CROSS BAR and AL BAR RANCH ECOSYSTEM MANAGEMENT PLAN

September 2019

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Pinellas County UTILITIES

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3 B Cattle Company

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EXECUTIVE SUMMARY

The Cross Bar / Al Bar Ranches (CB/AB) comprise 12,381 acres located in north-central Pasco County. CB/AB is owned and managed by Pinellas County Utilities (PCU) and is primarily used as a regional well field, operated by Tampa Bay Water (TBW). Current management of CB/AB is based on a mixed use resource management plan developed for the site in 1992, which called for the creation of high yield pine plantations while balancing the water supply program, agricultural operations, and wildlife habitat management. The land uses and activities on CB/AB have evolved over this time period, requiring an update to the current program and development of an Ecosystem Management Plan (EMP). As stated by PCU: "The Objective of the EMP is to protect the water and natural resources of CB/AB. The forestry, agricultural, and other future revenue producing activities shall be compatible with this intent and with the desire to offset management costs."

In May 2018, PCU Pinellas County (County) contracted with The Forestry Company (TFC) to lead a team of professionals with the required expertise to assist the County with the development and implementation of a comprehensive management plan, including development of the EMP. In addition to TFC foresters, team members include and Quest Ecology Inc. (Quest) and 3B Cattle (3B), firms that are recognized for expertise in wildlife management and habitat restoration planning, and cattle production/range management, respectively. Development of the EMP for the property is one of the objectives of the first year of the five (5) year contract and is the subject of this document.

Pinellas County maintains a set of requirements for protecting water resources that it applies to the ownership and management of its properties that are held primarily for wellfield purposes. This EMP has been prepared in conformance with these management requirements, listed below.

- Protection of Water Resources - No land use or management will be permitted that could adversely impact the wellfield operations or compromise the area hydrology. The proposed management plan will provide for enhancement of groundwater and wetland resources where beneficial. Protection of the water resources shall be consistent with TBW's wellfield and water withdrawal restricted covenant and Pasco County's Groundwater Protection Ordinance.
- Maintain or Enhance Property Security - A 24/7 onsite security mechanism should continue in order to prevent exposure of the County to liability or jeopardize the wellfield and silviculture investments.
- Long-term Financial Return - Land uses must not put excessive fiscal burden on the County. Capital outlay must be justified to demonstrate that the investment will offset the cost of implementing the proposed ecosystem management plan.
- Wildlife Enhancement - Operations shall incorporate practices that increase and diversify habitat to encourage viable populations of important wildlife species.
- Laws and Regulations - Operations on the property will comply with the laws, rules, and ordinances of regulatory agencies at all jurisdictional levels.

- Sound Land Management - All practices shall adhere to standards that demonstrate responsible and ethical land use per above. Perspective shall be long-term and focused on sustaining productivity.
- Tax Status Maintenance - Management of the property shall be that of accepted agricultural uses so that the current taxing status is maintained.
- Public Perception - Use of the property shall enhance the area and maintain public support.

It is the intent of PCU and this EMP to recommend strategies based on sound ecosystem management principles to be implemented to meet the above stated management requirements.

This EMP document provides a summary of the County's management objectives and requirements; a description of historical conditions that shaped and influenced the present-day character of CB/AB; a summary of the existing conditions as documented within the first year of the Contract; and goals and recommendations for short- and long-term habitat restoration and management. This includes addressing the long-term goal of establishing a longleaf pine flatwoods habitat, scrubby flatwoods and sandhill habitats after the timber harvest is completed, the management of pasture preserve areas, and restoration within the designated Florida Scrub-jay Management Area (FSJMA).

This EMP also includes an overview of proposed future conditions, which summarize the priorities and preferences selected by PCU to guide future management. This EMP is envisioned to be an evolving document with a significant Adaptive Management component. As such, recommendations for management and restoration actions will be presented in a broad-brush approach, with overall goals outlined, but details on locations, methods and timing will be developed as the EMP is implemented.

While it is understood that the current high yield forestry operations are critical to the successful economic model of the property, the recommendations provided in this EMP are intended to be considered as integrated future land use components for the purpose of restoring and enhancing the wildlife habitat in key areas.

1.0 INTRODUCTION

1.1 Background

The Cross Bar / Al Bar Ranches (CB/AB) comprise 12,381 acres located in north-central Pasco County, between US Highway 41 and I-75, approximately 1.5 miles north of State Road 52 (**Figure 1-1 – Location**). The property is accessed from Bowman Road on the north and Locket Road on the South. CB/AB is owned and managed by Pinellas County Utilities (PCU) and is primarily used as a regional well field, operated by Tampa Bay Water (TBW). CB/AB is currently being managed for mixed uses, including water supply operations, silviculture, agriculture, and wildlife habitat management. The intent has been to manage the property to protect the water and natural resources, with the forestry, agricultural and other current and future revenue producing activities to be compatible with this intent and with the desire to offset management costs.

Pinellas County purchased the Cross Bar Ranch from the Norris Cattle Company in 1976. The County leased the land to others for cattle and crop/citrus operations until 1992. The County purchased Al-Bar Ranch in 1990 and leased back the property for continuation of the existing ranching activities until 1992. In 1992 the County established a land management team to convert the property from principally a wellfield and cattle ranch to a balanced regime of wellfield production, silviculture, wildlife enhancement and cattle production operations. The report "Natural Resource Production as a Management Option" (NRPS 1992) was developed and formed the basis of the current management program for the site. Over 4,770 acres of pine were planted between 1993 through 1996 on existing pasture. Another 1,500 acres were designated as pasture for agricultural operations. The remaining land (approximately 6,100 acres) was allowed to remain in the natural state, with minimal management. The 1,678 acre Florida Scrub-jay Management Area was later designated on the Al-Bar Ranch.

The activities on CB/AB have evolved since the implementation of the 1992 plan, requiring an update to the current program and development of an Ecosystem Management Plan (EMP). In May 2018 PCU contracted with The Forestry Company (TFC) to lead a team of professionals with the required expertise to assist the County with the development and implementation of a comprehensive management plan, including development of the EMP. TFC team members include Quest Ecology Inc. (Quest) and 3B Cattle (3B), firms that provide expertise in the areas of wildlife management and habitat restoration planning, and cattle production/range management, respectively. Development of this EMP for the property is one of the objectives of the first year of the five (5) year contract.

1.2 Management Requirements

This EMP has been prepared in conformance with the County's Management Requirements for the property, as outlined below:

- Protection of Water Resources – No land use or management will be permitted that could adversely impact the wellfield operations or compromise the area hydrology. The proposed management plan will provide for enhancement of groundwater and wetland resources where beneficial. Protection of the water resources shall be consistent with Tampa Bay Water's (TBW's) wellfield and water withdrawal restricted covenant and Pasco County's Groundwater Protection Ordinance.
- Maintain or Enhance Property Security – A 24/7 onsite security mechanism should continue in order to prevent exposure of the County to liability or jeopardize the wellfield and silvicultural investments.
- Long-Term Financial Return – Land uses must not put excessive fiscal burden on the County. Capital outlay must be justified to demonstrate that the investment will offset the cost of implementing the proposed ecosystem management plan.
- Wildlife Enhancement – Operations shall incorporate practices that increase and diversify habitat to encourage viable populations of important wildlife species.
- Laws and Regulations – Operations on the property will comply with the laws, rules, and ordinances of regulatory agencies at all jurisdictional levels.
- Sound Land Management – All practices shall adhere to standards that demonstrate responsible and ethical land use per above.
- Tax Status Maintenance – Management of the property shall be that of accepted agricultural uses so that the current taxing status is maintained.
- Public Perception – Use of the property shall enhance the area and maintain public support.

1.3 Purpose and Goals of the Ecosystem Management Plan

1.3.1 Purpose

The purpose of this EMP is to identify long-term goals for the site, focusing on future land uses and vegetation communities, based on the mixed use scenario envisioned by PCU, while adhering to the above Management Requirements. This EMP will also provide recommendations for strategies to attain these goals based on sound ecosystem management principles. The EMP is intended to provide a broad overview of proposed future conditions, with the various objectives for achieving individual goals subject to significant Adaptive Management strategies.

This EMP document includes a description of historical conditions that shaped and influenced the present-day character of CB/AB, as well as a summary of the existing land uses and current conditions that will serve as a baseline from which to measure the success of actions taken under the EMP. Historical and current conditions will guide recommendations for short- and long-term habitat restoration and management, with an emphasis on restoring chosen areas to historic native vegetation communities. Recommendations for management and restoration actions will vary depending on proposed land uses, and will be based on current data and other relevant factors. The EMP is a general

road map for achieving overall management goals and is intended to be adapted over time in response to observed environmental changes and outside influences such as funding mechanisms. The results of short-term management activities, and potentially the response of target species, will also affect future management decisions. Plan details regarding specific locations, methods and timing will continue to be developed as the EMP is implemented.

1.3.2 Management Goals

While it is understood that the current high yield forestry operations are critical to the successful economic model of the property, the management recommendations provided in this EMP are intended to be considered as integrated future land use components for the purpose of restoring and enhancing the wildlife habitat in key areas.

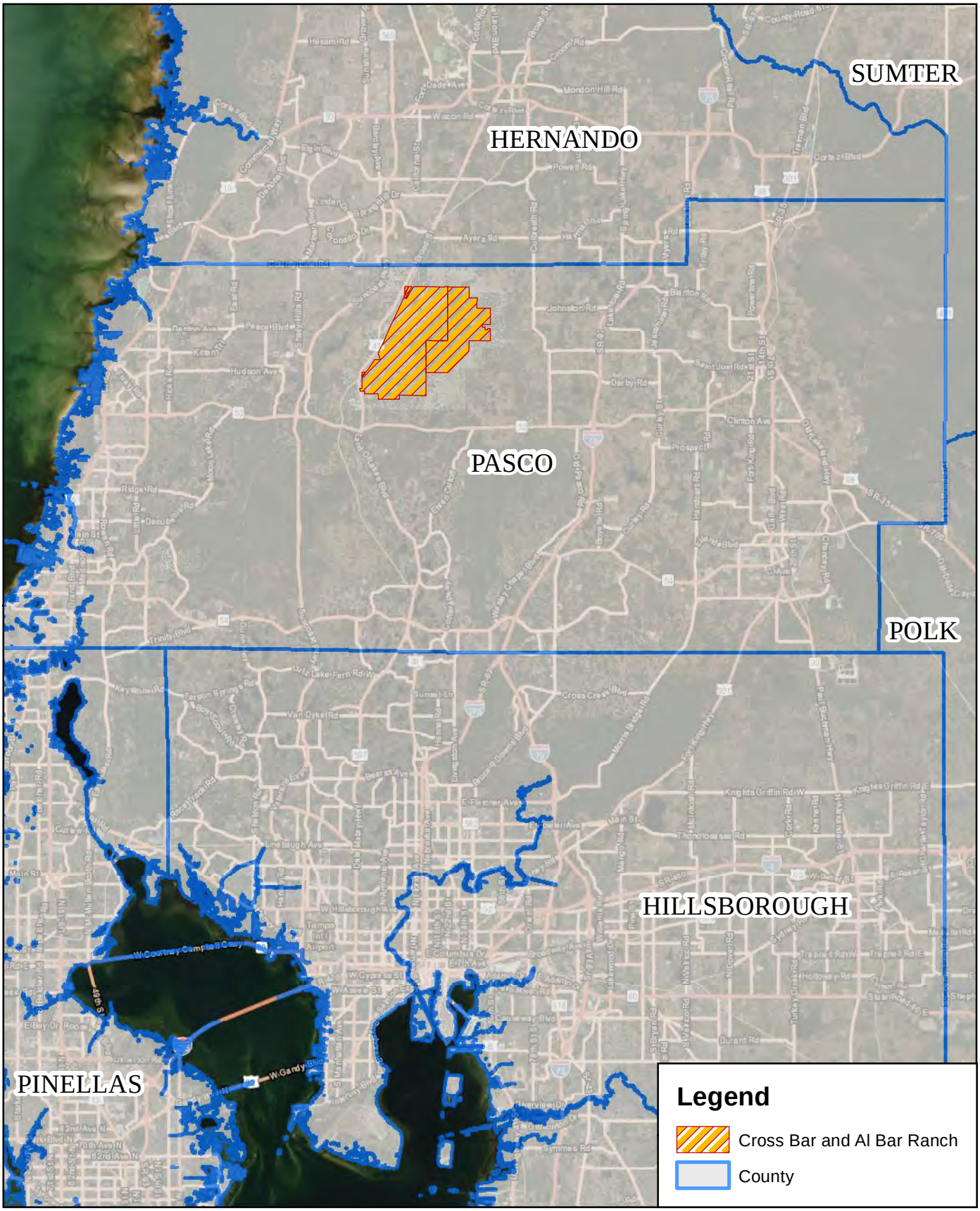
Pinellas County's stated overarching goal for the EMP is to: "protect the water and natural resources of CB/AB. The forestry, agricultural, and other future revenue producing activities shall be compatible with this intent and with the desire to offset management costs."

1.3.2.1 Long-term Goals

The following long-term goals have been identified to meet the intent of the County's Management Requirements for the property and to specifically address the restoration and management of native habitats for wildlife and resource protection.

1. Implement conservation measures to enhance and expand the use of the site by a diverse assemblage of native plant and wildlife species;
2. Establish, restore, and manage for native longleaf pine flatwoods habitat, scrubby flatwoods and sandhill habitats within appropriate areas;
3. Restore and manage habitat in optimal condition for the Florida scrub-jay within and adjacent to the designated Florida Scrub-jay Management Area (FSJMA);
4. Manage and expand pasture areas in conditions suitable for use by the burrowing owl;
5. Implement a Prescribed Burn Plan for the site that will mimic natural burn regimes to maintain the historic structure and composition of native habitats while protecting forestry resources;
6. Implement a monitoring and maintenance program for maintaining wetlands in optimal condition for wildlife and water resources;
7. Control nuisance and exotic plants and wildlife that threaten the integrity of native habitats, land uses, and the achievement of management goals;
8. Employ compatible land uses that generate revenue to offset management costs;
9. Ensure that all forestry, agricultural, and other future revenue producing activities adhere to practices that will not negatively impact native habitats and protected wildlife;

10. Implement a wildlife and habitat monitoring plan for the purpose of monitoring the results of management activities and employing adaptive management;
11. Adopt an Adaptive Management Program that will employ the results of ongoing monitoring, maintenance and management to evaluate success and adjust actions accordingly.
12. Reevaluate and update the EMP every five years.



Path (E:\Mapping\Cross Bar - Al Bar Ranch\Maps\Cross Bar and AL Bar Location Map.mxd) By: CK Date: 7/8/2019

QUEST ecology

Figure 1-1
Location
Cross Bar and Al Bar Ranch
Pasco County, Florida

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2.0 SITE HISTORY

This section of the EMP describes some of the significant historical forces that have shaped and influenced the present-day character and condition of the CB/AB property. A comprehensive understanding of these forces is essential for making fully informed land management decisions.

2.1 Geologic History

CB/AB is located between the elevations of 60 to 100 feet along the western toe of the Brooksville Ridge, near its southern terminus (**Figure 2-1, Topography**). The Brooksville Ridge is a northwest to southeast-trending relict dune feature that rises up to 200 feet above the Gulf Coastal Lowlands lying west of the ridge. Its western toe is topographically defined by a marine scarp located between 90 to 100 feet, formed by a prolonged high stand of sea level during the early Pliocene (Alt & Brooks, 1965), approximately 5.33 to 3.60 million years ago (mya). A younger scarp was also recognized by Alt & Brooks (1965) as occurring roughly between the elevations of 70 and 80 feet. This high stand of sea level occurred in the Late Pliocene (Scott, 1997), 3.60 to 2.59 mya. Multiple fluctuations in sea level followed during the Pleistocene (2.59 mya – 11,700 years before present), but those seas did not rise higher than approximately 65 feet above present-day sea level (Scott, 1997). Therefore, based on the topography of CB/AB, most of the land surfaces within the property have been aerially exposed and not inundated by the sea for any significant length of time for the past 3.60 to 2.59 million years.

The one area of exception on CB/AB is located in the northwestern quarter of the property where the average elevation is closer to 60 feet and the topographic relief is considerably less. This portion of the property represents a land surface more recently subjected to the leveling influences of Pleistocene sea level transgressions, and it belongs to the physiographic province known as the Gulf Coastal Lowlands (White, 1970). The scarp that defines the boundary between the Brooksville Ridge and Gulf Coastal Lowlands is oriented northeast-southwest on CB/AB and is readily apparent on **Figure 2-1.** In general, the higher soil fertility and lower relief of the Gulf Coastal Lowlands is better suited to agriculture than the Brooksville Ridge, hence the historic and present-day concentration of pasture and hay fields in this northwestern portion of CB/AB.

The surfaces of both the Brooksville Ridge and the Gulf Coastal Lowlands are covered by Quarternary sands of varying thickness. On the Ridge, these sands overlie relatively erosion-resistant red clastics of Pliocene and Miocene age, and in the lowlands they overlie more soluble limestones. The weathering differential between these underlying formations also contributes to the striking topographic contrast between the northwestern portion of CB/AB and the remainder of the property, and is also one of the primary reasons that the Brooksville Ridge (and other ridges in Florida) have remained elevated above Pleistocene sea level transgressions for at least 2.59 million years.

It should be noted that the portion of the lower Brooksville Ridge that is present on CB/AB is oriented northeast-southwest, perpendicular to the primary axis of the greater Brooksville Ridge along its entire ~100-mile length (White, 1970). This is due to CB/AB being located on a lateral extension of the ridge, as depicted by Healy (1975). It should also be noted that the highest elevation on CB/AB and the only 100-foot contour evident on **Figure 2-1** is located just inside and near the center of the eastern boundary of the property, immediately adjacent to the scarp. Presumably, this knob was more resistant to historical weathering processes than other portions of the property, and/or is overlain by deeper Quarternary sands. This knob likely existed as a barrier island or shallow sand bar in the early Pliocene, when other portions of CB/AB were below sea level.

2.2 Vegetation History

Vegetation communities have been developing on CB/AB for at least 2.59 million years since this lower portion of the Brooksville Ridge has been above sea level. After the early Pliocene seas retreated from most of CB/AB, existing vegetation from higher elevations that had been above sea level for much longer provided the seed and propagule sources for newly exposed adjacent lands. Some of these vegetation communities above 215-250 feet, such as those found on the Lake Wales Ridge (LWR), had been evolving in a deep-sand, fire-prone landscape since the Miocene, 11.6 to 5.3 mya. During that time, many of the highest elevations along the LWR existed as a narrow archipelago of small islands (Healy, 1975), a fact supported by the present-day limited distributions of some extremely rare and narrowly endemic plant species that are highly-dependent on fire to maintain openings in scrub habitats.

Middle Pliocene pollen records from Florida indicate a trend toward increasing pine, grass, rosette palms, and scrub vegetation, and a decrease in deciduous hardwoods (Graham, 1999). The increased dominance of subtropical, fire-dependent pine savanna and scrub communities in Florida correlates well with the vertebrate fossil record from the same period, which included horses, peccaries, a llama, a proboscidean (elephant relative), a small pronghorn, additional ungulates and other wildlife species that were also well-adapted for savannah-like conditions and plant communities maintained by lightning-ignited fires (Webb, 1990; Hulbert, 2001).

By the late Pliocene, when most of CB/AB was above sea level, an extensive and continuous ‘Gulf Coastal Corridor,’ consisting of a relatively unbroken swath of semi-arid habitat, connected the southeastern and western portions of North America and portions of Central America (Noss, 2018). This temporarily enabled many western and neotropical plant and animal species to migrate eastward, resulting in many taxa with disjunct ranges that persist in Florida today. Examples of these fire-adapted species with western North America origins include many of our rare species and monotypic genera such as the Florida scrub-jay, burrowing owl, gopher tortoise, crested caracara, pocket gopher, harvester ant, grama grasses, yuccas, and wild buckwheats (Noss, 2013).

This Gulf Coastal Corridor persisted for millions of years, fluctuating in size multiple times during the Pleistocene, and reaching a maximum approximately 20,000 to 30,000 years before present (ybp) when Florida's land area was twice its present size (Noss, 2018). For comparison, the highest stand of Pleistocene sea level occurred approximately 400,000 ybp when the coast line was approximately 65 feet higher than present (Scott, 1997). Though plant macrofossil records are limited, Florida's faunal fossil record from this period is rich, and includes many large herbivores that would have undoubtedly relied upon the abundant, fire-adapted upland vegetation present at that time. These megaherbivores included bison, mammoth, mastodon, giant tortoises, horses, and antelope. Many avian species that are also adapted to fire-maintained systems are also documented in the late Pleistocene fossil record, including the scrub-jay, burrowing owl, red-cockaded woodpecker, caracara, and bobwhite quail.

The rapid period of warming at the beginning of the Holocene about 12,000 ybp triggered a rise in sea level to near its present elevation, and an enigmatic disappearance of the Pleistocene megafauna. Florida's climate fluctuated between warm-wet and cool-dry in the ensuing years, stabilizing at its present norm in the mid-Holocene, approximately 6,000 ybp. Florida's extensive pollen record prior to this period had shifted back and forth from pine-dominance to oak-dominance, but consistently reflects a pine-dominated ecosystem in central Florida since at least 5,000 ybp. In strong contrast to the antiquity of Florida's upland, fire-maintained systems (scrub, sandhill, pine flatwoods), it wasn't until a few thousand years ago that most of our modern-day wetland systems (marshes, swamps, bayheads, and lakes) became established in peninsular Florida (Webb, 1990).

With climate stabilizing in the mid-Holocene, the distribution of Florida's vegetation communities became primarily determined by depth of the water table and fire return intervals. Areas with shallow water tables supported wetland communities, primarily Freshwater Marshes, Wet Prairies, Cypress Swamps, and Mixed Bottomland Hardwoods. Upland areas with deeper water tables supported scrub, sandhill, and pine flatwoods communities. A few upland areas also supported hardwood (primarily oak) hammocks due to natural fire breaks in the landscape; however, the extent of these hardwood hammocks was considerably less than at present (Noss, 2018) due to the propensity of lightning and human-ignited fires to burn freely across the landscape, reducing hardwood cover, until encountering a natural fire break.

The disruption of these natural vegetation distribution patterns and the abiotic processes that influenced them began in Florida primarily in the second half of the 19th century, and intensified in the first half of the 20th century (Noss, 2018). In 1880, Florida's population was approximately 270,000, and the state was home to 135 sawmills and 10 naval stores plants processing tar, pitch, and turpentine from southern pines (UF-IFAS, 2019). By 1890, Florida's naval store industry was at its peak, and many of the virgin pines dominating the upland canopy were destroyed by the often-fatal box-cutting method of bleeding the pines. The blow to Florida's pine forest was compounded by the wholesale logging of pines that peaked in Florida in 1909, when lumber production in the state reached 1.25 billion board feet, of which less than 1% consisted of hardwoods. Combined, the naval stores and lumber industries are one

of the most significant precursors of large-scale fire suppression in Florida. They succeeded in removing thousands of acres of virgin pine overstory, which also resulted in the removal of a significant source of fine fuels in the form of pine needles that facilitate both the ignition and spread of natural fire.

Intensive fire prevention campaigns launched by the U.S. Forest Service (USFS) and the American Forestry Association between 1928 and 1950 in the southeastern coastal plain compounded the trend toward increasing fire suppression. These campaigns included the outreach efforts of the USFS's "Dixie Crusaders," a group of young foresters who travelled throughout the southeast preaching the gospel of fire prevention in a fleet of special trucks equipped with generators and motion-picture projectors (Noss 2018). The USFS was so committed to the concept of fire prevention that they even hired psychologists to produce publications and propaganda that portrayed the people who intentionally ignited fires on their lands (which included many rural southerners) as uncivilized, uneducated villains. These campaigns continued into the 1940's with the introduction of the USFS's new mascot Smokey Bear, whose slogan "Remember, only YOU can prevent forest fires" was coined in 1947.

Coincident with these government-sanctioned fire-suppression campaigns was the passage of Florida's fence law in 1949. This law made open-range grazing of cattle illegal, and brought a swift end to many of the open-range fires often ignited by Florida's early cattlemen to promote the production of tender, nutritious forage for their livestock. This loss of open-range grazing privileges prompted many ranchers to begin an intense period of ditching and draining of wetlands, in an attempt to increase forage production on their own lands in areas that were originally inundated.

In the latter half of the 20th century, Florida's native plant communities became increasingly fragmented, increasingly fire-suppressed, and increasingly compromised by the invasion of exotic species. These trends continue to this day, as does the outright conversion of native habitats to other purposes that have little to no ecological value. Although awareness of the benefits of natural fire and the crucial role it has played in maintaining vegetative structure and composition in Florida's native upland plant communities for millions of years is slowly increasing, there are fewer and fewer opportunities to implement prescribed burning in Florida due to the ever-increasing fragmentation of native habitats and rural-urban interface that has come as a result of Florida's population as it approaches 21 million in 2019.

Fortunately, approximately 30% (~11 million acres) of Florida's total land area is currently in public ownership (FNAI, 2019a), and conservation and management for the remaining native plant communities and the wildlife they support is still possible on many of these larger tracts, including CB/AB. Although CB/AB has endured the same historical manipulations of native plant communities described above (removal of pine overstory, fire suppression, ditching and draining of wetlands, land conversion to timber and pasture), approximately one-third of the property still retains some semblance of its natural, albeit fire-suppressed, character. A concerted effort to reduce hardwood cover in these remaining undeveloped areas to levels that will once again enable appropriate fire return intervals,

facilitate a return to historical vegetation conditions, and optimize wildlife habitat is recommended as the primary restoration objective for the remaining natural lands at CB/AB.

2.3 Cross Bar/Al Bar History (1940's to present)

The 12,381 acres that currently comprise CB/AB were originally part of lands owned by the Norris Cattle Company Ranch (Cross Bar) and the J.A. Barthle and Sons Ranch (Al Bar). In the late 1940s, the Barthles purchased much of their land from a turpentine company in anticipation of Florida's pending 1949 Fence Law and loss of open-range grazing privileges. J.A. Barthle cut much of the remaining timber on CB/AB to help fund the land purchase. In addition to ranching, the Norris Cattle Company also operated citrus groves on some of the higher elevations on the site.

Aerial imagery from 1941 provides us with the earliest glimpse of what CB/AB looked like at this time (**See Figures 2-2 & 2-3, 1941 Aerial Imagery of CB/AB and FSJMA**). The most immediately striking differences between these 1941 aerials and present-day imagery are: 1) the conversion of approximately 2/3 of the property to pine plantation and pasture, and 2) the significant encroachment of hardwoods that has occurred since 1941. An abundance of white sand is visible in the 1941 aerial, and darker signatures indicating tree cover in the uplands is sparse, as would be expected in mature, low-density pine-dominated uplands regularly maintained by fire. In contrast, white sands on present-day aerials are only visible along some roads that are regularly disked and around the edges of some marshes and wet prairies. The open understory conditions of 1941 uplands that presumably supported a diverse groundcover community has been replaced by a dark green signature, representing oaks, primarily live oaks (*Quercus virginiana*) and sand live oaks (*Q. geminata*), that have become established in the approximately 80 years since regular burning was excluded.

In 1976, Pinellas County purchased the Cross Bar Ranch from the Norris Cattle Company for the purpose of providing for the growing demand for potable water in Pinellas County. The County leased much of this land for cattle and crop/citrus production until 1992 when the original CB/AB management plan was developed (NRPS, 1992). Pinellas County purchased the adjacent Al Bar Ranch from J.A. Barthle in 1990, also for the purpose of supplementing and protecting the regional water supply.

2.4 Wellfield History

In 1974 the West Coast Regional Water Supply Authority (WCRWSA) was formed as a cooperative to supply water to five member governments, including Pinellas County. Concerns over the WCRWSA's ability to consistently serve Pinellas County's water needs prompted the County's purchase of the Cross Bar Ranch in 1976. Wellfield production began on Cross Bar in 1980 when 17 production wells were established **(Figure 2-4, TBW Production Wells)** to withdraw water from the Upper Floridan Aquifer. According to the Southwest Florida Water Management District's (SWFWMD) WMIS website, these wells operated from 1980 to 1998 under former Water Use Permit (WUP) #204290.02.

Due to issues with the structure of WCRWSA and concerns regarding its ability to equitably supply water to the member governments and their ever-increasing populations, the WCRWSA cooperative was replaced by a regional utility known as the Tampa Bay Water Regional Water Supply Authority (TBW) in 1998. In accordance with the Interlocal Agreement, TBW serves six member governments that include Pinellas County, the City of St. Petersburg, Hillsborough County, the City of Tampa, Pasco County and New Port Richey.

The 17 production wells on Cross Bar were transferred to TBW operation, and the land and pump houses associated with each well (total ~6.4 acres) were granted to TBW in 1999. TBW's first Consolidated Water Use Permit (WUP) (#20011771.000) was issued on 12/15/98, authorizing withdrawal of up to 90 million gallons per day (mgd) based on a 12-month running average, and a maximum of 455.792 mgd from multiple sources, including Cross Bar. This WUP was renewed on 1/25/2011 (#20011771.001) and is the current permit that authorizes TBW's 11 wellfield facilities collectively known as 'The Central System.'

Due to concerns regarding wetland impacts associated with groundwater withdrawals at Cross Bar, two (2) WUP's were issued to Pinellas County in 2000, authorizing groundwater withdrawal for the purpose of augmenting impacted wetlands at Cross Bar and Al Bar. Both of these WUP's were renewed on 5/24/11 and will expire on 5/24/21. The current Cross Bar WUP (#200024649.003) authorizes an average withdrawal of 0.8 mgd and a peak of 1.5 mgd from two (2) wells designated for wetland augmentation and one (1) well designated as a transient non-community public supply. Augmentation of eight (8) wetlands and two (2) lakes are required under the Cross Bar WUP when water levels drop below a permitted threshold. The current Al Bar WUP (#20011558.007) authorizes an average withdrawal of 1.343 mgd and a peak of 2.339 mgd from seven (7) augmentation wells for the purpose of augmenting 13 wetlands. Both WUP's require routine monitoring of surface water levels, groundwater levels, vegetation changes, and wildlife in each of the augmented wetlands (~530 acres). Annual monitoring reports are submitted to the SWFWMD. TBW's Consolidated WUP also requires augmentation, monitoring, and reporting for additional wetlands on CB/AB, two (2) of which (Goose Lake and Clear Lake) are jointly augmented by TBW and the County. **Figures 2-5 and 2-6** provide locations of the CB/AB Augmented Wetlands.

Pinellas County constructed a fixed-weir ditch block on Cross Bar in 1998 as an additional strategy to mitigate hydrological impacts to wetlands on the wellfield. Construction of three (3) adjustable ditch blocks with removable stop boards occurred in 2001 (**See Figure 2-7, PCU Ditch Blocks**). Each of these ditch blocks is monitored weekly, and adjusted as needed to retain water onsite. TBW also has a ditch block system consisting of six (6) structures that are also regularly monitored by TBW and adjusted as-needed by TBW for similar purposes.

2.5 Land Management History

In 1992, Pinellas County contracted with a land management team to transform CB/AB from a cattle, agricultural, and wellfield operation to include additional land uses of silviculture and wildlife management. As a result CB/AB's first management plan *"Natural Resource Production as a Management Option on Cross Bar and Al Bar Ranches for Pinellas County"* was produced (NRPS, 1992). This plan resulted in the planting of timber on approximately 4,770 acres of former pasture on CB/AB between 1993 and 1996. Pine-straw raking operations began within the timber plantations in 2001. Harvesting and re-planting of the timber began in 2011 and continues at present.

The NRPS management team also included a wildlife ecology component, and in 1995 "*Wildlife Management for Cross Bar and Al Bar Ranches"* was prepared by Peacock & Associates (P&A) to provide guidance for wildlife enhancement opportunities (Peacock, 1995). This document identified three areas of the property that were designated as "preservation areas" that were reserved to allow for future evaluation for more specific management planning. These designated areas included: The Pasture Preserve Area on Cross Bar, consisting of approximately 1,300 acres; the 1,678-acre Florida Scrub Jay Management Area (FSJMA) on Al Bar; and a 10-acre tract known as the Florida Sandhill Crane Nesting Area (**Figure 2-8, 1995 Designated Preservation Areas**). Timber production was to be limited in these areas; however, an actual management plan was prepared only for the FSJMA.

2.5.1 Florida Scrub-jay Management Area (FSJMA)

The approximate 1,678-acre Florida Scrub Jay Management Area boundary was established on the Al Bar Ranch in the early 1990s in an effort to set-aside a specific area for the conservation of this federally and state threatened endemic species (**Figure 2-8)**.

Due to the poor condition of the remaining Florida scrub-jay habitats on CB/AB, a robust restoration plan was initiated in 1999 (Pranty 2001). Because there were no scrub-jays remaining on Cross Bar, and there was little desirable habitat remaining there, restoration efforts were focused in the FSJMA on Al Bar. Most scrub was either overgrown or had succeeded into young hammocks with oaks four (4) to six (6) inches in diameter or larger (Pranty 1997). In early 1999 almost all large oaks were cut down by chainsaws in an area of the FSJMA larger than 400 acres. In February 2000 approximately 400 acres around this area was burned from a wildfire sparked by nearby prescribed burning. This fire removed much of the woody debris left behind after the oak removal; however, it was noted that within a few months, oaks were re-sprouting abundantly from stumps and roots, and palmettos and wiregrass were flowering (Pranty 2001). In his March 2001 report, Bill Pranty anticipated that this area would be suitable for FSJ occupancy in just a few years.

Management recommendations made since 1997 (including Pranty 1997, Pranty 2001, Paul 2005, and Peacock 2015, 2016, & 2018), have included either not re-planting harvested pine, or the removal of

select pine plantations affecting scrub-jay management areas as an effective means of adding to and restoring scrub-jay habitat. Detailed habitat assessments conducted by P&A from 2000 to 2004 separated the FSJMA into two segments, east and west, divided by a large tract of planted pine. Prescribed burns were conducted progressively during this time period, but in 2005, the FSJ habitat assessments concluded that neither segment of potential FSJ habitat was suitable for occupancy. Overall, the fires reduced the understory but large oaks and other trees were not top killed, failing to alter the overall habitat structure. The assessment indicated that the eastern segment was overgrown, consisting of oaks that were too tall and too dense for scrub-jay use. The inverse was true for the habitat on the western side; where oaks had been previously cut and burned there was not enough height or density to sustain FSJs (Paul *et. al.* 2005). In their 2005 report, Audubon of Florida (Audubon) noted a total of four (4) FSJ groups in the FSJMA but anticipated a period of five (5) years before the FSJMA would have enough usable habitat to sustain them.

2.6 Wildlife History

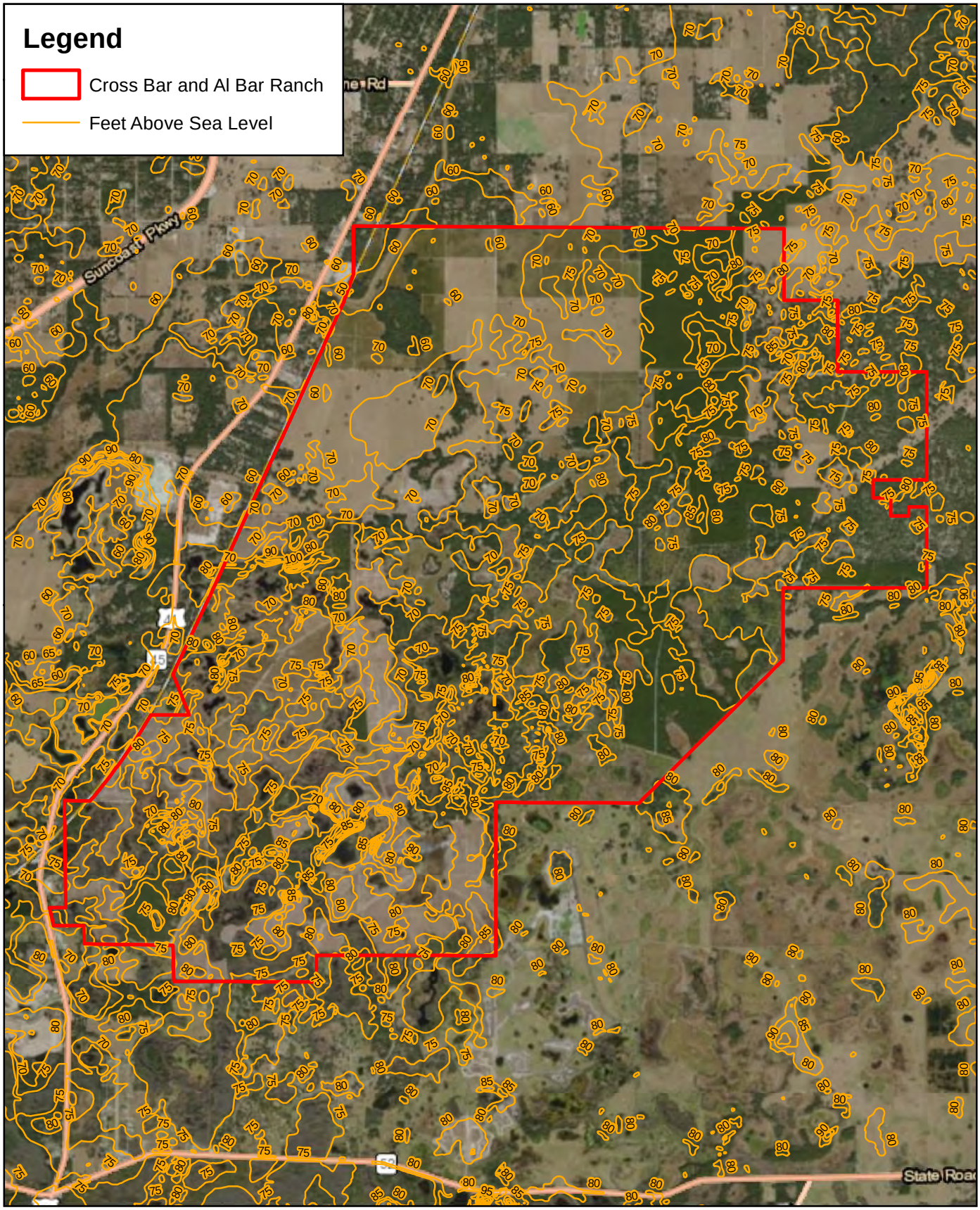
Surveys for wildlife, and protected species in particular, have been taking place on CB/AB since at least 1992, when the NRPS document was compiled for PCU. The results of subsequent surveys conducted by others including P&A, Audubon, and Archbold Biological Station (ABS), have been documented in various reports and publications. Most of these surveys focused on specific species and/or habitats within the site, such as the FSJMA that was specifically designated to sustain the onsite population of Florida scrub-jays on Al Bar. P&A documented the results of annual surveys from 1993 through 2018 with their final report *"Wildlife Management Summary Report for Cross Bar and Al Bar Ranches"* (Peacock, 2018) submitted to PCU in April 2018. The surveys and reporting conducted by P&A focused on the FSJMA and protected target species including: Florida scrub-jay, burrowing owl (*Athene cunicularia*), southeastern American kestrel (*Falco sparverius paulus*), Florida sandhill crane (*Grus canadensis*), and gopher tortoise (*Gopherus polyphemus*). **Figure 2-9** depicts historic observations of protected species at CB/AB.

2.6.1 Central Pasco Important Bird Area

In October of 2000, Audubon of Florida designated CB/AB as part of the "Central Pasco Important Bird Area (IBA)." An IBA designation is given when a site meets one or more of the following criteria:

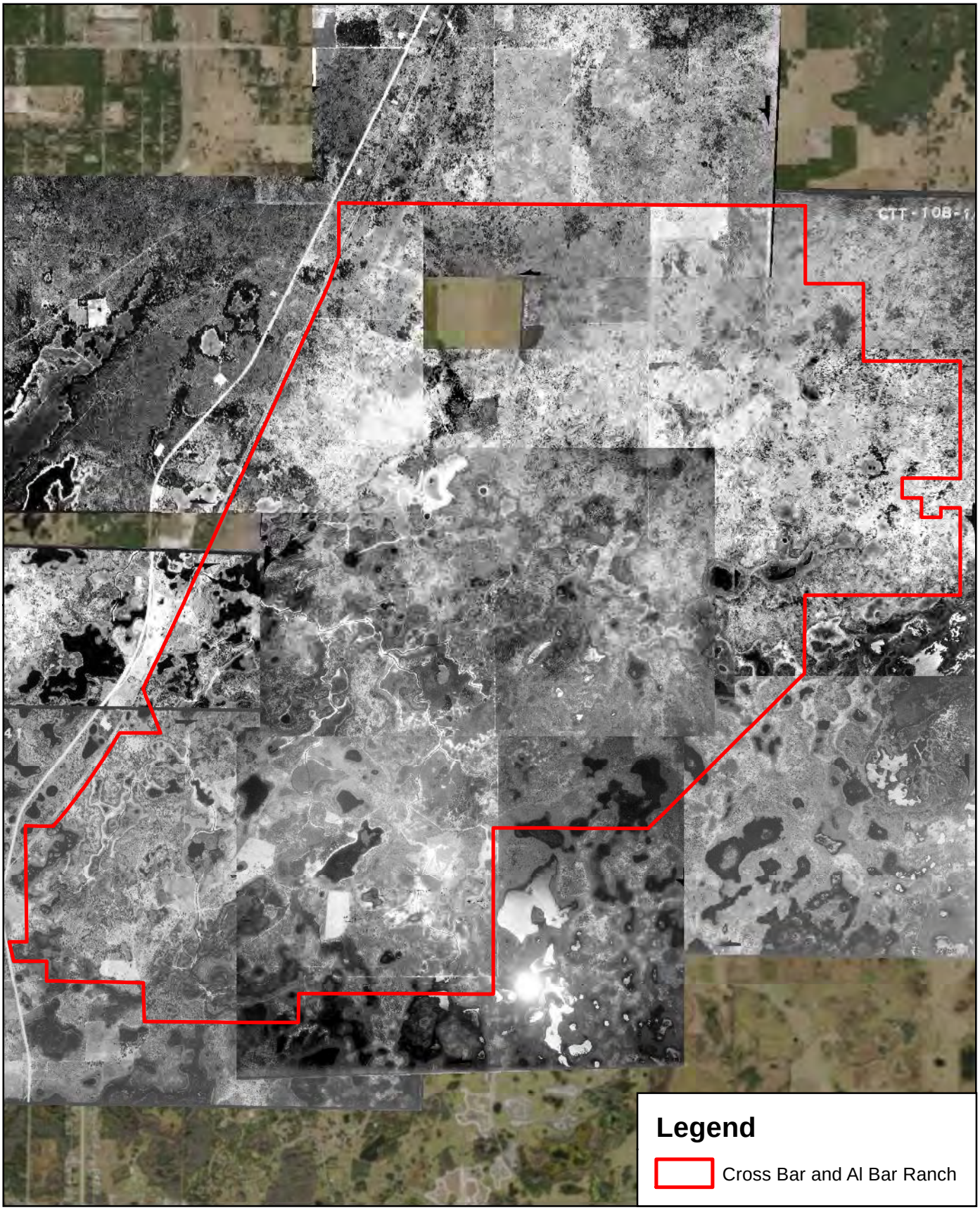
1. Sites that support significant (i.e. 1% or greater) state populations of Endangered or Threatened birds.
2. Sites that support significant (i.e. 1% or greater) state populations of other birds of conservation priority.
3. Sites that support significant numbers or diversity of birds.
4. Sites that support birds characteristic of a habitat that is endemic, restricted, or threatened.

Along with CB/AB the Central Pasco IBA includes nearby properties including: the Barthle Brother's Ranch, 4G Ranch, Connor Ranch, and the Fort King Ranch/Pruitt Ranch. Together, the six (6) properties that comprise the IBA were estimated to support 30 Florida scrub-jay groups in 2000 (Pranty 2001). In 1997 the FSJ population residing in this IBA was the second-largest population on the entire Gulf Coast and the only substantial population between Cedar Key and Sarasota (Pranty 1997). Since then more habitat within this IBA has been lost by the sale and subsequent conversion of Connor Ranch into a 15,000 home development and the continued degradation of remaining suitable FSJ habitat (Pranty 2001). These habitat losses further highlight the significance of any remaining or restorable FSJ and other important avian species habitat in the region, particularly on publicly owned lands such as CB/AB.



QUEST ecology

Figure 2-1
Topography
Cross Bar and Al Bar Ranch
Pasco County, Florida



Path (E:\Mapping\Cross Bar - Al Bar Ranch\Maps\All Areas 1941 Aerial.mxd) By: AA Date: 8/26/2019

QUEST ecology

Figure 2-2
1941 Aerial Imagery
Cross Bar and Al Bar Ranch
Pasco County, Florida

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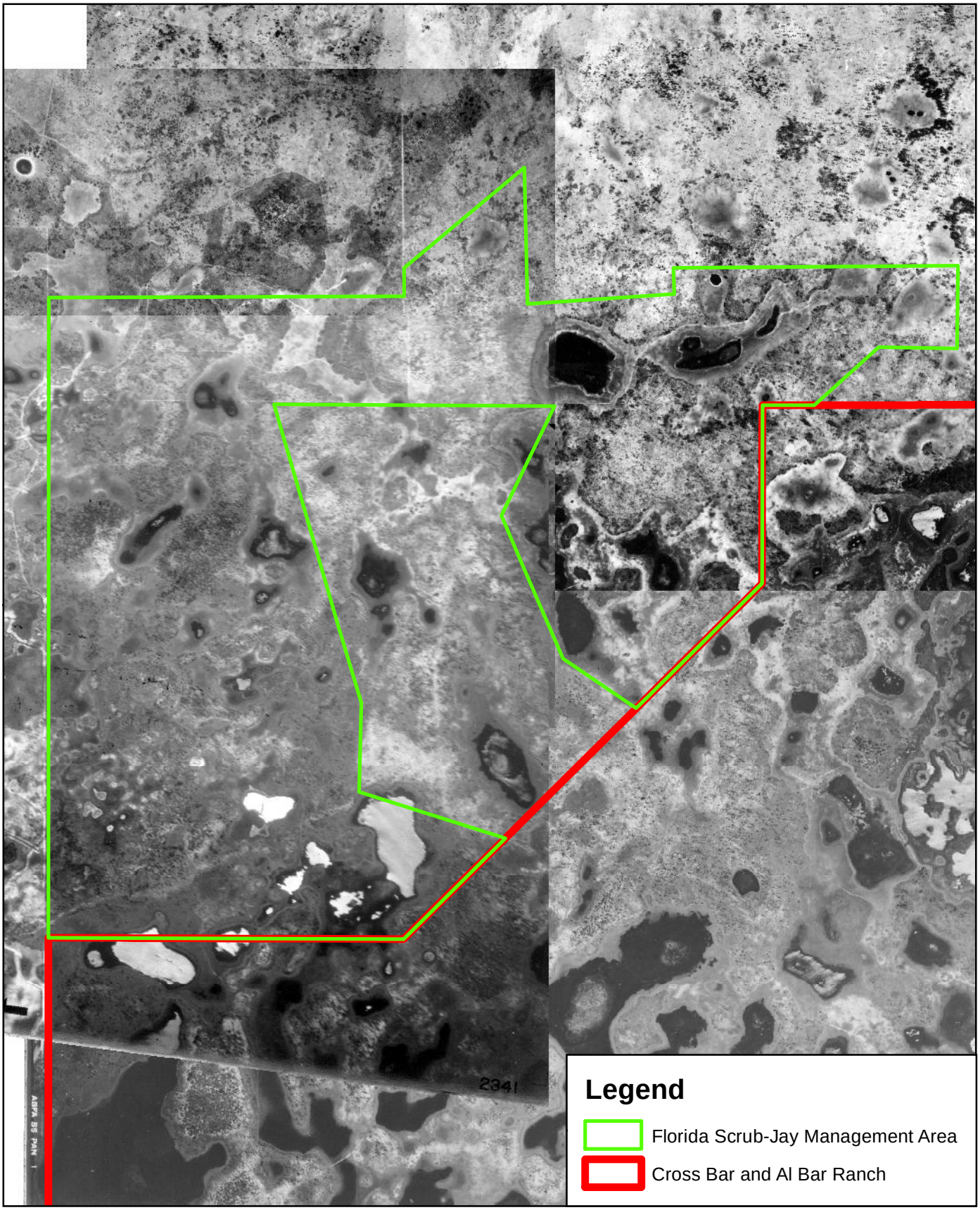

Path (E:\Mapping\Cross Bar - Al Bar Ranch\Maps\FSJMA 1941 Aerial.mxd) By: AA Date: 8/26/2019

QUEST ecology

Figure 2-3
1941 Aerial Imagery
Florida Scrub-Jay Management Area
Cross Bar and Al Bar Ranch
Pasco County, Florida

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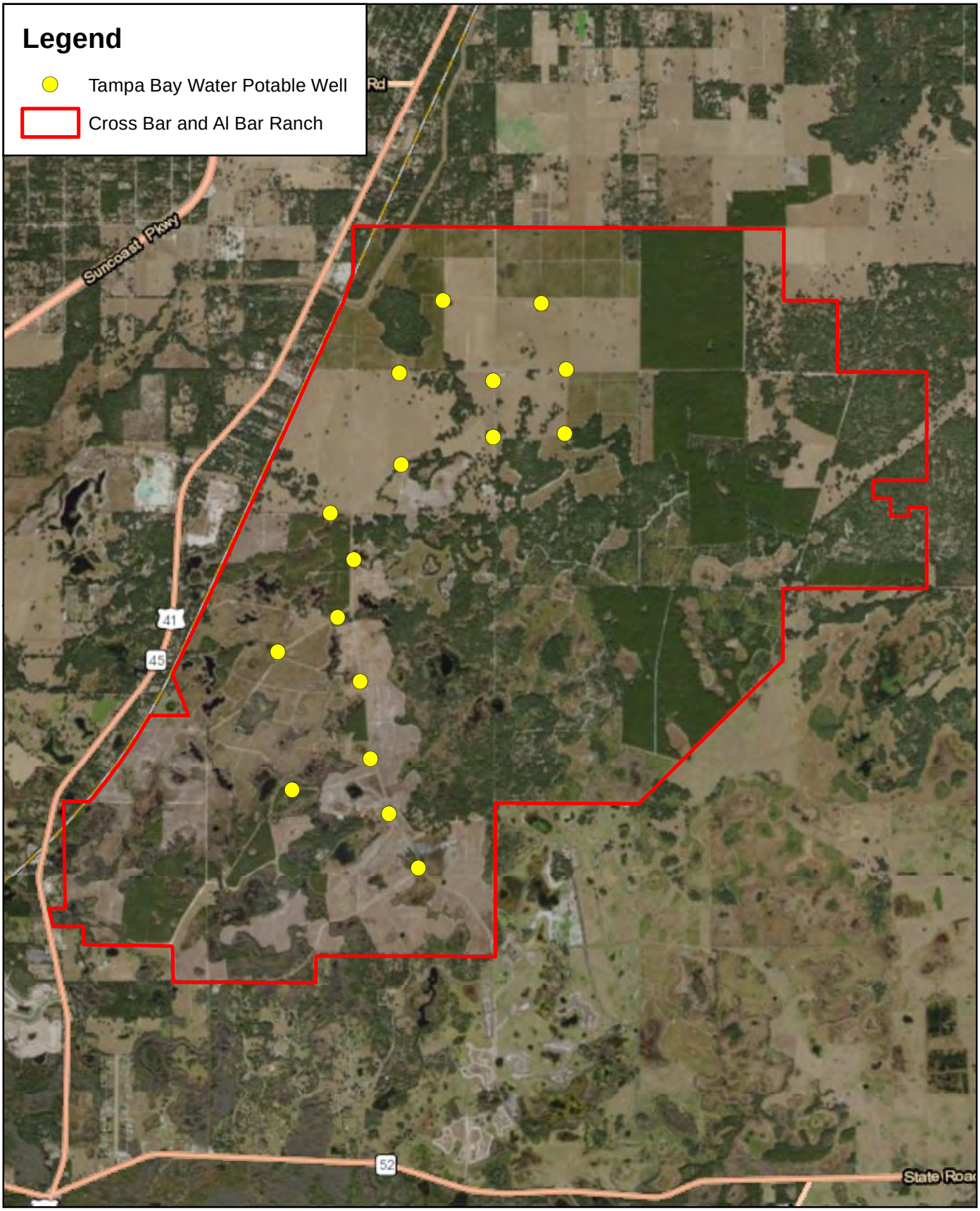

Path (E:\Mapping\Cross Bar - Al Bar Ranch\Maps\TBW potable wells.mxd) By: CK Date: 8/26/2019

QUEST ecology

Figure 2-4
Tampa Bay Water Production Wells
Cross Bar and Al Bar Ranch
Pasco County, Florida

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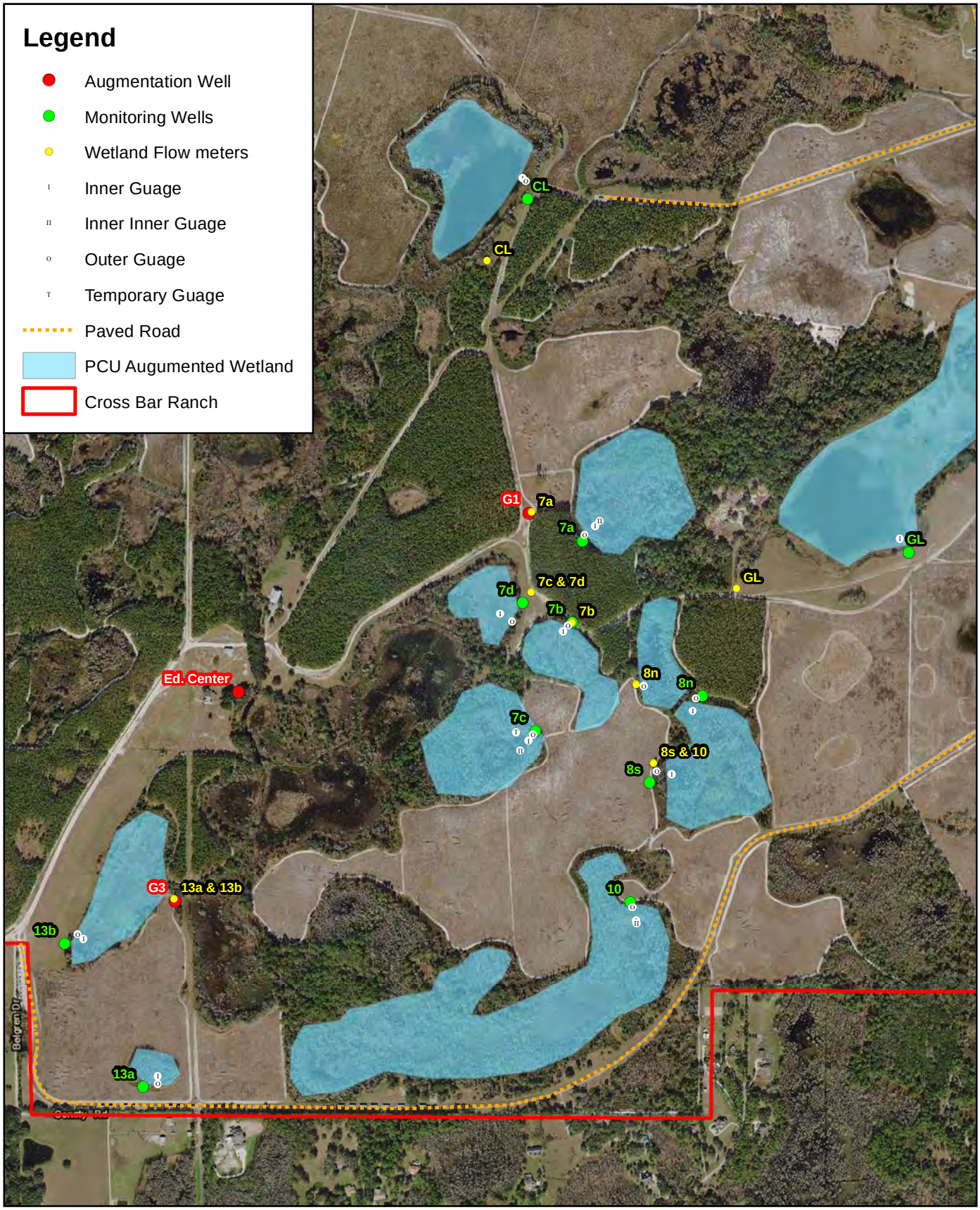
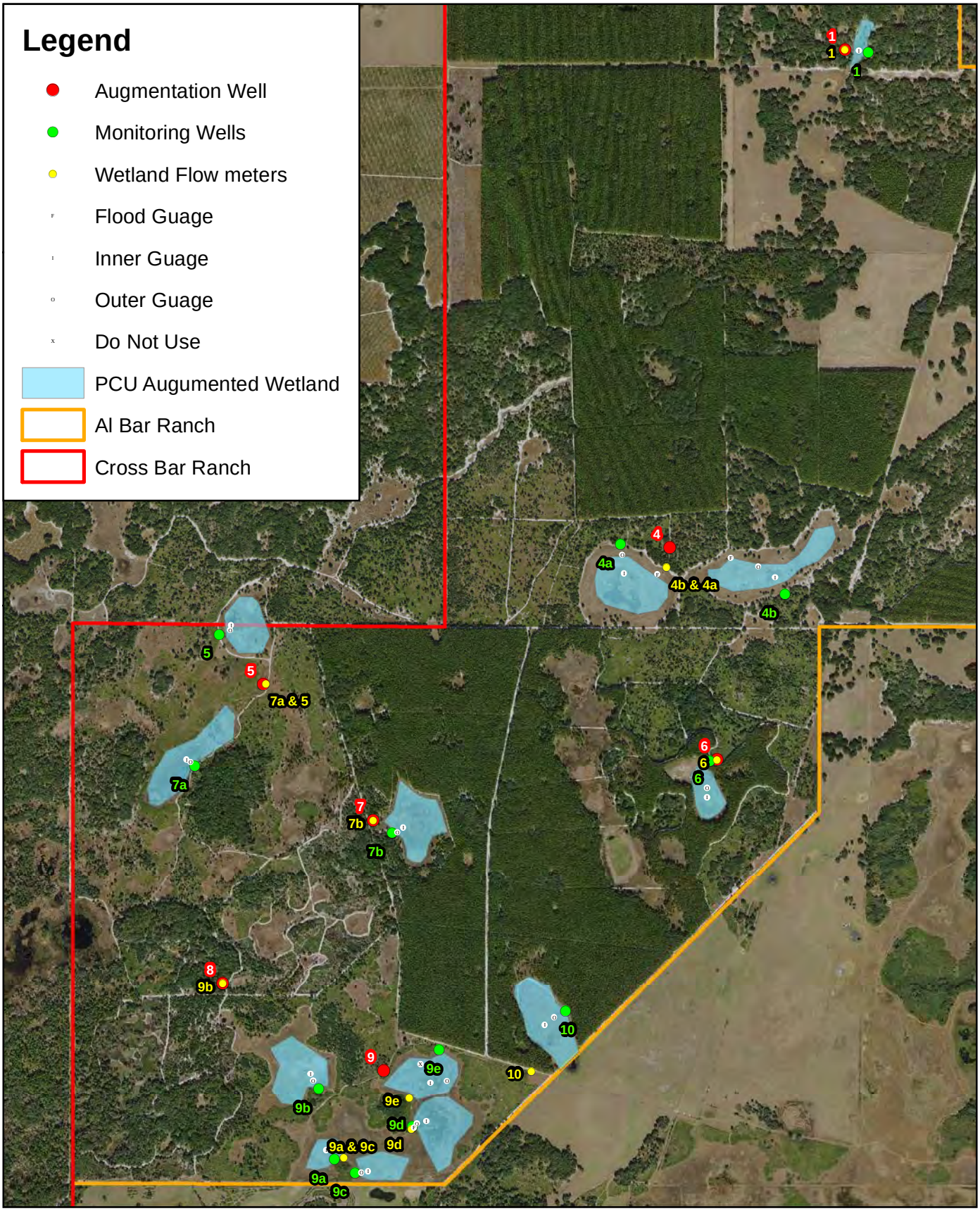


QUEST ecology

Figure 2-5
Augmented Wetlands
Cross Bar Ranch
Pasco County, Florida



QUEST ecology

Figure 2-6
Augmented Wetlands
Cross Bar and Al Bar Ranch
Pasco County, Florida

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Path (E:\Mapping\Cross Bar - Al Bar Ranch\Maps\Ditch Blocks.mxd) By: CK Date: 8/26/2019

QUEST ecology

Figure 2-7
PCU Ditch Blocks
Cross Bar and Al Bar Ranch
Pasco County, Florida

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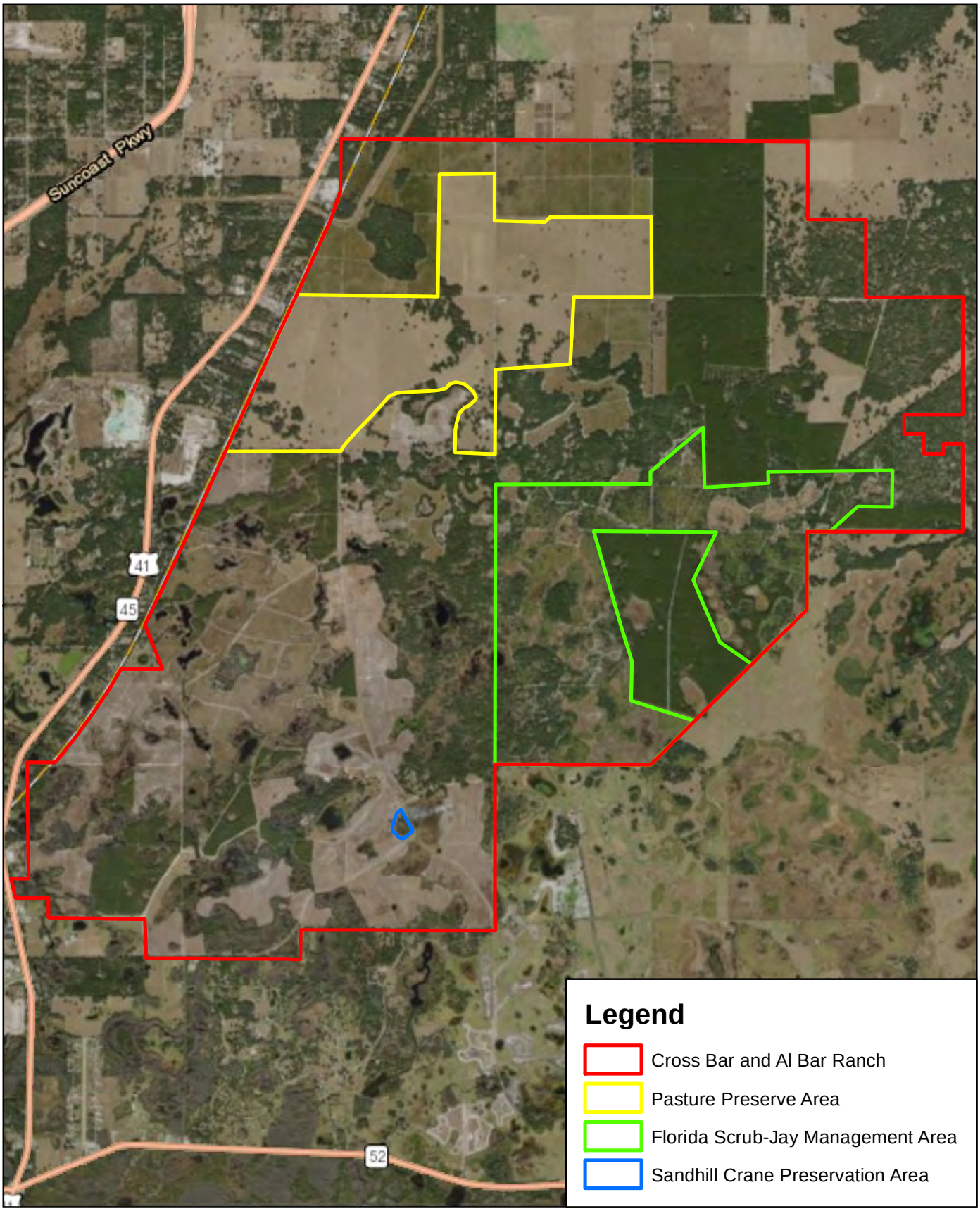
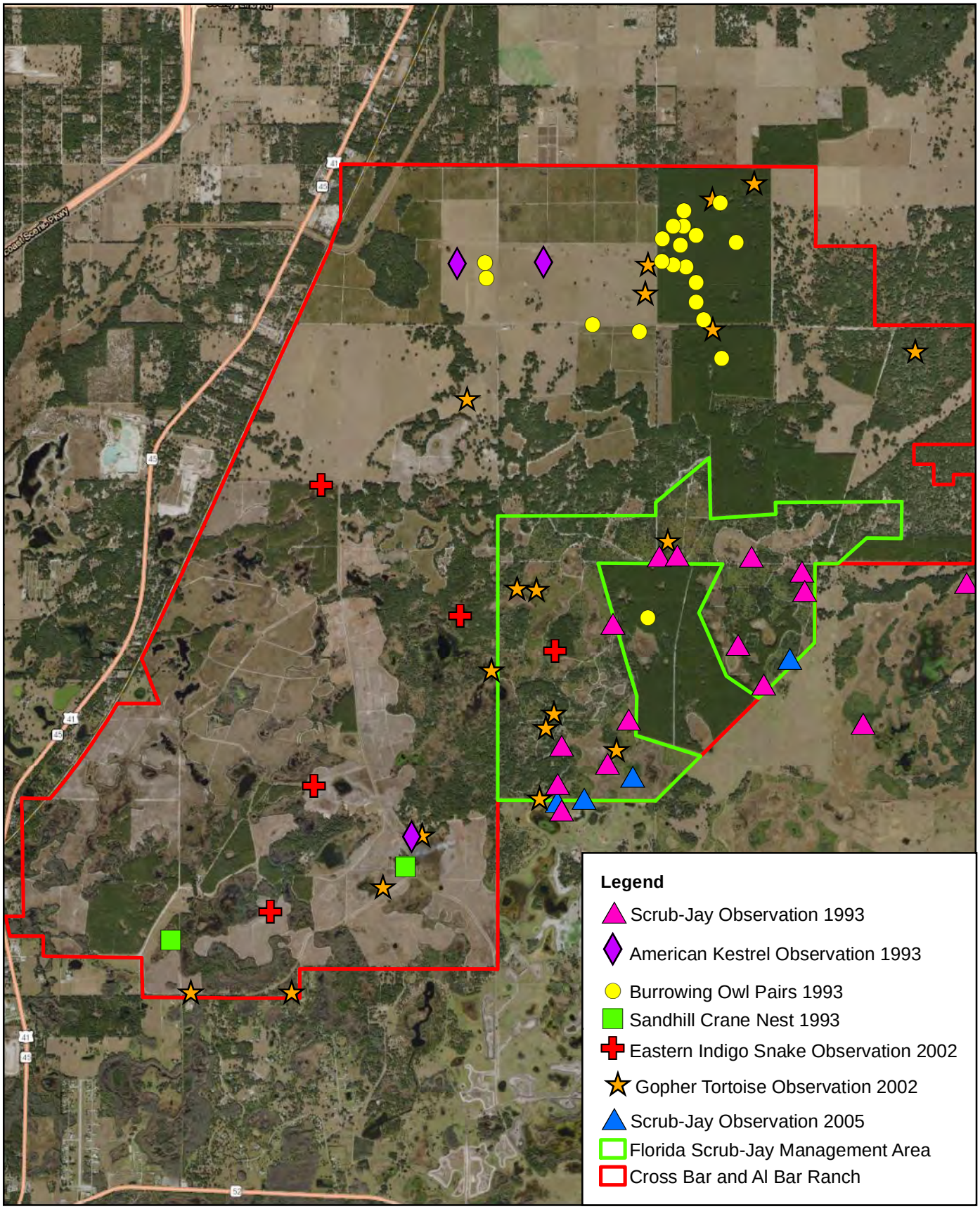


Path (E:\Mapping\Cross Bar - Al Bar Ranch\Maps\Historical Preservation Areas.mxd) By: CK Date: 8/26/2019

QUEST ecology

Figure 2-8
1995 Designated Preservation Areas
Cross Bar and Al Bar Ranch
Pasco County, Florida



QUEST ecology

Figure 2-9
Historical Protected Species Observations
Cross Bar and Al Bar Ranch
Pasco County, Florida

3.0 CURRENT SITE CONDITIONS

3.1 Infrastructure

Existing infrastructure both major and minor are important to the access, maintenance, protection and operation of CB/AB. Major infrastructure on the property includes approximately 26 miles of maintained roads, three (3) residences for use by the land manager, a north and south barn for equipment storage, a visitor's center that houses two outdoor seating areas and a large classroom used for Pasco County school field trips, and 17 production wells housed in concrete block buildings operated by TBW (**Figure 3-1, Infrastructure**). Minor infrastructure includes a perimeter fence, totaling approximately 24 miles in length, interior fences and gates owned by the on-site ranch manager, and utility poles distributed across much of CB/AB.

3.2 Soils

According to the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRDC) Web Soil Survey, there are 38 documented soils types within CB/AB (USDA 2019). Much of this (49.5%) consists of four (4) main soil types, and 94.5% of the property is composed of just 18 of the total 38 soil types. There are 20 soils types within the property that each make up less than 1% of the entire site. The four (4) most prevalent soil types are: "Adamsville fine sand, 0 to 2 percent slopes," "Tavares sand, 0 to 5 percent slopes," "Sparr fine sand, 0 to 5 percent slopes," and "Smyrna fine sand", in that order. Six (6) soils composing 22.5% of the property are considered hydric, meaning that these locations are permanently or seasonally saturated with water. See **Table 3-1, Soil Distribution by Type**, for a complete list of soil types with acreages, percent cover, and gopher tortoise suitability ratings.

Soil types have a substantial impact on the success of desired land uses. As such, suggested habitat management plans always consider soil types and coverages to produce successful outcomes. For example, 27.5% (~3,436 acres) of the property is composed of soils that are "highly suited" for gopher tortoises. These soils are also ideal for burrowing owls, indigo snakes, and other species that utilize burrows. Interestingly, all known burrowing owl burrows occur in soils that are "highly suited" for gopher tortoises. Interpreting soil data in this manner can assist with the identification of additional locations suitable for habitat restoration and/or management for focus species such as gopher tortoise or burrowing owl. See **Figure 3-2, Soils** for a map of all existing soil types onsite.

3.3 Hydrologic Features

According to maps created by the Federal Emergency Management Agency (FEMA), 5,480 acres or approximately 44% of CB/AB is located within the 100-year floodplain (**Figure 3-3, FEMA Flood Risks**). As noted above 22.5% of the site supports hydric soils that are permanently or seasonally saturated, and 17% of the site consists of wetland habitats. Surface water features include lakes, ponds and man-made

ditches. The ~34 acres of lakes at CB/AB include Goose Lake, Clear Lake, Spring Lake, and Lost Lake. Only one named stream system, Jumping Gully, occurs on CB/AB. This stream flows offsite to the west near Ditch Block #1 (**Figure 2-7**).

3.3.1 Hydrologic Monitoring

Hydrologic monitoring per CB/AB WUP conditions includes twice-monthly assessments of water levels at staff gauges and monitoring wells established for each of the 23 augmented wetlands (**Figures 2-5 and 2-6),** monthly monitoring of well and wetland augmentation flow meters, and weekly monitoring of staff gages located upstream and downstream of PCU's four (4) ditch blocks (**Figure 2-7)**. PCU also conducts water quality sampling (e.g., pH, hardness, and specific conductance) annually at two (2) augmentation wells on Cross Bar, and seven (7) augmentation wells on Al Bar. Vegetation monitoring includes twice-annual, semi-qualitative assessments of all augmented wetlands (except Goose Lake and Clear Lake) according to Wetland Assessment Procedures (WAP) outlined in the Environmental Management Plan for the Tampa Bay Water Central Systems Wellfield (TBW, 2000). Twice-annual quantitative vegetation monitoring using line intercept methods and the Plant Hydroperiod Index is also required at four (4) Al Bar augmented wetlands (4B, 5, 9C, and 10). Incidental wildlife observations are recorded and photo-documentation of each of the 23 augmentation wetlands also occurs twice-annually during each vegetation monitoring event. All data except for the weekly staff gauge ditch blocks readings are presented and summarized in annual reports submitted to the Southwest Water Management District (SWFWMD) before July 1 of each year.

Data collected during the bi-monthly monitoring of augmentation wetland water levels is also used to assess the need to activate the augmentation pumps. Target high and low pool elevations for each of the augmented wetlands are established by Special Condition 12 of the WUP's. Per this condition, augmentation of a wetland is only allowed when its water level drops below its Target High Pool Elevation.

None of the 23 augmented wetlands monitored on CB/AB in Water Year 2018 exhibited significant indicators of current drought stress. Evidence of past drought-stress (e.g., soil subsidence, fallen trees, crown dieback) is present, but none of these appear to have occurred recently. These observations are generally supported by a comparison of 2001 and 2018 qualitative WAP monitoring and quantitative vegetation monitoring scores. As described in the WY18 Annual Reports, these scores suggest an overall improvement and stabilization in wetland conditions since 2001 including species composition, species zonation and improved hydrology.

3.4 Existing Vegetation Communities

According to the Existing Land Use map (**Figure 3-4, FLUCFCS)**, there are a total of seven (7) vegetation cover types that occupy more than 5% of the land area at CB/AB. These include: Tree Plantations (41%),

Cropland and Pastureland (15.9%), Hardwood Conifer Mixed (10.4%), Freshwater Marshes (7.6%), Longleaf Pine – Xeric Oak (6.8%), Wet Prairies (6.5%), and Shrub and Brushland (5.6%) **(Table 3-2)**. The acreages provided on Table 3-2 are an approximation based on current overall FLUCFCS mapping and will vary as land uses change across the site.

3.4.1 Native Habitats

Due to the various anthropomorphic activities detailed in Section 2.0, 42% (~5,200 acres) of the land area within CB/AB is occupied by vegetation that still resembles a native upland (~25% or ~3,140 acres) or wetland (17% or 2,100 acres) vegetation community. Most of these uplands exist in an altered steady-state due to decades of fire suppression and subsequent hardwood encroachment.

A description of each cover type that resembles a natural vegetation community is provided below. These descriptions are based on the FLUCFCS Manual (FDOT, 1999), and adapted for CB/AB.

Shrub and Brushland (FLUCFCS 320 and 330)

Shrub and Brushland is concentrated in the SJMA, and accounts for approximately 41% of the cover within that boundary. This community is dominated by shrubs with mostly saw palmetto (*Serenoa repens*), gallberry (*Ilex glabra*), and wax-myrtle (*Morella cerifera*) dominating or co-dominating depending upon variations in soil moisture. Canopy cover is generally less than 10%, and where present, consists of oaks and/or pines depending upon soil moisture and fire history. Groundcover abundance varies inversely with shrub cover and time since fire. In patches where shrubs are not too dense due to fire suppression and/or historic over-grazing, the groundcover may include a high diversity of native graminoids and forbs and potential for rare species.

Pine Flatwoods (FLUCFCS 411)

The primary location of Pine Flatwoods on CB/AB is a ~100-acre polygon that spans the north border of the SJMA. This community typically has at least 10% canopy cover of either slash pine (*Pinus elliottii*) or longleaf pine (*Pinus palustris*) depending upon soil moisture, fire history, and logging history. Understory species primarily include oaks (*Quercus* spp.) saw palmetto, wax myrtle, gallberry, wiregrass (*Aristida stricta*), broomsedges (*Andropogon* spp.) and a wide variety of other shrubs and groundcover species. In the absence of frequent fires, oak cover generally increases and groundcover diversity decreases in these communities.

Longleaf Pine - Xeric Oak (FLUCFCS 412)

The Longleaf Pine – Xeric Oak forest type occupies ~850 acres on CB/AB, mostly on unconverted lands lying outside but adjacent to the SJMA boundary. It typically occupies what is considered ‘Sandhill’

habitat by Florida Natural Areas Inventory (FNAI) and others. Its canopy is dominated by longleaf pine with at least 10% cover, and its subcanopy is dominated by various oaks depending upon fire history and soil moisture. In regularly burned sandhills oak cover remains low, and ground cover abundancy and diversity remains high. Typical associates include turkey oak (*Quercus laevis*), sand live oak (*Quercus geminata*), saw palmetto, and wiregrass. This community occurs on deep, infertile sands and requires regular fire to maintain groundcover diversity and reduce hardwood cover.

Hardwood - Conifer Mixed (FLUCFCS 434)

This community is one of the dominant and most variable native cover types remaining on CB/AB, accounting for ~10% of the total cover and ~13% of the SJMA. It primarily consists of a dominant and often dense canopy cover of live oak (*Quercus virginiana*) or sand live oak (*Quercus geminata*), often with scattered remnant mature pines occasionally rising above the oak layer. Beneath dense oak canopies, shrub cover and groundcover are generally sparse due to deep shade and oak litter, but typically includes patches of saw palmetto, bunchgrasses, and a few other persistent native species. The dense oak cover that characterizes this community is primarily a result of decades-long fire suppression. Mechanical hardwood reduction followed by fire is recommended for most of this community to restore a natural vegetative structure more closely resembling the former pine flatwoods, sandhill, or scrub communities that occupied these polygons. A few small areas of this cover type are presumably natural live oak hammocks from which fire has historically been mostly excluded by higher soil moisture. These areas often do not have any remnant pines in the overstory, nor saw palmetto in the understory.

Lakes (FLUCFCS 520)

Lakes account for approximately 34 acres at CB/AB and include Goose Lake, Clear Lake, Spring Lake, and Lost Lake. This category excludes reservoirs and cattle ponds. These lakes often have a forested wetland perimeter consisting of hardwoods and/or cypress (*Taxodium* spp.) and are an important resource for waterfowl and other wetland dependent wildlife.

Stream and Lake Swamps (Bottomland) (FLUCFCS 615)

This community accounts for ~60 acres and is confined to the southwestern portion of Cross Bar. It is also often referred to as bottomland or stream hardwoods and is usually restricted to creek and lake flood plain or overflow areas. It typically has a dense canopy comprised of a variety of predominantly hardwood species, including red maple (*Acer rubrum*), sweet bay (*Magnolia virginiana*), swamp bay (*Persea palustris*), swamp tupelo (*Nyssa biflora*), water oak (*Quercus nigra*), laurel oak (*Quercus laurifolia*), sweetgum (*Liquidambar styraciflua*) and occasionally cypress or slash pine. Scattered wetland shrubs, ferns and emergent aquatic vegetation often sparsely occupy the understory.

Cypress (FLUCFCS 621 and 630)

This community accounts for approximately 200 acres and like the Streams and Lake Swamps (FLUCFCS 615) community described above, is confined to the southwest portion of Cross Bar. Pond cypress (*Taxodium ascendens*) or bald cypress (*Taxodium distichum*) are the predominant canopy species. Common associates include swamp tupelo, slash pine, red maple, sweet bay, and swamp bay. Many of the cypress communities have presumably formed as a result of dissolution of underlying limestone. These cypresses dominated communities often have a dense muck layer and support groundcover consisting of ferns and aquatic emergent vegetation adapted to prolonged inundation. Many of the cypress wetlands on Cross Bar are regularly monitored and augmented as-needed according to the County's Water Use Permit.

Freshwater Marshes (FLUCFCS 641)

Freshwater marshes are the dominant wetland cover type on CB/AB accounting for approximately 950 acres or 7% of the land area. They are closely related to Wet Prairie (FLUCFCS 643), and both herbaceous wetland types often contain components of the other at the outer edges or centers. Classification of these two cover types may vary over time depending on changes in hydroperiod. In general a wet prairie is a slightly drier version of freshwater marsh. Freshwater marshes on CB/AB are typically dominated by a combination of pickerelweed (*Pontederia cordata*) and bulltongue arrowhead (*Sagittaria lancifolia*) at the deeper center portions of the marsh, and maidencane (*Panicum hemitomon*), blue maidencane (*Amphicarpum muhlenbergianum*), southern cutgrass (*Leersia hexandra*), and dotted smartweed (*Persicaria punctata*) on the edges. A variety of other graminoids and forbs may also be present with species richness generally increasing along the marsh edge and ecotone. A few marshes also contain patches of nuisance-exotic species such as torpedo grass (*Panicum repens*) and cattail (*Typha* sp.). Several of the Freshwater Marshes on CB/AB are regularly monitored and augmented as-needed according to the County's Water Use Permit.

Wet Prairies (FLUCFCS 643)

Wet Prairies are the second most abundant wetland cover type on CB/AB, accounting for approximately 800 acres (~6%) of the total land area approximately half of which is located within the SJMA. Most of these occur as small (<5 acre), isolated depressions surrounded by Shrub and Brushland (FLUCFCS 320), and former flatwoods, sandhill, and scrub communities. As aforementioned, Wet Prairies are closely linked with Freshwater Marshes. Marshes often contain a wet prairie component along their perimeter, and some Wet Prairies may develop a marsh center over a period of prolonged inundation. Most Wet Prairies, however, do not contain standing water over a prolonged period. They are typically dominated by grasses such as blue maidencane, carpetgrass (*Axonopus* spp.), and broomsedges (*Andropogon* spp.) with a lesser component of sedges (*Cyperus* spp.), beakrushes (*Rhynchospora* spp.), and forbs such as St. John's-wort (*Hypericum* spp.), and yellow-eyed grasses (*Xyris* spp.).

3.4.2 Converted Lands

These altered cover types account for a combined approximately 57% (~7,000 acres) of the land area at CB/AB and represent areas where the natural vegetation community has been mostly removed and replaced in the past ~80 years.

Tree Plantations (FLUCFCS 440)

Since the development of the initial management plan for CB/AB, over 4,700 acres of pine plantation timber has been established and managed to produce pine straw and pine timber. Some of the first plantation stands have been harvested and reforested, with the reforested areas totaling 3,055 acres. Currently cut over areas comprise 447.5 acres, and 860 acres remain from the original 1994-96 plantings that are scheduled for harvest within the next two years. A total of 4,363 acres are being actively managed for pine plantations (See **Figure 3-5, Pine Plantations 2019**). Straw raking within designated areas will begin when the pines reach age seven.

Approximately 242 acres (~5% of the total pine acres) remain from longleaf pine plantings conducted in 1994 and 1995. Pine bark beetle activity has been identified in some of the stands, and a salvage harvest of some areas has been recommended. Clear cutting or thinning of stands to avoid further beetle damage is ongoing, and some of these areas will be allowed to naturally regenerate to a longleaf pine (LLP) flatwoods community (**Figure 3-6, Longleaf Pine Harvest Plan**). This LLP restoration process is further described in Section 4.3.

Cropland/Pastureland (FLUCFCS 210)

The pastures at CB/AB include hayfields and cattle grazing pastures (**Figure 3-7, Hay Fields & Cattle Pastures**). The hayfields are planted with a hybrid Bermuda grass (*Cynodon dactylon*), known as Tifton 44. According to Burton (2003), compared with Coastal Bermuda, Tifton 44 is darker green, has finer stems that cure faster when cut for hay, has more rhizomes, is a little shorter, and makes a denser sod. The improved cattle grazing pastures have been planted with Pensacola Bahia grass (*Paspalum notatum*). In the improved condition, native vegetation has been removed to create a more mono-typical scenario which is easier and more efficient to maintain.

3.4.3 Nuisance and Exotic Vegetation

Nuisance and exotic (n/e) plant species pose a substantial threat to natural areas including those found on CB/AB. Every two (2) years the Florida Exotic Pest Plant Council (FLEPPC) compiles a list of invasive plant species that alter natural environments by displacing native species, changing community structures and ecological functions, or have the potential to do so in the near future (FLEPPC 2017).

The most prevalent n/e species observed on site is cogongrass (*Imperata cylindrica*), which occurs throughout including within pastures and pine plantations. Additional invasive vegetation frequently observed includes: torpedo grass (*Panicum repens*), Caesarweed (*Urena lobata*), skunk vine (*Paederia foetida*), smut grass (*Sporobolus indicus*), tropical soda apple (*Solanum viarum*), and camphor tree (*Cinnamomum camphora*). Other less prevalent or problematic n/e species that have been observed include Chinaberry (*Melia azedarach*), cattail (*Typha sp.*), Japanese climbing fern (*Lygodium japonicum*), Chinese tallow (*Triadica sebifera*), and primrose willow (*Ludwigia peruviana*).

Many of these n/e species are found in the transition zone, or ecotone, where one habitat type changes into another, or areas of frequent disturbance; (e.g., wetland edges, where pasture meets a forested habitat, frequently maintained fire breaks, etc.). Several acres of torpedo grass have been documented surrounding Augmented Wetlands 4A and 4B on Al Bar and Clear Lake on Cross Bar. Torpedo grass has also been observed in smaller quantities in and around most of the other augmented sites. Caesarweed, skunk vine, and camphor trees are also commonly found in small patches around the majority of wetlands on site. Caesarweed has also been observed in smaller, isolated patches within upland pastures and hammocks.

3.4.4 Listed Plant Species

Multiple sources were consulted to determine the potential occurrence of state and/or federally-listed Endangered or Threatened plant taxa on CB/AB pursuant to Chapter 5B-40, F.A.C. and 50 CFR Part 17 (Wunderlin et al, 2019; Chafin, 2000; FNAI, 2019b). Based on this review, a total of 36 listed plant species have the potential to occur on CB/AB due to their documented occurrence in Pasco County or adjacent counties and the presence of potential preferred habitats on CB/AB (**Table 3-3, Listed Plants Potentially Occurring on CB/AB**). Of these, a total of 14 have been documented from Pasco County, so may have a higher potential of occurrence on CB/AB.

To date none of the potentially occurring rare plant taxa has been identified on CB/AB. However, a thorough rare plant survey has not been conducted. If restoration of fire-suppressed habitats proceeds, the potential for observation of listed plant taxa is expected to increase. For example, many listed species that prefer fire-maintained habitats (e.g., scrub, sandhill, flatwoods) have the ability to remain dormant for many years in the absence of an appropriate fire regime. If removal of hardwoods and implementation of prescribed burning were conducted in designated areas, conditions favoring emergence of many listed upland groundcover species will improve. This is expected to include species such as Curtiss' milkweed (*Asclepias curtiissii*), giant orchid (*Orthochilus ecristata*), Catesby's lily (*Lilium catesbaei*), and many-flowered grasspink (*Calopogon multiflorus*).

3.5 Wildlife

As noted above, wildlife surveys have been taking place on CB/AB since 1992 or before and currently continue at least annually for target species. Incidental observations of listed and non-listed wildlife species and their signs are regularly documented during ongoing CB/AB field reviews. **Table 3-4, Listed Wildlife Species Observed on CB/AB and Table 3-5, Non-listed Wildlife Observed on CB/AB** provide a comprehensive list of protected and non-listed species observed at the site to date.

3.5.1 Focal Species

Historic surveys and management planning have focused on five focal protected species: Florida scrub-jay, burrowing owl, southeastern American kestrel, Florida sandhill crane, and gopher tortoise. The history and the current status of these five target species is provided below.

The presence of wildlife species known as "umbrella species" is often an indication of good habitat quality, and management practices often use these species as a gauge for success. For example, the Florida scrub-jay is an umbrella species that is habitat specific to oak scrub. Where the Florida scrub-jay is found in oak scrub habitats, it is generally assumed that the habitat is in good condition. Additionally, where this umbrella species is present, a known association of flora and fauna can also be expected to be present. Similarly, "keystone species" such as the gopher tortoise play a critical role in maintaining the structure of an ecological community and strongly influence the number and diversity of species that can use those habitats. This is primarily due to the availability of the burrow as shelter to over 350 other commensal species including for example, the gopher frog (*Lithobates capito*), the Florida mouse (*Podomys floridanus*), and the eastern diamondback rattlesnake (*Crotalus adamanteus*) (FWC, 2012).

Florida Scrub-jay

The Florida scrub-jay (FSJ) is a 12-inch long, blue and gray, crestless jay that lacks the white wing spots and tail feather tips of the more common and widespread blue jay. A necklace of blue feathers separates the whiter throat from the gray whitish forehead. The tail is long and loose in appearance and the back is gray. The FSJ is restricted to scattered, often small and isolated patches of sand pine scrub, xeric oak scrub, and scrubby flatwoods in peninsular Florida. They have very specific habitat requirements and prefer forms of scrub habitat that burn frequently enough to maintain a tree height of three to 10 feet tall. While scrub-jays can be found in areas where scrub has been allowed to exceed the ideal height structure, or in areas recently converted to other uses such as residential developments or farmland, their survival and reproductive success are generally very poor in these areas.

Florida scrub-jays have been documented on the CB/AB property since 1992, according to the known occurrence of scrub-jays reported by NRPS (NRPS 1992). The site was surveyed in 1993 as part of a comprehensive state-wide population analysis organized by Archbold Biological Station (ABS), under

contract with the U.S. Fish and Wildlife Service (USFWS). The results from this survey concluded that the FSJ has declined by 25-50% in the northern third of its range, including Pasco County, since the early 1980s. This decline was mostly due to fire suppression and the clearing of formerly suitable habitat. FSJ decline has been projected to continue across their entire range unless substantial habitat management and preservation occurs (Fitzpatrick *et al.* 1994).

The first surveys conducted by P&A were in 1993, when "up to 12" FSJ groups were observed, consisting of 1-6 individual FSJ's per group. (Peacock 1995). These twelve groups made up half of the 24 total groups identified in Pasco County at this time (Fitzpatrick *et. al.* 1994) and represented a statistically significant population of FSJs in the region. For this reason, PCU and their consultants designated approximately 1,688 acres on Al Bar as the "Florida Scrub-Jay Management Area" (FSJMA). In 1997 P&A documented 10 groups of FSJs and in 1998 only nine (9) groups were identified, including one outside of the FSJMA on Cross Bar (Peacock 2015). Audubon of Florida began annual FSJ surveys on the site in the spring of 2000. The initial survey determined that only five (5) of the originally documented 12 groups remained. Previously observed groups on Cross Bar had dispersed due to adverse changes in the vegetation communities that comprised former habitat, including species compositions and vertical structures, brought about by the lack of a well implemented fire management program. Due to this, all five (5) groups were found only on Al Bar (Pranty 2001).

In 2009 and 2010, biologists from ABS sought to reassess all the Florida scrub-jay populations originally documented in the 1992 and 1993 surveys. During these surveys, they were unable to find a single group of scrub-jays on CB/AB (Boughton & Bowman 2011). This result is likely due to the unsuccessful FSJMA habitat restoration attempts in the early 2000s. The reduction of usable habitats in the FSJMA likely resulted in the emigration of those FSJ groups to more suitable habitat on the adjacent ranches.

Surveys conducted by P&A annually from 2013 to 2015 resulted in the documentation of only one (1) FSJ group utilizing property along the southern boundary; however, it was noted that most of this group's territory appeared to be on the adjacent 4G Ranch (Peacock 2015).

Based on the most recent surveys, conducted to date, two FSJ groups are utilizing habitats on the FSJMA (**Figure 3-8, Florida Scrub-jay Observations 2018-2019**). The first group has been observed using mesic pine flatwoods areas within the approximately southern third of Burn Unit B within the FSJMA, as well as off-site habitats to the south. Juveniles were observed within this group in July 2018. The second group, currently consisting of two adult jays, was observed utilizing the central and eastern portion of Burn Unit A. The recent harvest of the adjacent planted pines has resulted in additional suitable habitat for these jays; an active nest site was observed in clumps of saw palmetto and oak along the FSJMA/pine plantation boundary in June 2019 (**Figure 3-8**).

Confirmation of group sizes and individuals will not be conclusive until all local scrub-jays can be banded using color identification bands given to each bird. For this reason, a banding and monitoring program

will be included as a recommended management action (Section 4.4). Additional information regarding onsite scrub-jay populations will be provided in the Wildlife Utilization Report to be prepared following the 2019 breeding season.

Burrowing Owl

Burrowing owls (BUOW) are small fossorial owls found in the Western United States and in Florida (*A. cunicularia floridana*). They live and nest in underground burrows in open, dry grassland habitat with short vegetation structure such as upland prairies and cow pastures. Burrowing owls found in Florida have the ability to dig their own burrow but often use burrows dug by other species such as gopher tortoise or armadillo (*Dasypus novemcinctus*). Each pair of burrowing owls uses several burrows, one being the primary burrow in which the nest is built, the others called satellite burrows, used for shelter, food storage and protection against predators. Florida burrowing owls are non-migratory and use their burrows year-round (Haug et al. 1993; Millsap and Bear 2000). The lack of available suitable habitat and burrows is known to be a limiting factor for burrowing owl populations.

Surveys conducted from 1993 to 1995 by P&A represent the earliest documented burrowing owl presence on CB/AB. These surveys resulted in the observation of 20 pairs of burrowing owls spread across CB/AB. Four (4) pairs were observed in pastures on Cross Bar and 16 pairs were observed in pastures on Al Bar; one (1) of which was located adjacent to the FSJMA (**Figure 3-9, Historical Burrowing Owl Pasture Use**). At this time, P&A proposed a mowing regime in occupied burrowing owl locations to "maintain the low groundcover preferred by this species" (Peacock 1995). Current FWC guidelines discourage the use of heavier equipment that could collapse the burrow (FWC 2018) (https://myfwc.com/media/2028/floridaburrowingowlguidelines-2018.pdf) and agriculture wildlife best management practices call for avoiding contact with heavy equipment (FDACS 2015). (https://www.fws.gov/panamacity/resources/Envirothon%20Study%20Guides/2017/Agriculture%20Wildlife%20Best%20Management%20Practices%20for%20State%20Imperiled%20Species.pdf).

P&A conducted additional population surveys in March 1996 resulting in a total count of only 12 adult burrowing owls on CB/AB. By 1997 pastures formerly suitable for burrowing owl occupation had been lost due to the planting of slash pine (Peacock 2015). Of the 20 previously documented burrowing owl pairs, 16 had resided within pastures that were converted to pine. In late 1997 artificial burrows were installed in suitable pasture locations to cope with this significant habitat loss. However, agricultural activities (disking) destroyed these burrows shortly thereafter. Surveys conducted between 2000 and 2004 resulted in an estimate of eight (8) to 18 individuals, fluctuating according to reproductive success. Additional artificial burrows were installed in 2012 but met the same fate as the original set, destroyed by agricultural practices (Peacock 2015). Incidental observations from 2016 noted five (5) active burrows in cattle pastures located in the northwestern portion of Cross Bar, and in 2018 six (6) total burrows were observed by P&A (Peacock 2018). Increased tree heights on adjacent pine plantations, as well as

increased agricultural activity, have dramatically reduced available burrowing owl habitat throughout the property.

As of June 2019, a total of 11 burrowing owl breeding pairs have been located and 44 burrows have been observed. Each breeding pair is located in cattle pasture in the northwestern portion of Cross Bar (**Figure 3-10, 2019 Burrowing Owl Primary Nest Burrows**). These pastures provide suitable habitat for burrowing owls due to the low groundcover and the fence posts that provide necessary line-of-sight and perching requirements. The location of owl burrows underneath fence lines can be indicative of disturbances such as mowing within the pastures. Repeated disturbance from agricultural practices including cattle production and the use of tractors for mowing, disking, planting, or hay production can discourage the use of open pasture, and potentially exclude them from otherwise acceptable habitats. After much of the property's historic owl habitat was converted to planted pine, these pastures are the most important areas of remaining suitable habitat and specific management actions should be implemented (See Section 4.5).

Additional information regarding onsite burrowing owl populations will be provided in the Wildlife Utilization Report to be prepared following the 2019 breeding season.

Southeastern American Kestrel

Southeastern American kestrels (*Falco sparverius paulus*) are a non-migratory subspecies of the migratory American kestrel (*Falco sparverius*). This species is found in prairies, open pine savannahs, sandhills, and pastures in the southeastern United States. It nests in cavities excavated by woodpeckers and in artificial objects such as power poles. The American kestrel, a non-listed species which is visually indistinguishable from the resident subspecies, winters in Florida and can be found there between September and March. For this reason, all kestrels found in April through early September should be treated as the listed subspecies.

Southeastern American kestrels (kestrels) prefer to hunt from high vantage points adjacent to swaths of open areas composed of short vegetation where their primary prey can be found. CB/AB offers miles of power lines and tall trees that provide these preferred high perching points along roadsides and pastures that maintain a vegetation height of less than 12 inches. Natural snags with cavities can be found throughout the site, as well as nest boxes that have been installed to provide enhanced nesting opportunities.

The earliest available record of kestrels on CB/AB comes from the P&A monthly power line surveys initiated in 1992. After these surveys confirmed the presence of kestrels on site, P&A installed 19 kestrel nest boxes within potentially suitable habitat throughout CB/AB (Peacock 2018). In their first wildlife management report, P&A noted that three (3) pairs of southeastern American kestrels were successfully

nesting in nest boxes along the paved road on Cross Bar. Other observations at this time also indicated potentially successful nesting in natural cavities on Cross Bar (Peacock 1995).

Kestrel nest box usage data is unavailable from 1995 to 1999, however, it was noted that a total of four (4) boxes were being utilized by kestrels in 2000 and 11 boxes were being used in 2003. Nest box usage data is again unavailable from 2003 to 2012, but P&A recorded the use of five (5) nest boxes in 2013, nine (9) in 2014, nine (9) in 2015, and nine (9) in 2016 (Peacock 2015; Peacock 2018). Fluctuations in kestrel nest box usage are more likely attributed to box deterioration and a lack of maintenance than it is to actual changes in the kestrel population.

There are currently 15 kestrel boxes located primarily in the north pasture and hay field portions of Cross Bar (**Figure 3-11, Existing Kestrel Nest Boxes**). Recent observations indicate continued healthy site usage by kestrels, and opportunities for expansion of the nest box program exist provided future land use plans are consistent with kestrel habitat requirements. The miles of power lines intersecting CB/AB provide areas of good hunting and nesting habitat for kestrels. Kestrels and other species have also been observed nesting in cavities within wooden power poles.

Due to the threatened status of this species, and the compatibility of the kestrel habitat requirements with most ongoing ranch and forestry practices, management recommendations include measures for enhancing and maximizing nesting opportunities on CB/AB as a compatible wildlife objective.

Florida Sandhill Crane

Sandhill cranes are large, grey, wetland dependent birds standing nearly four (4) feet tall. Adults have black legs and white cheeks with a red crown. They utilize a wide variety of wetland and upland habitats for foraging needs, but primarily nest in herbaceous, depressional wetlands (FWC 2016).

P&A initiated sandhill crane population assessments in 1993. Random surveys and pedestrian observations resulted in a population estimate of between 10 and 12 pairs. In 1996 P&A conducted detailed surveys on the property utilizing the methods set forth by the Florida Fish and Wildlife Conservation Commission (FWC) to include pedestrian surveys and an aerial flyover. These surveys conducted from February to April 1996 tallied 12 active sandhill crane nests. Pedestrian surveys conducted in 1997 resulted in a total of seven observed active nests, and from 2000 to 2004 counts fluctuated from five (5) to nine (9) active nests (Peacock 2015). The next surveys on record from 2016 to 2018, indicated an estimated 10-12 nesting pairs (Peacock 2018).

Sandhill crane nesting success is dependent upon suitable water levels in herbaceous wetlands. Desirable emergent vegetation cover and the extent of the shrub and forested component along the wetland fringe are also factors affecting preferred nesting conditions. As such, these year to year

fluctuations in nest counts can be anticipated based on rainfall and other factors that influence wetland habitats.

CB/AB provides hundreds of acres of wetlands that provide ideal nesting habitat for sandhill cranes, and this species has been documented breeding successfully for many years. Incidental sightings throughout 2018 and 2019 indicate an abundance of sandhill cranes across the property. Often seen in groups of 2 or more, sandhill crane observations have occurred during nearly every site visit, in both wetlands and pasture areas, including observing chicks and juveniles in the spring of 2019.

Gopher Tortoise

The gopher tortoise is a terrestrial reptile found in well-drained sandy areas with sparse tree canopy and low growing vegetation. This species digs burrows on average 15 feet long and 6.5 feet deep in order to seek refuge from cold, heat, drought, fire, and predators. Over 350 burrow associate species have been documented using gopher tortoise burrows, making them an important "keystone species" in upland habitats.

Gopher tortoises occur commonly throughout upland habitats on CB/AB and are frequently observed. P&A began gopher tortoise surveys on CB/AB in March 1993. Previous reports do not give population or burrow counts but do indicate that tortoises were most likely to be found in native scrub, new and mature planted pine and improved pasture. P&A most recently reported that tortoises are most commonly found along road and fire breaks bordering one of these habitat types (Peacock 2018). Even without historical population estimates, it can be assumed that the property's gopher tortoise population has been in decline for many years as a result of fire suppression, the ensuing increase in canopy cover, and resulting decrease in forage, as well as the conversion of former habitats into production timber.

The majority of observed tortoises and burrows have occurred from incidental sightings, and comprehensive, quantitative surveys have not been performed. To date, a total of 142 gopher tortoise burrows have been identified on the property (**Figure 3-12, Gopher Tortoise Burrows)**; however, because these are incidental sightings, these burrows likely represent only a small percentage of the total onsite population.

Preliminary assessments for the potential to establish portions of CB/AB as an FWC approved Gopher Tortoise Recipient Site are being conducted. To determine potential suitability, a quantitative survey was conducted on July 3, 2018, in the southern portion of the recently harvested timber area in the center of the FSJMA. Two (2) burrows were observed in the approximately 465 acres of previously planted pine both within 200 feet of the former plantation edge. Low usage of this habitat by gopher tortoises is indicative of the limited use of closed canopy plantations due to the lack of ground cover

available for forage, and the unsuitability of such areas for gopher tortoise reintroduction (**See Section 4.9**).

The management recommendations outlined below that target other focus species will also benefit gopher tortoises by reducing canopy coverage and encouraging establishment of ground cover vegetation.

3.5.2 Other Protected Species

In addition to the above species, a number of other state and/or federally listed species have been observed and historically documented on the property.

Wetland Dependent Birds

This category includes state and federally listed wetland dependent avian species including roseate spoonbill (*Platalea ajaja*), wood stork (*Mycteria americana*), tri-colored heron (*Egretta tricolor*), and little blue heron (*Egretta caerulea*), all of which have been documented on CB/AB. These species depend on wetlands and surface waters to provide foraging and nesting potential.

Recorded observations of these species have been documented consistently across CB/AB since 1992 as observed by P&A, Audubon, and the current land management team. The site provides an abundance of suitable foraging habitat for these species due to its large supply of wetlands and surface waters. A database search using the Florida Natural Areas Inventory (FNAI) biodiversity matrix software returned one (1) historically documented little blue heron rookery along the eastern boundary of Cross Bar, just west of Al Bar (FNAI 2019b). However, it has been more than 20 years since this rookery was last documented.

Whooping Crane

Whooping cranes (*Grus americana*) are the tallest species of bird in North America, standing at approximately five (5) feet tall. Adult plumage is white with the exception of black primary feathers, black cheeks from the side of the head to the bill at the angle of the jaw line, and a dark red crown. The bill, legs and feet are dark gray or black (CWS & USFWS 2007). Whooping cranes primarily utilize shallow marshes and open grasslands for nesting and foraging. Their diet consists of aquatic invertebrates and small vertebrates including fish, reptiles, amphibians, mammals, and other birds (FWC 2019).

From 1993 to 2005 FWC helped to release 289 whooping cranes into Central Florida in parts of Lake, Osceola and Polk Counties as part of an effort intended to populate habitat historically utilized by a non-migratory population of the species. The results were unsuccessful with a total of 47 nests producing four (4) chicks that fledged and survived to independence (Folk et. al. 2008). Whooping cranes have

occasionally been observed on CB/AB since re-introduction to Florida began. One pair nested in Al Bar Wetland 4A (AB-4A) in 2008, but since there is little documentation' it is unknown if the nest was successful (S. Dawson, pers. comm., 2019). Most recently unconfirmed sightings of whooping cranes were made in May 2019, with one confirmed sighting of a pair observed foraging in Al Bar Wetland 6 (AB-6) on May 31, 2019 (See **Figure 3-8**). The sightings were reported to USFWS and FWC personnel, and FWC requested a site visit to review the habitat. Quest Ecology staff met Mr. Tim Dellinger, FWC's Whooping Crane Biologist on August 1, 2019, and toured the areas where the cranes were observed, as well as similar herbaceous wetlands. Mr. Dellinger said that whooping cranes and sandhill cranes have similar ecological needs, and appropriate management of these habitats would benefit both species.

Bald Eagle

Although they are no longer state or federally listed, bald eagles (*Haliaeetus leucocephalus*) are still protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668a–668c) and the Migratory Bird Treaty Act (16 U.S.C. 703–711). In Florida, Rule 68A-16.002, Florida Administrative Code (F.A.C.), prohibits take (as defined in Rule 68A1.004), feeding, disturbance, possession, and sale of bald eagles, their nests and eggs, or parts thereof. In early 2018 a bald eagle nest was documented in the northwestern corner of the Cross Bar property (Peacock 2018). A data search using the FWC Online Eagle Nest Locator Program indicated that there are no recorded nests on CB/AB at this time. The closest known nest was located approximately two (2) miles south of the FSJMA and last confirmed active in 2014. Should a nest be observed on CB/AB, any activity should be restricted within 660 feet of the nest during nesting season (October 1 through May 15).

REPTILES

Eastern Indigo Snake

Eastern indigo snakes (*Drymarchon corais couperi*) are large, black, non-venomous snakes which are distributed throughout the southeastern United States. The eastern indigo snake occurs in a variety of habitats including pine and scrubby flatwoods, dry prairies, tropical hardwood hammocks, freshwater marsh edges, and agricultural fields. This species feeds on snakes, frogs, salamanders, toads, small mammals, birds and young turtles. Five (5) eastern indigo snakes were documented by P&A in a 2002 figure (NRPS 2002), and one was observed (See **Figure 3-8**) in 2018 by Quest Ecology staff.

Florida Pine Snake

The Florida pine snake (*Pituophis melanoleucus mugitus*) can reach eight (8) feet in length and has a brown back with darker black or brown splotches, a white belly, and pointed snout. This non-venomous species inhabits relatively open canopies and dry sandy soils, in which it burrows. They often coexist with pocket gophers (*Geomys pinetis*) and gopher tortoises. The Florida pine snake was noted in the

2018 P&A report, and one (1) snake was documented from a database search using the FNAI biodiversity matrix software, recorded in the southwestern corner of the property along Locket Ave (FNAI 2019b).

American Alligator

The presence of American alligators (*Alligator mississippiensis*) on CB/AB has been documented consistently in former P&A reports. Alligators are large, semi-aquatic, reptiles ranging six (6) to 14 feet in length as adults. The alligator is an opportunistic feeder that will consume almost anything, but primarily eats fish, turtles and snails. Female alligators construct nests comprised of vegetation, sticks, leaves, and mud in a location near a regularly inundated water source. The large supply of wetlands and surface waters on CB/AB provides substantial habitat for alligators.

3.5.3 Other/Nuisance Wildlife

White-tailed Deer

White-tailed deer (*Odocoileus virginianus*) are prevalent throughout CB/AB in potentially problematic densities. On December 3, 2018, an FWC deer management program coordinator conducted a brief site review to provide a general density assessment and recommendations for the site's population of white-tailed deer. The findings are summarized in **Attachment 1, FWC Letter dated Dec. 4, 2018**. Heavy deer browse observed on less desirable forage species indicated that the population of deer on the property is above average. High densities of deer can have detrimental effects on the population including lower weight due to limited desirable forage, an increase in potential disease transmission, and reduced physical fitness.

This assessment was performed mid-day when deer are less active. As such, the only available indicator of density was browse on forage species. A comprehensive night-time population analysis that takes place across a period of several days is recommended to more accurately determine deer populations on the property. Detailed information including buck to doe ratio and fawn to doe ratio is essential to the creation of any scientifically based deer management plan.

Wild Hogs

The property also supports a large number of exotic wild hogs (*Sus scrofa*). Wild hogs can be found in every county in Florida and most southeastern states. Florida has a stable population of wild hogs estimated at over 500,000. Hogs are typically found in large forested tracts with dense understory vegetation and limited public access, similar to much of CB/AB. Hogs enjoy hard mast like acorns, often competing with native wildlife but have also been known to consume nests and young of ground nesting birds and reptiles (Guiliano and Tanner 2008). One of the central issues that hogs create in natural areas

is soil disturbance from rooting. Hogs root through the top layer of soil in search of food, resulting in often large expanses of upturned soil which can then be colonized by fast growing nuisance and exotic vegetation species. Wild hogs can also disturb ground nesting native wildlife and compete with more desirable wildlife species for forage. Management actions for the site include recommendations for control of wild hogs (see Section 4.8).

Coyotes

Coyotes (*Canis latrans*), have ascended as the apex predator in most of Eastern North America since the extirpation of wolves. While perceived as a nuisance species to much of the public, they play a crucial ecological role of keeping ungulate populations, native and exotic, in check (Benson, 2017). This role may be of importance in areas where wild hog and deer populations are problematic, as has been documented on CB/AB. A study in Oklahoma illustrated the dramatic increase of white-tail deer fawn population survival rates due to the removal of coyotes in the study area. The study saw a 154% average increase in fawn production within the three study areas (Stout, 1982). Another study at the Welder Wildlife Refuge in southern Texas saw an increase from 34.6 deer per kilometer to 84 deer per kilometer after a substantial coyote removal program was initiated in 1973 (Kie, 1978).

With an increasingly growing and expanding population in the eastern United States there have been several studies on human-coyote interactions, with the most controversial interaction occurring with sheep and cattle ranchers. Many ranchers have elected to take lethal measures to control coyote populations, however studies have revealed that this is proven to be ineffective, expensive and futile (McCown, 2007). According to the FWC, when new coyotes move into the area where others have been removed, the pack may start reproducing at a younger age and the offspring are more likely to survive (FWC, 2019). This causes populations to bounce back quickly and often exceed its previous size.

While it is evident that coyotes do affect livestock production, it is also evident that their effects on sheep and lamb production greatly outweigh that of cattle. Data from 2011, published by the USDA, shows 51% of all sheep ranches in the United States experienced loss by some type of predator (USDA, 2014) with coyotes having the highest impact (Sacks, 2019). In comparison only 0.2% of all cattle in the United States were killed by coyotes for the same year. In terms of cattle, there is a much higher significance on the effects coyotes have on calves in comparison to adults. In 2011, the USDA found that coyotes were responsible for 77.4% of the predator related calf deaths and only 34% of the adult cattle deaths for the state of Florida (USDA, 2011). The CB/AB ranch managers have reported mortality rates of calves at 8.1% in 2018/2019 and suspect coyotes, noting the high number of coyotes observed during the calving season (Chris Barthle, pers. comm. 2019). It is unclear whether this high number of coyotes recently observed may be attributed to the lethal control that's been employed at CB/AB, as FWC studies have found.

From a management standpoint, the removal of coyotes may cause populations of deer and hogs to increase, further adding to the existing problem of overpopulation and overgrazing. The killing of coyotes as a control measure is generally not recommended unless there is strong evidence of predation of calves by specific individuals or packs.

3.6 Conservation Corridors

The role of CB/AB as a conservation corridor has been specifically recognized by Pasco County for a number of years, and the property is viewed as a major component of Pasco County's Conservation Strategy. In a January 2014 presentation prepared by Pasco County for a Pinellas County Commission meeting, CB/AB was identified as a vital linkage between envisioned wildlife corridors with other large publicly-owned lands or rural protection areas in the region, including Starkey Preserve, Connor Preserve, Cypress Creek Preserve, and the Green Swamp (Pasco County, 2014). On a larger scale, CB/AB also represents a significant potential extension of the Florida Wildlife Corridor, which is located approximately 20 miles northeast of CB/AB and includes the existing Withlacoochee State Forest-Green Swamp conservation corridor (**Figure 3-13, Regional Conservation Lands**).

The importance of conservation corridors to wildlife migration, gene flow, and the preservation of biodiversity emerged in the 1930s, ironically around the same time that significant fragmentation of natural habitats by humans began in the United States and Florida. The disruption of suitable corridors was first noted by George Wright, a forester and wildlife biologist with the National Park Service who raised concerns about the ability of certain wide-ranging wildlife species to persist due to boundary limits of the national park system. This concept was later quantified in MacArthur and Wilson's (1967) seminal book, *The Theory of Island Biogeography*. MacArthur & Wilson created a model that predicted an equilibrium species number based on known extinction and immigration rates, and the size and distance between islands on which those species occurred. This model was later applied to and embraced by the emerging fields of Conservation Biology and Landscape Ecology in the 1980s, and were embodied by the notable works of Noss (1983) and Harris (1984), who recognized the importance of regional planning efforts to maximize conservation efforts.

These same principles are currently and locally being applied by The Florida Wildlife Corridor, an organization who seeks to foster public and private partnerships to 'connect, protect, and restore' a network of corridors throughout the state. The principles can also be applied at smaller, local scales, such as CB/AB and other publicly and privately-owned lands of significant size and singular ownership. Large landowners such as these have the unique ability, and perhaps ethical duty, to prevent the extinction of rare species and enable the persistence of native flora and fauna in an increasingly-fragmented landscape. Approximately 75% of Florida voters elected to support goals such as these with the passage of Amendment 1 in 2014, intended to provide funding for Florida Forever, a land acquisition program that began in 2001 through a tax on real-estate documentary stamps.

Awareness of the existing and potential future connections with wildlife corridors at all scales (within CB/AB, Pasco County, and state-wide) is a fundamental concept of conservation planning and should be applied when making management decisions here. The majority of remaining natural lands at CB/AB are concentrated within the existing FSJMA boundary and immediately adjacent similar lands. Although this existing corridor is fragmented by a large pine plantation in the center of the FSJMA and much of the uplands are in need of restoration from decades of fire suppression, this portion of the property holds the highest potential for habitat conservation, corridor enhancement, and the preservation of biodiversity. Further underscoring the regional significance of onsite habitats is the designation of CB/AB by Audubon of Florida in 2000 as part of the "Central Pasco Important Bird Area (IBA)."

3.8 Adjacent Lands

The potential for CB/AB's role as an important wildlife corridor is enhanced by the character and current ownership of adjacent lands, particularly those lying south, southeast, east, and northeast of CB/AB **(Figure 3-14, Adjacent Land Owners)**. These large, privately-owned adjacent tracts have retained much of the natural vegetation cover types, and are relatively unfragmented by roads, residential developments, intensive agriculture, and other land uses that are incompatible with the concept of wildlife corridors. The location of the currently designated FSJMA boundary and its immediately surrounding natural lands dovetails with the primary corridor created by these adjacent lands. Efforts to expand and restore these existing corridors within CB/AB, and potentially extend them to include the western linkage to Starkey Preserve as identified by Pasco County, represents the maximum conservation benefit for the property, the native flora and fauna that inhabit or pass through it, and the 75% of the voting public that supports the acquisition and management of public lands for conservation purposes.

TABLE 3-1
SOIL DISTRIBUTION BY TYPE

Map Unit Symbol	Map Unit Name	Acres	% Cover	GT Suitability**
11	Adamsville fine sand, 0 to 2 percent slopes	2057.8	16.5	MS
6	Tavares sand, 0 to 5 percent slopes	1669.1	13.4	HS
7	Sparr fine sand, 0 to 5 percent slopes	1382.5	11.1	MS
21	Smyrna fine sand	1056.6	8.5	LS
8*	Sellers mucky loamy fine sand	906.3	7.3	U
23*	Basinger fine sand, depressional, 0 to 1 percent slopes	899.6	7.2	U
59	Newnan fine sand, 0 to 5 percent slopes	497.8	4	MS
43	Arredondo fine sand, 0 to 5 percent slopes	411	3.3	HS
74	Candler Variant fine sand, 0 to 5 percent slopes	404.1	3.2	HS
22*	Basinger fine sand	390.4	3.1	U
69	Millhopper fine sand, 0 to 5 percent slopes	369.5	3	HS
60*	Palmetto-Zephyr-Sellers complex	308.2	2.5	U
26	Narcoossee fine sand, 0 to 2 percent slopes	296.5	2.4	HS
45	Kendrick fine sand, 0 to 5 percent slopes	275.6	2.2	MS
2	Pomona fine sand	271.7	2.2	LS
52*	Samsula muck, frequently ponded, 0 to 1 percent slopes	228.6	1.8	U
9	Ona-Ona, wet, fine sand, 0 to 2 percent slopes	221.8	1.8	LS
66	Micanopy fine sand, 2 to 5 percent slopes	123	1	U
67	Kanapaha-Kanapaha, wet, fine sand, 0 to 5 percent slopes	82.7	0.7	LS
73	Zolfo fine sand, 0 to 2 percent slopes	80.6	0.6	HS
30*	Okeelanta-Terra Ceia association	76.2	0.6	U
32	Lake fine sand, 0 to 5 percent slopes	75.8	0.6	HS
14	Candler fine sand, 5 to 8 percent slopes	61.1	0.5	HS
64	Nobleton fine sand, 0 to 5 percent slopes	59.1	0.5	MS
5	Myakka-Myakka, wet, fine sands, 0 to 2 percent slopes	51.8	0.4	LS
99	Water	51.6	0.4	NR
48	Lochloosa fine sand, 0 to 5 percent slopes	47.3	0.4	MS
13	Candler fine sand, 0 to 5 percent slopes	30.9	0.2	HS
57	Wabasso Variant fine sand	19.3	0.2	LS
19	Paola fine sand, 0 to 8 percent slopes	16.3	0.1	HS
42	Pomello fine sand, 0 to 5 percent slopes	14.4	0.1	HS
1	Wauchula fine sand, 0 to 5 percent slopes	11.7	0.1	U
54	Flemington Variant fine sand, 2 to 5 percent slopes	8.5	0.1	U
72	Orlando fine sand, 0 to 5 percent slopes	6.3	0.1	HS
53	Sparr fine sand, 5 to 8 percent slopes	2.7	0	MS
46	Cassia fine sand, 0 to 5 percent slopes	2.6	0	MS
24	Quartzipsamments, shaped, 0 to 5 percent slopes	1.7	0	NR
49	Blichton fine sand, 0 to 2 percent slopes	0	0	U

*Indicates hydric soil

GT Suitability: **HS = highly suited; **MS** = moderately suited; **LS** = less suited; **U** = unsuitable; **NR** = not rated

TABLE 3-2
EXISTING VEGETATION COMMUNITIES

FLUCFCS	DESCRIPTION	ACRES	PERCENT
110	RESIDENTIAL LOW DENSITY < 2 DWELLING UNITS	21.4	0.2
140	COMMERCIAL AND SERVICES	1.1	<0.01
150	INDUSTRIAL	0.5	0
170	INSTITUTIONAL	3.8	0
190	OPEN LAND	18.2	0.1
210	**CROPLAND AND PASTURELAND**	**1976.8**	**15.9**
214	ROW CROPS	0.7	<0.01
260	OTHER OPEN LANDS <RURAL>	112.7	0.9
320	**SHRUB AND BRUSHLAND**	**693.4**	**5.6**
330	MIXED RANGELAND	89.3	0.7
411	PINE FLATWOODS	115.4	0.9
412	**LONGLEAF PINE - XERIC OAK**	**846.2**	**6.8**
420	UPLAND HARDWOOD FORESTS	99	0.8
434	**HARDWOOD CONIFER MIXED**	**1295.6**	**10.4**
440	**TREE PLANTATIONS**	**5111.9**	**40**
510	STREAMS AND WATERWAYS	7.5	0.1
520	LAKES	33.9	0.3
530	RESERVOIRS	0.8	<0.01
615	STREAM AND LAKE SWAMPS (BOTTOMLAND)	61.5	0.5
620	WETLAND CONIFEROUS FORESTS	9.6	0.1
621	CYPRESS	159.8	1.3
630	WETLAND FORESTED MIXED	35.2	0.3
641	**FRESHWATER MARSHES**	**948.1**	**7.6**
643	**WET PRAIRIES**	**808.2**	**6.5**
644	EMERGENT AQUATIC VEGETATION	2.1	<0.01
652	SHORELINES	7.9	0.1
653	INTERMITTENT PONDS	4.2	<0.01
740	DISTURBED LAND	5.5	<0.01
TOTAL		**12470.3**	**100**

TABLE 3-3
LISTED PLANTS POTENTIALLY OCCURRING ON CROSS BAR-AL BAR RANCH

Scientific Name*	Common Name	Listing Status#	Habitat	Flowering Time
Agrimonia incisa	incised groove-bur	FL-T	sandhills	Fall
Asclepias curtissii	Curtiss' milkweed	FL-E	scrub	Spring-Fall
Asplenium verecundum	modest spleenwort	FL-E	limestone outcrops	All year
Bonamia grandiflora	Florida bonamia	FL-E; US-T	scrub	Spring-Summer
Calamintha ashei	Ashe's savory	FL-T	sandhills, scrub	Spring-Fall
Calopogon multiflorus	many-flowered grass-pink	FL-T	flatwoods	Winter-Spring
Campanula robinsiae	Brooksville bellflower	FL-E, US-E	seepage slopes, pond margins	Spring
Centrosema arenicola	sand butterfly pea	FL-E	sandhills	Summer-Fall
Chrysopsis floridana	Florida goldenaster	FL-E; US-E	scrub; rarely oak hammocks	Fall
Coelorachis tuberculosa	piedont jointgrass	FL-T	pond/marsh margins	Summer-Fall
Coleataenia abscissa	cutthroat grass	FL-E	wet flatwoods, seepage slopes	Spring-Fall
Eriogonum longifolium var. gnaphalifolium	scrub buckwheat	FL-E; US-T	sandhills, scrub	Spring-Fall
Garberia heterophylla	garberia	FL-T	sand pine and oak scrub	Spring-Fall
Glandularia tampensis	Tampa mock vervain	FL-E	clearings in moist hammocks	Spring-Fall
Justicia cooleyi (=pringlei)	Cooley's waterwillow	FL-E, US-E	calcareous hammocks	All year
Lechea cernua	nodding pinweed	FL-T	scrub	Summer-Fall
Lechea divaricata	drysand pinweed	FL-E	flatwoods; scrub	Summer-Fall
Lilium catesbaei	Catesby's lily	FL-T	moist flatwoods; savannas	Summer-Fall
Litsea aestivalis	pondspice	FL-E	edges of baygalls, flatwoods ponds, and cypress domes	Spring
Matelea floridana	Florida spiny-pod	FL-E	hammocks	Spring
Monotropsis reynoldsiae	pgymy pipes	FL-E	mesic-xeric hammocks	Winter
Nemastylis floridana	celestial lily	FL-E	swamps, marshes, wet flatwoods	Aug-Oct (4 pm-dusk)
Nolina brittoniana	Britton's beargrass	FL-E, US-E	sandhills, scrub	Spring
Ophioglossum palmatum	hand fern	FL-E	boots of old cabbage palms	All year

TABLE 3-3
LISTED PLANTS POTENTIALLY OCCURRING ON CROSS BAR-AL BAR RANCH

Scientific Name*	Common Name	Listing Status#	Habitat	Flowering Time
Orthochilus ecristatus	giant orchid	FL-T	sandhills, pinelands, oak hammocks	Summer-Fall
Peperomia humilis	low peperomia	FL-E	calcareous hammocks, cypress swamps	Summer
Pycnanthemum floridanum	Florida mountain-mint	FL-T	sandhills	Summer-Fall
Schizachyrium niveum	scrub bluestem	FL-E	scrub	Fall
Spigelia loganioides	pinkroot	FL-E	wet, calcareous hammocks	Spring
Thelypteris reptans	creeping star-hair fern	FL-E	hammocks around limestone outcrops	All year
Thelypteris serrata	toothed lattice-vein fern	FL-E	cypress swamps; occasionally epiphytic	All year
Tillandsia balbisiana	northern needleleaf	FL-T	hammocks; scrub	Fall
Tillandsia fasciculata	cardinal airplant	FL-E	cypress swamps; hammocks	Summer-Fall
Tillandsia utriculata	giant airplant	FL-E	hammocks; cypress swamps	Summer-Fall
Triphora craigheadii	Craighead's nodding caps	FL-E	hammocks	Summer
Warea carteri	Carter's warea	FL-E, US-E	sandhills, scrub	All year

*species in **BOLD** type documented from Pasco County; all other species documented adjacent to Pasco County.

T = Threatened; E= Endangered

References:

Listing Status: Ch. 5B-40, F.A.C.; 50 CFR Part 17

Nomenclature & Distribution: Wunderlin et al, 2019

Habitat: Chafin, 2000; Wunderlin, 1998

Flowering Times: Wunderlin, 1998

TABLE 3-4
LISTED WILDLIFE SPECIES DOCUMENTED

SPECIES	COMMON NAME	PEACOCK OBSERVED 1992 - 2018	AUDUBON OBSERVED 2000 - 2005	QUEST OBSERVED 2018 - 2019	STATE STATUS	FEDERAL STATUS	TOTAL
AVIAN SPECIES							
Athene cunicularia	Burrowing owl	**X**	**X**	**X**	ST		9
Antigone canadensis pratensis	Florida sandhill crane	**X**	**X**	**X**	ST		
Aphelocoma coerulescens	Florida scrub-jay	**X**	**X**	**X**	FT	T	
Egretta caerulea	Little blue heron	**X**	**X**	**X**	ST		
Egretta rufescens	Reddish egret		**X**		ST		
Platalea ajaja	Roseate spoonbill	**X**		**X**	ST		
Falco sparvarius paulus	Southeastern American kestrel	**X**		**X**	ST		
Egretta tricolor	Tricolored heron	**X**	**X**	**X**	ST		
Mycteria americana	Wood stork	**X**	**X**	**X**	FT	T	
REPTILE SPECIES							
Alligator mississippiensis	American alligator	**X**	**X**	**X**	FT(S/A)	T(S/A)*	4
Drymarchon corais couperi	Eastern indigo snake	**X**		**X**	FT	FT	
Pituophis melanoleucus mugitus	Florida Pine Snake	**X**			ST		
Gopherus polyphemus	Gopher tortoise	**X**	**X**	**X**	ST		
						TOTAL OBSERVED SPECIES:	**13**

TABLE 3-5
NON-LISTED WILDLIFE SPECIES DOCUMENTED

SPECIES	COMMON NAME	PEACOCK OBSERVED 1992 - 2018	AUDUBON OBSERVED 2000 - 2005	QUEST OBSERVED 2018 - 2019	TOTAL
AVIAN SPECIES					
Epidonax virescens	Acadian flycatcher		X		162
Botaurus lentiginosus	American bittern	X	X		
Anas rubripes	American black duck	X	X		
Fulica americana	American coot	X	X	X	
Corvus brachyrhynchos	American crow	X	X	X	
Carduelis tristis	American goldfinch		X		
Falco sparvarius	American kestrel		X	X	
Anthus rubescens	American pipit	X	X		
Setophaga ruticilla	American redstart		X		
Turdus migratorius	American robin	X	X	X	
Philohela minor	American woodcock		X		
Anhinga anhinga	Anhinga	X	X	X	
Peucaea aestivalis	Bachman's sparrow	X	X		
Haliaeetus leucocephalus	Bald eagle	X	X	X	
Tyto alba	Barn owl	X			
Hirundo rustica	Barn swallow	X	X	X	
Strix varia	Barred owl	X	X	X	
Ceryle alcyon	Belted kingfisher	X	X	X	
Mniotilta varia	Black and white warbler	X	X		
Setophaga fusca	Blackburnian warbler		X		
Dendroica striata	Blackpoll warbler	X	X		
Himantopus mexicanus	Black-necked stilt		X		
Dendroica caerulesens	Black-throated blue warbler		X		
Setophaga virens	Black-throated green warbler		X		
Coragyps atratus	Black vulture	X	X	X	
Polioptila caerulea	Blue gray gnatcatcher	X	X	X	
Guiraca caerulea	Blue grosbeak		X		
Vireo solitarius	Blue-headed vireo		X		
Cyanocitta cristata	Blue jay	X	X	X	
Anas discors	Blue-winged teal	X	X	X	
Vermivora cyanoptera	Blue-winged warbler		X		
Quiscalus major	Boat-tailed grackle	X	X	X	
Dolichonyx oryzivorus	Bobolink	X	X		
Molothrus ater	Brown-headed cowbird		X	X	
Tosostoma rufum	Brown thrasher	X	X	X	

TABLE 3-5
NON-LISTED WILDLIFE SPECIES DOCUMENTED

SPECIES	COMMON NAME	PEACOCK OBSERVED 1992 - 2018	AUDUBON OBSERVED 2000 - 2005	QUEST OBSERVED 2018 - 2019	TOTAL
Poecile carolinensis	Carolina chickadee	X	X	X	
Thryothorus ludovicianus	Carolina wren	X	X	X	
Hydroprogne caspia	Caspian tern			X	
Bubulcus ibis	Cattle egret	X	X	X	
Bombycilla cedrorum	Cedar waxwing	X	X		
Setophaga cerulea	Cerulean warbler		X		
Dendroica pensylvanica	Chestnut-sided warbler		X		
Chaetura pelagica	Chimney swift	X	X		
Spizella passerina	Chipping sparrow		X	X	
Caprimulgus carolinensis	Chuck-will's-widow		X		
Gallinula galeata	Common gallinule	X	X	X	
Quiscalus quiscula	Common grackle	X	X	X	
Columbina passerina	Common ground-dove	X	X	X	
Chordeiles minor	Common nighthawk		X	X	
AVIAN SPECIES CONTINUED					
Geothlypis trichas	Common yellowthroat	X	X	X	
Accipiter cooperii	Cooper's hawk	X	X	X	
Phalacrocorax auritus	Double-crested cormorant	X	X	X	
Picoides pubescens	Downy woodpecker		X	X	
Calidris alpina	Dunlin		X		
Sialia sialis	Eastern bluebird	X	X	X	
Tyrannus tyrannus	Eastern kingbird	X	X	X	
Sturnella magna	Eastern meadowlark	X	X	X	
Sayornis phoebe	Eastern phoebe	X	X	X	
Megascops asio	Eastern screech owl	X	X	X	
Pipilo erythropthalmus	Eastern towhee	X	X	X	
Caprimulgus vociferus	Eastern whip-poor-will	X			
Contopus virens	Eastern wood-peewee	X	X	X	
Streptopelia decaocto	Eurasian collared dove		X	X	
Sturnus vulgaris	European starling	X	X	X	
Corvus ossifragus	Fish crow	X	X	X	
Sterna forsteri	Forster's tern		X		
Plegadis falcinellus	Glossy ibis	X		X	
Ammodramus savannarum	Grasshopper sparrow		X		
Dumetella carolinensis	Gray catbird	X	X	X	
Ardea herodias	Great blue heron	X	X	X	

TABLE 3-5
NON-LISTED WILDLIFE SPECIES DOCUMENTED

SPECIES	COMMON NAME	PEACOCK OBSERVED 1992 - 2018	AUDUBON OBSERVED 2000 - 2005	QUEST OBSERVED 2018 - 2019	TOTAL
Myiarchus crinitus	Great crested flycatcher	X	X	X	
Casmerodias albus	Great egret	X	X	X	
Bubo virginianus	Great horned owl	X	X		
Tringa melanoleuca	Greater yellowlegs	X	X	X	
Butorides striatus	Green heron	X	X	X	
Dryobates villosus	Hairy woodpecker		X		
Lophodytes cucullatus	Hooded merganser	X	X	X	
Wilsonia citrina	Hooded warbler		X		
Podiceps auritus	Horned grebe		X		
Passer domesticus	House Sparrow		X	X	
Troglodytes aedon	House wren	X	X	X	
Passerina cyanea	Indigo bunting		X		
Geothlypis formosa	Kentucky warbler		X		
Charadrius vociferous	Killdeer	X	X	X	
Rallus elegans	King rail		X		
Ixobrychus exilis	Least bittern		X		
Tringa flavipes	Lesser yellowlegs	X	X		
Aramus guarauna	Limpkin	X	X	X	
Lanius ludovicianus	Loggerhead shrike	X	X	X	
Limnodromus scolopaceus	Long-billed Dowitcher		X		
Dendroica magnolia	Magnolia warbler		X		
Falco columbarius	Merlin	X	X		
Ictinia mississippiensis	Mississippi kite			X	
Anas fulvigula	Mottled duck	X	X	X	
Zenaida macroura	Mourning dove	X	X	X	
Colinus virginianus	Northern bobwhite	X	X	X	
AVIAN SPECIES CONTINUED					
Cardinalis cardinalis	Northern cardinal	X	X	X	
Colaptes auratus	Northern flicker	X	X	X	
Circus cyaneus	Northern harrier	X	X	X	
Mimus polyglottos	Northern mockingbird	X	X	X	
Anas clypeaata	Northern shoveler		X		
Parula americana	Northern parula	X	X	X	
Stelgidopteryx serripennis	Northern rough-winged swallow		X		
Pandion haliaetus	Osprey	X	X	X	

TABLE 3-5
NON-LISTED WILDLIFE SPECIES DOCUMENTED

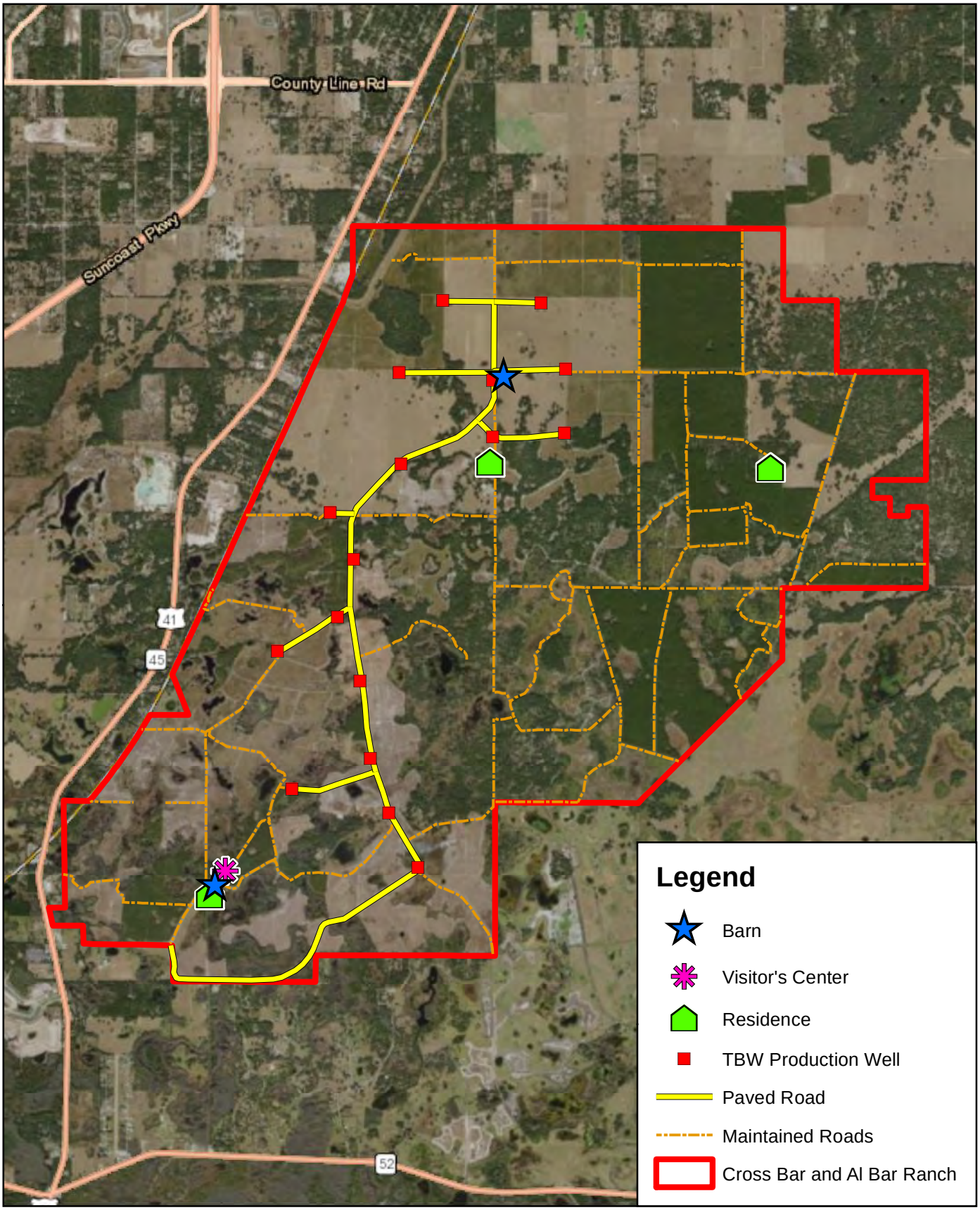
SPECIES	COMMON NAME	PEACOCK OBSERVED 1992 - 2018	AUDUBON OBSERVED 2000 - 2005	QUEST OBSERVED 2018 - 2019	TOTAL
Seiurus aurocapillus	Ovenbird		X		
Dendroica palmarum	Palm warbler	X	X	X	
Calidris melanotos	Pectoral sandpiper		X		
Falco peregrinus	Peregrine falcon	X	X		
Podilymbus podiceps	Pied-billed grebe	X	X	X	
Dryocopus pileatus	Pileated woodpecker	X	X	X	
Dendroica pinus	Pine warbler	X	X	X	
Dendroica discolor	Prairie warbler		X		
Porphyrula martinica	Purple gallinule	X	X		
Progne subis	Purple martin	X	X		
Melanerpes carolinus	Red-bellied woodpecker	X	X	X	
Vireo olivaceus	Red-eyed vireo	X	X	X	
Melanerpes erthrocephalus	Red-headed woodpecker	X	X	X	
Buteo lineatus	Red-shouldered hawk	X	X	X	
Buteo jamaicensis	Red-tailed hawk	X	X	X	
Agelaius phoeniceus	Red-winged blackbird	X	X	X	
Larus delawarensis	Ring-billed gull		X		
Aythya collaris	Ring-necked duck	X	X	X	
Columba livia	Rock dove		X		
Regulus calendula	Ruby-crowned kinglet		X	X	
Archilochus colubris	Ruby-throated hummingbird		X	X	
Passerculus sandwichensis	Savannah sparrow		X	X	
Cistothorus platensis	Sedge wren		X	X	
Accipiter striatus	Sharp-shinned hawk	X	X	X	
Molothrus bonariensis	Shiny cowbird	X	X		
Anser caerulescens	Snow goose	X	X		
Egretta thula	Snowy egret	X	X	X	
Tringa solitaria	Solitary sandpiper		X		
Melospiza melodia	Song sparrow		X		
Porzana carolina	Sora		X		
Actitis macularius	Spotted sandpiper		X		
Calidris himantopus	Stilt sandpiper		X		
Piranga rubra	Summer tanager	X	X	X	
Elanoides forficatus	Swallow-tailed kite	X	X		
Melospiza georgiana	Swamp sparrow		X	X	

TABLE 3-5
NON-LISTED WILDLIFE SPECIES DOCUMENTED

SPECIES	COMMON NAME	PEACOCK OBSERVED 1992 - 2018	AUDUBON OBSERVED 2000 - 2005	QUEST OBSERVED 2018 - 2019	TOTAL
Oreothlypis peregrina	Tennessee warbler		X		
Tachycineta bicolor	Tree swallow	X	X	X	
Baeolophus bicolor	Tufted titmouse	X	X	X	
Cathartes aura	Turkey vulture	X	X	X	
Catharus fuscescens	Veery		X		
Rallus limicola	Virginia rail		X		
Calidris mauri	Western Sandpiper		X		
Eudocimus albus	White ibis	X	X	X	
Vireo griseus	White-eyed vireo	X	X	X	
Calidris fuscicollis	White-rumped Sandpiper		X		
Pelecanus erythrorhynchos	White pelican	X			
Meleagris gallopavo	Wild turkey	X	X	X	
Gallinago delicata	Wilson's snipe	X	X	X	
Cardellina pusilla	Wilson's warbler		X		
Aix sponsa	Wood duck	X	X	X	
Hylocichla mustelina	Wood thrush	X	X		
Syphyrapicus varius	Yellow-bellied sapsucker				
Coccyzus americanus	Yellow-billed cuckoo		X		
Dendroica coronata	Yellow-rumped warbler	X	X	X	
Colaptes a. auratus	Yellow-shafted flicker		X	X	
Dendroica dominica	Yellow-throated warbler	X	X		
Vireo flavifrons	Yellow-throated vireo		X		
Dendroica petechia	Yellow warbler		X	X	
AMPHIBIAN SPECIES					
Hyla gratiosa	Barking tree frog	X			9
Rana catesbeiana	Bullfrog	X		X	
Acris gryllus dorsalis	Florida cricket frog	X		X	
Hyla cinerea	Green tree frog	X		X	
Rana grylio	Pig frog	X		X	
Hyla femoralis	Pinewoods tree frog			X	
Pseudacris nigrita verrucosa	Florida chorus frog	X		X	
Rana sphenacephala	Southern leopard frog	X		X	
Bufo terrestris	Southern toad	X			
FISH SPECIES					
Lepomis macrochiras	Bluegill			X	3

TABLE 3-5
NON-LISTED WILDLIFE SPECIES DOCUMENTED

SPECIES	COMMON NAME	PEACOCK OBSERVED 1992 - 2018	AUDUBON OBSERVED 2000 - 2005	QUEST OBSERVED 2018 - 2019	TOTAL
Micropterus salmoides	Largmouth Bass	X			
Gambusia holbrooki	Mosquito fish			X	
MAMMAL SPECIES					
Felis rufus	Bobcat		X		15
Canis latrans	Coyote	X	X	X	
Sylvilagus floridanus	Eastern cottontail rabbit	X	X	X	
Peromyscus floridanus	Florida mouse	X			
Sciurus carolinensis	Gray squirrel	X	X	X	
Sigmodon hispidus	Hispid cotton rat	X			
Sylvilagus palustris	Marsh rabbit	X	X	X	
Dasypus novemcinctus	Nine-banded armadillo	X	X	X	
Procyon lotor	Raccoon	X		X	
Lutra canadensis	River otter	X	X	X	
Sciurus niger	Sherman's fox squirrel	X	X	X	
Glaucomys volans	Southern Flying Squirrel	X			
Geomys pinetis	Southeastern pocket gopher	X		X	
Odocoileus virginianus	White-tailed deer	X	X	X	
Sus scrofa	Wild pig	X		X	
REPTILE SPECIES					
Terrepene carolina	Box turtle	X			14
Norops sagrei	Brown anole			X	
Stenotherus odoratus	Common musk turtle	X			
Sistrurus miliarius barbouri	Dusky pigmy rattlesnake	X			
Masticophis flagellum flagellum	Eastern coachwhip	X	X		
Micrurus fulvius	Eastern coral Snake		X	X	
Crotalus adamanteus	Eastern diamondback	X	X		
Thamnophis sirtalis sirtalis	Eastern garter snake	X			
Apalone ferox	Florida softshell turtle	X		X	
Anolis carolinensis	Green anole	X		X	
Cnemidophorus sexlineatus sexlineatus	Six-lined racerunner	X		X	
Sceloporus undulatus	Southern fence lizard	X		X	
Kinosternon baurii	Striped Mud Turtle		X		
Coluber constrictor priapus	Southern Black Racer		X	X	



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QUEST ecology

Figure 3-1
Major Infrastructure
Cross Bar and Al Bar Ranch
Pasco County, Florida

Legend

Cross Bar and Al Bar Ranch

Soils

Map Unit Symbol	Map Unit Name	Acres	% Cover
1	Wauchula fine sand, 0 to 5 percent slopes	11.7	0.1
2	Pomona fine sand	271.7	2.2
5	Myakka-Myakka, wet, fine sands, 0 to 2 percent slopes	51.8	0.4
6	Tavares sand, 0 to 5 percent slopes	1669.1	13.4
7	Sparr fine sand, 0 to 5 percent slopes	1382.5	11.1
8*	Sellers mucky loamy fine sand	906.3	7.3
9	Ona-Ona, wet, fine sand, 0 to 2 percent slopes	221.8	1.8
11	Adamsville fine sand, 0 to 2 percent slopes	2057.8	16.5
13	Candler fine sand, 0 to 5 percent slopes	30.9	0.2
14	Candler fine sand, 5 to 8 percent slopes	61.1	0.5
19	Paola fine sand, 0 to 8 percent slopes	16.3	0.1
21	Smyrna fine sand	1056.6	8.5
22*	Basinger fine sand	390.4	3.1
23*	Basinger fine sand, depressional, 0 to 1 percent slopes	899.6	7.2
24	Quartzipsamments, shaped, 0 to 5 percent slopes	1.7	0
26	Narcoossee fine sand, 0 to 2 percent slopes	296.5	2.4
30*	Okeelanta-Terra Ceia association	76.2	0.6
32	Lake fine sand, 0 to 5 percent slopes	75.8	0.6
42	Pomello fine sand, 0 to 5 percent slopes	14.4	0.1
43	Arredondo fine sand, 0 to 5 percent slopes	411	3.3
45	Kendrick fine sand, 0 to 5 percent slopes	275.6	2.2
46	Cassia fine sand, 0 to 5 percent slopes	2.6	0
48	Lochloosa fine sand, 0 to 5 percent slopes	47.3	0.4
49	Blichton fine sand, 0 to 2 percent slopes	0	0
52*	Samsula muck, frequently ponded, 0 to 1 percent slopes	228.6	1.8
53	Sparr fine sand, 5 to 8 percent slopes	2.7	0
54	Flemington Variant fine sand, 2 to 5 percent slopes	8.5	0.1
57	Wabasso Variant fine sand	19.3	0.2
59	Newnan fine sand, 0 to 5 percent slopes	497.8	4
60*	Palmetto-Zephyr-Sellers complex	308.2	2.5
64	Nobleton fine sand, 0 to 5 percent slopes	59.1	0.5
66	Micanopy fine sand, 2 to 5 percent slopes	123	1
67	Kanapaha-Kanapaha, wet, fine sand, 0 to 5 percent slopes	82.7	0.7
69	Millhopper fine sand, 0 to 5 percent slopes	369.5	3
72	Orlando fine sand, 0 to 5 percent slopes	6.3	0.1
73	Zolfo fine sand, 0 to 2 percent slopes	80.6	0.6
74	Candler Variant fine sand, 0 to 5 percent slopes	404.1	3.2
99	Water	51.6	0.4

*Indicates hydric soil

QUEST ecology

Figure 3-2
Soils
Cross Bar and Al Bar Ranch
Pasco County, Florida

N W E S

0 1

Miles

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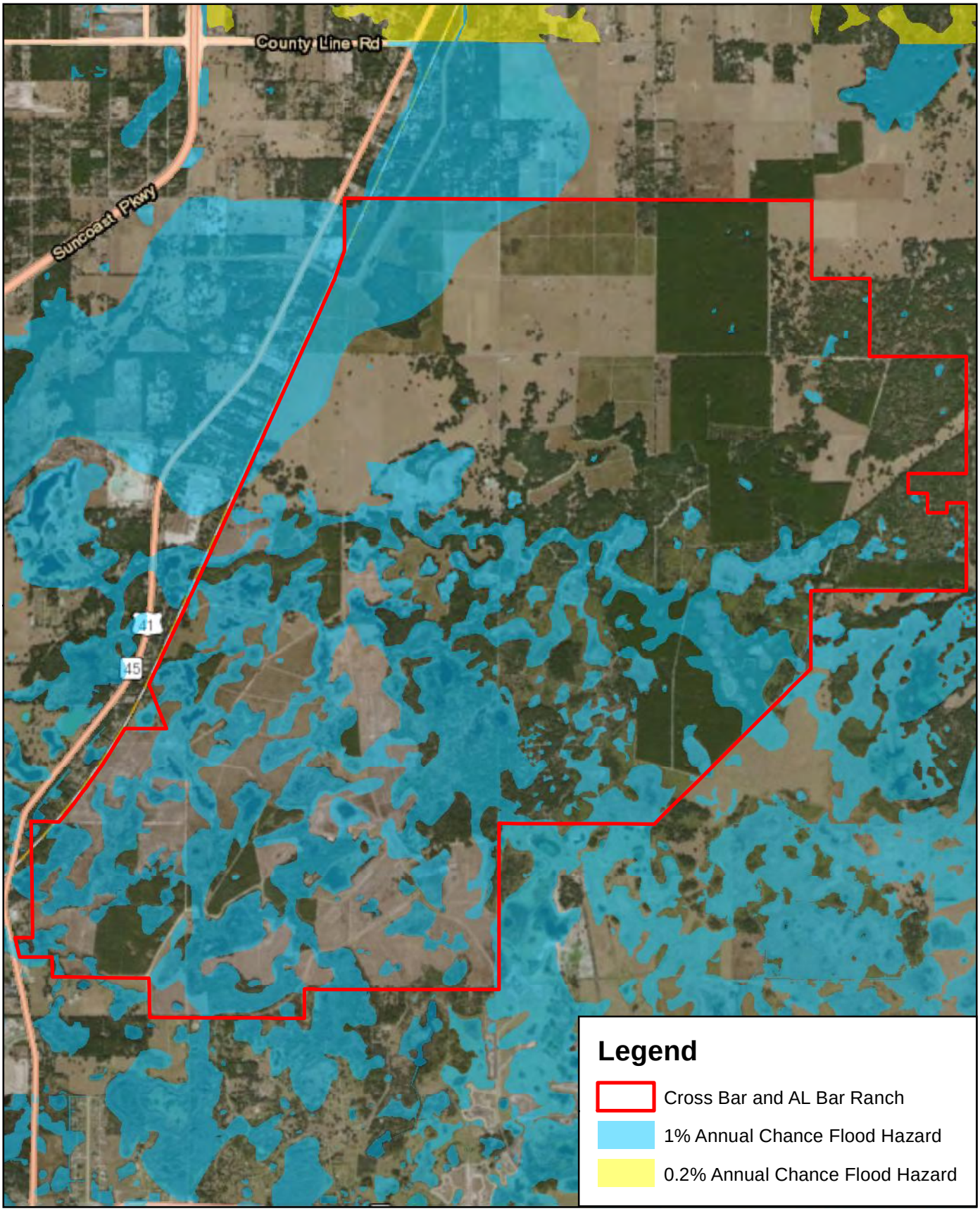

Path (E:\Mapping\Cross Bar - Al Bar Ranch\Maps\FEMA Flood Zones.mxd) By: CK Date: 8/26/2019

QUEST ecology

Figure 3-3
FEMA Flood Risks
Cross Bar and Al Bar Ranch
Pasco County, Florida

Legend

Cross Bar and Al Bar Ranch

Florida Land Use Cover Classification

CODE	ACRES
110	21.36
120	0.01
140	1.06
150	0.47
170	3.76
190	18.19
210	1976.78
214	0.67
260	112.68
320	693.42
330	89.30
411	115.36
412	846.17
420	98.98
434	1295.63
440	5111.92
510	7.48
520	33.88
530	0.80
615	61.45
620	9.60
621	159.82
630	35.24
641	948.12
643	808.19
644	2.08
652	7.86
653	4.18
740	5.46

CODE	DESCRIPTION	CODE	DESCRIPTION
110	RESIDENTIAL LOW DENSITY < 2 DWELLING UNITS	440	TREE PLANTATIONS
120	RESIDENTIAL MED DENSITY 2->5 DWELLING UNIT	510	STREAMS AND WATERWAYS
140	COMMERCIAL AND SERVICES	520	LAKES
150	INDUSTRIAL	530	RESERVOIRS
170	INSTITUTIONAL	615	STREAM AND LAKE SWAMPS (BOTTOMLAND)
190	OPEN LAND	620	WETLAND CONIFEROUS FORESTS
210	CROPLAND AND PASTURELAND	621	CYPRESS
214	ROW CROPS	630	WETLAND FORESTED MIXED
260	OTHER OPEN LANDS <RURAL>	641	FRESHWATER MARSHES
320	SHRUB AND BRUSHLAND	643	WET PRAIRIES
330	MIXED RANGELAND	644	EMERGENT AQUATIC VEGETATION
411	PINE FLATWOODS	652	SHORELINES
412	LONGLEAF PINE - XERIC OAK	653	INTERMITTENT PONDS
420	UPLAND HARDWOOD FORESTS - PART 1	740	DISTURBED LAND
434	HARDWOOD CONIFER MIXED		

QUEST ecology

Figure 3-4
FLUCFCS
Cross Bar and Al Bar Ranch
Pasco County, Florida

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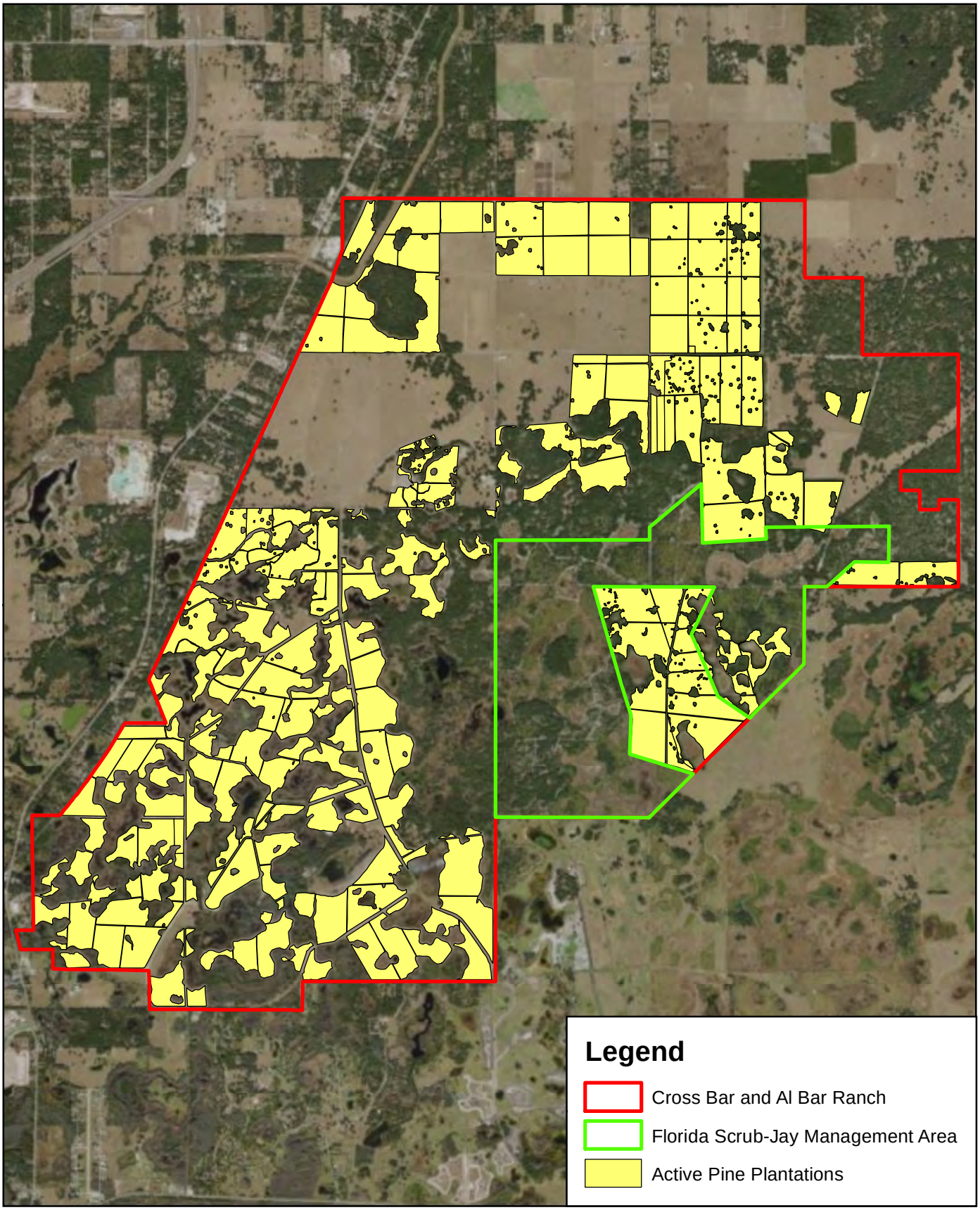

QUEST ecology

Figure 3-5
Pine Plantations 2019
Cross Bar and Al Bar Ranch
Pasco County, Florida

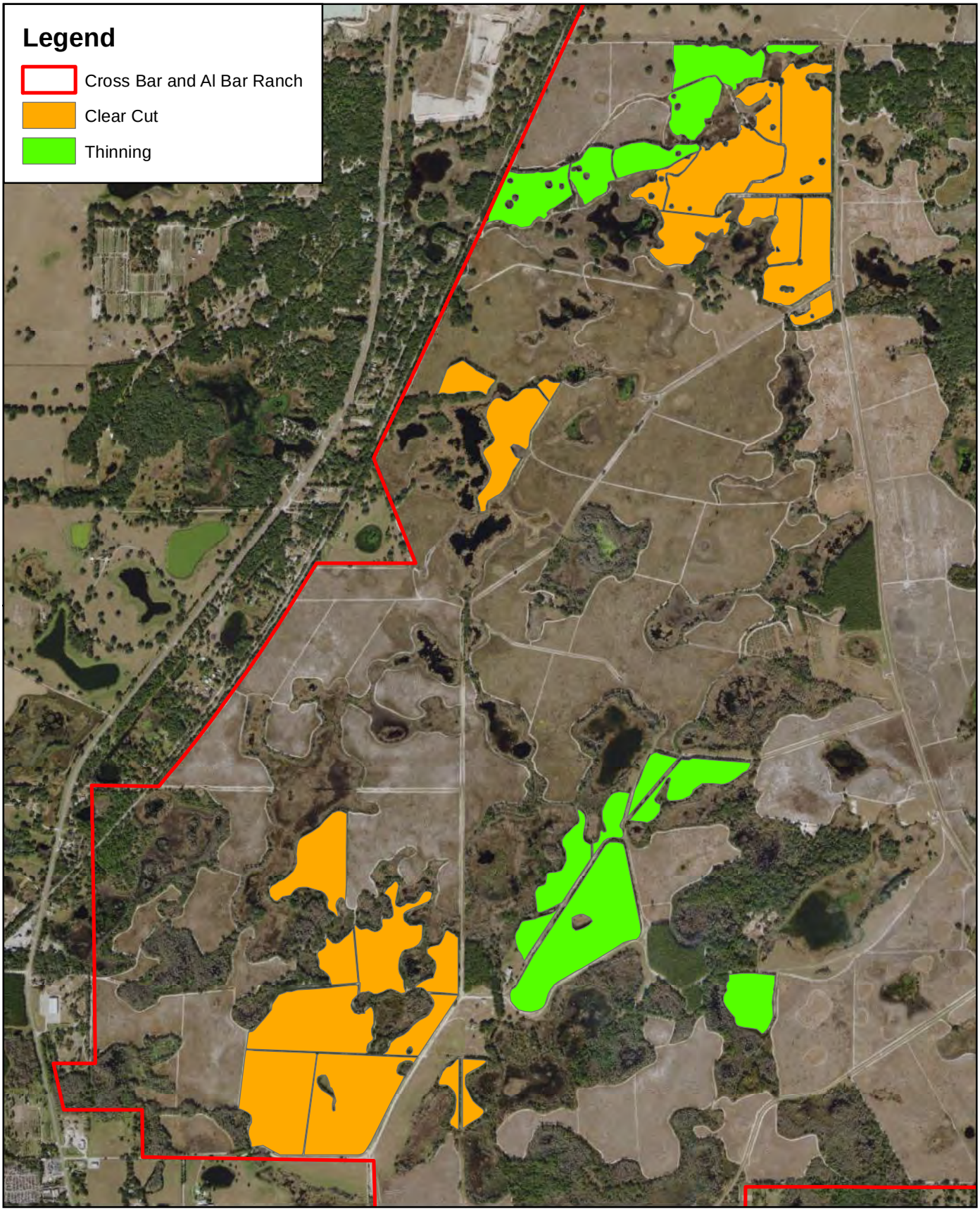

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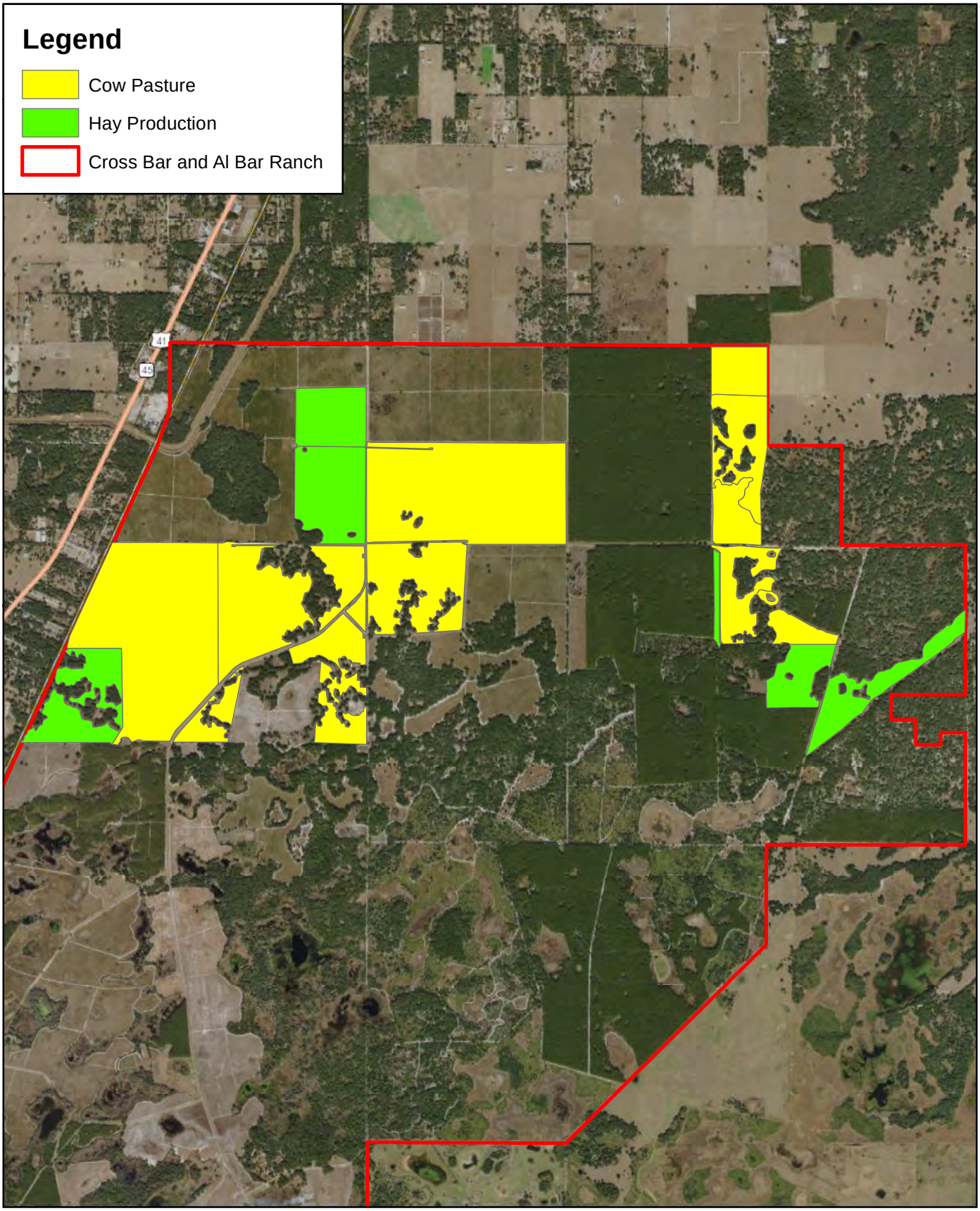
Figure 3-6
Longleaf Pine Harvest Plan
Cross Bar and Al Bar Ranch
Pasco County, Florida



Path (E:\Mapping\Cross Bar - Al Bar Ranch\Maps\Pasture Use.mxd) By: CK Date: 8/26/2019

QUEST ecology

Figure 3-7
Hay Fields and Cattle Pastures
Cross Bar and Al Bar Ranch
Pasco County, Florida

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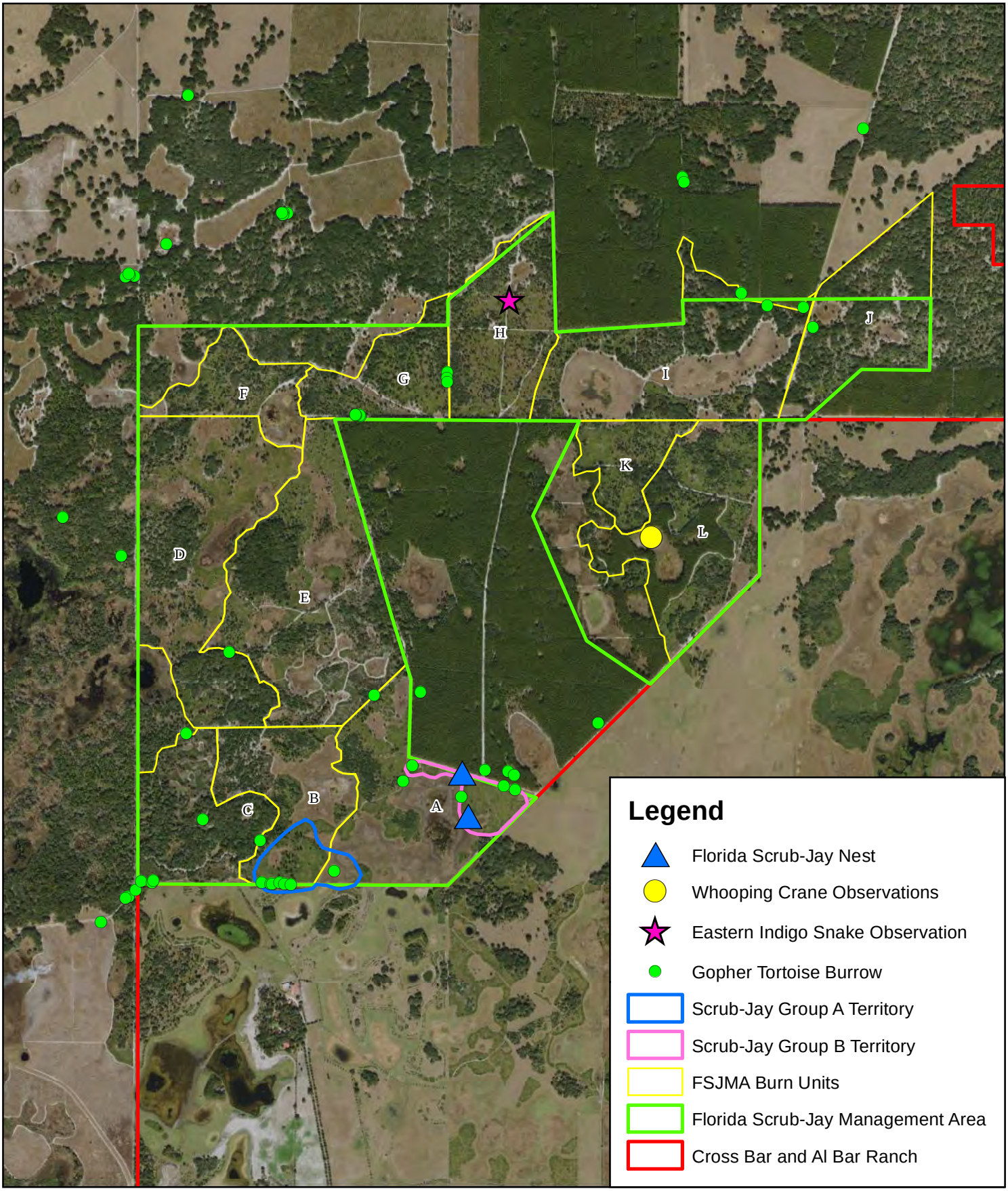
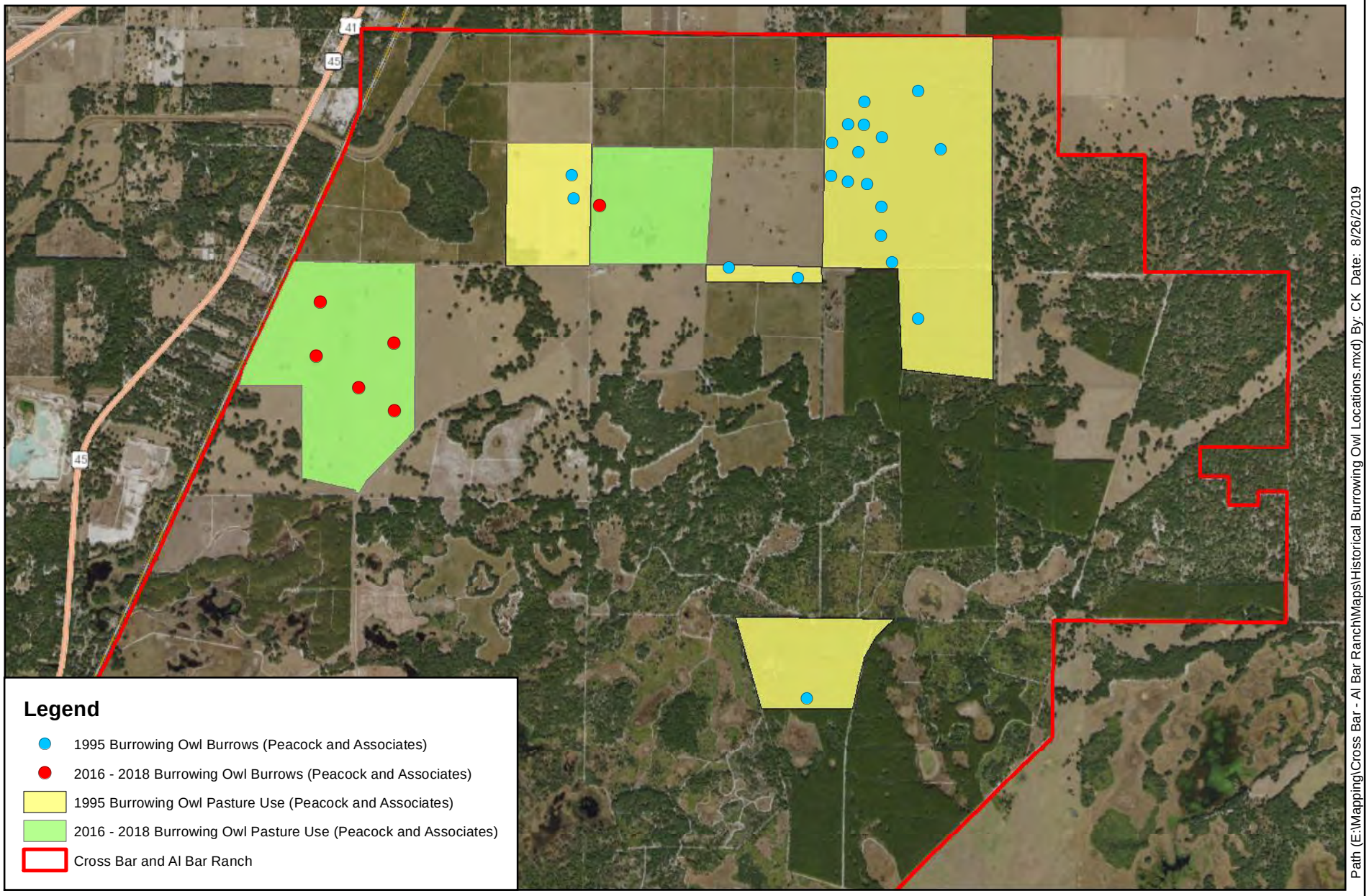


Path (E:\Mapping\Cross Bar - Al Bar Ranch\Maps\FSJ Observations 2018-2019.mxd) By: CK Date: 8/26/2019

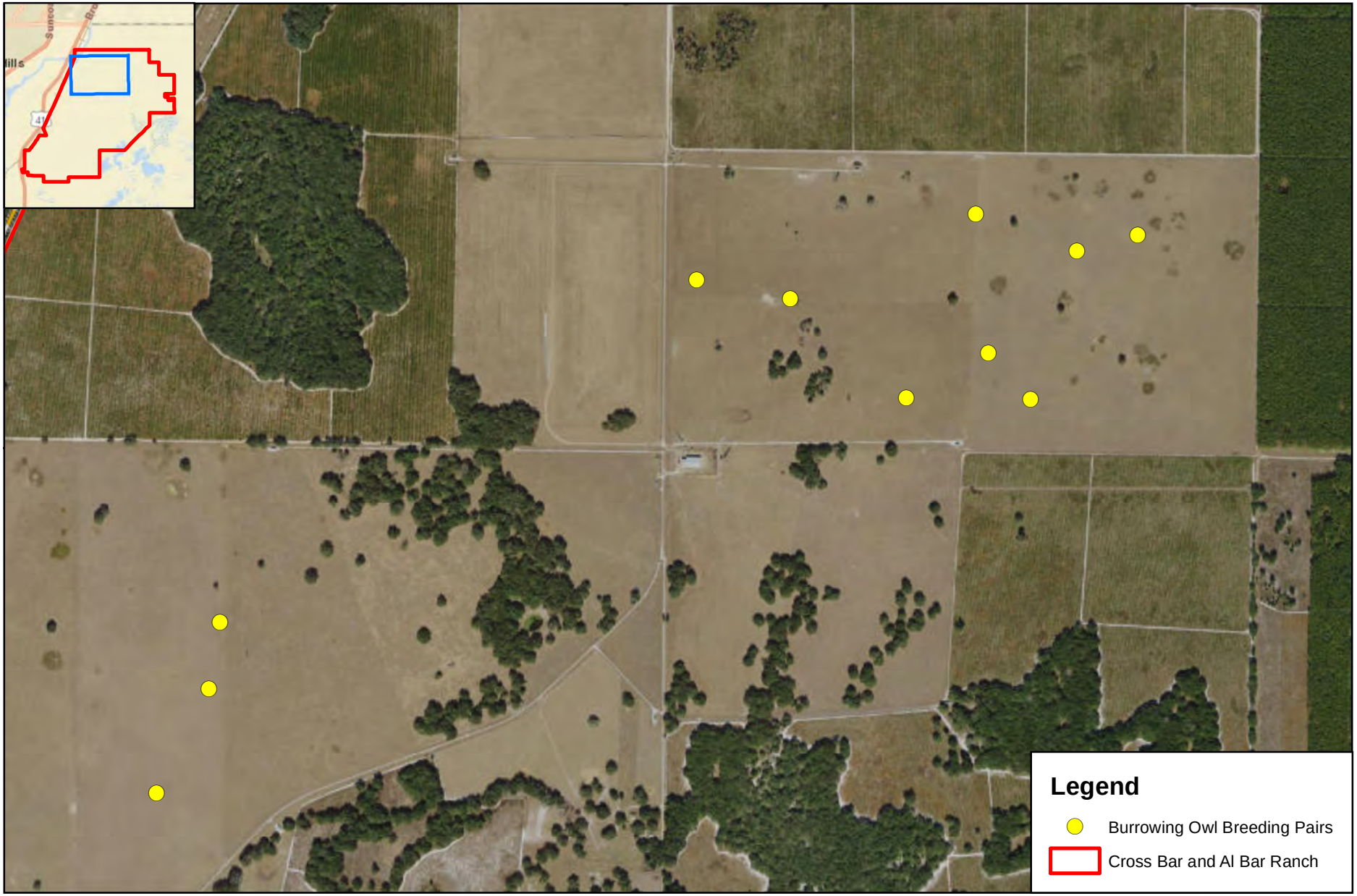
QUEST ecology

Figure 3-8
Florida Scrub-Jay Observations 2018-2019
Cross Bar and Al Bar Ranch
Pasco County, Florida



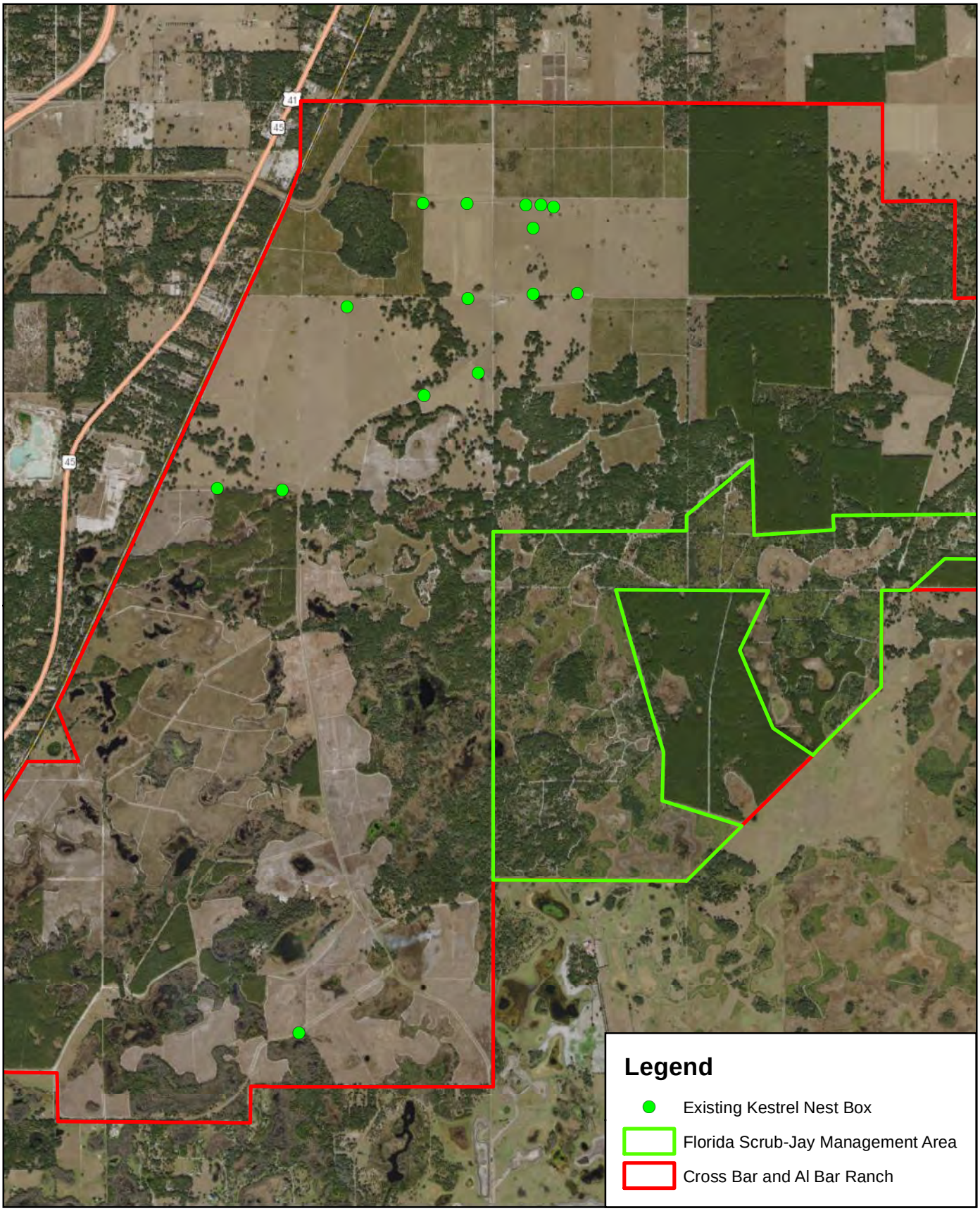
QUEST ecology

Figure 3-9
Historical Burrowing Owl Pasture Use
Cross Bar and Al Bar Ranch
Pasco County, Florida



QUEST ecology

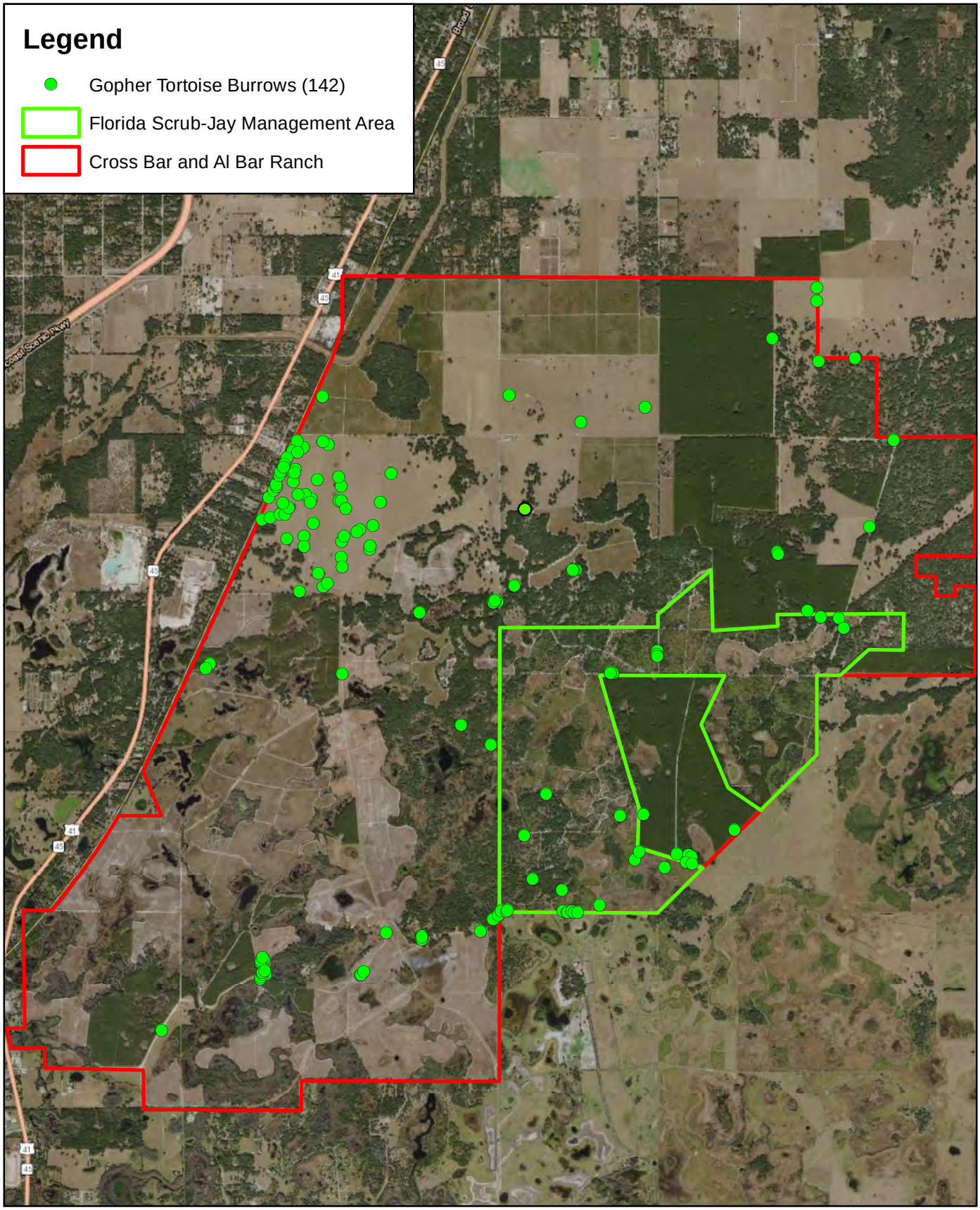
Figure 3-10
2019 Burrowing Owl Primary Nest Burrows
Updated 6/7/19
Cross Bar and Al Bar Ranch
Pasco County, Florida



Path (E:\Mapping\Cross Bar - Al Bar Ranch\Maps\Existing Kestrel Boxes.mxd) By: CK Date: 8/26/2019

QUEST ecology

Figure 3-11
Kestrel Nest Boxes
June 2019
Cross Bar and Al Bar Ranch
Pasco County, Florida



QUEST ecology

Figure 3-12
Gopher Tortoise Burrows
June 2019
Cross Bar and Al Bar Ranch
Pasco County, Florida

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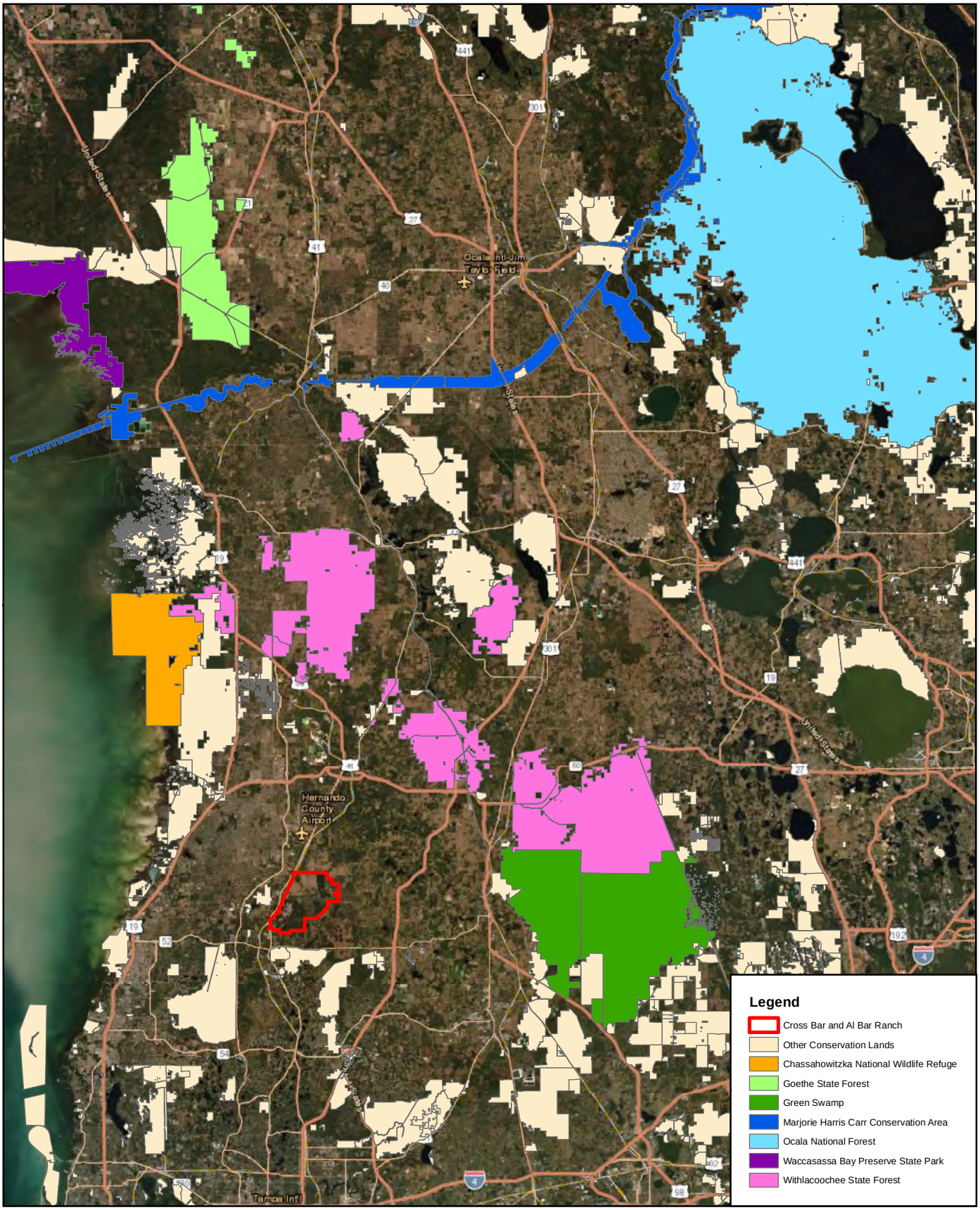

Path (E:\Mapping\Cross Bar - Al Bar Ranch\Maps\Adjacent Conservation Lands AQ.mxd) By: AQ Date: 8/26/2019

QUEST ecology

Figure 3-13
Regional Conservation Lands
Cross Bar and Al Bar Ranch
Pasco County, Florida

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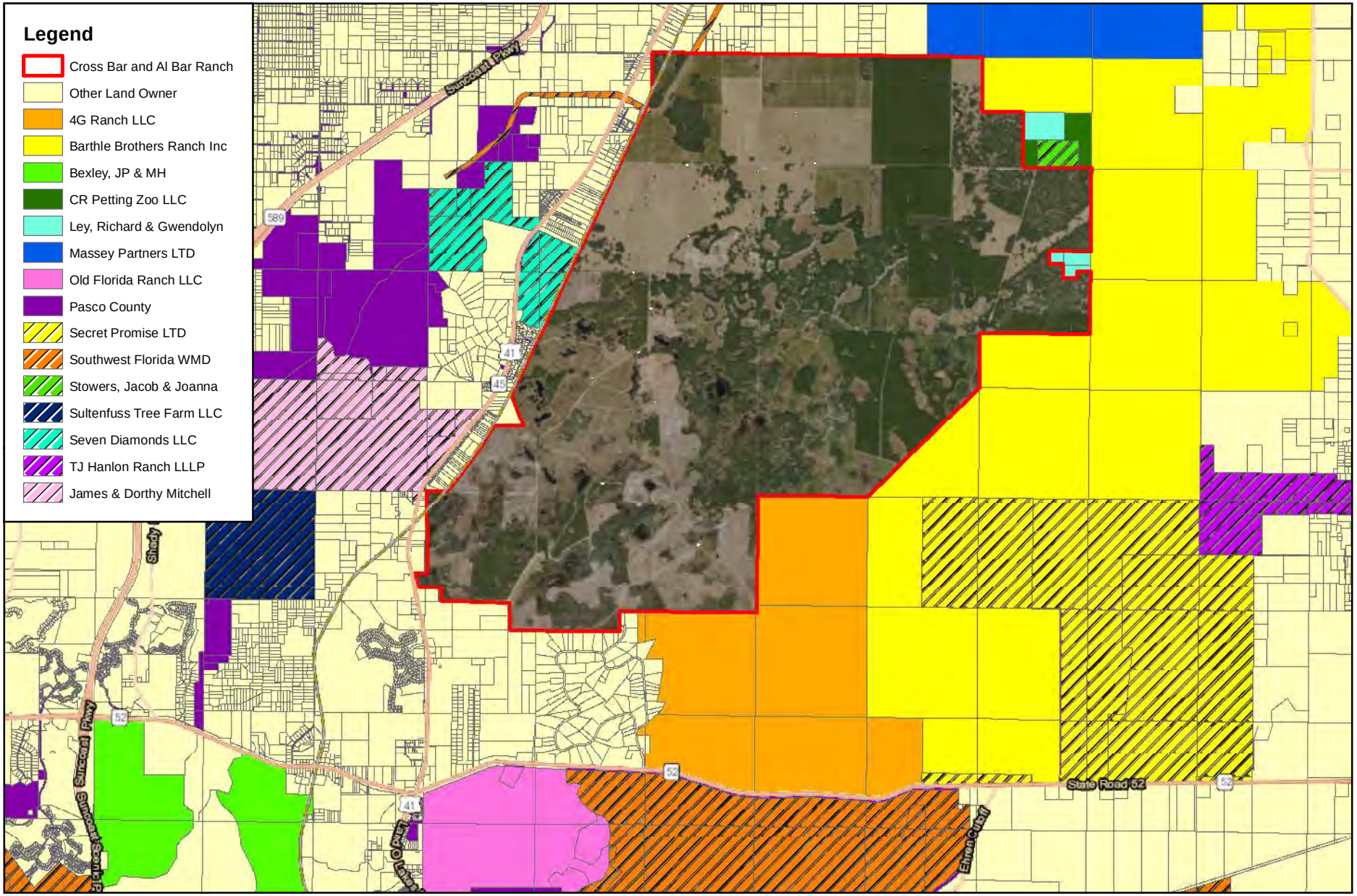


QUEST ecology

Figure 3-14
Adjacent Land Owners
Cross Bar and Al Bar Ranch
Pasco County, Florida

4.0 RESTORATION AND MANAGEMENT PLAN

4.1 Long-Term Restoration and Management Goals

While it is understood that the current high yield forestry operations are critical to the successful economic model of the property, the management recommendations provided in this EMP are intended to be considered as integrated future land use components for the purpose of restoring and enhancing the wildlife habitat in key areas.

As outlined in Section 1.3, the proposed goals listed below have been developed to guide the restoration and management of native habitats for wildlife and resource protection.

1. Implement conservation measures to enhance and expand the use of the site by a diverse assemblage of native plant and wildlife species;
2. Establish, restore, and manage for native longleaf pine flatwoods habitat, scrubby flatwoods and sandhill habitats within appropriate areas;
3. Restore and manage habitat in optimal condition for the Florida scrub-jay within and adjacent to the designated Florida Scrub-jay Management Area (FSJMA);
4. Manage and expand pasture areas in conditions suitable for use by the burrowing owl;
5. Implement a Prescribed Burn Plan for the site that will mimic natural burn regimes to maintain the historic structure and composition of native habitats while protecting forestry resources;
6. Implement a monitoring and maintenance program for maintaining wetlands in optimal condition for wildlife and water resources;
7. Control nuisance and exotic plants and wildlife that threaten the integrity of native habitats, land uses, and the achievement of management goals;
8. Employ compatible land uses that generate revenue to offset management costs;
9. Ensure that all forestry, agricultural, and other future revenue producing activities adhere to practices that will not negatively impact native habitats and protected wildlife;
10. Implement a wildlife and habitat monitoring plan for the purpose of monitoring the results of management activities and employing adaptive management;
11. Adopt an Adaptive Management Program that will employ the results of ongoing monitoring, maintenance and management to evaluate success and adjust actions accordingly.
12. Reevaluate and update the EMP every five years.

The following sections provide recommendations for addressing these goals and where applicable the specific objectives and methods to be utilized to achieve them. Several of the goals apply across the entire site versus within individual management areas (e.g. nuisance/exotic species control) and will be an inherent part of each management objective. Objectives for achieving other goals on this list will be developed in future iterations of this EMP, based on evolving site conditions and as the results of ongoing restoration and management are evaluated.

4.2 Core Conservation Areas

The initial step for addressing many of the above goals has been to identify areas of the site in which to focus these efforts. The CB/AB site and current land uses have been evaluated to determine which areas may be most appropriate for habitat restoration and management (**Figure 4-1, Core Conservation Areas**). In delineating these preliminary boundaries, the emphasis was placed on areas that provide one or more of the following:

- Currently or previously have been designated for conservation activities;
- Still support native vegetation communities that may be readily restored;
- Provide important habitats for protected/target wildlife species; and
- Serve to promote or maintain wildlife corridors and connectivity to offsite lands.

This approximately 7,084 acres includes the 1,688 acres of the FSJMA, 145 acres of longleaf pine restoration, 1,154 acres of Pasture Preserve, and approximately 1,350 acres of wetland habitats that are interspersed throughout (**Figure 4-2, Core Conservation Areas; Wetlands and Pine**). The remaining ~2,750 acres consists primarily of planted pine and historic pine-dominated uplands that have become overgrown in the absence of fire.

Proposed management and restoration activities for each of these areas is provided in the sections below. It is important to note that although immediate management needs call for overall hardwood reduction and fire application throughout, site specific evaluations will need to be conducted in each restoration unit. Additionally, ongoing assessments of responses to short-term actions will be necessary in each restoration unit. Ground-truthing will be conducted in all areas to identify and prioritize restoration units based on the type, extent and cost of initial treatments. This will be followed by identifying the best short-term approach for each unit. Attempting to apply broad methods beyond these immediate needs can place limitations on the ability to achieve target community goals and on applying the best methods for that community type.

For areas of the site not specifically discussed below that are managed more intensively for ranching and other agricultural uses, it is recommended that for each use a “prescription” is provided that outlines the management methods being employed within each area. This will allow PCU and the land manager to better track these activities and ensure they adhere to FWC guidelines, applicable BMP’s, and actions are taken to minimize impacts to adjacent areas managed for wildlife.

4.3 Native Forest Restoration

Approximately 2,750 acres of unconverted, fire-suppressed pine-dominated uplands occur within the Core Conservation Areas, outside of the FSJMA. These areas historically supported a variety of upland community types including sandhills, flatwoods (scrubby, mesic, and wet), and scrub depending on

landscape position and soil moisture. However, like most of the FSJMA, these vegetation communities have experienced a long period of fire suppression, such that the current structure and composition of most uplands are no longer representative of their historic or desired future conditions. At present the fire-suppressed state of these areas obscures the subtle boundaries between these community types, such that Hardwood Conifer Mixed (434) adequately describes most of the present cover (**Figure 3-4**). Embedded within this upland matrix are many small shallow wetland depressions consisting of Wet Prairies (FLUCFCS 643), Freshwater Marshes, and two (2) perennial lakes (FLUCFCS 520) depending on hydroperiod and landscape position. Because of their current heterogeneity, the initial restoration objectives and management recommendations are generally the same for all uplands within this area. Hardwood reduction and re-introduction of fire are recommended for all upland communities at various levels in the short-term. As restoration progresses, and the distinctions between the upland communities become more pronounced, individual objectives and management recommendations should be reassessed and refined.

In the prolonged absence of fire, these native upland communities inevitably succeed to an alternative stable state dominated by hardwoods such as live oak *(Quercus virginiana)*, sand live oak *(Q. geminata)*, laurel oak *(Q. laurifolia)*, water oak *(Q. nigra)*, and in the case of some scrub, sand pines *(Pinus clausa)* (Noss, 2018; Myers, 1985). These alternative stable states are sometimes referred to as xeric hammock, oak barrens, or sand pine scrub, and they are often characterized by having dense leaf or needle litter and minimal groundcover species richness and abundance. Due to this state fire alone is no longer able to control/reduce hardwoods to the desired density and percent cover representative of healthy pine-dominated stands, nor restore other attributes of healthy forested grasslands such as groundcover species richness and composition. This is due to the relative inflammability of hardwoods after their heights exceed normal flame lengths; the depth of leaf litter; the gradual decline of flammable bunchgrasses such as wiregrass (*Aristida stricta*) under a closed canopy system; and the absence of sufficient pine needle litter as a fuel source due to historic logging of pines. In these circumstances intervention in the form of mechanical and/or chemical reduction of hardwoods is necessary to safely and efficiently begin restoration of the desired forest structure and composition so that these attributes can be maintained by fire alone going forth.

The current restoration objectives for these uplands are listed below. This plan addresses Long-Term Goals 1, 2, and 5 in the short-term and ultimately Goals 8 and 10.

1) Reduce mid-story and overstory hardwoods to approximately 5% cover, on average.
2) Increase total percent groundcover (grasses, forbs, low shrubs) and groundcover species richness toward target community-appropriate levels.
3) Increase natural recruitment and establishment of longleaf pine (*Pinus palustris*) and/or slash pine (*Pinus elliottii*) seedlings.
4) Increase percent cover bare mineral soil.
5) Minimize mortality of mature pines from re-introduction of fire.

6) Abandon unnecessary internal roads and firebreaks.
7) Conduct supplemental planting of desirable groundcover species and pine seedlings as feasible where natural recruitment sources are lacking.
8) Trend toward transition-season burns (April-May) over 1 to 3 year fire return intervals after current fuel loads have been reduced.
9) Minimize impacts to desirable vegetation cover and wildlife during all restoration activities.
10) Prioritize and coordinate restoration efforts with adjacent FSJMA restoration plans.
11) Establish monitoring protocol to regularly assess success toward achievement of above-stated goals.

The following recommendations are provided for implementing each of the above:

1) Reduce mid-story and overstory hardwoods to approximately 5% cover, on average.

Reduction of most mid-story and overstory hardwoods should initially be accomplished utilizing pedestrian chainsaw crews to minimize disturbance to soils, remaining desirable groundcover, and sensitive wildlife species, and to reduce the risk of introducing invasive, exotic, or nuisance species. Stumps should be cut as close to ground level as feasible, and no more than four (4) inches above-ground. Hardwoods should be felled and coarse fuels scattered to the maximum extent practical by hand crews to minimize local fuel load and fire intensity, and to maximize distance from mature remnant pines. Immediately following cutting of the hardwoods by chainsaws, all except approximately 5% of the cut hardwoods should be treated with an appropriate approved herbicide. Leaving 5% of the oaks to coppice provides some diversity, and with proper fire regimes, the coppicing oaks should not become problematic.

An approved Tryclopyr ester (oil soluble) solution applied directly to the stump within five (5) minutes of cutting has proven to be an effective choice with minimal soil residual. The chemical should be mixed at appropriate rates with an approved penetrating oil to increase absorption into the tree's cambium. This herbicide should not be used within 1000 feet of any wetland. For hardwood reduction activities within 1000 feet of wetlands, an approved Tryclopyr amine (water soluble) solution should be used in conjunction with the cut stump method. Never apply any Trycoplyr solution directly to water and all instructions for mixing rates, application techniques, and other directions for use (as identified on the herbicide label) should be followed.

Larger hardwoods (i.e. ≥12" dbh) located in topographic lows and/or natural fire breaks should be evaluated for retention with an overall goal of retaining approximately 5% cover by mature hardwoods for mast and cover for wildlife. In addition, it is recommended that 1-2 larger hardwoods per acre be killed in place via girdling and left standing to serve as future snags for wildlife nesting and denning.

Hardwood reduction efforts within a designated burn unit should be followed by a prescribed burn within 6 to 9 months to allow ample curing time for fuels and minimize the chances that any coppicing hardwoods will again exceed average flame length.

Hardwood reduction via chippers, mulchers, feller-bunchers, roller-chopping, and other heavy equipment may be acceptable in special circumstances, but multiple factors should be evaluated prior to implementing these methods that present greater risks to the systems being restored. Mechanical reduction would more likely be employed in areas with a significant concentration of mature hardwoods (i.e. greater than 12" dbh), dense oak leaf litter, minimal desirable groundcover/shrub vegetation, and minimal concentration of gopher tortoise burrows or other potentially affected wildlife. The evaluation of these areas for potential hardwood reduction via mechanical means should only occur after the initial hardwood reduction efforts by chainsaw have been accomplished within a designated management unit, after the initial restoration burn for that unit has been completed, and after the approximate 5% cover of mature mast-producing hardwood stands have been designated for retention. If mechanical reduction via heavy equipment is deemed appropriate for an area, chipped or mulched hardwoods should be removed from the site and not left in place, as this will result in deep mulch beds that will not carry fire and will impede natural recruitment of desirable groundcover species and pine seedlings.

The mature hardwood stands designated for retention should be carefully selected to maximize corridor potential, patch dynamics, and wildlife benefits. The retained stands should be preferentially located in natural fire breaks and shadows, such as mesic basin soils where live oak hammocks may naturally occur. Hardwoods with evident cavities that may serve as potential nesting and denning habitat for wildlife should also be preferentially retained. All hardwood reduction and retention activities should be supervised by a qualified ecologist, and chainsaw crews instructed on basic ecological principles and requirements prior to beginning work.

2) Increase total percent groundcover (grasses, forbs, low shrubs) and groundcover species richness toward target community-appropriate levels.

It is well documented that fire-maintained, pine-dominated grasslands of the southeastern coastal plain support some of the highest species richness and endemism rates in the world (Noss, 2018; Walker and Peet, 1984; Sorrie and Weakley, 2001). It is also widely recognized that periodic fires, particularly growing season fires, are crucial to the maintenance of diversity and vigor in these unique ecosystems (Noss, 2018; Beckage and Stout, 2000). In the absence of an appropriate fire regime, as is the case for most of the Hardwood Conifer Mixed (FLUCFCS 434) stands at CB/AB, these forests succeed to hardwood-dominated, closed canopy systems that shade out the diverse, light-demanding groundcover vegetation and typically eliminate essential bare mineral soil patches necessary for seedling recruitment through deposition of fire-retardant leaf litter. Restoration of the historical groundcover abundance and species richness in these upland forests with community-appropriate species (FNAI, 2010c; Carr et al, 2010) would be an indicator of success of the proposed restoration measures (hardwood reduction and

prescribed burning). Therefore, a gradual increase in these measures toward an average goal of 30% to 60% desirable groundcover (depending on the targeted community) is regarded as one of the primary goals for the native forest restoration areas.

Since hardwoods have not encroached as significantly into the wetland communities embedded within this upland matrix, most of the wet prairies and marshes have retained near-normal values for percent total groundcover which are typically greater than the 30% to 60% desirable groundcover goal stated above for the upland communities. However, these wetland communities will likely also enjoy an increase in species richness and attain a more appropriate overall composition following the reintroduction of fire to the landscape. Fire will reduce competition from light-competing shrubs along wetland margins, promote viable seed production of C4 grasses and other species that typify the diverse ecotones of wet prairies and marshes, and reduce litter/expose bare mineral soil necessary for the germination and expansion of the graminoid-dominated community.

It is anticipated that the desirable ground cover goal will be achieved via natural recruitment and will begin to be apparent after the initial hardwood reduction efforts and the initial restoration burn. Assessments to be conducted following these initial treatments will reveal whether this is the case and if supplemental planting or seeding may be recommended to achieve the desired cover and diversity.

3) Increase natural recruitment and establishment of longleaf pine and/or slash pine seedlings.

An increase in the natural recruitment of seedlings from remnant mature longleaf and slash pines on site is a primary goal of the restoration efforts (Goal #2) due to the elimination of much of the historical pine overstory through logging and subsequent decades of fire suppression. It is estimated that less than 1% of the historical density of mature pines remain in these CB/AB uplands. Mature and healthy sandhill and flatwoods communities typically support between 75 to 150 mature trees per acre (tpa), or between 50 to 80 ft2/ac basal area, depending on soil moisture. The reintroduction of fire and increased exposure of bare mineral soils beneath remnant pines is essential for recruitment of pine seedlings, which require contact with bare mineral soil for germination. Seed dispersal distance from mature remnant pines is roughly equivalent to the height of the seed tree (Brockway et al, 2005), so supplemental planting of pine seedlings is recommended to accelerate restoration of the desired canopy where seed sources are limited. In general, longleaf pine is recommended for installation on upland sandhill sites, whereas a combination of slash pine and longleaf pine is recommended for flatwoods site, with the ratios dependent upon soil moisture.

Longleaf pine seed production typically occurs between October and November; therefore, prescribed burning should occur within at least one (1) year preceding seed fall, ideally in August or September to minimize the chances that increasing fuel loads with time since fire will impede seed to soil contact and the chances of seed “catch”, as seeds need bare mineral soil to germinate. Longleaf pine seedlings germinate very soon after seed fall, typically within one (1) week of seed fall, so natural recruitment

success can be evaluated in late summer following the seed catch. The success of natural regeneration is best evaluated at the end of the first growing season as drought conditions in spring and summer increase the rate of seedling mortality. If the seed catch was not successful, this process can be repeated when the next cone crop develops, or containerized seedlings may be planted in open areas. If natural recruitment is overall successful within a particular burn unit, then prescribed burning is not recommended for that unit for at least two (2) years following seedling establishment to maximize seedling survival. Longleaf pines are an extremely fire-tolerant species but are most vulnerable in the early seedling stage before the terminal bud achieves a height greater than average flame length (3-4 feet). It is therefore recommended to wait several years before burning until seedlings have become well established.

4) Increase percent cover bare mineral soil.

An increase in the percent cover of bare mineral soil is expected following application of the recommended restoration methods. Greater exposure of mineral soil will occur as a result of consumption of leaf litter and other fuels by fire, reduction in dense shrub cover (e.g. saw palmetto (*Serenoa repens*), gallberry (*Ilex glabra*) following fire, and removal of oaks and oak leaf litter sources from the mid-story and overstory. At present vast upland areas within the proposed Core Conservation lands have little to no exposed bare mineral soils due to decades of fuel accumulation. These conditions are unfavorable for many common and desirable species in pine-dominated grasslands, including keystone species such as longleaf pine and wiregrass, whose seeds require contact with bare mineral soil for germination. Seedling establishment and early seedling growth of many common sandhill forbs and grasses are also maximized under very light litter levels. The range of desirable percent cover of bare mineral soil varies among and within the targeted upland communities (sandhill, flatwoods, scrub), but a range of approximately 25% to 50% is a reasonable target for all upland communities in the initial phases of restoration.

5) Minimize mortality of mature pines due to reintroduction of fire.

Prolonged fire exclusion leads to the accumulation of heavy fuel loads that present a potential threat to mature remnant pines upon the re-introduction of fire. Extensive pine mortality after restoring fire to long un-burned longleaf pine forests has largely been attributed to smoldering combustion of duff around the bases of old pines (Varner et al, 2005). Crown scorch is another potential cause of mortality if adjacent mid-story or overstory fuels are present. Even if remnant pines aren't directly killed during the re-introduction of fire, they can become weakened and stressed by the event, and therefore, more susceptible to disease and pests.

All reasonable efforts should be made to preserve the remnant pines at CB/AB during the re-introduction of fire. These pines are a keystone component of the majority of the uplands targeted for restoration, they provide a valuable seed source for natural recruitment, contribute flammable fuels to

help carry fire, perpetuate the local genetic stock, and contribute vertical structure for wildlife. Methods of protection that may be considered include: 1) conducting initial restoration burn(s) during cooler winter months with adequate soil moisture; 2) raking away duff and/or removing vegetation from around tree bases; 3) pre-burning around the bases of old trees; and 4) mopping up/spraying tree bases with water after the fire to ensure no duff is burning in the sub-surface. The decision about which method(s) of protection are most appropriate should be made by a qualified ecologist after a site assessment and preliminary inventory of remnant pines has been conducted within a unit proposed for burning.

6) Abandon unnecessary internal roads and firebreaks

Prior to conducting restoration activities, the proposed Conservation Core lands should be divided into management units utilizing existing roads and natural fire breaks as boundaries to the greatest extent practical. No new fire breaks or roads should be established unless deemed absolutely essential. Management units should initially mimic the burn units established for the FSJMA (**Figure 4-3, FSJMA Burn Units**), which range in size from 50 to 230 acres, and average 130 acres. After management unit boundaries have been established, all internal roads and fire breaks should be blocked off and abandoned. Any fire breaks or roads previously established along wetland ecotones via disking should also be abandoned, as vegetation species richness often peaks at this upland-wetland interface area (Kirkman et al, 1998). Artificial plow lines along ecotones may also impede the migration of herpetofauna whose life cycles depend on access to both wetlands and the surrounding uplands, and, therefore, migration across the ecotone boundary. Vegetation recovery within the abandoned roads and firebreaks should then be allowed to proceed via natural recruitment from adjacent seed sources and monitored over time. Supplemental planting of desirable vegetation may be recommended if the abandoned roads and fire breaks are not trending toward a composition that is representative of adjacent natural communities via natural recruitment.

7) Conduct supplemental planting of desirable groundcover species and pine seedlings as feasible when natural recruitment sources are lacking.

After hardwood reduction and 1 or 2 successful restoration burns have been completed within a management unit, an assessment of the resulting spatial distribution of desirable groundcover vegetation and pine seedling recruitment should be conducted. Any gaps identified between patches of desirable groundcover vegetation or seed-producing pines that are larger than the maximum expected seed dispersal distance (~50 feet) are candidates for supplemental planting. Supplemental planting lists and recommended planting densities for each species should be developed for the identified gaps after a thorough review of site conditions and target communities. These lists should not only consist of keystone species such as longleaf pine, slash pine, wiregrass, and saw palmetto as appropriate for the target community, but also include a variety of other C4 grasses, low shrubs, and forbs that are characteristic of the local version of the target community according to FNAI (FNAI, 2010c).

Establishment of the basic vegetation components of the target community is essential to restoring many ecosystem functions, including the ability to carry fire, so should be aggressively pursued as soon as possible to prevent the need for repeated hardwood reduction efforts.

Containerized longleaf pine seedlings, bare root slash pine seedlings and 1-gallon containerized stock for grasses, forbs, and shrubs are the most likely recommended planting sizes. All supplemental planting material should originate from an approved, state-inspected nursery and be thoroughly inspected for the presence of nuisance or invasive species prior to installation. Plantings of herbaceous material within uplands should be conducted relatively early in the growing season (June-August) so that regular summer rains will facilitate plant establishment and minimize and/or eliminate the need for irrigation. Plantings of bare root slash pine seedlings should take place in the winter (December-February) and longleaf containerized seedlings can be planted in winter (December-February) or summer (during the rainy season).

Over time as restoration goals are achieved and management routines have stabilized, supplemental planting of rare and/or endangered plant populations through partnerships with organizations such as Bok Tower Gardens Rare Plant Conservation Program, the Florida Native Plant Society, the Center for Plant Conservation, and/or the U.S. Fish and Wildlife Service should be considered. CB/AB has the potential to support many rare plant species that are indigenous to Pasco or adjacent counties (See **Table 3-3**), and plant conservation organizations prefer to work with public landowners that can provide greater assurance that proper land management techniques will conserve rare plant populations in perpetuity. For example, Bok Tower and USFWS collaborated with Manatee County to establish several populations of the Florida goldenaster (*Chrysopsis floridana*) on their ~22,000-acre wellfield known as Duette Preserve. These populations have become well-established and help lessen the extinction risk of this federally endangered species that is documented from only five (5) counties in west-central Florida.

8) Trend toward transition-season burns (late April-July) over 1 to 3-year fire return intervals after current fuel loads have been reduced.

Due to accumulation of heavy fuel loads over long periods of fire suppression, cooler winter burns are recommended for the first restoration burn(s) to safely reduce fuel loads to near-historic conditions. Once this has been accomplished, and the desired longleaf pine seedling establishment has occurred, efforts should be made to incorporate more transition season or lightning season (late April-July) burns into the overall burn plan for the conservation area in an attempt to mimic historical fire patterns. Transition season burns have the potential to result in much higher fire intensities, but studies have shown that many desirable grassland species, including wiregrass, respond most favorably (i.e. production of viable seeds, shoot growth rate) to burns conducted during the transition season. (Noss, 2018; Bridges, 2019). This positive vegetation response is not surprising considering that the transition season is when most natural lightning-ignited fires would have occurred historically due to dry fuel conditions, low water table, and increasing frequency of lightning strikes. It has also been documented

that repeated winter burns tend to favor shrub dominance in the groundcover layer, resulting in a significant loss of species richness. Transition season burns also benefit many wildlife species, particularly longleaf pine forest specialists (Noss, 2018). Transition season burns are also critical for burning through seasonally ponded wetlands such as wet prairies and marshes and for reducing shrubs around perennial wetlands (Noss, 2018).

To maximize pyrodiversity while maintaining appropriate structure and function, fire return intervals should typically vary between 1 and 3 years for all management units, except those containing true scrub or scrubby flatwoods communities where a longer fire return interval (5-10 years) is more appropriate. Repeated annual burns is probably not representative of the historical fire regime within this portion of CB/AB where the topography is more varied, and the presence of multiple small wetlands embedded in the landscape would have historically interrupted the progress of fire. In general a rigid and regimented fire rotation schedule is not recommended for these conservation lands, but the average goal of burning each management every 1 to 3 years during the transition season should result in desirable and representative composition and structure for a vast majority of these lands. Potential conflicts such as a lack of fine fuels and/or difficulty in obtaining burn permits during the growing season will also inevitably require adaptive management and adjustment of fire season and fire return interval goals.

9) Minimize impacts to desirable vegetation cover and wildlife during all restoration activities.

All reasonable efforts should be made to minimize negative impacts to desirable vegetation and wildlife during restoration activities. Avoidance of impacts is best accomplished by first conducting a thorough inventory of each management unit prior to conducting restoration activities and ensuring that a professional ecologist supervises all phases of the restoration efforts. The inventory should identify locations of intact groundcover communities, mature remnant pines, gopher tortoise burrows, large hardwoods with cavities suitable for nesting and denning, and any other resources that are worthy of protection. The timing of certain activities to avoid nesting and breeding seasons must also be considered. This information should be shared and discussed with all parties involved in restoration activities to ensure maximum awareness of sensitive locations. Minimization of impacts during the course of restoration activities is also accomplished by conducting the hardwood reduction efforts by pedestrian chainsaw crews and avoiding the use of heavy equipment. Conducting initial burns during the cool winter season until fuel loads are reduced and employing other methods described above in Goal #5 to prevent mortality of mature pines, is another example of how impacts can be minimized during the restoration process.

10) Prioritize and coordinate restoration efforts with adjacent FSJMA restoration plans.

Restoration activities compatible with the proposed goals and management recommendations for these lands are also proposed in the adjacent FSJMA. Management recommendations for the FSJMA are

specifically designed to maximize benefits for the Florida scrub-jay, and will also benefit many other wildlife species with similar habitat requirements, whereas recommendations for these adjacent conservation lands are not currently species-specific and were instead developed to restore habitat conditions to their historic vegetation structure and composition. Because the Florida scrub-jay is state and federally endangered and a designated focal species for this EMP whose current population on and surrounding CB/AB is in critical condition, restoration activities, schedules, and priorities for the FSJMA should take precedence over restoration activities proposed for lands adjacent to the FSJMA. In addition, any and all activities proposed for these additional conservation lands should be vetted with proposed restoration activities for the FSJMA to minimize disturbance to potentially nesting jays on the adjacent lands and concentrate restoration efforts where they have the greatest chance of also providing improved habitat for the adjacent scrub-jay population.

11) Establish monitoring protocol to regularly assess success toward achievement of above-stated goals.

The results of all restoration activities proposed for these additional conservation lands should be monitored and documented by a qualified ecologist on a regular and ongoing basis using qualitative and quantitative methods. Monitoring protocols should be developed and refined according to the proposed methods and target community type but should generally focus on tracking progress toward the above-stated objectives. An appropriate number and size of permanent monitoring stations should be established and monitored in each management unit prior to beginning any restoration activities so that baseline conditions and improvement from baseline conditions can be measured. Variables that should be tracked for the target communities include overstory, mid-story, and groundcover vegetation composition and abundance; average height and percent cover of hardwoods; percent cover of bare mineral soil/leaf litter; natural recruitment of pine seedlings; mature pine mortality and/or observations of stress indicators; soil moisture; and observations of wildlife utilization. Permanent photo stations should also be established at each monitoring station, and any other incidental observations regarding fire behavior and successful reduction of coarse fuels should also be noted to guide future prescribed burns and adaptive management strategies.

4.3.1 Long Leaf Pine Restoration

Approximately 242 acres remain from the original longleaf pine timber plantations established on CB/AB in 1994 and 1995 (See **Figure 3-6, Longleaf Pine Harvest Plan**). Approximately 40% (97 acres) of these stands have suffered from active infestations by Ips engraver beetles (*Ips* spp.), black turpentine beetle *(Dendroctonus terebrans)* and fusiform rust disease (*Cronartium quercuum f. sp. Fusiforme*). These pine bark beetles normally don't infest healthy trees but tend to attack stressed and dying pine trees (Eickwort et al., 2006).

Efforts to contain the beetle infestation have included clearcutting severely infected stands. Stands with lower levels of infestation are thinned to save a remnant of these stands. The infestations are so severe that harvesting has been implemented as a "salvage emergency cutting". Mr. Jeffrey Eikworth, the State Forest Entomologist with the Florida Forest Service inspected the infected longleaf stands in June 2018 and recommended a combination of clearcuts and thinnings. Salvage harvests of these stands began in 2017 and continue at present (TFC, pers. comm., 2018). All thinning and clearcut operations are expected to be completed in 2019.

The objectives of the longleaf pine thinning harvest are to:

- remove the diseased and beetle infested trees;
- remove the trees with very poor form;
- open the forest canopy such that light can reach the forest floor; and,
- leave a less dense, higher quality stand to provide seed for the future naturally regenerating forest.

A 'third-row thin and select' thinning is a type of modified group selection system used to move the longleaf stand toward a naturally regenerated stand with at least 3 age classes in the future, creating an uneven aged stand (Gagnon, 2002). This salvage thinning method includes removal of every third row of pines and any trees with poor form, disease or are beetle infested. This may result in a slightly higher density of trees remaining after the first thin than would be desired for a healthy natural stand, but the desire is to save enough seed trees for the future in the event the beetle infestation reemerges.

The beetle infestation has also resulted in large openings where all the trees were killed. These openings in the canopy are ideal for seed catch to start the process of natural regeneration and create an uneven, natural pattern of tree density. Since longleaf normally produces a good cone crop (for seeding) intermittently, supplemental planting of containerized longleaf pines is also used to accelerate regeneration of an uneven aged longleaf stand.

The 145 acres of remaining longleaf pine plantation are located in two (2) general areas. The southern area (Area 1) is located east and northeast of the Education Center and consists of approximately 88 acres that were planted in 1995 except for one (1) 11-acre stand that was planted in 1991. These stands are located at an elevation of approximately 75 feet on flat to nearly level soils consisting primarily of Adamsville, Narcoossee, Smyrna Fine Sands, and Tavares Sand. This area most likely supported a dry to mesic pine flatwoods community (FNAI, 2010c) prior to conversion to longleaf pine plantation. Some thinning of these stands was conducted in 2018-2019.

Approximately 42 acres immediately east of the Education Center received the seed-tree thin, and the third-row thinning occurred on the remaining 46 acres. These thinning activities were to remove the dead, dying, insect infested, and/or diseased trees and those with very poor form. The 42-acre stand had an exceptionally high incidence of fusiform rust disease, active beetles and very poor form.

The northern area (Area 2) consists of approximately 57 acres located approximately two (2) miles north of the Education Center, along the north side of Jumping Gully and near the west-central boundary of CB/AB. These stands were planted in 1994-1995 at an elevation of 80-100 feet, coincident with an isolated topographic knob that represents the highest elevation present on CB/AB. Candler Sands (0 to 5% slopes) occur at the highest elevations, followed by Tavares and Adamsville Fine Sands along the slopes. These deep sands were most likely deposited as a result of ongoing erosion and deposition cycles associated with channel incisement of the adjacent Jumping Gully during alternating wet-dry cycles in the post-Pliocene landscape. Prior to conversion to longleaf pine plantation, the dominant historic vegetation community in this area was most likely Sandhill (FNAI, 2010c) with potential small Scrub (FNAI, 2010c) elements present at the highest elevations. Third-row and select thinning of these stands is ongoing.

This longleaf restoration program provides an excellent opportunity to promote PCU's long-term goal of restoring longleaf pine habitat on-site, and address several of the above-stated goals, as well as PCU's Management Requirements, including Wildlife Enhancement, Sound Land Management, and enhancement of Public Perception.

The restoration objectives listed above also apply to the upland areas discussed below. Overall management as detailed above are also applicable to these communities. Ongoing monitoring of the stands will take place to detect any reemergence of beetles or other forest pests. They should be evaluated with a timber cruise approximately every ten (10) years to determine when the next thinning is needed based on the basal area of the stand at that time.

Additional, site-specific recommendations for these areas are provided below.

Area 1 (~88 acres) – Flatwoods Target Community

- Reduce stand basal area to approximately 30-50 ft2/acre basal area utilizing third-row and select thinning methods to improve stand health and form.
- Conduct baseline timber cruise of stand conditions within one year of thinning completion, and every ten years thereafter.
- Conduct qualitative monitoring quarterly during Year 1 to assess for vegetation recruitment, seed catch and beetle mortality and annually thereafter.
- Apply appropriate herbicide to control emerging hardwoods at less than 5% cover, as-needed.
- Apply appropriate herbicide to control non-native or nuisance groundcover vegetation at less than 5% cover, as needed.
- Install an appropriate and diverse mixture of flatwoods groundcover and shrub species (FNAI, 2010c) where desirable remnant vegetation is lacking as soon as possible following initial

herbicide treatments. Install vegetation when soil moisture is high and/or precipitation anticipated, as feasible, and conduct supplemental irrigation as needed.

- Conduct a prescribed burn during the winter following the first growing season to remove logging debris and return nutrients to the soil. Subsequent burns should occur on a 1 to 3-year rotation as fuel accumulation permits.
- Engage Pasco County school groups and other interested parties in restoration activities (hand-pulling of undesirable vegetation, supplemental planting of appropriate flatwoods species, follow-up visits to observe restoration success).

Area 2 (~57 acres) – Sandhill Target Community

- Reduce stand basal area to approximately 30-50 ft2/acre basal area utilizing third-row and select thinning methods to improve stand health and form.
- Conduct baseline timber cruise of stand conditions within one year of thinning completion, and every ten years thereafter.
- Conduct qualitative monitoring quarterly during Year 1 to assess for vegetation recruitment, seed catch and beetle mortality and annually thereafter.
- Apply appropriate herbicide to control emerging hardwoods at less than 5% cover, as-needed.
- Apply appropriate herbicide to control non-native or nuisance groundcover vegetation at less than 5% cover, as needed.
- Install an appropriate and diverse mixture of sandhill groundcover and shrub species (FNAI, 2010c) where desirable remnant vegetation is lacking as soon as possible following initial herbicide treatments. Install vegetation when soil moisture is high and/or precipitation anticipated, as feasible, and conduct supplemental irrigation as needed.
- Conduct a prescribed burn during the winter following the first growing season to remove logging debris and return nutrients to the soil. Subsequent burns should occur on a 1 to 3-year rotation as fuel accumulation permits.
- Engage Pasco County school groups and other interested parties in restoration activities (hand-pulling of undesirable vegetation, supplemental planting of appropriate Sandhill species, monitoring restoration success)

Implementation of the management recommendations above is expected to result in the restoration of two (2) longleaf pine forest types that increasingly resemble natural Sandhills and Flatwoods pine forests over time. As with any ecosystem restoration project, close supervision by qualified personnel and a willingness to perform adaptive management as needed to establish the desired communities is required for success. It is anticipated that these restoration projects will enhance public perception of CB/AB and PCU through their engagement of citizen scientists, demonstrated commitment to restoration goals, and opportunities to share successes and lessons learned with public interest groups and other land managers.

4.4 Florida Scrub-jay Management Area

The regional and onsite CB/AB Florida scrub-jay population has declined significantly over the past ~20 years due to years of fire exclusion and mismanagement. The future of the remaining jays depends very much on the actions taken at this point and beyond. In order to optimize habitat for jays, there are many ecological factors to consider, and the methods and timing of activities affect each of these. Scrub-jays are dependent on very specific habitat requirements for vegetation type and structure.

The current FSJMA boundary includes 1,688 acres of upland and wetland habitats, consisting primarily of fire-suppressed palmetto prairie, scrubby flatwoods, oak (*Quercus* spp.) hammocks, and sandhill habitats interspersed with wet prairies and marshes. According to the Florida Land Use, Cover, and Forms Classification System (FLUCFCS), these communities correspond with Shrubs and Brushland (3200), Hardwood Conifer Mixed (4340), Pine Flatwoods (411), Wet Prairie (643), and Herbaceous Marsh (640). A 465-acre polygon of harvested and recently replanted slash pine plantation (440) is located in the center of the FSJMA, and additional smaller polygons of pine plantation occur on the east side, within the FSJMA boundary (**Figure 4-4, FSJMA FLUCFCS**).

Adequate management throughout much of the FSJMA has been lacking for many years, resulting in sub-optimal conditions for the FSJ and other species listed as federally and/or state Endangered, Threatened, or Imperiled, including gopher tortoise, gopher frog *(Rana capito)*, and eastern indigo snake *(Drymarchon couperi)*. However, the vegetation composition and structure required for continued FSJ and occupation by other listed species can be restored via sound land management practices, i.e., a combination of mechanical oak canopy reduction, implementation of a robust prescribed burning plan, and compatible adjacent land uses. Per Florida Fish and Wildlife Conservation Commission's (FWC) guidelines for the management of scrub habitats in peninsular Florida, the ideal habitat structure for Florida scrub-jays consists of mostly treeless, open expanses of low shrubs interspersed with bare sand or sparsely vegetated patches.

During field surveys conducted in July 2018, as many as eight (8) scrub-jays were observed within a small polygon of overgrown scrub in the southwest portion of the FSJMA. Based on the most recent surveys conducted to date, two FSJ groups are utilizing habitats on the FSJMA, within Burn Units A and B. (**Figure 3-8, Florida Scrub-jay Observations 2018-2019**). The harvest of the adjacent mature planted pines has resulted in additional suitable habitat for these jays; an active nest site was observed in clumps of saw palmetto and oak along the FSJMA/pine plantation boundary in June 2019 (**Figure 3-8**). Juveniles were observed within the Burn Unit B group in July 2018. The presence of two groups and evidence of nesting and breeding, along with historical observations site-wide, indicates that the FSJMA could support a higher number of scrub-jay groups when managed properly.

Development of methods for restoring scrub habitat, particularly when occupied by FSJ, is an evolving process; subsequent steps depend on the results of the management and the response of the jays as

restoration and appropriate management proceeds. Detailed land use mapping and canopy characterization should be conducted for each burn unit within the FSJMA on an annual basis in order to prioritize and quantify management prescriptions. This burn unit by burn unit approach will be necessary over the next approximately five (5) years to assess the amount of hardwood reduction required, the most effective mechanical methods, promote planning efforts, and evaluate utilization by scrub-jays. Canopy reduction activities and other required activities may then be expanded to adjacent units or habitats based on observations of jay movements and how they respond to management. It is recommended that burning and mechanical management activities take place outside of the nesting season.

For each unit burned, post-burn evaluations of the remaining live forested vertical structure and density should be evaluated, and where structure and density are determined to remain too high, these areas should be targeted for mechanical reduction. Generally, the goals for each burn are to reduce accumulated biomass, expose bare mineral soil, allow future seed germination by grasses and forbs, top kill oaks, reduce the height of and cover by palmetto and other shrub species, and reduce the potential for wildfire onsite from lightning strikes and unintended ignition sources.

In August 2018, Quest prepared the Florida Scrub-Jay Management Area Short-term Management Plan (SMP) to provide interim management guideline updates to the original management plan prepared in 1992. This short-term plan was prepared to address the immediate management needs of the FSJMA and to provide recommendations for future uses. Although this plan was not fully implemented, prescribed burning took place within some of the unoccupied units within the FSJMA in late 2018 and early 2019. Post-burn field evaluations were conducted by Quest Ecology's Prescribed Burn Manager in January 2019, and the SMP has been updated to reflect results, current site conditions, and recommendations for restoration and management actions in the short-term (Appendix A – FSJMA SMP). Pursuant to the above described need for annual assessments to guide restoration steps, the results of this SMP will need to be evaluated and updated for subsequent years, through approximately 2023. The objective of the SMP is to achieve the long-term goal of restoring habitats to the historic structure and composition suitable for jays that can be managed through adequately timed prescribed fire alone. Correctly implemented, under the direction of a qualified Restoration Ecologist, this goal should be achievable within this 5-year time frame. Once these short-term objectives have been achieved, the size of the burn units can be increased, for more effective and efficient burns; scrub structure and growth rates will dictate future fire return intervals.

Both the short and long-term recommendations for CB/AB have incorporated FWC guidelines for FSJ habitat management. In 2009 FWC published "Scrub Management Guidelines for Peninsular Florida; Using the Florida Scrub-Jay as an Umbrella Species". In February 2019, those guidelines were updated and published by FWC as "Scrub Management Guidelines" (FWC, 2019) (https://myfwc.com/media/19479/scrub-management-guidelines.pdf). These guidelines discuss scrub-jay biology, habitat types and structural requirements for scrub-jays, as well as the timing and methods

for management, and proper fire burn intervals based on the floral and faunal resources of individual sites.

Overall vegetation structure and management recommendations for maintaining optimal FSJ habitat within the FSJMA in the long-term are listed below. The current and future SMPs will serve to address the individual objectives by burn unit and management year, as the restoration progresses. These address Long-Term Goals 1, 3, 5, 7, 8,10, 11 and 12.

1. Maintain each FSJMA burn unit at maximum oak heights of 10-12 feet for no more than 70% of the area;
2. Maintain each burn unit at or below 15% pine cover. Height of pines is not a factor;
3. Maintain 5-20% of the ground cover to consist of open mineral soil to sparse (<15% cover) cover by herbaceous species;
4. Maintain a 1000' non-forested buffer between FSJ territories and adjacent areas where forested cover over 12 feet in height is 15% or higher;
5. Maintain a minimum 300' non-forested buffer in areas being restored and managed for future FSJ occupation;
6. Maintain burn lines to follow existing/required roads and only disk where needed to avoid wildfire risks along property boundaries. Maintenance of essential burn lines should only be conducted immediately prior to burns to minimize soil disturbance and invasion by nuisance/exotic vegetation that may potentially spread to adjacent natural areas;
7. Increase the size of burn units such that more efficient, effective burning takes place in the long-term. Discontinue the use and maintenance of unnecessary existing roads or fire breaks within burn units and allow them to revegetate to allow fire to carry through the entire burn unit;
8. Implement a trapping, banding and monitoring program to track results of restoration, response by jays, management needs, and long-term FSJ utilization and breeding success. Monitoring is recommended to occur approximately every two months to include: prior to the breeding season to identify locations of breeding groups; during the breeding season to document nesting and nest locations; after the breeding season in July to determine fledgling success; and in the fall to evaluate habitat conditions for management needs.
9. Update the SMP's annually for the first five years, and every five years thereafter, based on the results of the above banding and monitoring program.

4.4.1 FSJMA Compatible Adjacent Land Uses

A very important component of effective restoration of the FSJMA is ensuring compatible adjacent land uses which most importantly includes ultimately restoring the planted pine areas within and adjacent to the FSJMA back to native habitats. This recommendation was also made by Audubon (2005), and Peacock (2018) and is consistent with the County's current and historic management requirements and/or objectives for the property.

The eastern portion of the FSJMA was previously identified in Audubon reports as one of the two "core" scrub-jay areas and supported several jay groups in the past. Maintaining pine plantations in this area effectively reduces the available suitable habitat for any jays that may benefit from proposed management activities, as it creates discontinuous blocks of habitat and non-native areas in the short-term, and ultimately, barriers to jay movements in the long-term. There is little point in conducting specific management for scrub-jays if other activities are being conducted that are in direct conflict with what the management is meant to achieve. This is particularly apparent now that the FSJ Group within Burn Unit A has been observed nesting along what was previously the edge of the planted pine area.

The structural characteristics of a pine plantation will impede movements of scrub-jays within the FSJMA and will create predator perches and hides within what will become a dense forest. Dense forests discourage scrub-jays from traversing these areas and create a 'shadow zone' of at least 300 feet along the perimeter of the forest habitat, which scrub-jays will avoid. The pine plantations provide nesting and roosting areas for avian predators of FSJ such as great horned owls *(Bubo virginianus)*, barred owls *(Strix varia)*, sharp shinned hawks (*Accipiter striatus*), and Cooper's hawks *(Accipiter cooperii)*. The maturation of the central 465-acre pine plantation, surrounded on three sides by the FSJMA, coincided with the population decline of the scrub-jays in the FSJMA. The presence of this dense forest structure within occupied scrub-jay habitat, upon attaining heights over 12 feet, likely contributed to the decline of the scrub-jay population due to scrub-jay dispersal and increased predation.

FWC guidelines call for a 1000' buffer from forest edges to maintain "optimal" FSJ habitat (recruitment exceeds mortality), and a minimum 300' buffer to provide "suitable" FSJ habitat (jays can persist in the short-term) (FWC, 2019). Because the intent for the FSJMA is to restore to optimal habitat such that FSJ may persist in the long-term, the 1000' buffer has been recommended adjacent to currently occupied areas. For the portions of the FSJMA that are currently unoccupied but proposed for restoration and management to provide areas for FSJ to expand into, a 300' minimum buffer is recommended. These buffers may be revisited and adjusted in the future based on FSJ response to restoration actions. The lack of at least the minimum 300' buffer along adjacent pine plantations equates to a loss of over 278 acres of usable scrub-jay habitat within the FSJMA (**Figure 4-5, Timber Impacts**). Within areas of FSJ occupation, the presence of a forest edge will ultimately cause the jays to disperse.

In addition to FSJ, other species have been historically documented within these pine plantations, including gopher tortoise and burrowing owl, which would also benefit from restoration of these areas. In 1995, a burrowing owl burrow was identified in the northern section of the central planted pine area (**Figure 3-9**). Gopher tortoise burrows have been identified along the perimeter of the pine plantation; restoration will open additional areas suitable for occupation by tortoises. The potential for using suitable portions within the higher elevations of the restored pine plantation to create a Gopher Tortoise Recipient site warrants further consideration. Current recommendations for restoration of the planted pine areas are provided in the SMP (Appendix A – FSJMA SMP).

4.5 Pasture Preserve Areas

The proposed Pasture Preserve Areas consist of existing designated grazing lands totaling approximately 1154 acres. These pasture areas were delineated as part of the proposed Conservation Core based on the previous designation proposed in 1995 (**Figure 2-8, 1995 Designated Preservation Areas**), the dependence of burrowing owls (BUOW) on these pastures, and the current designation of these pastures for cow grazing (**Figure 4-6, BUOW Pasture Use**). Although burrowing owls have been observed in areas designated for hay fields on Cross Bar, these were excluded from the Pasture Preserves as the more intensive management (mowing) within these areas tend to be incompatible with long-term occupation by BUOW (R. Boughton, pers. comm., 2019). These areas should be revisited if any of the current land use designations change.

Management recommendations specific to BUOW will also serve to mimic the vegetation structure of native upland grasslands and will serve to benefit a variety of grassland wildlife species. The current restoration objectives for these pastures are listed below. These address Long-Term Goals 1, 4, 5 and 6, in the short-term, and ultimately Goals 7 and 10.

1) Maintain Bahia grass height at less than 18” overall, and within a 4” – 16” range throughout the year
2) Timing of required management and ranching operations must consider the nesting season (February – July)
3) Control pioneer and exotic vegetation to maintain desired structure
4) Reduce or remove forested structure within 300’ of occupied BUOW habitats
5) Implement the use of Cattle Excluders to protect burrows from trampling and heavy equipment damage
6) Implement a monitoring and banding program
7) Implement appropriate conservation measures per FWC guidelines

The following recommendations are provided for implementing each of the above.

1) Maintain Bahia grass height at less than 18” overall, and within a 4” – 16” range throughout the year

Cattle grazing is an important habitat management tool that keeps the grass cover at low heights that are optimal for burrowing owl occupation. This low vegetation structure is preferred by the owls, as it allows for the high visibility needed to avoid predation by hawks and other predators. Bahia grass (*Paspalum notatum*) is the dominant grass species currently growing in cattle pastures on CB/AB. Mowing or burning to maintain pastures can also benefit burrowing owls; however, the timing and

frequency of mowing and burning needs to be considered in relation to the breeding season and presence of fledglings.

Cattle stocking density is recommended at an appropriate stocking rate such that the Bahia grass remains less than 18" in height on average, and range between 4-16" in height through the year. No more than 20% of a pasture should have grasses taller than 18". If the chosen cattle stocking rates do not maintain desirable grass heights between 4-16", rates should be adjusted to maintain desirable grass heights for burrowing owls. Vegetation height is also weather dependent and should be assessed annually to determine if grazing cattle density is sufficient and whether alternative management actions may be needed.

2) Timing of required management must consider the nesting season (February – July)

The preferred method to maintain suitable grass heights for burrowing owls is by stocking each pasture with an appropriate density of cattle. However, there may be situations where mowing or burning are necessary. When mowing is necessary the timing needs to be such that it does not coincide with burrowing owl breeding season (February – late June). Mowing should leave at least 4 inches of standing grass biomass.

If burning is the preferred method, burning is also recommended to take place outside of the breeding season but before the end of annual migration of raptors wintering in Florida. Burning would be best conducted in late June through September. Controlled burns of pasture between October and February would be detrimental to the burrowing owls, as significant cover would be removed in the non-growing season leaving insufficient cover when growth rates of grasses are slower and wintering raptor (potential predators) densities are at their highest.

Some pasture areas occupied by BUOW are being harvested for Bahia seed. This practice is not compatible with BUOW management as it requires the use of heavy equipment for seed collection during the breeding season. Heavy machinery or tractors used for mowing and Bahia seed collecting operations have been observed running over burrows vs. mowing around or avoiding them. It is recommended these Bahia grass seed cultivation fields be fenced and converted to grazing pastures.

3) Control pioneer and exotic vegetation to maintain desired structure

Smut grass and cogongrass are two of the most common upland undesirable, exotic, tall grass species that will necessitate management in the form of select herbicide application. Appropriate approved herbicides applied in the correct and timely fashion should be applied to limit the expansion of these species. Other pioneer native and exotic grasses, woody perennials, shrubs and forested species should also be managed to maintain the existing structure and vegetative assemblage of the existing pastures that currently support BUOW. Note that the use of pesticides, insecticides, and/or herbicides near

burrowing owl burrows should be avoided, especially during the nesting season. When necessary, an herbicide labeled to have the fewest negative effects to birds should be selected.

4) Reduce or remove forested structure within 300' of BUOW habitats

Forested areas and isolated large trees are typically avoided by burrowing owls, as forested structure provides perching, hunting, loafing, and nesting sites for aerial predators. This includes the large live oaks present within pastures and the planted pines that abut some pastures. Where this forest structure is present, burrowing owls will typically establish and maintain their primary and satellite burrows approximately 300 feet away. One method to increase the potential carrying capacity of burrowing owls within occupied pastures is to remove live oak trees from select areas. This will reduce a potential predator threat and provide additional area for burrowing and foraging. In addition, the pasture areas not being used by BUOW due to unsuitable cover by oaks could be cleared of oaks to be made more suitable for owls, or converted to a more compatible, non-forested use. The installation of hayfield buffers in some of these areas could also be a possibility, as BUOW are not currently using any pastures adjacent to areas of high cover by oaks. It is understood, however, that the larger oaks provide shade for cattle, and this will need to be considered in the overall management of these areas.

Although BUOW will sometimes use forested areas for foraging, the pasture areas within ~300' of existing mature pine stands are not used for nesting. Following harvest of planted pines, the BUOW may start to establish burrows and forage more frequently closer to the clear-cut areas but are likely to retreat after a few years as the planted pines reach heights near 15 feet. Limiting the replanting of pines within 300' of the managed boundary would increase the pasture areas available to BUOW.

We recommend these options be explored further as the EMP is implemented and areas occupied by BUOW increases.

5) Implement the use of Cattle Excluders to protect burrows from trampling damage

BUOW burrow trampled by cattle. Note new exit hole excavated due to collapsed burrow

Although grazing is recommended to maintain habitat structure, burrowing owls can be directly impacted by cattle stepping on and collapsing their burrows. This can be especially detrimental on owl populations during the breeding season, when eggs and chicks can be crushed inside the burrow. Impacts from cows are known to occur and have been observed at CB/AB. This situation has also been observed for gopher tortoise burrows. The burrow is an integral part of the life cycle of both of these species, and disturbance from cows, other grazers, mowing, heavy equipment, or vehicles, resulting in collapse of the burrows, can cause abandonment or mortality by entombing burrowing owl nestlings and incubating females, entombing gopher tortoises,

and crushing of tortoise eggs laid within the soil of the burrow apron. Burrows may then become abandoned, particularly if the impacts are frequent and/or repeated. This has been observed in any pasture utilized by livestock, regardless of the stocking density.

Cattle Excluders (CE) should be installed to protect all active burrows, at least within the Pasture Preserve areas. These are endorsed by the FWC as a management tool (FWC 2018) and are found to be effective in eliminating the crushing or collapsing of both owl and gopher tortoise burrows. Anecdotally, no negative effects to grazing calves, cows, bulls, donkeys, or horses, have been reported, and they may actually reduce the potential for leg injuries that could be sustained by these grazing animals. They also help to prevent vehicles, tractors, and other similar heavy equipment from inadvertently running over and impacting burrows. The excluders have the added benefit of providing perching opportunities at desirable heights for the owls.

The Cattle Excluder is made of 1'-1/8" thickness angle iron that is cut and welded to create a one-meter square with 24" tall legs. The Cattle Excluder is placed over the burrow and the legs hammered into the soil such that the top of the Cattle Excluder is 18" above the ground. Grazing animals can stand near the burrow or apron without impacting them and can get close enough to graze the grass inside and maintain a desirable grass height inside the Cattle Excluder.

6) Implement a monitoring and banding program

A monitoring plan to include BUOW inventories and qualitative vegetative monitoring plan should be implemented to regularly census known populations and verify that the vegetative structure remains conducive for burrowing owls. Annual surveying of both occupied and unoccupied areas should occur to track known and expanded utilization. Monitoring during and following the breeding season should be conducted to document nest burrow locations and determine the success of management activities.

A trapping and banding program should be established by a qualified ecologist and Master Bird Bander. Banding of adults and juveniles will allow us to identify specific individuals and track their survival, breeding success, and local movements. It will also help to identify the expansion of the resident population, and whether juveniles persist or disperse from the site. Monitoring data will provide a better understanding of burrowing owl habitat needs and may provide needed research data for rural burrowing owls as addressed in FWC's Action Plan for the species: *determine macro-habitat characteristics; determine mean annual survival rates of adults and young: and determine mean annual reproductive success and survival rates of burrowing owls in rural landscapes* (FWC, 2018).

7) Implement appropriate conservation measures per FWC guidelines

The FWC Burrowing Owl Guidelines include additional conservation measures that should be investigated for applicability in the Pasture Preserves. These include means for attracting BUOW to suitable habitats through the use of starter burrows, artificial burrows, and creating small areas of exposed soil within the sod. Strategic placement of these measures can help attract burrowing owls away from less desirable or more intensely managed areas such as hay fields. Burrowing owls are attracted to areas with exposed soil, and the above measures can create opportunities to attract BUOWs.

Artificial burrows increase the number of burrows available, provide instant cover, caching and nesting opportunities, are structurally sounder than a natural burrow, persist longer, and have been shown to be effective in sustaining or increasing burrowing owl populations. Proper placement and installation are the keys to the artificial burrows' effectiveness as a conservation strategy. Minimal annual maintenance of artificial burrows is necessary to ensure cattle have not damaged them and that soil does not accumulate in the artificial burrow tunnel. An artificial burrow design has been established and proven effective in Florida and western States. This design is described in Appendix D of FWC's Burrowing Owl Guidelines (FWC 2018) (https://myfwc.com/media/2028/floridaburrowingowlguidelines-2018.pdf).

4.6 Timberlands Management

Soon after PCU purchased CB/AB in 1990, between 1993 and 1996, several areas of pasture were converted to planted pine to create timber income to offset operation costs. Currently, approximately 4,363 acres of the property are used for timber production. Due to the substantial size of the timber production operation on CB/AB, the development of a management plan that encourages compatibility with other land uses and goals is an important component of the EMP. PCU's number one stated management requirement is to protect the water supply and natural resources on the site. To achieve this goal, timber production and other land management activities need to consider management strategies that will promote wildlife utilization and reduce negative impacts to native habitats and the species dependent on them. For regionally and ecologically significant public lands such as CB/AB, improvements should be made to accommodate wildlife and other natural resources as much as possible.

Large stands of production pine are known to be significant barriers to wildlife by impeding natural movement through a property and removing valuable foraging and nesting areas (Harper 2015, Self 2016). At present, there are no strategies in place to combat the challenges that CB/AB timber stands present to wildlife. The current order of operations for the production of timber is outlined below:

- Site preparation
- Pre-planting herbicide application
- Plant seedlings
- Mow at age 3
- Fertilize at age 3
- Mow at age 6
- Herbicide application prior to straw raking at age 6
- Fertilize at age 12
- Rake pine straw from ages 7 to 20
- Clear cut stands at age 20

These actions are standard practice for high yield production timber, but do not take into consideration other property goals or adjacent land uses. While the original management plan set forth in 1992 contained acceptable strategies at that time, site conditions, goals, needs, and the regional significance of CB/AB have evolved over time. While the revenue generated by these plantations is important in assisting to offset the management costs, strategies can be employed to improve compatibility with wildlife and other land uses. Plantations planned and managed accordingly can support very diverse plant and animal communities, thereby reducing impacts to wildlife species and promoting regional connectivity. This may be accomplished using a mix of existing high yield timber management and pine straw harvest, along with the implementation of more wildlife friendly practices in designated areas, ideally within the Conservation Core. The following provide recommendations for addressing this, Long-Term Goals 1, 5, 6 and 7, in the short-term, and ultimately Goals 10 and 11.

Increase Understory

The most valuable improvement that can be made to increase wildlife use in CB/AB's pine plantations is to increase understory development (Harper 2015). Proper site preparations prior to planting, as well as increasing tree spacing, can improve the development of this layer. For strong understory development, after clear cutting and prior to replanting, site preparations should include the removal of leftover slash and debris, herbicide treatment to remove non-native species and sod forming grasses, and application of prescribed fire. These activities will assist with equipment access during replanting, will reduce the litter layer, and will stimulate germination of the native seedbank (Harper 2015). Increasing planting spacing to 10-12 feet apart when establishing future plantations in designated areas will drastically increase the available sunlight for groundcover species. This, along with proper site preparations, will stimulate growth of forbs and grasses, increase nesting habitat, and improve forage, seed production, and invertebrate availability. Approximately five years after planting, most groundcover forbs and grasses become shaded out and are replaced by a thick shrub layer that provides high quality cover for deer, birds, and many other species. These created and varied early successional habitat zones will benefit a variety of species on CB/AB and will increase wildlife use for many years (Harper 2015).

Once the pines have reached a height of approximately 20 feet and a diameter at breast height (DBH) of 4 inches, prescribed fire should be applied to reduce forest litter and brush while stimulating the herbaceous seedbank. Prescribed fire should be implemented once every 4 years after the initial burn, and after each thinning of the stand (Harper 2015; Farrar 1998). Thinning of the tree stands is recommended between years 12 and 15 to open the canopy thereby increasing sunlight and water availability for the herbaceous layer once again. This will also increase the health and vigor of the remaining pines. Trees removed at this time will likely be in the 6-8 DBH range and can be sold as pulpwood, OSB, chips, or low grade lumber. Thinned trees 10 inches in diameter or larger at this time can be sold as saw logs, veneer, or poles which are more valuable (Texas A&M Forest Service 2019). After the thinning, prescribed fire should be implemented once again to stimulate the seed bank and open up the soils for quick regeneration of herbaceous and primary successional species. Implemented prescribed fires, combined with proper thinning, enhances the structure of understory vegetation for species that nest on or near ground level (Harper 2015). During this early successional regeneration, wildlife use will again increase for the same reasons previously discussed. Once the plantation is clear cut at approximately year 20, the process can begin again.

Under the current management schedule, the pine stands are mowed at years 3 and 6, and herbicide is also applied at age 6. These activities greatly interfere with the understory development that is crucial for increased wildlife usage. As previously discussed, these practices are standard for high yield silviculture operations, but fail to consider other land uses or goals. These activities are recommended to cease within plantations identified for wildlife enhancement. It is understood that the above recommendations will only be applied in areas not designated for continued pine straw harvest.

Vary Successional Stages

The management methods described above should be implemented for all plantations chosen for wildlife enhancement, ideally those within the Conservation Core. However, the overall plan should include maintaining various successional stages throughout the site via the appropriate planning and timing of planting and harvesting, regardless of the type of management. Even aged timber management, as used on CB/AB where large tracts are planted and clear cut at the same time, can still provide the structural diversity desired by wildlife through locating different aged stands close to one another (Self 2016). By creating small harvest units, up to 50 acres each, and staggering planting and harvest times within these units by several years, substantial landscape diversity can be created (Mercker, 2009). Future CB/AB harvests should be planned such that adjacent reforested areas are at least 3 years old or 5’ high at the desired level of stocking before the mature forested areas are clear cut (Sustainable Forestry Initiative, Inc, 2015). This is commonly called the “green up” practice. This provides for nearby forage and cover for wildlife in the adjacent forest stands before a mature forest stand is harvested and the ground cover is disturbed. These principles should be employed across the site to the greatest extent practicable, excluding events of forest health emergencies or natural

catastrophes. This will create a "checkerboard" landscape that provides wildlife with many more opportunities for forage and cover. Pine stands, and other forest types, of differing successional stages provide habitat for a wider variety of wildlife species and better accommodate the various life stages of those species (Harper 2015).

Create Edge Habitats

In addition, improvements to the harsh edges created by production timber, especially where adjacent to pastures and other open lands, is recommended for all planted pine blocks, but particularly where immediately adjacent to important habitat areas, such as the Pasture Preserve. Edge habitats are commonly used for nesting, feeding, and traveling. Changes to the structure of pine plantation edges alone would add hundreds of acres of improved wildlife habitat. Creating plantations with irregular shapes can add significant acres of edge habitat. When implemented successfully, these simple changes can have a profound effect on site usability for a variety of species (Allen et al. 1996).

The objective for forest edge improvements is to increase the available food and cover by providing a variety of vegetation types and structures (Brittingham 1998). In general, a 50 foot buffered "edge" should be in place between pine plantations and any opening or change in habitat type, including roads and firebreaks. This will allow for softer edges that create escape cover in brush, tall grasses, and early successional shrubs for wildlife (Harper 2015). If the plantation is already in place, this buffer can be created by heavily thinning a 50 foot wide zone inside of the planted pine. By creating this buffer zone, additional sunlight becomes available along road surfaces and firebreaks, increasing the cover of grasses and other herbaceous vegetation available for wildlife forage. The increase in herbaceous structure will also attract more insects, another important food source for many wildlife species (Mercker, 2009).

Apply Applicable Sustainable Forestry Initiatives

These changes can be implemented even in high yield timber production areas to improve usability for wildlife. The sustainable forestry initiative (SFI), an internationally recognized program that promotes sustainable forestry practices through the use of principles designed to protect "water quality, biodiversity, wildlife habitat, species at risk, and forests with exceptional conservation value," emphasizes the importance of managing forestry operations with the conservation of biological diversity in mind (Sustainable Forestry Initiative, Inc, 2015). The suggested practices identified for enhancing wildlife use in CB/AB plantations align with the most important aspects of SFI's 4th objective, conservation of biological diversity: "Manage the quality and distribution of wildlife habitats and contribute to the conservation of biological diversity by developing and implementing stand- and landscape-level measures that promote a diversity of types of habitat and successional stages, and the conservation of forest plants and animals" (Sustainable Forestry Initiative, Inc, 2015).

4.7 Wetlands

There are a little over 2,000 acres of wetlands on CB/AB of varying types, mainly freshwater marshes and wet prairies that together account for approximately 1,750 acres. An additional ~195 acres consists of mostly cypress-dominated forested wetlands. The following provides recommendations for addressing site-wide wetlands management, per Long-Term Goals 1, 4, 5 and 6, in the short-term, and ultimately Goals 7 and 10.

4.7.1 Wetland Monitoring Program

An ongoing monitoring and maintenance program is essential for tracking the conditions and potential management needs for these native systems. This program should begin by conducting a baseline evaluation of all onsite wetlands to determine current conditions, identify management and restoration needs, and prioritize management actions. Photo stations may be established in select locations to assist with tracking changes over time. The baseline evaluations should consist of general qualitative observations regarding edge structure, density and locations of nuisance and exotic species, interior species diversity, hydrologic regime, wildlife usage, effect of adjacent land uses, and overall wetland health. The product will be maps depicting the individual wetland community type and locations of areas to be addressed. The success of subsequent restoration and maintenance activities can then be readily evaluated and compared to the baseline condition to guide future management.

Following the baseline event, wetland monitoring is recommended to take place quarterly, such that overall conditions of each wetland area can be evaluated at least annually. The timing for visiting each individual wetland may depend on the season, the use by wildlife for nesting or breeding, or the need to follow up on previous management actions. These will consist of qualitative assessments to document hydrology, vegetation composition, presence of nuisance/exotic species, wildlife utilization, and the need for maintenance. These regular assessments will guide maintenance, including herbicide applications, and provide direction on specific locations, target species for control, and the need for burning or other actions. Such monitoring ensures the most effective and efficient maintenance will occur where and when needed.

A good indicator of successful management is the continued, and potential increase of sandhill crane (SHC) pairs nesting on CB/AB. A component of wetland and wildlife monitoring should include an annual aerial survey to determine the number and locations of SHC nests throughout CB/AB, commencing in early March 2020. Surveys conducted by two qualified ecologists via helicopter is the most effective and efficient way to cover all potential nest sites and readily detect recent and previous year nests. The first event will serve as a baseline, with subsequent surveys to quantify any annual changes that may gauge successful management strategies or indicate the need for adaptive management. It is also important to document the locations of nest sites in order to prioritize wetland management, such that nest wetlands may be provided priority attention. Nesting survey results will also assist in ensuring activities in the

vicinity of nest sites follow established guidelines. Forestry and Agricultural BMP's call for avoiding heavy equipment operation (except prescribed burning and related activities) within 400 feet of active, known, and visibly apparent SHC nests from February to May.

Aerial surveys are most effective since SHC nests are difficult to spot from the ground as they generally occur on the interior of wetlands, and by design are hidden by wetland vegetation. SHC nest surveys are best accomplished via aerial monitoring transects covering 100% of the suitable nesting habitat at higher altitudes (500-700') but greater than 250 feet to prevent disturbance (Stys 1997). Three surveys spaced at least 3 weeks apart during the breeding season should occur until nests are identified, with early March, early April, and early May being ideal, per the Florida Sandhill Crane Species Conservation Measures and Permitting Guidelines (FWC 2016).

4.7.2 General Wetland Management Recommendations

Detailed management actions tailored for specific wetlands will be prepared once the above baseline evaluation has been completed. In general, however, the following management recommendations apply to wetlands across the site.

Most of the wetlands on CB/AB are in good ecological condition with distinct assemblages of native vegetation occurring in appropriate locations and densities. However, the ongoing mowing of wetland edges and ecotones (i.e., the wetland/upland interface) and the lack of ongoing, appropriate management has resulted in an increase in unhealthy edge compositions and disturbed ecotones in many areas. As the interior of most wetlands are in good condition, management actions at this time should focus on improving edge structure. Many of the forested wetland edges are encroached with nuisance and exotic species including Caesarweed *(Urena lobata)*, skunk vine, *(Paederia foetida)*, camphor tree *(Cinnamomum camphora)*, primrose willow *(Ludwigia peruviana)*, and Chinese tallow *(Triadica sebifera).* Fire exclusion has facilitated the encroachment of hardwood shrubs and trees into many of the marshes and herbaceous wetland edges. Long-term fire exclusion can lead to the invasion and eventual replacement of herbaceous marsh vegetation by shrubs, thus altering wildlife food chain dynamics, water flow, and evapotranspiration rates leading to a decrease in overall biodiversity within marsh systems (Miller et al. 1998). Improving the current edge conditions through the use of nuisance and exotic vegetation control and the introduction of prescribed fire will reduce woody vegetation encroachment and substantially increase wetland values for wildlife, especially Florida sandhill cranes. As an umbrella species for wetland health and one of the CB/AB target species, management of wetland habitats to promote success by sandhill cranes should be a priority.

Florida sandhill cranes depend on open habitats including freshwater marshes, prairies, and improved pastures for nesting, roosting, and foraging. Their preferred nesting and roosting habitat consist of open marshes where most of the vegetation is less than 50 cm (20 in) high (FWC 2016). The encroachment of shrubs and trees around herbaceous wetlands on CB/AB reduces the amount of desirable habitat for

these activities. SHC nesting success also declines in wetlands where the forested or shrubby edge becomes dense and overgrown. Wetlands in these conditions can be avoided by SHC as they reduce visibility from the nest site and increase opportunities and cover for predators.

Whooping cranes have occasionally been observed on CB/AB, and one pair nested in Al Bar Wetland 4A (AB-4A) in 2008. Two recent observations in AL Bar Wetland 6 (AB-6) include a pair and a pair with an unconfirmed juvenile in late May and early June 2019. These sightings are significant due to the rarity of the species, the specific habitat needs, and their known sensitivity to human disturbance (Caven, et al. 2019). This underscores the need for sound management and cessation of unnecessary practices such as mowing and disking wetland edges. It is not uncommon for whooping cranes to interact with and even have an affinity for the much more common sandhill crane. There has even been one documented occurrence of the two species mating and nesting together in 2003, but the nest was a failure (Folk et. al. 2008). The similarity in habitat preferences indicates that managing for one species can result in positive impacts for the other. The important wetland management activities that take place on CB/AB for sandhill cranes will also have the potential to benefit whooping cranes.

Prescribed Fire

The most beneficial management tool for controlling wetland edge structure is prescribed fire. According to FWC (2016) the loss of natural fire regimes in both upland and wetland plant communities across the Florida landscape can hamper the nesting success of SHC. Mowing around select wetland edges has previously occurred, however is not recommended. Mowing does not serve to reduce the height or density of existing early successional shrubby species that encroach upon herbaceous wetland edges and can cause soil rutting and damage to desirable herbaceous species. In addition, FDACS BMPs (2014, 2015) call for avoiding heavy equipment operation (except prescribed burning and related activities) within 400 feet of SHC nests from February to May. Prescribed fire is the preferred management tool and will serve to restore and maintain the open expanses within and around these wetlands. If needed, burn lines can be established in the adjacent uplands, and prescribed fire ignited in the uplands should carry into the ecotone and upper wetland fringes. Over time with repeated burns, tall successional species that have become established along the ecotone and wetland fringes should decrease in height and cover. A 1-4-year fire return interval for the wetland fringes and associated ecotones is recommended.

Required management within wetlands also includes the chemical control of nuisance and exotic vegetation, using the appropriate timing and application methods. Not only do these invasive species displace native vegetation and decrease diversity, but they produce less desirable forage for native wildlife, and can alter the structure of the wetland entirely. Recommended maintenance involves herbicide treatments of select areas using chemicals approved for aquatic use under supervision from a state licensed applicator. The frequency, timing, and site-specific locations for application events should be based on the results of the wetland monitoring program to be implemented for all CB/AB wetlands.

Protect Ecotones

Current and previous management prescriptions have called for the disking of firebreaks along wetland/upland ecotones as often as 3 times per year. This frequency is not only unnecessary for typical fire line maintenance but disturbs a very important part of the ecosystem. To protect and retain these important ecotones and provide the natural fire ecology required when maintaining natural wetlands, abandonment of disked fire breaks that currently encroach on or are immediately adjacent to wetland systems is necessary (Noss, 2018). Allowing selected fire breaks around wetland edges to regenerate naturally from adjacent seed sources should restore continuous fuels so that the extent of prescribed burns can be determined by natural conditions, such as wetland hydroperiod, soil productivity, and day-of-burn-weather conditions. Facilitating the return of fire through wetlands and into wetland edges according to natural fire breaks will effectively reduce inappropriate shrub and hardwood encroachment, as well as fuel loads; stimulate germination of fire-dependent plants; and improve desirable habitat for SHC and other plant and animal species that thrive within, migrate across, or otherwise depend upon ecotones of ephemeral and/or perennial wetlands during critical portions of their life cycles (Gorman et al, 2009; Bishop and Haas, 2005; Palis, 1997). This is particularly true of anuran species, including the gopher frog *(Rana capito)*, Pinewoods tree frog *(Hyla femoralis)* and several species of native toads: eastern spadefoot toad *(Gastrophryne carolinensis)*, southern toad *(Bufo terrestris)*, oak toad *(Bufo quercicus)*, and eastern narrowmouthed toad *(Scaphiopus holbrooki holbrooki)* (Rittenhouse and Semlitsch, 2007). All of these species breed in wetlands but live primarily in adjacent upland habitats, and the ability to access through natural ecotones is essential. Additionally, in wetlands with sufficient hydroperiod to support aquatic turtles such as cooters (*Chrysemys* spp.), mud turtle (*Kinosternon subrubrum*), and Florida softshell (*Trionyx ferox*), disking of firebreaks in the ecotone likely increases mortality for these species by crushing or exposing eggs laid in shallow nests in upland soils adjacent to the wetlands. At a minimum, breeding season for these species must be considered when conducting work within ecotones and adjacent uplands.

The expense of mechanical treatments, such as mowing and disking, should also be considered, in addition to the ecological costs which often include soil disturbance and compaction, increases in non-native plants (e.g. cogongrass) and animals (e.g. fire ants) and impacts on native ground-or shrub-dwelling animals (Noss, 2018). Natural regeneration within these areas will reduce these impacts and the need for increased nuisance/exotic species control.

Specific fire breaks proposed for regeneration will be identified during the baseline assessment event of the wetland monitoring program.

4.8 Nuisance and Exotic Species Management

4.8.1 Nuisance and Exotic Vegetation Management

As discussed in Section 3, the most prevalent n/e species observed on site is cogongrass *(Imperata cylindrica)*, which occurs throughout, including within pastures and pine plantations. Additional invasive vegetation frequently observed includes: torpedo grass *(Panicum repens)*, Caesarweed *(Urena lobata)*, skunk vine, *(Paederia foetida)*, smut grass *(Sporobolus indicus)*, tropical soda apple *(Solanum viarum)*, and camphor tree *(Cinnamomum camphora)*. Other less prevalent or problematic n/e species that have been observed include China berry *(Melia azedarach)*, cattail *(Typha sp.)*, Japanese climbing fern *(Lygodium japonicum)*, Chinese tallow *(Triadica sebifera)*, and Peruvian primrose willow *(Ludwigia peruviana)*.

Treatments for all nuisance and exotic vegetation is recommended to occur on an as needed basis to address infestations as they are observed, or as application methods dictate by species. In general, an overall maintenance program should include documentation of FLEPCC species locations and treatment dates. Many of these species are persistent and will require repeated visits to eradicate. Follow-up visits will also be necessary to account for fallen seed, even after successfully treating an area. Treatments for herbaceous vegetation including cogongrass, torpedograss, natalgrass, smutgrass, skunk vine, and Japanese climbing fern should consist of applying a 2% mixture of rodeo™, a glyphosate based herbicide, and a .5% mixture of a surfactant such as induce™ in a foliar spray. Extra care should be taken to avoid spray drift and applications should not occur with wind conditions greater than 10 miles per hour. Where small patches are encountered, backpack sprayers should be used to avoid collateral damage to desirable species. For large concentrations, burning the infestation through the use of prescribed fire prior to application has been shown to be effective. The burn can remove standing dead matter and the new growth in some cases may be more receptive to the herbicide (Richardson 2013).

For Caesarweed and other woody groundcover species, as well as seedlings of trees including China berry, Chinese tallow, camphor tree, and other n/e trees in upland communities, a 3% mixture of an approved Tryclopyr amine (water soluble) chemical, and a 0.5% mixture of an approved non-ionic, low foam surfactant should be applied with spot treatments in a foliar spray using the same methods described above. Depending on the size of individuals, applicators should employ varying treatment methods. While foliar spray can be effective for seedlings, it is often not sufficient for larger specimens. Saplings can be treated with the basal bark method by mixing a Tryclopyr ester (oil soluble) chemical, with an oil surfactant penetrating basal oil to produce a mixture of Tryclopyr ester at the rate recommended by the penetrant's label. This solution is then applied to the base of the tree to cover 360 degrees of the bottom 6" of the trunk. For mature trees, and saplings as desired, the cut stump method, or a girdle technique should be used. This requires the use of a chainsaw or machete to either cut the tree down, leaving only the stump, or to expose the cambium in 360 degrees around the base. The same solution should then be applied directly to the exposed cambium.

It is important to note that Tryclopyr ester is toxic to fish and other aquatic wildlife and should not be used within any wetlands or within 1000 feet of a wetland edge. When working within 1000 feet of a wetland, an approved Tryclopyr amine solution should be used for woody species control. No Trycoplyr solution should be applied in standing water. When working within standing water, wetlands, or sensitive habitats, it is advised that a 100% solution of a Glyphosate based herbicide approved for aquatic use is applied in place of Tryclopyr for tree removal. When Glyphosate is used to control trees, the cut stump method should be employed. Glyphosate will not be effective for basal bark treatments or girdling. Applications should only occur with winds less than 10 miles per hour in order to limit spray drift, and all instructions for mixing rates, application techniques, and other directions for use (as identified on the herbicide label) should be followed.

Former control methods that include the use of herbicides containing Imazypyr are not suggested in natural areas. Unlike Glyphosate products, chemicals containing Imazapyr remain active in the soil and increase the potential to kill or injure sensitive non-target species, including trees, with roots in the treatment area (Miller and Enloe 2009). Additionally, former control methods such as mowing for smutgrass control have been proven to be ineffective, “Mowing decreases the diameter of the clumps, but often results in increased density” (Sellers et. al. 2018). Smutgrass should be treated with spot applications of “Rodeo™” in all natural areas. The use of herbicides that are toxic to aquatic wildlife including Hexazinone based chemicals such as Velpar™ as well as “Grazon™,” another Tryclopyr based herbicide, can continue in upland agricultural areas not designated for habitat management and greater than 1000 feet from any wetland edge. Applicators must continue to work proactively in advance with TBW and PCU to ensure herbicide application is conducted in cooperation with TBW and in conformance with their mandated 1000’ buffer zones to protect the site’s water supply. Also note that the use of pesticides, insecticides, and/or herbicides near active burrowing owl burrows should be avoided, especially during the nesting season.

Previous management plans for CB/AB called specifically for treatment of cattail within wetlands. Cattail, includes both native and non-native species, and both are often referred to collectively as a nuisance species. Although observed throughout CB/AB, it typically occurs as sparse coverage in many of the augmented wetlands, and along the edges of lakes and deep marshes. Cattail provides good nesting habitat for a variety of songbirds and wading birds and can be efficient in absorbing pollutants and heavy loads of nutrients that could otherwise be harmful to wetlands, resulting in improved water quality. Cattail presence in and of itself should not automatically be considered problematic unless large monocultures are formed that prevent the growth and success of a more diverse assemblage of wetland vegetation. Particularly where cattail coverage is low, herbicide treatments can also result in collateral damage to desirable wetland vegetation. Such damage can then provide opportunities for invasive and non-native species to establish. In addition, potential disturbance to nesting avian species and other wetland dependent wildlife should be considered, and the timing and methods of any treatment deemed necessary should be adjusted accordingly.

To date, only one monoculture of cattail has been observed on the property, located in Al Bar's Wetland 6. Although this monoculture is likely out-competing other desirable wetland species, treatment is not recommended at this time due to the potential for collateral damage to existing wildlife and desirable wetland vegetation. Overall, coverage of cattail throughout CB/AB is low, and the cost and effort associated with treatment could be better spent on the more problematic invasive exotic species observed on this site. Control of cattail is not a requirement of the Water Use Permit (WUP), and unless future monitoring reveals otherwise, it is recommended that regular maintenance events to specifically target cattail be discontinued.

Along with regularly scheduled treatments for known n/e species and locations, care should be taken to prevent dispersing these and other problematic species across CB/AB. Vehicles and heavy equipment are two of the most common anthropogenic vectors for the spread of nuisance exotic vegetation. Seeds and fragmented plant pieces are commonly collected and unintentionally transported by equipment and vehicles from other sites. This is a generally acknowledged issue in the conversation on nuisance and exotic plant dispersal, but there are preventative measures that can be taken to minimize these effects. All equipment including tractors and their implements (disks, mowing decks, cultivators, scrapers, blades, hay equipment, and others); heavy equipment including bulldozers, excavators, skidsteers, and mulchers; and forestry equipment including loaders, feller bunchers, skidders, etc. should be thoroughly cleaned prior to entry onto CB/AB to remove all dirt, mud, dust, seeds, and vegetation that has collected on the units. Additionally, any trailers or vehicles used to transport this equipment onto the property should also be cleaned prior to entry. Simply ensuring that this equipment is cleaned upon arrival will limit the influx of new invasive and exotic species to CB/AB habitats.

Similarly, vehicles and equipment used internally on CB/AB should also be cleaned to remove all dirt, mud, dust, seeds, and vegetation monthly as well as immediately following use in locations where nuisance exotic presence is known. This will limit the spread of these species throughout the property. Care should also be taken to limit unnecessary soil disturbance on CB/AB including excessive disking that creates disturbed soil for nuisance exotic species colonization. There are approximately 427 acres of fire breaks, disked 3 times per year on CB/AB. Disking and other soil disturbing activities break up existing vegetation communities and expose fresh soil. This fresh soil easily accepts new seed and can quickly become overrun with nuisance exotic vegetation. Due to their quick, invasive growth habits, these species colonize the soil rapidly, preventing germination by many native species. Soil disturbance, specifically disking, is necessary on CB/AB in many places, however a full evaluation of all disked areas should be conducted. Many disked locations including wetland edges and road sides are unnecessary. This creates avoidable risk, disturbs native habitats and ecotones and takes away budgetary resources from other more worthwhile activities. A site evaluation of fire breaks will reveal that many can be left to regenerate and the frequency of necessary disking locations can be reduced.

4.8.1.1 N/E Vegetation Monitoring Program

To evaluate the effectiveness of herbicide treatments for all FLEPPC species, a Monitoring Program should be established. This will not only track improvements through time but will allow for adjustments to application techniques when ineffective. A state licensed applicator and/or qualified restoration ecologist should conduct this monitoring to help guide the onsite crews and land managers performing the treatments. This is recommended to occur throughout the site semi-annually and may overlap with and/or occur concurrently with other monitoring programs recommended for the site. The inspector will visit the majority of known problem areas to determine herbicide success rates. The information generated during each monitoring event will include an evaluation of the effects of herbicide treatments and other management activities, locations of problem areas observed, and recommendations for any adaptive management.

4.8.2 N/E Wildlife

White-tailed Deer

White-tailed deer *(Odocoileus virginianus)* are prevalent throughout CB/AB in potentially problematic densities, as during an FWC site visit, the observation of heavy deer browse indicated “moderate to high density” (Attachment 1). Generally, when deer exceed 15 to 20 per square mile, ecosystems begin to degrade (Revkin 2002). Heavy deer browse can stunt the growth of native plants and can open up areas for nuisance and exotic species to take hold. Deer will often avoid consuming non-native plants thereby increasing their coverage and simultaneously decreasing coverage by native desirable species. This overgrazing can also remove entire habitats and niches depended upon by low nesting species (Revkin 2002). Deer, as with any species, have a healthy ecological population size that once exceeded, can have detrimental effects to both the habitat and the species itself.

An annual comprehensive night-time population analysis that takes place across a period of several days is recommended to more accurately determine deer populations on CB/AB. An annual population analysis will help to track changes in the population size and will encourage informed management decisions to keep deer populations at ecologically sustainable levels. Until we have more detailed information about the population size and characteristics including individuals per square mile, buck to doe ratio, and fawn to doe ratio, any management suggestions would be premature.

Wild Hogs

The property also supports a large number of exotic wild hogs *(Sus scrofa)*. Hogs enjoy hard mast like acorns, often competing with native wildlife, but have also been known to consume nests and young of ground nesting birds and reptiles (Guiliano and Tanner 2008). Soil disturbance from their constant rooting is another major issue created by wild hog populations. Hogs root through the top layer of soil in

search of food, resulting in often large expanses of upturned soil which can then be colonized by fast growing nuisance and exotic vegetation species.

In good habitat such that on CB/AB, it is unlikely that any amount of hunting or other population control will eradicate populations of hogs but using a combination of methods on a continual basis can prevent further population expansion (Guiliano and Tanner 2008). Currently, between 5 and 10 hogs are trapped or shot on CB/AB monthly. Continual baiting of corral type live traps will increase these numbers and further limit population growth. Traps should be baited several days before trapping begins with the door locked open. This will allow hogs time to find the bait and to become accustomed to entering the trap, increasing the odds of capturing many individuals at one time. It may take several days for hogs to begin coming to the bait but once they start visiting the trap, bait should be replaced daily and enough bait should be supplied to keep the hogs from moving on to areas with more food. Baits can include corn, oat, or barley soaked in water (this decreases interest from non-target wildlife such as deer) vegetables, or livestock feed (Guiliano and Tanner 2008). By strategically adding more and relocating corral traps as hog concentrations move, the effectiveness of hog control on the property may be increased.

Adjacent property owners reportedly breeding and releasing hogs adds to the continued influx on CB/AB, making control more difficult. Hog deterrent fencing along portions of the property boundary is somewhat effective in controlling ingress to the site (C. Barthle, pers. comm.), however this low to the ground fencing creates a substantial barrier to other wildlife moving through the area. As observed in the past by Peacock and recently by Quest personnel, numerous turtles and gopher tortoises have been caught, and several killed at this fence, and the impact to movement of deer, alligators, wild turkey, and sandhill cranes has been observed. It is recommended that this fence be removed in particularly sensitive habitat areas, including adjacent to SHC nest wetlands. At a minimum, additional “wildlife crossing” openings should be placed strategically along the fencing.

Coyotes

Coyotes *(Canis latrans)*, although sometimes considered a nuisance species, can play an important role in natural systems. As an apex predator, coyotes can contribute to the reduction and control of both wild hogs and white-tailed deer. For this reason, along with the documented scientific evidence that killing or removing coyotes is largely unsuccessful, lethal control measures are not recommended. Studies have revealed that lethal means are ineffective, expensive and futile (McCown, 2007). According to the FWC, when new coyotes move into the area where others have been removed, the pack may start reproducing at a younger age and the offspring are more likely to survive (FWC, 2019). This causes populations to bounce back quickly and often exceed its previous size.

Several studies out of the University of Nebraska have shown the effectiveness donkeys can have on controlling canids impacting herds. Most of these examples are in relation to donkeys protecting sheep

herds, primarily because coyotes have a much higher success rate with adult and young sheep. However, in theory and anecdotally, donkeys could also be helpful with protecting cattle operations. Donkeys have a natural dislike for canids, and have been documented for years defending against, chasing, and attacking coyotes and feral dogs (Andelt, 2004). In a study conducted in Texas, 40% of farmers rated the use of donkeys to protect goat and sheep herds as excellent, good, or fair.

From a management standpoint, the removal of coyotes may cause populations of deer and hogs to increase, further adding to the existing problem of overpopulation and overgrazing. Lethal control of coyotes on CB/AB is therefore not recommended and should be limited to only specific individuals that are known to prey on calves.

4.9 Other/Target Species

The above management actions will have a profound effect on a wide range of additional native species, including CB/AB focus species and other protected as well as non-listed species.

A number of grassland/savannah dependent avian species and woodland passerines have been identified throughout CB/AB habitats. Many of these are considered common, however others, although not listed as endangered or threatened, have been identified as rare, declining, or imperiled, including: eastern meadowlark (*Sturnella magna*), loggerhead shrike (*Lanius ludovicianusI*), eastern bluebird (*Sialia sialis*), Northern bobwhite (*Colinus virginianus*), killdeer (*Charadrius vociferous*), woodpecker species, wild turkey (*Meleagris gallopavo),* migrant upland plovers and sandpipers, resident and migrant sparrows, resident and migrant raptors (including eagles, hawks, falcons, kites, and owls), black and turkey vultures.

As discussed in previous sections, many reptile and amphibian species are also expected to respond well to improved habitat management, such as the eastern indigo snake, pine snake, and gopher frog.

Additional actions to benefit other CB/AB target species, the gopher tortoise and southeastern American kestrel, are discussed below.

Gopher Tortoise

The management actions recommended will provide additional habitat for the gopher tortoises, by reducing canopy and encouraging establishment of ground cover vegetation. In addition, several restoration areas within CB/AB provide potential opportunities to establish a gopher tortoise recipient site, which, in addition to increasing densities of this important keystone species, could also provide revenue generating opportunities for PCU. These include the Longleaf Pine restoration areas discussed above, the higher elevation portions of the pine plantation within the FSJMA proposed for restoration, and possibly portions of the Pasture Preserve. The areas of previously closed canopies where gopher

tortoise burrow densities tend to be low due to inadequate ground cover will provide excellent native forage habitat following restoration. Gopher tortoise reintroduction to these habitats could be a viable option.

Prior to applying for a recipient site permit, a baseline gopher tortoise burrow and vegetation survey of the proposed recipient site will need to be completed in order to determine the baseline density. Vegetation and soil conditions that are most suitable for tortoises will yield a higher recipient density per acre. The FWC has created thresholds for "acceptable" and "desirable" tortoise habitat in recipient sites, which is where all future efforts for potential recipient sites should focus.

Management of approved recipient sites will be required in order to provide assurance that the site will continue to be suitable for gopher tortoises in perpetuity. Per FWC requirements, a management plan will need to include practices and measures to keep canopy cover below 60% and groundcover above 30%. Existing and proposed land uses will need to be defined and described in order to demonstrate that activities will not inhibit the ability of tortoises to use the site. If livestock are proposed within the recipient site, grazing parameters and a grazing plan will need to be developed which is compatible with gopher tortoises. A cost estimate of all proposed habitat management activities must be developed, and financial assurances must be provided to demonstrate that adequate funding will be available to implement the plan. Once a recipient site is permitted, a long-term monitoring and reporting program would need to be implemented for the life of the permit. Monitoring will be implemented in phases and will need to include gopher tortoise burrow and vegetation surveys.

Additional surveys and investigations into the feasibility of a recipient site on CB/AB will be necessary following restoration and management of potentially suitable areas.

Southeastern American Kestrel

Habitat research of the Southeastern American kestrel (SEAK) has shown that these small falcons favor managed sandhill longleaf-turkey oak habitats but are typically found to be associated with a medium to low density natural pine stands with native ground cover or exotic turfgrass species dominating the ground cover. A low density or no subcanopy is preferred. Historically, open pine savannahs were the preferred foraging habitats. However, with the development and conversion of these native habitats, some kestrels have adapted to forage in similar man-made open habitat where grasses are dominant, and trees and shrubs are infrequent. Grazed pastureland, mowed hayfields and other mowed areas such as road-way-right of ways, dry retention ponds, and public parks and ball fields all have been documented as being utilized by kestrels as foraging areas. Some kestrels have also adapted to foraging in other man-made fallow areas, such as powerline corridors and young silviculture stands (Smallwood, 1987). Based on these habitat preferences, and observations to date, current agricultural activities at CB/AB do not appear to be negatively affecting the SEAK. The proposed restoration of sandhill and pine

habitats and management of the Pasture Preserve areas for grassland species will also be of great benefit to ensuring continued and expanded use by kestrels.

The SEAK is a secondary cavity nester, meaning they rely on a primary cavity nester, primarily woodpeckers, to provide their nest cavity; factors limiting population size appears to be loss of nesting snags (Rodgers et al., 1996). Due to the threatened status of this species, and the compatibility of the kestrel habitat requirements with current and proposed CB/AB land uses, ongoing management should include enhancing and maximizing the number of kestrel nest boxes at CB/AB.

The SEAK nest box program will include the maintenance of existing nest boxes and installation of additional boxes in properly sited locations throughout the property. Proposed new box locations have been chosen based on observations of kestrels in areas where nest boxes are currently absent (**Figure 4-8, Proposed Nest Box Locations**). The habitats in these areas generally consist of open, nearly treeless areas with short grasses and open herbaceous wetlands.

Annual nest box maintenance should be conducted in November – December to confirm whether the box is still structurally sound for the upcoming breeding season, and rotten pieces or the entire box are replaced. The previous year's nest material and accumulated matter that attract mites, lice, or other insects and may have a negative effect on the adults or nestlings should be removed annually. Wood shavings are added because kestrels do not collect nesting material, and the wood shavings prevent the eggs from rolling around on the flat floor of the nest box during incubation.

Following restoration and management of habitats throughout CB/AB, it's anticipated that additional opportunities for nest boxes will become available. Annual summer surveys are recommended to identify kestrel sightings in locations where the habitat will remain suitable. Additional nest boxes may then be installed in the fall and early winter to be used for nesting opportunities the following breeding season (March – June). The nest boxes are sometimes utilized by the resident kestrels as nightly roosting locations in the non-breeding season, and often also support additional native species such as screech owls and flycatchers.

Establishing a regular monitoring program to monitor the use of nest boxes during the breeding season is recommended. As part of FWC's Species Action Plan for the southeastern American kestrel, data regarding locations and nesting demographics are being requested to allow the agency and land managers to make better conservation decisions. Nest box monitoring consists of using a "peeper" camera on an extension pole to peep the box and determine dates of nesting, clutch size, number of chicks and fledgling success. This monitoring occurs several times during the breeding season; the timing depends on the number of boxes ultimately used by kestrels and whether re-nesting occurs. A program to capture and band nestlings would ultimately be ideal, as dispersal data for juveniles is currently lacking. Particularly if the proposed native forest restoration program occurs on CB/AB, the ability to

band and track the response of threatened species such as the SEAK, which is known to historically rely on these habitats would be ideal.

4.10 Additional/Future Land Uses

Land uses and activities that may be proposed in the future for CB/AB, whether revenue generating, conversions of existing uses, or more intensive agricultural practices, must take into consideration the impact on wildlife, habitats, restoration programs, and the ability to effectively manage the property and ecosystem. Any such proposed activity or changes needs to be evaluated for compatibility with the County's Management Requirements, and the EMP's stated long-term goals. It is anticipated that any number of land use changes or revenue generating actions may be proposed or requested for consideration in the future, and a plan for vetting each for compatibility and requiring measures to offset adverse impacts is recommended. This will be further developed as these situations arise.

4.10.1 Palmetto Berry Harvesting

Select areas on CB/AB have been designated for the harvest of saw palmetto berries (**Figure 4-9, Proposed Palmetto Berry Harvest Areas 2019**). Combined, this consists of 1,555 acres, and the first harvest took place in August 2019. Although the outcome of this harvest will need to be evaluated and incorporated into the EMP to cover future plans, it is highly recommended that maximum harvest quotas be established; methods, areas and access be carefully designated; and oversight of harvesting crews be conducted.

In June 2018 saw palmetto was added to the Florida Department of Agriculture and Consumer Services (FDACS) commercially exploited plants list. Commercially exploited plants are species determined to be at risk by the Florida Endangered Plant Advisory Council due to removal in significant numbers from natural habitats in the state and sold or transported for sale.

Saw palmetto is recognized as a vital ecological component for numerous native wildlife species in Florida ecosystems with well over 100 animal species utilizing its fibers, berries, and dense cover for nesting, forage, and protection (Carrington and Mullahey 2006; Maehr and Layne 1996). Many species on CB/AB including gopher tortoises, raccoons, white-tailed deer, wild turkeys, bobwhite quail, box turtles, a variety of song birds, and even fish and waterfowl depend on saw palmetto berries that are rich with crude fiber, potassium, fats, sodium and ash (Hale 1898; Liu et al. 2004; Abrahamson and Abrahamson 1989; Maehr and Layne 1996; Martin et al. 1951). Burrowing owls occasionally excavate burrows in saw palmetto patches and the flowers attract hundreds of species of pollinators (Mrykalo et al. 2007; Carrington et al. 2003).

Because of the importance of this food source for many wildlife species, palmetto berry harvesting is recommended to be limited or highly regulated, if not excluded entirely from areas that are specifically

designated for conservation, such as the FSJMA. To minimize impacts, harvest recommendations have included harvesting no more than 10% of any single plant's reproductive output and no more than 10% of the population's reproductive output in a single season (Menges et al. 2004). For palmetto berry harvests at Duette Preserve in Manatee County, land managers follow the Center for Plant Conservation Guidelines (https://saveplants.org/wp-content/uploads/2019/05/CPC-Best-Practices-5.22.2019.pdf) by harvesting no more than 10% of their collection area to ensure sustainable harvesting (M. Elswick, pers. comm, 2019). Keeping harvests at or below 10% can be sustainable for many years, but climate and population changes can influence the intensity and frequency of safe collection (Center for Plant Conservation 2019). Harvest schedules and plans should be adaptable and should take into account the changes and needs of CB/AB's wildlife and other land uses.

As a designated commercially exploited species, a Native Plant Harvesting Permit must be obtained from FDACS, with the permit application being submitted 14 days prior to the intended harvest date. A copy of this permit must always be present during harvest and transport.

Many factors including the time since fire, season of fire, drought, flooding, and hurricanes affect the crop load; and harvest timing is important to ensure that berries are ripe when picked, as berry values are less when picked before they are ripe. According to Carrington & Mullahay (2006), palmetto berry production is strongly correlated with the time since last growing season fire, with the maximum yield being approximately five (5) years after fire. Due to the historic fire suppression and winter burns on CB/AB, palmetto berry yield is estimated to be on the low side.

To avoid collateral damage to wildlife and sensitive habitats, crews should be supervised, access routes defined, and crews educated in the identification of protected species and the need to avoid impacts to native wildlife, including snakes. A post-harvest inspection of the site should be performed to determine whether secondary impacts have occurred, such as collapsed gopher tortoise burrows and damage to native vegetation caused by equipment and vehicles, trash left on the property, and other possible effects. This inspection will serve to provide information on how to plan for future harvests and what additional activities may be required to avoid collateral damage as needed.

4.11 Prescribed Fire Plan

The purpose of the fire management plan is to identify the current and desired ecological conditions, establish goals from a fire management perspective, and apply the principals of fire management as a tool to achieve the desired ecological goals. Understanding fire regimes to which our native species are adapted is fundamental to the development of any fire management plan. The following provides preliminary recommendations to serve as a guideline for achieving fire management goals; however, because fire application and fire behavior can vary for site specific ecosystems, the plan must include a mechanism for adaptive management so the plan can evolve and be adjusted where necessary. This adaptive management will be applied as land managers implement and monitor the effects of fire on

the landscape. Ultimately, the fire management plan needs to also consider issues outside the plan area, including the impacts the fire management plan may have on public roadways and private property.

Because of the preliminary nature of this EMP as an evolving document as site management proceeds and additional data are assimilated, the fire plan discussed below is intended to serve as a general overview based on assessments made to date, and not all inclusive of the specific management needs that will be made clearer in the future.

4.11.1 Fire Management Goals

Fire management goals have been established that focus on short term and long term goals. Short-term goals address the historic fire suppression that has occurred on CB/AB habitats, and the resulting loss of ecosystem function. Long-term goals address maintaining ecosystem diversity, function, and structure for the benefit of native flora and fauna.

Paramount to any prescribed fire program is to conduct the burn in a safe manner. This is primarily accomplished by having trained, experienced, and knowledgeable fire management personnel along with site specific planning and preparation. The Burn Boss must also possess knowledge of the habitats being burned and the primary objectives for each burn, whether to reduce accumulated fuels, reduce woody species composition, or stimulate seed germination.

The primary short-term burn goal for CB/AB habitats is to reduce successional vegetation. As discussed in previous sections, the suppression or exclusion of fire from CB/AB habitats has resulted in successional vegetation encroaching into both uplands and wetlands, resulting in overgrown conditions that are not conducive to maintaining biodiversity. The first few burns will be conducted to reduce the structure and composition of successional species. Continued burning of these areas using the proper fire return intervals will result in returning a more desirable structure and composition to both the upland and wetland ecosystems and will improve overall floral and faunal diversity.

In the long-term, burn goals are anticipated to generally include:

1) mimic natural pyrogenic processes,
2) enhance and sustain ecological diversity, and
3) reduce the risk of wildfire

1. Mimic natural pyrogenic processes

The goal of mimicking the natural process of fire will be addressed after the initial step of reducing successional vegetation and overgrowth has been accomplished. This will be achieved by varying fire frequency within the range of the fire return interval for a specific habitat; and by varying fire intensity,

fire technique and application, seasonal ignition, and weather. The resulting fire behaviors and effects can be expected to mimic the effects of a naturally ignited lighting strike burn. It is anticipated over time, once long unburned accumulated fuels are consumed, larger burn units will be achievable, further mimicking large naturally ignited fires that once moved over large areas prior to human initiated fire suppression efforts. Controlled burns may then also be conducted under a greater variety of parameters including fuel loads, weather conditions, and firing techniques. While there will always be limitations to the application of fire, to the extent possible, mimicking the timing, frequency, and intensity of natural burn conditions will be applied. Due to the scale of the property, and other land uses to consider, such as silviculture, the amount of acreage burned and left unburned in any given year or years will always be a consideration.

2. Enhance and sustain ecological diversity (floral and faunal)

Ecological diversity refers to both the floristic and wildlife composition and can be maximized where fire regimes are appropriately managed and maintained. Fire maintained habitats typically support higher floral and faunal diversity, and species richness than in long unburned habitats. Maintaining diversity helps to sustain and preserve rare and protected species as well as the more common species. Mimicking the natural and varying occurrence of fire will help to enhance and sustain the ecological diversity of CB/AB habitats in the long-term.

3. Reduce the risk of wildfire

Lightning strike fires are more difficult to control and are unplanned, thus posing a hazard to ecosystems, wildlife, and humans. Long unburned habitats present the highest risk of wildfire from either naturally ignited lightning strikes or from accidental or purposeful fire set by humans. Both of these scenarios can seriously affect ecological diversity, as unplanned wildfires within heavy fuel loads can have catastrophic and long-term effects on the flora, fauna, and soil characteristics. In addition, impacts to habitats from Florida Forest Service (FFS) wildfire suppression activities (use of a bulldozer pulling a fire plow) can have long term unwanted effects on vegetation communities, and will have short term effects on future prescribed fire management. Implementation of a burn plan, with burn goals that include the application of prescribed fire can help to direct and mitigate wildfire impacts, while retaining and enhancing the existing ecological diversity and reducing risk to ecosystems, wildlife, forestry resources, and infrastructure. Not only does maintaining a prescribed fire management program help to reduce the risk of wildfire, but should a wildfire occur, the intensity, and severity is greatly reduced; the ability to control the wildfire is increased; the damage associated with FFS fire suppression is reduced, and ecosystem diversity is not compromised.

4.11.2 Prescribed Fire Planning

Fire Return Intervals

Fire return intervals are a range of years between fires that maintain ecological diversity, preferred vegetation structure, and allow a land manager the flexibility in the timing of applying fire and variations in firing techniques to achieve fire management goals.

Fire return intervals for habitat types throughout the state of Florida have been researched, and these general fire return intervals are accepted by land managers. The Florida Natural Areas Inventory (FNAI) describes 81 natural communities found in Florida. Fire plays a role in over 26 (32%) of these 81 communities. In some instances, the communities are considered "fire dependent", meaning that periodic fire is a vital ecological function for that community. In other communities where fire is less common, and combines with other ecological influences these are considered "fire influenced" (Saddler 2012) (Table 4-1).

It is recommended to use the fire return intervals identified by FNAI as a general guideline, until such time fire behavior, post-fire monitoring and vegetation sampling indicate otherwise. Fire return intervals during the short term may be more frequent than recommended in order to slowly reduce overgrowth or accumulated fuels from these long unburned, but fire dependent upland and wetland communities. Once fuel loads have been removed, more predicable fire return intervals will be identified and utilized.

Past fire history, existing fuels, and past land uses on a particular site can affect the fire return intervals initially when implementing a fire management plan. As such, each land manager, through observations and monitoring of the effects of prescribed fire, will fine tune site specific fire return intervals based on the vegetation/fuel types present within the targeted habitat types. Adjacent habitat fuel types as well as ground water table will play a role in identifying site specific fire return intervals.

It is not uncommon for multiple habitat types to exist within a given fire management unit, and where this occurs the dominant habitat type within the unit will dictate the fire return interval. Small embedded habitats, like freshwater marshes within pine flatwoods, will have a shorter fire return interval than the surrounding pine flatwoods; however, it is not expected that the diversity of these embedded habitats with shorter fire return intervals will be greatly compromised as long as the variation of the range of fire return intervals within dominant surrounding habitats is adhered to.

Initially, fire return intervals for specific burn units will be established for the sole purpose of understory reduction, and the intervals may be less frequent as fuels are slowly removed. The aim is to reduce mortality of mature pines, retain existing diversity of plant and wildlife species, and minimize impacts to soil characteristics. Post fire monitoring will assist in identifying when long accumulated fuel loads have been consumed. Monitoring will also serve to identify the changes in fuel structure and fuel types in

order to establish long-term site-specific fire return intervals that will sustain and enhance ecological diversity within the systems targeted for fire management.

Hardwood hammocks and forested wetlands are considered natural fire breaks, as these systems typically have long fire return intervals, low pyrogenic fuel loads, and high fuel moisture content. Utilization of these long fire return interval habitats as fire breaks will be dependent upon soil moisture and presence of standing water within these systems. As fuel reduction burns accomplish the goal of reducing accumulated fuels in targeted upland and wetland ecosystems, burn units may be adjusted for more effective and efficient management.

Burn Prescriptions and Post-Burn Monitoring

For each burn unit a prescribed fire burn prescription will be written utilizing the FFS formatted Prescribed Burn Plan (Prescription). Each burn will consider fire management goals, as well as fuel loads, weather, and fire and smoke sensitive areas when developing each prescription, specific to a burn unit or units. The prescription includes information about the governing/permitting Forest Service Supervisor, location of the burn, size and type of burn to be executed, habitat and purposes of the burn, fuel types to be burned, resources needed onsite to conduct the burn safely, precautions and fire/smoke sensitive areas surrounding the area to be burned, and the FFS/National Oceanic and Atmospheric Administration (NOAA) predicted fire weather. Included with each prescription are predicted smoke screening maps, site maps with the areas to be burned delineated, escape routes and safe zones identified for the burn crew, and water sources identified.

Prior to the implementation of any prescribed burn, the proposed burn unit and burn lines will be prepared. On the day of the burn these areas will be reviewed in the field with all burn crew members to identify any physical deficiencies that may allow for the prescribed burn to escape. Following the review of the burn unit, the Burn Manager will review the prescription with the burn crew and make sure that all crew members are clear on their tasks for the day and any questions or concerns are heard and discussed prior to conducting the burn.

The actual fire weather during each prescribed burn is typically recorded, as well as observed fire behavior. This information, as well as the recommended vegetation monitoring, will assist land managers in planning and implementing subsequent burns.

Post fire mapping will be necessary to document fire intensity, fuels reduction, and to record the areas burned. This mapping will be used to determine whether and where fire management goals are being achieved. Mapping will also help to identify where fuel loads are insufficient or sufficient to pass fire given the weather conditions in which the fire was initiated.

General vegetation monitoring will be necessary to track fuel height, composition, and structural changes over time, and will assist in determining if fire management goals are being met. The results of monitoring will also assist land managers in making any adaptive changes to the fire management plan. Establishing photo points are recommended to provide a visual reference and representation of changes that occur over time, primarily to vegetation composition and structure

Seasonality

Pine Flatwoods

Initial prescribed burns within pine flatwoods will occur during the cooler periods of the year outside of the growing season, typically between November and February, and when fuel and soil moisture is moderate. The short-term goal of debris and understory reduction in restored flatwoods under the above conditions will help to reduce impacts from pine crown scorch when branch cambium or buds are not actively growing. Having adequate fuel moisture and soil moisture will allow for the gradual reduction of accumulated ground fuels and will help to minimize consumption of surficial pine roots that likely are present within the duff layer at the base of mature pine trees. If too dry the duff could burn completely and cause tree mortality. For initial understory reduction burns, fire suppression equipment can be utilized the day of the burn to extinguish burning duff around the base of pines, thus mitigating the potential mortality of mature pines.

Based on the ground cover disturbance of the long leaf pine communities at CB/AB, it may take time for ground fuels to develop. Until ground fuels develop fire return interval at CB/AB may be from 2-5 years, until pine leaf litter and ground cover fuels have established and stabilized in cover and diversity. The most fire-exposed landscapes (long leaf pine) have natural fire-return intervals averaging from one to three years (Frost 2006). For the purpose of mimicking natural lightning fire regimes, and to encourage seed production by ground cover species and seed germination of long leaf pine seeds, prescribed burns should occur from mid-April to late June. Growing season burns are favorable for seeding and fruiting of flora, and recolonization of existing species and perhaps species that were reduced from the effects of fire exclusion, but the seed source for which are still present and viable within the soil.

Pine seed fall should be taken into consideration, and if a heavy seed crop is expected, fire management should account for the timing of the seed fall or the establishment of seedlings, by burning or holding off, respectively.

Scrub

Seasonality of prescribed fire in scrub habitats is less critical than within pine flatwood habitats. However, due to the potential presence of tall scrub trees and the necessity to top kill tall oaks to restore a dominant oak shrub structure, weather conditions when fuel moisture and relative humidity are low and wind speeds are moderate will be necessary to accomplish the top killing. Once the tall oak structure has been significantly reduced, prescribed fire can be applied predominantly in the growing season. Growing season burns will help to mimic the high lightening intensity period when lightning strike burns would have naturally occurred. Please refer to the FSJMA SMP (Appendix A) for additional details specific to these habitats.

Wetlands

Historically, fires would have ignited in uplands and carried to wetland edges, if not through wetland systems, given specific weather, hydrologic, and climate conditions. These fires would have maintained a relatively low and open wetland edge along the ecotone, with scattered shrubs. Conversion of uplands at CB/AB to silviculture, and installation of disk lines around wetlands, has resulted in fire has being excluded and has led to the current shrub dominated condition with encroaching pioneer forested species along wetlands bordering silviculture.

Fire management is the most cost-effective form of management, and it is recommended that fire be introduced into the wetland ecotones between the disk lines and the wetland. Since disk lines around timber blocks are regularly maintained, fire escaping the ecotone into the silviculture areas should be of low concern, and burning with appropriate weather should reduce the potential of fire spotting into the pine plantations. For forested wetland ecotones, and some shrub wetlands, care should be taken to ensure water levels are sufficient to prevent ignition of duff in their interior, which may occur under dry conditions and low or no standing water. Duff fires in wetland systems are difficult to access, difficult to extinguish, and can reduce or eliminate the wetland forested canopy. Inspection of the duff layer in the fringes and interior of forested and shrub wetlands, prior to implementing a prescribed burn is recommended.

Pasture Preserves

Prescribed burns within grazing pastures bring the benefits of improvement to forage quality, brush control, improvement of wildlife habitat, and reduction of hazardous fuel to help prevent wildfire. The publication, Managing South Florida Range for Cattle (Vendramini et al. 2019), produced via studies conducted at UF/IFAS Range Cattle Research and Education Center, in Ona, Florida, provides excellent guidance for prescribed burns on grazing lands. When, how often, and the burning technique used depends on the objectives of a controlled burn. The benefits to wildlife from burning includes an

increase in herbaceous plants, especially annuals, which are good seed producers, and insects, an important food source, are more abundant following fire.

Listed Species

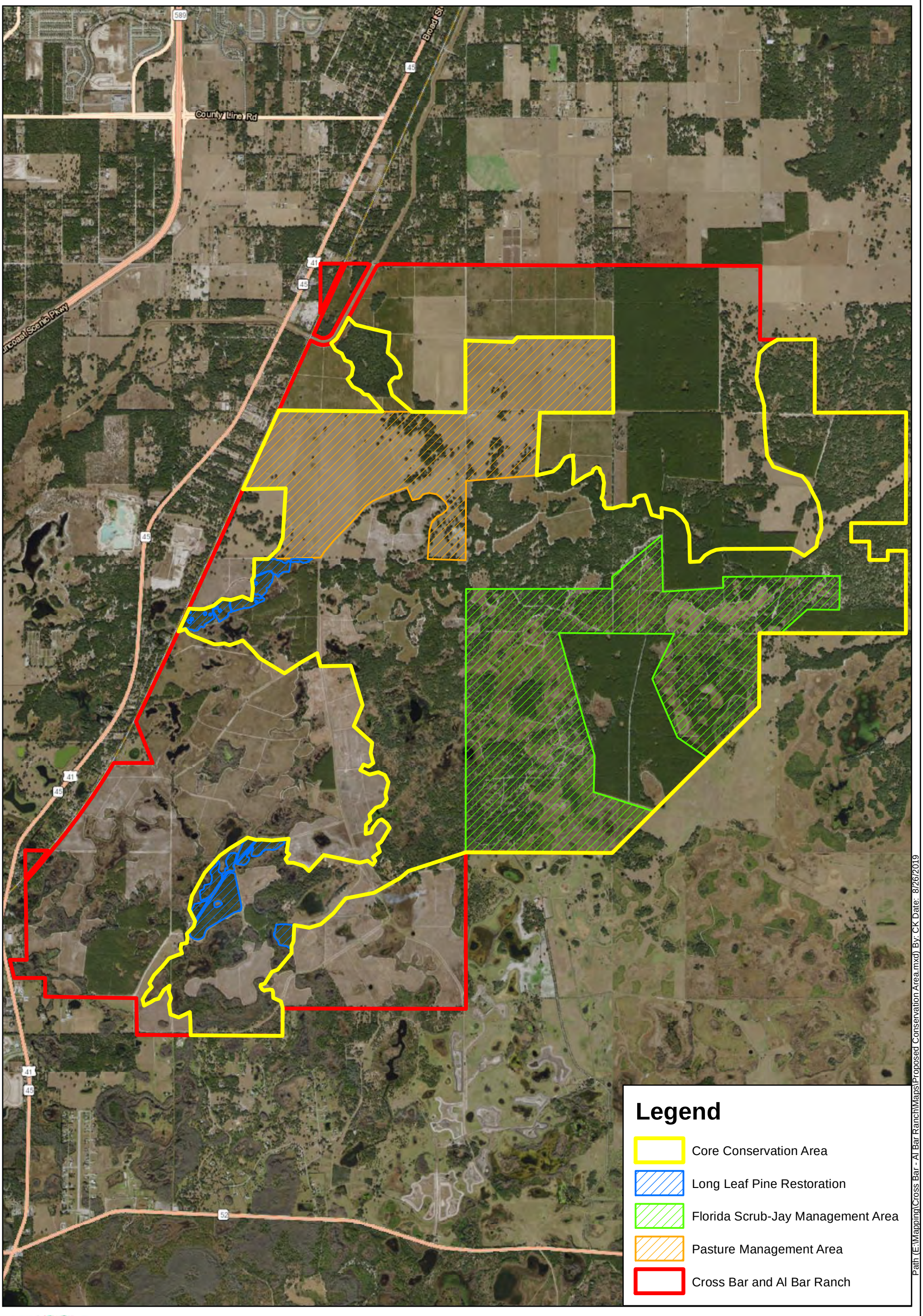
Considerations for listed plants and animals with regard to the above fire application considerations will be taken into account in order to enhance populations on CB/AB, and not adversely affect protected species. Species-specific recommendations for appropriate prescribed fire application will also be taken into consideration as applicable. There is substantial literature indicating that most of Florida's protected plant and wildlife species are adapted to fire and often are dependent upon the effects of fire.

TABLE 4-1
FLORIDA NATURAL COMMUNITIES, FIRE DEPENDENCY AND FREQUENCY OF FIRE PER FLORIDA NATURAL AREAS INVENTORY.

Natural Community	Fire Dependent	Fire Influenced	FNAI Fire Frequency/Interval
Hardwood Forested Uplands			
Mesic hammock	No	Maybe	Frequent (for prairie variant) to rare depending on surrounding community
Upland hardwood forest	No	Maybe	Fire may be important on edges
Xeric hammock	No	Maybe	Impacts to edges, 30+ yrs
High Pine and Scrub			
Sandhill	Yes	-	Frequent, 1-3 yrs
Scrub	Yes	-	Variable, 5-30 yrs
Upland mixed woodland	Yes	-	Fire burns into it, 10-20 yrs
Upland Pine	Yes	Yes	Frequent, 1-3 yrs
Pine Flatwoods and Dry Prairie			
Dry prairie	Yes	-	Frequent, 1-2 yrs
Mesic flatwoods	Yes	-	Frequent, 1-4 yrs
Pine rockland	Yes	-	Frequent, 3-7 yrs
Scrubby flatwoods	Yes	-	Occasional, 5-15 yrs
Wet flatwoods	Yes	-	Frequent, 3-10 yrs
Coastal Uplands			
Beach dune	No	Yes	Occasional - Rare
Coastal grassland	No	Yes	Occasional
Sinkhole and Outcrop Communities			
Upland glade	Yes	-	Irregular Intervals
Freshwater Non-Forested Wetlands			
Basin marsh	Yes	-	Frequency depends on surroundings
Depression marsh	Yes	-	Burns with surrounding community
Floodplain marsh	Yes	-	Depends on water levels

TABLE 4-1
FLORIDA NATURAL COMMUNITIES, FIRE DEPENDENCY AND FREQUENCY OF FIRE PER FLORIDA NATURAL AREAS INVENTORY.

Natural Community	Fire Dependent	Fire Influenced	FNAI Fire Frequency/Interval
Glades marsh	Yes	-	Tied to surrounding matrix, estimate 2-5 yrs
Marl prairie	Yes	-	Frequent, 1-6 yrs
Seepage slope	Yes	-	Frequent to occasional, 2-3 yrs
Shrub bog	No	Yes	Shrubs, 3-8 yrs; woody, 50-150 yrs
Slough	Yes	-	Tied to surroundings, est. 2-5 yrs
Wet prairie	Yes	-	Frequent, 2-4 yrs
Freshwater Forested Wetlands			
Baygall	No	Yes	Fire impacts edge
Basin swamp	No	Yes	5-150 yrs
Dome swamp	No	Yes	Light surface fire from nearby community
Hydric hammock	No	Maybe	Frequent (for prairie variant) to rare depending on surrounding community.



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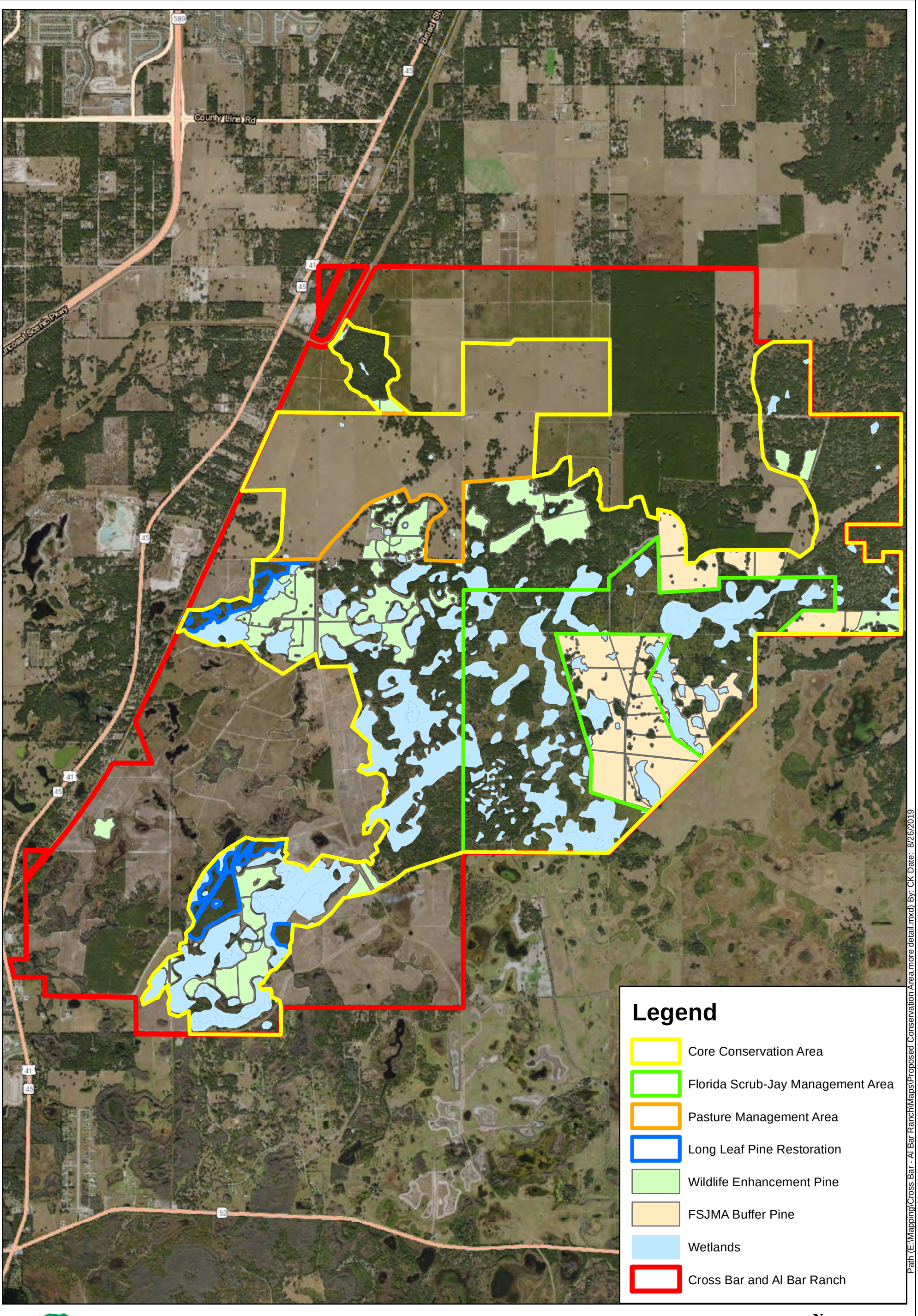
ecology

Figure 4-1
Core Conservation Areas
Cross Bar and Al Bar Ranch
Pasco County, Florida

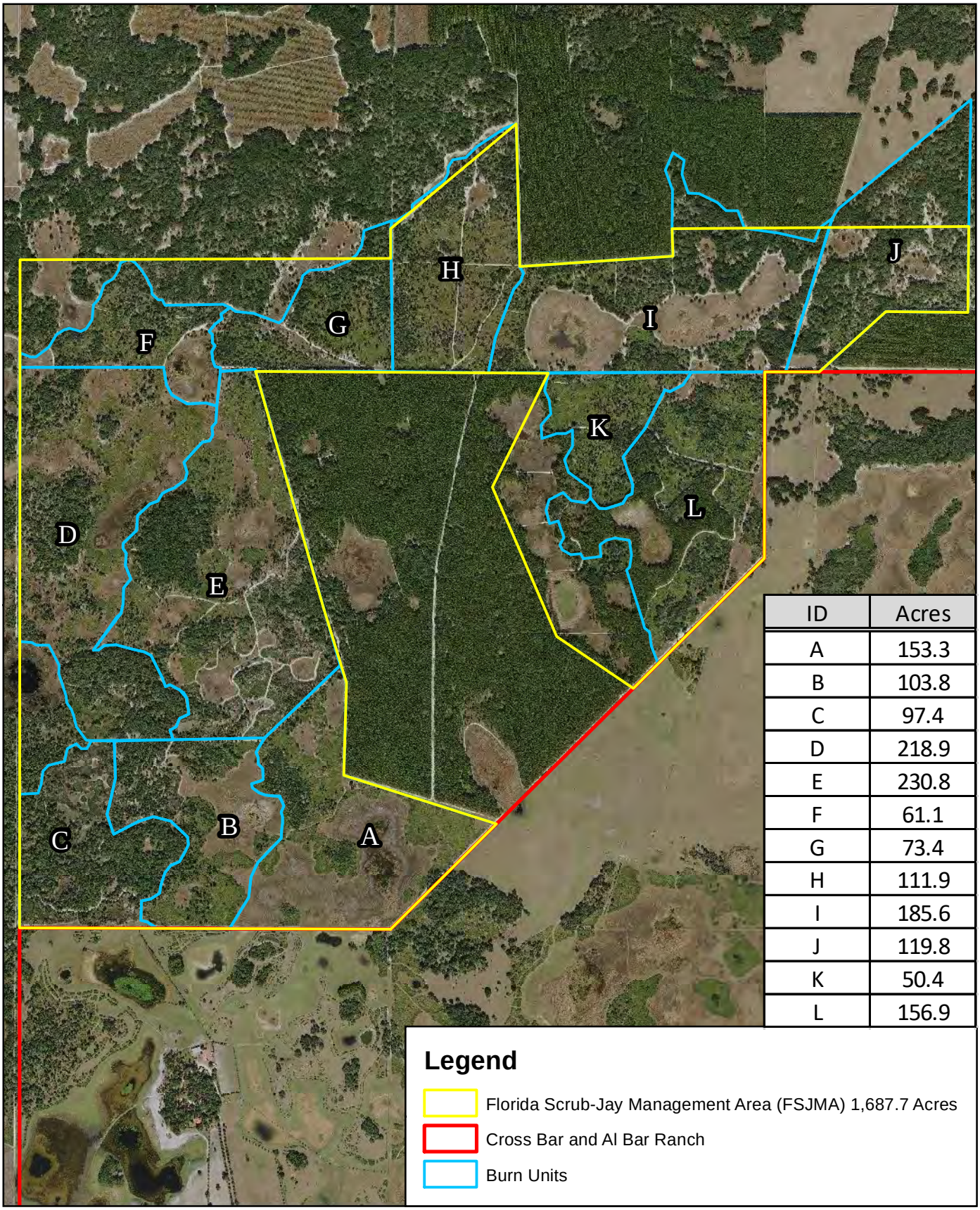


QUEST ecology

Figure 4-2
Core Conservation Areas; Wetlands and Pine
Cross Bar and Al Bar Ranch
Pasco County, Florida

N
W E
S

0 1
Miles



ID	Acres
A	153.3
B	103.8
C	97.4
D	218.9
E	230.8
F	61.1
G	73.4
H	111.9
I	185.6
J	119.8
K	50.4
L	156.9

Legend

- Florida Scrub-Jay Management Area (FSJMA) 1,687.7 Acres
- Cross Bar and Al Bar Ranch
- Burn Units

Path (E:\Mapping\Cross Bar - Al Bar Ranch\Maps\Burn Units.mxd) By: CK Date: 8/26/2019

QUEST ecology

Figure 4-3
FSJMA Burn Units
Cross Bar and Al Bar Ranch
Pasco County, Florida

N
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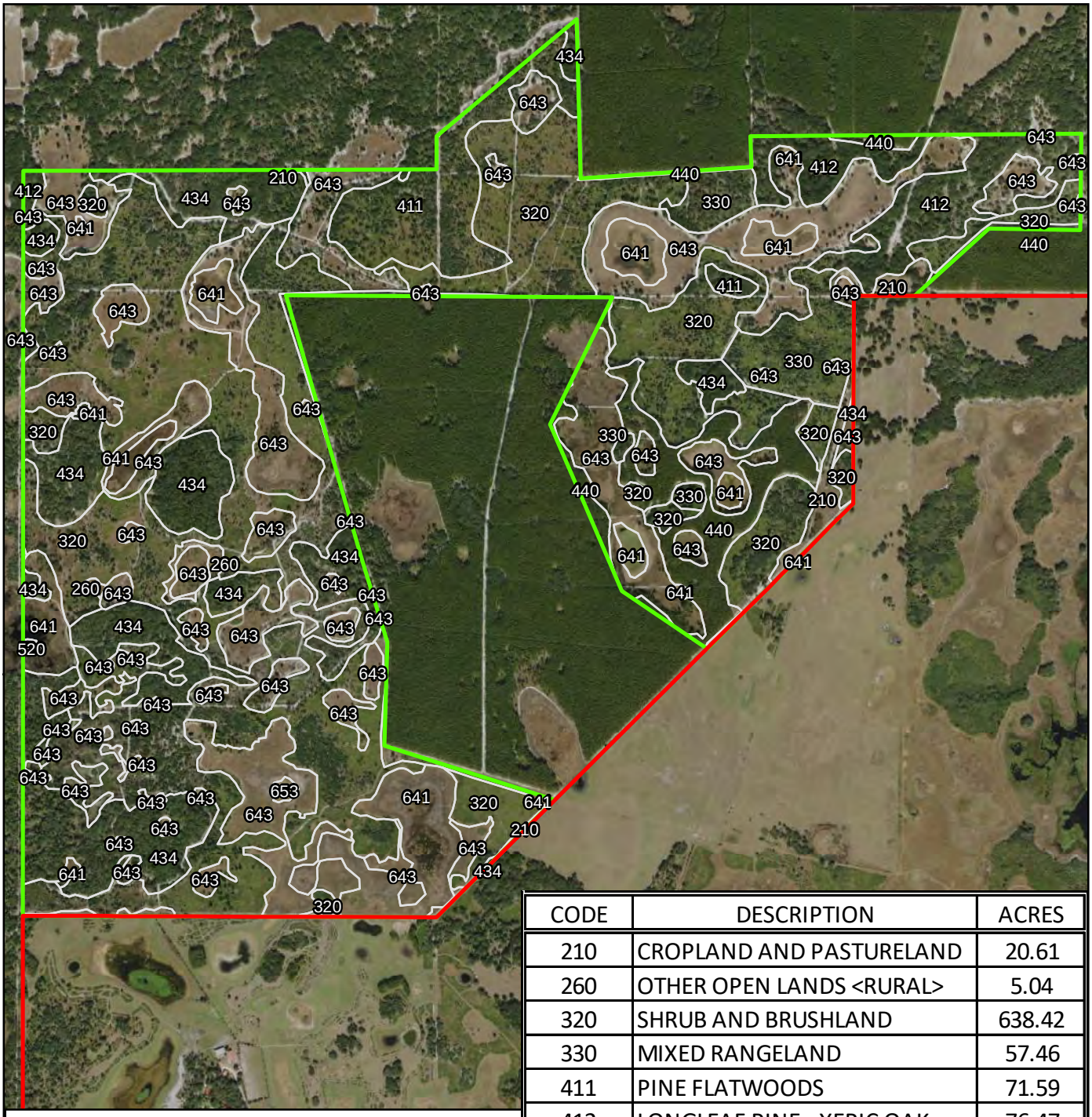
0 1,500
Feet



CODE	DESCRIPTION	ACRES
210	CROPLAND AND PASTURELAND	20.61
260	OTHER OPEN LANDS <RURAL>	5.04
320	SHRUB AND BRUSHLAND	638.42
330	MIXED RANGELAND	57.46
411	PINE FLATWOODS	71.59
412	LONGLEAF PINE - XERIC OAK	76.47
434	HARDWOOD CONIFER MIXED	213.60
440	TREE PLANTATIONS	84.49
520	LAKES	0.58
641	FRESHWATER MARSHES	105.66
643	WET PRAIRIES	412.28
653	INTERMITTENT PONDS	1.53

Path (E:\Mapping\Cross Bar - Al Bar Ranch\Maps\FSJMA FLUCCS.mxd) By: CK Date: 8/26/2019

QUEST ecology

Figure 4-4
Florida Scrub-Jay Management Area FLUCFCS
Cross Bar and Al Bar Ranch
Pasco County, Florida

N
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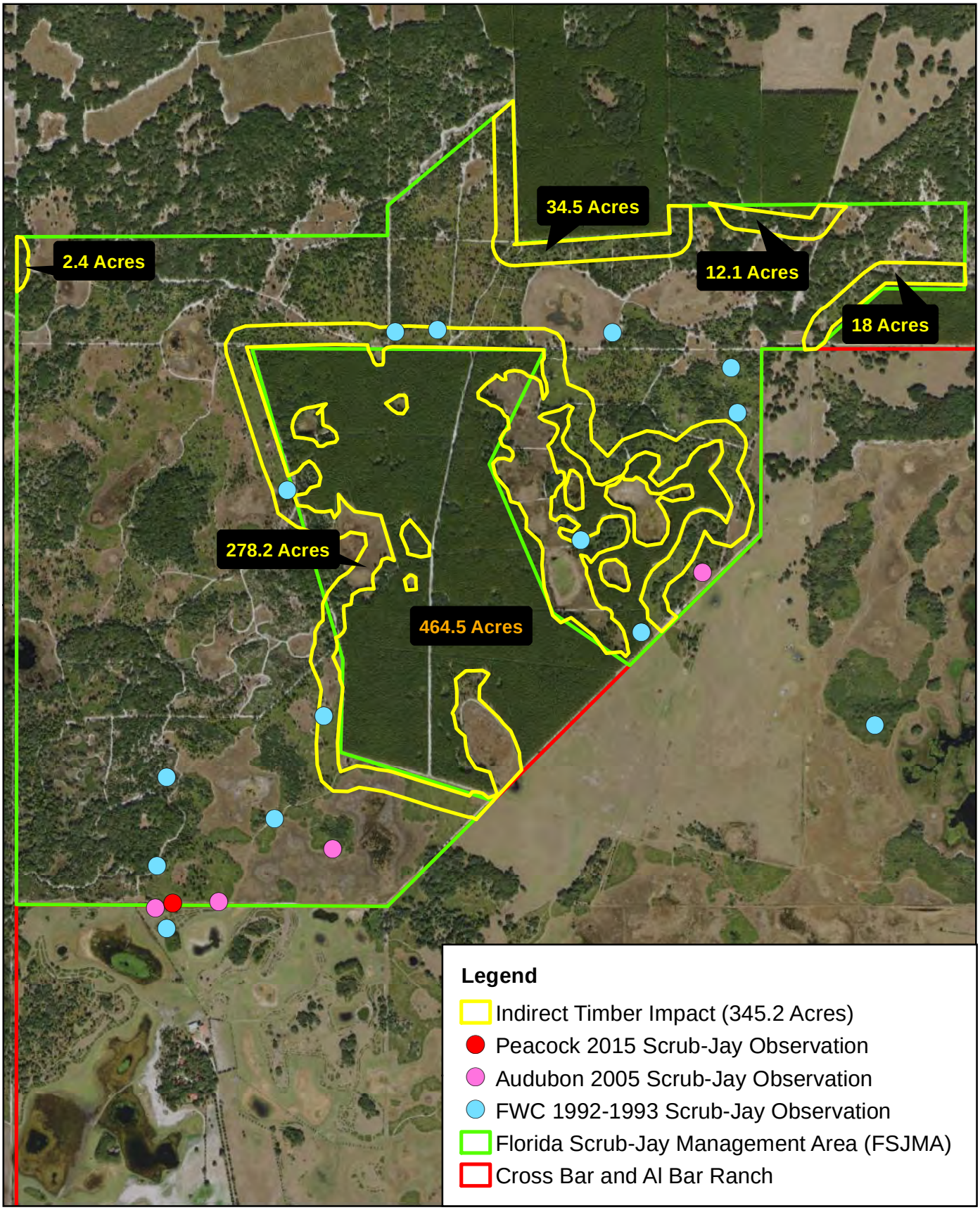
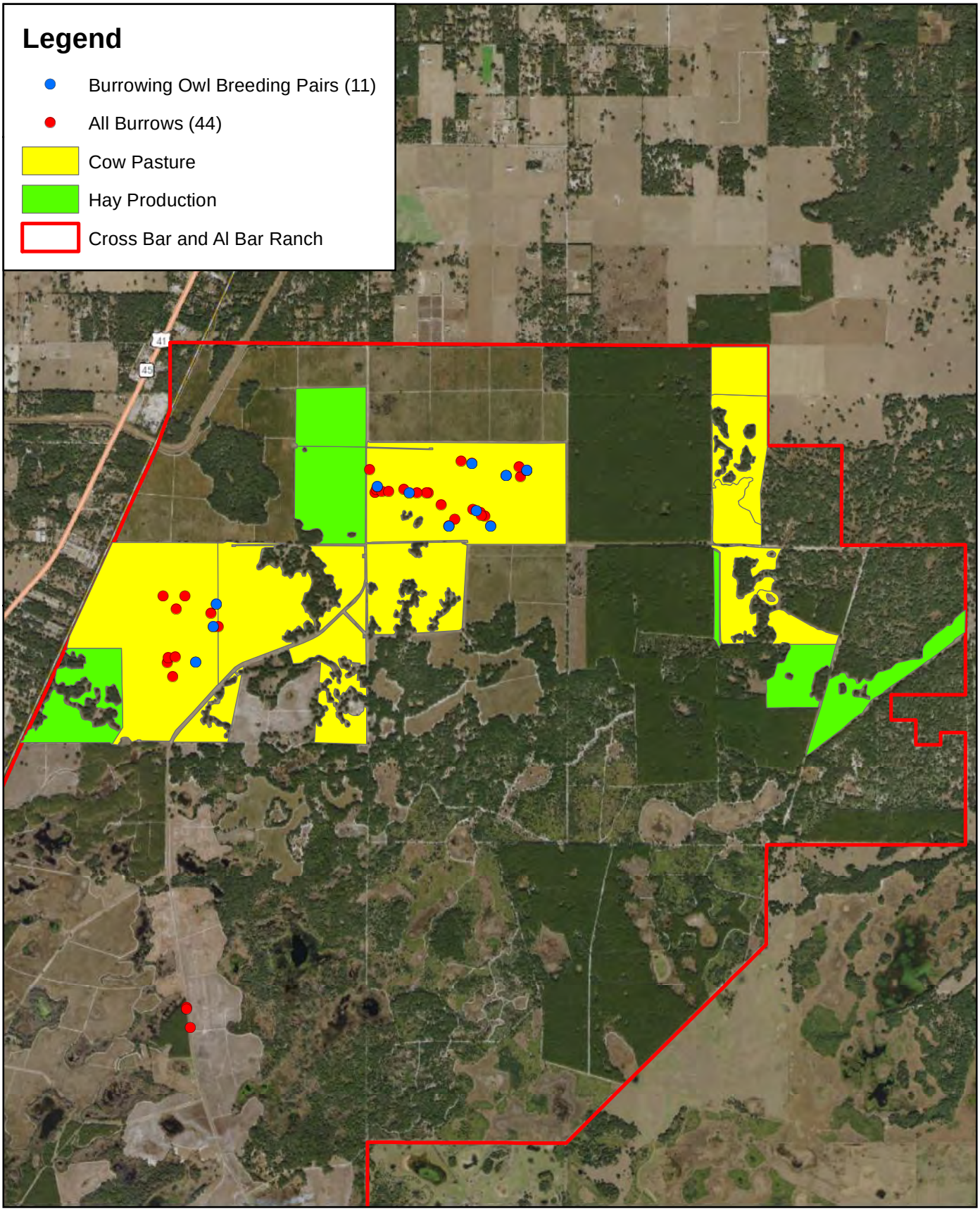
0 0.5
Miles



QUEST ecology

Figure 4-5
Timber Impacts & Historic Scrub-jay Locations
Cross Bar and Al Bar Ranch
Pasco County, Florida



Path (E:\Mapping\Cross Bar - Al Bar Ranch\Maps\BO vs. Pasture Use.mxd) By: CK Date: 8/26/2019

QUEST ecology

Figure 4-6
Burrowing Owl Pasture Use
Cross Bar and Al Bar Ranch
Pasco County, Florida

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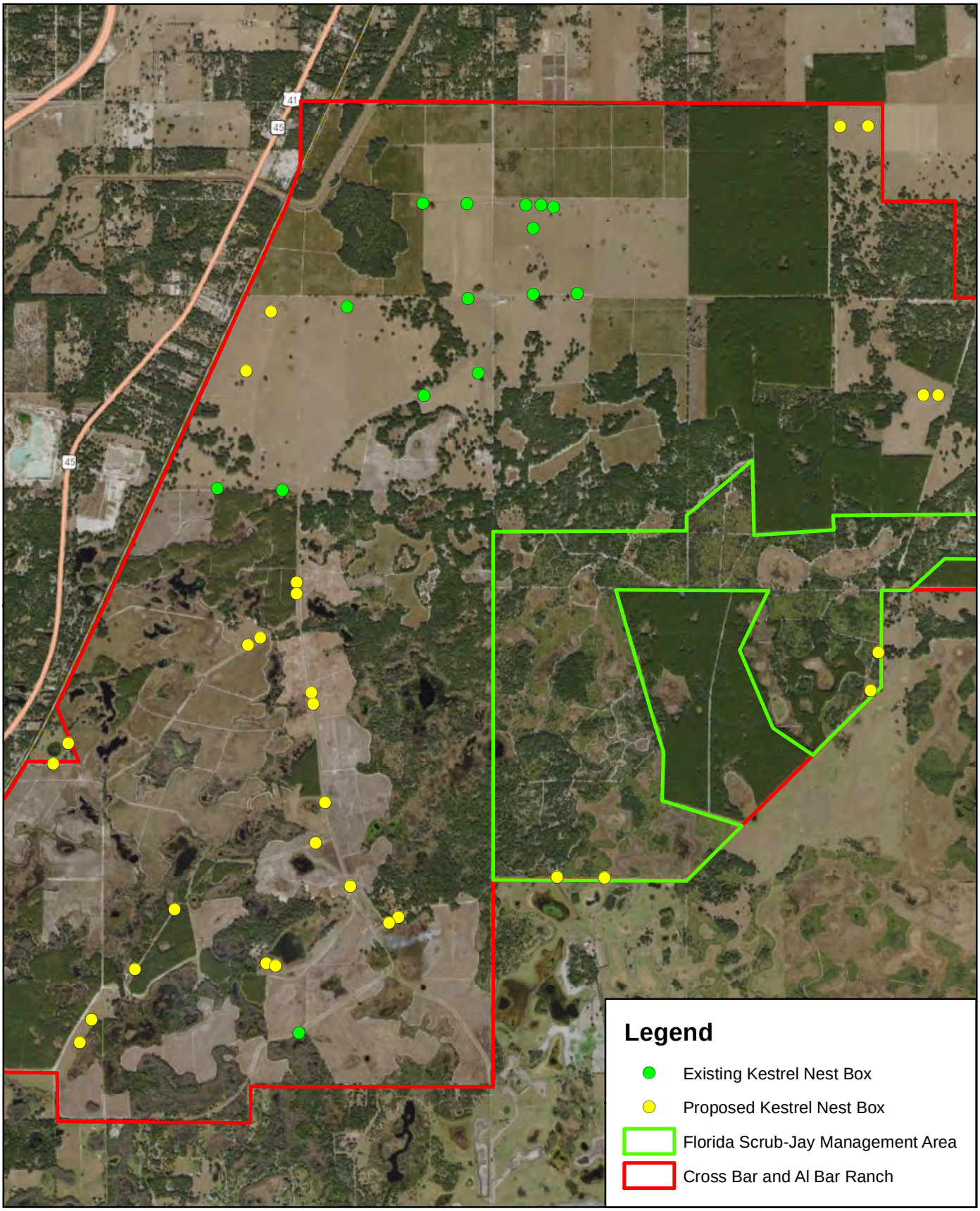
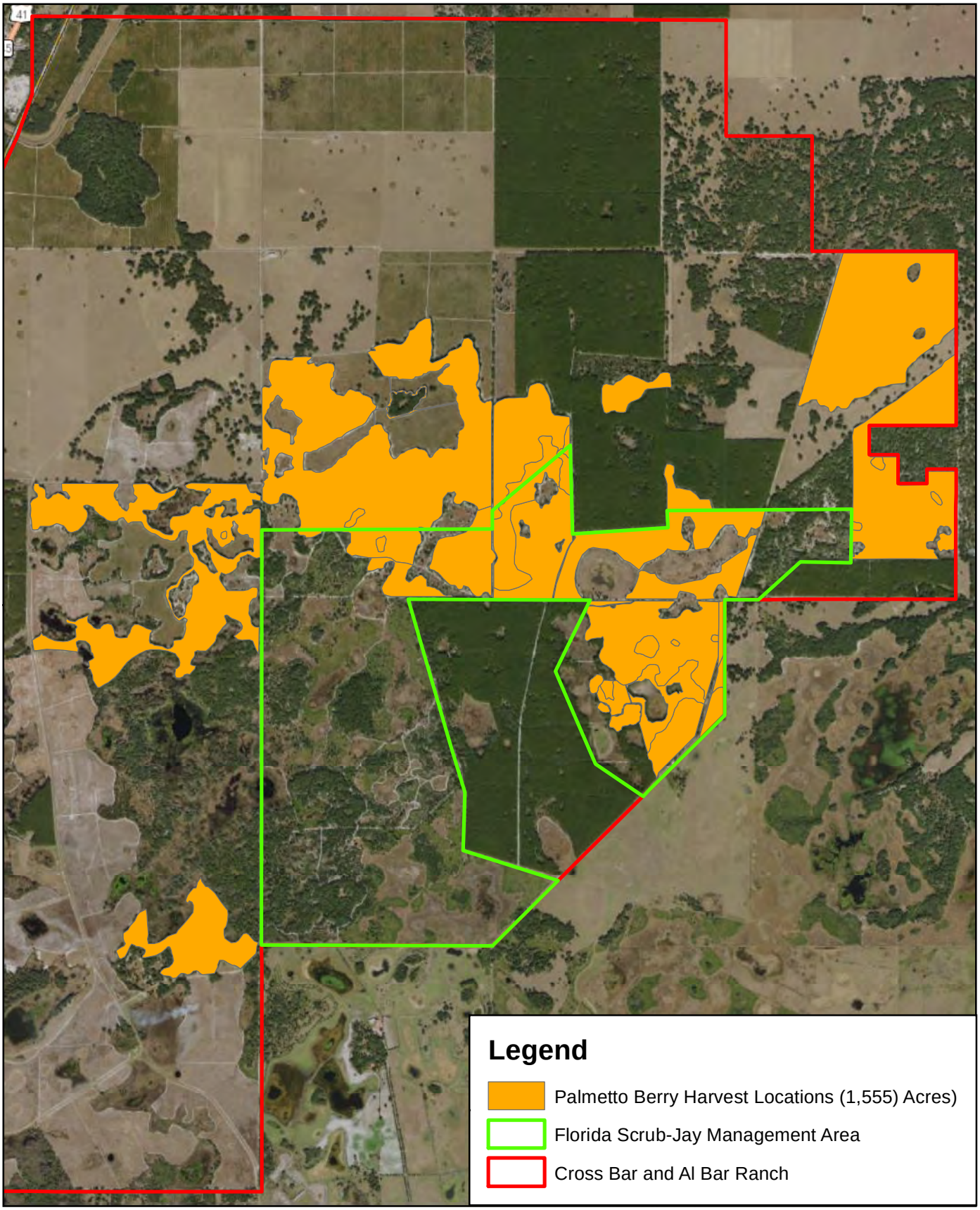
Miles



Path (E:\Mapping\Cross Bar - Al Bar Ranch\Maps\Existing and Proposed Kestrel Boxes.mxd) By: CK Date: 9/3/2019

QUEST ecology

Figure 4-7
Existing and Proposed Kestrel Nest Boxes
June 2019
Cross Bar and Al Bar Ranch
Pasco County, Florida



Path (E:\Mapping\Cross Bar - Al Bar Ranch\Maps\Palmetto Berry Harvest Areas.mxd) By: CK Date: 9/3/2019

QUEST ecology

Figure 4-8
Proposed Palmetto Berry Harvest Areas 2019
Cross Bar and Al Bar Ranch
Pasco County, Florida

5.0 MANAGEMENT PLAN IMPLEMENTATION

Because decisions have yet to be made regarding the timing, methods and specific locations for recommended management actions, a detailed implementation plan will need to be developed later. An exact schedule for implementation will depend on a variety of factors, including costs associated with proposed restoration, seasonal factors, current obligations regarding land uses, the size of individual management units, the results of recent activities, and prioritization of overall goals. In summary, however, the following action items are recommended to be given priority, to address specific goals in the short-term, and to move ahead with the additional data collection and planning required to be able to address these various factors. Many of these are relatively easy to implement in the short-term without a great deal of cost. Others, such as the FSJMA SMP must be implemented immediately to prevent further decline of the onsite population of target species.

1. Implement the FSJMA SMP as soon as possible. These short-term restoration and management actions are essential for the continued occupation of these habitats by FSJ. Lack of management for far too long has decreased the FSJ population to precarious levels such that timing is now critical. This includes immediately conducting trap acclimation and banding of resident FSJs. Because future habitat restoration may depend on the response of resident and nearby off-site jays, color-banding must be prioritized to allow for immediate identification and tracking of individual birds and family groups.
2. Assess the long-leaf pine restoration and thinning areas to develop a list of appropriate groundcover and shrub species to plant during the 2020 rainy season. Document stand conditions (basal area, density, diameter at breast height, tree height) for each stand once thinning is complete to serve as a baseline for making future tree planting and thinning decisions, and to assess progress toward restoration goals.
3. Obtain the basal area for each stand once thinning is completed to serve as a baseline for making future tree planting and thinning decisions.
4. Implement the Pasture Preserve management recommendations prior to the next BUOW breeding season, so the response can be evaluated and potential for future decline is avoided.
5. Install the additional SEAK nesting boxes as recommended prior to the next breeding season, so the onsite population may benefit from the expedited nesting location opportunities.
6. Conduct the field evaluations required to identify management units within the native forest restoration so that the initial, relatively inexpensive restoration work can proceed.
7. Cease activities that are unnecessary, costly, and potentially damaging to ecosystems and wildlife, such as mowing and over-disking. Address each area and evaluate for alternative management strategies.
8. Require the preparation and submittal to PCU of prescriptions for each major land use activity, including silviculture, ranching and agricultural uses. These should identify the specific locations, schedules, methods, and equipment to be utilized; the potential affect these may have on wildlife and adjacent habitats; and the proposed means of minimizing impacts. This

form of documentation of how, where and when these activities are being carried out will allow for the appropriate checks and balances to ensure BMPs and County Management Requirements are being followed, and provide a means for reviewing current and past methods as changes occur across the property and responses to each activity are evaluated.

9. Establish a monitoring program to address each of the monitoring requirements outlined above for specific management areas/community types. This monitoring program should be created to maximize efficiency yet cover each of the individual data collection and seasonality/timing needs for target species and habitats. A schedule and protocols for each event should be developed to ensure the frequency and level of detail are covered, while performing assessments concurrently where possible. Bi-monthly may suffice, but monthly is preferable, particularly at certain times of the year.
10. Develop a schedule and proposed time frame for updating this EMP within one year.

5.1 Adaptive Management

Throughout this document, the concept and importance of adaptive management has been emphasized. This is not only because of the preliminary status of this EMP, but also because of the large number of changes to the property being considered, the response to those, and the need to remain flexible in our methods and timing. Management plans that include regular, periodic reviews of methods and results, and implementation of Adaptive Management, will result in more efficient and effective management, and potential annual cost savings.

The purpose of this EMP is to replace a previous resource management plan that was not updated in over 25 years. As we have seen, recommended land management and habitat restoration methods are an evolving science, and what was once perhaps accepted as standard practice is often no longer the case several years later. For example, “environmental mowing” is an activity previously prescribed because at one point it was believed to benefit some grassland species, however, alternative management is now recommended as more beneficial and with less potential for unintended disturbances. Termination of this mowing practice avoids unnecessary impacts and saves time and money, thus potentially freeing up management funds for important activities such as canopy reduction within the FSJMA. Similarly, this EMP calls for cessation of over-disking of burn lines and roads, due to the drainage, soil compaction, impact on wildlife, and potential for the spread of nuisance exotic species. However, this may be a gradual process where the location of disked burn lines needs to be evaluated and adjusted or relocated over time to reduce impacts in the most sensitive areas. Ultimately, one of the goals of this EMP is to use the more cost-effective management tool, prescribed fire, to replace more aggressive and invasive management activities. Fewer fire lines and larger burn units are ways of reducing disking costs, enabling more efficient prescribed burning, and decreasing impacts to native habitats in the long-term. This can only be accomplished, however, via the ability to adapt our approach over time based on the response of each community and/or target species to these changes.

The ability to apply Adaptive Management is highly dependent on the implementation of the recommended monitoring, restoration unit approach, and use of prescriptions for timber and agriculture uses. The potential impacts or benefits of mowing, spraying, or harvesting can't be fully evaluated unless a record of the timing, chemicals, and/or equipment employed is available for review. Similarly, the success or need for adjustments to habitat restoration methods can only be determined through regular, appropriately timed monitoring events.

Adaptive Management, primarily through the results of the above described monitoring and documentation program(s), will serve to update and refine management activities and methods to best meet the needs of the site and ensure the best use of funds. In the short-term this may consist of applying adaptive management principles relatively frequently, to evaluate the response to initial restoration efforts and total ecosystem management that has been absent on the site for many years. In the longer term, ongoing management activities and the methods employed should be revisited at least every 5 years and revised, reduced, or eliminated as needed based on results, site conditions, and any changes to overall management goals.

5.2 Summary

The preceding recommendations provide a flexible outline for making significant improvements to wildlife habitats and vegetation communities throughout CB/AB. This level of flexibility is intended to allow for fluid decision making and the ability to modify management methods and the timing of implementation to best meet the necessary financial and ecological functions of the property. The best application of this document is therefore as a guide for future management decisions, while employing the appropriate observations, monitoring and documentation that will allow land managers to confirm and/or adjust outcomes and goals.

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MyFWC.com

December 4, 2018

Don Curtis
The Forestry Company
502 West Green Street
Perry, FL 32347

Mr. Curtis,

On December 3, 2018, I had the pleasure of conducting a site visit to Cross Bar Ranch in Pasco County, Florida. During my visit, I was given a tour of a large portion of the property.

Because the tour was conducted mid-day, the most appropriate way to assess the density of deer on the property was to assess deer browse on the vegetation. To do this, we stopped at several sites in several different habitat types and evaluated the number of stems browsed. At multiple sites, I found heavy browse on hairy indigo (*Indigofera hirsuta*) and greenbriar (*Smilax* spp.), two highly-preferred white-tailed deer forages, as well as heavy browse on (American beautyberry (*Callicarpa americana*) and Spanish needle weed (*Bidens* sp.). Both these species are moderately-preferred by white-tailed deer, meaning that deer will consume these plants but only once the more highly preferred species are gone. With intensively managed, early successional habitats such those on this property, there should be a large amount of highly preferred deer forage. With a low to moderate density of deer, I would not expect the deer to consume all the highly-preferred forage; therefore, with this level of browse on the moderately-preferred forages, I would expect that this property has a moderate to high density of deer on it.

High densities of deer can have impacts on both the deer themselves and the ecosystems around them. Overbrowse can reduce the growth, reproduction, and survival of some grasses and many forbs, shrubs, and tree seedlings. High densities can also lead to lower deer weights, reduced fitness, and the potential for increased disease transmission.

My recommendation is a 10-15% annual reduction of deer on the Cross Bar Ranch through the harvest of female deer. This will provide a benefit for both the deer and the habitat.

Although I am not a turkey biologist and cannot speak to population management recommendations, I would like to note that I did see numerous large groups while we were touring the property. Turkeys populations tend to have a slow growth rate and the current food resources on the property appear to be sufficient at this time, but turkey management may be something that should be looked at in the future.

Sincerely,

Becky Shuman
Assistant Deer Coordinator

RE: Cross Bar/Al Bar (CBAB) visit for 12/3

Shuman, Becky <Becky.Shuman@MyFWC.com>
Wed 12/5/2018, 12:41 PM
To: 'Don Curtis' <drcurtisjr@hotmail.com>

Suggesting a number without any survey data is a bit more difficult because I don't know exactly how many deer you have per square mile or what the buck to doe ratio is. But based on what I saw and heard from you and your staff I can give you an educated guess of what your deer population is (25-30 deer/sq. mile). This would then give us approximately 500-600 deer on the property, and a suggested removal rate of 50-90 does per year. The current antlerless allotment of 1 tag/150 acres would allow you to harvest the suggested number of does. As with any harvest program, I would recommend monitoring the population and adjusting harvest rates accordingly. Because it is closed to the public, you are not likely going to have a problem with overharvest, but deer populations in Florida are more susceptible to overharvest and are slower to recover than in other areas because they have lower reproductive rates. Do you need me to put the numeric range in the letter or is this email sufficient?

I will also follow up with the places to donate deer meat. The only place that I currently know of is in Lakeland; so I reached out to one of our biologists in the area to see if he had any suggestions.

Thanks,
Becky

Becky Shuman
Assistant Deer Management Program Coordinator
Florida Fish and Wildlife Conservation Commission
1105 SW Williston Rd
Gainesville, FL 32601
850-567-8856 (mobile)

From: Don Curtis <drcurtisjr@hotmail.com>
Sent: Wednesday, December 5, 2018 7:03 AM
To: Shuman, Becky <Becky.Shuman@MyFWC.com>; Michele Curtis <mrc1218@hotmail.com>; Christopher Barthle <sncbarthle@yahoo.com>
Subject: Re: Cross Bar/Al Bar (CBAB) visit for 12/3

Becky, thanks for taking the time to visit CBAB. I knew that visiting in the middle of the day would limit seeing the deer like we do in the mornings and evenings.

When you suggest removing 10-15% annually, can you suggest a numeric range? Would the doe permits of 1/150 acres work?

Also, can you email me a list of groups that utilize the meat for giving to the needy?

Thanks again. Don

Don Curtis, President - The Forestry Company
Georgia Forester License # 1537, Association of Consulting Foresters #579, Society of American Foresters #16325,
Florida Real Estate Broker #BK642296
502 West Green Street, Perry, FL 32347
850-584-8887 office, 888-600-6151 fax,

Al Bar Ranch Florida Scrub-Jay Management Area
Short-term Management Plan
2019

Introduction

This short-term management plan (SMP) is specific to the immediate management needs of the FSJMA and is provided as a supplement to the Ecosystem Management Plan (EMP) currently being developed for the entire Cross Bar/Al Bar properties. This interim plan follows the overall management objectives and recommendations of the 1992 Plan currently in place under Wildlife Enhancement (Part VI, page 9), and specifically pertaining to the hardwood scrub habitat within the FSJMA as outlined under Wildlife Recommendations for Listed Species that states: "specific management programs should be developed to enhance the habitats required by the listed species known to occur on the property" (Part XI, page 40; NRPS, 1992). The following short-term plan has been designed to meet these objectives for the FSJMA specifically, and for the current resident Florida scrub-jays in particular.

The prolonged lack of vertical structure management is evident throughout the FSJMA. A significant amount of mechanical reduction of forested and, to a lesser extent saw palmetto, will be required across most of the upland habitats within the FSJMA to lower the overall height and density of woody vegetation into a range that is usable for scrub jays. The lack of proper fire management has allowed for substantial oak and saw palmetto encroachment, which has diminished site viability for the scrub-jay and other scrub-dependent species. The ultimate management goal for the FSJMA should be to return the habitat to its historic early successional state so that it can be maintained through adequately timed prescribed fire alone.

These proactive, collaborative and highly specific management efforts outlined below are essential to preserving the remaining two groups of scrub-jays. Lack of such efforts in the past has resulted in the decline of the Al Bar scrub-jay population. Proper management will increase the suitability of the FSJMA so dispersing jays outside CBAB may find suitable habitat, and the offspring and existing jay groups have available habitat to expand into. Juvenile scrub-jays were observed in the SJMA in 2018, and nesting has occurred in 2019, further underscoring the need to restore, and potentially expand, these habitats.

Current Conditions

An estimated 30% of the FSJMA consists of a mosaic of palmetto prairie and scrubby flatwoods habitats (**Figure 1 – FJSMA FLUCFCS**). Dense saw palmetto (*Serenoa repens*) averaging three (3) to five (5) feet in height is the dominant cover in these habitat types, typically occupying 75% to 90% of the ground surface. Other woody shrubs averaging six (6) to eight (8) feet in height are frequently interspersed in the palmetto thickets, including gallberry (*Ilex glabra*), winged sumac (*Rhus copallinum*), rusty staggerbush (*Lyonia ferruginea*), fetterbush (*Lyonia lucida*), and wax myrtle (*Morella cerifera*). Bare sandy patches are occasionally present, but, in the absence of fire, have become occupied by saw

palmetto and, as a result, these important acorn caching sites for scrub-jays account for 5% or less of the groundcover layer. A variety of grasses [wiregrass (*Aristida stricta*) and broomsedges (*Andropogon* spp.)], low shrubs [shiny blueberry (*Vaccinium myrsinites*), running oak (*Quercus pumila*), gopher apple (*Licania michauxii*)], bracken fern (*Pteridium aquilinum* var. *pseudocaudatum*), and a diversity of forbs account for an additional 10% to 20% of the groundcover. Trees in these areas range from 15 to 30 feet in height and consist of scattered, mature slash pine (*Pinus elliottii*) and frequent oaks, including myrtle oak (*Quercus myrtifolia),* sand live oak (*Quercus geminata*), and live oak (*Quercus virginiana*). Oaks are present at an estimated average of 20 to 60 trees per acre and pines at an additional 5 to 20 trees per acre.

The areas of hardwood/conifer mixed forest (FLUCFCS 430) make up an additional estimated 20% of the FSJMA. These habitats are typified by a mature live oak canopy that ranges in height from 20 to 40 feet, and varies widely in density from 10% to almost 100%. Saw palmetto cover in these habitats also ranges widely from 60% to 80% in the areas with scattered oak canopy, and 10% to 20% in the dense oak hammocks that approach 100% canopy cover. Groundcover vegetation and bare ground in these habitats is typically sparse (5% to 10%) due to either dense saw palmetto cover or dense oak leaf litter occupying the majority of the ground surface.

The pine plantation in the center of the FSJMA and in areas on the east side, was harvested within the past 24 months, and much of it was replanted in early 2019. Emerging groundcover observed to date includes witchgrass (*Dichanthelium sp.*), blue maidencane, carpet grass (*Axonopus sp.*), dog fennel (*Eupatorium capillifolium*), and saw palmetto.

Management Recommendations 2019-2020

Burns were conducted in Units G, H, and K in late 2018, and a portion of Unit L was burned in early January 2019. The northern-most portion of Burn Unit L was not burned. An assessment of the results of these burns was conducted in January 2019. **Burn units are depicted in Figure 2**.

Overall, the above burns consumed ground fuels, but the top killing of oaks was estimated at only 10%. This is likely due mostly to the overgrowth of oaks and the lack of natural fuels and fuel fragmentation to carry the fire. However, improperly placed burn lines, small burn units, and possibly the weather conditions under which the burns are conducted can contribute to the ineffectiveness of fire to top kill the oaks.

The primary goal for scrub-jay habitat management is to maintain the height of oaks at a maximum of 10-12', and to ideally accomplish this through properly timed controlled burns such that 70% of the oaks are top killed during each burn.

The current priority is for management efforts be focused on vertical hardwood reduction. The best approach for maintaining the current onsite scrub-jay populations is to ensure the areas currently used

by the jays are managed for the desired structure and composition. The following actions should take place immediately following the 2019 breeding season, in the listed order of priority. It is highly recommended that these actions be conducted by and/or under the direction of a qualified restoration ecologist to ensure objectives are met.

- Discontinue mowing of herbaceous marsh fringes and all other areas within the FSJMA. Current mowing practices within FSJMA habitats are not necessary and contribute to disturbance and potential introduction of nuisance and exotic vegetation.
- Conduct field evaluations and prepare maps to identify, quantify and prioritize the acreages and costs of hardwood management needed per burn unit. Update burn unit boundaries as needed.
- Cut oaks in Units A and B, where the jays currently reside, with chainsaws only to keep the structure from overgrowing to the point that the jays leave the site.
- Return the oak structure to 10 feet or less in each burn unit by cutting down, at ground level, all oaks over 10 feet within each unit.
- Use primarily chainsaw crews with only limited forestry equipment in select areas to eliminate soil and habitat disturbance by heavy equipment.
- Leave cut oaks in place vs. removing or chipping, as the downed wood will provide additional invertebrate habitat and forage for scrub-jays and other species.
- Burn within the canopy reduction units approximately within 3-12 months after the hardwood cutting has been completed in each management unit but avoid burning during the breeding season.
- Conduct hardwood reduction in Unit E using the above methods, followed by a burn, to increase areas the jays may be able to move into.
- Depending on the results in Unit E, Unit D and Unit L may then be recommended using these same methods.
- Modify planted pine areas to include, at a minimum, the FWC recommended buffers from FSJMA habitat to the forested edge (see below).

Canopy reduction activities should be expanded into the remainder of the burn units based on observations of jay movements and whether they respond to management. The use of such adaptive management is imperative to making the correct decisions for maintaining jays on the site. We don't recommend a set burn schedule for the next five years for this reason.

Mechanical treatment is not a substitute for prescribed fire but must be utilized in the short-term to decrease overall tree height and density and to add ground fuels that can increase the ability to carry fire through the landscape. In general, heavy equipment is not recommended for mechanical canopy reduction due to anticipated impacts to soil and desirable groundcover vegetation, increased risk of nuisance/exotic seed introduction, and potential impacts to gopher tortoise burrows. However, use of heavy equipment may be suitable in select dense oak hammocks where desirable groundcover is minimal, and no gopher tortoise burrows are present. Otherwise, the use of chainsaw crews to

accomplish the canopy reduction is the preferred method to minimize impacts to desirable resources. Any use of forestry equipment must be carefully planned and supervised in the field. In our experience, use of chainsaw crews is more cost effective, and will help to meet the highly specific management goals within the sensitive habitats of the FSJMA.

For each unit burned, post-burn evaluations of the remaining live forested vertical structure and density should be evaluated, and where structure and density are determined to remain too high, these areas should also be targeted for mechanical reduction. Generally, the goals for each burn are to reduce accumulated biomass, expose bare mineral soil, allow future seed germination by grasses and forbs, top kill oaks, reduce the height of and cover by shrub species, and reduce the potential for intense wildfire onsite from lightning strikes and unintended ignition sources. Note that oaks need to be top killed, but not entirely eliminated, as coppicing oaks are important to maintain for the acorn crop the jays depend on. When cut first and then burned, as prescribed here, the physiological form of coppicing takes place that more closely mimics natural scrub, where the coppicing branches are irregular, and grow from the sides of the trunk and stump vs. a straight-up vertical growth pattern. This growth habit produces more acorns and provides a more natural sub-canopy for the jays to utilize. If cut after burning, the coppicing oaks tend to send up vertical shoots from the stump surface that quickly grow straight up, resulting in an undesirable growth form, making them denser and more difficult to top kill in subsequent controlled burns.

Prescribed fire management and application in forestry practices differs from scrub-jay habitat management practices. The burn planning and implementation would best be accomplished by a Burn Manager and crews experienced in scrub-jay habitat management and the timing and application of prescribed fire required to meet the goals of the highly specific needs for successfully restoring FSJ habitat. Each of these recommendations are for the purpose of optimizing the habitat conditions for jays, and anything less will yield less than optimal results, and a continued precarious future for the jays.

Scrub-Jay Banding and Monitoring Program

In order to adequately document and manage for onsite and future scrub-jay populations, a banding program should be implemented. This will consist of acclimating, trapping and banding all of the resident scrub-jays for a number of purposes, including: future identification; monitoring and tracking of individual movements; changes in habitat utilization; determining success of management activities; tracking future expansion of resident populations; and identifying any immigration into the FSJMA from outside areas.

Acclimation consists of the use of fake traps baited with raw shelled peanuts to get the scrub-jays to readily enter the trap. Once this is achieved, a real trap is substituted, and the birds are captured and banded using distinct color band combinations and a USFWS aluminum federal identification band. This will be conducted by Quest Ecology's licensed Master Bird Bander. Fake traps have already been placed on existing feeding platforms within both FSJ group territories, and Quest staff has been baiting these

will peanuts when on site. All the jays have been observed entering the trap to retrieve the peanuts at some point, indicating they may already be fairly well acclimated to the traps, and the banding process may be achieved relatively quickly.

Once the birds have been banded, it is recommended that monitoring take place approximately bi-monthly, or six times per year. These events should be timed such that censuses occur just before and at the end of nesting season in February and July to identify breeding groups and fledged juveniles; during the nesting season to identify nest locations; and after nesting season to monitor site conditions and make and implement management recommendations prior to the following breeding season. Censuses will also identify and track the survivorship of banded individuals within each group, identify immigration of jays outside the FSJMA, and determine the number of juveniles to be banded within each group.

Monitoring will also include, during the same period of censuses, surveys of areas known to be unoccupied, to identify if jays have colonized new portions of the FLSJMA.

Planted Pine Restoration Recommendations

A very important component of effective restoration of the FSJMA is ensuring compatible adjacent land uses, which most importantly includes ultimately restoring the planted pine areas within and adjacent to the FSJMA back to native habitats. Cost will likely be weighted heavily in decision making for these areas, however; lag time until the site can be utilized again by jays and other native wildlife should be considered equally. Priority should be placed on the areas immediately adjacent to currently occupied FSJ habitats. We also recommend restoring the smaller planted pine polygons, totaling 52 acres, imbedded within the eastern portion of the FSJMA (See **Figure 1**), which historically supported several FSJ groups.

Although much of the pine plantation in the center of the FSJMA has been replanted, Blocks within the northern portions (Blocks 1 and 3) were originally slated for replanting in late 2019 (**Figure 3, 2020 Reforestation Plan**). Because of the location and proximity to currently occupied FSJ habitat, PCU has chosen not to replant these areas to avoid the loss of suitable FSJ habitat created as the pines mature. These blocks should therefore be restored to the appropriate native habitats as soon as feasible. Within the areas that have been replanted, although the structure is currently compatible, as these trees mature, the adjacent FSJMA habitat will become unsuitable for use by FSJ. The southwestern most portion of this plantation should be prioritized for restoration, as one of the FSJ groups has been observed using and nesting within habitat immediately adjacent to the young planted pines (See **Figure 3-8**).

For the replanted areas to be restored, mowing should occur when the seedling pine trees are tall enough to mow and kill, which should be timed to take place during the dry season. Timing within the dry season lessens soil compaction and rutting in wetter areas. Restoration planning, for Blocks 1 and 3,

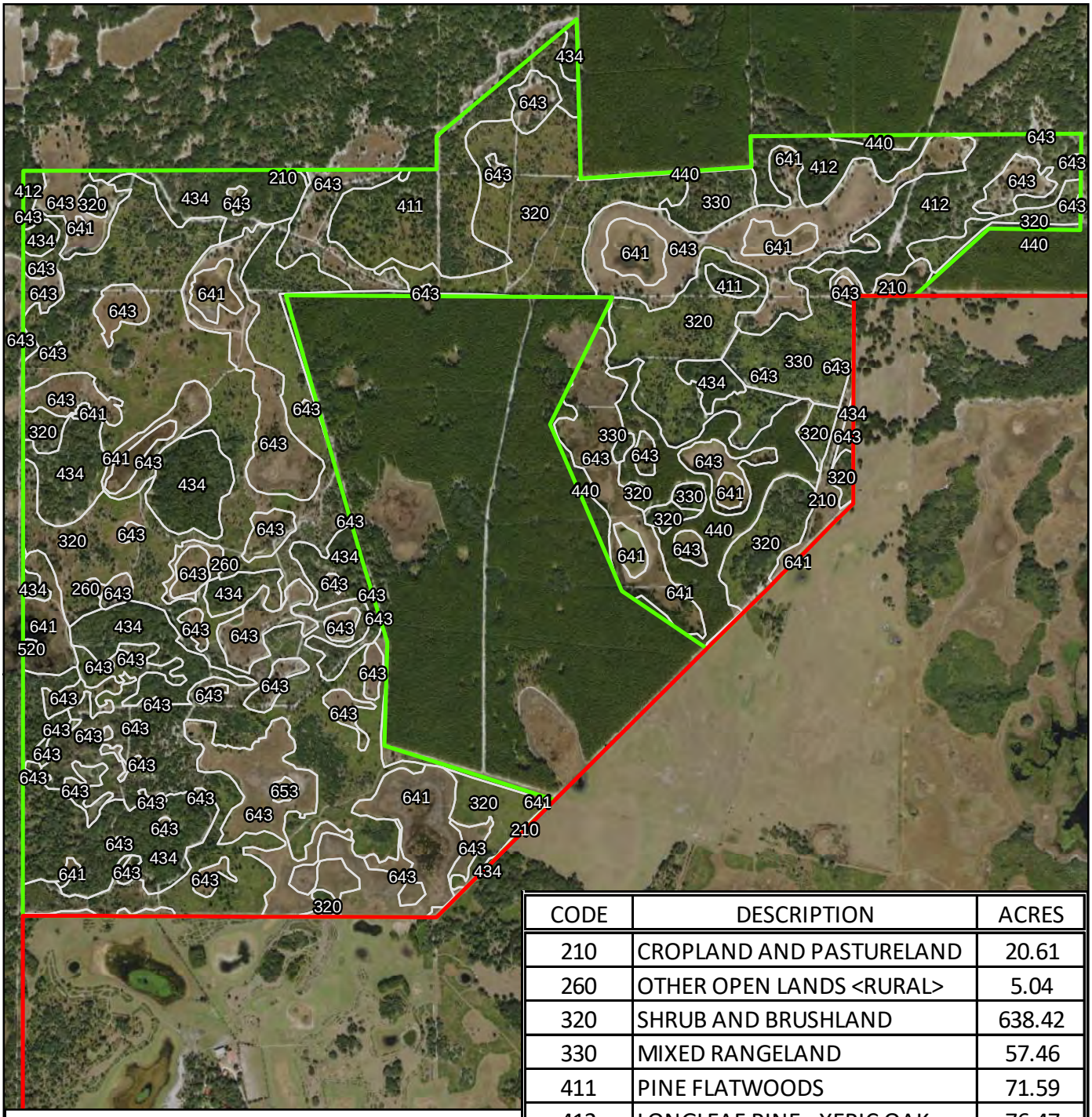
as well as the replanted areas, will start with using soils maps and field verifying existing contours to identify and delineate target habitat restoration units and types. Based on the surrounding habitats and observed recruitment, target habitat types would include scrubby flatwoods, pine flatwoods, and ephemeral wetlands. Proposed habitat acreages and plant assemblages within each habitat will be identified to help estimate restoration costs and determine the appropriate methods. Restoration techniques may consist of direct seeding combined with hand planting or hand planting coupled with rigorous herbicide applications to manage unwanted pioneer and exotic vegetation. Direct seeding can be costly than hand planting alone but may be more effective in achieving the target vegetation community assemblages. The chosen technique may depend on the size, type and timing for each restoration unit, and whether the unit is being considered as an FWC-approved Gopher Tortoise Recipient Site.

Direct seeding involves using tractors to disk and herbicide multiple times to eliminate nuisance and exotic seeds and plants. Following disking and herbicide treatments, native seeds are spread with a specialized machine and tractor over the site, and then the site is rolled with a tractor and drum. A seed source that provides the desired plant assemblage will need to be identified. Maintenance to eliminate and control nuisance and exotic species will have to occur as often as monthly at least for the first year, with subsequent maintenance events modified based presence and cover of target species. One to three years following the successful direct seeding effort, planting of forbs, shrub, and trees, as appropriate for soil moisture conditions can occur. Introduction of fire should take place after 2-3 years, once the hand planted species are well established.

Planted Pine Buffers

In addition to the above areas recommended for complete restoration due to location within the FSJMA, the FWC buffer guidelines need to be considered when planting additional areas adjacent to the FSJMA to the north and east, which are currently slated for replanting in late 2019 (**Figure 3**). This pertains to Blocks 19, 20, 21, and 17. PCU has chosen to implement the minimum 300’ buffer recommended by FWC in these areas as depicted on Figure 3, so those portions of the blocks will not be replanted.

The above restoration activities are recommended to be implemented in the unplanted buffer areas, as well as within the 52 acres of pine replanted within the eastern portion of the FSJMA.



CODE	DESCRIPTION	ACRES
210	CROPLAND AND PASTURELAND	20.61
260	OTHER OPEN LANDS <RURAL>	5.04
320	SHRUB AND BRUSHLAND	638.42
330	MIXED RANGELAND	57.46
411	PINE FLATWOODS	71.59
412	LONGLEAF PINE - XERIC OAK	76.47
434	HARDWOOD CONIFER MIXED	213.60
440	TREE PLANTATIONS	84.49
520	LAKES	0.58
641	FRESHWATER MARSHES	105.66
643	WET PRAIRIES	412.28
653	INTERMITTENT PONDS	1.53

Path (E:\Mapping\Cross Bar - Al Bar Ranch\Maps\SMP FSJMA FLUCCS.mxd) By: CK Date: 8/26/2019

QUEST ecology

Figure 1
Florida Scrub-Jay Management Area FLUCFCS
Cross Bar and Al Bar Ranch
Pasco County, Florida

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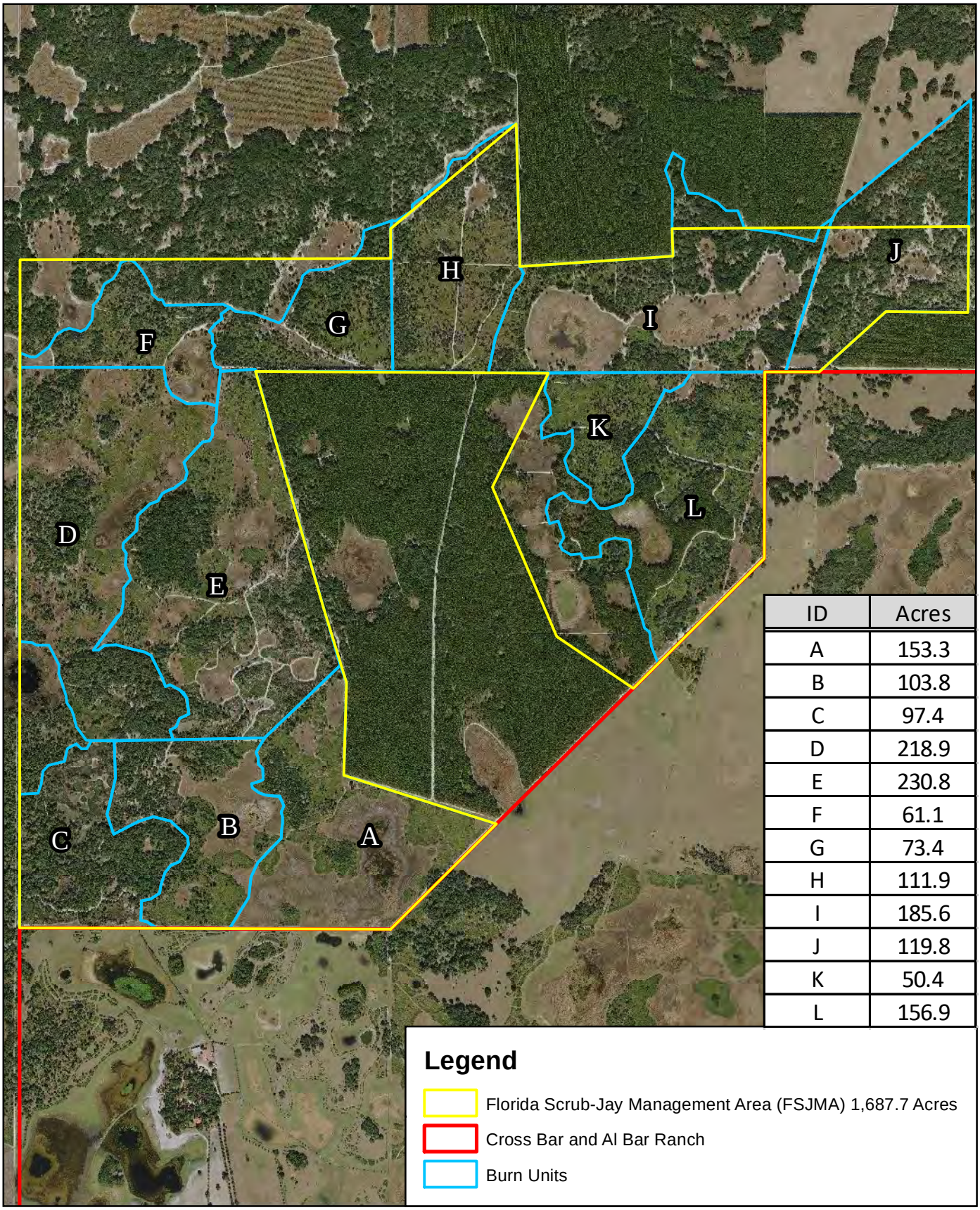
Miles



ID	Acres
A	153.3
B	103.8
C	97.4
D	218.9
E	230.8
F	61.1
G	73.4
H	111.9
I	185.6
J	119.8
K	50.4
L	156.9

Legend

- Florida Scrub-Jay Management Area (FSJMA) 1,687.7 Acres
- Cross Bar and Al Bar Ranch
- Burn Units

Path (E:\Mapping\Cross Bar - Al Bar Ranch\Maps\SMP FSJMA Burn Units.mxd) By: CK Date: 8/26/2019

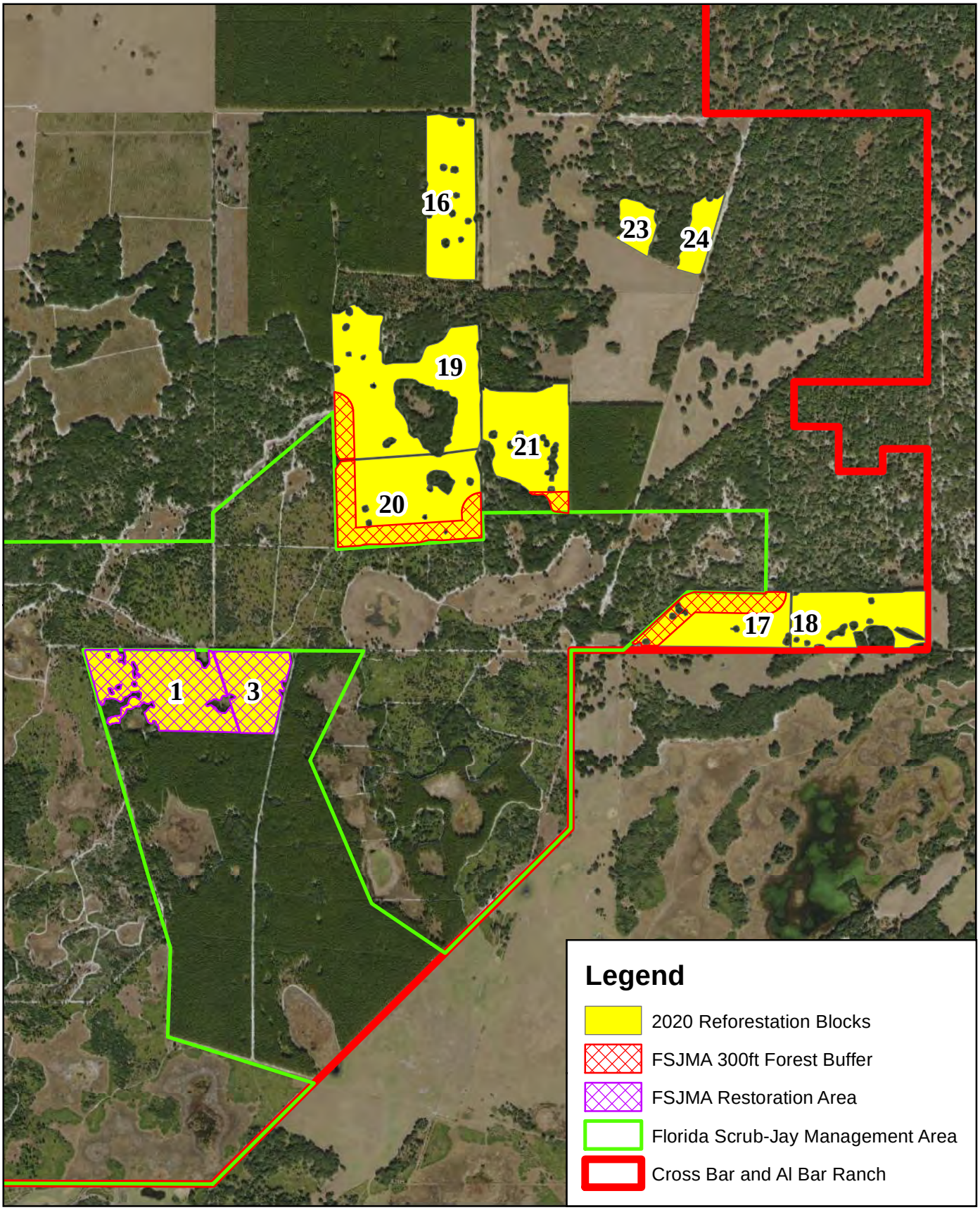
QUEST ecology

Figure 2
FSJMA Burn Units
Cross Bar and Al Bar Ranch
Pasco County, Florida

N W E S

0 1,500

Feet



QUEST ecology

Figure 3
2020 Reforestation Plan
Cross Bar and Al Bar Ranch
Pasco County, Florida