An Update to the Natural Resource Component of the Plan for the Use and Management of the

Lake Lizzie Conservation Area

FCT Project #95-011-P56

October 24, 2008

Osceola County Parks Division

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Contact: Robert Mindick
Public Lands Manager
Osceola County Parks
366 N. Beaumont Avenue
Kissimmee, Florida 34741
407-742-7805

By:

Glatting Jackson Kercher Anglin, Inc.
Contact: Randall Mejeur, M.S.
120 North Orange Avenue
Orlando, FL 32801
Tel: 407-843-6552
Fax: 407-839-1789

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Executive Summary

Introduction

The Lake Lizzie Conservation Area (the LLCA) consists of approximately ±1,017 acres of land in Osceola County, Florida located north of US 192 and east of the City of St. Cloud (**Figures 1, 2,** and **4**). The site consists of a mosaic of scrub, flatwoods, and wet prairies and marshes between the shorelines of three lakes: Lake Lizzie, Trout Lake, and Bay Lake. The site provides passive recreation access for County residents. One prominent feature of the site is a large wetland system that extends from the southern edge of Lake Lizzie to the eastern property boundary (hereafter called Lake Lizzie Prairie). The site was historically used for cattle ranching and silviculture (See **Figures 3A-3E** for historical aerial photographs). Grant funding from Florida Communities Trust (FCT) (Project #95-011-P56) was used to acquire the LLCA with additional funding for the project provided by Osceola County. A management plan entitled "Lake Lizzie Nature Preserve Management Plan" was provided to the FCT in February 1998 in compliance with the management plan requirements for lands purchased in part or whole with FCT funding. This document is intended to update the natural resource components (Section III of the FCT management plan checklist) as a supplement of the original management plan and is not intended to replace non-natural resource components of the existing management plan. The LLCA was assessed during a series of site reviews in the spring of 2008 for natural and cultural resources occurring on the site.

The project site is situated in the Osceola Plain physiographic region of Florida (**Figure 5**). Eleven soil types exist on the project site, the majority of which are very poorly drained to poorly drained, with some excessively drained soils in higher portions of the site (**Figure 6**). The existing conditions of the LLCA represent not only a collection of diverse and in some cases unique natural systems, but also the effect of a history of land uses that are characteristic of much of the rest of Osceola County (**Figure 7**). Land uses on the site prior to County acquisition have included silvicultural management of timberlands, cattle grazing, canal excavation, and powerline right-of-way construction. A portion of the sand pine scrub near the southern caretaker residence currently serves as unimproved rangeland for horses stabled at the caretaker residence. Field roads and trails have been created through many of the habitats to service these historical land uses.

Site Evaluations and Technical Workshop

The LLCA was evaluated for the occurrence or potential occurrence of threatened and endangered (T&E) species in April 2008. Nine listed wildlife species were observed on the site, including the federally threatened Florida Scrub-Jay (**Figure 8**). Gopher tortoise and Sherman's fox squirrel are also state listed species that were found on the site. Eight listed plant species are known to occur on the site, including a population of water sundew that is known in Osceola County only from this site. One listed plant species, nodding pinweed, occurs in and adjacent to the sand pine scrub being used as unimproved rangeland for horses. Management focused on the maintenance of habitat requirements for these listed species should also maintain habitat for common species on the site.

Site visits in April 2008 included an initial assessment of exotic invasive species populations, including both wildlife and plant species, within the LLCA (**Figure 12**). Feral hogs were observed throughout the project site, and they currently cause the most significant source of alteration of all the exotic species on site. Regular and frequent trapping to remove feral hogs is an important management tool for the site. Generally small populations of 13 invasive exotic plant species identified by FLEPPC (**Attachment D**) were observed in scattered locations on the site. Maintenance by a licensed herbicide applicator is important for controlling invasive exotic plant species.

No archaeological sites or historic structures were observed on the site during assessments conducted in April 2008 by Archaeological Consultants, Inc (**Attachment A**). Alligator Canal and the Old Melbourne Road occur on the boundaries of the project site and are considered to be historical resources.

A technical workshop was held to receive input from multiple agencies that will likely serve as land management partners (**Attachment B**). The group discussed long term priorities for management objectives for the LLCA. A consensus-based method was used to define the top 5 priorities for management based on current issues and knowledge of existing conditions on the site. The working group concluded that long-term success of the management of the LLCA depended upon the implementation of prescribed fire and the sustained involvement with other natural resource agencies.

Proposed Management and Monitoring

Thirteen ecological management units (EMUs) for the LLCA were defined for areas of the site that have relatively similar ecological communities, management needs, and/or management constraints posed by adjacent land uses (**Figure 9**). Management specifications for these units include timing, frequency and season for the application of prescribed fire; options for mechanical management; and exotic species control. One priority management activity for all EMUs is the construction of fire breaks at the boundaries of the entire project (**Figure 10**).

Prescribed fire is the primary desired tool for enhancing and sustaining the ecological health of the fire-dependent systems in all EMUs in the LLCA. Smoke sensitive areas and wildland-urban interface locations also require identification for appropriate fire implementation. Ongoing coordination with neighbors, especially prior to a burn, is essential for long-term implementation of a prescribed fire plan. Partnerships with other natural resource management agencies also are important for long-term fire management. The development of a fire tracking system should be pursued to maintain records of prescribed fire applied to the site. Certified burn managers must obtain a permit from DOF for each prescribed burn on the site. A sample fire prescription form is included as **Attachment C**.

Ecological restoration opportunities on the site range from returning fire to natural systems to hydrological enhancements (**Figure 11**). A total of 12 specific smaller scale ecological restoration or enhancement opportunities were identified in portions of the site. These include plugging ditches, exotic species removal, potential native canopy and herbaceous species planting locations, and removal of spoil mounds or filling of excavated surface waters.

Monitoring land management activities provides an opportunity to evaluate management methods, adaptively change approaches, determine success of restoration actions, and evaluate the responses of plants and wildlife from habitat modifications. Potential approaches to monitoring the site were discussed. Prior to implementation of prescribed fire, ecological restoration or exotic species control, monitoring plans, including both baseline and long-term monitoring efforts, should be developed for areas in which these management activities take place.

Resource-based Recreation

Recreation and access management contributes to the implementation of natural resource management activities for the LLCA. While access is encouraged, unauthorized or uncontrolled access can be detrimental to management goals. The trails and natural systems of the LLCA provide an appropriate venue for natural resource-compatible, passive recreation activities such as hiking, fishing, bird-watching, picnicking, and equestrian use (**Figure 13**). Unauthorized access to the property by non-approved users, such as ATV use, can lead to habitat disturbance and affect the experience of other users on the site. A specific Recreation and Access Management Plan (RAMP) should be developed for the property within the next 1 to 2 years.

The LLCA includes littoral shelves and/or open water for three lake systems: Lake Lizzie, Trout Lake, and Bay Lake. Recreation access points for these lakes are currently unimproved and informal. Lakefront management and access control should be included as part of the RAMP. Because of the distance from parking areas, extensive structures such as docks or boardwalks are likely only suitable if they would provide significant access control or use from lake based access users.

Initial Steps

Several priority actions emerged as measures that can or should be initiated soon due to their priority, urgency, deleterious impacts to the site, or because of ease of implementation for immediate benefit that are detailed on the attached workplan (**Attachment E**). These actions include the following:

1. Establish defensible boundaries such as firebreaks around the margins of the entire property during 2009.
2. Phase out the horse pasture located north of the southern caretaker residence since it is incompatible with the long-term conservation goals of the LLCA.
3. Establish and begin management of 13 management units on the site.
4. Re-introduce fire carefully into the flatwoods systems.
5. Identify smoke sensitive areas (SSAs) or other potential constraints for prescribed fire in 2009.
6. Continue developing partnerships with the DOF and the Osceola County fire department for long-term management assistance on the park.
7. Meet with neighborhood associations and/or groups to educate about and promote conservation management tools.
8. Evaluate key hydrological enhancements over the next 2 to 5 years.
9. Initiate an exotic species control program to remove Category 1 and 2 invasive exotic species and feral hogs.
10. Develop a monitoring protocol for areas subject to prescribed fire, ecological restoration, and exotic species control.
11. Develop a Recreation and Access Management Plan within the next 1 to 2 years.

Table of Contents

1.0 Introduction

The Lake Lizzie Conservation Area (hereafter referred to as "the LLCA") consists of approximately ±1,017 acres of land in Osceola County, Florida (**Figure 1**). More specifically, the site occurs in Sections 1, 2, 10, 12, and 14 of Township 26 South, Range 31 East. The project area is located in Osceola County north of US192 and east of the City of St. Cloud. The site consists of a mosaic of scrub, flatwoods, wet prairies and marshes along with the shorelines of three lakes: Lake Lizzie, Trout Lake, and Bay Lake. One prominent feature of the site is a large wetland system that extends from the southern edge of Lake Lizzie to the eastern property boundary (hereafter called Lake Lizzie Prairie). The site was historically used for cattle ranching and silviculture. A current aerial photograph of the site is included as **Figure 2**. A series of aerial photographs taken from 1963 to present are included as **Figures 3A – 3E**. The boundary of the project site overlaid on a USGS Quadrangle map is included as **Figure 4**.

Grant funding from Florida Communities Trust (FCT) was used to acquire the LLCA. Additional funding for the project was provided by Osceola County. A management plan entitled "Lake Lizzie Nature Preserve Management Plan" was provided to the FCT in February 1998 in compliance with the management plan requirements for lands purchased in part or whole with FCT funding. This document updates the natural resource components (Section III of the FCT management plan checklist) as a supplement of the original 1998 management plan and is not intended to replace non-natural resource components of the existing management plan. The following update to the natural resource component of the approved Management Plan was developed to provide specific guidance for appropriate management of the unique natural resources on the site, to ensure that the LLCA will be maintained in accordance with the FCT Grant Award Agreement and in furtherance of the purpose of the grant application. This update was intended to serve as a supplement to the original Management Plan to update the natural resource inventory and management techniques covered under Section III of the FCT Management Plan checklist.

2.0 Natural and Cultural Resources

The LLCA was assessed during a series of site reviews in the spring of 2008 for natural and cultural resources occurring on the site. The following information is presented to document the physiographic setting, soils, land use and plant communities, listed wildlife and plant species, and historical and cultural resources occurring on the site.

2.1 Physiographic Setting

The project site is situated in the Osceola Plain physiographic region of Florida (**Figure 5**) (USDA SCS 1979**)**. The Osceola Plain is the dominant physiographic region within Osceola County, encompassing the generally level to gently rolling lands between the Lake Wales Ridge to the west and the Eastern Valley to the east. Pine and palmetto flatwoods dotted with small to large lakes, broad grassy sloughs, and other depressions historically dominated the sandy soils of this region. Portions of this region have been converted to improved pastures for cattle grazing, although much of the naturally occurring vegetation has been used for native range as well. Other portions of this region have been converted to various residential and commercial uses, especially around the cities of St. Cloud and Kissimmee.

2.2 Soils

According to the United States Department of Agriculture Soil Conservation Service Soil Survey of Osceola County (1979), the following 11 soil types exist on the project site:

- 4 - Arents, 0-5% slopes
- 5 - Basinger fine sand
- 15 - Hontoon muck
- 16 - Immokalee fine sand
- 22 - Myakka fine sand
- 31 - Pits
- 32 - Placid fine sand
- 34 - Pomello fine sand, 0-5% slopes
- 40 - Samsula muck
- 42 - Smyrna fine sand
- 43 - St. Lucie fine sand, 0-5% slopes

The majority of the soils on the LLCA are very poorly drained to poorly drained, with some excessively drained soils in topographically higher portions of the site (**Figure 6**). The Hydric Soils of Florida Handbook (1995) notes that four of the soils occurring on the site are comprised primarily or solely of hydric soils, including Basinger fine sand, Hontoon muck, Placid fine sand, and Samsula muck. These soils exhibit ponding, saturation, or flooding during much of the growing season and typically underlie wetland areas such as wet prairie, treeless hydric savanna, freshwater marshes, and/or freshwater marshes like those occurring on the site. The predominant soil on the site, Samsula muck, underlies the Lake Lizzie Prairie. Other soils, such as Immokalee fine sand, Myakka fine sand, and Smyrna fine sand, are primarily comprised of upland, non-hydric soils, but do exhibit hydric inclusions. These soils may inundate occasionally after heavy rainfall, but typically underlie the broad, upland pine flatwoods on the site. Both Pomello fine sand and St. Lucie fine sand are xeric, well-drained soils that typically underlie sand pine scrub and/or drier portions of the longleaf pine flatwoods in the central and southern portions of the site.

2.3 Existing Conditions: Vegetation and Land Use

The existing conditions of the LLCA represent not only a collection of diverse and in some cases unique natural systems, but also the effect of a history of land uses that are characteristic of much of the rest of Osceola County. Land uses on the site prior to County acquisition have included silvicultural management of timberlands, cattle grazing, canal excavation, and powerline right-of-way construction. Field roads and trails have been created through many of the habitats to service these historical land uses.

These land uses left an imprint on the natural and altered systems that currently exist on the site. Pinelands on the site were likely timbered in the early 1900s like much of the rest of Central Florida. Regeneration and growth of pines over the following century continued to produce merchantable timber, some of which comprises the mature pine canopies of the flatwoods and some of which was harvested, such as the lands within the central portion of the site. These pinelands and adjacent wetland systems also provided unimproved rangelands for cattle grazing. Management through fire or other mechanical methods to maintain the forage quality of these rangelands helped to maintain the diversity and quality of the natural systems. Canal and ditch excavation associated with Alligator Canal and, to a lesser extent, the smaller ditch systems in the southern portion of the site have likely affected the hydrology of the site. These changes have likely affected inundation levels of Lake Lizzie as well as the duration of inundation and on-site drainage patterns. The construction of field roads to service the powerlines and provide a field road connection over the Lake Lizzie Prairie between the two entrances to the site has also altered drainage patterns on the site. These hydrological alterations, coupled with range management practices have substantially influenced the composition, density and structure of the existing natural systems.

Vegetative community types occurring on the LLCA were characterized using Florida Land Use, Cover, and Forms Classification System (FLUCFCS) (Florida Department of Transportation (FDOT) 1999) designations. **Figure 7** depicts the extent and type of these communities – specific categories were used to characterize the unique features (and altered landscapes) of the natural communities on-site. A detailed list of the plant species observed during site inspections conducted on April 15, 17 and 29, 2008, including both common and scientific nomenclature, is included as **Table 1**. Brief descriptions of the FLUCFCS designations occurring on the site are included as follows:

110 – Caretaker Residences
Two single-family houses occur within the boundaries of the LLCA. The first occurs in the southeast corner of the site adjacent to the existing paved parking lot; structures include both a house and associated outbuildings. Some of these outbuildings are used as horse barns. Horses stabled in these barns current range within a portion of the sand pine scrub north of this residence that has been cleared of underbrush and exhibits extensive open sand. The second occurs in the north central portion of the site adjacent to the unpaved northern parking area.

180 – Parking Facilities
Parking facilities occur at the north and south entrances to the site. The southern parking area is paved and striped and provides access to restroom facilities, a trailhead, and parking for vehicles up to and including horse trailers, while the northern parking area is grass-surfaced with a restroom and trailhead.

211 – Relict Pasture
This vegetative community is found exclusively on the island in the northeast portion of the property. The community is comprised of an open canopy consisting of scattered live oak and slash pine over a ground layer of open sand and scattered patches of herbaceous species. The herbaceous patches are dominated by bahiagrass, flatsedges, and wireweed. Other herbaceous species observed include blackberry, saw palmetto, and bluestem. Seedlings and saplings of slash pine have begun growing in this area along with a few scattered sand pine saplings. Historically, this area likely consisted of longleaf pine flatwoods or scrubby flatwoods, but land clearing associated with historical agricultural activities resulted in the conversion to this habitat type.

310 – Mesic Herbaceous Prairie
This vegetation type occurs adjacent to freshwater marsh systems with dynamic hydrologic regimes. Likely as a result of the dynamic hydrological regime of the adjacent wet prairie/marsh and/or fire patterns on the site, the canopy is relatively sparse (<20% areal cover) and consists primarily of slash pine. The shrub layer is relatively open, with the exception of scattered clumps of saw palmetto and gallberry. The herbaceous layer is relatively dense and is dominated by bloodroot, bushy bluestem, yellow-eyed grass, rush, and witchgrass. Other herbaceous species found in this area include slash pine seedlings, shiny blueberry, blue maidencane, pale meadowbeauty, roundpod, St. John's wort, and fetterbush.

319 – Altered Mesic Shrubland
This vegetative community occurs in the northern central portion of the site southwest of the northern parking area. This area likely historically had a canopy of slash pine or longleaf pine that has been eradicated through fire or other disturbance (such as the 2004 hurricanes). Despite the disturbance, this relatively xeric area is comprised of a diverse shrub and subcanopy layer that

includes scattered clumps of sand live oak, Chapman's oak, myrtle oak, and scrub oak as well as saw palmetto. This understory occurs in the more intact habitats elsewhere on the LLCA, but in this particular area the groundcover is sparse. The dominant groundcover species observed includes bluestem, shiny blueberry, brackenfern, prickly pear cactus, and blackroot.

320 – Mesic Shrubland

Mesic shrublands are similar to mesic pine flatwoods found in other portions of the site, except that they no longer have canopy trees. The lack of canopy trees may be a result of historical land practices such as timber removal, wildfire, or hurricanes or may be representative of a biogeographical variant of the flatwoods ecosystem that historically lacked canopy. The shrub layer is dominated by tarflower, fetterbush, and gallberry. Saw palmetto is notably absent. The groundcover is relatively open, consisting of shiny blueberry, bluestem, scattered clumps of wiregrass, Virginia chainfern, brackenfern, slash pine saplings, wax myrtle, and dogfennel.

411 – Slash Pine Flatwoods

This vegetation type occurs throughout the LLCA, primarily in mesic to hydric portions of the uplands adjacent the marsh and wet prairie wetlands on the site. The open to moderately dense canopy (ranging from 10 - 50% areal cover) in this vegetative community is dominated by slash pine, although scattered individuals of live oak, sweetbay, loblolly bay, and laurel oak also occur. The understory exhibits two different forms with one dominated by gallberry and one dominated by saw palmetto. The gallberry dominated slash pine flatwoods typically occur immediately adjacent to the wetlands on the site, while the saw palmetto variant occurs in drier areas. Other shrub species observed within both variants include fetterbush, tarflower, highbush blueberry, and wax myrtle. The herbaceous layer within the saw palmetto variant is dominated by wiregrass and brackenfern, while this layer is dominated by bushy bluestem and Virginia chainfern in the gallberry flats. A wide diversity of other herbaceous species was observed in the area, including flatsedge, shiny blueberry, bottlebrush threeawn, silk-leaved goldenaster, bluestem, and pawpaw with openings dominated by grasses and forbs.

412 – Longleaf Pine-Flatwoods

Longleaf pine flatwoods occur primarily in the central and eastern portion of the project site on dry sand ridges. The canopy of this vegetation type is generally open (10 - 25% areal cover) and dominated by longleaf pine, although scattered individuals of slash pine, sand pine, and live oak also occur. The shrub layer ranges from dense thickets of various scrub oaks (e.g. myrtle oak, Chapman's oak, turkey oak) to little, if any, shrub cover. Herbaceous vegetation in dense shrub areas typically is sparse and dominated by dense thickets of saw palmetto with scattered wiregrass, shiny blueberry, and brackenfern. Areas lacking shrub cover are dominated by wiregrass, but also exhibit a wide diversity and dense cover of other herbaceous species, including cottony goldenaster, dwarf wax myrtle, dwarf huckleberry, prickly pear cactus, nodding indiangrass, and Queen's delight.

413 – Sand Pine Scrub

Sand pine scrub occurs in several locations on the site, but the largest aggregation occurs in the rolling, xeric hills in the southwestern portion of the site. Much of the sand pine scrub exhibits a canopy dominated by moderate to dense stands (between 50 - 75% areal cover) of sand pine. Some of the sand pine scrub on the site has undergone pine tree harvesting in the recent past or was burned, thereby reducing or eliminating mature sand pine trees from the area. A small portion of the sand scrub habitat adjacent to the southern caretaker residence is currently being grazed by

horses and exhibits limited sand pine canopy, open sand, and limited herbaceous cover. However, saplings of sand pine in areas are present in most of the areas lacking mature pines except for the portion adjacent to the southern caretaker residence. The shrub layer ranges from very dense to open, low-growing stands of scrub oak, Chapman's oak, myrtle oak, and sand live oak depending on recent management history. A variety of other shrub species, including rusty lyonia, saw palmetto, wild olive, and silk bay, also occur in the area. The herbaceous layer is generally sparse, although a variety of species occur throughout the area, including Elliot's milkpea, sandyfield beaksedge, witchgrass, shiny blueberry, and brackenfern. The canopy trees also have abundant epiphytes, including Spanish moss and air plant. The populations of nodding pinweed observed on the site occur within the open sand portions of this habitat type.

421 – Oak Scrub

This vegetative community is dominated by low growing canopy species of scrub oaks including myrtle oak, Chapman's oak, and sand live oak. Understory vegetation is very dense, almost impenetrable in some areas. Species associations include saplings of the canopy species, deerberry, catbrier, muscadine, scattered sand pine saplings, tarflower, gallberry, and saw palmetto. The herbaceous species generally are sparsely distributed and include Elliott's milkpea, shiny blueberry, silk-leaved goldenaster, blackroot, Darrow's blueberry, brackenfern, and witchgrass. These oak scrub areas may represent an early successional phase of sand pine scrub or distinct scrub community on the margins of the sand pine scrub.

425 – Altered Mesic Pine Flatwoods

This vegetation type occurs primarily in the west central portion of the property in an area that appears to have been cleared more than 10-15 years ago. Historically, this area likely consisted of slash pine or longleaf pine flatwoods, but land-clearing activities or other historical agricultural activity removed much of the herbaceous material and original canopy trees. The community is dominated by a relatively sparse open canopy (10 – 20% areal cover) of slash pine. The shrub layer is relatively open except for scattered clumps of saw palmetto and gallberry. The herbaceous layer is sparsely vegetated and comprised of scattered individuals of bloodroot, yellow-eyed grass, rush, witchgrass, shiny blueberry, bushy bluestem, blue maidencane, pale meadowbeauty, and fetterbush. However, slash pine seedlings have begun to grow throughout the area, likely resulting from changes in historical fire patterns, and/or alterations in regional hydrology. Scattered individuals of rose myrtle were observed within this community. This area may occasionally inundate during high water level periods, but it does not appear to be inundated frequently enough to support vegetation typically found in wetlands on the site.

427 – Live Oak Hammock

Live oak hammocks occur in several locations on the site, ranging from low-lying hammocks adjacent to Lake Lizzie to drier oak hammocks between the flatwoods and marshes on the site. Live oak dominates the canopy, often exhibiting more than 75% areal cover. A few other species, including slash pine, water oak, and laurel oak, also occur within the canopy in scattered locations. The shrub layer is generally sparse, although scattered individuals of red bay, saw palmetto, wax myrtle, muscadine, and catbrier do occur. Similarly, the herbaceous layer is generally sparsely vegetated to nonexistent with scattered individuals of Virginia chainfern, witchgrass, bluestem, muscadine, and catbrier where vegetation does occur. Some of these hammocks exhibit limited amounts of trash or other debris from occasional picnicking or boat access (for hammocks adjacent to the lake).

434 – Hardwood-Conifer Mixed

This vegetation type occurs in the central portion of the site on drier soils than the Altered Mesic Pine Flatwoods habitat type, but also appears to have been cleared more than 10 - 15 years ago. It is likely that this area was historically comprised of scrubby longleaf pine or slash pine flatwoods similar to the 411 or 412 habitat types, but the alterations removed much of the historical canopy trees and herbaceous diversity and cover. The canopy of this vegetation type ranges from open to very dense, but is typically dominated by various aged stands of slash pine that have grown in since the clearing efforts occurred. Scattered clumps of live oak, sand live oak, myrtle oak, and/or Chapman's oak also occur. Other than scattered, dense clumps of saw palmetto and wax myrtle, the herbaceous layer is sparsely vegetated. Species observed include cactus, silk-leaved goldenaster, bottlebrush threeawn, yellow-eyed grass, blackroot, and cottony goldenaster.

436 – Sandhill Oak (47.31 acres)

The sandhill oak vegetation type occurs in the central portion of the site on dry, rolling hills that are crossed by a number of sandy field roads. The canopy is comprised of low-growing (typically less than 20 feet) shrubs and subcanopy trees, such as turkey oak, sand live oak, and myrtle oak, although a few scattered longleaf pines still rise above these oak species. Saw palmetto occurs throughout the majority of this system, although large pockets of open sand and herbaceous vegetation also occur. Herbaceous vegetation is generally sparsely to moderately dense where it occurs and dominated by wiregrass and brackenfern, although a variety of other species also occur, including pinebarren frostweed, prickly-pear cactus, sandyfield beaksedge, Queen's delight, and dwarf huckleberry.

516 – Ditch (0.35 acres)

A relatively wide (10 to 15 feet) ditch occurs in the southern portion of the site where it serves to drain water from adjacent neighborhoods into the Lake Lizzie Prairie. Large ditches also occur along the southern and eastern boundaries of the project site. A shallow, narrow ditch drains the south-central portion of the site into the Lake Lizzie Prairie, but does not connect to the regional perimeter ditches. The margins of the ditch range from open sand to sparsely vegetated with cattails, primrose willow, torpedograss, pickerelweed, and duck potato. The spoil mounds on the sides of these ditches (often used as a field access roads) exhibits a wide variety of herbaceous species, including bahiagrass, caesarweed, wild rice, saw palmetto, sweetbroom, and Virginia chainfern.

520 – Lakes (6.58 acres)

Open water portions of three lakes, including Lake Lizzie, Trout Lake, and Bay Lake occur within or immediately adjacent to the boundaries of the project. Vegetated littoral margins of these lakes typically occur, but are designated as freshwater marshes.

530 – Excavated Pond/Marsh (0.52 acres)

Several small excavated surface waters occur on the property, with one occurring in the central portion of the site near the eastern boundary, one in the sand pine scrub in the southwest corner of the site, and the other in the northeast island. These areas have been excavated within the flatwoods, scrub, or margins of existing wetlands, likely as part of the cattle grazing operations for the site. Deeper portions of these excavated areas are primarily open water, although species such as spatterdock, maidencane, and cattails also occur. The margins of these areas are typically dominated by a variety of herbaceous species, including pickerelweed, duck potato, swamp fern, rush, cattails, and smallfruit beggarticks.

617 – Mixed Wetland Hardwoods (12.85 acres)
Small, generally circular tree/shrub islands occur in several locations within the Lake Lizzie Prairie. These islands are dominated by dense thickets of shrub and subcanopy species such as wax myrtle, loblolly bay, sweet bay magnolia, swamp bay, and dahoon holly, although scattered individuals of slash pine also occur. The herbaceous layer ranges from very open peaty soils to grassy areas dominated by maidencane, blue maidencane, bloodroot, and other species found in the adjacent wet prairie.

625 – Hydric Pine Flatwoods (89.16 acres)
Hydric pine flatwoods occur throughout the site, primarily around the margins of wetland systems. Typically, these areas exhibit dense canopies comprised primarily of slash pine, although scattered individuals of sweetbay magnolia, loblolly bay, and water oak also occur. The shrub layer varies from open stands of saw palmetto to scattered occurrences of wax myrtle, gallberry, and fetterbush. The herbaceous layer is generally dominated by various fern species, including cinnamon fern, royal fern, Virginia chain fern, netted chainfern, and swamp fern. However, a wide diversity of other species also occur, including bloodroot, sand cordgrass, bushy bluestem, dogfennel, carpetgrass, muscadine, catbrier, maidencane, and lizard's tail. Margins of this habitat closest to the adjacent wetland have often been disturbed by feral hog activity.

626 – Hydric Pine Savanna (103.09 acres)
The hydric pine savanna occurs primarily within the Lake Lizzie Prairie both along its northern margin and within the southeastern quarter of the wetland. The canopy of this area is generally open (10-25% areal cover) and dominated by slash pine ranging from very scattered mature individuals to smaller saplings. A variety of other subcanopy trees, including dahoon holly, wax myrtle, red bay, and sweet bay magnolia, also occur, but are typically small trees or shrubs with limited canopies. The herbaceous layer is very dense and exhibits a large number of species ranging from cinnamon fern, royal fern, St. John's wort, yellow-eyed grass, blue maidencane, beaksedge, centella, sphagnum moss, sundew, water sundew, foxtail clubmoss, Virginia chainfern, hooded pitcherplant, and rose pogonia. Portions of this system appear to be floating or occur within a very thick sphagnum mat such that the area "bounces" or "waves" as a person walks over the area.

630 – Wetland Forested Mixed (15.59 acres)
This wetland vegetation type occurs in the south central portion of the site adjacent to the powerline easement. The canopy is densely vegetated with a variety of species, including red maple, slash pine, sweetbay magnolia, loblolly bay, dahoon holly, and water oak. The understory is also generally densely vegetated with primrose willow, wax myrtle, Carolina willow, elderberry, saplings of the canopy species, muscadine, and catbrier. Herbaceous vegetation ranges from sparse to dense, likely depending on the amount of light hitting the groundcover, fire history, and/or the hydrological regime. Herbaceous species observed in the area include Virginia chainfern, cattail, maidencane, rush, gallberry, and sand cordgrass. This vegetation type likely has grown in this area due to changes in hydrology and fire associated with the adjacent powerline easement.

641 – Freshwater Marshes (60.72 acres)
This vegetation type grows in the deeper areas of many of the wetland systems on the site as well as within the littoral zones of Lake Lizzie and Trout Lake. This diverse herbaceous vegetation type is

dominated by yellow-eyed grass, sawgrass, lizard's tail, swamp rosemallow, primrose willow, spikerush, buttonbush, and maidencane. Marshes on the western side of the large wetland south of Lake Lizzie exhibit dense concentrations of sawgrass, while other marshes are dominated by the diversity of species listed above. Other herbaceous species observed in the marshes include spatterdock, largeflower rosegentian, bloodroot, flatsedge, witchgrass, torpedograss (especially in lake littoral zones), and smallfruit beggarticks. Feral hogs have rooted in many of the marshes on the site, which has caused extensive vegetation impacts and soil disturbance.

643 – Wet Prairie (207.96 acres)
Wet prairies occur in many of the wetlands on the site, with especially notable wet prairies occurring in the northeast corner of the site and a large portion of the Lake Lizzie Prairie. These wetlands are primarily herbaceous systems, although scattered individuals of slash pine and Carolina willow do occur as well. St. John's wort dominates the wet prairies, where it grows over a dense, diverse groundcover layer that is dominated by beaksedge, nutrush, sphagnum moss, yellow-eyed grass, witchgrass, and Virginia chainfern. Other species observed in the wet prairie include hooded pitcher plant, rose pogonia, foxtail clubmoss, water sundew, centella, blue maidencane, tall pinebarren milkwort, marsh pennywort, meadow beauty, maidencane, cinnamon fern, royal fern, sundew, and scattered sand cordgrass. Feral hogs have rooted in many of the wet prairies, which has caused extensive vegetation impacts and soil disturbance.

740 – Disturbed Lands (4.02 acres)
Disturbed lands are comprised of two large fill piles that occur in two locations on the property with one occurring in the northeast island and the other in the west central portion of the site and the Alligator Canal bank. These areas have been created from the deposition of fill, debris, or muck from historical agricultural operations, excavation of the canal, and/or maintenance work done within the lakes adjacent to the site. These fill areas are dominated by maidencane, pokeweed, dogfennel, blackberry, and bluestem. Portions of the canal spoil mound are dominated by live oak, slash pine, and water oak, while other portions are dominated by Brazilian pepper. The canal bank is primarily herbaceous in character and dominated by creeping oxeye, torpedo grass, paragrass, air potato, and bahiagrass.

814 – Field Road Crossing (1.75 acres)
Field roads occur throughout the site, ranging from dry "sugar" sands to hard packed seasonally inundated areas. Many of these field roads typically exhibit soil conditions of the adjacent habitats (albeit usually in a more compacted state) and often exhibit at least scattered occurrences of herbaceous species found within those habitats as well. Thus, these roads were designated as part of the adjacent FLUCFCS type on **Figure 7**. However, two field roads have been identified with a separate land use designation as these segments of field roads through the site were constructed to provide vehicular access across extensive wetland systems in the northeast corner and south-central portion of the site and are dry all year. These two field roads were built on fill excavated from the adjacent wetland and are typically vegetated with bahiagrass. Culverts under these field roads provide some hydrological connections to the wetlands bisected by the roads, many of which are in need of enhancement or repair.

832 – OUC Electrical Power Transmission Lines (19.36 acres)
A power line easement runs north along the eastern property boundary from the southern entrance to the Lake Lizzie Prairie. At the Prairie, the powerline easement turns runs east along the southern margin of the Prairie to the eastern property boundary, where it again turns to the north

all the way to the northern property boundary. The power line easement goes through many of the vegetation communities occurring on the site. Field roads occur within the easement area to provide access to the power poles. These field roads are surfaced with sand/gravel, although vegetation occurs along much of the roads, including bahiagrass, bermudagrass, paspalum, rough Mexican clover, beggarticks, ragweed, and evening primrose. The majority of the length of the field road in the powerline easement adjacent to the Prairie is bordered by shallow ditches and has culverts at scattered locations. An enhancement in the condition and number of culverts along this field road may improve the hydrology of the site.

2.4 Listed Species

During site reviews conducted in April 2008, the LLCA was evaluated for the occurrence or potential occurrence of threatened and endangered (T&E) species through preliminary pedestrian and vehicular transects. **Table 2** includes a list of T&E species and Species of Special Concern (SSC) that potentially occur in Osceola County, typical habitats occupied by each species, and an estimated probability of occurrence of each species within the project. Plant species observed on the project site, including listed and exotic plant species, are noted on **Table 1**, while wildlife species observed on-site are noted in **Table 3**. Listed species that were observed on the site during the field reviews or have been noted previously by Osceola County staff consist of eight plant species and nine wildlife species, including:

- gopher tortoise
- Sherman's fox squirrel
- American alligator
- Florida scrub-jay
- bald eagle
- wood stork
- sandhill crane
- little blue heron
- white ibis
- water sundew
- nodding pinweed
- nodding club moss
- cinnamon fern
- royal fern
- rose pogonia
- hooded pitcher plant; and
- giant wild-pine.

The locations and/or habitats in which these species were observed during the field reviews are noted on **Figure 8**. A brief description of these species and the habitats in which they occur on the site are included as follows:

Gopher Tortoise

Additional studies are required to determine gopher tortoise densities within each habitat.

Historically, gopher tortoises ranged throughout much of Florida in areas dominated by xeric or mesic soils. They are known for constructing large burrows that provide refugia from heat, cold, desiccation, and predators. Gopher tortoises use several burrows throughout their lives, and may use 1 to 12 burrows annually. Therefore, not all burrows contain a resident tortoise. Male gopher tortoises exhibit home ranges from 1.2 to 4.7 acres, while females generally have smaller home ranges from 0.25 to 1.5 acres. These burrows also provide refugia for many commensal species, including other reptiles, amphibians, mammals, and invertebrates. Land management efforts should limit the establishment of dense sand pine or other pine plantations and maintain areas with high densities of grasses, herbs and small shrubs that are the main food source for tortoises. Because historical tortoise habitat would have burned periodically, prescribed burning is highly recommended as the primary management tool. Thinning also may be used to help decrease pine density when necessary. Several gopher tortoise burrows were noted on the property, predominantly in the various pine flatwoods and sandhill oak communities. Additional studies are

required to determine gopher tortoise densities within each habitat. Habitat conditions ideal for tortoises can be achieved through the management actions proposed in this plan, and the tortoise should be considered an ideal indicator species for sandhill and scrub health on-site.

Sherman's Fox Squirrel

The Sherman's fox squirrel is found only in central Georgia through southeastern Florida. It typically inhabits mature longleaf pine sandhills, open pine flatwoods, mixed pine-hardwood areas and rangeland interspersed with trees. Common forage items for this species includes nuts, fruits, insects, mushrooms, buds and tubers, and acorns of the live oak. Home ranges may shift as a result of food shortages, though they average approximately 105 acres for males and 42 acres for females. Fox squirrels often prefer to nest in hollows of trees, but will also construct bulky nests of twigs or create a nest of leaves in treetops. Breeding occurs in January and/or June, and young typically disperse in September and October. Habitat for fox squirrels can be improved through selective cutting to maintain nut-bearing trees, and maintaining mature and large crown trees; however, more intense harvesting can eliminate fox squirrel habitat. Furthermore, prescribed burning on relatively short intervals (2 to 7 years) is recommended to maintain an open understory. Sherman's fox squirrels have been observed in the mesic flatwoods in the northeast portion of the site, and much of the uplands on the site provide potential habitat for this species.

American Alligator

The American alligator ranges throughout the Southeastern United States, including Alabama, Arkansas, North & South Carolina, Florida, Georgia, Louisiana, Mississippi, Oklahoma, and Texas. They inhabit large swamps, lakes, ponds, and other bodies of water, and feed on a variety of vertebrates, including amphibians, reptiles, birds and both small and large mammals. The alligator was previously federally-listed as endangered by the USFWS, but was removed from the list and pronounced fully recovered in 1987. Currently, the American alligator is listed by the State of Florida as a Species of Special Concern (SSC). The American alligator was not observed during the site review, although some trails observed in the marshes may be evidence of alligator use on the site. The extensive wetland systems and lakes on or adjacent to the site likely provide foraging habitat for alligators, while the uplands adjacent to these wetlands may provide potential nesting sites. Management for this species should include maintaining or enhancing the depth of the current lakes and marshes on-site, as well as improving water quality.

Florida Scrub-Jay

The Florida scrub-jay is a federally threatened species that occurs only in peninsular Florida. It is a relatively sedentary habitat specialist, preferring open, low-growing oak scrub. Scrub-jays are cooperative breeders that defend territories consisting of one breeding pair and from zero to several non-breeding helpers. Typically, this species breeds from March through May, although the nesting season often is extended in suburban areas. Like other scrub and sandhill species, the scrub-jay cannot persist in habitat that is not burned regularly. The fire return interval depends largely upon whether there are xeric or mesic conditions, with less frequent fires (10 to 20 years) required in xeric conditions, and more frequent fires (6 to 12 years) required in more mesic habitat. Ultimately, fires must prevent oaks from becoming too large and overgrown, but must also maintain them at or above acorn-bearing height, as acorns are the single most important food source for scrub-jays. Furthermore, fires in nesting habitat during the breeding season or before young are independent and capable of flight (typically by mid to late August) can have adverse impacts on breeding populations and/or young of year. A single scrub-jay was observed in two locations in the sandhill oak scrub in the north-central portion of the property. The estimated

extent of occupied habitat for this species is depicted on **Figure 8**. Additional surveys to define the extent of scrub-jay occupied habitat and/or determine if the site has a breeding population of scrub-jays would be beneficial, especially prior to any fire or mechanical management within scrub-jay habitat during the breeding season. Although the LLCA likely cannot support more than 1 to 2 families of scrub-jays based on existing and/or future managed scrub areas, even relatively small patches of scrub provide important connections between scrub-jay populations to maintain meta-population dynamics for the regional scrub-jay population.

Bald Eagle

A large population of bald eagles occurs within in Florida with a large portion of the population occurring within the lakes and flatwoods mosaic of Central Florida. Eagles typically nest in mature or old-growth trees, choosing the tallest tree with strong limbs. Eagles form lifelong monogamous pair bonds, and will re-use the same nest in subsequent years. The nesting season in Florida begins in October, and most young fledge by May and early June. During the breeding season, eagles can be very sensitive to human activity during courtship, laying and fledging period; however, some eagles, especially those nesting in urban settings, are able to tolerate substantial levels of human activity. The pine canopy throughout much of the site provides suitable nesting habitat for bald eagles, while the nearby lakes provide potential forage habitat. Bald eagles were observed in flight and interacting with osprey over Lake Lizzie, but no nests for this species are known to occur on the site. If a nest is found, it is recommended that site management activities incorporate appropriate buffers (up to 660 feet from the nest) when locating trails and/or the structures to decrease the effects of human disturbance on the nesting eagles.

Wood Stork

In the United States, the wood stork is limited to Florida, Georgia and South Carolina. It was listed as endangered in 1984 as a result of hydrological alterations, dry downs and alteration of the Everglades. Storks are sensitive to alterations in their feeding habitat, which consists of wetlands and surface waters in which water is 2 to 15 inches in depth, remains relatively calm, and is not thick with vegetation; however, almost any shallow wetland depression where fish concentrate may be suitable. Wood storks are a colonial species that nest most frequently in large cypress trees or in mangroves on islands, and inundation of trees prior to or during nesting helps deter predators. Nesting storks will travel between 5 to 40 miles from the colony to forage, and the most successful colonies tend to be those that have the most feeding site options. Wood storks were observed in scattered locations in the ditch network on the Lake Lizzie. Suitable foraging habitat is provided by this ditch network and other shallow wetlands on the property. No rookeries were noted within the property boundary during the site reviews. The conservation of the LLCA as well as the maintenance of hydrology of the extensive wetland systems on the site will continue to provide potentially suitable foraging habitats for wood storks.

Florida Sandhill Crane

Sandhill cranes prefer open habitats, such as prairies, and typically nest and roost in shallow, herbaceous wetlands. Nesting usually occurs between January and August, and pairs will re-nest after the loss of eggs or chicks. Potential nesting sites could exist in any of the wet prairie and/or marsh systems on the Preserve. Disturbance to the nest during incubation may lead to nest abandonment and subsequent re-nesting in another location. Foraging occurs in open fields or grassy areas (e.g., pastures, prairies, or emergent palustrine wetlands), and chicks will follow adults during foraging bouts. Maintenance of uplands adjacent to nesting areas through fire or mowing is important to maintain the herbaceous vegetation at less than 20 inches in height for forage.

Florida sandhill cranes were noted in the margins of Lake Lizzie and the marsh/wet prairie systems scattered throughout the site. Therefore, management activities that could affect nesting sandhill cranes should be evaluated carefully to limit potential impacts to the chicks and adults that are relatively immobile during this time.

Other Wading Birds

Great egrets and great blue herons have been observed foraging in the ditch network and on the margins of Lake Lizzie and Trout Lake. The ditch network, lake edges, and extensive wetland systems also provide potential foraging habitat for other wading birds, such as the limpkin, little blue heron, tri-colored heron, and white ibis. State and federal regulations protecting these species are focused on roosting and nesting (rookery) locations. The closest known rookeries for great egrets and great blue herons occur in Runnymede Lake west-northwest of Lake Lizzie, and Cat Lake and Jug Creek Swamp east of the LLCA. No roosting areas or rookeries were observed during the field reviews within the LLCA. The conservation and/or enhancement of wetland areas on the site will help to maintain foraging habitat.

Eastern Indigo Snake

The eastern indigo snake primarily occurs in the dry sandhill and scrub habitats of northern Florida and southern Georgia, although they are also known to occur in Osceola County. Eastern indigo snakes have been federally listed as threatened since 1978. This species frequents habitat mosaics such as the pine flatwoods, scrubby flatwoods, freshwater marshes, agricultural fields, and human-altered habitats found on the site. Although no eastern indigo snakes have been observed on the site, the habitat mosaic on the site and regional location of the LLCA provide potential habitat for this species. They are closely associated with tortoise burrows in xeric habitat, as these burrows provide shelter from cold and desiccation, to which they are particularly susceptible. Females also may use tortoise burrows as oviposition sites. In south-central Florida, egg-laying occurs from April to July and hatching occurs from mid-summer through early fall. Because of the large home range of this species (average 183 acres for males and 47 acres for females in south-central Florida), they are especially vulnerable to regional habitat loss and degradation. Unfortunately, little is known about the optimal management strategies for this species; however, management to maintain the variety of xeric and marsh habitats of the LLCA that comprise potential eastern indigo snake habitat likely would benefit this species as well.

Listed Commensal Species

Several listed wildlife species, including gopher frog, Florida pine snake, and Florida mouse, depend upon or frequently use gopher tortoise burrows. Similar to gopher tortoises and eastern indigo snakes, another listed commensal species, the latter two species are often found in xeric to mesic pine dominated habitats. Gopher frogs typically occur within pineland mosaics that also include seasonally inundated, isolated marsh and wet prairie systems. Although none of these species have been observed on the site, the pine dominated upland systems in which gopher tortoises occur on the site provide suitable habitat for these species. Management of these uplands through the use of prescribed fire and/or mechanical management that maintains gopher tortoise habitat will help to maintain habitat for these listed commensal species.

Southeastern American Kestrel

Southeastern American kestrels occur throughout much of Florida where they are primarily found in longleaf pine-turkey oak sandhills, sand pine scrubs, or pastures with scattered pines. American kestrels are secondary cavity nesters within nests previously excavated by woodpeckers or other

cavity excavators in snags. Kestrels require open fields or open woodlands with low-growing vegetation to forage for food. Nesting pairs require, at a minimum, approximately 125 acres of suitable foraging habitat within 1.24 miles of an active nest. Most nesting occurs between mid-March and early June while most chicks fledge within 8 to 9 weeks after the clutch is laid. Portions of the site may currently provide suitable habitat for kestrel nesting and foraging. No southeastern American kestrel nests were observed on the site during the site reviews. Prescribed fire on frequent intervals (every 2 to 3 years) within pine flatwoods that currently exhibit dense shrub layers may provide additional habitat for kestrels in future years.

Listed Plant Species

Cinnamon fern and royal fern are listed by the Florida Department of Agriculture (FDA) as commercially exploited. These ferns typically occur in forested and herbaceous wetlands that exhibit seasonal inundation and occur throughout the state. Many of the wetland areas on the site, especially the hydric flatwoods, exhibit large stands of these species. Fire or other management techniques that maintain an open herbaceous layer benefit these species.

A single population of a couple of individuals of giant wild-pine was observed in the northeastern portion of the site in a xeric oak hammock. This species is an epiphyte that grows on the trunk or branches of various tree species, but does not parasitize or absorb nutrients from the host plant. This species is the largest of the air plants that occur in Central Florida. It is typically found in mesic live oak hammocks and/or forested wetland systems, although it occasionally occurs within dense scrubs that have not burned in many years. The population of this species is in decline in the southern portion of the state as a result of attacks from the "evil weevil", a bromeliad weevil (*Metamasius callizona*) that was first found in the state in 1989. The existing population could be monitored for the appearance of the evil weevil. The giant wild pine is listed as endangered by the FDA. Forested wetlands and the live oak hammocks along Lake Lizzie may also serve as habitat for this species, although none were observed during the site reviews.

Water sundew, rose pogonia, and hooded pitcher-plant are each listed as threatened by the FDA. The rose pogonia and hooded pitcher-plant are typically found in moist, acidic soil conditions associated with bogs or seepage areas that are shallowly and seasonally inundated or saturated for the majority of the year. Water sundew is often bound in similar boggy conditions, although it can also be found growing in areas that experience shallow, year-long inundation as well. Large populations of all three of these species were observed within the Lake Lizzie Prairie. Fire or other management techniques that maintain open herbaceous layers coupled with the maintenance of the shallow inundation conditions benefit these species. The water sundew occurring on the LLCA is the only known population of this species within Osceola County as of 2008.

Nodding pinweed is listed as threatened by the FDA. This species typically is found in dry, fire-dominated systems such as xeric oak and sand pine scrub systems in xeric sands associated with the Lake Wales Ridge and coastal scrubs. A small population of this species was observed in the portions of the sand pine scrub used for horse pasture and subject to canopy clearing. This species typically uses open sand patches in the scrub and benefits from the initial open sand conditions resulting from fire and/or mechanical management.

Nodding clubmoss is listed as commercially exploited by the FDA. This species was observed growing in a seepage area within the slash pine gallberry flatwoods adjacent to Lake Lizzie Prairie. Nodding clubmoss typically grows in a wide variety of wetland habitats that exhibit shallow,

seasonal inundation or soil saturation throughout the year, including the margins of excavated ponds and lakes. This species can be found throughout the southeastern United States into Texas, and often grows in wet depressions and pinelands. Fire or other management techniques that limit the growth of shrubs and/or maintain herbaceous conditions often benefit this species.

2.5 Non-Listed Wildlife Species

The LLCA provides habitat for a wide diversity of non-listed wildlife species, which account for many of the species noted on **Table 3**. Common species such as turkey, northern cardinal, and the great-crested flycatcher occur throughout the site and will likely continue to occur under most conservation management approaches. Less common species such as short-tailed hawk and swallow-tailed kite use a variety of habitats both on and off the site that do not necessarily require specific management actions for a site like the LLCA. Management efforts that concentrate on maintaining habitat conditions for a variety of keystone listed species such as the gopher tortoise, sandhill crane, and/or rose pogonia will also maintain suitable habitat structure, diversity, and foraging habitat for many of the common species found on the site.

2.6 Cultural & Historical Resources

Archaeological Consultants, Inc. (ACI) conducted a cultural resource assessment of the LLCA in 2008. No archaeological sites or historic structures were observed on the site during these assessments. Two resources, Alligator Canal and the Old Melbourne Road, occur on the boundaries of the project site and are considered to be historical resources. Various cultural and historical resources do occur within the vicinity of the LLCA. A copy of the ACI assessment is included as **Attachment A**.

3.0 Resource Management

Natural resource values of the LLCA are dependent upon or benefit from implementation of fire and variable hydrological conditions within the landscape. However, the frequency, intensity, and ease of implementation of management activities to accommodate or implement prescribed fire and/or enhance hydrological conditions vary across the different vegetation communities occurring on the site. The following information is provided to document the results of a planning workshop for resource management on the LLCA, describe ecological management units, describe potential management activities for these units such as prescribed fire, ecological restoration, and exotic species control, and outline potential monitoring techniques to observe the effects of these management activities.

3.1 Resource Management Planning Workshop

To receive input from multiple agencies that will likely serve as partners in the implementation of land management activities in the LLCA, a technical workshop was held on Friday, June 6, 2008 to discuss short-term and long-term priorities for natural resource management on Lake Lizzie. **Attachment B** includes the list of attendees and their agencies, a bulleted notation of the issues discussed, and potential priorities for implementing management objectives in the LLCA. The workshop consisted of a site review in the morning and an afternoon session in which three break-out groups each discussed six major topics. These topics included:

- Overall goals and objectives;
- Prescribed fire/vegetation management;

- Exotic species control;
- Partnerships;
- Resource base recreation; and
- Restoration.

Dialogue from this meeting was used as a reference for the organization and composition of this management plan.

The group discussed long-term priorities for management objectives for the LLCA. Issues discussed during the majority of the workshop were summarized into a variety of categories. A consensus-based method was used to define the top 5 priorities for management based on current issues and knowledge of existing conditions and circumstances on the site. The consensus opinion of these priorities included:

1. Prescribed fire/vegetation management;
2. Partnerships;
3. Resource-based recreation;
4. Restoration; and
5. Exotic species control.

The technical working group concluded that long-term success of the management of the LLCA depended upon sustained involvement with natural resource agencies, including the South Florida Water Management District, Florida Fish and Wildlife Conservation Commission, Division of Forestry, numerous departments within Osceola County, and nearby residents, among others. Multi-agency assistance in the implementation of management coordinated through continued meetings of this working group will be beneficial to implement the Management Plan, and achieve long-term objectives.

With respect to resource-based recreation, it was agreed that additional work needed to be conducted that would involve residents and adjacent neighborhoods, and the likely end users of the LLCA. This neighborhood coordination should include a series of two to three neighborhood meetings to solicit the input of nearby residents and another planning workshop to forge a resource-based Comprehensive Recreation Plan for public use over time that is compatible with this Management Plan.

3.2 Ecological Management Units

Ecological management units (EMUs) for the LLCA have been delineated to recognize areas of the site that have relatively similar ecological communities, management needs, and/or management constraints posed by adjacent land uses. A total of 13 EMUs has been identified for the Lake Lizzie site (**Figure 9**). These EMUs do not represent strict fire management units, as the extent of any prescribed fire will need to be determined at the time the burn plan for that fire is developed. In fact, the application of prescribed fire across community boundaries and ecotones is a desirable management goal, although management activities that are anticipated to cross EMU boundaries) should be evaluated against the management goals of all units involved prior to implementation. For example, prescribed fires in flatwoods can and often should burn through the ecotone in marshes The EMUs and the management activity descriptions provided in subsequent sections of this report provide guidance on existing and future ecological conditions for which management is

required, frequency of the management needs to accomplish those conditions, and constraints that may limit the application of particular management techniques.

Ecological Management Unit Description
A description of each management unit and potential management tools are included as follows:

- Unit #1 – This unit occurs in the western corner of the property adjacent to the Alligator Canal. The unit is comprised of a mixture of habitats including the canal spoil bank, hydric flatwoods adjacent to Lake Lizzie, and a live oak hammock. A number of exotic species including Brazilian pepper, air potato, torpedo grass, and creeping oxeye occur on the canal spoil mound. The live oak hammock and hydric flatwoods are relatively small and isolated from other upland natural systems in the LLCA. Although fire may be beneficial for the hydric flatwoods, the relative lack of accessibility, the small size of the system, and adjacency of housing and US 192, limit the potential applicability of fire in this system. Management for this area should be focused on the treatment and eradication of exotic species as described in Section 3.4.
- Unit #2 – The sand pine scrub area in the southwestern corner of the site comprises the vast majority of Unit #2. A small amount of hydric pine flatwoods occurs around northern edge of the sand pine in a thin strip on the margins of the adjacent marsh. The sand pine scrub likely burned infrequently (every 15 to 50 years) historically, while the hydric flatwoods fringe likely burned more much frequently (every 1 to 5 years) when fire swept through the adjacent marsh. This sand pine scrub has not been burned in recent years, although the canopy of a portion of this area has been cut. A small portion of this habitat is currently used as a horse pasture. Although the horses do maintain some open sand conditions that can be favorable for early successional scrub herbaceous species, such as the nodding pinweed, the long-term use of this portion of the scrub as a horse pasture is incompatible with the conservation goals for management of the entire unit and the LLCA in general. The use of this area as a horse pasture should be phased out to allow the scrub canopy, shrubs, and herbaceous species to regenerate. Management tools for the scrub include mechanical management and/or prescribed fire on long return intervals. Management for the hydric flatwoods will be dependent upon the maintenance or enhancement of the hydrology and/or the prescribed fire regime of the Lake Lizzie Prairie.
- Unit #3 – This unit occurs east of Unit #2 and consists primarily of mesic and hydric flatwoods bordered on the north by a wet prairie/marsh wetland and on the south by a residential neighborhood. The hydrology of this unit has been affected by ditches and canals occurring on the southern boundary and through the middle of this unit. These flatwoods systems likely burned every 1 to 5 years in the historical landscape. Fire suppression in recent years has resulted in the growth of dense shrubs and the accumulation of duff layers around the canopy trees. Additionally, the hydrological alterations in the area potentially affect moisture levels in the historically organic soils, which could lead to deleterious impacts from fires in a dry period and/or muck fires. Mechanical management may be useful to limit shrub height in portions of this unit, although organic soils may limit mechanical management options, especially during the wet season. Frequent prescribed fires (every 1 to 5 years) in the lightning season (April through August) would be desirable for long-term management of this unit, although a phased approach to implementing the fire (initial cool season fires for several fires prior to introducing lightning season fires) should be used to limit the potential for extensive canopy loss.
- Unit #4 – Sand pine scrub dominates this unit, although hydric flatwoods and an oak hammock also occur on the margins of the adjacent marsh/wet prairie system. The sand pine scrub in

this portion of the site likely burned infrequently (every 10 to 20 years) historically, although the presence of scattered longleaf pine and wiregrass clumps in the area indicate that it may have burned more frequently than Unit #2. The hydric flatwoods fringe likely burned more frequently (every 1 to 5 years) when fire swept through the adjacent marsh. The oak hammock likely rarely burned. Mechanical management to remove the sand pine canopy and lower the shrub/understory prior to initiating prescribed fire should be done as a fire control method. Management for the hydric flatwoods will be dependent on the prescribed fire regime of the Lake Lizzie Prairie and adjacent longleaf pine xeric flatwoods. Over time, management efforts should be coordinated to allow for fire to burn from Unit #5 into Unit #4, thus merging the two units and maintaining Unit #4 as a more frequently burned scrubby flatwoods system instead of sand pine scrub.

- Unit #5 – This unit is dominated by longleaf pine and slash pine flatwoods bordered on the north by the Lake Lizzie Prairie, on the south by Bay Lake, on the west by Unit #4, and on the east by residential housing. Historically, these communities would have burned regularly (every 1 to 10 years) as fuels accumulated, but this unit has not burned regularly in many years. This fire suppression has resulted in the invasion of sand pine into the longleaf pine flatwoods, the growth of a dense sub-canopy of scrub oaks beneath the canopy pines, and thick layers of duff in portions of the flatwoods. Timbering of all sand pine within this unit coupled with mechanical management of the oaks and dense saw palmetto are needed prior to prescribed fire implementation to reduce the chance of canopy loss of the longleaf pine. Frequent prescribed fires (every 1 to 5 years) in the lightning season (April through August) would be desirable for long-term management of this unit. A phased approach to implementing the fire (initial cool season fires for several fires prior to introducing lightning season fires) should be used to reduce the duff layers and limit the potential for extensive canopy loss in the flatwoods.

  A small band of hydric flatwoods/hammock occurred adjacent to Bay Lake as far back as 1963 with marshes occurring between these hammocks and the longleaf pine flatwoods. Likely as a result of fire suppression and/or changes in regional hydrology, these marshes have become overgrown with wetland shrub and tree species. Depending upon funding availability, two methods could be used to reduce the canopy and restore herbaceous conditions within these systems. The first method would consist of mechanical or hand clearing of the trees and shrubs within the historical marsh area prior to the implementation of prescribed fire in the area. The second method would be to allow the leading edge of prescribed fires in the adjacent pine flatwoods to sweep into the areas with no additional canopy clearing, which would slowly convert the area to more herbaceous conditions. Regular fire (every 1 to 5 years) would likely maintain the eventual herbaceous condition of the area within the general boundaries of the area noted as zone 6 on **Figure 11**.

- Unit #6 – The Lake Lizzie Prairie is an extensive wetland comprised of a variety of hydric habitats ranging from sawgrass marshes to wet prairie to hydric savanna to hydric tree islands. Much of the Prairie is underlain by thick layers of peat and/or muck that pose an important consideration for prescribed fire, especially during dry seasons. Historically (at least up to 1963 – see **Figure 3A**), this Prairie exhibited limited tree or shrub canopy except for the tree islands. Shrubs and relatively young pine trees now grow within much of the southern half of the Prairie, likely as a result of fire suppression within the Prairie and/or hydrological alterations within the region. The three rare plant species (rose pogonia, water sundew, and hooded pitcherplant) found in the Prairie typically thrive in areas subject to a frequent fire regime and

saturated soil conditions. Frequent fire (every 1 to 5 years) that is allowed to burn into the area from the adjacent flatwoods or started within the prairie would benefit the herbaceous plant communities present and limit shrub and canopy growth. Initial hand-clearing or mechanical clearing by a non-soil disturbing machine could be used to clear the shrubs and trees within the Prairie, but long-term application of frequent fires will likely reduce or eliminate the shrubs and trees over time. Enhancement of the hydrology of the system through restoration activities with the ditch draining into the Prairie from the south and/or the field road crossing the prairie may also be beneficial to the long-term ecological value of the Prairie.

- Unit #7 –Occurring in the east central portion of the site, this unit is comprised of pine flatwoods and seasonally inundated wet prairies. This unit is bordered on the north and east by residential development, on the south by Lake Lizzie Prairie, and on the west by a sand ridge dominated by sandhill oak. Portions of the upland pine flatwoods still exhibit typical flatwoods herbaceous and shrub vegetation, while the majority of the historical pine flatwoods have been altered by silvicultural activities and/or site clearing. Management within this unit should be focused on implementing frequent fire (every 2 to 5 years) within the naturally vegetated flatwoods to reduce shrub and sub-canopy oak growth and, within the altered flatwoods, to thin the canopy and promote open sand conditions for potential native species regeneration. At least a portion of the oak trees in the northeastern portion of this unit should be retained as the population of giant wild-pine was found in this area.

  The herbaceous vegetation within the wet prairies within this unit has been substantially affected by hog rooting. These wet prairies have also been altered hydrologically by the regional canal on the eastern property boundary. Fires initiated in the flatwoods should be allowed to burn into the wet prairies, although care should be taken to apply fires when the wet prairie soils are saturated to limit the potential for muck fires.

- Unit #8 – The primary component of this unit is the sandhill oak community that occurs on the rolling sand ridge in the central portion of the site, although a small fringe of hydric pine flatwoods occurs between the ridge and the Lake Lizzie Prairie and a small stand of sand pine occurs in the southwestern edge of the unit. The sand pine scrub appears to have grown within an area that would otherwise be comprised of the sandhill oaks. Long-term management efforts to convert the sand pine scrub to oak scrub would potentially benefit the scrub-jay population on the site.

  The scattered longleaf pine and clumps of wiregrass occurring throughout the otherwise dense oak thickets of this unit provide some evidence that this area historically burned relatively frequently (compared to sand pine scrub communities), likely on a 5 to 10 year return interval. The scrub-jay observed on the site occupies the sandhill oak habitat. To minimize potential impacts to the scrub-jay, no more than half of the sandhill oak should be burned during a given management event. Furthermore, the remaining half should not be burned for at least 5 to 7 years after the first half is burned to allow for re-growth of oak species to support the scrub jay(s). Coordinating the burning of portions of the sandhill oak habitats with adjacent units (either Unit #7 or Unit #9) would allow for landscape-level fires to occur, while still limiting the potential for the entire sandhill oak area to burn in one event. Smaller sub-unit fires may also be possible if funding is available because of the abundant field roads through the area, although no more than half of the sandhill oak portion of the unit should be in the 0 to 5 year seral stage at any one time. Mechanical methods, such as roller-chopping, may be useful for opening the oak canopy and preparing for or simulating fire within the sandhill oak system.

Both mechanical methods and/or prescribed fire should be limited in use during the nesting season of scrub-jays. As the site is burned more frequently, some of the smaller roads that bisect the sandhill oak could be evaluated for rehabilitation into oak scrub stands.

The hydric flatwoods within this unit likely burned every 1 to 5 years historically - consistent with the adjacent marsh and/or flatwoods systems. The canopy of these flatwoods is likely denser than historically occurred due to fire suppression over the years. Thinning that would result from the re-introduction of fire in the area would be beneficial for the understory and should not necessarily be avoided. The shrub layer of the hydric flatwoods would benefit from mechanical management prior to fire, although the use of heavy or ground-altering equipment should be avoided because of the organic, typically wet soils that underlie these flatwoods. Alternatively, frequent fires in the cool, wet season conducted for several burn cycles could be used to lower the shrub canopy over a longer period of time. Ultimately, frequent fires primarily within the lightning season (April through August) would be desirable for long-term management of this unit to reduce the duff layers and limit the potential for extensive canopy loss in the flatwoods.

- Unit #9 (A and B) – Occurring in the west central portion of the site, this unit is comprised primarily of mixed forested uplands along with a large isolated wet prairie/marsh complex and wetlands associated with Lake Lizzie. When the purchase of the outparcel between 9A and 9B is closed, the new parcel would be included in this unit. The mixed forested uplands were historically comprised of scrubby pine flatwoods (on drier soils) and mesic to hydric pine flatwoods (on wetter soils adjacent to marshes), but are now comprised of slash pine stands that have grown in since the area was cleared more than 30 years ago. This unit is bordered on the north by a large seasonally inundated wetland, on the east by sandhill oak and sand pine scrub, on the south by Lake Lizzie Prairie, and on the west by Lake Lizzie. Management within this unit should be focused on implementing frequent fire (every 2 to 5 years) to promote open sand conditions for potential native herbaceous species regeneration. Additional seeding efforts or longleaf pine planting efforts may benefit the area if funding is available, but the priority event should be fire implementation. Fires initiated in the flatwoods should be allowed to burn into the wetlands within the unit and the marsh on the northern boundary of the unit, although care should be taken to apply fires when the wetland soils are saturated to limit the potential for muck fires, especially in the northern marsh.
- Unit #10 – This unit occurs on the western margin of the property and is bounded on the north and west by residential development, on the south side by Lake Lizzie and on the east by a large marsh system. Although this portion of the site was not visited during the April 2008 site reviews as the parcel was in the process of being acquired, aerial interpretation and review of soils in the area suggest that the unit is comprised of a mosaic of upland habitats ranging from mesic slash pine flatwoods to scrubby longleaf pine flatwoods. Historically, these communities would have burned regularly (every 1 to 10 years), but fire suppression in recent decades would likely have allowed scrub oaks and shrubs to increase in height and duff layers to form under the canopy pines. Mechanical management of the oaks and dense saw palmetto would likely be beneficial prior to prescribed fire implementation to reduce the chance of canopy loss of the longleaf pine. Frequent prescribed fires (every 1 to 5 years) in the lightning season (April through August) would be desirable for long-term management of this unit, although a phased approach to implementing the fire (initial cool season fires for several fires prior to introducing lightning season fires) should be used to reduce the duff layers and limit the potential for

extensive canopy loss in the flatwoods. Alternatively, mechanical methods to reduce sub-canopy oak and shrub heights could be used to simulate fire and/or prepare for fire use.

- Unit #11 – This management unit is comprised almost entirely of the large seasonally inundated wetland system that occurs on and extends offsite over the northern property boundary, although a small peninsula of pine flatwoods extends through the center of this wetland (under the "11" on **Figure 9**). The wetland system is comprised of both wet prairie and deeper water marsh systems. Historically, all or portions of this wetland burned every 2 to 5 years in association with the adjacent pine flatwoods. The extent of the wetland that was burned was likely dependent upon the depth of inundation within the wetland and likely varied within each fire. The small area of pine flatwoods within this unit was burned recently and/or lost its canopy as a result of wind storms of some kind. Mechanical management should be used to lower the shrub and sub-canopy layer prior to the re-introduction of fire to this pine flatwoods. Frequent (every 2 to 5 years) fires would be beneficial for the entire unit, but a significant fire break on the property margin and/or fires conducted during wet times of the year would be needed to limit possible fire encroachment onto adjacent properties.
- Unit #12 (A and B) – Units 12A and 12B are marsh and wet prairie segments that are part of a larger wetland system connected to Trout Lake. All or portions of these scenic wetlands likely historically burned on a frequent (every 2 to 5 years) cycle in association with adjacent upland systems. The extent of the wetland that was burned was likely dependent upon the depth of inundation within the wetland and likely varied within each fire. Although frequent (every 2 to 5 years) fires would be beneficial for these marshes, control of any fire applied within the units would be problematic, especially considering the extensive wet prairies connected to these units. However, fires from the adjacent units (Unit 7 and Unit 13) should be allowed to burn into the margins of these wetlands if hydrological conditions are suitable.
- Unit #13 – This management unit occurs in the northeast portion of the project site on an upland island, the majority of which occurs on the LLCA. This island was cleared prior to 1963 to be converted to improved pasture. Slash pines and scattered oaks have grown on the island since it was cleared, but the herbaceous layer is still relatively sparse. Additionally, a fill pile of muck or other soil was deposited in the northern portion of the unit. Removal of the fill and rehabilitation of the fill pile location through native seeding, planting of saplings, or natural succession should be evaluated. The site likely historically consisted of mesic pine flatwoods that burned on a frequent (every 2 to 5 years) return interval. The implementation of fire on the historical cycle and the control of exotic and/or nuisance species are the management focus for this unit. Prescribed fire on the island will remove accumulated pine needle litter and maintain open sand conditions favorable for re-colonization by or seed re-introduction of native herbaceous species.

Management Frequency

As noted above in each EMU, the LLCA contains diverse array of habitats that require varying fire frequencies. The following is a brief summary of the fire frequencies, the habitats to which they apply, and the management units in which these fire frequencies should be assessed:

- 10 to 50 years –Sand pine typically naturally burns with a catastrophic fire, which results in the death of the canopy trees, during the months of February to June. Seeds released from serotinous cones germinate and grow to replace the lost canopy trees. Sand pine saplings can begin producing cones within 5 years of germination, although it typically takes 10 to 15 years to produce cones. Sand pine often invades longleaf pine flatwoods during long periods of fire suppression, which can mask the historical plant community and

fire regime present at the site. True sand pine scrubs typically exhibit a fire frequency of 15 to 50 years (like Unit #2), while sand pine scrubs occurring immediately adjacent to longleaf pine stands or that include longleaf pine trees typically burn on a 10 to 20 year frequency (Unit #4).

- 5 to 10 years – Sandhill oak systems likely burned on a relatively infrequent fire cycle because of the limited presence of fine fuels in the herbaceous layer. When longleaf pines are present in this system, the systems may be able to undergo more frequent fire (at the 5 year end of the range) due to the pine needle fine fuel produced by the pines. This frequency applies to Unit #8.
- 1 to 10 years – Xeric longleaf pine flatwoods can exhibit a fairly broad range of fire return intervals depending on the amount of fine fuel producing herbaceous species and/or the amount of open sand present within the system. Longleaf pine flatwoods that have abundant fine fuels will typically burn frequently (every 1 to 5 years), while longleaf flatwoods dominated by scrub oaks may burn less frequently (at the 5 to 10 year range) during drier weather conditions. This frequency is applicable in Units #5 and #10, with the ultimate goal of managing these systems at the lower end of the range (every 1 to 5 years).
- 1 to 5 years – The remaining systems, including marshes, wet prairies, pine flatwoods, and hydric flatwoods, on the site historically exhibited high frequency of fires, sometimes with frequencies up to annual fires. These systems typically are comprised of abundant herbaceous plant species that re-sprout quickly after a fire and combine with abundant pine needle litter to rapidly regenerate fine fuels for the low-intensity, high frequency fires. This is the desired frequency range for the majority of the units on the site.

Fire Introduction Concerns

Fire re-introduction on sites that have had not been burned for many years typically requires an extensive period of acclimation prior to restoring historic characteristics.. During extensive fire-free periods, vegetation types often change (e.g. herbaceous plants to shrubs), duff layers accumulate, and/or ladder fuels or additional coarse fuels increase in abundance. The vegetation changes, ladder fuels, and coarse fuel accumulation can significantly change both the patterns of fire (e.g. speed at which the fire moves through the landscape) and the intensity of fire temperature and height. These changes can result in catastrophic fires, vegetation community changes, and loss of characteristic species that are not adapted to the altered fire conditions. Duff layers also typically accumulate around the bases of large pines during fire free periods, often extending several feet up the base of the tree. The pine trees then often grow feeder roots into the duff layers to obtain nutrients and water. Fire applied to thick duff layers during drier times of the year can smolder around the base of the pines, effectively girdling the tree and directly killing the tree. The duff fire can secondarily kill the tree by consuming all the duff in which the feeder roots occur, thereby depriving the tree of its ability to obtain water and nutrients.

Management approaches that implement a series of initial fires conducted in cool, wet weather to reduce fuel loads, slowly decrease accumulated duff layers, limit smoldering within duff layers can often increase canopy pine survivability and allow a gradual transition to fires during the desired season and frequency. Research in Florida for flatwoods sites indicates that a series of 2 to 4 cool season fires occurring 2 years or less apart with the drought index below 250 can be a very effective tool to minimize canopy mortality prior to the re-introduction of lightning season fires. However, recent research also indicates that the frequency of fires is more important the season of fire to reduce saw palmetto height, which indicates that frequent fire no matter the season is the most important goal for managing fire dependent systems such as pine flatwoods in Florida.

3.3 Prescribed Fire

Prescribed fire is a critical tool for enhancing and sustaining the ecological health of the fire-dependent systems in all EMUs in the LLCA. Not only does prescribed fire reduce fuel loads to protect natural systems and adjacent structures, but it also assists in the control of exotic species, plays a significant role in the life history of many plant species, and improves habitat for a wide variety of native wildlife and plant species. Where possible, fire regimes under which the prescribed fire occurs should be consistent with historical frequencies for fire-dependent community types as the species found within those fire-dependent communities are adapted to the frequency and intensity of the historical fire regime.

The State of Florida regulates implementation of prescribed fire within the state. Permits are required from the local Department of Forestry (DOF) office prior to implementation of the prescribed burn. Certified burn managers meeting the conditions of the DOF certification program and possessing a valid certification number are required to prepare a written prescription for a given fire prior to obtaining authorization from DOF. The certified burn manager that obtained the permit or another certified burn manager must have a copy of the written prescription and be present on the site of the fire until the fire is complete. Prescriptions for each fire on the site should be prepared by the prescribed fire contractor and/or County manager to account for existing site conditions, ambient weather conditions, and/or other information required by DOF and should be provided to Osceola County following application of the fire. A copy of a draft fire prescription form from the DOF is included as **Attachment C**.

Although fire prescriptions are specific instruments that document conditions under which a given prescribed fire is to occur and are typically more detailed than an overall management plan, the LLCA management plan can address general issues associated with application of fire to the site. The following issues should be addressed to provide the framework in which the fire prescriptions are prepared:

Fire Control Features

A firebreak program should be initiated within the LLCA. This program should identify and maintain defensible locations along the boundary of the LLCA, provide internal control points for implementing prescribed burn units, and provide guidance for fire control measures for ecotonal zones between uplands and wetlands. A depiction of existing and proposed fire break locations as well as important ecotonal management zones on the site are depicted on **Figure 10**.

- Defensible Boundaries – The vast majority of the boundaries of the LLCA are currently lacking well-defined or maintained firebreaks that can be used to either provide defensible fire break boundaries for a wildfire or to be used for initiating a prescribed burn program. A 15 to 20 foot wide break should be created along all project boundaries adjacent to residential development, while a maximum 10 foot wide fire break should be created along property boundaries not adjacent to residential development. These breaks should be created and maintained for all portions of the LLCA that occur on or adjacent to upland fire-dependent communities, the approximate locations of which are depicted as "Proposed new firelines" on **Figure 10**. These fire breaks should be maintained free of brush with exposed mineral soil and should be sufficiently wide to accommodate a driven brush truck. These fire breaks should be checked at least annually and before any prescribed fire adjacent to them for tree falls or other debris that could form a continuous fuel source past the break. The fire breaks should be cleared or maintained as needed

prior to wildfire season, during extensive droughts conducive to wildfire formation, or prior to the application of prescribed fire. The establishment of these fire breaks is one of the most important priorities for the LLCA in 2009.

- Burn Unit Firebreaks – Field roads on the site provide potential firebreaks for internal burn unit delineation. These field roads can be maintained in their current condition for driving accessibility. Additional supplemental maintenance prior to a fire to maintain a mineral sand fire line may be required for field roads that are minimally used. Existing field roads are depicted as "Existing firelines" on **Figure 10**.
- Ecotone Fire Control Measures – Traditionally, fire breaks have often been constructed along ecotonal boundaries between wetlands and uplands to limit the encroachment of fire into the wetlands and limit the potential for long-burning muck fires. This often led to the formation of dense stands of shrubs and canopy trees along the margins of wetlands that could then be a fire hazard during dry weather periods. However, fires historically ranged freely over the ecotone boundary and burned into the wetland margins, thereby maintaining open vegetation conditions that provided habitat for a number rare plant species.

  Fire control measures such as wet lines, mowing or bush-hogging to maintain very low-growing vegetation, or other techniques can be used within these ecotones to provide defensible fire breaks during wildfires and/or prescribed fires during dry periods that could make wetlands susceptible to muck fires. These control options are especially important in locations such as EMUs #11 and #12A/B where fires could creep through wetlands onto adjacent parcels or around the margin of Lake Lizzie Prairie where muck fires or long-smoldering fires could have adverse effects on rare plant populations. The potential locations where "soft" fire breaks should be used or evaluated for use during a prescribed burn are depicted as "Wetland Management Zones" on **Figure 10**.

Potential Conflict Zones

Fire prescriptions typically require the identification of smoke sensitive areas (SSA) that may be affected by smoke generated from the fire. The fire contractor should conduct a smoke screening analysis that incorporates at a minimum the size of the burn, the fuel model, and the wind direction for all SSAs in the area prior to a fire. The SSAs that should be considered include but are not limited to adjacent neighborhoods, roads, schools, daycare and health facilities such as hospitals, and airports. Furthermore, the identification of wildland-urban interface locations where prescribed fire could occur adjacent to urbanized areas or on-site structures (such as the high-voltage power line occurring on the site) is important for establishing appropriate control and safety methods. **Figure 9** depicts neighborhoods and regional transit corridors (regional road systems) adjacent to the site that may contain smoke sensitive areas or potential wildland-urban interface zones, while the power line right of way is depicted on **Figure 7**. These maps should be updated as new developments occur in the vicinity of the LLCA and expanded to cover areas that may be affected by smoke generated from the LLCA to provide information for the certified burner that prepares and implements a fire prescription for the site.

Neighborhood Coordination

Because the LLCA occurs adjacent to homes and major roadways, public awareness of prescribed fire will be a key component to the success of the LLCA fire management program. Coordination with neighborhoods through education materials/kiosks on the site, meetings with neighborhood

associations in the vicinity of the LLCA, and notification of neighbors prior to a given prescribed fire are effective and important tools for maintaining the viability of the LLCA fire program.

- Fire education – Educational materials should be developed or adapted from other public education venues to provide information about the benefits, ecological necessity, and goals of the prescribed fire program on the site. These materials could be mailed to adjacent homeowners, provided in brochures and signage within kiosks on the site, or maintained on the County website for the park. These materials should be updated as needed to maintain relevant information about the burn program on the site.
- Neighborhood Association Meetings – County staff should initiate regular (annual or bi-annual) communication with neighborhood associations or groups in the vicinity of the LLCA. This communication could range from letters informing the groups of the status of activities on the LLCA to presentations to the groups about upcoming fires. These meetings could be used to identify park neighbors that require particular notification prior to a fire due to health issues associated with smoke inhalation.
- Neighbor Notification Letter – A standard letter or reverse 911 script should be developed that could be sent to residences adjacent to a future prescribed burn that documents the expected date and conditions of an upcoming burn and a reminder that access to the park will be limited during that time. A database of addresses and contact information should be developed and maintained to provide a list of neighbors that should be contacted prior to a given fire.

Partnerships

Enhancing and building upon existing partnerships with DOF, the Osceola County fire department, and/or other agencies are important for maintaining the fire program on the site. Training activities on the site that expose fire department personnel to site conditions assist in familiarizing these personnel with general wildland fire control as well as provide site familiarity for fire control if wildfires were to occur on the site. The County should closely coordinate with DOF about existing fire breaks, desired management conditions, and ecotonal management zone considerations. In addition County staff and DOF should identify wildfire fighting procedures to limit potential alterations to the site from wildfire control. The close proximity of the local DOF office could easily promote the use of the site for training on priority burn initiatives, fire risks, or other fire and forestry related features of the site.

Prescribed Fire Tracking

A system to categorize which units and/or habitats have burned in a given year should be developed to track frequency and season of past and future prescribed burns on the site. This can be accomplished by a series of paper maps that are completed each year as fires are implemented, or can consist of a GIS file that is updated regularly throughout the year. This tracking system can serve as a planning tool for future burns, as well as provide information to partners or researchers that conduct work on the site.

3.4 Ecological Restoration and Enhancement

The scrub, flatwoods, and wetlands comprising the LLCA are generally intact natural systems, although many of these systems exhibit overgrown shrub and/or canopy conditions due to the lack of fire in the recent or long-term timeframe. Reduction of the shrub layer for most systems coupled with the removal of canopy species in some systems, such as the sand pine scrub, is one form of ecological enhancement or restoration activity for the LLCA. These enhancements would

result in a community structure that is more similar to function and form of the historic vegetation community. Almost all natural systems on the site would be enhanced by the re-introduction of fire on frequent (most wetland and upland systems) or long-term (sand pine scrub) intervals as described above in **Sections 3.2** and **3.3**.

In addition to the general habitat enhancement resulting from the fire on regular intervals on the site, a number of smaller scale ecological enhancement or restoration opportunities exist (**Figure 11)**. These opportunities range from exotic species removal along canal banks to hydrological enhancement through culvert installation on wetland field road crossings. As funding becomes available, specific restoration/enhancement plans should be developed to guide the implementation of these activities. A brief description of the potential restoration/enhancement opportunities follows:

- Area #1 – Alligator Canal Bank - This enhancement zone occurs on the southern bank of Alligator Canal, which consists of spoil from the adjacent canal vegetated with a mixture of native and exotic plant species. One enhancement opportunity for this area includes herbicide application/removal of exotic species (Brazilian pepper, air potato, torpedograss, paragrass) followed by the installation of native species through seed or plantings in the treated areas. A second enhancement opportunity is to remove, re-grade, or provide additional breach points in the canal bank to allow water from the adjacent canal to overflow into the wetlands on the site during high water periods. Maintenance activities targeting the removal of exotic invasive species should be a priority for 2009 to limit the potential for the canal bank exotic populations to serve as seed sources into the rest of the site. As funding becomes available, re-vegetation of the maintained slopes should be evaluated to limit future growth of exotic species and enhance the diversity of the bank area. Grading of the canal bank could be a long-term enhancement opportunity (next 5 to 20 years as funding is available) that could be conducted as part of future canal maintenance or enhancement efforts.

- Area #2 – Scrub Excavation Restoration – This zone consists of the small excavated area (to a depth of 10 to 15 feet) within Management Unit #2. The majority of this area consists of open white sand, although the bottom of the excavated area appears to be at least seasonally inundated and is vegetated with ruderal wet prairie species. Although restoration of the area could include re-filling the excavated area followed by planting or natural re-vegetation by scrub species, the existing condition does provide some habitat diversity for the area. Enhancement activities that could be pursued include planting of scrub species on the sand slope of the excavated area and planting of additional wet prairie species within the seasonally inundated area. However, natural seeding from adjacent areas will likely re-vegetate the slope in the long-term timeframe. Enhancement or restoration of this area should not be prioritized over other enhancement efforts.

- Area #3 – Pasture Restoration – The southwest corner of Management Unit #2 includes a remnant of open pasture fields and disturbed sand pine scrub that could be enhanced with native plantings or seeding. This pasture area consists of ruderal species along with trash and debris that has accumulated over the years near the corner of Old Melbourne Highway and US 192. A priority activity for 2009 should include the removal of trash and debris from the area. This area may re-vegetate naturally with scrub species due to the small size of the disturbed area and adjacency to managed sand pine scrub. However, even with natural seeding into the area, bahiagrass and other less desirable species may be retained

for many years. Thus, a secondary enhancement opportunity consists of the removal of bahiagrass through herbicide application or other means followed by native seeding or planting within the pasture and disturbed areas. Because this area is near the main entrance to the park, it would be beneficial to implement the enhancement within the next 2 to 5 years, if funding becomes available.

- Area #4 – Scrub Horse Pasture Use – The portion of sand pine scrub adjacent to and north of the southern caretaker residence has been fenced and used for horse pasture. As part of this use, a number of the canopy sand pine trees were removed and the understory was cleared to open sand, in many areas. A few canopy sand pines were retained likely to provide shade for the horses, although some have begun to die following the understory clearing. Although the open sand conditions can be beneficial for some scrub species like the nodding pinweed, management activities needed to maintain the open range for horses likely will limit shrub and canopy growth and the density of herbaceous vegetation within this area. To maintain compatibility with the conservation uses on other portions of the LLCA, the use of this area as a horse pasture should be phased out in the next 1 to 2 years. Following the removal of the horses, fencing not required for internal LLCA boundary control should be removed to minimize potential affects on wildlife movement in the area and the area should be allowed to re-vegetate naturally.

- Area #5 – Drainage Ditch Hydrological Enhancement – A relatively large drainage ditch occurs in the central portion of the site that conveys water between the Lake Lizzie Prairie and a series of ditches associated with the residential development to the south. This ditch likely affects the hydrology of the adjacent flatwoods as well as potentially affecting drainage patterns of the Prairie. Several nuisance or exotic species, such as cattail, primrose willow, and creeping oxeye have been observed within the canal or adjacent wetlands, while bahiagrass and other ruderal species dominate the ditch bank.

  Enhancement opportunities include herbicide/physical removal and long-term maintenance of nuisance and exotic species in the canal, the canal bank, and the adjacent wetlands, planting or seeding of native species along the canal bank, and/or filling, plugging, or conversion to a piped section of the ditch segment. Herbicide or physical removal of the nuisance and exotic species within this area should be a priority to begin in 2009. Enhancement of the canal bank by native seeding or plantings would be beneficial to stabilize the area following the removal of bahiagrass and other ruderal species, but could be done over the next 2 to 5 years as funding becomes available. The feasibility of filling the ditch segment or converting it to a piped segment will require extensive engineering review to determine potential affects of this filling on the adjacent neighborhoods. If feasible, this would be a potential long-term project within the LLCA (greater than 5 years until initiation).

- Area #6 – Lake Bay Marsh/Wet Prairie Restoration – Based on the 1963 and 1968 aerial photography of the site (**Figures 3A** and **3B**), the wetland adjacent to Bay Lake historically had an open wet prairie and/or marsh fringe (see **Figure 11**). As fire frequency and season was modified prior to County purchase, these marshes and wet prairies became overgrown with canopy trees such as slash pine and loblolly bay. Historically, fires within the longleaf pine flatwoods to the north would have burned into the margins of these prairies, likely limiting potential canopy growth and maintaining the open herbaceous conditions shown on the historical aerial photographs.

If funding is available, the enhancement opportunity for this area would consist of mechanical canopy removal or thinning followed by prescribed fire in the wetland and/or adjacent uplands. This enhancement may occur naturally without mechanical clearing after several to many prescribed fires from the adjacent flatwoods are allowed to burn into the wetland margin. The mechanical clearing would enhance the rate at which the wet prairie/marsh would be restored to the area.

- Area #7 – Field Road Hydrological Enhancement – Field roads servicing the powerline or internal site access exhibit three segments with significant stretches within wetlands, including a long segment along the southern margin of the Lake Lizzie Prairie (Segment 7A), a crossing of the Prairie (Segment 7B), and a crossing of the wetland prairie adjacent to Trout Lake in the northern portion of the site (Segment 7C). These field roads consist of fill material likely excavated from the ditches adjacent to the road and/or other fill material from the region and are generally raised in elevation above the wetlands through which they pass. Several culverts occur along the length of these roads, although many of the culverts are in various states of disrepair and require maintenance to improve hydrological flow. Secondarily, the ditches adjacent to these roads often exhibit nuisance and/or exotic species, such as cattail and primrose willow. Segment 7A likely affects drainage patterns between the flatwoods to the south and Lake Lizzie Prairie to the north, while the other two segments affect water movement within each of the wetlands crossed by those segments.

  Enhancement opportunities include repair of existing culverts, installation of new culverts, removal of segments of the roads, and/or exotic and nuisance species removal. The repair of existing culverts should be a priority in 2009 to maintain the base hydrological connections under each road segment. Over the next 2 to 5 years, the installation of additional culverts or conversion of all or portions of the road sections to pervious sections should be evaluated to improve hydrological connections within these wetlands. Application of herbicide or physical removal of nuisance/exotic species in the area adjacent to these roads should be a priority in 2009 with continual maintenance thereafter.

- Area #8 – Ditch Removal/Plug – A shallow ditch occurs within this area that drains from a seasonally inundated, seepage wetland area into the Lake Lizzie Prairie. This ditch likely affects duration and, potentially, water elevation of the small wetland at its head during periods of high water. A series of ditch plugs along the length of this ditch or filling of the entire length of the ditch would help to restore drainage patterns in this portion of the site.

- Area #9 – Herbaceous Layer and Canopy Enhancement - This area occurs within altered upland and wetland systems within Management Unit #7. Much of this area exhibits little to no canopy, which appears to have been affected by historical land uses and/or storms (hurricanes of 2004). The southeastern portion of this area is an open canopy of mixed hardwoods and pines, but exhibits minimal herbaceous vegetation.

  Enhancement opportunities for this area consist of canopy plantings and herbaceous seeding or planting. Plantings of bare root or liner longleaf pines (in xeric and mesic portions) and slash pine (in hydric portions) would enhance the regeneration of the canopy for this area and should be planted at a density sufficient to obtain an open canopy density similar to other pine flatwoods on the site. Native seeding of desirable native grasses and forbs or liner plantings of wiregrass and other fire-carrying species would enhance the herbaceous layer in those areas with little to no herbaceous diversity or cover. These

plantings would serve to speed up the timeframe in which the canopy and herbaceous layer regenerates, although both of these layers could regenerate naturally over a long (20+ years) period of time. These planting efforts would be a useful enhancement tool over the next 2 to 10 years for the LLCA.

- Area #10 (A and B) – Herbaceous Layer Enhancement – This area occurs within altered upland and wetland systems within Management Unit #9. The relatively dense canopy of slash pine occurring within the area exhibits few mature canopy trees, but significant numbers of younger trees that have grown since the land was disturbed. However, little herbaceous vegetation occurs within the area, which could affect the frequency and intensity of fires applied to the area. Secondly, a large pile of fill material occurs in the southern portion of 10B.

  Enhancement opportunities for this area include the re-introduction of native herbaceous species through planting or seeding and removal and re-vegetation of the fill pile. Prescribed fire within this area likely will gradually reduce the density of the canopy and allow herbaceous species to begin to regenerate naturally. However, the majority of this area is not adjacent to native stands of herbaceous species, which could limit seedfall and natural regeneration rates. Native seeding of desirable native grasses and forbs or liner plantings of wiregrass and other fire-carrying species would enhance the herbaceous layer in this area. These plantings would serve to speed up the timeframe in which the herbaceous layer regenerates. The fill material from the spoil mound should be removed from the site followed by plantings of longleaf pine seedlings (bare root or liner) and plantings or seeding of native herbaceous species. The removal of the fill pile would be beneficial within 1 to 3 years, while the re-establishment of herbaceous vegetation in the remainder of the zone could be conducted over the next 2 to 10+ years as funding becomes available.

- Area #11 – Canopy and Herbaceous Layer Enhancement – This area occurs within altered upland and wetland systems within Management Unit #7. The western third of this area exhibits herbaceous and shrub layers with little to no canopy, while the remainder exhibits dense canopies of slash pine (middle third) or longleaf pine/oak (eastern third). The relatively dense canopy of slash pine occurring within the area exhibits few mature canopy trees, but significant numbers of younger trees that have grown since the land was disturbed. The area dominated by longleaf and oak species exhibits large specimens of both trees as well as regeneration of slash pine within the area. Little herbaceous vegetation occurs within the densely canopied portions of this enhancement area, which could affect the frequency and intensity of fires applied to the area.

  Enhancement opportunities for this area include planting of longleaf pine within the western third of this area and the re-introduction of native herbaceous species through planting or seeding in the remainder of the area. Plantings of bare root or liner longleaf pines would enhance the regeneration of the canopy for this area and should be planted at a density sufficient to obtain and open canopy density similar to other xeric pine flatwoods on the site. Prescribed fire within canopied portions of this enhancement area likely will gradually reduce the density of the canopy and allow herbaceous species to begin to regenerate naturally. Native seeding of desirable native grasses and forbs or liner plantings of wiregrass and other fire-carrying species would enhance rate of recovery and, potentially, the ultimate diversity of the herbaceous layer. The re-establishment of canopy

plantings and herbaceous vegetation in this zone could be conducted over the next 2 to 10+ years as funding becomes available.

As an additional management action, a cattle dipping vat also occurs just north of the east-west road on the north section of the property. Soils in this area should be tested, and this area should be remediated. If the remediation requires removal of soil, fill piles in other portions of the site could be used to fill any excavated area. This should be remediated at the time trails or other public uses are anticipated to occur on or adjacent to the dipping vat location.

- Area #12 – Flatwoods Restoration – Based on the 1963 historical aerial (**Figure 3A**), the island in the northeastern portion of the site was cleared more than 40 years ago. Dense, young slash pine stands along with scattered oak trees occur throughout this area, but the herbaceous layer is sparely vegetated. A large spoil mound occurs in the northwest corner of this enhancement area, while a small excavated pond occurs in the southeast corner. This area likely consisted of a mosaic of longleaf pine and slash pine dominated flatwoods prior to the clearing activity.

  Enhancement opportunities for this area include canopy and herbaceous flatwoods restoration within the majority of the area, removal of the fill pile, and filling of the excavated pond. The existing slash pine stands require thinning by mechanical or prescribed fire to open up the canopy. Following this thinning, plantings of bare root or liner longleaf pines would enhance the diversity of the ultimate canopy for this area. Native seeding of desirable native grasses and forbs or liner plantings of wiregrass and other fire-carrying species concurrent with the longleaf pine planting would enhance rate of recovery and, potentially, the ultimate diversity of the herbaceous layer. The fill material from the spoil mound should be removed from the site followed by plantings of longleaf pine seedlings (bare root or liner) and plantings or seeding of native herbaceous species. Similarly, the excavated pond could be filled in with some of the material from the spoil mound and then planted with slash pine seedlings and plantings or seed of native herbaceous species. The removal of the fill pile and filling of the excavated pond would be beneficial within 1 to 3 years, while the re-establishment of herbaceous vegetation in the remainder of the zone could be conducted over the next 2 to 10+ years as funding becomes available.

3.5 Exotic Species

Site visits in April 2008 included an initial assessment of existing populations of exotic invasive species, including both wildlife and plant species, within the LLCA. The invasive wildlife species, feral hogs, was observed throughout the project site. Similarly, invasive exotic plant species were observed in scattered locations throughout the site, although typically in low densities. A brief description of invasive exotic species observed on the site occurs as follows:

Feral Hogs

Hog damage from rooting behavior is extensive in many areas of the project site, especially in hydric areas such as wet prairies and wet flatwoods. The locations noted on **Figure 12** for hogs are a sampling of the areas in which hog damage was observed, although many of the wetlands on the site exhibited some degree of damage from hogs. Hogs are a significant modifier of habitats in the Southeast, causing millions of dollars worth of damage annually. Known to not only cause damage to wetlands as observed on the site, these species can also drastically diminish the success of

longleaf pine regeneration and/or plantings due to their rooting behavior. Consistent and regular trapping on the property is recommended.

Invasive Exotic Plant Species

The Florida Exotic Plant Pest Council (FLEPPC) defines two categories of invasive exotic species. Category 1 exotic species are those non-native plant species that alter native plant communities by displacing native species, changing community structures or ecological functions, or hybridizing with natives, while Category 2 species are non-native plant species that have increased in abundance while not displacing native species. These definitions rely entirely on documented ecological damage and not on the economic severity or geographic range of the problem. However, the FLEPPC categories do give guidance on species that should be given priority in exotic species management on the site. A copy of the FLEPPC list of Category 1 and 2 species is included as **Attachment D**.

The locations of exotic species observed during these site visits were recorded on maps by hand and, when feasible, with GPS. All exotic species observed on the site have been noted on **Tables 2** and **3**, while the locations of Category 1 or 2 exotic species or nuisance species such as cattails are noted on **Figure 12**. A total of 13 Category (Cat) 1 and 2 exotic plant species was observed on the site during the site visits, including:

- Air potato (Cat 1)
- Brazilian pepper (Cat 1)
- Camphor tree (Cat 1)
- Chinese tallow (Cat 1)
- Cogongrass (Cat 1)
- Creeping oxeye (Cat 2)
- Downy rose myrtle (Cat 1)
- Lantana (Cat 1)
- Natalgrass (Cat 1)
- Old world climbing fern (Cat 1)
- Primrose willow (Cat 1)
- Torpedograss (Cat 1)
- Tropical soda apple (Cat 1)

Although these species were spread around a number of locations around the site, populations were generally small with a couple of notable exceptions. The bank of Alligator Canal was infested with a variety of invasive exotics, including Brazilian pepper and air potato. The upland area in the northern portion of the site with Chinese tallow also exhibited extensive numbers of this exotic species. The downy rose myrtle in the western portion of the site occurs through much of Management Unit #9, although in relatively low densities. Lastly, torpedograss occurs throughout the margins of Lake Lizzie, where it is growing among the native herbaceous littoral zone species. While the numbers of exotics are low relative to the size of the site, careful and consistent planning, surveys, and maintenance events are necessary to prevent continued infestation.

Control is most successful on a phased basis, and priority should be given to the most aggressive species in the most sensitive areas. Initial management efforts should focus on the reduction of Category 1 and 2 invasive exotic plant species. Once these have been effectively controlled on the site, other non-native plant species (noted on **Table 2**) can become of the focus of additional management efforts. Typically, control of invasive exotic plant species consists of herbicide application, physical removal of the plants, or a combination of the two. Licensed applicators of herbicides familiar with the invasive exotic plant species occurring on the site should be used to control these exotic species to minimize the potential for native species reductions caused by misidentification of an exotic species and/or inaccurate application of herbicide.

3.6 Monitoring

Monitoring land management activities allows the opportunity to evaluate management methods, adaptively change approach, determine success of restoration actions, and evaluate the responses of plants and wildlife from habitat modifications. Monitoring can be expensive, time intensive, and all too frequently planned, but not implemented. Monitoring is probably most effective when there are options that allow quick, cost effective strategies that are implemented frequently, and more detailed options that can be implemented when time and budget allow. Specific monitoring approaches at Lake Lizzie will be determined when long-term management and monitoring budgets can be better defined. Options that are potentially available for monitoring efforts on the LLCA range from quick and qualitative methods to detailed and quantitative methods. Potential approaches to monitoring include the following:

Qualitative Monitoring Strategies
Aerial Photo-interpretation
Permanent Photo-monitoring Stations
"Walk-through" Surveys of Heavily-used Sites and Sensitive Areas
User Surveys

Quantitative Monitoring Strategies
Permanently-Designated Vegetation Monitoring Transects
Listed Species Censuses
Repeatable Non-Listed Wildlife Censuses
Water Quality Sampling

Monitoring plans should include both baseline and long-term monitoring efforts. Baseline monitoring, under any scenario, is important to track and verify the effects of management on the site. Although detailed quantitative baseline monitoring is very helpful, even qualitative strategies such as photo-monitoring stations can be useful to document conditions prior to management actions. A baseline monitoring plan should be developed for areas prior to implementing prescribed fire, exotic species control, or ecological restoration. Long-term monitoring plans should be developed during planning for or immediately following the implementation of prescribed fire, exotic species control, or ecological restoration. These long-term plans should include the monitoring strategies mentioned above, and define timeframes (after burns, before burns, every 1, 3, 5 years, after restoration occurs, etc.) in which the monitoring efforts could be repeated. Some monitoring approaches, such as non-listed wildlife surveys, could be coordinated with neighborhood groups or other interested non-profit entities that conduct regular field trips.

3.7 Recreation and Access Management

Recreation and access management are significant aspects of natural resource management activities for the LLCA. While access to the LLCA is encouraged, unauthorized or uncontrolled access could be detrimental to management goals and control of exotic species. The expansive trails and natural systems of the LLCA provide an excellent venue for natural-resource compatible, passive recreation activities such as hiking, fishing, bird-watching, picnicking, and equestrian use. Some authorized activities, such as horses that can serve as vectors for introducing non-native species populations, and hiking during the implementation of management activities such as fire could have potential effects on the quality of natural systems on the site or the health and safety of

the visiting public. Similarly, unauthorized access to the property by non-approved uses, such as ATVs, can lead to habitat disturbance and/or affect the experience of other users on the site.

The site currently exhibits a number of recreation and access features as depicted on **Figure 13**. Existing facilities and access to the site are provided by the paved parking area and restroom facility in the south and the unpaved parking area with a restroom in the north.. Educational signs occur at several locations across the site. An extensive trail network occurs on the field roads through the site. Additional access points consisting of gates in the fences occur along the eastern and southern boundaries, although some of these gates lead to private residential lots. Fencing occurs around much of the property boundaries, except for the western boundary adjacent to US 192 and much of the southeastern boundary. Portions of the fencing along the eastern property boundary are in disrepair due to treefall or cutting by local residents accessing the site. No gates and minimal fencing occurs within the property.

A specific Recreation and Access Management Plan (RAMP) should be developed for the property within the next 1 to 2 years, if funding is available, that would become ultimately part of this management plan. This RAMP would include:

- A description of the objectives for the RAMP at LLCA,
- Program elements for the RAMP over the short- and long-term,
- Desired, acceptable, and prohibited recreation uses on the site,
- Communication with potential users of the site, including nearby residents,
- The identification of public access locations,
- Existing and proposed trails accessible to the public,
- Sensitive landscape features that require particular access requirements (like Lake Lizzie Prairie),
- Access control during prescribed fires,
- Lakefront access and management,
- New access points (if any) along the northern and eastern boundaries,
- Locations for new or existing public use facilities (like picnic tables, restroom facilities)
- Educational and other signage locations, and
- Security methods to patrol and fix boundary fence issues, if needed.

Potential new access locations and trails have been conceptually depicted on **Figure 13**. However, these conceptual features should be reviewed as part of the RAMP preparation. Coordination with adjacent homeowners and other stakeholders should be included in the RAMP preparation.

3.8 Lakefront Management

The LLCA includes littoral shelves and/or open water for three lake systems: Lake Lizzie, Trout Lake, and Bay Lake. These lakes provide significant ecological resources and recreation opportunities for the site, although the recreation access points are currently unimproved and informal. Access to the lakes varies, but is described as follows:

- Lake Lizzie – An informal canoe launch occurs on the shoreline near the terminus of the Lake Lizzie Trail (the trail is noted on **Figure 13**). Although this launch is accessible from the northern parking area, the distance to carry a canoe from the parking area to the launch is daunting. Thus, this launch primarily serves lake-based access users. Several other landing spots were noted along the southern shore of Lake Lizzie in the live oak hammocks, although these are accessible solely from the lake itself.

- Trout Lake – A few potential pullout locations were noted along the southwestern margin of the island in the northeastern portion of the site. Similar to the informal canoe launch on Lake Lizzie, the access points to Trout Lake within the project site occur a significant distance away from the northern parking area.
- Bay Lake – The portions of Bay Lake on and adjacent to the LLCA are bordered by a densely vegetated wetland strand, which limits potential access to Bay Lake from the property. A narrow trail does go through this wetland to the lake, but likely provides limited access to the lake during the rainy season. Similarly, pullout locations along the Bay Lake shoreline for lake-based users are limited by the densely vegetated wetland strand.

As noted in **Section 3.7**, lakefront management and access control should be included as part of the RAMP. The majority of the users interacting with the lakefronts will likely be accessing the site from the lake, as opposed to hiking into the lakefront from the parking areas. This is especially true for canoe or motorized boat access. This would suggest that the ultimate lake management approach should include specific boat access locations that are formalized with signs and/or other identifying features to minimize random pullout locations that would be harder to maintain (for trash or other incompatible uses). The lakefront management approach should also address access to Lake Lizzie in the southwest corner from US 192 as a potential controlled non-motorized (canoe) access point. The new alignment for US 192 passes immediately adjacent to this hammock, thereby increasing the visibility and potential desirability to access the lake from this area. However, the area is not currently designed to allow for appropriate and safe access for users exiting US 192 and parking in the area, which would need to be evaluated carefully prior to implementation. Because of the distance from the parking areas, extensive structures such as docks or boardwalks are likely only suitable if they would provide significant access control or use from lake based access users.

4.0 Summary and Conclusions

The LLCA is comprised of a mosaic of naturally vegetated and altered upland and wetland systems that provide a diversity of habitat types and diverse wildlife and plant populations that are, in many respects, representative of Osceola County habitats as a whole. Like many properties in Osceola County, management activities such as prescribed fire, exotic and nuisance species control, and ecological restoration of altered habitats would benefit and maintain these natural systems. Monitoring of these actions is important to track changing conditions for the site, thus allowing adapting management actions to take place. Recreation and access management contribute to maintaining the quality of natural systems and the health and safety of the visiting public. The management plan above identified a number of priorities and/or action items described in detail on the attached workplan (**Attachment E**) and briefly described as follows:

- The establishment of 13 management units on the site for prescribed fire implementation. Four different frequencies of fire implementation were identified depending on the habitat type, including:
    - 10 to 50 years for sand pine scrub;
    - 5 to 10 years for sandhill oak areas;
    - 1 to 10 years for xeric pine flatwoods;
    - 1 to 5 years for the remaining systems.
- The re-introduction of fire into the flatwoods systems on the site should be carefully managed to allow the flatwoods species to re-adjust to frequent fire prior to significant growing season fire application.

- The establishment of defensible boundaries such as firebreaks around the margins of the entire property is a high priority for 2009.
- Firebreaks along ecotonal boundaries should be minimized except as needed to provide appropriate control to allow fires to burn from uplands into wetland systems.
- Smoke sensitive areas or other potential constraints for prescribed fire should be identified in 2009 and used during the development of specific burn plans.
- Neighborhood interactions and continued contacts with partners are important for the long-term success of the management plan.
- The horse pasture located north of the southern caretaker residence should be phased out of the park as an incompatible use.
- Hydrological enhancements should be evaluated over the next 2 to 5 years (or longer), but would be valuable to restore historical drainage patterns and improve the operating hydrology of the site.
- Canopy and herbaceous plantings would be beneficial in a number of locations on the site. Gradual implementation of these plantings over the next 2 to 10+ years would contribute to the speed of recovery of altered systems on the LLCA.
- Exotic species occur in various locations on the site. The establishment of an exotic species control program to herbicide and/or remove Category 1 and 2 invasive exotic species and feral hogs should be implemented in 2009.
- Monitoring plans that include both baseline and long-term monitoring actions should be developed for areas subject to prescribed fire, ecological restoration, and exotic species control prior to the implementation of these activities.
- A Recreation and Access Management Plan should be developed for the property within the next 1 to 2 years. Existing and proposed access points to the lakes on the site should be incorporated into the RAMP.

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Table 1. Plant species observed during site reviews in April 2008 at the Lake Lizzie Conservation Area, Osceola County, Florida.

Common name	Scientific name	Common name	Scientific name
air plant	*Tillandsia reticulata*	Elliot's milkpea	*Galactia elliottii*
air potato*	*Dioscorea bulbifera*	evening primrose	*Oenothera* sp.
American bluehearts	*Buchnera americana*	false goldenrod	*Euthamia minor*
bahiagrass*	*Paspalum notatum*	fetterbush	*Lyonia lucida*
beaksedge	*Rhynchospora sp.*	fireweed	*Erechtites hieraciifolia*
beautyberry	*Callicarpa americana*	flatsedge	*Cyperus* sp.
bermudagrass*	*Cynodon dactylon*	flattened pipewort	*Eriocaulon compressum*
blackberry	*Rubus* sp.	flattop goldenrod	*Euthamia caroliniana*
blackgum	*Nyssa biflora*	Florida hoarypea	*Tephrosia florida*
bloodroot	*Lachnanthes caroliana*	gallberry	*Ilex glabra*
blue maidencane	*Panicum hemitomon*	giant air plant	*Tillandsia utriculata*
blue-eyed grass	*Sisyrinchium sp.*	giant brackenfern*	*Pteris tripartita*
bluestem	*Andropogon* spp.	golden polypody	*Phlebodium aureum*
bog white violet	*Viola lanceolata*	goldenaster	*Chrysopsis spp.*
bottlebrush threeawn	*Aristida spiciformis*	hairsedge	*Bulbostylis* sp.
brackenfern	*Pteridium aquilinum*	hairy indigo*	*Indigofera hirsuta*
Brazilian pepper*	*Schinus terebinthifolius*	highbush blueberry	*Vaccinium corymbosum*
bushy bluestem	*Andropogon glomeratus*	hooded pitcher plant	*Sarracenia minor*
buttonbush	*Cephalanthus occidentalis*	lantana*	*Lantana camara*
cabbage palm	*Sabal palmetto*	largeflower rosegentian	*Sabatia grandiflora*
cactus	*Opuntia humifusa*	laurel oak	*Quercus laurifolia*
caesarweed*	*Urena lobata*	live oak	*Quercus virginiana*
camphor tree *	*Cinnamomum camphora*	loblolly bay	*Gordonia lasianthus*
camphorweed	*Pluchea sp.*	longleaf pine	*Pinus palustris*
Carolina willow	*Salix caroliniana*	lupine	*Lupines diffusus*
carpetgrass	*Axonopus sp.*	maidencane	*Panicum hemitomon*
catbrier	*Smilax* sp.	marsh pennywort	*Hydrocotyle umbellata*
cattail	*Typha latifolia*	meadowbeauty	*Rhexia mariana*
Chapman's oak	*Quercus chapmanii*	Mohr's thoroughwort	*Eupatorium mohrii*
Chinese tallow*	*Sapium sebiferum*	muscadine	*Vitis rotundifolia*
cinnamon fern	*Osmunda cinnamomea*	myrtle oak	*Quercus myrtifolia*
climbing fern*	*Lygodium microphyllum*	natalgrass*	*Rhynchelytrum repens*
cluster-leaf St.-John's-wort	*Hypericum cistifolium*	netted pawpaw	*Asimina reticulata*
coastal plain milkwort	*Polygala setacea*	nodding clubmoss	*Lycopodiella cernua*
coinwort	*Centella asiatica*	nodding indiangrass	*Sorghastrum secundum*
coreopsis	*Coreopsis* spp.	nodding pinweed	*Lechea cernua*
cottony goldenaster	*Chrysopsis gossypina*	paragrass*	*Urochloa mutica*
creeping oxeye*	*Sphagneticola trilobata*	paspalum	*Paspalum* sp.
cypress	*Taxodium* sp.	pawpaw	*Asimina sp.*
Darrow's blueberry	*Vaccinium darrowii*	pennyroyal	*Piloblephis rigida*
deerberry	*Vaccinium stamineum*	persimmon	*Diospyros virginiana*
dodder vine	*Cuscuta* sp.	pickerelweed	*Pontederia cordata*
dogfennel	*Eupatorium capillifolium*	pinebarren frostweed	*Helianthemum corymbosum*
rose myrtle*	*Rhodomyrtus tomentosa*	pink sundew	*Drosera capillaris*
duck potato	*Sagittaria latifolia*	poison ivy	*Toxicodendron radicans*
dwarf huckleberry	*Gaylussacia dumosa*	pokeweed	*Phytolacca americana*

Common name	Scientific name		Common name	Scientific name
dwarf wax myrtle	*Myrica pumila*		primrose	*Ludwigia sp.*
eastern milkpea	*Galactia regularis*		primrose willow*	*Ludwigia peruviana*
elephant's foot	*Elephantopus sp.*		queen's delight	*Stillingia sylvatica*
queen palm	*Syagrus romanzoffiana*		St. Andrew's cross	*Hypericum hypericoides*
ragweed	*Ambrosia artemisiifolia*		St. Johns wort	*Hypericum fasciculatum*
red bay	*Persea borbonia*		swamp fern	*Blechnum serrulatum*
red maple	*Acer rubrum*		swamp rosemallow	*Hibiscus grandiflorus*
resurrection fern	*Pleopeltis polypodioides*		sweet bay	*Magnolia virginiana*
rose pogonia	*Pogonia ophioglossoides*		sweet goldenrod	*Solidago odora*
rosemary	*Ceratiola ericoides*		toadflax	*Linaria floridana*
rough Mexican clover*	*Richardia scabra*		torpedograss	*Panicum repens*
rush	*Juncus marginatus*		tough bully	*Sideroxylon tenax*
rustweed	*Polypremum procumbens*		tropical soda apple	*Solanum viarum*
rusty lyonia	*Lyonia ferruginea*		turkey oak	*Quercus laevis*
sand cordgrass	*Spartina bakeri*		Virginia chain-fern	*Woodwardia virginica*
sand live oak	*Quercus geminata*		viviparous spikerush	*Eleocharis vivipara*
sand pine	*Pinus clausa*		wandering jew*	*Tradescantia zebrina*
sand spike moss	*Selaginella arenicola*		sweetbroom	*Scoparia dulcis*
sandweed	*Hypericum fasciculatum*		tall pinebarren milkwort	*Polygala cymosa*
sandyfield beaksedge	*Rhynchospora megalocarpa*		tarflower	*Bejaria racemosa*
saw palmetto	*Serenoa repens*		tenangle pipewort	*Eriocaulon decangulare*
sawgrass	*Cladium jamaicense*		warty panicum	*Panicum verrucosum*
scrub oak	*Quercus inopina*		water oak	*Quercus nigra*
shaggy hedgehyssop	*Gratiola hispida*		water sundew	*Drosera intermedia*
shiny blueberry	*Vaccinium myrsinites*		wax myrtle	*Myrica cerifera*
silk bay	*Persea humilis*		white water lily	*Nymphaea odorata*
silk leaved goldenaster	*Pityopsis graminifolia*		wild olive	*Osmanthus megacarpus*
slash pine	*Pinus elliottii*		winged sumac	*Rhus copallinum*
small fruit beggarticks	*Bidens mitis*		wiregrass	*Aristida stricta*
Spanish moss	*Tillandsia usneoides*		wireweed	*Stipulicida setacea*
spatterdock	*Nuphar luteum*		witchgrass	*Dichanthelium* sp.
sphagnum moss	*Sphagnum* spp.		yellow-eyed grass	*Xyris* sp.
spikerush	*Eleocharis* sp.			

* Species marked with an asterisk are non-native species per Wunderlin and Hansen (2003).

Table 2. Wildlife and Plant Species Listed as Threatened, Endangered, and/or Species of Special Concern That Potentially Occur on the Lake Lizzie Conservation Area Osceola County, Florida

Scientific Name	Common Name	State	USFWS	Habitat Type	Probability of Occurrence
Plants					
Andropogon arctatus	pinewood bluestem	T		1,3,4,5	High
Asclepias curtissii	Curtis' milkweed	E		1	High
Bonamia grandiflora	Florida bonamia	E	T	1	Low
Carex chapmanii	Chapman's sedge	E		8	Medium
Chionanthus pygmaeus	pygmy fringe-tree	E	E	1	Low
Clitoria fragrans	pigeon wings	E	T	1,2	Low
Conradina grandiflora	large-flowered rosemary	E		1	Low
Drosera intermedia	water sundew	T		12,16	On-site
Encyclia tampensis	Florida butterfly orchid	C		6,7,11,15,21,23	High
Epidendrum conopseum	green-fly orchid	C		7,15	High
Eriogonum floridanum	scrub-buckwheat	E	T	1,2	Low
Garberia heterophylla	garberia	T		1	Medium
Harrisella filiformis	threadroot orchid	T		15	Medium
Lechea cernua	scrub pinweed	T		1	On-site
Lilium catesbaei	pine lily	T		4,10	High
Lycopodium cernuum	nodding club-moss	C		5,7,14,16	On-site
Myrcianthes fragrans	Simpson's stopper	T		6,7	Low
Nemastylis floridana	celestial lily	E		5,12,15	Medium
Nolina brittoniana	Britton's beargrass	E	E	1,2,3	Low
Osmunda cinnamomea	cinnamon fern	C		12,14,15	On-site
Osmunda regalis	royal fern	C		12,14,15	On-site
Panicum abscissum	cut throat grass	E		5,14	Low
Pecluma ptilodon	swamp plume polypody	E		7,11,15,23	Medium
Pinguicula caerulea	blue butterwort	T		4,5,14	High
Pinguicula lutea	yellow butterwort	T		4,5,14	High
Platanthera integra	orange rein orchid	E		5,12,14	High
Platanthera nivea	snowy orchid	T		5,10,14	High
Pogonia ophioglossoides	rose pogonia	T		5,12,14	On-site
Polygala lewtonii	Lewton's polygala	E	E	1,2	Low
Polygonella myriophylla	woody wireweed	E	E	1	Low
Pteroglossaspis ecristata	non-crested eulophia	T		1,2,3	High
Rhapidophyllum hystrix	needle palm	C		6,7	Low
Sarracenia minor	hooded pitcher-plant	T		4,5,10,14	On-site
Schizachyrium niveum	scrub bluestem	E		1,2	Medium
Spiranthes laciniata	lace-lip ladies'-tresses	T		12,15	High
Spiranthes longilabris	long-lip ladies'-tresses	T		5,10	High
Sacoila lanceolata	leafless beaked orchid	T		4,5,6,17	High
Tillandsia balbisiana	inflated wildpine	T		1,6,7,8,23	Medium
Tillandsia utriculata	giant wild-pine	E		1,6,7,15,23	On-site
Warea amplexifolia	clasping warea	E	E	1,2	Low
Zamia pumila	coontie	C		1,2,3,6	Medium
Zephyranthes atamasco	atamasco lily	T		4	Low
Zephyranthes simpsonii	Simpson's zephyr-lily	T		5,10	Low
Amphibian					
Rana capito	gopher frog	SSC		4,6,9	High

Table 2. Wildlife and Plant Species Listed as Threatened, Endangered, and/or Species of Special Concern That Potentially Occur on the Lake Lizzie Conservation Area Osceola County, Florida

Scientific Name	Common Name	State	USFWS	Habitat Type	Probability of Occurrence
		Bird			
Ammodramus savannarum floridanus	Florida grasshopper sparrow	E	E	9,17	Low
Aphelocoma coerulescens	Florida scrub jay	T	T	1	On-site
Aramus guarauna	limpkin	SSC		7,9,10,11	High
Dendroica kirtlandii	Kirtland's warbler	E	E	2,18	Very Low
Egretta caerulea	little blue heron	SSC		7,9,10,11,12,13,14,15,16,17,21	High
Egretta thula	snowy egret	SSC		7,9,10,11,12,13,14,15,16,17,21	High
Egretta tricolor	tricolored heron	SSC		7,9,10,11,12,13,14,15,16,17,21	High
Eudocimus albus	white ibis	SSC		7,9,10,11,12,13,16,20	High
Falco peregrinus sspp.	peregrine falcon	E		6,9,10,12,15,16,17,18	Medium
Falco sparverius paulus	southeastern American kestrel	T		2,3,4,5,10,12,17	High
Grus americana	whooping crane	SSC	T(E/P)	9,10,12,14,16,17	Very Low
Grus canadensis pratensis	Florida sandhill crane	T		9,10,12,14,16,17	On-site
Haliaeetus leucocephalus	bald eagle	T	T	2,3,4,5,10,11,12,13,15,16,17,21	On-site
Mycteria americana	wood stork	E	E	7,9,10,11,12,13,14,15,17,21	On-site
Polyborus plancus audubonii	Audubon's crested caracara	T	T	3,4,6,7,9,10,12	Low
Rostrhamus sociabilis plumbeus	snail kite	E	E	10,11,12,15,16	Low
Speotyto cunicularia	burrowing owl	SSC		2,9,17	Medium
		Mammal			
Blarina carolinensis shermani	Sherman's short-tailed shrew	SSC		4,5,6,7,10	Medium
Felis concolor coryi	Florida panther	E	E		Very Low
Podomys floridanus	Florida mouse	SSC		1,2,3	High
Sciurus niger shermani	Sherman's fox squirrel	SSC		2,3,4,5,6,7	On-site
Ursus americanus floridanus	Florida black bear	T	CA	1,2,3,4,5,6,7,11,15	Low
		Reptile			
Alligator mississippiensis	American alligator	SSC	T(S/A)	11,12,15,16,17	High
Drymarchon corais couperi	eastern indigo snake	T	T	1,2,3,4,5,12,13	High
Eumeces egregius lividus	bluetail mole skink	T	T	1,2,3	Low
Gopherus polyphemus	gopher tortoise	SSC		1,2,3,4,6	On-site
Neoseps reynoldsi	sand skink	T	T	1,2,3	Low
Pituophis melanoleucus mugitus	Florida pine snake	SSC		2,3,6,17	High

SSC - Species of Special Concern (FGFWFC)
C - Commercially Exploited
T - Threatened
E - Endangered

T(S/A) - Similarity of Appearance (USFWS)
CA - Candidate for Listing
T(E/P) - Experimental Population

***Habitat Types**

1 - Scrub
2 - Sandhills
3 - Scrubby Flatwoods
4 - Mesic Flatwoods
5 - Wet Flatwoods
6 - Dry Hammocks
7 - Wet Hammocks
8 - Calcerous Hammocks
9 - Dry Prairie
10 - Wet Prairie
11 - Bottomland Hardwood
12 - Freshwater Marsh
13 - Saltwater Marsh
14 - Seepage Bog
15 - Swamp/Cypress Dome
16 - Ponds/Lakes
17- Disturbed/Cultivated
18 - Sand Dunes/Beach
19 - Pinelands
20 - Banks of Streams
21 - Mangroves
22 - Shell middens
23 - Epiphyte
24 - Limestone Sink Edges

Source: Wunderlin, R. 1998. Guide to the Vascular Plants of Florida. Univ. P of Florida
Various authors. Endangered Biota of Florida series. 1992-1996
Envirotools - Tess 2.0 - version 2000. *Glatting Jackson Kercher Anglin Lopez Rinehart, Inc.*

Table 3. Wildlife species observed during site reviews conducted in April 2008 at Lake Lizzie Conservation Area, Osceola County, Florida.

Common name	Scientific name		Common name	Scientific name
Birds			Swallow-tailed kite	*Elanoides forficatus*
American crow	*Corvus brachyrhynchos*		Tree swallow	*Tachycineta bicolor*
Anhinga	*Anhinga anhinga*		Tufted titmouse	*Parus bicolor*
Bald eagle	*Haliaeetus leucocephalus*		Turkey vulture	*Cathartes aura*
Black-and-white warbler	*Mniotilta varia*		White-eyed vireo	*Vireo griseus*
Blue Jay	*Cyanocitta cristata*		Wild turkey	*Meleagris gallopavo*
Blue-gray gnatcatcher	*Polioptila caerulea*		Wood stork	*Mycteria americana*
Brown thrasher	*Toxostoma rufum*			
Brown-headed Nuthatch	*Sitta pusilla*		***Reptiles***	
Carolina chickadee	*Parus carolinensis*		Alligator	*Alligator mississippiensis*
Carolina wren	*Thryothorus ludovicianus*		Black racer	*Coluber constrictor priapus*
Cedar waxwing	*Bombycilla cedrorum*		Cricket frog	*Acris gryllus dorsalis*
Common grackle	*Quiscalus quiscula*		Gopher tortoise	*Gopherus polyphemus*
Common ground dove	*Columbina passerina*		Pig frog	*Rana grylio*
Common yellowthroat	*Geothlypis trichas*		Scrub lizard	*Sceloporus woodi*
Downy woodpecker	*Picoides pubescens*			
Eastern bluebird	*Sialia sialis*		***Mammals***	
Eastern phoebe	*Sayornis phoebe*		Bobcat	*Lynx rufus*
Eastern towhee	*Pipilo erythrophthalmus*		Raccoon	*Procyon lotor*
Fish crow	*Corvus ossifragus*		Sherman's fox squirrel	*Sciurus niger shermani*
Florida scrub-jay	*Aphelocoma coerulescens*		White-tailed deer	*Odocoileus virginianus*
Gray catbird	*Dumetella carolinensis*		Wild hog*	*Sus scrofa*
Great egret	*Ardea albus*			
Great-blue heron	*Ardea herodias*			
Great-crested flycatcher	*Myiarchus crinitus*			
Killdeer	*Charadruis vociferous*			
Mourning dove	*Zenaida macroura*			
Northern bobwhite	*Colinus virginianus*			
Northern cardinal	*Cardinalis cardinalis*			
Northern flicker	*Colaptes auratus*			
Northern mockingbird	*Mimus polyglottos*			
Northern parula	*Parula americana*			
Osprey	*Pandion haliaetus*			
Pileated woodpecker	*Dryocopus pileatus*			
Pine warbler	*Dendroica pinus*			
Red-bellied woodpecker	*Melanerpes carolinus*			
Red-headed woodpecker	*Melanerpes erythrocephalus*			
Red-shouldered hawk	*Buteo lineatus*			
Red-tailed hawk	*Buteo jamaicensis*			
Red-winged blackbird	*Agelaius phoeniceus*			
Sandhill crane	*Grus canadensis pratensis*			
Short-tailed hawk	*Buteo brachyurus*			

*Non-native species.

CULTURAL RESOURCE ASSESSMENT SURVEY FOR THE LAKE LIZZIE CONSERVATION AREA, OSCEOLA COUNTY, FLORIDA

Performed for:

Osceola County Parks Department
366 North Beaumont Ave.
Kissimmee, Florida 34741

Performed by:

Archaeological Consultants, Inc.
8110 Blaikie Court, Suite A
Sarasota, Florida 34240

Marion Almy - Project Manager
Elizabeth A. Horvath - Project Archaeologist
Justin Winkler - Archaeologist
Patricia Slovinac - Architectural Historian

August 2008

EXECUTIVE SUMMARY

A cultural resource assessment survey of the Lake Lizzie Conservation Area was performed by Archaeological Consultants, Inc. (ACI) in May and June 2008. The purpose of this investigation was to: locate and identify any cultural resources within the project area; assess their significance in terms of eligibility for listing in the National Register of Historic Places (NRHP); and make recommendations for preservation and/or interpretation at the Lake Lizzie Conservation Area. The 1000-acre parcel is planned for recreational development. This cultural resource assessment survey was required as part of the Florida Communities Trust Florida Forever Program (FCT# 95-011-P56).

This survey and resulting report meet the requirements set forth in Chapters 267 and 253, *Florida Statutes (F.S.)*, and implementing state regulations regarding possible impact to significant historic properties. All work was carried out in conformity with the specifications set forth in Chapter 1A-46, *Florida Administrative Code*.

Findings

Archaeological: Background research, which included a review of the Florida Master Site File (FMSF) and the NRHP, indicated that six archaeological sites are located within two miles of the project area. A review of relevant site location information for environmentally similar areas within Osceola County and the surrounding region indicated a moderate probability for the occurrence of aboriginal archaeological materials given the previously recorded sites near the Lake Lizzie Conservation Area. The background research also indicated that sites, if present, would most likely be small lithic or artifact scatters. As a result of extensive field survey, ACI found no archaeological sites and could not confirm local lore, which according to Robert Mindick (2008) places a "mound" in the northeast portion of Section 1, northeast of Trout Lake.

Historical/Architectural: Background research revealed an absence of previously recorded historic structures within the project area. However, a previously recorded resource, the Alligator Canal (8OS1900), which connects Alligator Lake with Lake Lizzie, is located near the western project boundary. Also, a small portion of the Old Melbourne Road can be documented along the southern boundary of the Conservation Area, and has been recorded as a linear resource group (8OS2564) as part of this report.

Conclusions

The Lake Lizzie Conservation Area offers an excellent opportunity for public interpretation of the region's unique environment and history.

The aboriginal and historic data presented in this report indicate that the lakes, creek, wetlands, and surrounding uplands have provided sustenance and settlement

opportunities to human populations for over 6000 years. The numerous archaeological sites recorded in the area most likely served as small, seasonal camps where gatherers collected plants or aquatic resources and hunters fashioned and sharpened stone spear points thousands of years ago. The presence of aboriginal ceramics at sites in the vicinity indicate that cooking and storage activities were carried out along lake shores. Later Native Americans used the lands around the lakes as a stronghold during the Second Seminole War. The Seminoles tended their cattle and retreated into the cypress swamps as U.S. soldiers advanced. In fact, Tohopekaliga, located a few miles to the northwest, means "Fort Site," and the lake's islands reportedly hid the forts and stockades of the Seminoles.

According to federal survey records, more than 100 years ago the natural environment of the survey parcel was comprised of marshes, swamps, and 3rd rate pine. However, by the late 19th century, the natural lake environment was dramatically altered by canals and drainage projects resulting from the Disston Purchase and ensuing "improvements" which created, among other things, the Kissimmee Chain of Lakes, and thousands of acres of rich mucky land for growing and processing sugarcane. Many of the prairies were converted into cattle farms. Almost all of the project area was initially purchased by Disston or his various companies and later sold to the Olive Branch group of the Shakers. These folks raised pineapples, citrus, and vegetables for their own use as well as sale to the local markets. Fishing was also an important 19th century economic activity. Later the settlers turned to cattle raising and the timber industry, like the Seminoles before them.

The Kissimmee Chain of Lakes, which includes Lake Lizzie and Trout Lake, has become world renown for its excellent fishing, and since the turn of the century, fish camps have been established along the shores of the lakes and along the creeks that feed the lakes. Long before Florida became a State, the aboriginal populations made use of these same water resources for their own fishing exploits.

Citrus also became an important industry in the early 1900s as a result of the construction of the railroad which allowed for rapid shipment of the produce to northern markets. Because the lands which today comprise the Lake Lizzie Conservation Area were once a working farm in the early part of the 20th century there is an intimate relationship with the cattle and citrus industry which can be interpreted on site.

In summary, using the data in this report and other available documents, over 6000 years of human interaction, ranging from sustenance to sport, with the natural environment can be interpreted on the Lake Lizzie Conservation Area.

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1.0 INTRODUCTION

1.1 Project Description

This project involved a Cultural Resource Assessment Survey of the 1000-acre Lake Lizzie Conservation Area in Osceola County, Florida (Figure 1.1). This property is proposed for recreational development. This survey was conducted as part of the Florida Communities Trust Florida Forever Program (FCT# 95-011-P56). All work was carried out in conformity with the standards contained in Chapter 1A-46, *Florida Administrative Code*, and complies with Chapters 267 and 253, *F. S.* and implementing state regulations regarding possible impact to significant historical properties.

1.2 Purpose

The purpose of the cultural resource assessment survey was to locate and identify any prehistoric and historic period archaeological sites and historic structures located within the project area, and to assess their significance in terms of eligibility for listing in the NRHP. The archaeological and historical/architectural surveys were conducted in May and June 2008. Field surveys were preceded by background research which identified all known cultural resources in the vicinity, and provided an informed set of expectations concerning the kinds of cultural resources which might be anticipated to occur within the project area, as well as a basis for evaluating any new sites discovered.

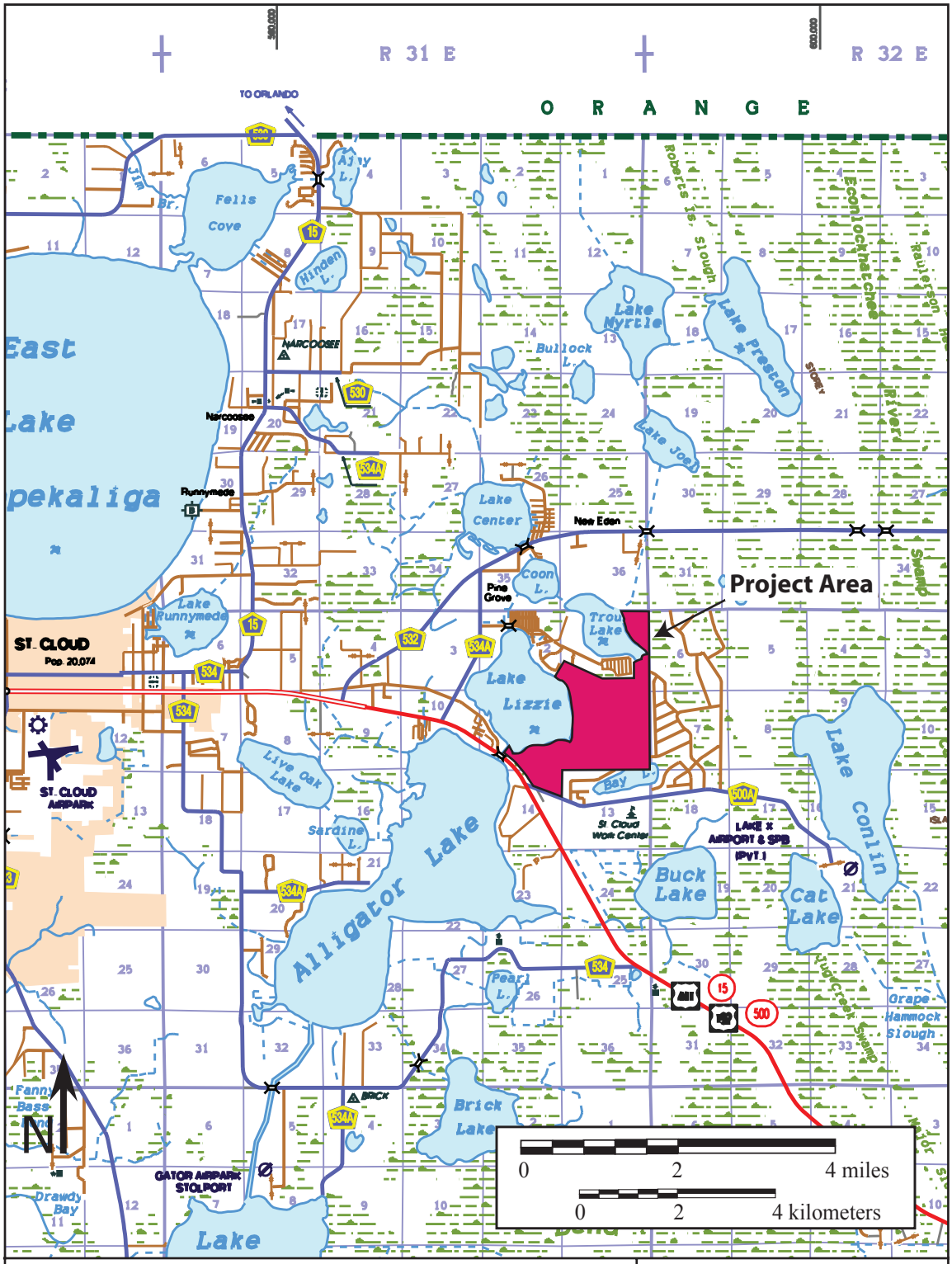


Figure 1.1. Location of the Lake Lizzie Conservation Area, Osceola County (Surveying and Mapping Office 2003).

2.0 ENVIRONMENTAL SETTING

Environmental factors such as geology, topography, relative elevation, soils, vegetation, and water resources are important in determining where prehistoric and historic period archaeological sites are likely to be located. These variables influenced what types of resources were available for utilization in a given area. This, in turn, effected decisions regarding settlement location and land-use patterns. Because of the influence of the local environmental factors upon the aboriginal inhabitants, a discussion of the effective environment is included.

The Lake Lizzie Conservation Area is located in Sections 1, 2, 11, 12, and 14, Township 26 South, Range 31 East in Osceola County, Florida (USGS Ashton, Fla. 1953, PR 1981 and Narcoossee, Fla. 1953, PR 1970) (Figure 2.1). The property is partially bounded by Alligator Canal, Lake Lizzie, Trout Lake, Bay Lake, Old Melbourne Highway, and US 192. The area consists of scrub, prairies, hammock, and pine flatwoods (Photos 2.1 and 2.2).

Photo 2.1. Hammock lands.

Physiographically, Osceola County is situated within the Coastal Lowlands physiographic division. Geomorphic features associated with this province include the Eastern Valley, the Wekiva Plain, and the Osceola Plain. The project area is located within the Osceola Plain which is a broad, relatively flat area bounded by the Mount Dora, Orlando, and Lake Wales Ridges to the west and the Eastern Valley to the east (White 1970). The Lake Lizzie Conservation Area is nearly level, with an elevation of roughly 18-24 m (60-80 ft) above mean sea level (AMSL).

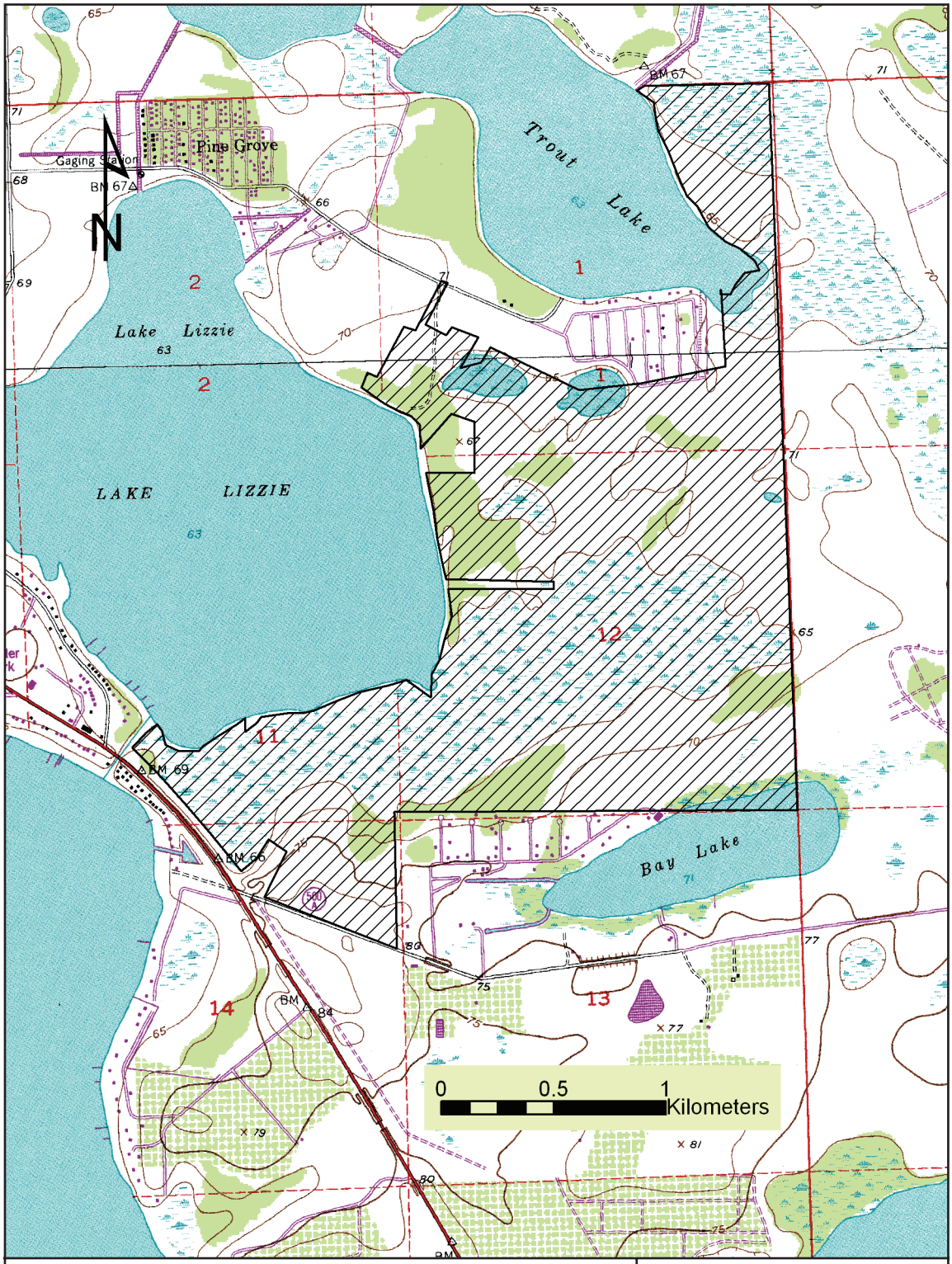


Figure 2.1. Environmental setting of the Lake Lizzie Conservation Area, Sections 1, 2, 11, 12, and 14, Township 26 South, Range 31 East (USGS Ashton, Fla. 1953, PR 1981 Narcoosee, Fla.).

Photo 2.2. Prairie and pine flats.

The project area is characterized by three soil associations: Immokalee-Pomello-Myakka, Myakka-Tavares-Immokalee, and Hontoon-Samsula (USDA 1979). The first two soil associations are characterized by nearly level to gently sloping, moderately well drained and poorly drained soils of the low ridges, knolls, and flatwoods. The Hontoon-Samsula soil association is characterized as nearly level, very poorly drained organic soils associated with swamps, marshes, and very wet areas, generally subject to flooding or ponding. Specifically, the tract is underlain by Basinger fine sand, Hontoon muck, Immokalee fine sand, Myakka fine sand, Placid fine sand, depressional, Pomello fine sand, 0-5% slopes, Samsula muck, and St, Lucie fine sand, 0-5% slopes (USDA 2006).

Basinger fine sand is a nearly level, poorly drained soil situated in low, broad flats and sloughs in the flatwoods. The natural vegetation consists mainly of grasses with scattered longleaf pine, sawpalmetto, and waxmyrtle. Immokalee, Myakka, and Smyrna fine sands are poorly drained soils of the flatwoods. The native vegetation consists of longleaf pine and slash pine with an understory of sawpalmetto, inkberry, creeping bluestem, chalky bluestem, lopsided indiangrass, pineland threeawn, switchgrass, fetterbush, running oak, and a variety of grasses and panicums. Pomello fine sand, 0-5% slopes, is a moderately well drained soil that occurs in areas transitional between the high sand ridges and the flatwoods and on slight knolls and low ridges in the flatwoods. The natural vegetation consists of scattered sand pine, longleaf pine, and slash pine. Occasionally there are dense thickets of sand live oak. The understory includes sawpalmetto, pineland threeawn, creeping bluestem, lopsided indiangrass, and low panicums. Running oak is common. St. Lucie fine sand, 0-5% slopes, is an excessively drained soil located on discontinuous ridges in the sandy uplands and flatwoods. The vegetative regime consists of dense stands of sand pine with a dense understory of myrtle

oak, Chapman oak, running oak, sand live oak, sawpalmetto, and rosemary. Pricklypear cactus, deermoss, and lichens are common.

The other three soil types are very poorly drained and are located along the lake margins and under the wet prairies. Placid fine sand supports maidencane, sand cordgrass, pickerelweed, giant cutgrass, waxmyrtle, sedges, and rushes with a scattering of cypress, bay, tupelo, and cabbage palm. The natural vegetation associated with Hontoon and Samsula muck consists mostly of sawgrass, maidencane, cattails, giant cutgrass, arrowheads, and a variety of sedges. In some areas, thick stands of willow elderberry, and buttonbush are present while other locales have mixed stands of cypress, red maple, loblolly bay, black tupelo, and sweetgum trees with an understory of greenbriers and ferns.

Paleoenvironment: The early environment of the region was different from that seen today. Sea levels were lower, the climate was arid, and fresh water was scarce. An understanding of human ecology during the earliest periods of human occupation in Florida cannot be based on observations of the modern environment because of changes in water availability, botanical communities, and faunal resources. Aboriginal inhabitants would have developed cultural adaptations in response to the environmental changes taking place which were then reflected in settlement patterns, site types, artifact forms, and subsistence economies.

Due to the arid conditions 16,500 to 12,500 years ago, potable water resources were scarce (Dunbar 1981:95). Palynological studies conducted in Florida and Georgia suggest that between 13,000 and 5,000 years ago, this area was covered with an upland vegetation community of scrub oak and prairie (Watts 1969, 1971, 1975). By 5000 years ago, a climatic event marking a brief return to Pleistocene climatic conditions induced a change toward more open vegetation. Southern pine forests replaced the oak savannahs. Extensive marshes and swamps developed along the coasts and subtropical hardwood forests became established along the southern tip of Florida (Delcourt and Delcourt 1981). Northern Florida saw an increase in oak species, grasses, and sedges (Carbone 1983). At Lake Annie, in south central Florida, pollen cores were dominated by wax myrtle and pine. The assemblage suggests that by this time, a forest dominated by longleaf pine along with cypress swamps and bayheads existed in the area (Watts 1971, 1975). By about 3500 B.C.E (Before Common Era), surface water was plentiful in karst terrains and the level of the Floridan aquifer rose to 1.5 m (5 ft) above present levels. After this time, modern floral, climatic, and environmental conditions began to be established.

3.0 CULTURE HISTORY

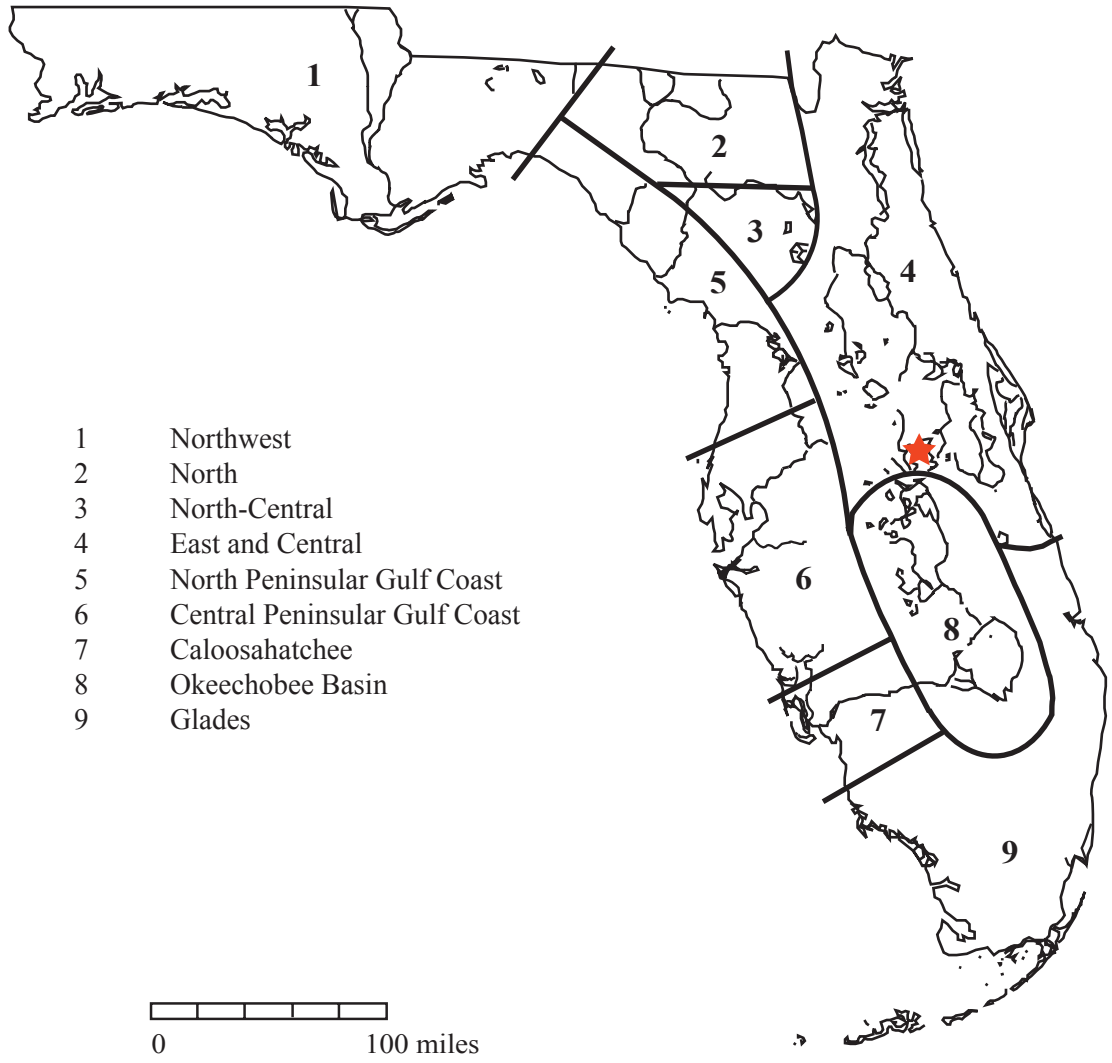
A discussion of the culture history of a given area is included in cultural resource assessment reports to provide a framework within which the local archaeological and historical records can be examined. Archaeological sites (aboriginal as well as historic) are not individual entities, but rather are part of once dynamic cultural systems. As a result, individual sites cannot be adequately examined or interpreted without reference to other resources in the area.

In general, archaeologists summarize the culture history of a given area (i.e. the archaeological region) by outlining the sequence of archaeological cultures through time. Archaeological cultures are defined largely in geographical terms, but also reflect shared environmental and cultural factors. The project area is within the East and Central Lakes archaeological region, as defined by Milanich and Fairbanks (1980) and Milanich (1994) (Figure 3.1). The spatial boundaries of the region are somewhat arbitrary, and it is after 500 B.C.E. that characteristic regional differences become more evident in the archaeological record. There are differences, however, evident as early as the Middle Archaic period when the characteristic Mount Taylor horizon develops along the St. Johns River. The Paleo-Indian, Archaic, Formative, and Acculturative stages have been defined based on unique sets of material culture traits such as characteristic stone tool forms and ceramics, as well as subsistence, settlement, and burial patterns. These broad temporal units are further subdivided into culture horizons, phases or periods: Paleo-Indian, Early Archaic, Mount Taylor, Orange, St. Johns I, St. Johns Ia, St. Johns Ib, and St. Johns IIa, IIb, and IIc.

The local history of the region is divided into four broad time periods based initially upon the major governmental powers. The first period, Colonialism, occurred during the exploration and control of Florida by the Spanish and British from around 1513 until 1821. At that time, Florida initially became a territory of the United States and 21 years later became a State (Territorial and Statehood). The Civil War and Aftermath (1861-1899) period deals with the Civil War, the period of Reconstruction following the war, and the late 1800s, when the transportation systems were dramatically increased and development throughout the state expanded. The Twentieth Century period is fairly self explanatory, but subperiods have been defined based on important historic events such as the World Wars, the Boom of the 1920s, and the Depression. Each of these periods evidenced differential development and utilization of the region, thus effecting the historic archeological site and historic structure distribution across the land.

3.1 Paleo-Indian

The Paleo-Indian stage is the earliest cultural manifestation in Florida, dating from roughly 11,000 to 8000 B.C.E. (Austin 2001; Milanich 1994). Archeological evidence for Paleo-Indians consists primarily of scattered finds of diagnostic lanceolate-shaped projectile points.



Post- 500 B.C.E. regions of precolumbian Florida

Figure 3.1. Florida Archaeological Regions. The project area (★) is within the East and Central Region.

The majority of Paleo-Indian sites are associated with the rivers in the north-central portion of Florida (Dunbar and Waller 1983). At that time, the climate was cooler and drier. Vegetation was typified by xerophytic species with scrub oak, pine, open grassy prairies, and savannas being the most common (Milanich 1994:40). Sea levels were as much as 35 meters (115 feet) below present levels and the coastal regions extended miles beyond present day shorelines (Milliman and Emery 1968).

Some of the information about the Paleo-Indian period is derived from underwater excavations at two inland spring sites in Sarasota County: Little Salt and Warm Mineral Springs (Clausen et al. 1979). Traditionally, this time was characterized by small nomadic bands of hunters and gatherers. Daniel (1985) has proposed a model of early hunter-gatherer settlement that suggests that some Paleo-Indian groups may have practiced a more sedentary lifestyle than previously believed. Since the climate was cooler and much drier, it is likely that these nomadic bands traveled between permanent and semi-permanent sources of water, exploiting seasonally available resources. This has been referred to as the Oasis hypothesis (Dunbar 1991). These watering holes would have attracted the animals upon which the Indians hunted, thus providing food and drink.

3.2 Archaic

The beginning of the Archaic is denoted by interrelated environmental and cultural changes. The environmental changes associated with the end of the Pleistocene necessitated modification of the extant aboriginal settlement patterns and subsistence strategies. Whereas the Paleo-Indians depended more heavily upon the Pleistocene megafauna and the relatively limited number of freshwater sources, Archaic populations hunted smaller game and learned to effectively exploit their changing environment. The gradual environmental changes led in part to the extinction of the Pleistocene fauna as well as resulted in the change in composition and distribution of various vegetative communities (Miller 1998).

Early Archaic sites are recognized by the presence of Greenbriar and Bolen points as well as Kirk, Hardee Beveled, Hamilton, Arredondo, Sumter, and Thonotosassa varieties (Bullen 1975). Milanich (1994:64) notes that there are no well-documented Early Archaic coastal or riverine shell midden sites. This may be due to sea level rise as opposed to avoidance of these areas. Discoveries at the Windover Site (Doran 2002) in Brevard County indicate that bone and wood tools, as well as fabric and cordage, were an important part of the material culture. The site contained primary and flexed burials within a peat pond. These were held in place with wooden stakes and the interments included grave goods such as textiles and worked bone, shell, and wood. The materials recovered suggest a pattern of exploiting both coastal and interior resources. Most Early Archaic sites are small campsites. This type of site may suggest that small bands moved periodically in search of food. The Early Archaic tool assemblages are more diverse than the preceding Paleo-Indian tool kits, and include specialized stone tools for performing a variety of tasks (Milanich and Fairbanks 1980).

During the Middle Archaic, wetter conditions prevailed, sea levels began to rise, and pine forests and swamps began to emerge (Watts et al. 1996). The climate was changed to one of more pronounced seasonality with warmer summers and colder winters, though by 4000 B.C.E., the climate became essentially the same as that of today (Watts et al. 1996:29). Settlement became focused within coastal and riverine locales (Milanich 1994:64). The Mount Taylor period has been identified for the time of roughly 5000-2000 B.C.E. (Milanich 1994). Subsistence was based on hunting, fishing, shellfish collecting, and plant gathering. Sites are generally located along the Atlantic coast or along the upper reaches of the St. Johns River and the Ocklawaha and Wekiva Rivers. Miller (1998:68) suggests that when sea levels reached their current positions, the St. Johns River changed its riverine characteristics to become similar to a lake in the upper reaches and more estuarine in the lower reaches.

Hammocks of broad-leafed mesic trees, pine forests on uplands, and bayhead and cypress swamps became significant plant communities (Watts 1971). It is believed that populations combined hunting and gathering into a productive subsistence strategy, and as a result, occupation became more sedentary and village life began (Milanich and Fairbanks 1980:147-152). Middens of mystery snail, apple snail, and mussel provide evidence of occupation and resource exploitation along the rivers of east and central Florida.

The type site for this period is the Mount Taylor Site in Volusia County (Moore 1893). The artifact inventory of the Mt. Taylor people, as evidenced at the Groves' Orange Midden (8VO2601) and the Lake Monroe Outlet Midden, includes stone projectile points, tools, and microliths, as well as tools and decorative items of shell, bone, and wood (ACI/Janus 2001; Purdy 1994; Wheeler and McGee 1994a, 1994b). Numerous shell and bone items recovered from these sites indicate contact with coast.

According to Milanich and Fairbanks (1980:151), one of the most interesting aspects of the Mount Taylor culture is evidence for mass burial interments in specially prepared areas within shell middens. The burial mound at Tomoka (8VO51) is one of the earliest in Florida (Piatek 1994). The Tomoka Site (8VO81) consists of nine mounds and a surrounding village midden. Occupants of this site utilized estuarine and coastal resources as evidenced by extensive use of coquina (coast) and oysters (estuary). No ceramics have been recovered from any of the excavations conducted at this site complex (Douglass 1882; Piatek 1992, 1994).

The Middle to Late Archaic/Mount Taylor sites recorded throughout the state include large base camps, smaller special-use campsites, quarries, and burial areas and within East Florida, extensive shell middens. The large stemmed projectile points, especially the Newnan type, are diagnostic of Middle and Late preceramic Archaic period sites. Other common point types include Hillsborough, Levy, Putnam, Alachua, and Marion (Bullen 1975). In addition, silicified coral was more prevalent as a lithic tool raw material (Milanich 1994) and thermal alteration of the stone became more common (Ste. Claire 1987).

Interior sites include the smaller lithic scatter campsites that were most likely used for hunting or served as special use extractive sites for such activities as gathering nuts or other botanical materials (Ste. Claire 1989, 1990). Nut collecting stations would have been used seasonally.

By about 2000 B.C.E., the firing of clay pottery made its appearance in Florida. The first ceramics types had fibers (Spanish moss or palmetto) as the tempering agents within the clay. These wares are referred to as the Orange series. The Orange period was divided into subperiods based on a variety of ceramic attributes (Bullen 1955, 1972; Milanich 1994). Initially it was thought that the ceramics lacked decoration until about 1650 B.C.E. Recent research, however, has called the entire Orange chronology into question (Sassaman 2003). Based on a series of AMS dates on soot from Orange Incised sherds from the middle St. Johns Valley and from radiocarbon dates on oyster and charcoal in association with Orange ceramics near the mouth of the river, all the various Orange ceramic types occur within the time span of roughly 4100-3600 years ago. In addition, research by Cordell (2004) has documented the presence of sponge spicules in the Orange ceramic paste (the diagnostic trait of St. Johns wares) which suggest that the St. Johns ceramic tradition extends back to the beginning of the ceramic technology in the region.

Orange settlements were primarily located near wetland locales. The abundance of resources located in and near the wetlands permitted larger settlements. This change in settlement patterns may be related to environmental changes resulting from the establishment of current sea levels. By the end of the Middle Archaic, the climate closely resembled that of today's; vegetation changed from those species that preferred moist conditions to pines and mixed forests (Watts and Hansen 1988). The adaptation to this environment allowed for a wider variety of resources to be exploited and greater variability in settlement patterns. Shellfish, fish, and other food sources were now available from coastal and freshwater wetlands resulting in an increase in population size.

Bridging the close of the Archaic stage and the beginning of the Formative is the Florida Transitional period, circa 1200 to 500 B.C.E. In general, this time was characterized by increased regionalism, population growth, and socio-cultural complexity (Bullen 1959, 1970). Exploitation of shellfish, fish and wild plants, as well as a reliance on hunting, was continued, and limited horticulture may have been engaged in at this time (Milanich and Fairbanks 1980).

3.3 Formative/Acculturative

The period from about 500 B.C.E. until 750 C.E. (Common Era) in the East and Central Lake region is referred to as St. Johns I, which has been divided into three temporal sub-periods: St. Johns I (500 B.C.E. – 100 C.E.), St. Johns Ia (100–500 C.E.), and St. Johns Ib (500–750 C.E.) based primarily on characteristic ceramic types (Milanich 1994:247). There are regional variants of this basic cultural tradition: the St. Marys to the north and the Indian River to the south. The St. Marys Region is located at

the mouth of the St. Johns and extends northward into Georgia (Russo 1992). Sites in this area contain a mixture of Georgia ceramics as well as St. Johns ceramics.

At the southern end of the East and Central Region is the Indian River Region which was first defined by Rouse (1951). There is a much higher prevalence of sand-tempered wares in this region. Malabar I is coeval with St. Johns I. Malabar II occurs at the same time as St. Johns II and both are defined based on the presence of St. Johns Check Stamped pottery. Cordell's ceramic analysis has helped to better define the cultural sequences in this more southern area (Sigler-Eisenberg et al. 1985).

Settlement patterns during this time were virtually the same as that seen for the earlier Mount Taylor and Orange periods, i.e. along the coastal estuaries and larger rivers. However, there was also a tremendous increase in the number of archaeological sites. An apparent trend from St. Johns I through Ib times was a population shift into the northern part of the St. Johns River valley, possibly due to the need for more arable land (Milanich and Fairbanks 1980:158).

Village wares were almost all St. Johns Plain throughout this period. St. Johns Incised is associated with the early St. Johns I period. Deptford and Swift Creek pottery are occasionally present in St. Johns I and Ia subperiods. St. Johns Cordmarked ceramics are associated with the St. Johns Ia period while Dunns Creek Red is associated with the St. Johns Ia and Ib periods. Cordell notes that through time, the St. Johns Plain ceramics become sandier due to increased use of quartz sand as an aplastic agent (Russo et al. 1989:68).

Evidence of the continuous use of burial mounds begins at this time. Many of the burials were found in large central pits, probably the result of secondary interments. Some changes in the burial practices include the possible use of log tombs during the St. Johns Ia period as well as inclusion of Hopewellian-Yent complex exotic trade items (Milanich 1994:261). Much of the information on St. Johns I period burial practices have been obtained from the Ross Hammock Site in Volusia County (Bullen et al. 1967). This site complex consists of two large burial mounds and an extensive village midden located on the west shore of Mosquito Lagoon. Year-round occupation of the coast and along the rivers occurred with special use-activity sites located in other locales and short-term campsites on the coast.

The St. Johns II period has also been sub-divided into three sub-periods: St. Johns IIa (750 – 1050 C.E.), St. Johns IIb (1050 – 1513 C.E.), and St. Johns IIc (1513 – 1565 C.E.). The St. Johns II periods are marked by the presence of St. Johns Check Stamped pottery. "St. Johns II carries on the tradition and is marked only by the introduction of check-stamped pottery" (Goggin 1952:70). Occupation of riverine and coastal shell middens continued, although Miller (1998:80) notes that there is a relative increase in the number of non-riverine and non-coastal sites, perhaps as the result of locating sites in more agriculturally suited locales.

Milanich and Fairbanks (1980) suggest that hunting and gathering remained important but the dependence upon cultivated crops such as maize, squash, and gourds increased. The use of gourds as domesticates is still being studied as there is no evidence for cultivation even though gourds and squashes have been around for thousands of years prior to this period (Newsom et al. 1993). Sigler-Eisenberg and her colleagues (1985) suggest that in the upper St. Johns basin, the practice of horticulture was not adopted. Russo (1984) and Sigler-Eisenberg (1984) further indicate that the wetland ecology and subsistence strategies were different.

There was an increase in the number and size of villages during the St. Johns IIa period suggesting population expansion. A ranked society evolved as evidenced by the differential burial customs. No longer were all people interred in burial mounds. Deagan (1978:109) notes that around 1000 C.E. a population shift from the more southern and southwestern areas into the northern areas is evidenced by changes in relative frequencies of burial mounds in the areas over time.

The St. Johns IIb period is characterized by the adoption of some Mississippian traits into the ceremonial system as well as the presence of St. Johns Simple Stamped ceramics. The Mississippian lifestyle, however, never became dominant, possibly because the soils were not suitable for full agricultural pursuits. A more complex socio-political organization is suggested by the presence of platform mounds at the ceremonial centers including the Shields Mound, Mount Royal, and the Thursby Mound (Ashley 2005a, 2005b; Moore 1894a, 1894b).

The St. Johns IIc period is marked by the introduction of European artifacts in some of the mounds. The historic aboriginal occupants of the region were the Timucua, Jororo, Mayaca, and the Ais. The Timucuans shared a common language but cannot be considered as a specific cultural group because the range of the Timucuan speakers "... was crosscut by dialect, techno-environmental, ceremonial, political and geographical differences" (Deagan 1978:89). The project area lies within the Jororo territory (Hann 2003; Milanich 1995). Although these Indians apparently continued the St. Johns tradition, they did not share the same Timucuan language as many of the other St. Johns historic counterparts (Milanich 1995).

3.4 Colonialism

The cultural traditions of the native Floridians ended with the advent of European expeditions to the New World. The initial events, authorized by the Spanish Crown in the 1500s, ushered in devastating European contact. After Ponce de Leon's landing near St. Augustine in 1513, Spanish explorations were confined along the west coast of Florida and European contact along the east coast was left to a few shipwrecked sailors from treasure ships which, by 1551, sailed through the Straits of Florida on their way to Spain. Cape Canaveral was a landmark for these early explorers and sailors. The French established Fort Caroline, near today's Jacksonville, to promote their interests in the New World. The need to protect the treasure galleons led Spain to remove the French from the

region. Pedro Menéndez de Avilés led the Spanish fleet in its conquest of Fort Caroline and the destruction of the French.

During Spain's first period of occupancy (1656-1763), it failed to establish permanent settlements in the project area. Located on the fringe of Spanish activity centered in St. Augustine, Osceola County was too far removed for Spain to exert political control (Milanich and Fairbanks 1980). Missionization of the Jororo and Mayaca began in the late 1600s, and in 1728 Joseph de Bullones wrote to the king that the Jororo were "gone" (Hann 2003:132). Evidence of European contact with the Jororo is seen at the Philip and Goodnow mounds where glass beads and iron scissors have been recovered (Milanich 1995). Due to the attempts of the Spanish military and missionaries to alter the traditional lifeways, by the end of the seventeenth century these aboriginal populations were virtually extinct.

The area that now constitutes the state of Florida was ceded to England in 1763 after two centuries of Spanish possession. England governed Florida until 1783 when the Treaty of Paris returned Florida to Spain; however, Spanish influence was nominal during this second period of ownership. Prior to the American colonial settlement of Florida, portions of the Creek Nation and remnants of other Indian groups from Alabama, Georgia, and South Carolina moved into Florida and began to repopulate the vacuum created by the decimation of the aboriginal inhabitants. The Seminoles, as these migrating groups of Indians became known, formed at various times, loose confederacies for mutual protection against the new American Nation to the north (Tebeau 1980:72).

3.5 Territorial and Statehood

The bloody conflict between the Americans and the Seminoles over Florida first came to a head in 1818, and was subsequently known as the First Seminole War. As a result of the war and the Adams-Onis Treaty of 1819, Florida became a United States Territory in 1821. Andrew Jackson, named provisional governor, divided the territory into St. Johns and Escambia Counties. At that time, St. Johns County included the lands lying east of the Suwannee River. In the first territorial census (1825), 5077 people were reported within St. Johns County, and by 1830, that number had risen to 8956 (Tebeau 1980:134).

Even though the First Seminole War was fought in north Florida, the Treaty of Moultrie Creek in 1823, at the end of the war, was to affect the settlement of all of Florida. The Seminoles relinquished their claim to the whole peninsula in return for an approximately four million acre reservation south of Ocala and north of Charlotte Harbor (Mahon 1985). The treaty never satisfied the Indians or the Anglo-Americans. The inadequacy of the reservation and desperate situation of the Seminoles living there, plus the mounting demand of the Anglo-Americans for their removal, soon produced another conflict.

By 1835, the Second Seminole War was underway. Mosquito County, created in 1824, encompassed present-day Osceola, Lake, Orange, Seminole, Brevard, and Volusia Counties as well as parts of several other counties. Mosquito County was sparsely occupied with mostly sugar plantations along the rivers near the coast. In 1835, the Territory's legislative council established the county seat at John Bunch's plantation in New Smyrna. However, before the first session could be held, the threat of Indian attacks during the Second Seminole War forced the county government to be moved to St. Augustine, the seat of St. Johns County, for safety. During the war, court was held concurrently with that for St. Johns County (Robison and Andrews 1995).

During the Second Seminole War, Fort Mellon, located near present-day Sanford, was the principal military installation in the East Central Florida area. Documents in the form of correspondence between officers in the United States Army during this war disclose that the area around Lake "Ahapopka" (now Apopka) became a refuge for the Indian groups headed by Chief Osuchee (ACI 1994; Tebeau 1980). Military and civilian suppliers passed through the region traveling to reach Seminole villages and an increasing number of military fortifications (ACI 1990:11).

The lands around Lake Tohopekaliga and the Kissimmee Chain of Lakes were a Seminole stronghold during the Second Seminole War. Here, the Seminoles kept their cattle and retreated into the cypress swamp west of the lake at the approach of soldiers (Mahon 1985; Sprague 1964). Tohopekaliga means "Fort Site," and the lake was so named because the islands within it housed the forts and stockades of the Seminoles (Moore-Willson 1935). It was speculated that Coacoochee or Wildcat at one time resided on one of the lake's islands. In January 1837, General Jesup's men encountered the Seminoles near the "Great Cypress Swamp" and drove them into dense swamp. On the 28th of January, the army moved forward and occupied a strong position on Tohope-ka-liga Lake where several hundred head of cattle were confiscated by Jesup (Sprague 1964:258).

The Second Seminole War lasted until 1842 when the federal government decided to end the conflict by withdrawing troops from Florida. Some of the battle-weary Seminoles were persuaded to emigrate west where the federal government had set aside land for a reservation. However, those who were adamant about remaining were allowed to do so but were pushed further south into the Everglades and Big Cypress Swamp. This area became the last stronghold for the Seminoles (Tebeau 1980).

Encouraged by the passage of the Armed Occupation Act in 1842, which was designed to promote settlement and protect the Florida frontier, families moved south through Florida. The Act made available 200,000 acres outside the already developed regions south of Gainesville to the Peace River, barring coastal lands and those within a two mile radius of a fort. The Armed Occupation Act stipulated that any family or single man over 18 able to bear arms could earn title to 160 acres by erecting a habitable dwelling, cultivating at least five acres of land, and live on it for five years. During the nine month period the law was in effect, 1184 permits were issued, totaling some 189,400 acres (Covington 1961:48; Dunn 1989:24-25).

Also during this time, the U.S. Government initiated surveys in the project area. Benjamin F. Whitner surveyed the exterior boundaries of Township 26 South, Range 31 East in 1844. The township was subdivided into sections by A. H. Jones in 1848. The plat maps depict no noteworthy features, including homesteads, military roads, trails, Indian camps, etc. (State of Florida 1844, 1848b). Whitner describes the exterior lines of Section 1 as being marsh with numerous cypress and myrtle islands, and extending into Section 12 is 3rd rate pine and marsh (State of Florida 1843-44:81, 95-95). The interior section lines were generally described as 3rd rate pine, swamps, and a small bit of scrub (State of Florida 1848a:404-405, 423-426).

At the end of the Second Seminole War, the Florida Legislature relocated the county seat from its safe haven in St. Augustine to Enterprise, now in Volusia County. In 1845, the Union admitted the State of Florida with Tallahassee as the state capital. In the same year, due to the thriving citrus industry, Mosquito County was renamed Orange County with a population in the 1850 census numbering 466 residents. At the same time, the Legislature moved the county seat to Mellonville, but in 1856 relocated it to the community which became Orlando (Hebel 1955:2). Much of the early development occurred along the coast or inland waterways. Cities such as Enterprise, Sanford, and New Smyrna developed along waterways such as the St. Johns, Halifax, and Indian Rivers. The rivers were heavily used; transporting residents, goods, and crops from the 1850s until the advent of the railroad (Hebel 1955). Prior to the Civil War, the cotton, cattle, and sugar industries thrived while the developing citrus, turpentine, and logging industries were in their infancy.

Throughout the intervening years between the Second and Third Seminole Wars, tensions erupted periodically between settlers and Seminoles. The desire to remove all Seminoles from Florida and to recapture all former slaves became national policy. As a result, 10 military forts were established in Orange County by 1846. These included: Fort Butler near the south end of Lake George; Fort Kingsbury at the northeast end of Lake George; Fort Mellon on the south bank of Lake Monroe; Fort Lane on the west side of Lake Harney; Fort Maitland, Fort Gatlin, Fort Christmas, and Fort Taylor to the west of Lake Winder; Fort McNeal west of Lake Poinsett; and Fort Ann on the Halifax River (Blackman 1927:19).

In December 1855, the Third Seminole War started as a result of pressure placed on the Indians remaining in Florida to move to the West (Covington 1982). The war originated in present-day Collier County when Seminole Chief Billy Bowlegs and 30 warriors launched a retaliatory attack upon an army camp, killing four soldiers and wounding four others. This hostile action renewed state and federal interest in the final removal of the Seminoles from Florida. As a result, several regional military posts were established (Tebeau 1966).

Military action was not decisive during the war; therefore, in 1858 the United States Government resorted to monetary persuasion to induce the remaining Seminoles to move west. Chief Billy Bowlegs accepted $5000 for himself and $2500 for his lost cattle;

each warrior received $500, and $100 was given to each woman and child. On May 4, 1858, the ship *Grey Cloud* set sail from Fort Myers with 38 Seminole warriors and 85 Seminole women and children. Stopping at Egmont Key, 41 captives and a Seminole woman guide were added to the group. On May 8, 1858, the Third Seminole War was declared officially over (Covington 1982:78-80). Between the end of the Third Seminole War and the beginning of the Civil War, settlers continued to arrive in Orange County. They were attracted to the area by its rich soil, mild climate, and homesteading opportunities.

3.6 Civil War and Aftermath

In 1861, Florida followed South Carolina's lead and seceded from the Union as a prelude to the American Civil War. Florida had much at stake in this war as evidenced in a report released from Tallahassee in June of 1861. It listed the value of land in Florida's 35 counties as $35,127,721 and the value of slaves in the state at $29,024,513 (Dunn 1989:59). Even though the coast of Florida experienced a naval blockade during the war, the interior of the state saw very little military action. One of the major contributions of the state to the war effort was in the supplying of beef to the Confederate Government. The blockade along the coast made it very difficult to ship cattle from Florida to Cuba. Therefore, the ranchers from Florida herded their cattle to Charleston, South Carolina and sold them to the Confederate Government. The Confederate Government estimated that three-fourths of the cattle which Florida supplied to the Confederacy originated from neighboring Brevard and Manatee Counties (Shofner 1995b:72). The war lasted until 1865 when General Robert E. Lee surrendered to General U.S. Grant at Appomattox Courthouse in Virginia.

At the close of the Civil War in 1865, the first commercial citrus grove, 100 acres in size, was planted near present-day Orlando by W.H. Holden. His produce was hauled via the St. Johns River to present day Sanford and continued by boat to Charleston (FWP 1939:224). In 1871, General Henry R. Sanford purchased 12,000 acres near Mellonville. He brought in hundreds of workmen to clear the land and plant citrus. Sanford's goal was to establish a city as large as Jacksonville and bring prosperity to the upper St. Johns region (FWP 1939:360). Sanford even sent an agent to Sweden to recruit workers who were guaranteed passage and expenses in exchange for one year of work. Because of this arrangement, Sanford was accused of operating a form of slavery and many of the workmen ran away. Other Swedes, however, remained to fulfill their contract and were given a five acre grove (FWP 1939:360).

Immediately following the war, the South underwent a period of "Reconstruction" to prepare the Confederate States for readmission to the Union. The program was administered by the U.S. Congress, and on July 25, 1868, Florida officially returned to the Union (Tebeau 1980:251). By 1870, the county population had risen from 987 in 1860 to 2,195 (Kendrick 1976:150). The Civil War stimulated growth in Florida in two ways: many Southerners sought new homes to escape the unrest in the neighboring ex-

Confederate states, and the war brought prosperity to a large number of Northerners who sought vacation homes in warmer climates.

Florida's financial crisis, born of pre-Civil War railroad bonded indebtedness, led Governor Bloxham to search for a buyer for an immense amount of state lands. Bloxham's task was to raise adequate capital in one sale to free from litigation the remainder of state lands for desperately needed revenue. In 1881, Hamilton Disston, a Philadelphia investor and friend of Governor Bloxham, purchased four million acres from the State of Florida to clear the state's debt. Disston also agreed to drain Florida's swamp and overflow lands south of Orlando (Davis 1939). This transaction became known as the Disston Purchase.

The Atlantic and Gulf Coast Canal and Okeechobee Land Company was formed on July 20, 1881 to develop Disston's lands and the Florida Land Improvement and Kissimmee Land Companies were formed to help fulfill the drainage contracts. These two companies purchased the entire project area in 1883 and 1884, except for Section 14 which was purchased by W. C. Parson in 1882 (State of Florida n.d.:242-243). Ancestry.com lists no one by the name of Parson living in the Osceola/Orange/Brevard County area between 1880 and 1930 (United States Census Bureau [USCB] 1880, 1900, 1910, 1920, 1930).

The Atlantic and Gulf Coast built four dredges. One of the first dredging operations occurred in 1882 between Lake Tohopekaliga and Lake Cypress; the headquarters was located in Kissimmee, formerly known as Allendale. Allendale was named after J. H. Allen, a former Confederate major, who became a steamboat captain along the Kissimmee River and who settled on the north bank of Lake Tohopekaliga. The second dredge operation in the area took place in 1883 between Lake Tohopekaliga and East Lake Tohopekaliga. This lowered the water levels in East Lake Tohopekaliga by three feet and exposed thousands of acres of rich, mucky land. This drainage project made possible the settlement of St. Cloud, located south of East Lake Tohopekaliga.

During the 1880s, Disston's Purchase also enabled the distribution of large land subsidies to railroad companies, inducing them to begin extensive construction programs for new lines throughout the state (Covington 1957; Harner 1973; Tebeau 1980). Improvements in the transportation systems, particularly the railroad, played a major role in fostering growth within the area. In 1880, the South Florida Railroad extended its lines from Sanford through Orlando to Kissimmee. Great change occurred with the enterprise of Henry Bradley Plant, an experienced railroad entrepreneur. In 1883, Plant acquired the Jacksonville-Tampa-Key West Railroad and contracts with the state. He constructed tracks from Kissimmee to a point some five miles east of present-day Lakeland, continuing on from an existing line out of Jacksonville. By January 25, 1884, Plant had completed rails connecting Kissimmee to Tampa. In 1893, the South Florida Railroad Company consolidated into the Savannah, Florida, & Western Railroad, and was generally known as the Plant System. In 1899, Plant added the Florida Southern Railway to his empire; in 1902 all his holdings were sold and consolidated with the Atlantic Coast Line (Mann 1983).

The railroads allowed the rapid entry of tourists and permanent settlers, while facilitating the export of products to northern markets. They also helped to foster the growth of businesses directly and indirectly associated with the tourist and fruit industries such as ice plants, packing houses, and canneries (Shofner 1995b). During all this great change in the area, Osceola County was created in 1887 from portions of Brevard and Orange Counties. The new Osceola County had a population of 815 (Brenda J. Elliott and Associates 1993). The economy was dominated by the cattle and citrus industries. Kissimmee, the county seat, became home to sugarcane plantations and sugar mills in the late nineteenth and early twentieth centuries (FWP 1939:364). Kissimmee also developed into a major shipping point for cattle as well as crops.

Founded in the early 1880s, St. Cloud prospered for almost a decade from its cattle operations (FWP 1939:462). It later became the headquarters for lumber and naval stores operators. In 1886, Disston developed a large sugar cane plantation in the vicinity of St. Cloud, and in 1887, a sugar mill was built on the outskirts of town (Dodson 1971).

> *In the late 1880s an English group settled near by on and above the shores of East Tohopekaliga Lake, to grow citrus. Many were of wealthy families and came with cricket bats and polo ponies. Several golf courses were laid out, among the first in the State, and a large frame hotel was built for the comfort of fashionable winter vacationists. The freeze of 1894-95 destroyed the citrus groves, and many of the planters drifted away* (FWP 1939:462).

The Kissimmee Chain of Lakes, which extends from Lake Kissimmee northward to Lake Mary Jane, encompassing over a dozen lakes, many of which were connected to each other by Disston's canals, became known as a fisherfolk's paradise (Centennial Book Committee 1987). Fish camps were constructed along the shores of all the lakes to provide for the needs of fisherfolk coming into the region.

The disastrous freeze of the mid-1890s virtually wiped out the Florida citrus industry. In 1896, Elder Issac Ansatt, a Shaker, purchased all of Sections 4, 8, and 9, and portions of Sections 1-3, 10-13, and 17 in Township 26 South, Range 31 East, from Hamilton Disston (Anderson 1959). This acreage included Trout Lake, Live Oak Lake, Sardine Lake, Lake Lizzie, and the upper part of Alligator Lake. In 1905, other Shakers from New York State founded a commune here, known as Olive Branch, cultivated the land, and sold produce to the Kissimmee and St. Cloud markets until about 1911 (Anderson 1959; FWP 1939). The community was based in Section 8, west of Alligator Lake, near Ashton. The Olive Branch community chiefly relied on the production of pineapples, citrus, vegetables, fish, and later timber and cattle. Initially, they had enclosed 1600 acres of land, on which 900 head of cattle roamed. Eventually this was expanded and the herd grew to 2000. This venture eventually failed, and by the late 1930s, a small tourist camp occupied the Shaker Village Site (FWP 1939:462).

3.7 Twentieth Century

The turn of the century prompted optimism and an excitement over growth and development. The Florida Land Boom of the 1920s started at the turn of the century with developers draining land and selling it to those looking to move to sunny Florida. New residences, banks, and stores sprang up in the Orlando, Kissimmee, and Sanford areas, and new roads tied the small towns and large cities together. In 1886, downtown Orlando received its first water mains, and in 1898 the first streetlights were installed. By 1903, Orlando Water & Light Company provided 24-hour electricity as well as an ice plant and gas works to be used by customers. Following the development brought about by the railroad in Central Florida during the late nineteenth century, and the influx of northern visitors who were unable to pursue their pleasures in Europe due to World War I, speculation started in earnest.

The 1920s land boom saw widespread speculation and development of towns and highways. Several reasons prompted the boom, including the mild winters, the growing number of tourists, the larger use of the automobile, the completion of roads, and the promise by the state legislature never to pass state income or inheritance taxes. Population which had grown only infinitesimally over the first twenty years of the century, exploded in the 1920s. By 1930, the census recorded a total of more than 10,000 in Osceola County, up over 30% from the previous census (USCB 1995).

Banks and real estate agents advertised the cheap land available in Florida as a paradise found. Hundreds of citrus growers even promoted crops and land simultaneously. The citrus industry thrived. Other agribusinesses in the area included the raising of cattle, operation of dairies, extraction of naval stores, and the processing of lumber (Shofner 1982:217). New residential areas containing homes in the popular Mediterranean Revival style were constructed. Railroads were no longer the main transportation source; the automobile commenced its rise to domination. From 1925 to 1929, 2,000 miles of highway and 17 miles of bridges were completed in the State of Florida. The Dixie Highway network of roads completed at this time essentially connected Florida to the rest of the nation. It was decided that there would be two routes: one to run through Jacksonville down the east coast to Miami and the other to pass through Gainesville, Ocala, Leesburg, Tavares, Apopka, and Orlando before meeting with the other line in Palm Beach. In 1919, the portion of the Central Connector, also known as the Old Melbourne Road, was completed between St. Cloud and Deer Park and was paved with bricks. From Deer Park, cars were loaded on to flatcars and hauled to Melbourne over the lumber company's trestle across the St. Johns Marsh (Cody and Cody 1987). A causeway constructed across the marsh was completed in 1924. By October 1925, the entire length of Dixie Highway opened from the Canadian border in Michigan to Miami. A modern highway finally connected central Florida with the rest of the nation (Robison and Andrews 1995:243-244; Shofner 1995b:228). A good portion of the road was abandoned by 1929, when the road was rerouted to the south through Holopaw from Alligator Lake. This new road, which became US 192, was constructed to accommodate 60 mile per hour traffic (Cody and Cody 1987). Today, much of the Old Melbourne Road is within the Deseret Ranch and is not accessible to local traffic.

By 1926-27, the bottom fell out of the Florida real estate market. A downturn in the stock market in 1926 and an investigation by the National Better Business Bureau into fraudulent real estate practices caused investors to pull their monies out of the booming Florida real estate market. Massive freight car congestion from hundreds of loaded cars sitting in railroad yards caused the Florida East Coast Railway to embargo all but perishable goods in August of 1925. The embargo spread to other railroads throughout the state, and, as a result, most construction halted. To make the situation even worse, two hurricanes hit south Florida in 1926 and in 1928. The hurricanes destroyed confidence in Florida as a tropical paradise and created a flood of refugees fleeing northward. The following year, in 1929, the Mediterranean fruit fly invaded and paralyzed the citrus industry creating quarantines and inspections which further slowed an already sluggish industry. Confidence in the Florida real estate market quickly diminished, investors could not sell lots, and the Great Depression hit Florida earlier than the rest of the nation.

In 1924, Arthur W. Brown conducted a supplemental land survey of portions of Township 26 South, Range 31 East because the draining of the area through Disston's canals exposed additional lands (State of Florida 1924). Even though the economy was in a downturn, these drained lands were soon purchased. In 1927 and 1928, Elijah B. Richard and Ethel L. Saunders bought the drained lands in Section 11, and in 1931, Leonidas E. Wade and William Glen Ray bought the drained lands in Sections 1 and 2 (State of Florida n.d.:242).

The 1930s saw the closing of mines, mills, and citrus packing plants, along with widespread unemployment all over Florida. By the mid-1930s, federal programs implemented by the Roosevelt administration started employing large numbers of construction workers, helping to revive the economy of the state. The programs were instrumental in the construction of parks, bridges, and public buildings. Agriculture continued to be the primary source of income for the towns in the general project area. The Federal Writers' Project, one of the federal programs implemented by the Roosevelt administration, described St. Cloud in the following way:

> *St. Cloud, on the eastern shore of East Tohopekaliga Lake, is sometimes called G.A.R. town because of the numerous veterans of the Grand Army of the Republic who settled here in 1909. In architecture, business, and mode of living, St. Cloud is typical of a northern village. . . The town has an attractive park and a recreation center* (FWP 1939:462).

By 1940, recovery from the Great Depression was imminent. The incoming servicemen renewed the area economy. Many Florida cities received military stations during World War II. In 1940, the Army Air Corps arrived in Orlando to take over the Orlando Municipal Airport, which had been built in 1928. The Orlando Army Air Base, as it became known, served as a home for bomber and fighter groups. The Army Air Forces School of Applied Tactics was established at the base as a school to train bomber crews and fighter escorts in the techniques of formation flying. A satellite base was also established in Kissimmee. The Pine Castle Army Air Field was established in 1941 in the

Orlando area as well. In 1948, it became Pine Castle Air Force Base and in 1958 was renamed McCoy Air Force Base. In 1974, when the Air Force vacated the base, it became the city's commercial airport and was renamed a final time to Orlando International Airport. Sanford received the Naval Air Station Sanford in 1942. Half of all of the Navy pilots who fought the Japanese in World War II trained at the Sanford base, and German prisoners of war worked at the base (Robison and Andrews 1995:250-52).

As World War II ended, Osceola County, like most of Florida, experienced a population boom in the 1950s. Florida's population increased from 1,897,414 to 2,771,305 from 1940 to 1950, and Osceola's population rose from 11,406 to 19,029 (USCB 1995). After the war, car ownership increased, making the American public more mobile. Vacations were made more inexpensive and easier. Many who had served at Florida's military bases during World War II also returned with their families to live. As veterans returned, the trend in new housing focused on the development of small tract homes in new subdivisions.

The 1956 Highway Act funded a plan for 41,500 miles of interstate highway nationwide. Interstate 4, which was constructed in the late 1950s and early 1960s, was part of that plan (Shofner 1995a:187). Interstate 4 quickly served as the belt across central Florida which provided access to both coasts and all of the tourist attractions which sprang up along the route. Walt Disney chose the intersection of Interstate 4 and the Florida Turnpike as the prime spot to build the Florida version of Disneyland. After Walt Disney World opened in 1971, commercial development, including other tourist attractions, restaurants, and hotels, exploded along Interstate 4, and tourism developed into one of the primary revenue sources in Florida. New housing developments including Celebration, Disney's planned community, have arisen along the interstate system.

In Osceola County, nearly two-thirds of the land was used in cattle ranching prior to the introduction of Walt Disney World. Today, roughly 83% of the county's land remains in agricultural use producing lumber, cattle, poultry, and citrus. As thousands of people move to Florida each day, Osceola County continues to grow. The population boom has resulted in the need for increased residential construction and the building and upgrading of primary and secondary roads. In addition, the tourist industry has boomed in and around the Kissimmee and Orlando areas. All of this growth has resulted in Osceola having an estimated population in 2006 of 244,045 (USCB 2008).

4.0 RESEARCH CONSIDERATIONS AND METHODS

4.1 Background Research and Literature Review

A comprehensive review of archaeological and historical literature, records and other documents and data pertaining to the project area was conducted. The focus of this research was to ascertain the types of cultural resources known in the project area, their temporal/cultural affiliations, site location information, and other relevant data. This included a review of sites listed in the NRHP, the FMSF, cultural resource survey reports, published books and articles, unpublished manuscripts, maps and interviews. Electronic data from the FMSF was obtained in April 2008, which is the most current update.

4.1.1 Archaeological Considerations

For archaeological survey projects of this kind, specific research designs are formulated prior to initiating fieldwork to delineate project goals and strategies. Of primary importance is an attempt to understand, based on prior investigations, the spatial distribution of known resources. Such knowledge serves not only to generate an informed set of expectations concerning the kinds of sites which might be anticipated to occur within the project area, but also provides a valuable regional perspective, and, thus, a basis for evaluating any new sites discovered.

A review of the FMSF indicated that no previously recorded archaeological sites are located within the Lake Lizzie Conservation Area. Six other archaeological sites have been recorded within two miles of the project area (Figure 4.1; Table 4.1). Four of the sites were recorded during ACI's survey for the Birchwood DRI. Two of the sites (8OS146 and 8OS147) consist of low density lithic scatters, and the other two (8OS148 and 8OS149) consist of isolated pieces of lithic debitage. A Hernando point fragment was recovered from 8OS146, indicating a St. Johns I period component. The other three sites are culturally indeterminate. None of the sites was considered significant (ACI 1990).

The other two sites within two miles of the project area were recorded during the survey along SR 500/US 192. 8OS1887 and 8OS1899 both were classified as temporally indeterminate campsites, evidenced by a scattering of lithic debris. Neither was considered a significant resource (Janus Research 2002).

In addition to the above mentioned surveys, a number of other cultural resource assessment surveys have been conducted with negative results, at least within the two-mile limits of the site search. These include a natural gas transmission line (Athens et al. 1993), transportation lines and associated facilities (Ashley 1997; Browning and Wiedenfeld 1989), and a cellular communication tower (Parker 2001).

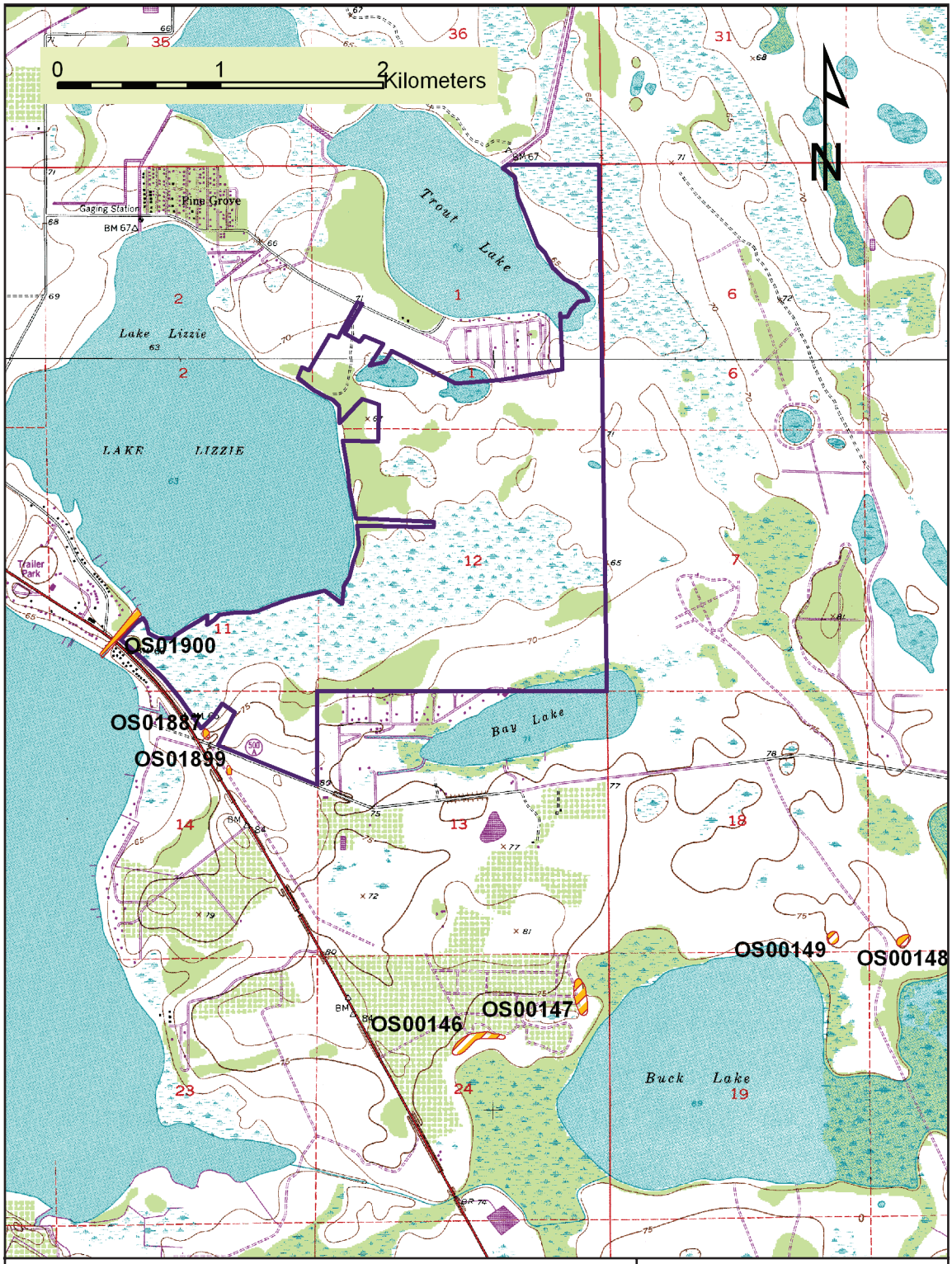


Figure 4.1. Previously recorded archaeological sites and historic canal proximate to the Lake Lizzie Conservation Area, Sections 1, 2, 11, 12, and 14, Township 26 South, Range 31 East (USGS Ashton, Fla. 1953, PR 1981 and Narcoossee, Fla. 1953, PR 1970).

Table 4.1. Previously recorded archaeological sites proximate to the project area.

SITE #	SITE NAME	SITE TYPE	CULTURE
OS00146	Birchwood Canal	Lithic scatter	St. Johns I
OS00147	Buck Lake Canal	Lithic scatter	Aceramic
OS00148	Buck Lake Swamp	Isolated flake	Aceramic
OS00149	Buck Lake North	Isolated flake	Aceramic
OS01887	Lizzie Gator	Campsite, lithic scatter	Aceramic
OS01899	Lizzie Gator 2	Campsite, isolated flake	Aceramic

Based on these data and other regional studies (cf., ACI 1999a; Austin and Piper 1986; Bense and Phillips 1990; Ellis et al. 1994; Johnson and Basinet 1995; Sigler-Eisenberg et al. 1985), informed expectations concerning the types of sites expected to occur within the Lake Lizzie Conservation Area project area, as well as their likely environmental settings, could be generated. As archaeologists have long realized, aboriginal populations did not select their habitation sites and special activity areas in a random fashion. Rather, many environmental factors had a direct influence on site location selection. Among these variables are soil drainage, distance to fresh water, relative topography, and proximity to food and other resources including stone and clay. On the basis of the aforementioned projects, and several general regional studies, it has been demonstrated that archaeological sites are most often located near a permanent or semi-permanent source of potable water. In addition, prehistoric sites are found, more often than not, on better drained soils and/or at the better drained upland margins of wetland features such as rivers, swamps, creeks, sinkholes, lakes, and ponds.

In general, comparative site location data for Osceola County indicate a pattern of site distribution favoring the relatively better drained terrain proximate to creeks, rivers, and other wetland features (ACI 1990, 1996a, 1996b, 1998a, 1998b, 1999b; ACI/Janus 2003). Upland sites well removed from potable water are rare. In the poorly drained pine flatwoods, sites tend to be situated on low ridges and knolls near a freshwater source. It should be noted that this settlement pattern cannot be applied to sites of the Paleo-Indian and Early Archaic periods, which precede the onset of modern environmental conditions.

Given these known patterns of aboriginal settlement, the likelihood for archaeological sites was considered to be moderate based upon the proximity to a variety of wetland resources but surrounded for the most part by poorly drained soils. The highest probability areas would be those locales with well drained soils proximate to permanent water sources. Based on the results of the historic research, no historic period archaeological sites, including early homesteads, military forts and trails, or Indian encampments, were expected.

Robert Mindick informed ACI archaeologists that local lore placed an Indian mound in the northeastern part of the project area, on the elevated lands northeast of Trout Lake. However, he had never been to the site and did not know its exact location nor was he aware of any local folks that did (Mindick 2008). Research revealed that no mounds are depicted in the FMSF in this area. In addition, Dr. Rachel Wentz, Regional

Director for the Florida Public Archaeological Network was contacted, but she was not aware of the mound or anyone who might have such information (Wentz 2008).

4.1.2 Historical Considerations

The background research revealed that no historic resources had been recorded previously within the Lake Lizzie Conservation Area and no historic structures were evidenced in the project area, according to the 1953 quadrangle maps (Ashton and Narcoossee). The previously recorded Alligator Canal (8OS1900) (Figure 4.1) is located just west of the project area. This canal, constructed around 1915 to assist in the management of water flow and flooding between Alligator Lake and Lake Lizzie, was recorded during the survey of SR 500/US 192. It was not considered significant due to the commonality of this type of feature in the region (Janus Research 2002). The SHPO concurred that the canal was not significant, that is, not eligible for listing in the NRHP.

It was also noted that the Old Melbourne Road is located along a portion of the southern project area boundary. This road was constructed in the early 1900s as part of the Dixie Highway system of roads. Thus, it was anticipated that during field survey, this resource would be recorded in the FMSF and evaluated for NRHP eligibility.

4.2 Field Methodology

Archaeological field methodology included ground surface inspection and systematic subsurface testing. Testing was conducted at 50 and 100 m (164 and 328 ft) intervals throughout the tract. Numerous tests were judgmentally placed. The shovel tests measured 50 cm (1.6 ft) in diameter by 1 m (3.3 ft) deep, and all soil removed from the test pits was screened through 0.64 cm (0.25 in) mesh hardware cloth to maximize the recovery of artifacts. The locations of all shovel tests were plotted on the aerial map and, following the recording of relevant data such as stratigraphic profile, all test pits were refilled.

Historical/architectural field survey consisted of a visual reconnaissance of the property to determine the location of any historic resources (50 years of age or older), and to ascertain if such resources could be eligible for listing in the NRHP. Had historic structures been present, they would have been photographed and information needed for completion of FMSF form gathered. In addition to architectural descriptions, structures and features would be reviewed as to style, historic context, condition, and potential NRHP eligibility.

4.3 Unexpected Discoveries

It was anticipated that if human burial sites such as Indian mounds, lost historic and prehistoric cemeteries, or other unmarked burials or associated artifacts were found,

then the provisions and guidelines set forth in Chapter 872.05 *F.S.* (Florida's Unmarked Burial Law) would be followed.

4.4 Laboratory Methods and Curation

Had cultural materials been recovered, they would have been cleaned and sorted by artifact class. Lithics would have been divided into tools and debitage based on gross morphology. Tools would have been measured, and the edges examined with a 7-45x stereo-zoom microscope for traces of edge damage and classified using standard references (Bullen 1975; Purdy 1981). Lithic debitage would have been subjected to a limited technological analysis focused on ascertaining the stages of stone tool production. Flakes and non-flake production debris (i.e. cores, blanks, tested cobbles) would have been measured, and examined for raw material types and absence or presence of thermal alteration. The debitage would have been classified into four types (primary decortication, secondary decortication, non-decortication, and shatter) based on the amount of cortex on the dorsal surface and the shape (White 1963).

Aboriginal ceramics would have been classified based on the characteristics of temper type and decoration, utilizing standard references (Cordell 1987, 2004; Goggin 1948; Luer and Almy 1980; Willey 1949). In addition, standard references would have been used to aide in the identification of historic period artifacts to ascertain site function and temporal placement. Faunal material would have been initially sorted into class (mammal, reptile, bony fish, etc.); within these broad categories, identifiable elements would have been classified as to genus and species, where possible.

Curation of the project-related documents, including aerials, photographs, and field notes are on file at Archaeological Consultants, Inc. in Sarasota.

5.0 SURVEY RESULTS AND RECOMMENDATIONS

5.1 Archaeological Results

Archaeological field survey included both ground surface reconnaissance and the excavation of 135 shovel tests (Figure 5.1). Forty-one of the tests were excavated at 50 m (164 ft) intervals, 61 were excavated at 100 m (328 ft) intervals, and 33 were judgmentally placed. The general stratigraphy consisted of 0-30 (0-12 in) gray sand and 30-100 cm (12-39 in) light gray sand. Based on the report from Robert Mindick that local lore places an Indian mound in the northeastern portion of the property between Trout Lake and a marsh (Mindick 2008), shovel testing and extensive surface reconnaissance were conducted in this locale. The results were negative. As a result of these efforts, no new archaeological resources were discovered within the Conservation Area.

5.2 Historical/Architectural Results

Background research revealed an absence of previously recorded historic structures and the 1953 USGS Ashton and Narcoossee, Fla. quadrangle maps depicted no potential for historic structures within the project area. The Alligator Canal (8OS1900) (Photo 5.1), located west of the project area, will not be impacted by the Conservation Area, and this survey yielded no new data concerning the feature which is outside the Conservation Area. Thus, the existing FMSF form was not updated. However, the Old Melbourne Road (Photo 5.2) which forms a small segment of the southern property boundary has been recorded as a linear resource group and assigned the FMSF number 8OS2564 (Figure 5.2). A brief description of the road follows; the completed FMSF form is in Appendix A.

Old Melbourne Road – 8OS2564: The Dixie Highway forms approximately a half-mile of the southern boundary of the Conservation Area (Figure 5.1 and Photo 5.2). This small segment is a remnant of the Dixie Highway network of roads essentially connecting Florida to the rest of the nation through two routes: one through Jacksonville, down the east coast to Miami; the other through Gainesville, Ocala, Leesburg, Tavares, Apopka, and Orlando before joining the other line in Palm Beach.

In 1919, the portion of the Central Connector of the Dixie Highway, (also known as the Old Melbourne Road), was completed and paved with brick between St. Cloud and Deer Park. From Deer Park, cars were loaded on to flatcars and hauled to Melbourne over the lumber company's trestle over the St. Johns Marsh (Cody and Cody 1987). In 1924, a causeway was constructed across the marsh, and by October 1925, the entire length of the Dixie Highway opened from the Canadian border in Michigan to Miami. As a result, a modern highway finally connected central Florida with the rest of the nation (Robison and Andrews 1995:243-244; Shofner 1995b:228). Nonetheless, a good portion of the road was abandoned by 1929, when the road was rerouted through Holopaw from

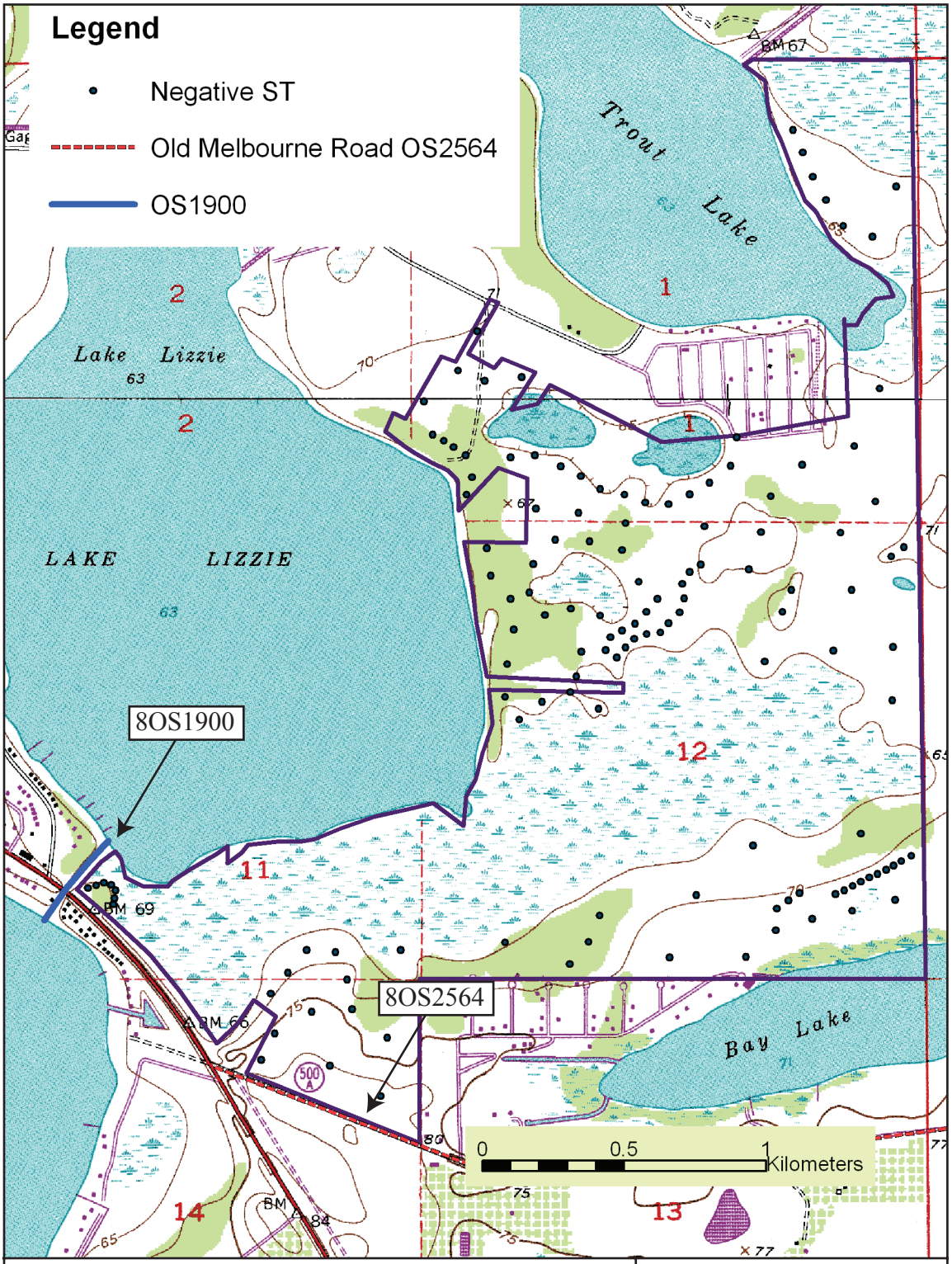


Figure 5.1. Approximate location of the shovel tests, and 8OS1900 and 8OS2564 in the Lake Lizzie Conservation Area, Sections 1, 2, 11, 12, and 14, Township 26 South, Range 31 East (USGS Ashton, Fla. 1953, PR 1981 and Narcoossee, Fla. 1953, PR 1970). Test pits not to scale.

Alligator Lake. This new road, which became US 192, was constructed to accommodate 60 mile per hour traffic (Cody and Cody 1987). Today, much of the Old Melbourne Road is within the Deseret Ranch and is not accessible to local traffic. The small segment of the road which forms the southern boundary of the Conservation Area does not appear eligible for listing in the NRHP. This segment has been paved with modern asphalt and has been slightly elevated above the surrounding terrain. Also, modern ditches and shoulder parallel the modern highway resulting in a loss of integrity.

Photo 5.1. Looking north at Alligator Canal (8OS1900) from US 192. The canal lies west of and outside the Conservation Area.

Photo 5.2. Looking east at Old Melbourne Highway (8OS2564) which forms part of the southern boundary of the Conservation Area. Note modern ditches, elevated shoulders, and road bed. Also note modern pavement has replaced original red brick.

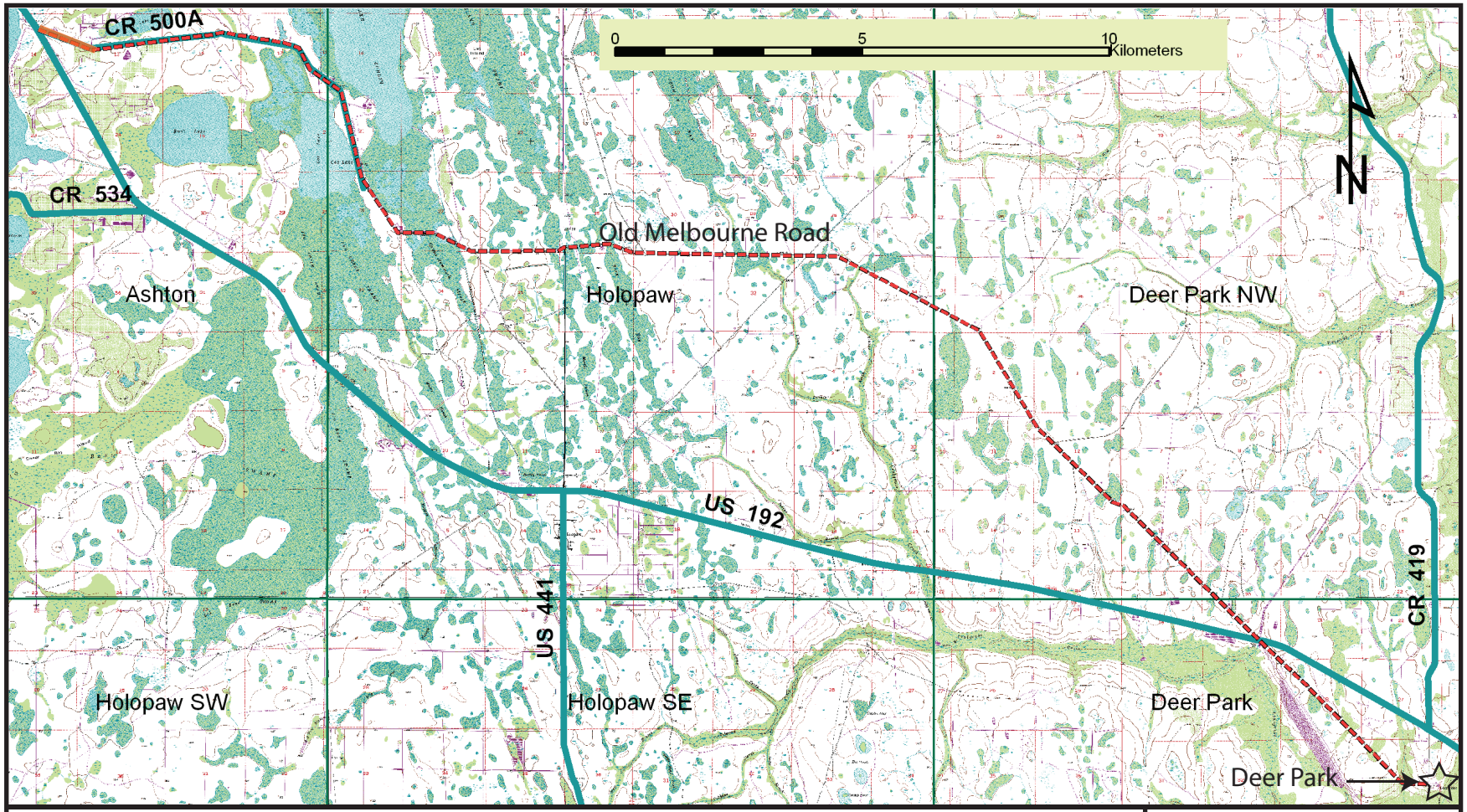


Figure 5.2. Location of the Old Melbourne Road between Deer Park and US 192 at Alligator Lake, Sections 13 and 14, Township 26 South, Range 31 East, Sections 16-18, 21, and 25-28, T26S, R32E, Sections 28-35, T26S, R33E, Sections 1-2 and 11-13, T27S, R33 E, and Sections 18-20, 28-29, and 33-34, T27S, R34E (USGS Ashton, Fla. 1953, PR 1981, Holopaw, Fla. 1953, PR 1970, Deer Park NW, Fla. 1953, PR 1970, and Deer Park, Fla. 1953, PR 1980). Orange indicates Conservation Area boundary.

5.3 Recommendations

Archaeological field survey resulted in the discovery of no archaeological sites and the mound referred to in local lore, purportedly located in the northeast portion of Section 1, northeast of Trout Lake, was not found despite extensive reconnaissance and subsurface shovel testing by ACI. The historic/architectural field survey resulted in the recording of the Old Melbourne Road (8OS2564) which forms a small portion of the southern property line. However, because of the small segment within the survey property, there is insufficient data to determine the significance of the highway. As a whole however, that portion within the project area is not considered eligible for listing in the NRHP due to a loss of integrity: the brick has been replaced with a modern, paved and elevated road bed paralleled by ditches and shoulders and will not be affected by any development of the Conservation Area. No additional investigations are deemed warranted.

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APPENDIX A: FMSF Form

☑ Original
☐ Update

RESOURCE GROUP FORM
FLORIDA MASTER SITE FILE
Version 4.0 1/07

Site #8 OS2564
Recorder# _____
Field Date ____/____/____
Form Date 06/23/08

NOTE: Use this form to document districts, landscapes and building complexes as described in the box below. Cultural resources contributing to the Resource Group should also be documented individually at the Site File. **Do not use this form for National Register multiple property submissions** (MPSs). National Register MPSs are treated as Site File manuscripts and are associated to the individual resources included under the MPS cover using the Site File manuscript number.

Check ONE box that best describes the Resource Group:

- ☐ **Historic district** (NR category "district"): buildings and NR structures only: NO archaeological sites
- ☐ **Archaeological district** (NR category "district"): archaeological sites only: NO buildings or NR structures
- ☐ **Mixed district** (NR category "district"): includes more than one type of cultural resource (example: archaeological sites and buildings)
- ☐ **FMSF building complex** (NR category usually "building(s)"): multiple buildings in close spatial and functional association
- ☐ **Designed historic landscape** (NR category usually "district" or "site"): can include multiple resources (see *National Register Bulletin #18*, page 2 for more detailed definition and examples: e.g. parks, golf courses, campuses, resorts, etc.)
- ☐ **Rural historic landscape** (NR category usually "district" or "site"): can include multiple resources and resources not formally designed (see *National Register Bulletin #30, Guidelines for Evaluating and Documenting Rural Historic Landscapes* for more detailed definition and examples: e.g. farmsteads, fish camps, lumber camps, traditional ceremonial sites, etc.)
- ☑ **Linear resource** (NR category usually "structure"): Linear resources are a special type of rural historic landscape and can include canals, railways, roads, etc.

Resource Group Name Old Melbourne Road **M**ultiple Listing [DHR only] _____
Project Name CRAS Lake Lizzie Conservation Area, Osceola County **F**MSF Survey # _____
National Register Category (please check one): ☐ building(s) ☐ structure ☐ district ☐ site ☐ object
Linear Resource Type (if applicable): ☐ canal ☐ railway ☑ road ☐ other (describe): _____
Ownership: ☑ private-profit ☐ private-nonprofit ☐ private-individual ☐ private-nonspecific ☐ city ☐ county ☑ state ☐ federal ☐ Native American ☐ foreign ☐ unknown

LOCATION & MAPPING

Address (if applicable, include N,S,E,W; #; St., Ave., etc.) _____
City/Town (within 3 miles) Kissimmee In Current City Limits? ☐ yes ☑ no ☐ unknown
County or Counties (do not abbreviate) Osceola
Name of Public Tract (e.g., park) _____

1) **T**ownship 26S **R**ange 31E **S**ection 13-14 ¼ section: ☐ NW ☐ SW ☐ SE ☐ NE ☐ Irregular-name: also sections
2) **T**ownship 26S **R**ange 32E **S**ection 16-18 ¼ section: ☐ NW ☐ SW ☐ SE ☐ NE ☐ Irregular-name: 21, 25-28
3) **T**ownship 26S **R**ange 33E **S**ection 28-35 ¼ section: ☐ NW ☐ SW ☐ SE ☐ NE ☐ Irregular-name: _____
4) **T**ownship 27S **R**ange 33E **S**ection 1-2 ¼ section: ☐ NW ☐ SW ☐ SE ☐ NE ☐ Irregular-name: 11-13

USGS 7.5' Map Name(s) & Date(s) (boundaries must be plotted on attached photocopy of map; label with map name and publication date) _____
Ashton 1953, PR 1981; Holopaw 1953, PR 1970; Deer Park NW 1953, PR 1970; Deer Park 1953, PR 1980
Plat, Aerial, or Other Map (map's name, originating office with location) _____
Landgrant _____
Verbal Description of Boundaries (description does not replace required map) also in T27S R34E S18-20, 28-29, 33-34

DHR USE ONLY	OFFICIAL EVALUATION	DHR USE ONLY
NR List Date ____/____/_____ ☐ Owner Objection	SHPO – Appears to meet criteria for NR listing: ☐ yes ☐ no ☐ insufficient info Date ____/____/_____ Init._____ KEEPER – Determined eligible: ☐ yes ☐ no Date ____/____/_____ NR Criteria for Evaluation: ☐ a ☐ b ☐ c ☐ d (see *National Register Bulletin 15*, p. 2)	

RESOURCE GROUP FORM

Site #8 OS2564

HISTORY & DESCRIPTION

Construction date: Exactly 1919 (year) Approximately _____(year) Earlier than _____(year) Later than _____(year)
Architect/Designer(last name first): _____ **B**uilder(last name first): _____
Total number of individual resources included in this Resource Group: # of contributing 1 # of non-contributing _____
Time period(s) of significance (for prehistoric districts, use archaeological phase name and approximate dates; for historical districts, use date range(s), e.g. *1895-1925)*
1919-1929
Narrative Description (*National Register Bulletin 16A* pp. 33-34; fit a summary into 3 lines or attach supplementary sheets if needed)_____

RESEARCH METHODS (check all that apply)

☑ FMSF record search (sites/surveys)	☑ library research	☐ building permits	☐ Sanborn maps
☑ FL State Archives/photo collection	☐ city directory	☐ occupant/owner interview	☑ plat maps
☐ property appraiser / tax records	☐ newspaper files	☐ neighbor interview	☑ Public Lands Survey (DEP)
☑ cultural resource survey	☐ historic photos	☐ interior inspection	☐ HABS/HAER record search

☐ other methods (specify) _____
Bibliographic References (use Continuation Sheet, give FMSF Manuscript # if relevant) _____

OPINION OF RESOURCE SIGNIFICANCE

Potentially eligible individually for National Register of Historic Places? ☐yes ☐no ☑insufficient information
Potentially eligible as contributor to a National Register district? ☐yes ☐no ☑insufficient information
Explanation of Evaluation (required, see *National Register Bulletin 16A* p. 48-49. Attach longer statement, if needed, on separate sheet.) _____
insufficient data available to determine significance based on the small segment adjacent to the project area; road will not be affected by the Nature Preserve

Area(s) of Historical Significance (see *National Register Bulletin 15*, p. 8 for categories: e.g. "architecture", "ethnic heritage", "community planning & development", etc.)
transportation

DOCUMENTATION

Accessible Documentation Not Filed with the Site File - including field & analysis notes, photos, plans, other important documents that are permanently accessible: For each separately maintained collection, describe (1) document type(s),* (2) maintaining organization,* (3) file or accession nos., and (4) descriptive information._____
documentation of file ACI, P08036

RECORDER INFORMATION

Recorder Name Horvath, Elizabeth A.
Recorder Contact Information (Address / Phone / Fax / Email) 98 Hickorywood Dr., Crawfordville, FL 32327, 850-926-9285
acinorth@comcast.net
Recorder Affiliation Archaeological Consultants, Inc.

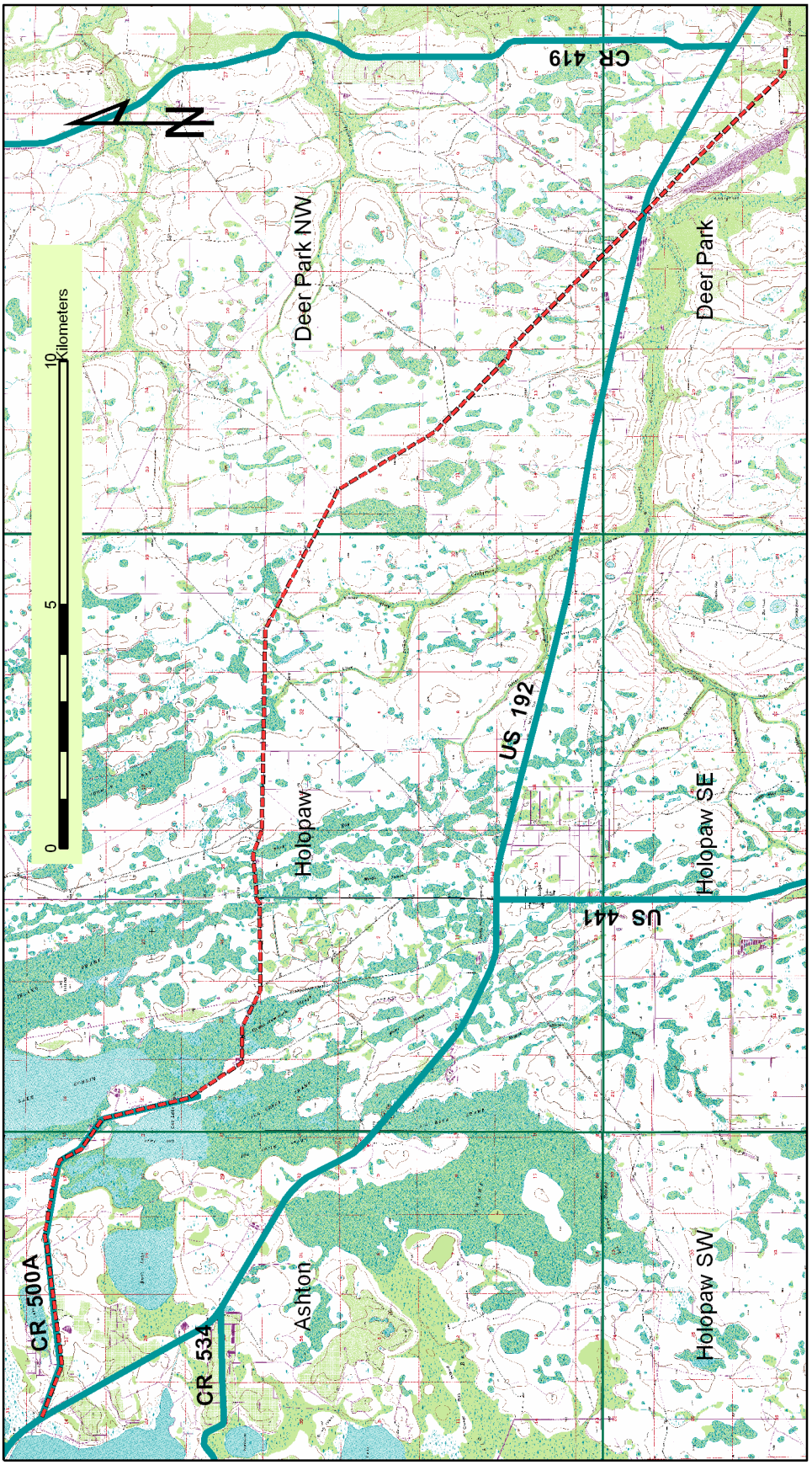
Required Attachments

❶ **PHOTOCOPY OF USGS 7.5' MAP WITH DISTRICT BOUNDARY CLEARLY MARKED**
❷ **LARGE SCALE STREET, PLAT OR PARCEL MAP WITH RESOURCES MAPPED & LABELED**
❸ **TABULATION OF ALL INLCUDED RESOURCES** (name, FMSF #, contributing? Y/N, resource category, street address or township-range-section if no address)
❹ **PHOTOS OF GENERAL STREETSCAPE OR VIEWS (Optional: aerial photos, views of typical resources)** Photos may be archival B&W prints OR digital image files. If submitting digital image files, they must be included on disk or CD AND in hard copy format (plain paper is acceptable). Digital images must be at least 1600 x 1200 pixels, 24-bit color, jpeg or tiff.

Resource Group Form

Florida Master Site File
Version 2.0

Site # ___OS2564___



APPENDIX B: Survey Log Sheet

Ent D (FMSF only)___/___/___

Survey Log Sheet

Florida Master Site File
Version 4.1 1/07

Survey # (FMSF only) _____

Consult *Guide to the Survey Log Sheet* for detailed instructions.

Identification and Bibliographic Information

Survey Project (name and project phase) CRAS Lake Lizzie Conservation Area Osceola County

Report Title (exactly as on title page) Cultural Resource Assessment Survey for the Lake Lizzie Conservation Area, Osceola County, Florida

Report Author(s) (as on title page– individual or corporate; last names first) ACI

Publication Date (year) 2008 **Total Number of Pages in Report** (count text, figures, tables, not site forms) 50

Publication Information (Give series and no. in series, publisher and city. For article or chapter, cite page numbers. Use the style of *American Antiquity*.)
ACI (2008) Cultural Resource Assessment Survey for the Lake Lizzie Conservation Area Osceola County, Florida. ACI, Sarasota.

Supervisor(s) of Fieldwork (whether or not the same as author[s]; last name first) Almy, Marion

Affiliation of Fieldworkers (organization, city) Archaeological Consultants, Inc., Sarasota

Key Words/Phrases (Don't use the county, or common words like *archaeology*, *structure*, *survey*, *architecture*. Limit each word or phrase to 25 characters.) Lake Lizzie, Aligator Canal, Old Melbourne Highway

Survey Sponsors (corporation, government unit, or person who is directly paying for fieldwork)

Name Osceola County Parks Department

Address/Phone 366 North Beaumont Avenue, Kissimmee, FL 34741

Recorder of *Log Sheet* Horvath, Elizabeth A. **Date *Log Sheet* Completed** 06 /23 /08

Is this survey or project a continuation of a previous project? ☑ No ❑ Yes: **Previous survey #(s) (FMSF only)** _____

Mapping

Counties (List each one in which field survey was done - do not abbreviate; use supplement sheet if necessary)
Osceola

USGS 1:24,000 Map(s) : Map Name/Date of Latest Revision (use supplement sheet if necessary):
Ashton, Fla. 1953, PR 1981; Narcoossee, Fla. 1953, PR 1970

Description of Survey Area

Dates for Fieldwork: Start 06 /17 /08 End 06 /20 /08 **Total Area Surveyed** (fill in one) _____ hectares 1000 acres

Number of Distinct Tracts or Areas Surveyed 1

If Corridor (fill in one for each): **Width** _____ meters _____ feet **Length** _____ kilometers _____ miles

Survey Log Sheet

Survey #_____

Research and Field Methods

Types of Survey (check all that apply): ☑ archaeological ☑ architectural ☑ historical/archival ☐ underwater ☐ other:_____

Preliminary Methods (✓Check as many as apply to the project as a whole.)

☐ Florida Archives (Gray Building)	☑ library research- *local public*	☑ local property or tax records	☐ other historic maps
☐ Florida Photo Archives (Gray Building)	☑ library-special collection - *nonlocal*	☐ newspaper files	☑ soils maps or data
☑ Site File property search	☑ Public Lands Survey (maps at DEP)	☑ literature search	☑ windshield survey
☑ Site File survey search	☐ local informant(s)	☐ Sanborn Insurance maps	☐ aerial photography

☐ other (describe)_____

Archaeological Methods (✓Check as many as apply to the project as a whole.)

☐ Check here if **NO** archaeological methods were used.

☐ surface collection, controlled	☐ other screen shovel test (size: ____)	☐ block excavation (at least 2x2 M)
☑ surface collection, **un**controlled	☐ water screen (finest size: ____)	☐ soil resistivity
☑ shovel test-1/4"screen	☐ posthole tests	☐ magnetometer
☐ shovel test-1/8" screen	☐ auger (size:____)	☐ side scan sonar
☐ shovel test 1/16"screen	☐ coring	☐ unknown
☐ shovel test-unscreened	☐ test excavation (at least 1x2 M)	

☐ other (describe):_____

Historical/Architectural Methods (✓Check as many as apply to the project as a whole.)

☐ Check here if **NO** historical/architectural methods were used.

☐ building permits	☐ demolition permits	☐ neighbor interview	☐ subdivision maps
☐ commercial permits	☑ exposed ground inspected	☐ occupant interview	☑ tax records
☐ interior documentation	☑ local property records	☐ occupation permits	☐ unknown

☐ other (describe):_____

Scope/Intensity/Procedures background research, systematic (50 & 100 m interval) and judgmental subsurface testing 50 cm diameter, 1 m deep, 6.4 mm mesh screen

Survey Results (cultural resources recorded)

Site Significance Evaluated? ☑ Yes ☐ No If *Yes*, circle NR-eligible/significant site numbers below.

Site Counts: Previously Recorded Sites 0 Newly Recorded Sites 1

Previously Recorded Site #'s with Site File Update Forms (List site #'s without "8." Attach supplementary pages if necessary) _____

Newly Recorded Site #'s (Are you sure all are originals and not updates? Identify methods used to check for updates, i.e., researched Site File records. List site #'s without "8." Attach supplementary pages if necessary.) OS2564

Site Form Used: ☑ Site File Paper Form ☐ SmartForm II Electronic Recording Form

REQUIRED: ATTACH PLOT OF SURVEY AREA ON PHOTOCOPIES OF USGS 1:24,000 MAP(S)

DO NOT USE SITE FILE USE ONLY DO NOT USE

BAR Related

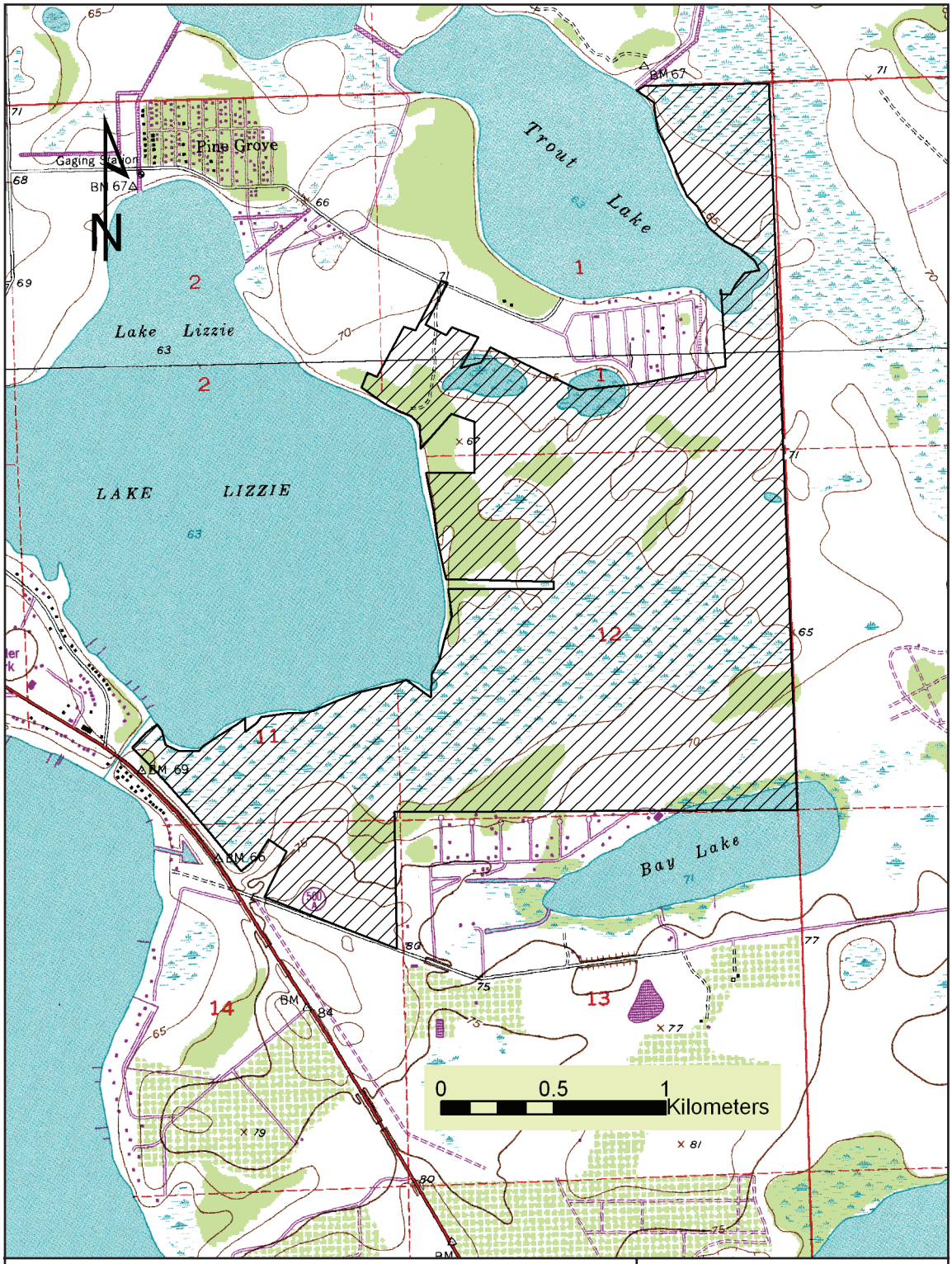
☐ 872 ☐ 1A32 #_____

☐ CARL ☐ UW

BHP Related

☐ State Historic Preservation Grant

☐ Compliance Review: CRAT #_____



Lake Lizzie Conservation Area
Sections 1, 2, 11, 12, and 14, Township 26 South, Range 31 East
USGS Ashton, Fla. 1953, PR 1981 Narcoosee, Fla.
Osceola County

Attachment B
Lake Lizzie Management Plan Workshop
Friday, June 6, 2008
8:30 am – 3:30 pm

Attendees:

Eleanor Foerste	UF/IFAS Osceola County Extension Services	321-697-3000	efoe@osceola.org
Steve Glass	FWC	407-436-1009	steve.glass@myfwc.com
Sam Van Hook	Kissimmee Valley Forester	863-678-5199	samvanhook@verizon.net
Tom Donohoe	DOF	407-892-3024	donohot@doacs.org
Don Fisher	Osceola County Growth Management	407-343-3111	dfis@osceola.org
Tim Debrecht	Osceola County Emergency Services	407-742-6850	tdeb@osceola.org
Don Miers	Osceola County Parks & Event Facilities	407-742-7808	dmie3@osceola.org
Bob Mindick	Osceola County Parks	407-742-7806	rmin2@osceola.org
Terry Johnson	Osceola County Parks	404-742-7801	tjoh@osceola.org
Sherry Burroughs	Osceola County Parks	407-742-7809	sbur5@osceola.org
Buddy Davis	Osceola County Parks	407-343-7176	bdav2@osceola.org
Sandy Bean	Osceola County Parks	407-742-7806	sbea@osceola.org
Mike Green	Glatting Jackson	407-843-6552	mgreen@glatting.com
Randy Mejeur	Glatting Jackson	407-843-6552	rmejeur@glatting.com
Jay Exum	Glatting Jackson	407-843-6552	jexum@glatting.com

Attachment B
Lake Lizzie Management Plan Workshop
Friday, June 6, 2008
8:30 am – 3:30 pm

Goals & Objectives

- Manage the LLCA to:
  - Maintain biological diversity on the site
  - Maintain listed species populations of scrub jays, gopher tortoises, eastern indigo snake, and Sherman's fox squirrel
  - Control population of exotic species, especially feral hogs
  - Provide passive recreation access and amenities for public use compatible with conservation objectives
  - Reduce fuel loads within natural systems
  - Provide appropriate access locations and manage access to attempt to address safety and security concerns
- Restore fire-dependent systems through
  - Mechanical methods, especially in sand pine systems
  - Prescribed fire
  - "Fix" Hydrology and water quality of lakes and wetlands on the site
- Provide educational and stewardship opportunities
  - "Friends of the Park", Adopt a park
  - Education materials for the benefits of prescribed fire and firewise planning methods
  - Provide outreach opportunities to other County Departments
- Improve aesthetic appearance
- Make site a destination compatible with natural values with urban connections

Prescribed Fire / Vegetation Management

- Maintain/refurbish existing boundaries
  - Sand Pine at south end
  - East along entrance road
  - South line along ditch-ok; with south wind burn with south wind
    - Different prescribed fire requires enhance break
  - East line ok width/+ ditch
  - Northeast boundary, re-established
  - North bog - maintain
  - North prescribed fire, need north wind
  - Access points sufficient
  - Smoke screen/critical for when to burn (along Highway 192/Interface)
  - H_20: DOF standard plus on site in season
  - Hydrants available? Tim?
- Increase fire-break width
  - 15 – 20 ft
  - Mineral soil
- Divide into management units
  - By habitat types

    - Scrub/Marsh/Sand Pine/Homestead
- Set desired future conditions (DFCs) for long-term, sustainable management. To include:
    - T&E
    - Safety
    - Vegetative control
    - Mechanical management
    - Timeframe to achieve "success"
    - Short-term milestones
    - Consideration of new developments
    - Communication to the public
    - "Fire wise" advice to neighbors
    - Fire cycles to meet natural resource goals
- Partnership with Fire Department
    - Large units contracted (Marsh, Sand Pine, Flatwoods)
    - Scrub jay units - DOF, Emergency Service
- Evaluate consulting with FWC for management
- Evaluate fencing needs along highway 192
    - What about fence lines/laws
    - Posting requirements
- Canopy thinning needed
- Restore seasonal fires
- Start with fuel but transition to seed production seasons (Quail)
- First set of firebreaks in north (SE winds)
- Soft lines and hard lines
- Use marsh as soft break
- Chop around (road roller chop) in center for interim fire management
- Break up burn units in Scrub Jays
- Remove fill piles
- Contracted burner vs. In house for small fires
- Check with HOA's, adjacent homeowners
    - Reverse 911 for burn notification
    - Firewise education
- Kiosks for education by neighborhoods (firewise kiosk)

Exotic Control

- Hogs, vegetation, feral cats, etc.
    - Reference adherence to FWC feral cat colony management
    - Focus <u>now</u> on natural vegetation management as a way of discouraging exotics
    - Map current extent of exotics*, monitor
    - Hogs
        - Have a hunt for revenue and meat (FCT grant allow this?)
        - Get all the mileage from free harvesting
        - Consider giving hogs to food bank
        - Monitor
- Budget now even though exotics seem "low"

- Horse recreation may introduce exotics - TSA
- Monitor edges for introduction
  - 2-4 times a year
  - Site visits each time
- Prioritize based on budget and aggressive species
- DEP - Lake edge maintenance?

Partnerships

- Glatting Jackson
- FDOF - Mitigation burning, fireline
- FCT
- OGT
- TPL
- TNC
- FDEP - Trial grant; Upland invasive grant
- USFWS
- SFWMD
- FWC - Biology
- Audubon Society - Wildlife Surveys
- UF - Studies
- Jay Watch
- Student researchers
- Florida Trail
- Boy Scouts
- 4-H
- Bike Group
- Osceola County Schools
- County Divisions/Departments
  - Parks
  - Land Acquisition
  - Extension Services
  - Road and Bridge – Fireline development/equipment
  - Growth Management
  - Emergency Services
    - Sheriff's Office - On-site residence/security
    - Fire Rescue
      - Large units contracted (Marsh, Sand Pine, Flatwoods)
      - Scrub jay units - DOF, Emergency Service
      - Evaluate consulting with FWC for management
      - Evaluate fencing needs along highway 192
        - What about fence lines/laws
        - Posting requirements
    - Canopy thinning needed
      - Restore seasonal fires
      - Start with fuel but transition to seed production seasons (Quail)

- Define roles, responsibilities of project caretakers; provide guidelines and expectations
- Engage, communicate, seek input
- Identify specific areas where we need support, money
- Create communication methods like brochures, kiosks, etc.
- Seek leaders for Friends of Lake Lizzie
- Copy partners on the management plan

Recreation

- Assure compatibility
- Conduct a workshop/needs assessment that includes the partners and user groups
- Focus only on resource-based recreation (passive)
- Don't let recreation compromise the natural resource DFCs
- Keep Lake Lizzie a special place but accommodate those that seek this experience
- Probably inappropriate:
  - ATV, motorcycles (T&E disturbance)
  - Active park
  - Paved roads
  - Paved bike trails
  - Off-road bicycles?
- Consider seasonal restrictions, quotas
- Define the roles, possible functions of concessionaires
- Boat access to day use area (pier/dock)
- Horses are staying
- Primitive camping/alternate site
- "Passive Use" resource based ok
- Boardwalk/overlook "plastic burns"
- Add kiosks/benches/picnic tables
- Access
  - North/South parking areas
  - Access goes both ways
  - Reduce access points
  - Access pressure from south/east
  - Management plan could save "develop access management plan"
  - Fencing needs
  - Boat access
    - Canoe access
    - Picnic access, camp by lakes (lake access only)
    - Destination points along Chain of Lakes
  - Short trails and straighter trail network needed
  - Rest stops/kiosks
  - Overlook
  - Primitive camp

Restoration

- Dipping vat

- Sandhill crane management needs
  - Shrubs in march are problematic
  - Hydro restoration may be difficult from a liability standpoint
- Priority is Scrub Jay area

Order of Priority

1. Prescribed Fire / Vegetation Management (55)
2. Partnerships (27)
3. Recreation (25)
4. Restoration (21)
5. Exotic Control (14)

Exhibit C

CHARLES H. BRONSON
COMMISSIONER

Florida Department of Agriculture and Consumer Services
Division of Forestry

PRESCRIBED BURNING PLAN
(PRESCRIPTION)

Use Fire Wisely

Forestry Center/ District:			**Authorization Number:**		
Landowner:					
Address:			**Telephone Number: ( ) - ext:**		
- LOCATION -					
County:	**Section**	**Township**	**Range**		
Latitude			**Longitude**		
Deg:	**Min:**	**Sec:**	**Deg:**	**Min:**	**Sec:**

Acres to Burn:	**Distance to Plow:**	**Previous Burn Date:**
Stand Description:		
Overstory Type:	**Understory Type:**	**Height to Bottom of Crown:**

Fuel Description:	**Fuel Model:** 0	**Topography and Soil:**

Purpose of the Burn:	**Burn Objectives:**
Firing Techniques & Ignition Methods:	
Personnel Needs:	**Equipment Needs:**
Maximum Crown Scorch Acceptable:	**Passed Smoke Screening System:** ☐ YES ☐ NO
List Possible Smoke-Sensitive Areas:	
Special Precautions:	
Adjacent Landowners to Notify:	

WEATHER FACTORS	PREFERRED	ACTUAL
Surface Winds		
Transport Winds		
Minimum Mixing Height		
Dispersion Index (DAY)		
Dispersion Index (NIGHT)		
Maximum Temperature		
Minimum Relative Humidity		
Fine Fuel Moisture		
Rate of Spread		
Starting Time		
Burn Technique		
Flame Length		

MONITORING & EVALUATION PROCEDURES		
PRE-BURN	BURN	POST BURN

Days Since Rain:	**Date Burned**:	**Distance Plowed**:

BURN CHECK LIST

FIRE BOSS: Check each item to indicate compliance.

- ☐ All prescription requisites met (preparation and day of burn).
- ☐ Authorization obtained.
- ☐ Adjacent landowners notified within past seven days of plan to burn.
- ☐ Local contacts made day of burn to advise (FHP, SO, Fire Dept., media, etc.)
- ☐ Smoke screening performed and documented.
- ☐ All equipment required on scene and fully operational.
- ☐ Each crew member has proper personal gear and clothing.
- ☐ Low Visibility Risk Index checked.
- ☐ Smoke on the Highway signs in place, if needed.
- ☐ Test burn performed and fire behavior within expectations.

CREW BRIEFING

- ☐ Objectives of burn.
- ☐ Exact area of burn.
- ☐ Hazards discussed (volatile fuels, spotting potential, weak points in perimeter lines, terrain features, etc.).
- ☐ Crew Assignments made.
- ☐ Ignition technique and pattern. Holding method(s).
- ☐ Location of extra equipment, fuel, water, vehicle keys.
- ☐ Authority and communications.
- ☐ Contingencies covered including escape routes or procedures.
- ☐ Sources of nearest assistance. Nearest phone and emergency numbers.
- ☐ Special instructions regarding smoke management, contact with the public and others.
- ☐ Questions.
- ☐ Crew members given opportunity to decline participation (is there anything that is going to prevent full physical performance?).

Prescription Done by:	**Certification Number**:
Title:	**Date**:

CERTIFIED BURN MANAGER SIGNATURE:

FLEPPC List Definitions: Exotic – a species introduced to Florida, purposefully or accidentally, from a natural range outside of Florida. Native – a species whose natural range included Florida at the time of European contact (1500 AD). Naturalized exotic – an exotic that sustains itself outside cultivation (it is still exotic; it has not "become" native). Invasive exotic – an exotic that not only has naturalized, but is expanding on its own in Florida native plant communities.

Abbreviations: Government List (Gov. List): **P** = Prohibited by Florida Department of Environmental Protection; **N** = Noxious weed listed by Florida Department of Agriculture & Consumer Services; **U** = Noxious weed listed by U.S. Department of Agriculture. Regional Distribution (Reg. Dis.): **N** = north; **C** = central; **S** = south; referring to each species' current distribution in general regions of Florida (not its potential range in the state). Please refer to the adjacent map.

The 2007 list was prepared by the FLEPPC Plant List Committee:

Keith A. Bradley – Chair (2006-present), The Institute for Regional Conservation, 22601 S.W. 152nd Ave., Miami, FL 33170

Kathy Craddock Burks – Chair (2001-2006)

Nancy Craft Coile, Botanist Emerita, Division of Plant Industry, Florida Department of Agriculture and Consumer Services, 22804 N.W. County Road 2054, Alachua, FL 32615

Janice A. Duquesnel, Florida Park Service, Florida Department of Environmental Protection, P.O. Box 1052, Islamorada, FL 33036

David W. Hall, Private Consulting Botanist, 3666 N.W. 13th Place, Gainesville, FL 32605

Roger L. Hammer, Miami-Dade Parks Department, Castellow Hammock Nature Center, 22301 S.W. 162nd Ave., Miami, FL 33030

Patricia L. Howell, Broward County Parks, Environmental Section, 950 NW 38th Street, Oakland Park, FL 33309

Colette C. Jacono, U. S. Geological Survey, Center for Aquatic Resources Studies, 7920 NW 71st Street, Gainesville, FL 32653

Kenneth A. Langeland, Center for Aquatic and Invasive Plants, IFAS, University of Florida, 7922 N.W. 71st St., Gainesville, FL 32606

Chris Lockhart, Florida Natural Areas Inventory, c/o P.O. Box 243116, Boynton Beach, FL 33424-3116

Gil Nelson, Gil Nelson Associates, 157 Leonard's Drive, Thomasville, GA 31792

Robert W. Pemberton, Invasive Plants Research Lab, U.S. Dept. of Agriculture, 3225 College Ave., Ft. Lauderdale, FL 33312

Jimi L. Sadle, Everglades National Park, 40001 State Road 9336, Homestead, FL 33034

Robert W. Simons, 1122 S.W. 11th Avenue, Gainesville, FL 32601-7816

Sandra M. Vardaman, Alachua County Forever Land Conservation Program, Alachua County Environmental Protection Dept., 201 SE 2nd Avenue, Suite 201, Gainesville, FL 32601

Daniel B. Ward, Department of Botany, University of Florida, 220 Bartram Hall, Gainesville, FL 326ll

Richard P. Wunderlin, Institute for Systematic Botany, Dept. of Biological Sciences, University of South Florida, Tampa, FL 33620

For more information on invasive exotic plants, including links to related web pages, visit the Florida EPPC web site: http://www.fleppc.org

Attachment D

Application for Membership in the Florida Exotic Pest Plant Council

Annual Membership Levels

(circle one)

Individual		Institutional	
Student	$10	Library	$100
General	$30	General	$100
Donor	$75 +	Contributor	$501 – $10,000
		Patron	$10,001 +

FLEPPC is a 501(c)(3) nonprofit organization.

NAME

ORGANIZATION

MAILING ADDRESS

CITY, STATE, ZIP

TELEPHONE

FAX

E-MAIL

Mail application & dues, payable to FLEPPC, to:

Florida EPPC, Treasurer

PO Box 23426

Fort Lauderdale FL 33307

(Or join online at www.fleppc.org)

Florida Exotic Pest Plant Council's 2007 List of Invasive Plant Species

Purpose of the List:

To focus attention on —

- the adverse effects exotic pest plants have on Florida's biodiversity and plant communities,
- the habitat losses from exotic pest plant infestations,
- the impacts on endangered species via habitat loss and alteration,
- the need to prevent habitat losses through pest-plant management,
- the socio-economic impacts of these plants (e.g., increased wildfires in certain areas),
- changes in the seriousness of different pest plants over time,
- the need to provide information that helps managers set priorities for control programs.

www.fleppc.org

CATEGORY I

Invasive exotics that are altering native plant communities by displacing native species, changing community structures or ecological functions, or hybridizing with natives. *This definition does not rely on the economic severity or geographic range of the problem, but on the documented ecological damage caused.*

Scientific Name	Commom Name	Gov. List	Reg. Dis.
Abrus precatorius	rosary pea	N	C, S
Acacia auriculiformis	earleaf acacia		C, S
Albizia julibrissin	mimosa, silk tree		N, C
Albizia lebbeck	woman's tongue		C, S
Ardisia crenata (=*A. crenulata* misapplied)	coral ardisia		N, C, S
Ardisia elliptica (=*A. humilis* misapplied)	shoebutton ardisia	N	C, S
Asparagus aethiopicus (=*A. sprengeri; A. densiflorus* misapplied)	asparagus-fern		N, C, S
Bauhinia variegata	orchid tree		C, S
Bischofia javanica	bishopwood		C, S
Calophyllum antillanum (=*C. calaba* and *C. inophyllum* misapplied)	santa maria (names "mast wood," "Alexandrian laurel" used in cultivation)		S
Casuarina equisetifolia	Australian-pine, beach sheoak	P, N	N, C, S
Casuarina glauca	suckering Australian-pine, gray sheoak	P, N	C, S
Cinnamomum camphora	camphor tree		N, C, S
Colocasia esculenta	wild taro		N, C, S
Colubrina asiatica	lather leaf	N	S
Cupaniopsis anacardioides	carrotwood	N	C, S
Dioscorea alata	winged yam	N	N, C, S
Dioscorea bulbifera	air-potato	N	N, C, S
Eichhornia crassipes	water-hyacinth	P	N, C, S
Eugenia uniflora	Surinam cherry		C, S
Ficus microcarpa (*F. nitida* and *F. retusa* var. *nitida* misapplied)	laurel fig		C, S
Hydrilla verticillata	hydrilla	P, U	N, C, S
Hygrophila polysperma	green hygro	P, U	N, C, S
Hymenachne amplexicaulis	West Indian marsh grass		C, S
Imperata cylindrica (*I. brasiliensis* misapplied)	cogon grass	N, U	N, C, S
Ipomoea aquatica	waterspinach	P, U	C
Jasminum dichotomum	Gold Coast jasmine		C, S
Jasminum fluminense	Brazilian jasmine		C, S
Lantana camara	lantana, shrub verbena		N, C, S
Ligustrum lucidum	glossy privet		N, C
Ligustrum sinense	Chinese privet, hedge privet		N, C, S
Lonicera japonica	Japanese honeysuckle		N, C, S
Ludwigia peruviana	Peruvian primrosewillow		N, C, S
Lygodium japonicum	Japanese climbing fern	N	N, C, S
Lygodium microphyllum	Old World climbing fern	N	C, S
Macfadyena unguis-cati	cat's claw vine		N, C, S
Manilkara zapota	sapodilla		S
Melaleuca quinquenervia	melaleuca, paper bark	P, N, U	C, S
Mimosa pigra	catclaw mimosa	P, N, U	C, S
Nandina domestica	nandina, heavenly bamboo		N, C
Nephrolepis cordifolia	sword fern		N, C, S
Nephrolepis multiflora	Asian sword fern		C, S
Neyraudia reynaudiana	Burma reed, cane grass	N	S
Paederia cruddasiana	sewer vine, onion vine	N	S
Paederia foetida	skunk vine	N	N, C, S
Panicum repens	torpedo grass		N, C, S
Pennisetum purpureum	Napier grass		N, C, S
Pistia stratiotes	waterlettuce	P	N, C, S
Psidium cattleianum (=*P. littorale*)	strawberry guava		C, S
Psidium guajava	guava		C, S
Pueraria montana var. *lobata* (=*P. lobata*)	kudzu	N	N, C, S
Rhodomyrtus tomentosa	downy rose-myrtle	N	C, S
Rhynchelytrum repens (=*Melinis repens*)	Natal grass		N, C, S
Ruellia tweediana (=*R. brittoniana; R. coerulea*)	Mexican petunia		N, C, S
Sapium sebiferum (=*Triadica sebifera*)	popcorn tree, Chinese tallow tree	N	N, C, S
Scaevola taccada (=*S. sericea; S. frutescens*)	scaevola, half-flower, beach naupaka	N	C, S
Schefflera actinophylla (=*Brassaia actinophylla*)	schefflera, Queensland umbrella tree		C, S
Schinus terebinthifolius	Brazilian pepper	P, N	N, C, S
Senna pendula var. *glabrata* (=*Cassia coluteoides*)	climbing cassia, Christmas cassia, Christmas senna		C, S
Solanum tampicense (=*S. houstonii*)	wetland nightshade, aquatic soda apple	N, U	C, S
Solanum viarum	tropical soda apple	N, U	N, C, S
Syngonium podophyllum	arrowhead vine		N, C, S
Syzygium cumini	jambolan plum, Java plum		C, S
Tectaria incisa	incised halberd fern		S
Thespesia populnea	seaside mahoe		C, S
Tradescantia fluminensis	white-flowered wandering jew		N, C
Urochloa mutica (=*Brachiaria mutica*)	Para grass		C, S

CATEGORY II

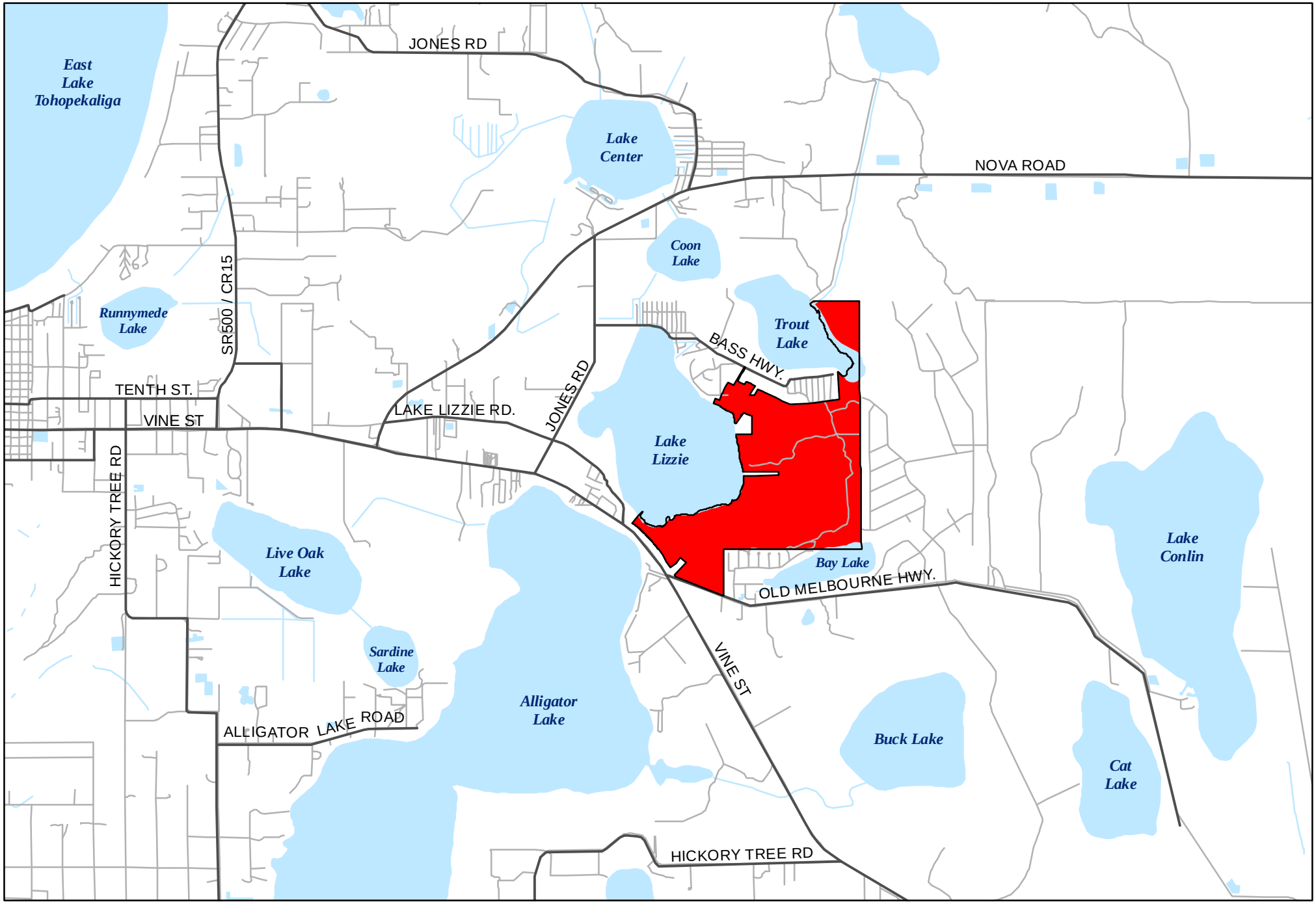
Invasive exotics that have increased in abundance or frequency but have not yet altered Florida plant communities to the extent shown by Category I species. *These species may become ranked Category I, if ecological damage is demonstrated.*

Scientific Name	Commom Name	Gov. List	Reg. Dis.
Adenanthera pavonina	red sandalwood		S
Agave sisalana	sisal hemp		C, S
Aleurites fordii (=*Vernicia fordii*)	tung oil tree		N, C
Alstonia macrophylla	devil tree		S
Alternanthera philoxeroides	alligator weed	P	N, C, S
Antigonon leptopus	coral vine		N, C, S
Aristolochia littoralis	calico flower		N, C, S
Asystasia gangetica	Ganges primrose		C, S
Begonia cucullata	wax begonia		N, C, S
Blechum pyramidatum	green shrimp plant, Browne's blechum		N, C, S
Broussonetia papyrifera	paper mulberry		N, C, S
Callisia fragrans	inch plant, spironema		C, S
Casuarina cunninghamiana	river sheoak, Australian-pine	P	C, S
Cecropia palmata	trumpet tree		S
Cestrum diurnum	day jessamine		C, S
Chamaedorea seifrizii	bamboo palm		S
Clematis terniflora	Japanese clematis		N, C
Cryptostegia madagascariensis	rubber vine		C, S
Cyperus involucratus (*C. alternifolius* misapplied)	umbrella plant		C, S
Cyperus prolifer	dwarf papyrus		C, S
Dalbergia sissoo	Indian rosewood, sissoo		C, S
Elaeagnus pungens	silverthorn, thorny olive		N, C
Epipremnum pinnatum cv. Aureum	pothos		C, S
Ficus altissima	false banyan, council tree		S
Flacourtia indica	governor's plum		S
Hemarthria altissima	limpo grass		C, S
Hibiscus tiliaceus (=*Taliparíti tiliaceum*)	mahoe, sea hibiscus		C, S
Ipomoea fistulosa (=*I. carnea* ssp. *fistulosa*)	shrub morning-glory	P	C, S
Jasminum sambac	Arabian jasmine		S
Kalanchoe pinnata	life plant		C, S
Koelreuteria elegans ssp. *formosana* (=*K. formosana; K. paniculata* misapplied)	flamegold tree		C, S
Leucaena leucocephala	lead tree	N	N, C, S
Limnophila sessiliflora	Asian marshweed	P, U	N, C, S
Livistona chinensis	Chinese fan palm		C, S
Melia azedarach	Chinaberry		N, C, S
Melinis minutiflora	Molassesgrass		C, S
Merremia tuberosa	wood-rose		S
Murraya paniculata	orange-jessamine		S
Myriophyllum spicatum	Eurasian water-milfoil	P	N, C, S
Nymphoides cristata	snowflake		C, S
Panicum maximum	Guinea grass		N, C, S
Passiflora biflora	two-flowered passion vine		S
Pennisetum setaceum	green fountain grass		S
Phoenix reclinata	Senegal date palm		C, S
Phyllostachys aurea	golden bamboo		N, C
Pittosporum pentandrum	Philippine pittosporum, Taiwanese cheesewood		S
Pteris vittata	Chinese brake fern		N, C, S
Ptychosperma elegans	solitaire palm		S
Rhoeo spathacea (see *Tradescantia spathacea*)			
Ricinus communis	castor bean		N, C, S
Rotala rotundifolia	roundleaf toothcup, dwarf Rotala		S
Sansevieria hyacinthoides	bowstring hemp		C, S
Scleria lacustris	Wright's nutrush		C, S
Sesbania punicea	purple sesban, rattlebox		N, C, S
Solanum diphyllum	two-leaf nightshade		N, C, S
Solanum jamaicense	Jamaica nightshade		C
Solanum torvum	susumber, turkey berry	N, U	N, C, S
Sphagneticola trilobata (=*Wedelia trilobata*)	wedelia		N, C, S
Stachytarpheta cayennensis (=*S. urticifolia*)	nettle-leaf porterweed		S
Syagrus romanzoffiana (=*Arecastrum romanzoffianum*)	queen palm		C, S
Syzygium jambos	rose-apple		C, S
Terminalia catappa	tropical-almond		C, S
Terminalia muelleri	Australian-almond		C, S
Tradescantia spathacea (=*Rhoeo spathacea; Rhoeo discolor*)	oyster plant		S
Tribulus cistoides	puncture vine, burr-nut		N, C, S
Urena lobata	Caesar's weed		N, C, S
Vitex trifolia	simple-leaf chaste tree		C, S
Washingtonia robusta	Washington fan palm		C, S
Wedelia (see *Sphagneticola* above)			
Wisteria sinensis	Chinese wisteria		N, C
Xanthosoma sagittifolium	malanga, elephant ear		N, C, S

Attachment E. Workplan for Natural Resource Management on the Lake Lizzie Conservation Area, Osceola County, Florida.

EMU #	Dominant Plant Community/Land Use	Desired Plant Community	Historical Fire Frequency	Muck Fire Danger	Proposed Fire Frequency	Potential Mechanical Management	Joint Management EMUs	Restoration Opportunities	Exotic Species	Listed Species	Management Actions		
											1st Year	2nd Year	3rd Year +
1	Alligator Canal bank	Live oak hammock	N/A	N/A	None	N/A	N/A	Remove/ regrade/ breach canal berm; re-vegetate	Brazilian pepper, air potato, torpedo grass, creeping oxeye	N/A	Initiate exotic species control**	Exotic species control**	Exotic species control**
	Hydric flatwoods	Hydric flatwoods	2 to 5 years	Medium									
	Live oak hammock	Live oak hammock	>100 years	Low									
2	Sand pine scrub	Scrub/successional	15 to 50 years	N/A	15 to 25 years	Harvest sand pine, roller chop sub-canopy oaks	Flatwoods with Unit #6	Remove horse pasture use; Restore scrub excavation area; restore pasture	Natalgrass; lantana; bermudagrass; feral hogs	Gopher tortoises; nodding pinweed	Remove horse pasture use*; install firelines*	Harvest sand pine and burn*; exotic species control**	Exotic species control**; scrub excavation and pasture restoration***
	Hydric flatwood fringe	Hydric flatwoods	1 to 5 years	Medium	Depends on adjacent EMU								
3	Mesic flatwoods	Mesic flatwoods	1 to 5 years	Low	1 to 5 years	Rollerchopping or bushhogging to reduce shrub height	Units #4 and #6	Ditch enhancement/ restoration	Creeping oxeye; feral hogs; air potato, primrose willow; cattails	Gopher tortoise	Install fire lines*; prescribed fire*; exotic species control**	Exotic species control**	Prescribed fire*; exotic species control**; ditch enhancement***
	Hydric flatwoods	Hydric flatwoods		Medium									
4	Sand pine scrub	Xeric flatwoods/scrub	10 to 20 years	N/A	1 to 10 years	Harvest sand pine, roller chop sub-canopy oaks	Merge with #5 over time; manage with #4 and #6	Install ditch plugs in small ditch	Feral hogs	Gopher tortoise	Install fire lines*; prescribed fire*; exotic species control**	Harvest sand pine and burn*; exotic species control**	Ditch plug installation**
	Hydric flatwoods	Hydric flatwoods	1 to 5 years	Medium		Bushhogging/light chop							
	Live oak hammock	Live oak hammock	>100 years	Low	None	N/A							
5	Xeric flatwoods	Xeric flatwoods	1 to 10 years	N/A	1 to 5 years	Harvest sand pine, roller chop sub-canopy oaks	Merge with #4 over time; manage with #6	Wet prairie restoration	Feral hogs	Gopher tortoise	Install fire lines*; prescribed fire*; exotic species control**	Harvest sand pine*; exotic species control**	Prescribed burn*
	Sand pine scrub		10 to 20 years										
	Hydric flatwoods	Flatwoods/wet prairie	1 to 5 years	Medium		Selective clearing of canopy, bushhogging of shrub layer							
	Wet prairie	Wet prairie		High									
6	Sawgrass marsh	Marsh/Wet prairie	1 to 5 years	Very High	1 to 5 years	Hand clear and drop sapling pines/shrubs	Allow fires to burn into #6 from all adjacent units	Field road hydrological enhancements	Feral hogs	Rose pogonia; water sundew; pitcher plant	Exotic species control program**; repair existing culverts***	Prescribed burn*; hand clear saplings/shrubs***	Prescribed burn*
	Wet prairie												
	Hydric savanna												
7	Mesic flatwoods	Mesic flatwoods	2 to 5 years	Low	2 to 5 years	Selective clearing of canopy, bushhogging of shrub layer	Allow fires to burn into #6, #8, and #12A	Canopy/ herbaceous plantings	Tropical soda apple; feral hogs; downy rose myrtle; cogongrass	Fox squirrel; gopher tortoise	Install fire lines*; prescribed fire*; exotic species control**	Exotic species control**	Prescribed burn*; exotic species control**
	Altered flatwoods			Low									
	Wet prairie	Wet prairie		High									
8	Sandhill oak	Sandhill oak	5 to 10 years	N/A	Half the unit every 5 to 7	Rollerchop half of unit before burn every 5-7 years	#7 and #9 to burn into the margins	Rehabilitate selected field roads	Natalgrass	Florida scrub jay; gopher tortoise	Chop half of unit/burn***	Chop/burn if not completed previous year*	N/A (in 2014, chop other half of unit)
	Sand pine scrub		10 to 20 years										
	Hydric flatwoods	Hydric flatwoods	1 to 5 years	Medium	1 to 5 years	Bushhogging/light chop							
9	Altered flatwoods	Mesic flatwoods	2 to 5 years	Low	2 to 5 years	Selective clearing of canopy, bushhogging of shrub layer	Allow fires to burn into #6, #8, and #11	Remove fill pile; Canopy/ herbaceous plantings	Torpedograss; downy rose myrtle; feral hogs	None observed	Exotic species control**	Prescribed burn*; exotic species control**; remove fill pile***	Exotic species control**
	Marsh/wet prairie	Marsh/Wet prairie	1 to 5 years	High		N/A							
10	Mesic flatwoods	Mesic flatwoods	1 to 5 years	Low	1 to 5 years	Rollerchopping or bushhogging to reduce shrub height	N/A	N/A	Unknown - requires survey	Unknown - requires survey	Install fire lines*; exotic species control/survey**	Exotic species control**	Prescribed burn*
	Xeric flatwoods	Xeric flatwoods	1 to 10 years	N/A									
11	Wet prairie	Wet prairie	2 to 5 years	High	2 to 5 years	N/A	Allow fires from #8 and #9 to burn into margins	N/A	Downy rose myrtle; feral hogs; Chinese tallow	None observed	Install fire lines*; exotics species control**	Exotic species control**	Exotic species control**
12	Marsh/wet prairie	Marsh/Wet prairie	2 to 5 years	High	Depends on adjacent EMU	N/A	Allow fires from #7 and #13 to burn into the margins	N/A	Cattails	None observed	Install fire lines*; exotics species control**	Exotic species control**	Exotic species control**
13	Improved pasture	Mesic flatwoods	2 to 5 years	Low	2 to 5 years	Selective clearing of canopy, bushhogging of shrub layer	Allow fires to burn into #12	Flatwoods restoration; remove fill pile	Feral hogs; old world climbing fern	Gopher tortoise; royal fern	Prescribed burn*; exotic species control**	Remove fill pile***	Prescribed burn*
	Altered flatwoods												

* - High Priority ** -Medium Priority *** - Low Priority



GLATTING JACKSON KERCHER ANGLIN

GJ# 20608
September 2008
Data Sources: FDOT, USGS

0 1 2 Miles

N

Figure 1
Location Map
Lake Lizzie Project Site

Z:\Projects\20\20608_Lk_Lizzie\Work\AVProjects\FIGURES_0608\fig_01_location_map_060208.mxd

GLATTING JACKSON KERCHER ANGLIN

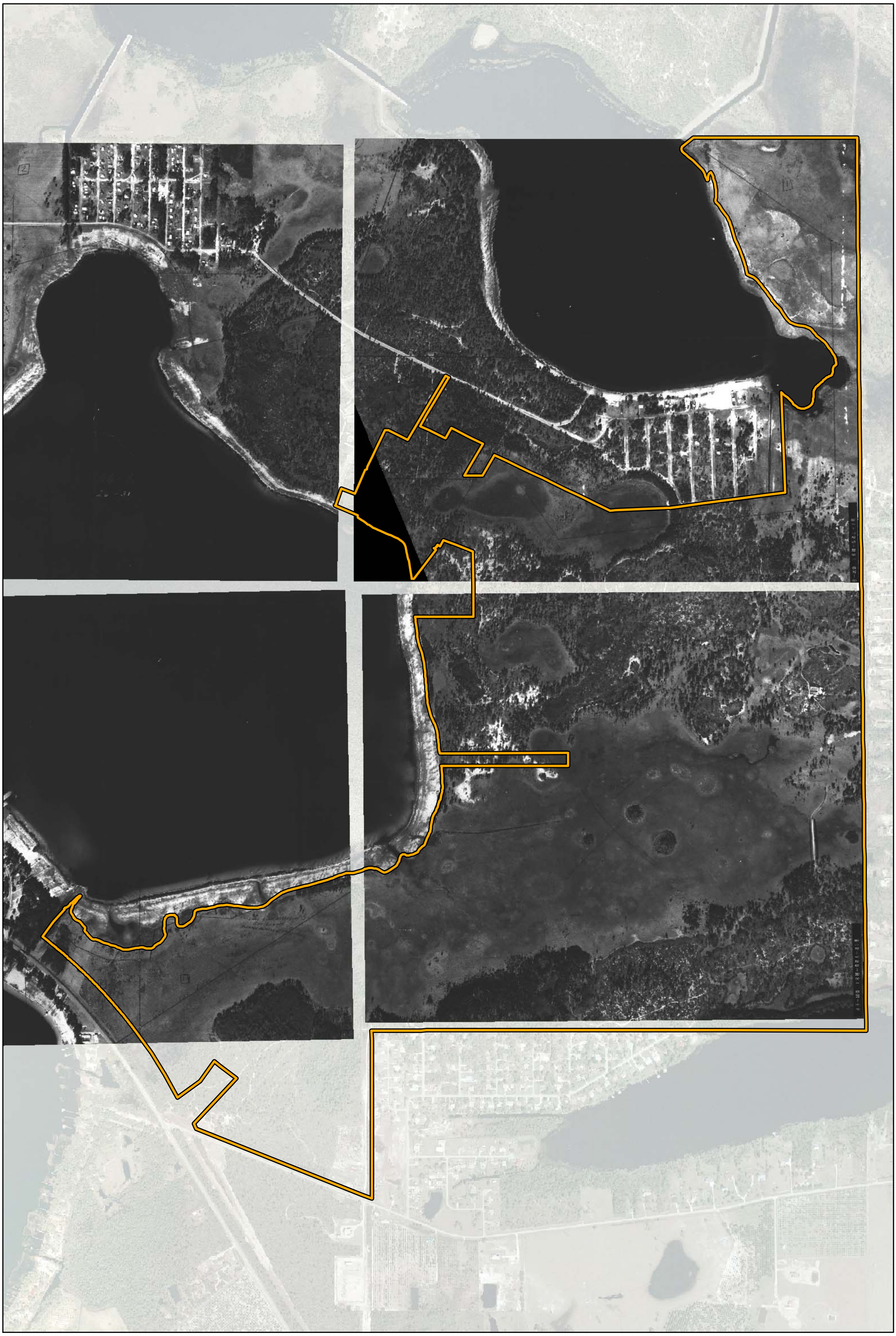
GJ# 20608
September 2008
Aerial Source: Aerials Express (3/2006)

0 1,000 2,000 Feet

N

Figure 2
Aerial Photograph / Site Map
Lake Lizzie Project Site

Z:\Projects\20\20608_Lk_Lizzie\Work\AVProjects\FIGURES_0608\fig_02_aerial_site_map_060208.mxd



GLATTING JACKSON KERCHER ANGLIN

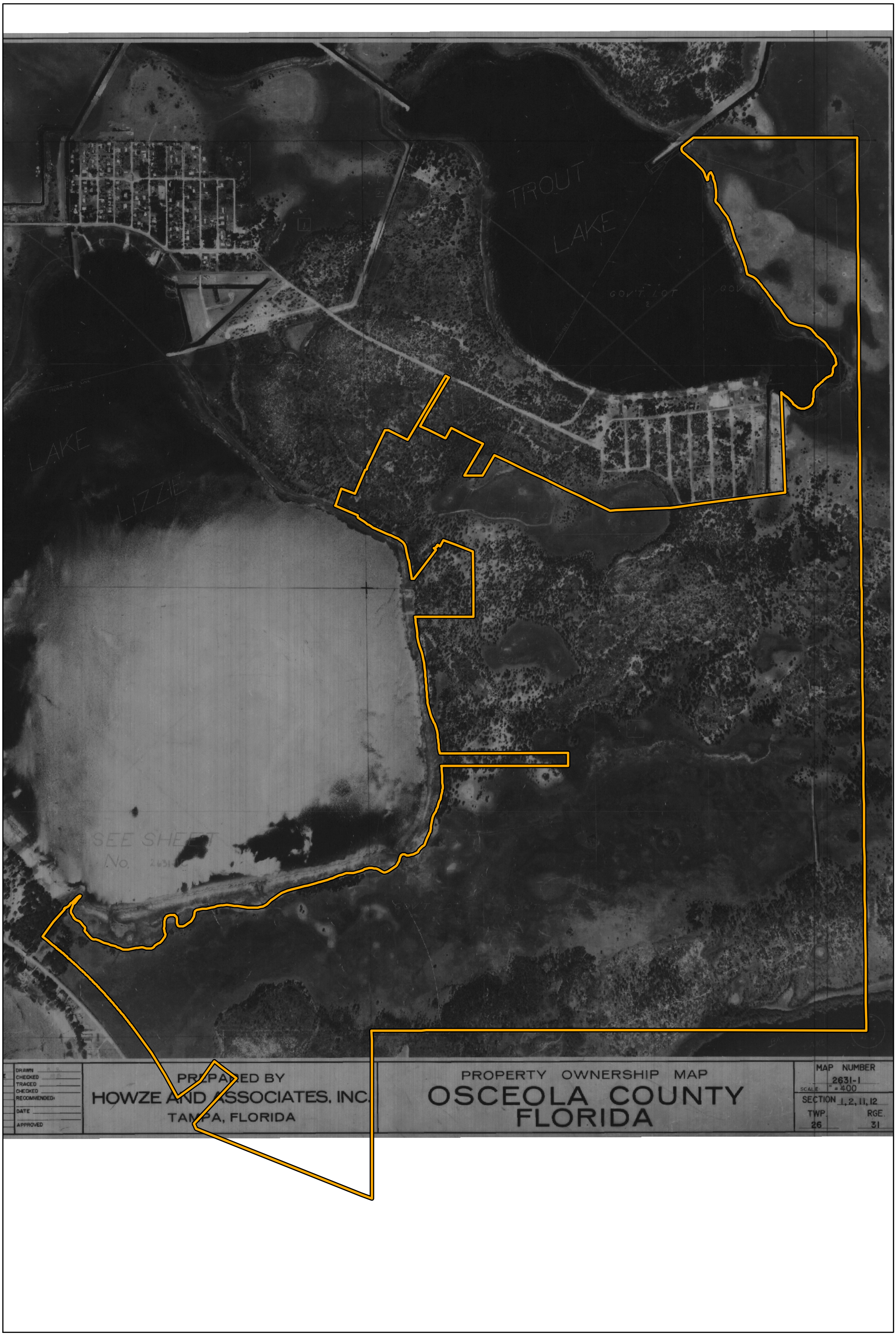
GJ# 20608
September 2008
Aerial Sources: Osceola County (1963), Aerials Express (3/2006)

0 1,000 2,000 Feet

N

Z:\Projects\20\20608_Lk_Lizzie\Work\AVProjects\FIGURES_0608\fig_03a_1963_aerial_060208.mxd

Figure 3A
1963 Aerial Photography
Lake Lizzie Project Site



GLATTING JACKSON KERCHER ANGLIN

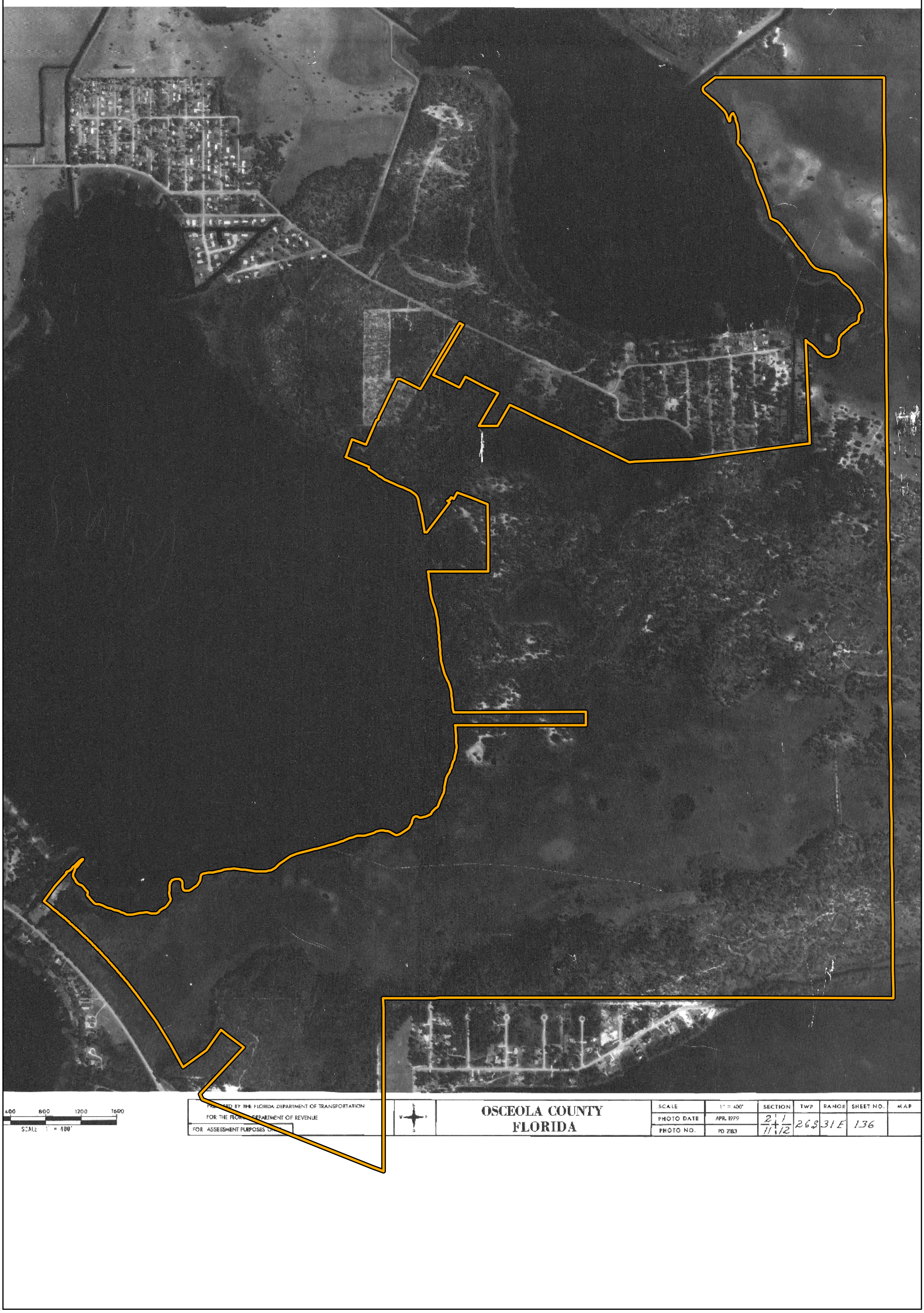
GJ# 20608
September 2008
Aerial Sources: Osceola County (1968)

0 1,000 2,000 Feet

N

Figure 3B
1968 Aerial Photography
Lake Lizzie Project Site

Z:\Projects\20\20608_Lk_Lizzie\Work\AVProjects\FIGURES_0608\fig_03b_1968_aerial_060208.mxd



GLATTING JACKSON KERCHER ANGLIN

GJ# 20608
September 2008
Aerial Sources: Osceola County (1979)

0 1,000 2,000 Feet

N

Figure 3C
1979 Aerial Photography
Lake Lizzie Project Site

Z:\Projects\20\20608_Lk_Lizzie\Work\AVProjects\FIGURES_0608\fig_03c_1979_aerial_060208.mxd

GLATTING JACKSON KERCHER ANGLIN

GJ# 20608
September 2008
Aerial Sources: Osceola County (1985)

0 1,000 2,000 Feet

N

Z:\Projects\20\20608_Lk_Lizzie\Work\AVProjects\FIGURES_0608\fig_03d_1985_aerial_060208.mxd

Figure 3D
1985 Aerial Photography
Lake Lizzie Project Site

GLATTING JACKSON KERCHER ANGLIN

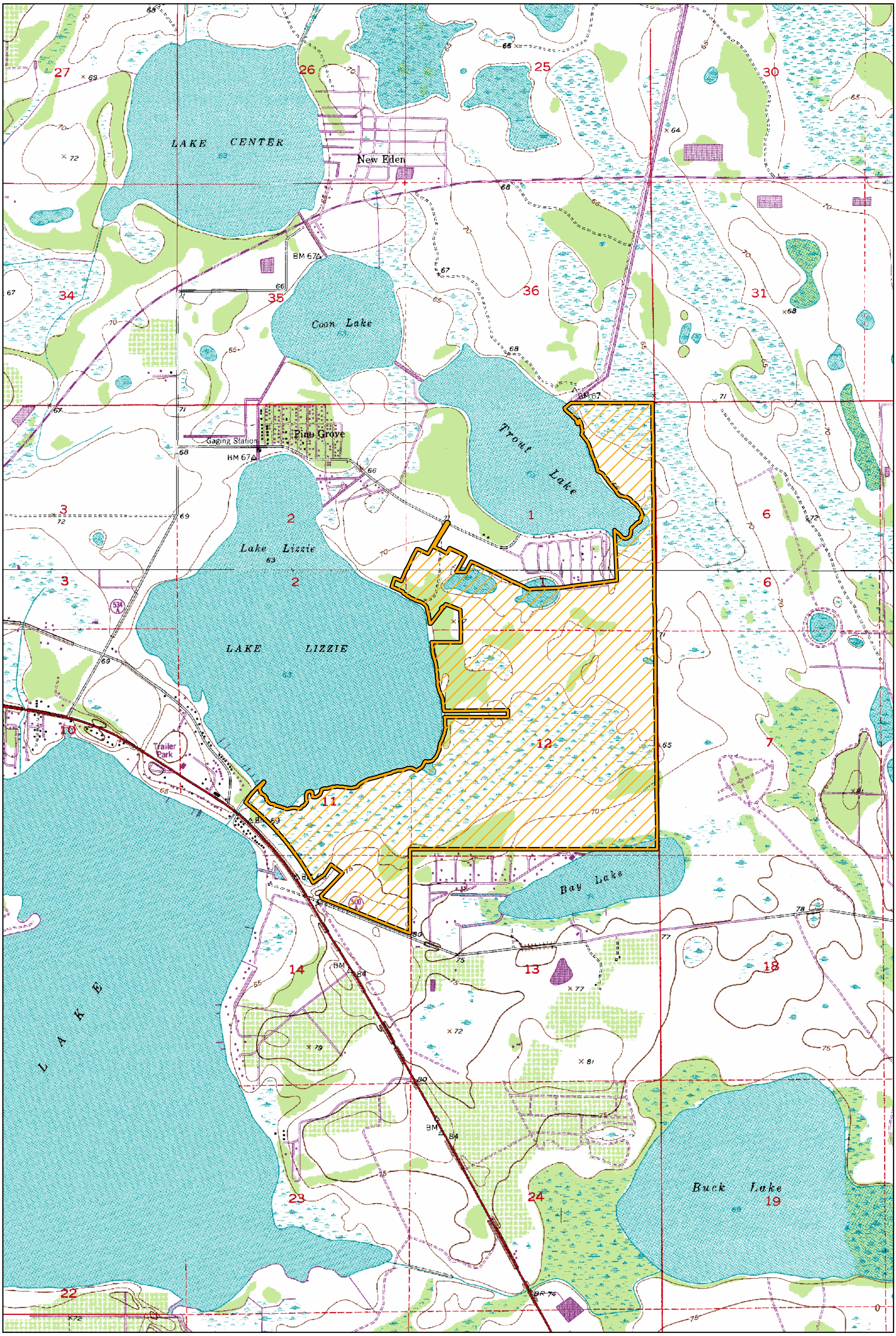
GJ# 20608
September 2008
Aerial Sources: Osceola County (1998)

0 1,000 2,000 Feet

N

Figure 3E
1998 Aerial Photography
Lake Lizzie Project Site

Z:\Projects\20\20608_Lk_Lizzie\Work\AVProjects\FIGURES_0608\fig_03e_1998_aerial_060208.mxd



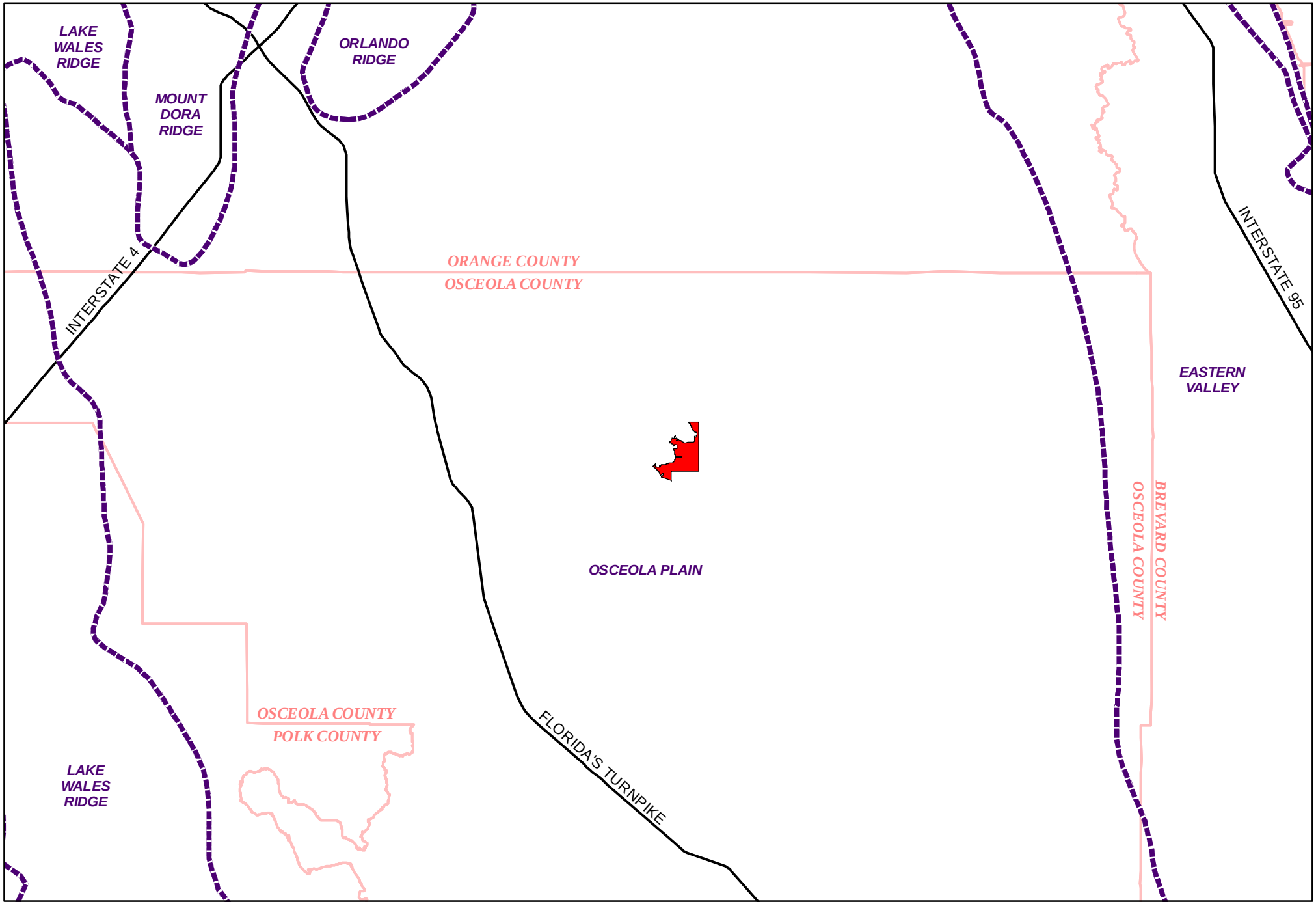
0 2,000 4,000 Feet

GLATTING JACKSON KERCHER ANGLIN

GJ# 20608
September 2008
Image Source: USGS Quad Sheets - #3410 and #3510

Z:\Projects\20\20608_Lk_Lizzie\Work\AVProjects\FIGURES_0608\fig_04_USGS_quadsheets_060308.mxd

Figure 4
USGS Quadrangle Maps
Lake Lizzie Project Site



GLATTING JACKSON KERCHER ANGLIN

GJ# 20608
September 2008
Data Source: FDEP

Figure 5
Physiographic Regions (FDEP)
Lake Lizzie Project Site

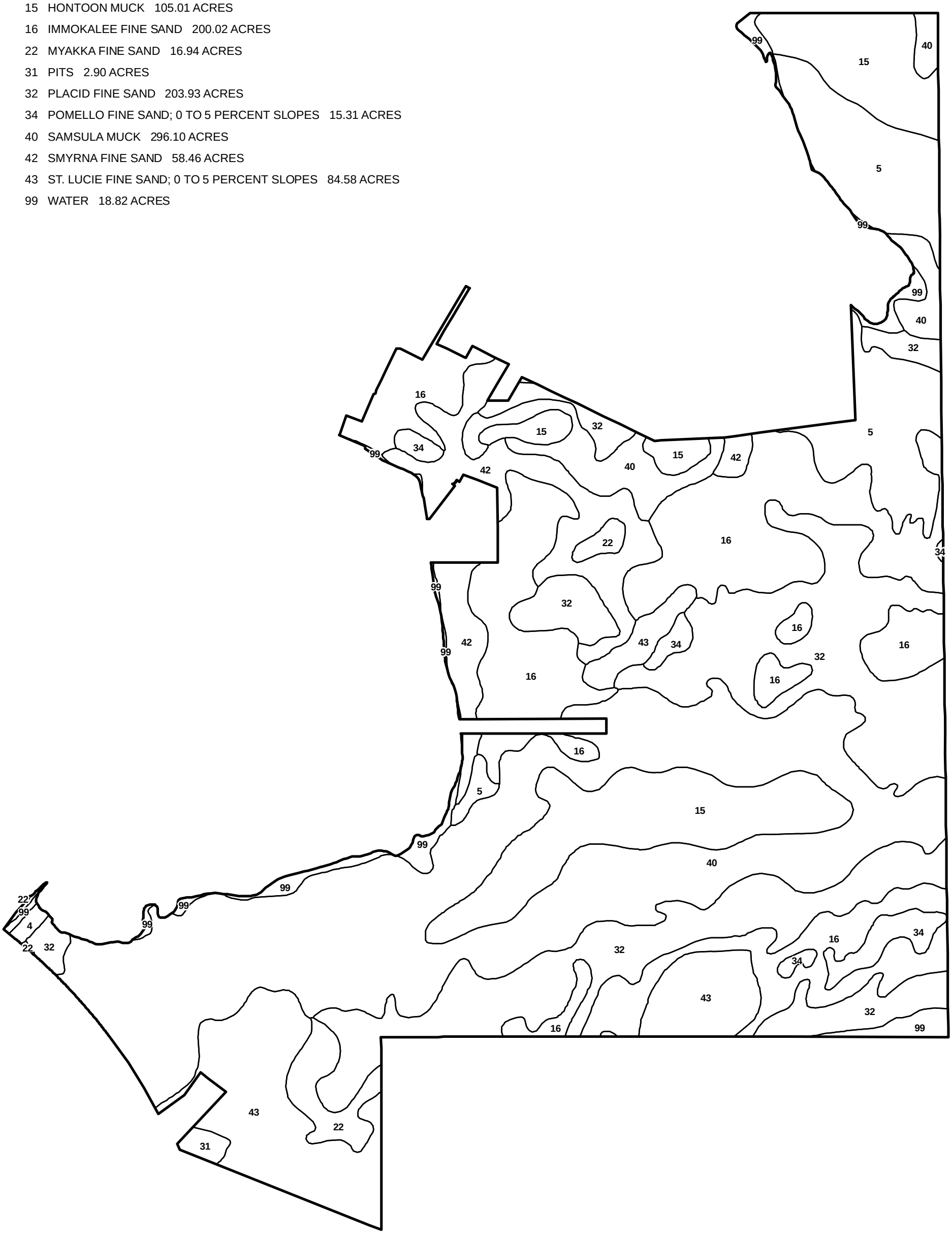
Z:\Projects\20\20608_Lk_Lizzie\Work\AVProjects\FIGURES_0608\fig_05_Physiography_060208.mxd

LEGEND

LAKE LIZZIE PROJECT BOUNDARY 1081.13 ACRES

SOIL DESCRIPTIONS:

- 4 ARENTS; 0 TO 5 PERCENT SLOPES 1.63 ACRES
- 5 BASINGER FINE SAND 77.43 ACRES
- 15 HONTOON MUCK 105.01 ACRES
- 16 IMMOKALEE FINE SAND 200.02 ACRES
- 22 MYAKKA FINE SAND 16.94 ACRES
- 31 PITS 2.90 ACRES
- 32 PLACID FINE SAND 203.93 ACRES
- 34 POMELLO FINE SAND; 0 TO 5 PERCENT SLOPES 15.31 ACRES
- 40 SAMSULA MUCK 296.10 ACRES
- 42 SMYRNA FINE SAND 58.46 ACRES
- 43 ST. LUCIE FINE SAND; 0 TO 5 PERCENT SLOPES 84.58 ACRES
- 99 WATER 18.82 ACRES



0 1,000 2,000 Feet

GLATTING JACKSON KERCHER ANGLIN

GJ# 20608
September 2008
Data Source: USDA/NRCS

Figure 6
Soils
Lake Lizzie Project Site

Z:\Projects\20\20608_Lk_Lizzie\Work\AVProjects\FIGURES_0608\fig_06_soils_060308.mxd

LEGEND

- LAKE LIZZIE PROJECT BOUNDARY
- FLUCFCS DESCRIPTIONS:
  - 110 CARETAKER RESIDENCES
  - 180 PARKING LOTS
  - 211 RELIC PASTURE
  - 310 MESIC HERBACEOUS PRAIRIE
  - 319 ALTERED MESIC SHRUBLAND
  - 320 MESIC SHRUBLAND
  - 411 SLASH PINE FLATWOODS
  - 412 LONGLEAF PINE FLATWOODS
  - 413 SAND PINE SCRUB
  - 421 OAK SCRUB
  - 425 ALTERED MESIC PINE FLATWOODS
  - 427 LIVE OAK HAMMOCK
  - 434 ALTERED XERIC PINE FLATWOODS
  - 436 SANDHILL OAK
  - 516 DITCHES
  - 520 LAKE
  - 530 EXCAVATED MARSH / PRAIRIE
  - 617 MIXED WETLAND HARDWOODS
  - 625 HYDRIC FLATWOODS
  - 626 HYDRIC PINE SAVANNA
  - 630 WETLAND FORESTED MIXED
  - 641 FRESHWATER MARSH
  - 643 WET PRAIRIE
  - 740 DISTURBED / FILL PILES
  - 814 FIELD ROAD CROSSING
  - 832 OUC ELECTRICAL POWER TRANSMISSION LINES

GLATTING JACKSON KERCHER ANGLIN

GJ# 20608
September 2008
Aerial Source: Aerials Express (3/2006)
Data Sources: Glatting Jackson; FLUCFCS 1999

0 1,000 2,000 Feet

N

Figure 7
Natural Communities
Lake Lizzie Project Site

Z:\Projects\20\20608_Lk_Lizzie\Work\AVProjects\FIGURES_0608\fig_07_FLUCFCS_060208.mxd

LEGEND

- LAKE LIZZIE PROJECT BOUNDARY
- APPROXIMATE FLORIDA SCRUB JAY OCCUPIED HABITAT
- APPROXIMATE RARE PLANT OCCUPIED HABITAT
- EXISTING HORSE PASTURE
- LISTED SPECIES (PLANTS)
- LISTED SPECIES (WILDLIFE)
- SPECIES IN DECLINE

GOPHER TORTOISE BURROW
ROYAL FERN
GIANT AIRPLANT
SWALLOW-TAILED KITE
FOX SQUIRREL
GOPHER TORTOISE BURROW
FLORIDA SCRUB JAY
FLORIDA SCRUB JAY
FLORIDA SANDHILL CRANE
NODDING CLUBMOSS
ROSE POGONIA
ROSE POGONIA
GOPHER TORTOISE BURROW
PITCHER PLANT
WATER SUNDEW
ROSE POGONIA
GOPHER TORTOISE BURROW
GOPHER TORTOISE BURROW
CINNAMON FERN
SILK BAY
GOPHER TORTOISE BURROW
GOPHER TORTOISE BURROW
WOOD STORK
GOPHER TORTOISE BURROW
GOPHER TORTOISE BURROW
GOPHER TORTOISE BURROW
NODDING PINWEED
NODDING PINWEED

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Data Source: Glatting Jackson

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Figure 8
Listed Species Observed
Lake Lizzie Project Site

LEGEND

- REGIONAL ROAD NETWORK
- LAKE LIZZIE PROJECT BOUNDARY
- PROPOSED ECOLOGICAL MANAGEMENT UNITS
- NEIGHBORHOODS

12B
13
12A
10
11
7
9A
8
9B
6
1
5
4
3
US 192 / VINE ST.
2

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Aerial Source: Aerials Express (3/2006)
Data Source: Glatting Jackson

0 1,000 2,000 Feet

N

Figure 9
Proposed Ecological Management Units
Lake Lizzie Project Site

Z:\Projects\20\20608_Lk_Lizzie\Work\AVProjects\FIGURES_0608\fig_09_mgmnt_units_060208.mxd

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GJ# 20608
September 2008
Aerial Source: Aerials Express (3/2006)
Data Sources: Osceola County, Glatting Jackson

0 1,000 2,000 Feet

N

Figure 10
Current and Proposed Firelines
Lake Lizzie Project Site

Z:\Projects\20\20608_Lk_Lizzie\Work\AVProjects\FIGURES_0608\fig_10_firelines_060208.mxd

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September 2008
Aerial Source: Aerials Express (3/2006)
Data Source: Glatting Jackson

0 1,000 2,000 Feet

N

Figure 11
Ecological Restoration / Enhancement Opportunities
Lake Lizzie Project Site

Z:\Projects\20\20608_Lk_Lizzie\Work\AVProjects\FIGURES_0608\fig_11_eco_rest_units_060208.mxd

LEGEND

- LAKE LIZZIE PROJECT BOUNDARY
- EXOTIC PLANTS
- EXOTIC WILDLIFE
- NUISANCE SPECIES (PLANTS)

CATTAILS
OLD WORLD CLIMBING FERN
CATTAILS
DOWNY ROSE MYRTLE
CHINESE TALLOW
DOWNY ROSE MYRTLE
HOG
DOWNY ROSE MYRTLE
DOWNY ROSE MYRTLE
COGONGRASS
HOG
TROPICAL SODA APPLE
TORPEDO GRASS
DOWNY ROSE MYRTLE
DOWNY ROSE MYRTLE
TORPEDO GRASS
HOG
HOG
AIR POTATO
CAMPHOR
CHINESE TALLOW
TROPICAL SODA APPLE
PRIMROSE WILLOW
CATTAILS
QUEEN PALM
HOG
HOG
HOG
PRIMROSE WILLOW
HOG
CAESARS WEED
AIR POTATO
AIR POTATO
CREEPING OXEYE
CREEPING OXEYE
NATAL GRASS & LANTANA
LANTANA
NATALGRASS
LANTANA
BERMUDA GRASS

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GJ# 20608
September 2008
Aerial Source: Aerials Express (3/2006)
Data Source: Glatting Jackson

0 1,000 2,000 Feet

N

Figure 12
Exotic Species Occurrences
Lake Lizzie Project Site

Z:\Projects\20\20608_Lk_Lizzie\Work\AVProjects\FIGURES_0608\fig_12_exotics_060208.mxd

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Aerial Source: Aerials Express (3/2006)
Data Source: Osceola County

0 1,000 2,000 Feet

N

Figure 13
Internal Roads, Gates, Access Points and Easements
Lake Lizzie Project Site

Z:\Projects\20\20608_Lk_Lizzie\Work\AVProjects\FIGURES_0608\fig_13_internal_rds_gates_etc_060208.mxd

FCT Project #95-011-P56

Contact: Robert Mindick
Public Lands Manager
Osceola County Parks
366 N. Beaumont Avenue
Kissimmee, Florida 34741
407-742-7805

By:
Glatting Jackson Kercher Anglin, Inc.
Contact: Randall Mejeur, M.S.
120 North Orange Avenue
Orlando, FL 32801
Tel: 407-843-6552
Fax: 407-839-1789

GLATTING JACKSON KERCHER ANGLIN
120 North Orange Avenue
Orlando, Florida 32801
phone: 407-843-6552
www.glatting.com

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