) and grant funding.

- In 2006, the University successfully pursued a grant to treat invasive exotic plants throughout the woods. This treatment was followed up with additional funding from the CITF to retreat areas in 2008. While these exotic plants have been reduced only continued vigilance by the University can hope to keep the woods from returning in a few years to prior infested condition.
- The building of Flexi-pave (recycled tire rubber) trails.
- Rebuild and enhancement of two bridges crossing creeks.
- Informational Kiosk.
- Aluminum fencing around park area on the eastern side.
- Tree planting in the woods and along the creek.
- Creek planting of native vegetation.
- Two pavilions.

The primary activities that have not been completed or have changed include eradication of invasive exotics and replanting with natives along Lake Alice Creek, the reduction of the EH&S parking lot and the placement of bird and bat houses in the woods.

#### Plantings along Lake Alice Creek

In the early summer a small group of engineering students undertook the planting of native plants along a small portion of the creek. The area had been previously cleared and treated for invasive exotics. However, the success of the planting was very limited due to the veracity of the nearby invasive exotics. Future endeavors to irradiate and replant with native along this riparian corridor will require a concentrated effort to weed out invasives as they sprout up or colonize. University efforts to date in all wetland/floodplain areas have had very minimal success with the one exception being the consistent effort by wetland students at Energy Park Pond. The main reason for the success at this Conservation Area appears to be the diligence of the student's ongoing effort.

#### Reduction of the EH&S parking lot

The reason for this area not being reclaimed was due to the inability of EH&S to find other suitable parking in the vicinity. Fortunately, this parking area is available on weekends for people looking to use the park.

#### Bird and Bat boxes

The plan to install bird and bat boxes in the Conservation Area is still planned once additional funding is found.

#### Invasive Plants

Invasive plant management will continue to be a maintenance issue in the woods. In order to address this management issue, University staff will continue to seek funding for treatment eradication and facilitate volunteer efforts such as the City's Air-Potato Round Up.

**Bat House Woods** is the unofficial name for the wooded area adjacent to Physical Plant greenhouses and across Museum Road from the northwest corner of Lake Alice. This area was identified in previous master plans as Preservation Area 3, due to its relatively undisturbed character and its proximity to Lake Alice. However, it appears that since that time additional encroachment has occurred and portions of the understory have been converted to low-light plant propagation and greenhouse maintenance activities. Additionally, much of the area not being used by Physical Plant has been taken over by invasive non-native plants that cover most of the ground and are winding up many of the pines and oaks. The 2005 Campus Master Plan enlarged the conservation boundary from 5 acres to 8.5 acres.

#### Actions Since 2005

The primary actions taken in these woods since 2005 has been to use the site yearly for the air-potato round-up and some student volunteer clean-up efforts. In addition, a conservation area sign was installed at the intersection of Museum and Radio Roads. This site has hosted the City of Gainesville's round-up since at least 2003. Unfortunately, no other improvements have been planned for these woods and it is unlikely to see additional improvement in the next 5 years. However, University staff will continue to facilitate volunteer efforts to clean trash and eradicate invasive exotic plants.

**Bivens Rim Forest** Conservation Area is located on the southern portion of campus, adjacent to the northern shoreline of Bivens Arm Lake, south of Archer road and west of US 441. Along with the natural areas around Lake Alice and the Natural Areas Teaching Lab, this Conservation Area has some of the most significant and diverse environmental resources on the main campus. This determination is based on the relatively large size of the area, mix of community types, undeveloped shoreline buffer and proximity to a large water body.

Wetlands on site are primarily represented by the bottomland forest associated with Tumblin Creek and with the hardwoods and marsh vegetation that ring the northern half of the lake. Mixed hardwood forest communities dominate the upland portions of this area. The 2000-2010 Comprehensive Master Plan recommended preservation for this area (Preservation Areas P5 and P6), due to its proximity to the lake, diversity and abundance of wildlife, ability to provide watershed protection and biological treatment of stormwater runoff.

Additionally, the master plan also stated that development activities including, but not limited to agriculture, earthwork, silviculture and construction, will be limited within these areas in order to protect the natural resources and habitat benefits they provide.

The 2005-2015 Campus Master Plan adopted new boundaries for the Bivens Rim area. Improved pastures associated with IFAS activities were removed from the Conservation land use, while a large forested area, contiguous to the lake, which had been previously planned as a Lake Wauburg style passive recreation area was brought into the Conservation boundary. The new boundary of 114 acres adds an additional 49 acres to the Conservation boundary (some of this increase is due to water being included within the Conservation Area, which had previously been excluded).

#### Actions Since 2005

In 2007 and again 2009 the University successfully partnered with the City of Gainesville and Alachua County on a competitive grant to treat invasive exotics near and within the watershed that drains to Paynes Prairie. By working together these public entities were able to get the top ranked grant for the year. The primary treatment focus for UF's Bivens Rim portion of the partnership grant was coral ardisia that in many areas was at near 100% coverage in the understory. While, the treatment of coral ardisia and other upland invasive species was successful, treatment of bottomland wetland areas infested with *Ruellia tweediana* (Britton's/Mexican Wild Petunia) and *Tradescantia fluminensis* (Wandering Jew) were much less successful. In 2009, the partnership again successfully applied for follow-up retreatment of the same areas.

In 2009, 2.5 acres of lake frontage within the Conservation Area that is owned by the University of Florida Foundation had a permanent conservation easement placed on it by the St. Johns River Water Management District as mitigation for an accidental impact to a wetland at the new Shands Cancer Hospital. Additionally, a conservation area sign was placed at the main entrance to the forest at the intersection of Shealy Drive and Richie Road.

**Blue Wave Wetland** is a 2.1 acre forested wetland and pond system located adjacent to the Coastal Science Engineering building on what is generally considered the P. K. Yonge campus. This area was designated as Academic on the Future Land Use Map of the 2000-2010 Campus Master Plan. 1940s historical photography indicates that this area was part of a riparian corridor that wound its way to Paynes Prairie through what is now known as the Kirkwood subdivision. At some point since this time, portions of the corridor were dug out and ponds were created, one of which is located within this Conservation Area. The 2005-2015 Campus Master Plan designated this area as Conservation based on its wetland features (pond and forests).

#### Action Since 2005

The only action taken since 2005 was the installation of a Blue Wave Wetland Sign.

**Energy Park Pond** is a Conservation Area located on both sides of SW 23<sup>rd</sup> Terrace, adjacent to Energy Research and Education Park (EREP) (east side of 23<sup>rd</sup>) and Organic Gardens (west side of 23<sup>rd</sup>), south of Archer Road. This Conservation Area is centered around two sinkhole ponds / depressions that appear, based on historical photography, to have been split by the building of SW 23<sup>rd</sup> Terrace.

The 2000-2010 Campus Master Plan identified this area as Wetland Preservation Areas 5 (west) and 6 (east), while the 2005-2015 plan named them Solar Park Pond(s). Future alternative uses of this Conservation Area are limited by the sinkhole ponds, small area of upland buffer and wetlands. The working group that inventoried this area in the spring of 2004 suggested that the boundaries to the Conservation Area be expanded to include both some forest and grass areas on both the eastern and western sides, largely following the 100-year floodplain, but exclude some research areas planted with non-native trees on the west-side. The 2005-2015 Campus Master Plan incorporated these ponds and forested upland buffers as a 10.5 acre Conservation Area, more than doubling the amount of acreage in Conservation.

### Actions Since 2005

In 2007 the Natural Areas Subcommittee awarded approximately \$10,000 dollars to graduate students in Environmental Engineering, Wetlands Ecology and members of the University's Wetlands Club to undertake restoration effort in the eastern pond. The student's plan included planting native trees, removing invasive species, and adding an informational kiosk that would address activities related to the restoration goals and classes related to these fields of study. This restoration effort focused on planting the Energy Park Pond East littoral zone. The student's inclusion of woody and herbaceous species not only improved pond aesthetics, but will also enhance habitat complexity and plant diversity. In doing so, it provides a vegetative structure; increases root zone sediment aeration and nutrient uptake; supplies a seed source; and provides important habitat for wildlife. Plantings were designed around the natural system features and included: trees, bulrush, flag marsh, and gramminoid species intermixed along the inflow bank and the along the northern, western, and southern wetland area, emergent aquatic species at the mouth of the inflow. Plantings were timed for a low-water period (typically just before onset of wet season) and completed with the assistance of volunteers from the University of Florida Wetlands Club.

For the update to the 2015-2025 Master Plan, it is being proposed to add a 2.3 acre area that was used by IFAS for research plots (Land Use change from Academic- Outdoor) as mitigation for the equivalent changed acreage at Lake Alice Conservation Area (Land Use change from Conservation to Housing), in accordance with the Conservation Element Policy 1.4.11.

**Fraternity Wetland** is a forested Conservation Area, located immediately behind (east and south) Fraternity Row and west of the Band Shell. This forest grades from a mixed hardwood forest into a narrow stream valley wetland. The steep slopes of the riparian corridor limit the development potential of these woods as both a future building site and as a more passive park. Therefore, management of the site should to be focused on stormwater management and invasive plant removal where appropriate. Public access and related improvements should be limited, due to the steep slopes and small size. The 2000 – 2010 Campus Master Plan identified Fraternity Wetland as Preservation Area 13. The 2005-2015 Campus Master Plan reduced the Conservation boundary from a little over 6 acres to approximately 4.5 acres in order to accommodate existing and potential fraternity house use including a service drive and other backyard activities.

### Actions Since 2005

Since 2005 the primary actions taken have been the placement of a conservation sign and fencing along the back of fraternity houses as was recommended by the Conservation Study Committee. Once funding is identified, the next project that should be taken within this area is the treatment of invasive exotic vegetation. A small portion of this area (.8 acres) adjacent to Woodlawn Drive has been identified, in conjunction with the neighboring parking lot, as a site for future Greek housing. Mitigation for the loss has been picked up by changing the same amount of acreage from Active Recreation-Outdoor to Conservation at Hogtown Creek Woods, in accordance with the Conservation Element Policy 1.4.11.

**Graham Woods** Conservation Area is a forested hardwood system that lies east of Flavet Field (Bandshell) and north of Graham Hall. An unnamed creek runs through these woods that drains into Graham Pond through culverts under Graham Hall. These woods are dominated by an upland mixed hardwood forest that grades down to a bottomland /floodplain swamp stream valley, which has been created by a deeply incised creek / ravine that runs southeasterly through the Conservation Area. The primary human use of the woods is as a short-cut between Flavet Field and the main campus. The steep slopes of the ravine and the wetland composition of the bottomland forest limit the development potential of these woods for future building sites. The 2000 – 2010 Campus Master Plan identified Graham Woods as Preservation Area 14. The 2005-2015 Campus Master Plan provided a Conservation boundary that is identical in area (7.5 acres) to the existing boundary.

#### Actions Since 2005

Since 2005 the primary activities have been the placement of a conservation sign and some small efforts at controlling invasive exotic vegetation. Additionally, in 2009 a group of locally residing students volunteered to clean up trash in the area. Once additional funding is identified, the next project that should be taken within this area is the treatment of invasive exotic vegetation.

**Liberty Pond** is a 1.5 acre natural area located just north of Museum Road and on the west side of Center Drive. Liberty Pond is also known as the Reitz Union Pond because of its adjacency to the Reitz Union. This area is characterized by two sinkholes, one of which is Liberty Pond, and a small hardwood forest that buffers a creek that flows out of Liberty Pond. This site is used primarily as a pedestrian path that connects the Reitz Union to Center-McCarty Drive via a boardwalk through the Conservation Area. The 2000-2010 Campus Master Plan identified these areas as Preservation Areas 16 (Liberty Pond). The 2005-2015 Campus Master Plan included a Conservation boundary that was nearly identical to the previously identified Conservation boundary, with only the pond itself being added.

#### Action Since 2005

The only action taken since 2005 was the installation of Conservation Area signs.

**Harmonic Woods** is a 10 acre hardwood natural area located north of Lake Alice on Museum Road and bordered on the east by Fraternity Drive and on the west by Village Drive. This property is a relatively undisturbed upland hardwood dominated forest, which slopes down to Lake Alice. Unlike many other natural areas on campus these woods have not been taken over by invasive exotic plants, although ardesia is fairly widespread. The primary use of the property has been by the Botany Department for plant identification and by the Geomatics (Survey and Mapping) Department for teaching surveying techniques in woods and on slopes. Due to its close proximity to campus, this site has been ideal for these departments. According to information from the 2000-2010 Campus Master Plan, the area was recommended for preservation (Preservation Area 12) by several university staff and faculty members as well as representatives from state and local environmental agencies, who value the area for its relatively pristine condition and proximity to the campus. The protection of the resources provided by this area will require the exclusion of development activity, including clearing, earthwork, and paving. Only minor restoration along the forested edges is necessary due to its relatively undisturbed condition. Approximately 1 acre was added in the 2005-2015 Campus Master Plan Conservation boundary modification for these woods.

#### Actions Since 2005

Since 2005 the primary actions taken have been the placement of a conservation sign, treatment of invasive exotic treatment and fencing along the back of fraternity/sorority houses as was recommended by the Conservation Study Committee. Additionally, Clare Ritscoff produced a poster of the life history of the Orb spider that is found in the woods. Once funding is identified, the next project that should be taken within this area is to continue the control efforts on invasive exotic vegetation.

**Hogtown Creek Woods** is a primarily wetland Conservation Area adjacent to SW 34<sup>th</sup> Street (west side of the street) on the far western side of the main campus. These woods are primarily bottomland hardwood wetlands. Future, alternative, uses of the Conservation Area are limited by the amount of wetlands, which would require wetland mitigation approval through the St. Johns River Water Management District, before any development could occur. The 2000-2010 Campus Master Plan identified this area as Wetland Preservation Area 1. Approximately 5 acres were added to the Conservation boundary of these woods by the 2005-2015 Campus Master Plan making the new total 24.8 acres.



#### Actions Since 2005

In 2005, University planning staff received a partnership grant with the City of Gainesville to treat invasive exotic vegetation in both the City's and University's portion of the woods. The only other activity that has taken place since then was the placement of a conservation sign. No future management activities are currently planned for this Conservation Area. For the 2015-2025 Master Plan, it is being proposed to increase the conservation boundary by 1.5 acres to create an offset mitigation for the small impacts to Fraternity Wetlands in accordance with Conservation Element Policy 1.4.11.

**Lake Alice** Conservation Area is an approximately 102 acre natural area located on the southwestern portion of the main campus, bounded by Museum Road to the north and west, Mowry Road to the south and North-South Drive to the east. Along with the natural areas around Bivens Arm, this Conservation Area has the most significant and diverse environmental resources on the main campus. This determination is based on the relatively large size of the area, mix of community types, undeveloped shoreline buffer and presence of a large water body.

The 2000-2010 Master Plan and the 1987 Stormwater Master Plan identified Lake Alice and Hume Pond and their surrounding uplands and wetlands as preservation areas (Preservation Areas, 8, 9, 10 – Wetland Preservation – 8 and 10). Adjacent to this Conservation Area is an Urban Park FLU area providing passive recreation known as University Gardens, which is also known as a medicinal garden due to some of the plants found within its confines. In the 2005-2015 Campus Master Plan, all of the contiguous uplands and wetlands have been placed into one Conservation Area with a total acreage of 129.5. This increase of approximately 28 acres is largely due to the inclusion of the water in Lake Alice, which was excluded from the previous Conservation boundary. In 2016 a shared-use path/ Greenway will be put into place along the eastern-southern boundary to facilitate pedestrian and bicycling transportation opportunities.

#### Actions Since 2005

Since 2005 the primary management actions taken have been the placement of conservation signs and the hiring of a contractor to control invasive exotic vegetation. The funding for this control effort was obtained from the Florida Department of Environmental Protection and was targeted at both wetland and upland invasive species. Once additional funding is identified, additional efforts should be made to continue to control invasive exotic vegetation.

In 2016 a shared-use path/ Greenway will be put into place along the eastern-southern boundary to facilitate pedestrian and bicycling transportation opportunities.

The update to the 2015 - 2025 Master Plan contains a proposal to remove 2.3 acres from Conservation and change it to Housing along Museum Road, between Hume and Lake Alice Fields. The goal of this change is to create space for new Greek housing in close proximity to similar housing found across the street. Mitigation for the loss has been picked up by changing the same amount of acreage from Academic-Outdoor to Conservation at Energy Park Pond, in accordance with the Conservation Element Policy 1.4.11.

**Lake Alice Creek/ Sweet Sink Wetland** is a Conservation Area south of the Digital Design Facility and includes a portion of the floodplain of an unnamed creek that flows east to Lake Alice, between Center Drive and Gale Lemerand Drive. This Conservation Area, formerly known as Digital Design Wetland, is primarily made up of the creek, wetlands and their associated buffers. Historical photography and documents indicate that this area was previously more of a depression marsh and sink. According to a 1948 report, "Lake Alice Drainage Project", this sink was plugged to prevent wastewater from directly entering the aquifer (and then the City's drinking wells). This sink is appropriately named Sweet Sink.

The 2000-2010 Campus Master Plan identified this area as Wetland Preservation Area 11. Future alternative uses of this Conservation Area are limited by the fact that the majority of the area is wetland, with only small areas of

upland buffer surrounding it. The working group that inventoried this area in the spring of 2004 suggested that the boundaries to the Conservation Area be expanded to include a small forested wetland area, largely following the 100-year floodplain. The 2005-2015 Campus Master Plan incorporated this boundary modification, which increased the Conservation Area from 4 acres to almost 8 acres.

#### Actions Since 2005

The only action taken in this area since 2005 is the placement of a conservation sign. The only future improvement planned over the next 5 years is the inclusion of a segment of the FDOT funded Greenway /path along the creek. This segment will create easier east-west connectivity from Gale Lemerand Drive to Center Drive through the area. This path will include a bridge to accommodate bicycles and pedestrians.

**Lake Alice South Wetland** is an approximately 16-acre Conservation Area adjacent to IFAS Facilities and Laboratories, south of Mowry Road on the southwest quadrant of campus. This Conservation Area is primarily a forested wetland surrounded by a small upland buffer of mowed pasture.

This Conservation Area was recommended for preservation in the Stormwater Management Master Plan (1987), due to its hydrological sensitivity and its proximity to Lake Alice. The 2000-2010 Campus Master Plan identified this area as Wetland Preservation Area 8. Future alternative uses of the Conservation Area are limited by the amount of wetlands. Previously this Conservation boundary bore little resemblance to the reality on the ground. Approximately 7 acres within the 2000-2010 boundary were horse pastures with barns and other animal research facilities. In recognition of this, the 2005-2015 Campus Master Plan reduced much of the boundary that was inappropriately identified as Conservation. This boundary modification reduced overall acreage from 15.6 to 10.6 acres.

#### Actions Since 2005

Since 2005 the only activity that has taken place was the placement of a conservation sign and removal of fencing around the wetland. In 2011, a bike path along the eastern side, connecting Archer Road to Mowry Road, was built. This trail was identified in the 2005 Master Plan as a shared use path that would help improve east-west and north-south bike / pedestrian connectivity. Future activity should include the planting of native trees along Mowry Road. Additionally, the update to the 2015 - 2025 Master Plan contains a proposal to change .3 acres from Conservation Land Use on the south side of the Conservation Area, adjacent to a Utility station, to the Utility Land Use in order to expand the utility to meet future needs. Mitigation for the loss has been picked up by changing the same amount of acreage from Academic-Outdoor to Conservation on the western portion of the Conservation Area in accordance with the Conservation Element Policy 1.4.11.

**Lakes, Creeks and Sinks** - These systems have been grouped together due to their similar management strategies and for ease of presentation. The following systems are included in the Lakes, Creeks, and Sinks management plan, Gator Pond, Ocala Pond, Dairy Pond, Graham Pond, Diamond Creek, Jennings Creek, Tumblin Creek, Hume Creek and Newins-Ziegler Sink.

The main campus at the University has many creeks, sinks and ponds that are both of natural and man-made origin. However, as campus has developed almost all of them have been integrated into the stormwater management system. Many of the ponds appear to have originated as sinkholes that were altered to retain water to a certain elevation and then were outfitted with a release structure that feeds into the stormwater system. Also, a few sinks have been altered with stormwater conveyance incorporated, usually at the base taking advantage of the lower elevation in the overall gravity flow system. On campus all of these systems feed into the University's creeks. As in pre-development conditions, these creeks are the primary conveyance system for stormwater, however while most would have only flowed on an intermittent basis, they now flow most of the time. This flow is established by both rainfall and irrigation. The 2005-2015 Campus Master Plan boundaries for these systems included a 25 foot buffer from the median high water line of the water body

where encroachment such as sidewalks and roads had not previously taken place. At the convergence of Diamond and Jennings Creeks, a larger buffer of wetlands and floodplains was included in the boundary.

**Law School Woods** is located on Village Drive and SW 2<sup>nd</sup> Avenue. In the 1980s this area was designed for use as a passive recreation, exercise area for people with disabilities. While some of these facilities are still present (paved trails and pavilion), the facility has not been maintained sufficiently to be used for this purpose any longer. Additionally, since the time of its inception, other facilities for people with disabilities have been placed in the student fitness centers. This site contains a disturbed, upland mixed forest that lost pine trees during the Pine Beetle outbreak in 2003, which opened it up to invasive plant species. Mapping from the 2000-2010 Campus Master Plan inconsistently showed this area as upland preservation, with an underlying land use of Passive Recreation. These inconsistencies were corrected in the 2005-2015 Campus Master Plan that designated the Law School Woods as a Conservation Area, with the appropriate land use of Conservation. The approved boundary is 3.3 acres.

#### Actions Since 2006

Since the 2005 Master Plan, many of the envisioned activities/improvements have been completed through the University's Capital Improvements Trust Fund (CITF). In 2007 a sub-grant was awarded for approximately \$20,000 to the Conservation Clinic to restore and maintain the woods.

The grant project by the Law Schools Conservation Clinic helped to restore Law School Woods (formerly known as Dash Course Woods). The grant's emphasis was to control invasive, exotic species and to improve the area for students, faculty and staff. This project was implemented in three phases and involved faculty and students from Law, Botany, Archaeology and Landscape Architecture, as well as residents from the adjacent Golfview neighborhood. Phase I included a survey, species inventory, development of an initial restoration plan and long-term vision for the park. Phase II commenced with an aggressive program to eliminate invasive, exotic species and included strategic replanting with appropriate native species. Phase III included the installation of basic passive use infrastructure and interpretation materials designed to invite the law school community and its neighbors to use and enjoy the site as restoration proceeds. The final elements were the inclusion of a perimeter fence, conservation area sign and native flowering trees placed along the perimeter boundary.

**McCarty Woods** is a 2.9-acre natural area located on the northwest corner of Museum Road and Newell Drive. This property is a disturbed upland hardwood dominated forest, bisected with paths for pedestrians. The primary use of the property has been by the Botany and Forestry Departments for plant identification, due to its close proximity to the departments, and as a respite for residents of the buildings on the northeast portion of campus, since this is the closest natural area to the historic parts of campus.

According to the 2000-2010 Campus Master Plan, McCarty Woods (Preservation Area 18) should be preserved because of its use as a teaching laboratory and research material resource. Additionally, the Master Plan states that these areas would greatly benefit from a restoration program that would remove invasive non-native species, primarily cat-claw vine, that dominate the understory and replant with native species. At 2.9 acres, the boundary of McCarty Woods in the 2005-2015 Campus Master Plan remained relatively the same as previously identified.

#### Actions Since 2005

The 2005 management plan for McCarty Woods called for a hybrid mixing characteristics of a more traditional park with those of a managed natural area that also lends itself to use as a teaching resource for class observation. This plan called for more formalized trails and the blocking off of redundant ones. Other improvements envisioned in the plan included the planting of native trees and shrubs, treatment of invasive exotic plants, reduction of mowing and the placement of bird and bat house boxes.

Since 2005, many of the envisioned activities/improvements have been completed to help realize this concept through the University's Capital Improvements Trust Fund (CITF) and Tree Mitigation.

- In 2006, the University successfully pursued a grant to treat invasive exotic plants throughout the woods. This treatment was followed up with additional funding from the CITF to retreat areas in 2008. While these exotic plants have been reduced only continued vigilance by the University can hope to keep the woods from returning in a few years to prior infested condition.
- Informational Kiosk.
- Native tree planting in the woods and flowering natives around the perimeter.

In 2007, the Natural Areas Subcommittee awarded \$5,000 dollars to the Agronomy and Soils Club to undertake restoration effort in the woods. The Club's plan included planting native trees, removing invasive and over abundant native species, and adding an informational kiosk that would address activities related to the club's goals and classes related to these fields of study. The tree planting called for using small trees and watering them in, until established. The club did a yeoman's job of clearing cherry laurels, blocking off redundant trails, planting numerous native species and watering during the spring semester of 2008. Once the semester was finished and club members left for the summer, all watering ended. Unfortunately, the months of May and June turned out to be very dry and most, if not all, of the tree seedlings did not survive. The lesson learned from this project is that in these types of restoration efforts, follow through commitments must be firmed up before granting or releasing money. While using a contractor or paid OPS workers would have cost significantly more, the follow-up efforts would have been assured or at least created some accountability.

**The Natural Areas Teaching Lab West (NATL)** is a Conservation Area on the southwest corner of the main campus, backing up in places to both Archer Road and SW 34<sup>th</sup> Street. As the name implies, the primary use of the property is as an outdoor teaching lab, which is used by a number of campus faculty to demonstrate natural and human induced changes in flora and fauna makeup. This area is the most actively managed Conservation Area and the only one where regular burning takes place. The 2000-2010 Campus Master Plan identified this area as Preservation Area 1 and along with the 1987 Stormwater Master Plan recommended that this area be preserved for its potential hydrological sensitivity. In consultation with the Natural Area Advisory Committee, the 2004 working group approved increasing the boundary of this area to include the SEEP stormwater/nature park, along with a few minor boundary adjustments adjacent to the Surge Area following existing fences. The new boundary placed the total acreage count at 48.8. In 2012, a portion of the NATL (known as the restricted Area) was renamed after Thomas J. Walker, Professor Emeritus (Entomology). Additional and current information on the NATL can be found at the NATL website.

**The Natural Areas Teaching Lab East- Thomas J. Walker / Surge Wetland (NATL)** is adjacent to Surge Area Road and the Natural Areas Teaching Lab Conservation Area (NATL), north of Archer Road on the southwest quadrant of campus. Surge Wetland consists primarily of a shrub wetland surrounded by a small upland buffer of hardwood hammock. This Conservation Area was recommended for preservation in the Stormwater Management Master Plan (1987), due to its hydrological sensitivity and its proximity to the NATL. The 2000-2010 Campus Master Plan identified uplands portions of this area as Preservation Area 2, but excluded the actual wetland from the land use designation. In 2005, the Conservation Study Committee, Lakes, Vegetation and Landscape Committee and the Natural Area Advisory Committee unanimously recommended that Surge Wetland be incorporated in the NATL as an outdoor teaching laboratory focused on wetland ecology. Their recommendation was accepted by the University's administration in 2005. The 2005-2015 Campus Master Plan identified a Conservation boundary modification that reduced the area by about 1.5 acres to 10.9 acres to exclude two existing buildings that were included in the previous boundary. In 2012, the Surge Wetland was renamed after Thomas J. Walker, Professor Emeritus (Entomology).

**President's Park** is a hardwood hammock located behind the former President's House between University Avenue and S.W. 2<sup>nd</sup> Ave. The property was classified as Conservation in the Campus Master Plan 2000 -

2010. Since the park is considered to be part of the President's residence, it is not generally open to the public, nor to students and faculty. Some minor modifications were made to the Conservation boundary in the 2005-2015 Campus Master Plan since the previous boundary included a swimming pool in the residence back yard. The approved boundary is approximately 0.5 of an acre smaller at 4.1 acres.

#### Actions Since 2005

In 2008, the Natural Areas Subcommittee of the Lakes Vegetation and Landscaping Committee initiated a project to treat invasive exotic plants on the property. This treatment made possible by a CITF allocation in 2006. This yearlong treatment program significantly reduced the prevalence of exotics, however without ongoing maintenance funds, staff fears that without the ability to re-treat the area may become infested again.

In order to help encourage native vegetation re-growth, the CITF grant also funded the planting of a number of native tree seedlings throughout the area. Along SW 2<sup>nd</sup> Avenue the subcommittee approved the planting of a native Walter's Viburnum hedge and Beautyberry, along with flowering native trees and live oaks.

**Reitz Ravine Woods** Conservation Area is approximately 3.3 acres in size and is buffered by 2.4 acres of Urban Park land use to the west. These woods lie southwest of the Reitz Union, south of the Mechanical Engineering Building and just north of Museum Road. A mixed hardwood forest that grades down to a narrow stream valley, flowing southwesterly, is the feature that characterizes this area. The steep slopes of the ravine limit development potential of these woods as a future building site. The 2000-2010 Campus Master Plan identified this Conservation Area as Preservation Area 15. This Conservation boundary was only slightly modified in the 2005-2015 Campus Master Plan review. The approved boundary is 0.3 acres smaller than previously, at 2.9 acres.

#### Actions Since 2005

Since 2005 the primary activities have been the placement of a conservation sign, some efforts at controlling invasive exotic vegetation and the rebuilding of the stormwater outfall infrastructure on the north end of ravine. In 2007, a contractor was hired to rebuild all of the stormwater outfall pipes on the northwest corner of the ravine. This project required the removal of some large trees and many shrubs. Restoration of the area, once reconstruction was concluded, involved the planting of numerous native trees, shrubs and groundcovers. In 2011, a pervious asphalt path was built along the western edge of the Conservation Area. Once additional funding is identified, the next project that should be taken within this area is the re-treatment of invasive exotic vegetation and the planting of more native vegetation.

**Swine Unit Woods** is a 3.5-acre Conservation Area adjacent to IFAS's Swine Unit, south of Archer Road and east of SW 23<sup>rd</sup> Terrace. This formerly pine dominated system was heavily impacted by pine beetle infestation in 2003, resulting in the loss of much pine canopy. As a result of this loss of canopy, invasive non-native plants have taken over much of the site. The property was changed to Conservation in the Campus Master Plan 2000-2010 from its previous classification as Passive Recreation in the 1995-2000 Comprehensive Master Plan. According to the Master Plan, the area was recommended for preservation due to its large size, proximity to Bivens Arm and potential for wildlife habitat. It also noted that restoration of this area would require the removal and maintenance of nuisance vegetative species. This Conservation boundary was modified by the 2005-2015 Campus Master Plan to eliminate areas that were in active swine husbandry and to include a forested wetland to the west that had been previously omitted. The overall boundary of these woods was increased by 4 acres to 7.7.

#### Actions Since 2005

No future activities are currently planned for this Conservation Area.

**Trillium Slope** is named after a rare Florida plant that is found in this wooded area adjacent to the University Golf Course. In fact, its location in these woods is thought to be the southern most extent of its range (it is

also found in Hogtown Creek Woods). These woods are located on the northwest corner of the University Golf Course and border SW 34<sup>th</sup> Street. This area is made up of an upland mixed forest community with moderate slope edging down into the Hogtown Creek floodplain. In the 2000-2010 Campus Master Plan this area was designated as Active Recreation, since it is located on University Athletic Association (UAA) property. The 2005-2015 Campus Master Plan, with concurrence from UAA, incorporated this 4.9 acre area as a campus Conservation Area.

#### Actions Since 2005

Since 2005 the only activity that has taken place has been the placement of a conservation sign. No future activities are currently planned for this Conservation Area.

**University Park Arboretum** was donated by W.A. and Catherine Shands to the University of Florida in 1950 to be utilized as an Arboretum. This area is located at the corner of University Avenue and N.W. 23 Street. Due to its proximity to the stadium, this 2.4 acre property had been used as a parking (tailgating) area during football games and as a neighborhood and campus natural area. In 2003, the University in conjunction with the local neighborhood association joined forces to begin implementation of the Shands family's wishes to turn the property into a true Arboretum. Plans included tree planting with identification markers, on-site stormwater improvements, invasive plant removal, and fencing. No adjustments were made in the 2005-2015 Campus Master Plan to this Conservation boundary.

#### Actions Since 2005

In 2008, a group of local residents with University staff assistance removed trash and invasive plants. In 2013, the University of Florida was designated a Tree Campus USA and received a grant from the Arbor Foundation to plant trees. The University used the grant to plant 55 native trees (many of them rare on campus) in the Arboretum, with the help of students, faculty and staff. In the near future, the University plans to add signage to the native trees, so that visitors will gain a better understanding of the flora endemic to Florida.

### ***B. Alachua County Satellite Properties Conservation Areas***

**Austin Cary Forest** – is 2,040 acre forest located off of SR24/ Waldo Road in northeast Alachua County. This forest was originally acquired for the School of Forestry (now the School of Resources and Conservation) to meet accreditation requirements by the Society of American Foresters. This school still maintains management responsibilities and uses the site for resident and continuing education, extension and demonstration and research. Of the 2040 acres, 110 are in the Conservation land use designation with the remainder in Academic / Research – Outdoor. Being a forestry research station in Florida, the primary community type is planted pine or mesic flatwoods (most Florida forestry involves pine plantations). However, the majority of the forest in Conservation is covered by bottomland hardwood communities. The CALM plan for this area is covered by the State's Land Management Plan as updated by IFAS and the School of Forest Resources and Conservation. The Conservation acreage will not have public access and no improvements have been identified.

**Beef Unit** – is an IFAS cattle research station adjacent to County Road 225 on the northeastern side of Alachua County. The site is primarily covered by pastures used for research; however a few isolated cypress domes exist along with a bottomland/ floodplain hardwood forest. This floodplain forest's creek is known as Hatchet Creek a primary tributary of Newans Lake. The entire research unit is 1268 acres with 120 acres in the Conservation land use designation. This Conservation acreage will not have public access and no improvements have been identified.

**Dairy Unit** – is an 1144 acre research unit located adjacent to C.R. 237, just off U.S. 441 and near the unincorporated community known as Hague. As the name implies, this research unit is focused on dairy cattle

research. This site is made up primarily of pasture lands dedicated to dairy cattle husbandry, however a few isolated wetlands and some bottomland forest are also present on site. Approximately 140 acres of the site are in the Conservation land Use designation with the remaining in Academic / Research – Outdoor. This Conservation acreage will not have public access and no improvements have been identified.

**Millhopper Unit** – is located at the terminus of NW 75th Street just off of Millhopper Road in the northwest Gainesville area. This research unit is used for agricultural field plot research, aquatic fisheries research and also houses the US Department of Interior Fisheries Laboratory and the IFAS Fisheries Department and Center for Aquatic Weeds. The majority of the site is designated as Academic / Research – Outdoor on the Future land Use Map, with approximately 90 acres in Conservation. In 2012, IFAS transferred approximately 40 acres that is in Conservation along the western boundary to the State Park – San Felasco Sate Preserve. Additionally, IFAS sold approximately 50 acres on the southern portion of the Unit to Alachua County to provide access and parking to Blues Creek Ravines (Alachua Conservation Trust owns Blues Creek Ravines, but the County manages). Thus, most if not all of the Conservation acreage on site has been transferred to conservation entities for ownership and management.

**Boston Farm/Santa Fe River Ranch-** is located off of C.R. 241 and borders the Santa Fe River in northern Alachua County. This property is one of two cattle research units that IFAS maintains in Alachua County. While the total site acreage is 1700 acres, 737 acres along the river are leased from the Suwannee River Water Management District (SRWMD). These leased lands make up the total Conservation land use acreage on site with the remaining land in Academic / Research - Outdoor. Most of the site is characterized as pasture and wood pasture, however most of the Conservation acreage along the Santa Fe is made of floodplain/ bottomland forest and upland mixed forest. Management of this area includes research that focuses on cattle management adjacent riverine systems looking at stocking densities, streamside buffers and fertilization management. The University controlled areas in Conservation will not have public access and no improvements have been identified.