University of Florida Conservation Area Land Management Plan

Lake Alice

Introduction

The Lake Alice Conservation Area is an approximately 129.5 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). In this plan, all of the contiguous uplands and wetlands have been placed into one Conservation Area. Within the confines of the Conservation Area is to be found an Urban Park, University Gardens, which is also known as Medicinal Gardens, due to some of the plants known for their healing properties found within its confines.

Natural Areas Inventory

Water Resources

As described in more detail in the CALM introduction, Lake Alice is the receiving body of a majority of the main campus's stormwater and basically serves as the University's stormwater utility (it is permitted as such). Fraternity Woods, Graham Woods, Rietz Ravine Woods, Green Pond, Bartram-Carr Woods and Lake Alice South all have streams (some intermittent) that flow into the lake. Additionally, stormwater drains into the lake from other intermittent streams and culverts scattered throughout campus. The Lake Alice watershed is a closed basin, with the primary outlet being through drainage wells in the lake, which were installed to alleviate flooding. Before these wells were installed Lake Alice would drain into sinkholes that worked very similar to drainage wells. One sink was located at what is now called Sweet Pond and the other was adjacent to the University Golf Course, in Greenhouse Woods. Sweet Pond sink was blocked off in the 1940's to prevent wastewater from directly recharging the aquifer. The sink adjacent to Greenhouse Woods is thought to be still active, but water from Lake Alice only flows into this area during heavy rainfall events, when the drainage wells are unable to keep up with the volume of water coming into the Lake.

Originally (1900), essentially all of the rainwater falling on the rural farmland and long leaf pine forests that would become the University of Florida campus (1906) drained to an open cavity limestone sink known as Sweet Sink located immediately east of the WWTP. Between 1906 and 1947 all UF WWTP effluent (raw to trickling filter) was discharged directly to this sink. In 1947 a berm and concrete wall were constructed across the inlet to the sink. Stormwater and treated wastewater was diverted away from Sweet Sink to the small pond referred to as Lake Alice. Lake level began to rise. By the early 1950's with more runoff directed to the lake, the borderlands of the lake transitioned from fields to marsh. In 1956 with the completion the J Hillis Miller Health Center when 11 MGD of cooling water discharges, which had to be diverted to the lake as a result of failure of thermal injection wells at the Health Center. Adjacent areas west, north and east of the lake including Radio Road (now Museum Road) began to flood. The UF Golf Course (constructed 1927) was forced to cease use of several fairways. The swine farm, at what is now McGuire Village Married Student Housing on 34th Street, became a quagmire too wet for the pigs. Rising lake levels threatened the Hospital and the WWTP. To stop the rise in lake level and return it to 1932 levels, two new 5,000 gpm recharge wells were constructed in 1959 on the west end of the lake. These two recharge wells remain in use as Injection Wells R-1 and R-2 of this report.

Based on historical photography and mapping, Lake Alice and the wetland marshes and shrubs surrounding it had a smaller aerial footprint before development on campus began. Campus urbanization, along with drainage alterations and augmentation by human water use (potable, sanitary and industrial-institutional), has led to a large increase in the water entering the lake. Along with increased water, the addition of treated wastewater (now reclaimed water) and fertilizers has added nutrients, which has led to accelerated eutrophication of the Lake. In turn, these unnatural conditions have favored the production of non-native plants in the lake, like water hyacinth, which Physical Plants routinely collects and disposes of in mass piles. The 1998 303(d) list of state impaired water bodies, listed the lake as impaired due to nutrients. However, with the removal of most of the direct wastewater discharges to the lake it is no longer listed as an impaired water body (the university now uses most of its wastewater for irrigation).

While stormwater improvements for water quality within the lake should be implemented primarily in upstream locations, there are areas where creeks enter the Conservation Area that have the potential to treat stormwater before it enters the lake. However, since these improvements would be implemented at base level, this Conservation Area's elevation, their primary functions would be to reduce nutrient loading before it enters the lake and to act as sediment traps. Therefore, placement of potential retention ponds must be weighed against improvements in upstream Conservation Areas where the added benefit of water storage and velocity reduction can reduce the amount of instream erosion that is currently taking place.

In the summer of 2004, a number of heavy rainfall events occurred over a short time frame, causing flooding within the basin. A number of roads were not passable for a few days, with particular concern being Museum Road adjacent to the Lake. As had occurred in the past, Lake Alice was not able to handle the massive amount of inflow, nor were its drainage wells able to drain the water before it crossed Museum Road and entered Bat House Woods heading to the low sink. Physical Plant Nurseries and Elmore Hall were both flooded for a few days, before the Lake Alice drainage wells were able to drain enough water to lower the lake and surrounding areas back to its set elevation. Currently, a number of solutions are being studied to alleviate the flooding adjacent to Elmore Hall and from around Lake Alice. These potential solutions include: 1) alter weirs and lower drainage wells in Lake Alice, so that lake levels can be dropped before major storm events, 2) have Physical Plant take over operation of pumps adjacent to the golf course to ensure that they are operational before flooding occurs (these pumps move water from the golf course, and from around the sink, into the Hogtown Creek basin across SW 34th Street), 3) build a new recharge well (RIB – Rapid Infiltration Basin) adjacent to Elmore Hall to give stormwater a quick outlet during major events (would function much like the sink hole did in years past), 4) test and potentially clean drainage wells at Lake Alice to ensure that they are fully operational, 5) explore opportunities to pick up additional stormwater storage through retention / detention.


Lake Alice Marsh

Natural Communities

Lake Alice is comprised of three natural community types, although wetland marsh – bottomland shrubs is the predominate community by acreage. These communities begin at the lakes edge with floodplain marshes that grade up into bottomland hardwoods, which in turn grades into a mesic mixed-hardwood forest. The marshes associated with this area are wetlands of herbaceous vegetation and low shrubs. Moving up the slope, the bottomland forest is characterized as a low-lying, closed-canopy forest of tall, straight trees with a dense shrubby understory and little ground cover. The upland forested areas are comprised primarily of a mesic / upland-mixed hardwood forest. Mesic forests typically support significant wildlife and plant diversity, which result from the nutrient rich nature of hardwood forests and flowering and fruiting plants.

Plant Species

The wetland marsh is home to a mix of small trees, shrubs, herbaceous plants, ferns and floating aquatics. Common species include *Acer rubrum* (Red Maple), *Apios americana* (Groundnut), *Baccharis halimifolia* (Dogfennel), *Cephalanthus occidentalis* (Common Buttonbush), *Hydrocotyle umbellata* (Manyflower Marshpennywort), *Hydrocotyle ranunculoides* (Floating Marshpennywort), *Ludwigia peruviana* (Peruvian Primrosewillow), *Myrica cerifera* (Wax Myrtle), *Osmunda regalis* var. *spectabilis* (Royal Fern), *Salix caroliniana* (Carolina Willow), *Sambucus nigra* subsp. *canadensis* (Elderberry), *Thelypteris palustris* var. *pubescens* (Marsh Fern) and *Typha latifolia* (Broadleaf Cattail). Other species documented are: *Acer negundo* (Boxelder), *Cuscuta* sp. (Dodder), *Decodon verticillatus* (Swamp Loosestrife), *Symphyotrichum carolinianum* (Climbing Aster), *Symphyotrichum dumosum* (Rice Button Aster), *Commelina virginica* (Virginia Dayflower), *Celtis laevigata* (Hackberry), *Liquidambar styraciflua* (Sweetgum), *Nyssa sylvatica var. biflora* (Swamp Tupelo), *Sagittaria* sp. (Arrowhead), *Saururus cernuus* (Lizard's Tail), *Taxodium distichum* (Bald Cypress), *Woodwardia areolata* (Netted Chain Fern), and *Zizaniopsis miliacea* (Southern Wild Rice).

The bottomland hardwood hammock grades into the swamp and mesic hammocks on either side of it. Dominant trees characteristic of this bottomland hardwood hammock include *Acer negundo*

(Boxelder), *Acer rubrum* (Red Maple), *Celtis laevigata* (Hackberry), *Liquidambar styraciflua* (Sweetgum), *Quercus nigra* (Water Oak). Also present are *Itea virginica* (Virginia Willow), *Prunus caroliniana* (Carolina Laurelcherry), *Sabal Palmetto* (Cabbage Palm), *Sapindus saponaria* (Soapberry), *Taxodium distichum* (Bald Cypress) and *Ulmus alata* (Winged Elm). The understory contains small saplings of the canopy species along with *Campsis radicans* (Trumpet Creeper), *Clematis* sp.(Leather Flower), *Myrica cerifera* (Wax Myrtle), *Rubus argutus* (Sawtooth Blackberry), *Sabal minor* (Bluestem Palm), *Smilax* (Greenbriar) species, *Toxicodendron radicans* (Poison Ivy), and many ferns including *Osmunda cinnamomea* (Cinnamon Fern), *Thelypteris kunthii* (Widespread Maiden Fern), *Thelypteris palustris* (Marsh Fern), *Woodwardia areolata* (Netted Chain Fern) and *Woodwardia virginica* (Virginia Chain Fern).

Trees dominant in the upland hardwood forests include *Carya glabra* (Pignut Hickory), *Liquidambar styraciflua* (Sweetgum), *Quercus nigra* (Water Oak), *Quercus hemisphaerica* (Upland Laurel Oak), *Tilia americana* var. *caroliniana* (Carolina Basswood), *Ostrya virginiana* (Eastern Hophornbeam), *Celtis laevigata* (Hackberry), *Ulmus alata* (Winged Oak) and *Pinus taeda* (Loblolly Pine). Also present are *Acer negundo* (Boxelder), *Acer rubrum* (Red Maple), *Aesculus pavia* (Red Buckeye), *Carpinus caroliniana* (American Hornbeam), *Chionanthus virginicus* (White Fringetree), *Juniperis virginiana* (Red Cedar), *Magnolia grandiflora* (Southern Magnolia), *Morus rubra* (Red Mulberry), *Prunus caroliniana* (Carolina Laurelcherry), *Prunus serotina* (Black Cherry), *Quercus michauxii* (Basket Oak), *Quercus shumardii* (Shumard's Oak), *Quercus virginiana* (Live Oak), and *Ulmus americana* (American Elm).

The upland understory contains a mix of native plants, including *Bignonia capreolata* (Crossvine), *Campsis radicans* (Trumpet Creeper), *Clematis virginiana* (Virginsbower), *Erythrina herbacea* (Coralbean), *Euonymus americanus* (American Strawberrybush), *Oplismenus hirtellus* (Woodsgrass), *Parthenocissus quinquefolia* (Virginia creeper), *Phytolacca americana* (American Pokeweed), *Rubus argutus* (Sawtooth Blackberry), *Rubus trivialis* (Southern Dewberry), *Sabal palmetto* (Cabbage Palm), *Solanum americanum* (American Black Nightshade), several *Smilax* (Greenbriar) species, *Stachys floridana* (Florida Betony), *Toxicodendron radicans* (Poison Ivy), *Vernonia gigantea* (Giant Ironweed), *Viola sororia* (Common Blue Violet), *Vitis aestivalis* (Summer Grape) and *Vitis rotundifolia* (Muscadine Grape).

Noteworthy natives include *Arisaema triphyllum* (Jack in the Pulpit, an uncommon species), *Clematis catesbyana* (Satincurls, an uncommon species), *Cocculus carolinus* (Carolina coralbead, an uncommon species), *Commelina virginica* (Virginia Dayflower, near the southern edge of its range), *Dioscorea floridana* (Florida Yam, an uncommon species) and *Zizaniopsis miliacea* (Southern Wild Rice, an uncommon species).

Invasive Non-Native Plant Species

The following list of non-native invasive plants has been documented within the Conservation Area and should be selectively dealt with when funding becomes available. In the marsh these include *Alternanthera philoxeroides* (Alligatorweed), Begonia cucullata (Wax Begonia), *Eichhornia crassipes* (Water Hyacinth), *Colocasia esculenta* (Wild Taro), *Xanthosoma sagittifolium* (Arrowleaf Elephantear) and *Salvinia minima* (Water Spangles). Non-native species documented throughout the bottomland and mesic hardwood hammocks include *Albizia julibrissin* (Mimosa), *Ardisia crenata* (Scratchthroat), *Citrus* x *aurantium* (Sour Orange), *Cinnamomum camphora* (Camphortree), *Dioscorea bulbifera* (Air Potato), *Elaeagnus pungens* (Silverthorn), *Eriobotrya japonica* (Loquat), *Hedera helix* (English Ivy), *Ipomoea cairica* (Mile A Minute Vine), *Lantana camara* (Lantana), *Ligustrum lucidum* (Glossy Privet), *Ligustrum sinense* (Chinese Privet), *Lonicera japonica* (Japanese Honeysuckle), *Macfadyena unguis-cati* (Catclaw Vine), *Melia azedarach* (Chinaberry Tree),

Nephrolepis sp. (Swordfern), *Sapium sebiferum* (Popcorntree), *Tradescantia fluminensis* (Small Leaf Spiderwort) and *Urena lobata* (Caesarweed).

Animal Species
The following list of animals has been documented on site: American Crow, American Goldfinch, American Robin, Baltimore Oriole, Black and White Warbler, Barred Owl, Blue-Gray gnatcatcher, Blue-headed Vireo, Blue Jay, Bobolink, Brown Thrasher, Boat-tailed Grackle, Carolina Chickadee, Carolina Wren, Cedar Waxwing, Chimney Swift, Common Grackle, Downy Woodpecker, Eastern Phoebe, Eastern Tufted Titmouse, European Starling, Fish Crow, Great Crested Flycatcher, Gray Catbird, Great Egret, House Finch, House Wren, Indigo Bunting, Killdeer, Mourning Dove, Northern Cardinal, Northern Flicker, Northern Mockingbird, Northern Parula, Osprey, Palm Warbler, Pine Warbler, Pileated Woodpecker, Ring-billed Gull, Red-bellied Woodpecker, Ruby-crowned Kinglet, Red-eyed Vireo, Red-Shouldered Hawk, Red-winged Blackbird, Swainson's Warbler, Turkey Vulture, White-eyed Vireo, White Ibis, Wild Turkey, Yellow-bellied Sapsucker, Yellow-rumped Warbler, Yellow-throated Warbler, Brown anole(1), Common ground skink(1), Green Treefrog, Leopard Frog, Squirrel Tree Frog, Gray Squirrel, Black rat, Raccoon, Feral Cat, and Armadillo.


Lake Alice – Shrub Marsh.

Soils Inventory
The following soil information for on-site soils was gathered from the Soil Survey of Alachua County (1985).

Arredondo Urban Land Complex (0-5% slope)

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. 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.

Bivans Sand (2-5% slope)
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.

Bivans Sand (5-8% slope)
This is a sloping, poorly drained soil on short breaking slopes and along hillsides of 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. Permeability is moderate to moderately rapid in the surface and subsurface layers.

Blichton Sand (2-5% slope)
This gently sloping, poorly drained soil is on gently rolling uplands. 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.

Blichton Urban Land Complex (0-5% slope)
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. About 15 to 50 percent of each delineation is Urban land. 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.

Kanapaha Sand (0-5% slope)
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.

Millhopper Urban Land – Urban Land Millhopper Complex (0-5% slope)
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.

Surrency Sand
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. Surrency soil has a water table that is within 10 inches of the surface for about 6 months or more during most years.

Cultural and Passive Recreational Resources
The majority of the Lake Alice Conservation Area is not readily accessible, due to the swampy nature of most of the land. Access to the site is mainly available along the north rim, parallel to Museum

Road. University Gardens provides users of the area with a pleasant walking area with boardwalks, benches, observation platforms and grassy areas under trees to sit and relax. While University Gardens is not technically part of the conservation area, it is totally within the confines of the conservation area and the boardwalk transverses through both areas. Additionally, the sidewalk along the northern and western side of the lake, along with benches and picnic tables, provides an opportunity to take in nice views of the lake and Conservation Area.

There are known archeological sites present within this conservation area. Additionally, the probability of additional Paleo-Indian sites within this area is high, due to the proximity of the lake. Future improvements to the site will take into account the location of known areas and follow guidelines by the Department of Historical Resources before sighting any new structures.

Future Improvements

The Lake Alice Conservation Area is one of the places where all three conservation Nature Park, Academic Preserve and Nature Preserve come into play. The shrub marsh area should be considered a Nature Preserve, while the rest of the area is more indicative of a Nature Park. Of course, the whole Conservation Area is and has been utilized for research and class activities, and these uses will be encouraged to continue. A future improvement that has been contemplated for this Conservation area is a greenway around portions of the lake's rim, which would mean an elevated boardwalk through wetland areas (or adjacent to) on the eastern and southern sides of the lake. This project would have to be permitted through the St. Johns River Water Management District and may require offsetting mitigation for wetland impacts (if there end up being any) caused by the boardwalk. Another area recommended for a trail / greenway is the upland area south and east of Hume Hall where some existing foot paths currently exist. This area is already used as a shortcut to the Band Shell from the commuter lot and should be formalized to prevent erosion in sloped areas and to provide crosswalks, where mid-block crossings currently occur. Another recommended management strategy is less frequent mowing along wetland and water body buffers. This will require some intuitional changes in the way Physical Plant Division approaches these areas or a more direct approach with small rope and post fencing of select areas. Finally, habitat enhancements like bird and bat boxes and wildlife friendly plantings should also be considered for certain areas.

Actions Since 2005

Since 2005 the primary actives taken has 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 Protection and was targeted at both wetland and upland invasive species. An additional activity completed in 2009 was the restoration of the riparian buffer adjacent to Lake Alice Creek and the large commuter parking lot on the east side of Conservation Area. After a Telecomm lay-down area was moved, the Grounds Department planted small native trees and ground covers, along with a few larger trees in order to help reestablish a native buffer. These buffers primarily help by creating wildlife habitat, but also can help mitigate (quality and quantity) stormwater run-off from impervious surfaces. Once additional funding is identified, additional efforts should be made to continue to control invasive exotic vegetation.

Maps on the following pages:

1. Aerial Photo
2. Water Resources
3. Natural Communities
4. Soils