

AGREEMENT

23-1018-RFP

This Agreement is entered into on the date last executed below ("Effective Date"), by and between Pinellas County, a subdivision of the State of Florida whose primary address is 315 Court Street, Clearwater, Florida 33756 ("COUNTY") and 3B Cattle Company, LLC whose primary address is P.O. Box 703, San Antonio, FL, 33576, (hereinafter "CONTRACTOR") (jointly, the "Parties").

NOW THEREFORE, the Parties agree as follows:

A. Documents Comprising Agreement

1. This Agreement, including the Exhibits listed below, constitutes the entire agreement and understanding of the Parties with respect to the transactions and services contemplated hereby and supersedes all prior agreements, arrangements, and understandings relating to the subject matter of the Agreement. The documents listed below are hereby incorporated into and made a part of this Agreement:
 - a. This Agreement
 - b. Pinellas County Standard Terms & Conditions, located on Pinellas County Purchasing's website, effective 6/14/2023, posted at <https://pinellas.gov/county-standard-terms-conditions/>.
 - c. Exhibit 1 - Solicitation Section 5, titled Insurance Requirements
 - d. Exhibit 2 - RFP Scope of Work
 - e. Exhibit 3 – Pricing Proposal
 - f. Exhibit 4 - RFP Attachments
2. In the case of a conflict, the terms of this document govern, followed by the terms of the attached Exhibits, which control in the order listed above.

B. Term

1. The initial term of this Agreement is for 60 months from March 17, 2024. At the end of the initial term of this contract, this Agreement may be extended for four (4) additional sixty (60) month terms, or such other renewal terms agreed to by the Parties.
2. Initial Term Adjustments
 1. Unit prices listed in Exhibit 3 will be held firm for initial term.
3. Extension Term Adjustments
 1. Each term extension will allow for one (1) price adjustment (Decrease/Increase), prior to the start of the term extension, in an amount not to exceed the average of the Consumer Price Index (CPI) or 5%, whichever is less, for all Urban Consumers, Series Id:

CUUR0000SA0, Not Seasonally Adjusted, Area: U.S. city average, Item: All Items, Base Period: 1982-84=100 for the twelve months prior to extension. The extension shall be exercised only if all terms and conditions remain the same and the County grants approval.

2. It is the vendor's responsibility to request any pricing adjustment under this provision. For any adjustment to commence on the first day of any exercised extension period, the vendor's request for adjustment should be submitted at time of the extension request from the County, utilizing the available index at the time of request. The vendor adjustment request should not be in excess of the relevant pricing index change. If no adjustment request is received from the vendor, the County will assume the vendor has agreed that the extension term may be exercised without pricing adjustment. Any adjustment request received after the commencement of a new extension period may not be considered. County has the right to request pricing decreases at any time.

C. Pricing & Expenditures Cap

1. Payment and pricing terms for the initial and renewal terms are subject to the fee schedule in Exhibit 3. Notwithstanding the above, County expenditures under the Agreement will not exceed the annual expenditure of \$509,696.39 per year, for a total not to exceed expenditure of \$1,690,280.64 for the sixty-month contract term without a written amendment to this Agreement.

D. Entire Agreement

1. This Agreement constitutes the entire agreement between the Parties.

IN WITNESS WHEREOF, the Parties have caused this Agreement to be executed by their undersigned officials, who are duly authorized to bind the Parties to the Agreement.

For Contractor: 3B Cattle LLC

Signature: *Larry Barthle*
Print Name and Title: *Larry Barthle*
Date: *Jan 28, 2024*

For County: Board of County Commissioners

Signature:

Print Name and Title:

Date:

Exhibit 1 - Solicitation Section 5, Titled Insurance Requirements

5.1. INSURANCE (General)

The Vendor shall obtain and maintain, and require any subcontractor to obtain and maintain, at all times during its performance of the Agreement in insurance of the types and in the amounts set forth. For projects with a Completed Operations exposure, Vendor shall maintain coverage and provide evidence of insurance for 2 years beyond final acceptance. All insurance policies shall be from responsible companies duly authorized to do business in the State of Florida and have an AM Best rating of VIII or better.

5.2. INSURANCE (Requirements)

- A. Submittals should include, the Vendor's current Certificate(s) of Insurance. If Vendor does not currently meet insurance requirements, Vendor shall also include verification from their broker or agent that any required insurance not provided at that time of submittal will be in place prior to the award of contract. Upon selection of Vendor for award, the selected Vendor shall email certificate that is compliant with the insurance requirements. If the certificate received is compliant, no further action may be necessary. The Certificate(s) of Insurance shall be signed by authorized representatives of the insurance companies shown on the Certificate(s).
- B. **The Certificate holder section shall indicate Pinellas County, a Subdivision of the State of Florida, 400 S Fort Harrison Ave, Clearwater, FL 33756. Pinellas County shall be named as an Additional Insured for General Liability. A Waiver of Subrogation for Workers Compensation shall be provided if Workers Compensation coverage is a requirement.**
- C. Approval by the County of any Certificate(s) of Insurance does not constitute verification by the County that the insurance requirements have been satisfied or that the insurance policy shown on the Certificate(s) of Insurance is in compliance with the requirements of the Agreement. County reserves the right to require a certified copy of the entire insurance policy, including endorsement(s), at any time during the Bid and/or contract period.
- D. If any insurance provided pursuant to the Agreement expires or cancels prior to the completion of the Work, you will be notified by CTrax, the authorized vendor of Pinellas County. Upon notification, renewal Certificate(s) of Insurance and endorsement(s) shall be furnished to Pinellas County Risk Management at InsuranceCerts@pinellascounty.org and to CTrax c/o JDi Data at PinellasSupport@ididata.com by the Vendor or their agent prior to the expiration date.
 - 1. Vendor shall also notify County within twenty-four (24) hours after receipt, of any notices of expiration, cancellation, nonrenewal or adverse material change in coverage received by said Vendor from its insurer Notice shall be given by email to Pinellas County Risk Management at InsuranceCerts@pinellascounty.org. Nothing contained herein shall absolve Vendor of this requirement to provide notice.

2. Should the Vendor, at any time, not maintain the insurance coverages required herein, the County may terminate the Agreement,.
- E. If subcontracting is allowed under this Bid, the Primary Vendor shall obtain and maintain, at all times during its performance of the Agreement, insurance of the types and in the amounts set forth; and require any subcontractors to obtain and maintain, at all times during its performance of the Agreement, insurance limits as it may apply to the portion of the Work performed by the subcontractor; but in no event will the insurance limits be less than \$500,000 for Workers' Compensation/Employers' Liability, and \$1,000,000 for General Liability and Auto Liability if required below.
1. All subcontracts between the Vendor and its Subcontractors shall be in writing and are subject to the County's prior written approval. Further, all subcontracts shall
 - a. Require each Subcontractor to be bound to the Vendor to the same extent the Vendor is bound to the County by the terms of the Contract Documents, as those terms may apply to the portion of the Work to be performed by the Subcontractor;
 - b. Provide for the assignment of the subcontracts from the Vendor to the County at the election of Owner upon termination of the Contract;
 - c. Provide that County will be an additional indemnified party of the subcontract;
 - d. Provide that the County will be an additional insured on all insurance policies required to be provided by the Subcontractor except workers compensation and professional liability;
 - e. Provide a waiver of subrogation in favor of the County and other insurance terms and/or conditions
 - f. Assign all warranties directly to the County; and
 - g. Identify the County as an intended third-party beneficiary of the subcontract. The Vendor shall make available to each proposed Subcontractor, prior to the execution of the subcontract, copies of the Contract Documents to which the Subcontractor will be bound by this Section C and identify to the Subcontractor any terms and conditions of the proposed subcontract which may be at variance with the Contract Documents.
- F. Each insurance policy and/or certificate shall include the following terms and/or conditions:
1. The Named Insured on the Certificate of Insurance and insurance policy must match the entity's name that responded to the solicitation and/or is signing the agreement with the County.
 2. Companies issuing the insurance policy, or policies, shall have no recourse against County for payment of premiums or assessments for any deductibles which all are at the sole responsibility and risk of Vendor.

3. The term "County" or "Pinellas County" shall include all Authorities, Boards, Bureaus, Commissions, Divisions, Departments and Constitutional offices of County and individual members, employees thereof in their official capacities, and/or while acting on behalf of Pinellas County.
4. All policies shall be written on a primary, non-contributory basis.

The minimum insurance requirements and limits for this Agreement, which shall remain in effect throughout its duration and for two (2) years beyond final acceptance for projects with a Completed Operations exposure, are as follows:

5.3. WORKERS' COMPENSATION INSURANCE

Worker's Compensation Insurance is required if required pursuant to Florida law. If, pursuant to Florida law, Worker's Compensation Insurance is required, employer's liability, also known as Worker's Compensation Part B, is also required in the amounts set forth herein.

A. Limits

1. Employers' Liability Limits Florida Statutory
 - a. Per Employee \$ 500,000
 - b. Per Employee Disease \$ 500,000
 - c. Policy Limit Disease \$ 500,000

If Vendor is not required by Florida law, to carry Workers Compensation Insurance in order to perform the requirements of this Agreement, County Waiver Form for workers compensation must be executed, submitted, and accepted by Risk Management. The County Waiver Form is found at <https://pinellas.gov/services/submit-a-workers-compensation-waiver-request/>. Failure to obtain required Worker's Compensation Insurance without submitting and receiving a waiver from Risk Management constitutes a material breach of this Agreement.

5.4. COMMERCIAL GENERAL LIABILITY INSURANCE

Includes, but not limited to, Independent Vendor, Contractual Liability Premises/Operations, Products/Completed Operations, and Personal Injury. No Physical Abuse or Sexual Molestation Exclusions.

A. Limits

1. Combined Single Limit Per Occurrence \$ 1,000,000
2. Products/Completed Operations Aggregate \$ 2,000,000
3. Personal Injury and Advertising Injury \$ 1,000,000
4. General Aggregate \$ 2,000,000

5.5. BUSINESS AUTOMOBILE OR TRUCKER'S/GARAGE LIABILITY INSURANCE

To cover owned, hired, and non- owned vehicles. If the Vendor does not own any vehicles, then evidence of Hired and Non-owned coverage is sufficient. Coverage shall be on an "occurrence" basis, such insurance to include coverage for loading and unloading hazards, unless Vendor can show that this coverage exists under the Commercial General Liability policy.

A. Limit

1. Combined Single Limit Per Accident \$1,000,000

5.6. EXCESS OR UMBRELLA LIABILITY INSURANCE

Excess of the primary coverage required, in paragraphs above. No Physical Abuse or Sexual Molestation Exclusions.

A. Limits

1. Each Occurrence \$ 1,000,000
2. General Aggregate \$ 1,000,000

5.7. POLLUTION LEGAL/ENVIRONMENTAL LEGAL LIABILITY INSURANCE

For pollution losses arising from all services performed to comply with this contract. Coverage shall apply to sudden and gradual pollution conditions including the discharge, dispersal, release or escape of smoke, vapors, soot, fumes, acids, alkalis, toxic chemicals, liquids or gases, waste materials or other irritants, contaminants or pollutants into or upon land, the atmosphere or any watercourse or body of water, which results in Bodily Injury or Property Damage. If policy is written on a Claims Made form, a retroactive date is required, and coverage must be maintained for 3 years after completion of contract or "tail coverage must be purchased. Coverage should include and be for the at least the minimum limits listed below:

- A. Bodily injury, sickness, disease, mental anguish or shock sustained by any person, including death; property damage including physical injury to or destruction of tangible property including the resulting loss of use thereof, cleanup costs, and the loss of use of tangible property that has not been physically injured or destroyed;
- B. Defense including costs, charges and expenses incurred in the investigation, adjustment or defense of claims for such compensation damages.
- C. Cost of Cleanup/Remediation.
- D. Limits
 1. Per Claim or Occurrence \$ 1,000,000
 2. General Aggregate \$ 1,000,000
- E. For acceptance of Pollution Legal/Environmental Legal Liability coverage included within another policy coverage required herein, a statement notifying the certificate holder must be

included on the certificate of insurance and the total amount of said coverage per occurrence must be greater than or equal to the amount of Pollution Legal/Environmental Legal Liability and other coverage combined.

5.8. PROPERTY INSURANCE

Vendor will be responsible for all damage to its own property, equipment and/or materials.

Exhibit 2 - RFP Scope of Work

6.1. OBJECTIVE/JUSTIFICATION

The objective is to contract with a knowledgeable land manager that shall be responsible for managing the multi-faceted land management requirements at the Cross Bar / Al-Bar Ranch property, including tasks related to ecosystem management and forestry coordinated to them by the forestry and ecological consultants. The requirements of the Contractor include site security, fire line maintenance, wildfire suppression, gate and fence maintenance, infrastructure and building maintenance, road upkeep, mowing, tree/debris clearing, nuisance wildlife control, and assistance to County and third-party personnel, as needed. Three on-site residences, and one out parcel available for use by placing a contractor owned manufactured home.

6.2. BACKGROUND

Pinellas County owns approximately 12,378 acres inclusive of the Cross Bar / Al Bar Ranch in central Pasco County. A mixed-use Ecosystem Management Plan is currently being implemented which balances water supply operations, silviculture, agricultural operations, and wildlife/habitat restoration activities. The Cross Bar Ranch is currently utilized as a regional well field operated by Tampa Bay Water (TBW).

6.3. REQUIREMENTS

A. SCOPE OF WORK:

1) Land Management

The LAND MANAGER will be responsible for managing the multi-faceted requirements at the Cross Bar / AL-Bar Ranch property, including tasks related to ecosystem management and forestry subordinated to them by the FORESTRY and ECOLOGICAL consultants. These requirements are described in the following paragraphs. The Cross Bar / AL-Bar Ranch Property location is depicted on the map provided as Attachment 1.

a. The LAND MANAGER must have the necessary equipment and be prepared to allocate sufficient personnel to take whatever action is necessary to meet the requirements of this contract and enable the COUNTY to meet its scheduled goals. It is anticipated that the LAND MANAGER will begin working on the site within 30 days after the “Notice to Proceed” (NTP) is issued. This notice will be issued after the contract is executed and all performance security bonds are processed and approved. Negotiations related to the transfer of ownership of any materials or equipment from the previous LAND MANAGER will be the sole responsibility of the LAND MANAGER, and not the COUNTY.

b. The LAND MANAGER will prepare monthly Project Status Reports (PSR’s), using formats and procedures approved by the COUNTY for all work specified in this Scope of Services.

c. The LAND MANAGER will be responsible for facilitating the management of the multi-faceted requirements at the Cross Bar / AL-Bar Ranch property, including tasks related to ecosystem management and forestry. The LAND MANAGER will educate him/herself in the requirements and responsibilities of each of these segments (ecology and forestry) of land use and become acquainted with the objectives of each.

2) Services/Contract Management/COUNTY Liaison

a. The LAND MANAGER will provide contract management services throughout the contract period and any term extensions, including invoicing and recordkeeping. Provide written monthly updates and a log of activities performed on the properties. Additionally, the LAND MANAGER will plan, organize, assign and supervise the staff for all activities conducted on the property.

b. The LAND MANAGER will act as an onsite contact between the COUNTY, Tampa Bay Water (TBW), Pasco County, Southwest Florida Water Management District (SWFWMD), other government agencies, and other contractors carrying out activities on the Cross Bar and AL-Bar Ranch. This is a support role as the onsite presence but should not be considered as acting on behalf of the COUNTY.

3) Security

The LAND MANAGER will maintain continuous security on the premises and shall provide a 24 hour a day/7 day a week presence on the property. This will include, but not be limited to, periodically patrolling the property to maintain security against trespassers, illegal dumping, unauthorized hunting, poaching, vandalism, and any other unauthorized use of the property. The LAND MANAGER will enforce the security by summoning the appropriate law enforcement agency, as needed. This provision, however, in no way requires the LAND MANAGER to take any action which would potentially endanger the LAND MANAGER or their staff. Hunting and fishing will be strictly controlled by the LAND MANAGER to maintain security and prohibit access to the property by unauthorized individuals. Hunting or fishing leases or clubs are strictly prohibited, and recreational hunting will also be strictly prohibited on the property except as planned, authorized and overseen exclusively by the County.

The LAND MANAGER may be employed to conduct guided scheduled hunts for the sole purpose of controlling the currently observed over-population of deer on the property. The harvest of deer will be based on annual population surveys conducted by the ECOLOGICAL CONSULTANT. These hunts will be limited to small groups lead by the LAND MANAGER's agents and any outside participants will be required to sign liability waivers.

The LAND MANAGER should expect to attend, accompany and/or participate in five (5) tours of the Cross Bar/Al Bar properties that may involve various entities such as public officials, regulatory agencies' site meetings, wildlife interests, and public awareness initiatives. For purposes of this Contract, anticipate one or two public official tours, two scheduled birding tours, and one or two regulatory site meetings per year. Compensation for additional tours will be based on the LAND MANAGER's hourly fee schedule.

4) Residence Use

There are currently three (3) residential houses available to the LAND MANAGER to utilize in order to maintain the required security presence on the property. There is also an outparcel on Bowman Road that can be utilized for a manufactured home provided by the LAND MANAGER, if desired. A credit to the COUNTY for each of these units will be deducted from the total compensation for the Basic

Services. The COUNTY reserves the right to conduct inspection of these properties and will provide notice of our intent to conduct an inspection 10 calendar days prior.

Land Manager may be removed from the property at the discretion of the County. At such time, 30 days' written notice to vacate property, including removal of temporary housing, will be given.

5) Pasture Use

Approximately 1654 acres will be made available to the operator for agricultural purposes. Attachment 2 provides a map depicting the areas available for use. If the LAND MANAGER desires to use the pasture acreage, a credit to the COUNTY will be deducted from the total compensation for the Basic Services. The crop type, soil treatments, fertilizers and insecticides, if any, must be compatible with wellfield and forestry/habitat restoration operations, and must be pre-approved by the COUNTY and TBW. Agricultural operations shall be consistent with TBW's wellfield and water withdrawal restricted covenant protection plan and Pasco County's Groundwater Protection Ordinance. These two documents are provided as Attachments 3 and 4. Coordination meetings with the COUNTY and the ECOLOGICAL CONSULTANT will be held prior to any farming activities that may potentially affect the wildlife habitats. Should the LAND MANAGER decline to use the pasture acreage, then mowing or burning of the pasture may be required twice per year to maintain the grassland habitat for the burrowing owls, kestrels, gopher tortoises and other species which utilize this type of habitat. COUNTY has ultimate authority over activities on pasture areas when such activities are in the interest of enhancing the diversity of, and/or revenue for, the property. Examples include ecological or other utilitarian purposes.

6) Fire Line Maintenance/Wildfire Suppression

The LAND MANAGER will disc and maintain approximately 350-400 acres of fire breaks as needed, fight fires with the assistance of outside agencies, and conduct routine patrols after lightning storms, as necessary to prevent and control wildfires on the property. Size and extent of firebreaks may vary from time-to-time and LAND MANAGER will consult with the ECOLOGICAL CONSULTANT and the FORESTER, through the COUNTY, on all firebreak management decisions. The COUNTY will provide two Kubota UTVs equipped with 100-gallon water tankers to help in the suppression of small fires. The vehicles and the water tankers should be kept clean and maintained in good working order, at the expense of the LAND MANAGER (County to pay for necessary maintenance and repairs). These working units shall be properly stored in the two barns and ready to deploy at all times.

7) Fences and Gates

a. The LAND MANAGER will maintain, repair and replace perimeter fences and gates as necessary. The perimeter fence line totals approximately 24 miles. Internal fence and gate maintenance will be dependent on the approved agricultural operations. The internal fences and gates are the sole responsibility of the LAND MANAGER, and not the COUNTY.

b. The automated gates at Locket Avenue and Bowman Road will be maintained by the COUNTY. The LAND MANAGER will notify the COUNTY of any operational issues or need for repair and the COUNTY will procure, oversee and approve the work performed. Invoices for any services related to

these gates will be submitted directly to the COUNTY, and payment will be made directly to the COUNTY's service provider. The LAND MANAGER will assist in coordination with vendors and contractors conducting repair or maintenance work on the gates.

8) Roads/Grassed Areas

a. The LAND MANAGER will maintain, keep clear and mow the edges of the internal dirt roads and the open grassed areas, as necessary. The mowing may include approximately 302 acres of grassed areas along the internal roads as needed, and the timing of the work will be approved by the ECOLOGICAL CONSULTANT to protect nesting birds and other wildlife. The primary internal roads total approximately 24 miles and a map depicting these roadways and the open grassed areas is provided as Attachment 5. The extent of mowing may vary from time-to-time and the LAND MANAGER will consult with the COUNTY, FORESTER and ECOLOGICAL CONSULTANT on management of roads and grassed areas. TBW maintains their own roads. However, as depicted on the attachment, there are grassed areas outside of TBW's area of responsibility that will be maintained by the LAND MANAGER. The LAND MANAGER may be directed by the COUNTY to mow other areas not depicted on the attachment. Cost for mowing additional areas will be paid on a per-unit basis as presented in the cost schedule herein.

b. The LAND MANAGER will trim trees and remove fallen logs to maintain road access and site safety. Before and after digital photographs will be taken and submitted to the COUNTY in the monthly Project Status Reports at the discretion of the COUNTY. All tree trimming on the property should be conducted in accordance with the University of Florida IFAS Center guidelines on tree pruning, which can be found at the following link: <http://hort.ifas.ufl.edu/woody/pruning.shtml>

c. The LAND MANAGER will grade Lockett Avenue from U.S. Hwy 41 to the entrance gate on Lockett Avenue on a quarterly schedule (or as needed). The LAND MANAGER will also grade the Lockett Avenue gravel road from the entrance gate to the Visitors Center on a monthly schedule. Bowman Road entrance will also be graded monthly from the entrance gate to where it meets the paved TBW Road. Before and after digital photographs will be submitted to the COUNTY in the monthly Project Status Reports at the discretion of the COUNTY. All road grading will be conducted in accordance with the United States Department of Transportation Federal Highway Administration 2015 Guidance on Gravel Roads Construction and Maintenance which can be found at the following link:

<https://www.fhwa.dot.gov/construction/pubs/ots15002.pdf>

9) Wild Hog Control

a. The LAND MANAGER will establish and maintain an effective wild hog control program.

b. The LAND MANAGER will trap and remove wild hogs as necessary to protect the property in accordance with the State of Florida Fish and Wildlife Commission's regulations which can be found at the following link: <http://myfwc.com/hunting/by-species/wild-hog/>

c. The LAND MANAGER will report the total number of hogs eradicated on a monthly basis,

d. Recreational hunting is not allowed on the property and will be prohibited except as planned, authorized and overseen exclusively by the County. No discharge of firearms will be allowed when any

tours are being conducted. Firearms will not be worn in areas where children or members of any outside agencies are present. Firearms kept on the property will be properly locked and stored out of sight when not in use.

10) Buildings, Infrastructure and Grounds Maintenance

a. The LAND MANAGER will provide all janitorial supplies and shall be responsible for the cleaning and grounds maintenance services for the Education Center, the gazebo area, and the two (2) barns on the property.

b. The LAND MANAGER will provide ground maintenance for the areas around all identified augmentation wells and the Education Center public supply well.

c. The LAND MANAGER will monitor and record chlorine residual for the public supply well twice weekly. The COUNTY will provide a chlorine test kit for the LAND MANAGER to utilize.

d. The LAND MANAGER will monitor, supply and fill the chlorine tanks at the public supply well and the Education Center booster pump, as necessary. Approximately 14 gallons of chlorine is needed per month. The Water Treatment System at the public supply well is maintained by an outside vendor under contract to the COUNTY.

e. The LAND MANAGER will provide exotic weed control by spraying with a glyphosate-based herbicide as directed by the County, as needed. Any request to utilize an alternative product for control of exotic vegetation will require approval from the COUNTY, and in areas within specific radii of the seventeen production wells, Tampa Bay Water's approval is required. The LAND MANAGER must provide Florida certified commercially licensed pesticide/herbicide applicator for the application of restricted-use pesticides/herbicides, as necessary. Applicator must be certified in the particular specialized ecosystem, as appropriate. The Land Manager will follow directives from any exotic vegetation control plan developed by the Ecologist and as directed by the County.

1. The LAND MANAGER will provide cattail control, as necessary, for the augmented sites with an aquatic glyphosate-based herbicide. The decision to spray cattails will come from discussion with the County and the ECOLOGICAL CONSULTANT.

2. The LAND MANAGER will maintain written records using the Florida Department of Agriculture and Consumer Services (FDACS) pesticide record keeping form which includes the herbicide type, application dates, locations and rates. The LAND MANAGER will submit the FDACS form to the COUNTY within 30 days after completing treatment.

3. Cost for exotic weeds control will be paid on a per-unit basis as presented in the cost schedule herein.

11) North and South Barns and Diesel Tank

a. The North Barn will be made available for the LAND MANAGER to utilize for storing equipment and operating supplies.

b. The South Barn is primarily used for storing the two safari buses (safari buses are primarily used by Pasco Schools for the Environmental Education Program, but also can be used by outside groups). This barn has limited storage available for the LAND MANAGER.

c. A 450 gallon above ground diesel storage tank (AST) is available to the LAND MANAGER to use for its operations. The LAND MANAGER will be responsible for installing and maintaining any pumps, fittings, etc., needed for accessing and utilizing the AST. The LAND MANAGER will be responsible for any spills or discharges due to their own negligence and will be required to pay for any subsequent assessments and/or cleanups, should they be required.

12) Ecosystem Management Program

The LAND MANAGER will be responsible for assisting in the management of the ecosystem and the water resource protection components of the site.

The LAND MANAGER will be responsible for aiding in the facilitation and management of the multi-faceted requirements at the Cross Bar / AL-Bar Ranch property, including tasks related to the implementation of the Ecosystem Management Plan (EMP – Attachment 6) and Forestry Management Plan (FMP – Attachment 7). The LAND MANAGER will educate him/herself in the general requirements and responsibilities of these documents, meet regularly to share and discuss current issues on the site with the ECOLOGICAL CONSULTANT and become acquainted with the goals and objectives of both the EMP and the FMP. The following section is an overview of the ECOLOGICAL CONSULTANT's responsibilities for the edification of the LAND MANAGER. For a general understanding of the property utilization, please review Attachment 6 - Ecosystem Management Plan. The LAND MANAGER will assist in the implementation of the following areas with guidance and direction from the ECOLOGICAL CONSULTANT and/or through the COUNTY, as necessary:

- a. Alert the COUNTY and the ECOLOGICAL CONSULTANT to areas or items of concern that may be observed in day-to-day activities and provide input for recommended remedies or improvements. Observation of areas of exotic vegetation would be a good example of this, and the County envisions a collaborative and comprehensive effort to control this problem on the property.
- b. Coordinate with the COUNTY and ECOLOGICAL CONSULTANT in their facilitations with TBW on their wellfield operation and wetland augmentation operations. The facilitations could include supporting the assessment of wetland augmentation and ditch block improvements as it relates to having a positive benefit to environmental recovery. Attachments 8 and 9 provide the general locations of the augmentation sites, public supply well, and ditch blocks. While coordination with Tampa Bay Water will be the responsibility of the COUNTY and ECOLOGICAL CONSULTANT, the LAND MANAGER will conduct hydro-monitoring activities which includes the monthly quantities from each individual augmentation well and the twice per month water elevation data recorded at each designated staff gauge and shallow groundwater monitoring well.
- c. The ECOLOGICAL CONSULTANT's assessment of current gopher tortoise population and habitat carrying capacity as part of development of recipient sites. The LAND MANAGER will provide assistance such as exotic vegetation control, as needed. Cost for exotic weeds control will be paid on a per-unit basis as presented in the cost schedule herein.
- d. The LAND MANAGER's activities will abide by the guidance and limitations set in the latest EMP as prepared by the ECOLOGICAL CONSULTANT. The EMP is the primary template that guides land use on Cross Bar and Al Bar Ranch properties.
- e. Fire Management/Prescribed Burns

The ECOLOGICAL CONSULTANT develops and implements an approved Site Preparation Plan for burning the wildlife habitat restoration areas. The Plan is approved by the COUNTY prior to implementation of any prescribed burns. Please review Attachment 6 – Ecosystem Management Plan for maps depicting the habitat burn units. The ECOLOGICAL CONSULTANT will develop a new and updated GIS data set and map to be included in their Site Preparation Plan. The LAND MANAGER may be required assist the ECOLOGICAL CONSULTANT and third-party contractors in prescribed burning activities. Cost for prescribed burn assistance will be paid on a per-unit basis as presented in the cost schedule herein.

13) Environmental Monitoring

- a. The LAND MANAGER will read and record well and wetland augmentation flow meters (monthly), staff gauges, and shallow groundwater monitor wells (twice monthly) at the COUNTY's augmented wetland sites and lakes and convey those readings electronically via email to the COUNTY before the 4th of each month for the previous month's data in order to maintain compliance with the specific conditions of the two Water Use Permits. The COUNTY will maintain the flow meters, staff gauges, and monitor wells as well as perform permit-required accuracy checks for the flow meters. The LAND MANAGER will notify the COUNTY in writing of any deficiencies or needs to repair or replace any of the components of the augmentation systems within this Environmental Monitoring Program.
- b. The LAND MANAGER will adjust the augmentation well discharge rates to follow established water levels for the COUNTY's augmented sites as outlined in the County's two Water Use Permits (WUP).
- c. The LAND MANAGER will adjust augmentation discharge rates to follow established WUP water levels for ponds and lakes on the Cross Bar Ranch which are augmented by TBW potable supply. Flow meter and staff gauge readings for the TBW sites are the responsibility of TBW.
- d. The LAND MANAGER will record staff gauge readings (weekly) for the COUNTY's ditch block structures and submit the weekly readings electronically via e-mail to the COUNTY on a monthly basis.
- e. When instructed, the LAND MANAGER will install and remove stop boards for the COUNTY's ditch blocks. Additionally, the LAND MANAGER will accurately record the date and time of the board installations and removals and submit the data electronically via e-mail to the COUNTY on a monthly schedule or as needed and directed by the County.

14) Forestry Management Plan:

a. The following section is an overview of FORESTER's responsibilities for the edification of the LAND MANAGER. The LAND MANAGER may be called upon to assist the FORESTER in its activities on-site and should therefore acquaint him/herself with the scope of work assigned to the FORESTER.

1. The primary focus of the Forestry Management Plan is to create an economically efficient timber management operation on the property compatible with the wildlife habitat restoration efforts, conservation efforts, and TBW's wellfield operations. Approximately 3820 acres of planted pines are present on the property ranging from an age of 1 to 12 years. Approximately 1300 acres of timber currently remain in pine straw production and pine straw will be harvested during the current contract period. An additional 400 acres may also be in pine straw production, depending on the health of these

blocks of timber. Attachments 10 and 11 provide maps that depict the pine straw production areas and the future timber harvest areas.

2. The Forestry Management Plan will outline a program for the best and most economical, pine straw production and maintenance of forest health. These plans will be developed from input from both the FORESTER and the COUNTY. Refer to the Forestry Management Plan to understand the FORESTER'S role and how the LAND MANAGER supports these efforts.

b. Pine Replanting Services

1. The LAND MANAGER may be tasked with the planting of pine seedlings if and when these services may be needed. Pine planting and/or re-planting may be necessary to replace timber crop or pine habitat as the result of wildfire, disease, flood, or other natural occurrences. The type and quantity of pine seedlings is coordinated with and approved by the COUNTY prior to being purchased by the FORESTER. The Pine replanting services are determined by the FORESTER and approved by the COUNTY. Once the proposed replanting services are approved and a formal request is submitted to the COUNTY by the FORESTER, an authorization letter is provided in written form and submitted to the FORESTER and the LAND MANAGER via e-mail.

2. Once the pines are planted and established, the LAND MANAGER shall mow between the rows of the pine trees to keep unwanted trees and brush from growing in the row middles. The LAND MANAGER will be required to spray row middles with an approved herbicide to prevent the reemergence of the unwanted vegetation. This work will be done at the direction of the COUNTY, based on the recommendations of the FORESTER, and will ensure a cleaner, more valuable pine straw mat under the closed canopy of the pine trees. Costs for pine planting services will be paid on a per-unit basis as presented in the cost schedule herein.

3. The cost for herbicide has historically been volatile, and so has the direct cost for these products. The LAND MANAGER will be reimbursed for the cost, plus an administrative fee not to exceed 10% of the cost.

15) Pine Straw Lease Preparation

The LAND MANAGER will mow and apply herbicide at appropriate stages of growth to prepare pine plantations for future pine straw harvesting at the direction of the COUNTY. The LAND MANAGER will make mowing and herbicide application preparations to blocks at suitable stages of growth to prepare for future pine straw harvesting based on the recommendation of the FORESTRY CONSULTANT. Preparation of pine plantation blocks for pine straw harvesting will be paid on a per-unit basis as presented in the cost schedule herein.

16) Additional Services

The LAND MANAGER may be required to provide additional services at the discretion of the COUNTY. The COUNTY may request the LAND MANAGER to perform services not mentioned above, which are required to maintain good stewardship of the publicly owned lands held for multi-use purposes. These additional services will be determined by and requested from the COUNTY'S Project Manager or Project Coordinators. All requests for Additional Services will be in written form via email.

Additionally, the COUNTY's Risk Management Department will perform a safety audit no less than one time each year, and the LAND MANAGER will be required to participate and provide supporting services in order to comply with the provisions of this contract. The LAND MANAGER will be notified in advance of the audit. These audits will include inspections of all structures and installations on the property, including the exterior and interior spaces of the three houses on the site. In addition, the COUNTY's insurance carrier has the right to separately ask for an inspection. Scope and compensation for these Additional Services will be negotiated and may be based on the LAND MANAGER's hourly fee schedule or on a lump sum fee basis, depending on the type of service requested.

6.4. DELIVERABLES

An event or action that marks a clear stage or change in the progress or development of a project. The completion of a milestone or the accomplishment of a task that can be measured and verified and may be a unit by which a contractor or consultant may be paid.

Exhibit 3 - Pricing Proposal

January 23, 2024

3B Cattle, LLC

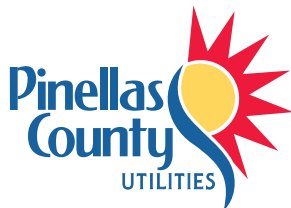
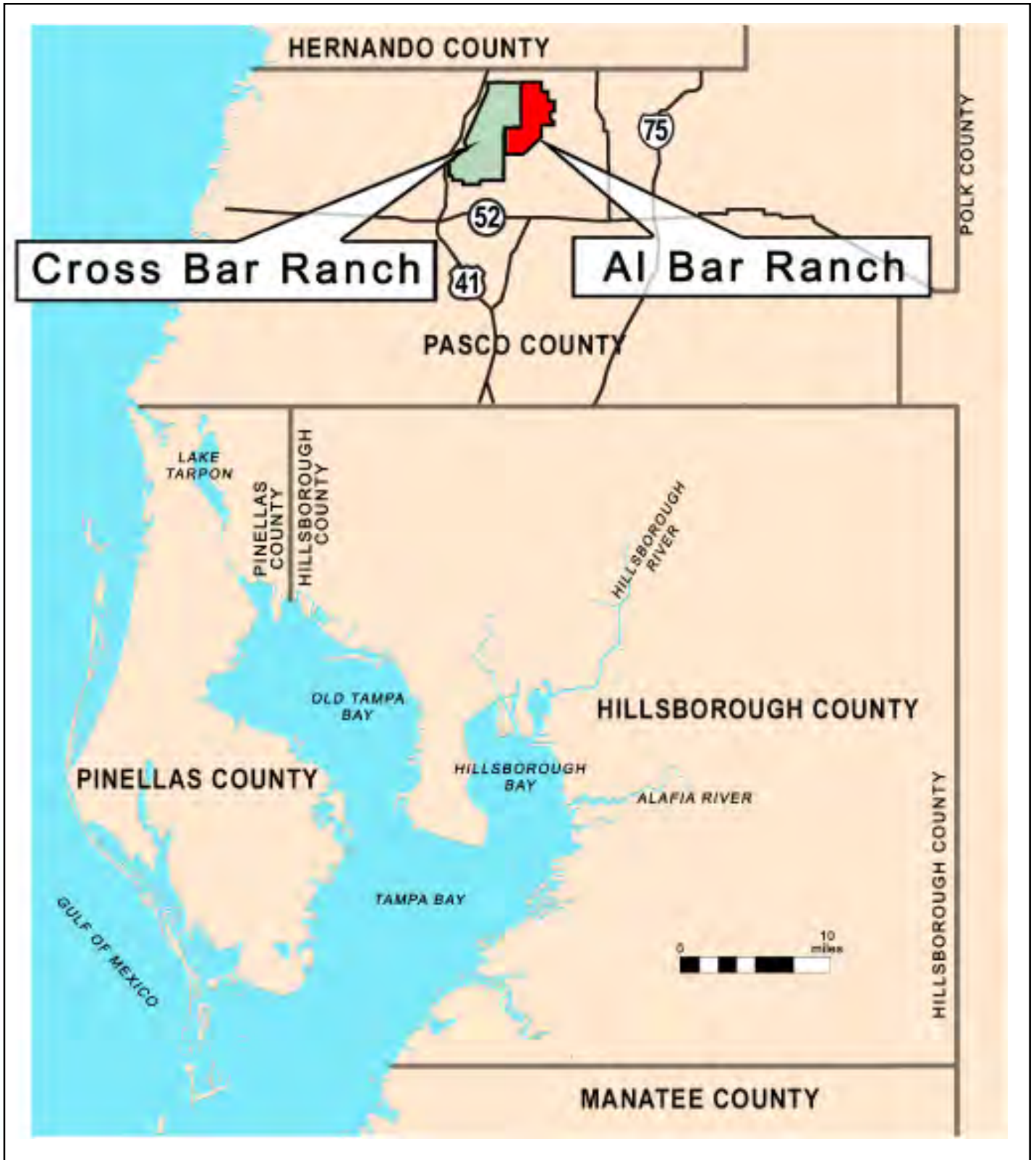
Additional Services Pricing

Description	UOM	Unit Price 2024	Unit Price 2025	Unit Price 2026	Unit Price 2027	Unit Price 2028
Payloader*cost includes operator	Hour	\$100.00	\$102.00	\$104.40	\$106.12	\$108.24
Mowing or Chopping	Acre	\$ 28.00	\$ 28.56	\$ 29.13	\$ 29.71	\$ 30.31
Pine Straw Prep Mowing	Acre	\$ 28.00	\$ 28.56	\$ 29.13	\$ 29.71	\$ 30.31
Pine Straw Prep Herbiciding**	Acre	\$ 23.00	\$ 23.46	\$ 23.93	\$ 24.41	\$ 24.90
Cost of Herbicides**	Gallon	\$ 30.00**	\$ 30.60	\$ 31.21	\$ 31.84	\$ 22.28
Exotic Weed Control, Hand Spraying-Labor	Hour	\$ 30.00	\$ 30.60	\$ 31.21	\$ 31.84	\$ 32.28
Prescribed Burning Assistance Hand Labor	Hour	\$ 30.00	\$ 30.60	\$ 31.21	\$ 31.84	\$ 32.28
Prescribed Burning, Refreshing Fire Lines Prior to burning and during burning. Tractor and Driver	Hour	\$ 55.00				
Management fee for prescribed burning	Hour	\$ 75.00	\$ 76.50	\$ 78.03	\$ 79.59	\$ 81.82
Clerical	Hour	\$ 45.00	\$ 45.90	\$ 46.82	\$ 47.75	\$ 48.71
Annual or Special Reports	Hour	\$125.00	\$127.50	\$130.05	\$132.65	\$135.31
Staff Meetings	Hour	\$ 75.00	\$ 76.50	\$ 78.03	\$ 79.59	\$ 81.18

*Loader already on property

**Cost of Herbicide (estimate, costs depends on current pricing)

2% Annual Increase








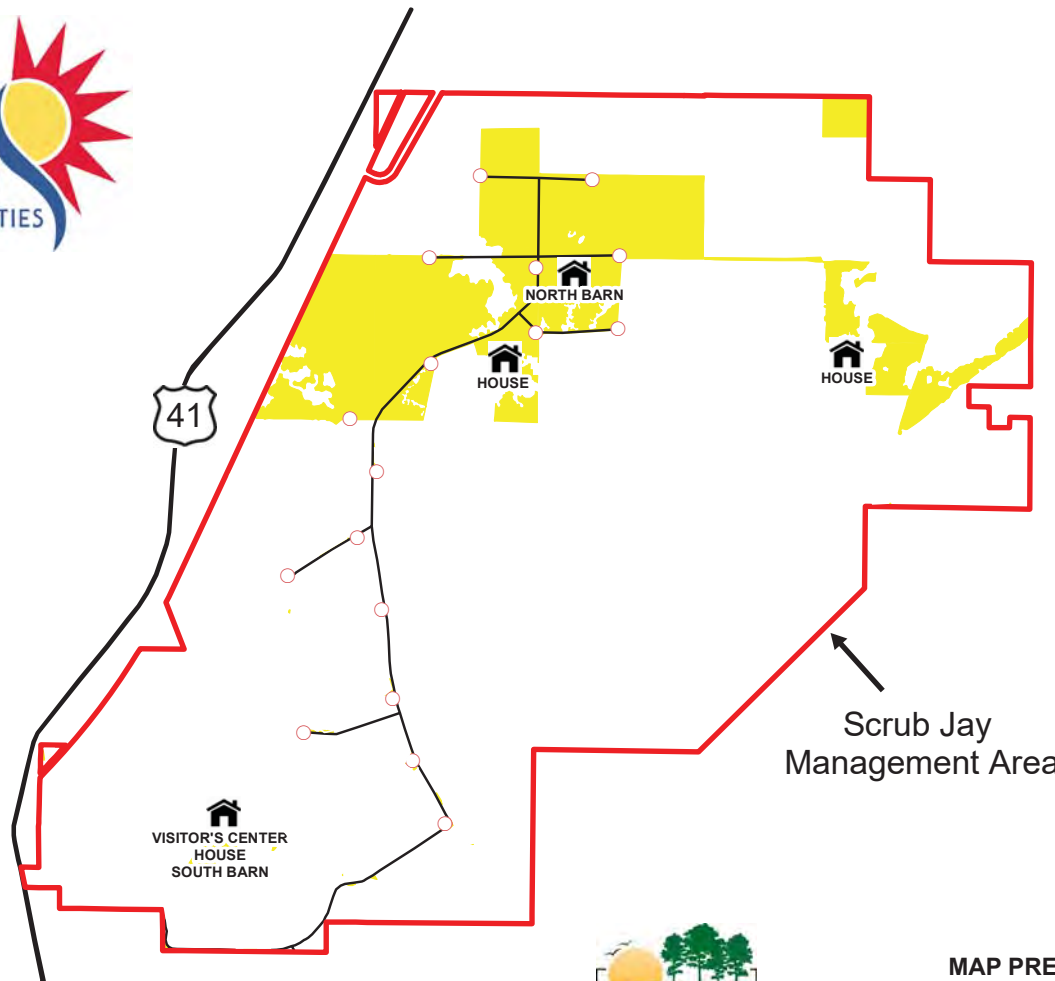
ATTACHMENT 1

Cross Bar-AL Bar Location Map



**Pinellas County Utilities
Cross Bar - Albar Ranch
PASTURE USE
MAP LEGEND**

-  Cross Bar Albar Ranch Boundary (12378 acres)
-  Scrub Jay Management Area (1689 acres)
-  Tampa Bay Water Production Wells
-  Tampa Bay Water Roads
-  Pasture available for agriculture operations (approx. 1600 acres)



Scrub Jay Management Area



0 2,000 4,000 8,000 Feet



MAP PREPARED BY:

NATURAL RESOURCE
PLANNING SERVICES, INC.
32745 Pennsylvania Avenue
P.O. Box 564
San Antonio, FL 33576
(352) 588-2580

NOTICE:

This map is not a survey. Therefore, any derived acreage numbers on this map or accompanying report are approximate and should only be used for planning and management.

This map is not suitable for engineering design or construction. Further, the use of any associated acreage numbers for sales or negotiations is entirely at the risk of the buyer and seller.

Map Modified by PCU 04/3/2017

Map Updated on: 03/24/2017

Map Updated by: J.T. Vogel

Projection: NAD 1983 UTM Zone 17N
Map Scale: 1 in. = 4000 ft

**EXHIBIT B
TO
WELLFIELD AND WATER WITHDRAWAL
RESTRICTIVE COVENANT
WELLFIELD PROTECTION ORDINANCE**

It shall be the policy of the County to review all developments for the purpose of limiting the discharge of toxic substances or other harmful pollutants into the groundwater aquifer and to specifically review and limit potentially harmful discharges upon or adjacent to designated wellfields as identified in the County's Comprehensive Plan and within 200 feet of other major potable water supply wells.

612.2 Minimum Criteria for Groundwater

A. All groundwater shall at all places and at all times be free from domestic, industrial, agricultural, or other man-induced nonthermal components of discharges in concentrations which alone or in combination with other substances, or components of discharges (whether thermal or nonthermal):

1. Are harmful to plants, animals, or organisms that are native to the soil and responsible for treatment or stabilization of the discharge relied upon by permits issued by the Florida Department of Environmental Regulation.

2. Are carcinogenic, mutagenic, teratogenic, or toxic to human beings, unless specific criteria have been established by appropriate rule of the Florida Department of Environmental Regulation.

3. Are acutely toxic to indigenous species of significance to the aquatic community within surface waters affected by the groundwater at the point of contact with surface waters.

4. Pose a serious danger to the public health, safety, or welfare.

5. Create or constitute a nuisance.

6. Impair the reasonable and beneficial use of adjacent waters.

B. Said minimum criteria shall not apply to the groundwater classified as Class G-IV by the Florida Department of Environmental Regulation unless said department determines that there is a danger to the public health, safety, or welfare.

EXHIBIT B

612.3 Wellhead Protection

Within 200 feet of any major potable water supply well producing in excess of 100,000 gallons of potable water per day there shall be no:

A. Physical nonresidential construction activities other than clearing, grubbing, earthwork, or construction activities associated with water production uses of the well facility.

B. No installation of potential sources of pollution which require the issuance of a permit from the Florida Department of Environmental Regulation; other than residential collection system for central wastewater systems.

C. No surface or groundwater discharge other than sheet flow stormwater drainage associated with residential development.

612.4 Wellfield Protection

A. The following land use activities within the wellfields identified within the Pasco County Comprehensive Plan are prohibited:

1. The use, handling, production, or storage of toxic substances or hazardous materials except those substances or materials necessary for the operations of the wellfields.

2. Wastewater effluent disposal except that of reuse or reclaimed water through land application as approved by the Florida Department of Environmental Regulation and the operator of the wellfield when the chloride content is no greater than 500 mg/l.

3. Liquid waste disposal.

4. Solid waste disposal.

5. Excavating or mining within a 500-foot radius of any existing wellhead located within the wellfield.

B. For land development uses or activities located adjacent to wellfields proposing discharge to surface or groundwater or the handling of toxic or hazardous materials, the County may require, where necessary, the following:

1. Groundwater monitoring wells as in the manner approved by the County, installed at the property owner's expense, prior to issuance of a Certificate of Occupancy. The County shall have the right to inspect and sample the monitoring wells. Certified analytical results of the quantity present in each monitoring well of the regulated substance, as identified by the Florida Department of Environmental Regulation, which are used, handled, reduced, or stored on the property, shall be filed quarterly with the County.

2. Containment regulated substances - Leakproof trays on the containers, floor curbing, liners, or other containment systems to provide secondary liquid containment, shall be installed where necessary, prior to the issuance of a Certificate of Occupancy. The containment shall be of adequate size to handle all spills, leaks, overflows, and precipitation until appropriate action can be taken. The specific design and selection of materials shall be sufficient to preclude any regulated substance loss to the external environment. The containment system shall be sheltered so that the intrusion of precipitation is effectively prevented. These requirements shall apply to all areas of use, production, and handling, to all storage areas, to loading and off-loading areas, and to aboveground and underground storage areas. The containment devices and liquid collection systems shall be certified by a registered professional engineer or a professional geologist licensed in the State of Florida.

3. Emergency collection devices - Vacuum suction devices, absorbent scavenger materials, or other devices approved by the County shall be present on-site prior to the issuance of a Certificate of Occupancy or within two (2) hours of a spill by contract with a cleanup company approved by the County prior to the issuance of a Certificate of Occupancy. Devices or materials shall be available in sufficient magnitude so as to control and collect the total quantity of regulated substances present. To the degree feasible, emergency containers shall be present in such capacity as to hold the total quantity of regulated substances plus the absorbent material. The presence of such emergency collection devices shall be

certified by a registered professional engineer or professional geologist licensed in the State of Florida and verification shall be provided to the County prior to the issuance of a Certificate of Occupancy.

4. Emergency Plan - An emergency plan shall be prepared and filed with the County prior to the issuance of a Certificate of Occupancy. The emergency plan shall indicate the procedure to be followed in the event of spillage of regulated substance so as to control all such spill material in such a manner as to prevent it from reaching the stormwater or wastewater system or the ground.

5. Alterations, Expansions, and Modifications - Any alteration, expansion, or modification of regulated land use or activity must be approved by the County prior to implementation. Such alteration, expansion, or modification may result from increased square footage or production, storage capacity, increased quantities of regulated substances, or changes in types of regulated substances. The County shall be notified in writing prior to any such alteration, expansion, or modification and shall be provided with a detailed description of the alteration, expansion, or modification. The proper notification shall not prevent a re-evaluation of the amendment for modification, and a revision of the conditions of approval if, in the opinion of the County, the alteration, expansion, or modification substantially or materially modifies, alters, or affects conditions upon which the approval was granted or the ability to continue to satisfy any conditions that have been imposed as part of the approval.

612.5 Conditions of Development Approval

In the event the County determines that a particular land use or activity outside the protection boundaries set forth above poses a significant threat of pollution or contamination to the groundwater, wellfields, or major potable water supply wells as well as a result of the handling, storage, production, or other use of hazardous or toxic materials, the County may impose, as conditions of development approval, one or more of the requirements set forth in Section 612.4(B) above.

CHAPTER 800. NATURAL AND CULTURAL RESOURCES PROTECTION

SECTION 808. GROUNDWATER PROTECTION

808.1. Intent and Purpose

It is the intent and purpose of this section to protect and maintain the quality of groundwater in the County by providing criteria for land uses and the siting of facilities which use, handle, produce, store, or dispose of regulated substances, and by providing protection to vulnerable features which discharge directly to the Floridan aquifer. This section is intended to protect the quality of water obtained from existing and future community public supply wells, in addition to the Countywide groundwater resources.

The Ground Water Resource Availability Inventory for the County, produced by the Southwest Florida Water Management District (SWFWMD) and the County Groundwater Protection Study, prepared by Metcalf & Eddy, and adopted by the Board of County Commissioners (BCC), both indicate that much of the County is highly susceptible to groundwater contamination. As such, these regulations are vital to the health, safety, and welfare of the County and its residents.

This section is not intended to duplicate existing State or Federal regulatory provisions, but shall apply to those activities not currently regulated by the Federal or State permits, or where such regulations are less restrictive.

808.2. Applicability

This section shall apply to the unincorporated area of the County and to the incorporated areas of the County to the extent permitted by Article VIII, Section 1(f), of the State Constitution.

808.3. Exemptions

The following activities are exempt from this section:

A. Continuous Transport of Regulated Substances

The transportation of any regulated substance through the County provided the transporting motor vehicle is in continuous transit and meets all applicable State and Federal requirements.

B. Office Uses

Use, handling, or storage of regulated substances by offices, provided that the regulated substances are auxiliary to the operating activities of the business, and the regulated substances are used, handled, and stored pursuant to all applicable State and Federal requirements and product label instructions.

C. Janitorial Uses

The use of regulated substances for the maintenance and cleaning of residential, commercial, office buildings, and other allowable uses provided the regulated substances are used, handled, and stored pursuant to all State and Federal requirements and product label instructions.

D. Application of Pesticides, Herbicides, Fungicides, and Rodenticides

The application of regulated substances used as pesticides, herbicides, fungicides, and rodenticides are exempt, provided that the application is conducted pursuant to all applicable State and Federal requirements and product label instructions. The application shall be flagged in the records of the certified operator supervising the use. The certified operator shall provide specific notification in writing to the applicators under his supervision that they are working at a site located in Wellhead Protection Areas (WPA) 1 or 2, or Special Protection Areas (SPA) for which particular care is required. Records shall be kept of the date and amount of those substances applied at each location, and said records shall be available for inspection at reasonable times by the County.

E. Fire, Police, Emergency Medical Services, and County Emergency Management Facilities

Existing fire, police, emergency medical services, and County emergency management center facilities.

F. Potable Water Utilities

Community water system utilities shall be exempt from Sections 810.7.A and B to the extent necessary to operate water treatment facilities in WPA 1, WPA 2, or SPA. Utilities shall eliminate the use of liquid fuels for backup generators whenever possible. Provisions shall be made for aboveground and secondary containment when liquid fuels will continue to be used.

G. Reclaimed Water

Reclaimed water activities as permitted, pursuant to Rule 62-610, Florida Administrative Code (F.A.C.).

H. Residential Lots of Record Where Sewer is Unavailable

On residential lots of record existing as of December 2, 2002, a residential land use may be developed with a permitted individual septic system and subject to existing zoning within a protection area, although such use would otherwise be prohibited by this section because a sewer is unavailable; however, such use shall be connected to a sewer when it becomes available.

808.4. **Existing Nonconforming Uses**

Any use which lawfully existed on December 2, 2002, or for which a County permit, master plan, or conditional plat had been issued by the County, or for which an active application for a County permit was pending on December 2, 2002, and which does not conform with all the provisions of this section, may remain in use or come into use as a nonconforming use, subject to the following:

- A. Expansion or modification of existing nonconforming uses shall be governed by this Code, Section 1200, Nonconformities.
- B. All existing uses utilizing on-site, sewage disposal; e.g., septic tanks, shall be connected to the public sewer within 365 days of the sewer becoming available as defined in the Pasco County Code of Ordinances, Sections 110-113.
- C. All permitted land application sites for wastewater residuals (sludge) or septage in SPAs and WPAs may be used until the expiration of the current permit. Permits for wastewater residual and/or septage land application sites shall not be renewed.
- D. Abandonment of a permit, permit application, master plan, or conditional plat under this section will result in the loss of nonconforming use status.
- E. All such uses shall be operated and maintained pursuant to all applicable County, State, and Federal laws and regulations.

808.5. **Establishment of Groundwater Resource, Wellhead, and Special Protection Areas**

A. **Groundwater Resource**

The entire land area within the County is a groundwater resource protection area. Any activity that involves the handling, utilization, generation, or disposal of regulated substances shall be conducted, pursuant to all applicable County, State, and Federal laws and regulations.

B. **Wellhead Protection Areas**

1. **Designation**

The County designates WPAs for all community water system supply wells based on the average permitted capacity of the supply well. (See Appendix 808 for methodology.)

- a. **Wells Below 100,000 gallons per day (gpd)**. Community water system supply wells with an average permitted capacity below 100,000 gpd shall have a WPA 1 with a 500-foot radius around the well.

- b. Wells 100,000 gpd or greater. Community water system supply wells with an average permitted capacity of 100,000 gpd or more shall have an established WPA 1 and WPA 2. The WPA 1 shall encompass the land between the well and the five (5) year travel time contour. The WPA 2 shall be the area between the five (5) and ten (10) year travel time contours. All WPAs for supply wells with a capacity of 100,000 gpd or more shall have a 200-foot buffer zone to account for variations in modeling, as recommended by Metcalf & Eddy in its Groundwater Protection Study Final Report.

2. Owner/Operator Responsibilities

- a. Operators and/or owners of community water systems shall provide the County with copies of applications to renew water use/water supply permits and final permits issued by the Florida Department of Environmental Protection (FDEP) and/or the SWFWMD. Community water systems shall provide the County with updates to existing water use/water supply permits. Additionally, water use/water supply permit applications for new supply wells shall be provided to the County at the time of the application to FDEP and/or SWFWMD.
- b. Community water systems shall provide, if necessary to delineate or revise protection areas, within ninety (90) days of a request by the County, a calibrated pump test from which the maximum capacity of the supply can be calculated. Community water systems that serve projects ninety-five (95) percent built out and contain adequate flow measuring devices may substitute peak daily pumpage for maximum capacity.

C. Special Protection Areas

SPAs shall be designated around vulnerable features when the County determines that the feature has the potential to discharge directly to the Floridan aquifer. These areas include excavations and solution features such as sinkholes and caves. These features shall be deemed vulnerable when they expose the top of the Floridan aquifer. For purposes of this section, SPAs may also be designated to include areas with land use approval for mining, whether actual excavation has taken place or not. Such a designation as an SPA shall remain in place unless and until, any excavation resulting from mining activities is backfilled, or otherwise reclaimed as set forth below, or for areas which have not been excavated, the land use approval for mining is eliminated.

The SPA shall consist of a setback of 500 feet as measured from the outer boundary of the vulnerable feature or area with land use approval for mining. SPAs shall be delineated on the SPA map.

Sinkholes or excavations which have been backfilled to the land surface with materials of permeability similar to or less than that of the surrounding soil or equivalent reclamation will not be considered a vulnerable feature.

D. Rebuttable Presumption

Challenge of the County's determination of the applicability of WPAs and SPAs will be conducted in accordance with Section 808.6.B below and may be appealed pursuant to this Code. The substantially affected party shall provide site specific data that would allow for more detailed calculations of the zones of contribution on a case-by-case basis.

808.6. **Maps**

A. Adoption of Maps

The WPA maps developed as a part of the Groundwater Protection Study are adopted by the County, and by reference, are made a part of this section. SPA maps shall be adopted by resolution as they become available. Official WPA and SPA maps shall be placed on digital file with the County Development Services Branch.

B. Determination of Prohibited Uses Within Wellhead and Special Protection Areas

Properties located partially within a WPA or an SPA reflected on the maps shall be governed by the restrictions applicable to that zone.

The determination of locations of prohibited uses within the WPAs and SPAs shall be accomplished in one (1) of the following ways:

1. Acknowledgement by the landowner or operator/owner of the facility that the use, as regulated by this Code, is located within a WPA or an SPA.
2. Review and location of property on the WPA or an SPA map by County staff.
3. Use of differentially corrected global positioning system techniques may be used to determine the distance from the protected feature to the prohibited use.
4. Survey of the proposed location of a prohibited use by a Licensed Professional Surveyor.

If the location of a WPA or an SPA boundary is disputed by any party, a survey, by a licensed professional, shall serve as the basis of the determination. (The survey shall be paid for by the property owner and prepared by a professional surveyor acceptable to the County.)

Such a survey may also be used to determine that portion of a property which is actually located within the WPA or an SPA, thereby allowing development of a land use on property located partially within a WPA or an SPA, while ensuring the groundwater protection intended by this section.

Potentially prohibited uses located within more than one (1) WPA shall be considered to be in the most restrictive WPA. Where the prohibited use is overlapped by WPAs of different wells or wellfields, the most restrictive WPA shall apply.

C. Review of Protection Area Maps

The WPA and SPA maps may be reviewed by the BCC on a periodic basis. However, failure to conduct said review shall not affect the validity of the existing approved map. WPA and SPA maps may be modified due to changes in technical knowledge, such as transmissivity or porosity; changes in pumping rates; reconfiguration of wellfields; abandonment or relocation of supply wells; the installation of new supply wells or wellfields; establishment of minimum flows or levels pursuant to Chapter 373, Florida Statutes; changes in maximum contaminant levels; changes in laws or regulations that may impact this section; or to accommodate changes in topography, such as sinkholes or newly approved mining areas, in a manner consistent with the methodology and standards established in this section for designation of these areas. In the event that new wellfields are established within the County which result in WPAs being established pursuant to the methodology set forth in this section, or changes that occur with respect to SPAs, the WPA and SPA maps may be amended by a BCC resolution after a duly noticed public hearing to reflect the existence or changes of such WPAs or SPAs. Any substantially affected person may petition the BCC to consider amendments to the WPA and SPA maps. The County shall schedule the requested WPA or SPA map amendment no more than ninety (90) days after receipt of the request by the County.

808.7. Prohibitions Within Wellhead and Special Protection Areas

A. WPA 1 and SPA

The activities listed below are prohibited in WPA 1 and SPA:

1. Solid waste disposal.
2. Discharges from commercial and industrial wastewater treatment plants and industrial septic systems and commercial and industrial wastewater effluent disposal.
3. Wastewater treatment plants. Expansion of existing domestic wastewater treatment plants may be allowed upon demonstration of compliance with the FDEP regulations. Public access reuse of reclaimed water and land application of domestic wastewater effluent

may be allowed upon demonstration of compliance with Rule 62-610, F.A.C.

4. Any use which is a potential source of pollution requiring the issuance of a permit required for the use and handling of regulated substances from the State (FDEP), other than residential collection systems for central wastewater systems.
5. Any commercial or industrial activity that handles, utilizes, generates, or disposes of regulated substances including, but not limited to, hazardous waste treatment, storage, or disposal facilities as defined in Section 403.703(22), Florida Statutes, or 40 CFR or Rule 62-730, F.A.C., including transfer facilities, such facilities ancillary to recycling facilities and facilities which burn such hazardous waste for fuel; hazardous waste generators including conditionally exempt small quantity generators and small quantity generators; facilities regulated by the Emergency Planning and Community Right-to-Know Act of 1986, 42 U.S.C. § 11001-11050; vehicle or equipment service and repair facilities; dry-cleaning or laundromat operations; commercial car wash operations; and maintenance yards and pesticide/fertilizer mixing and handling facilities.
6. New industrial euclidian zoning amendments.
7. Concentrated animal feeding operations.
8. Land application of wastewater residuals or septage.
9. Discharges of any regulated substance or untreated stormwater into karst solution features, sinkholes, or drainage wells. Stormwater facilities that treat stormwater to Chapters 62-25, F.A.C., and 40D-4, F.A.C., (in effect December 29, 2011), standards shall be presumed to be allowed.
10. Underground storage tanks for regulated substances; however, this does not prohibit the replacement of tanks associated with an existing nonconforming use where such replacement is required to comply with State or Federal regulations.
11. Mining and borrow pits; however, retention or detention ponds required for allowable uses shall not be prohibited, unless the ponds would be prohibited by Sections 810.7.A.17 or 18 below.
12. Residential subdivisions, with more than one (1) unit per two (2) acres, that do not provide for a central sanitary sewer facility and wastewater treatment plant outside WPA 2.
13. Junkyards.
14. Landfarming of soil contaminated with regulated substances.

15. Stormwater retention or detention ponds that will receive stormwater from land uses prohibited in WPA 1, WPA 2, or SPA were constructed after November 19, 2002.
16. The siting of underground product lines including, but not limited to, pipelines designed for the transportation of gasoline, oil, or other regulated substances. This prohibition does not include sewer or reclaimed water lines serving uses allowed within these protection areas.
17. Excavation of waterways or drainage facilities that intersect the Floridan aquifer.
18. Excavation that removes or disturbs the confining unit located above the Floridan aquifer.
19. Land application of animal waste.
20. Dairy farms or egg production facilities as defined in Rule 62-670.200, F.A.C.

B. WPA 2

The following activities are prohibited in WPA 2:

1. Hazardous waste treatment, storage, or disposal facilities as defined in Section 403.703(22), Florida Statutes; 40 CFR, § 260.10; or Rule 62-730, F.A.C., including transfer facilities, such facilities ancillary to recycling facilities, and facilities which burn such hazardous waste for fuel.
2. Solid waste disposal.
3. Discharges from commercial and industrial wastewater treatment plants, and industrial septic systems, and commercial and industrial wastewater effluent disposal.
4. Discharges of any regulated substance or untreated stormwater into karst solution features, sinkholes, or drainage wells. Stormwater facilities that treat stormwater to Chapters 62-25 F.A.C., and 40D-4, F.A.C., (in effect December 29, 2011), standards shall be presumed to be allowed.
5. Landfarming of soil contaminated with regulated substances.
6. The siting of underground product lines including, but not limited to, pipelines designed for the transportation of gasoline, oil, or other regulated substances. This prohibition does not include sewer or reclaimed water lines serving uses allowed within this zone.

7. Underground storage tanks for regulated substances; however, this does not prohibit the replacement of tanks associated with an existing nonconforming use where such replacement is required to comply with State or Federal regulations.
8. Residential subdivisions, with more than one (1) unit per acre, that do not provide for a central sanitary sewer facility and wastewater treatment plant outside WPA 2.
9. Wastewater treatment plants. Expansion of existing domestic wastewater treatment plants will be allowed upon demonstration of compliance with FDEP requirements. Public access reuse of reclaimed water and land application of domestic wastewater effluent may be allowed upon demonstration of compliance with Rule 62-610, F.A.C.
10. Hazardous waste generators including conditionally exempt small quantity generators and small quantity generators.
11. Excavation of waterways or drainage facilities that intersect the Floridan aquifer.
12. Excavation that removes or disturbs the confining unit located above the Floridan aquifer.

808.8. **Best Management Practices Within WPAs and/or SPAs**

- A. Any commercial or industrial activity that handles, utilizes, generates, or disposes of regulated substances shall be operated and maintained pursuant to all applicable County, State, and Federal laws and regulations.
- B. For existing and future land development uses or activities located in a WPA or an SPA proposing to discharge to surface or groundwater or to handle regulated substances, the County may require, where necessary for the protection of groundwater, any or all of the following:
 1. Groundwater monitoring wells as in the manner approved by the County, installed at the property owner's expense, prior to the issuance of a Certificate of Occupancy (CO). The County shall have the right to inspect and sample the monitoring wells. Certified analytical results of the quantity present in each monitoring well of any regulated substance used, handled, reduced, or stored on the property shall be filed quarterly with the County.
 2. Containment for regulated substances. Leak-proof trays on the containers, floor curbing, liners, or other containment systems to provide secondary liquid containment shall be installed where necessary, prior to the issuance of a CO. The containment shall be of adequate size to handle all spills, leaks, overflows, and precipitation

until appropriate action can be taken. The specific design and selection of materials shall be sufficient to preclude any regulated substance loss to the external environment. The containment system shall be sheltered so that the intrusion of precipitation is effectively prevented. These requirements shall apply to all areas of use, production, and handling, to all storage areas, to loading and off-loading areas, and to aboveground and underground storage areas. The containment devices and liquid collection systems shall be certified by a State-Registered Professional Engineer or Licensed Professional Geologist.

3. Emergency collection devices. Vacuum suction devices, absorbent scavenger materials, or other devices approved by the County shall be present on-site prior to the issuance of a CO or within two (2) hours of a spill by contract with a cleanup company approved by the County prior to the issuance of a CO. Devices or materials shall be available in sufficient magnitude so as to control and collect the total quantity of regulated substances present. To the degree feasible, emergency containers shall be present in such capacity as to hold the total quantity of regulated substances plus the absorbent material. The presence of such emergency collection devices shall be certified by a State-Registered Professional Engineer or Licensed Professional Geologist and verification shall be provided to the County prior to the issuance of a CO.
4. Emergency plan. An emergency plan shall be prepared and filed with the County Office of Emergency Management prior to the issuance of a Building Permit. The emergency plan shall contain each element listed on the Office of Emergency Management checklist as amended and shall indicate the procedure to be followed in the event of spillage of regulated substance so as to control all such spill material in such a manner as to prevent it from reaching the stormwater or wastewater system or the ground.
5. Alterations, expansions, and modifications. Any alteration, expansion, or modification of regulated land use or activity must be approved by the County prior to implementation. Such alteration, expansion, or modification may result from increased square footage or production, storage capacity, increased quantities of regulated substances, or changes in types of regulated substances. The County shall be notified in writing prior to any such alteration, expansion, or modification and shall be provided with a detailed description of the alteration, expansion, or modification. The proper notification shall not prevent a re-evaluation of the amendment for modification, and a revision of the conditions of approval if, in the opinion of the County, the alteration, expansion, or modification substantially or materially modifies, alters, or affects conditions upon which the approval was granted or the ability to continue to satisfy any conditions that have been imposed as part of the approval.

C. Conditions of Development Approval

In the event the County determines that a particular land use or activity outside the WPA or SPA boundaries poses a significant threat of pollution or contamination to the groundwater, wellfields, or community water system supply wells as a result of the handling, storage, production, or other use of regulated substances, the County may impose, as conditions of development approval, one (1) or more of the requirements set forth in Section 808.8.B.

808.9. **Registration - Regulated Substances**

Any nonresidential facility or activity within the County, other than the continuous transit through the County, that uses, handles, produces, stores, or disposes of regulated substances in quantities greater than twenty-five (25) gallons (approximately ninety-five [95] liters), if liquid, or greater than 220 pounds (100 kilograms), if solid, in a calendar month shall be required to register with the County.

808.10. **Sinkholes**

- A. Backfill material shall be clean and of similar or lower permeability of the surrounding soil. It shall be a violation of this section to dispose of regulated substances, solid waste, untreated stormwater, or other inappropriate substances in a sinkhole.
- B. Sinkholes that occur in existing detention/retention ponds shall be filled with clean fill material of similar permeability to surrounding soil that will not reduce storage within the ponds and will not allow for short-circuiting of the treatment process.

808.11. **New Community Water Supply Locations**

Prior to siting of new community water system supply well(s), the increase in permitted withdrawal quantities, or the relocation of permitted supply well(s), the utility shall model WPAs for the proposed supply wells using the methodology and data provided by the County. No community water system supply wells or withdrawal quantity increase will be allowed into an area that would incorporate existing prohibited uses in the WPA. However, if the only such prohibited use is a mine or borrow pit, the supply wells may be sited if the utility can demonstrate control of the mining or borrow pit.

808.12. **Appeals**

Any determination made pursuant to this section may be appealed by a substantially affected person pursuant to this Code, Section 407. Notice of an appeal hearing shall be mailed to the property owner, the owner/operator of the affected supply well(s), and all property owners within the WPA boundary in question.

808.13. **Reporting of Spills and Unauthorized Discharges**

- A. Any unauthorized discharge of a regulated substance(s), in excess of five (5) gallons if a liquid, or twenty-five (25) pounds if a solid, shall be reported immediately by the facility owner, operator, or other responsible party to the County. Such notification shall in no way alleviate the owner, operator, or responsible party from other local, State, or Federal reporting obligations required by law. The owner, operator, responsible party, or person providing notification shall inform the County of the substance(s) discharged, the amount, location, duration of discharge, and the potential hazard to groundwater, if known.
- B. A discharge of any quantity of a regulated substance must be remediated such that contamination of soils, surface water, or groundwater is brought into compliance with local, State, and/or Federal standards.
- C. Clean-up activities shall begin concurrent with or immediately following emergency response activities. A full written report including the steps taken to contain and clean up the spill shall be submitted to the County within forty-five (45) days of the discovery of the spill.
- D. Any person responsible for a spill or unauthorized discharge shall be subject to the clean-up and reimbursement provisions in this section.

APPENDIX 808

METHODOLOGY FOR DELINEATION OF WELLHEAD PROTECTION AREA

- A. Methodology for the delineation of WPAs for community water system supply wells permitted to pump 100,000 gpd or greater.

The wellhead protection areas correspond to five (5) and ten (10) year travel time contours. These travel time contours were generated using the modeling techniques explained in the September 25, 2001, County groundwater protection study by Metcalf & Eddy (Pasco Groundwater Study), adopted herein by reference. The following is a summary of the procedures used to develop the WPAs for community water system supply wells that are permitted on average to pump $\geq 100,000$ gpd.






1. The locations of the subject water supply wells were established in terms of the Universal Transverse Mercator (UTM) coordinates (NAD83 datum) based on surveying conducted by Tampa Bay Water, Metcalf & Eddy, Inc., and the SWFWMD.
2. The Central North Tampa Bay Integrated Surface and Groundwater model (version 2.5, calibration NEWCNTB 127) was used to develop regional groundwater regime information for input to local groundwater models with finer resolution.
3. The regional groundwater model was refined in eighteen (18) areas around water supply wells to produce local groundwater models with grid resolutions of fifty (50) to 100 feet. Groundwater levels calculated by the regional model were specified on the boundary of the local models, which were run to steady state with average recharge conditions, and well withdrawals equal to their permitted daily average flows.
4. Zones of contribution were determined by backward tracking of particles uniformly released around the supply wells for two (2), five (5), and ten (10) year travel times. For these simulations, an effective porosity of 0.15 was used in conjunction with a thickness of 500 feet for the Upper Floridan Aquifer. The delineation methodology is described in the Pasco Groundwater Study.
5. Based on a sensitivity analysis of the delineation methodology, a buffer of 200 feet around the calculated zones of contribution was adopted to provide a margin of safety and account for uncertainty in the parameters and approaches used in the modeling.

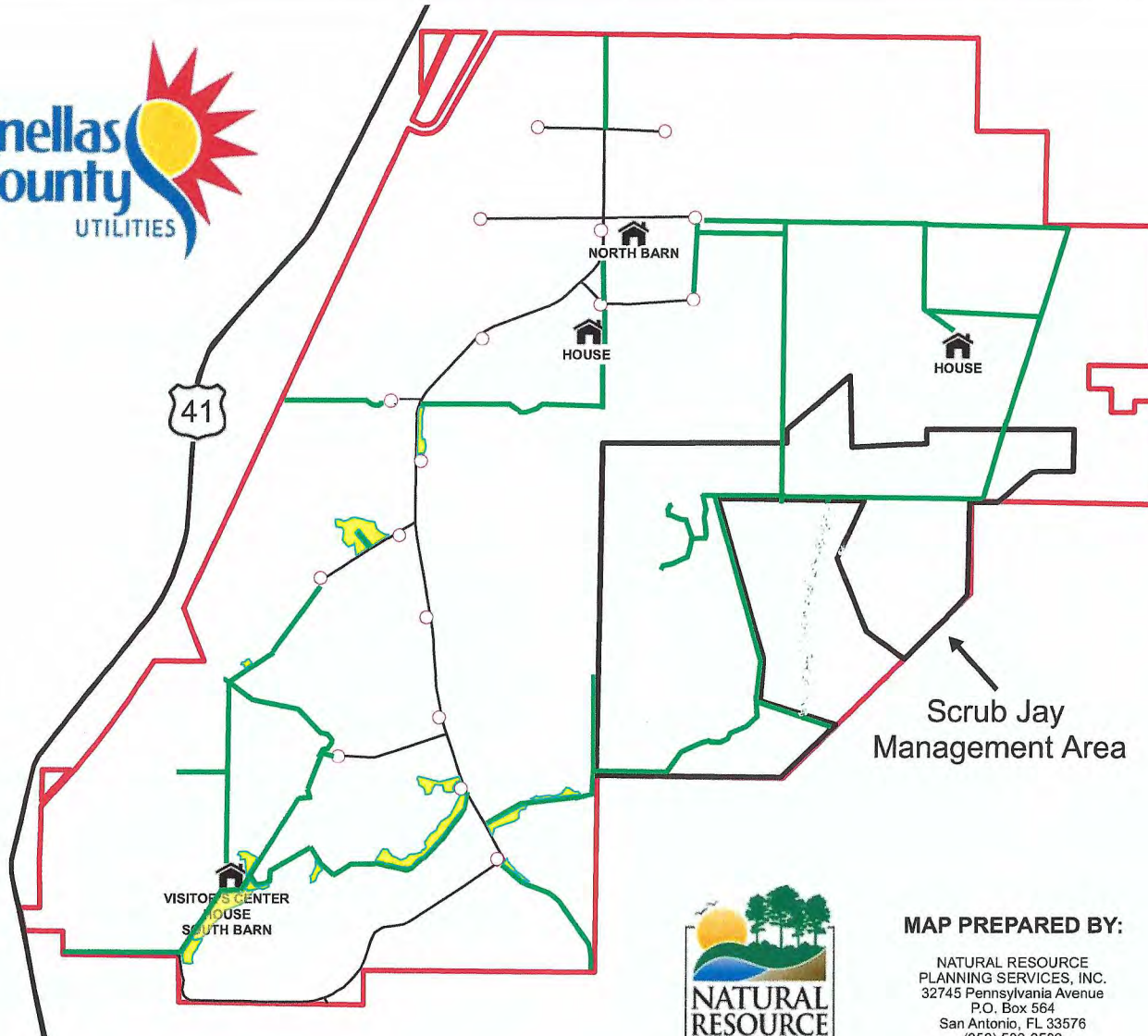
- B Methodology for the delineation of wellhead protection areas for community water systems permitted on average to pump less than 100,000 gpd.

WPA 1 for community water system supply wells permitted on average to pump less than 100,000 gpd shall be a fixed radius of 500 feet from the well or wells. This radius is based on a time of travel of five (5) years for a supply well withdrawing 100,000 gpd over an aquifer thickness of 200 feet, with an effective porosity of 0.15.



**Pinellas County Utilities
Cross Bar - Albar Ranch
Internal Roads Map
MAP LEGEND**

-  Cross Bar Albar Ranch Boundary (12378 acres)
-  Scrub Jay Management Area (1689 acres)
-  Tampa Bay Water Production Wells
-  Internal Roads (Approx. 100 miles)
-  Open Grassed Areas



0 2,000 4,000 8,000 Feet



MAP PREPARED BY:

NATURAL RESOURCE
PLANNING SERVICES, INC.
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P.O. Box 564
San Antonio, FL 33576
(352) 588-2580

NOTICE:

This map is not a survey. Therefore, any derived acreage numbers on this map or accompanying report are approximate and should only be used for planning and management.

This map is not suitable for engineering design or construction. Further, the use of any associated acreage numbers for sales or negotiations is entirely at the risk of the buyer and seller.

Projection: NAD 1983 UTM Zone 17N
Map Scale: 1 in. = 4000 ft

Map Modified by PCU 04/03/2017
Map Updated on: 01/17/2017
Map Updated by: J.T. Vogel

CROSS BAR and AL BAR RANCH ECOSYSTEM MANAGEMENT PLAN

September 2019

Prepared for:



Prepared by:



735 Lakeview Drive
Wimauma, FL 33598

In Association with:

The Forestry Company
3 B Cattle Company

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APPENDIX A FSJMA Short-term Management Plan

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 Lockett 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.

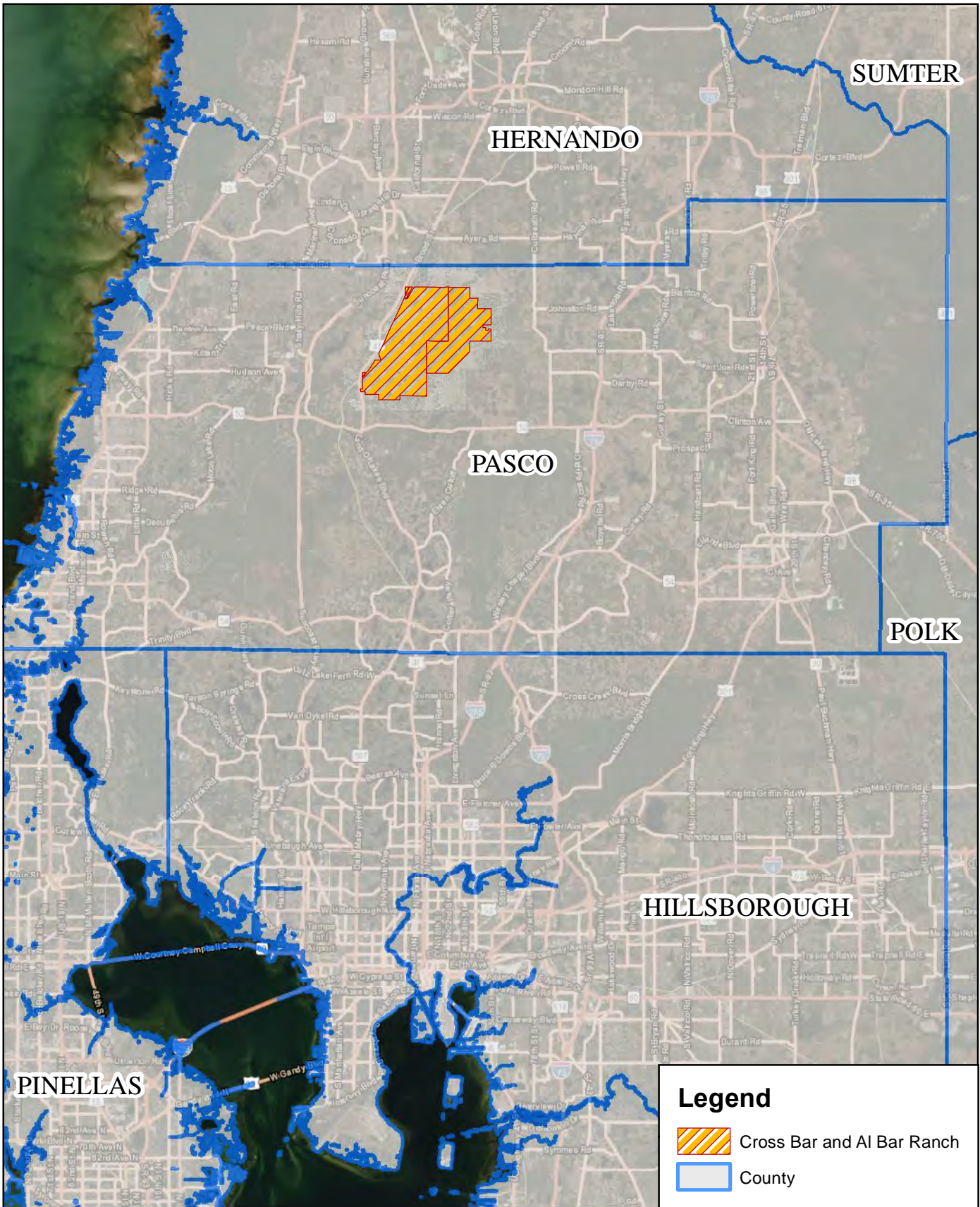
Pinellas County's stated overarching goal for the EMP is to: "protect the water and natural resources of CB/AB. The forestry, agricultural, and other future revenue producing activities shall be compatible with this intent and with the desire to offset management costs."

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;

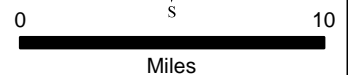
10. Implement a wildlife and habitat monitoring plan for the purpose of monitoring the results of management activities and employing adaptive management;
11. Adopt an Adaptive Management Program that will employ the results of ongoing monitoring, maintenance and management to evaluate success and adjust 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



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



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 Quaternary 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

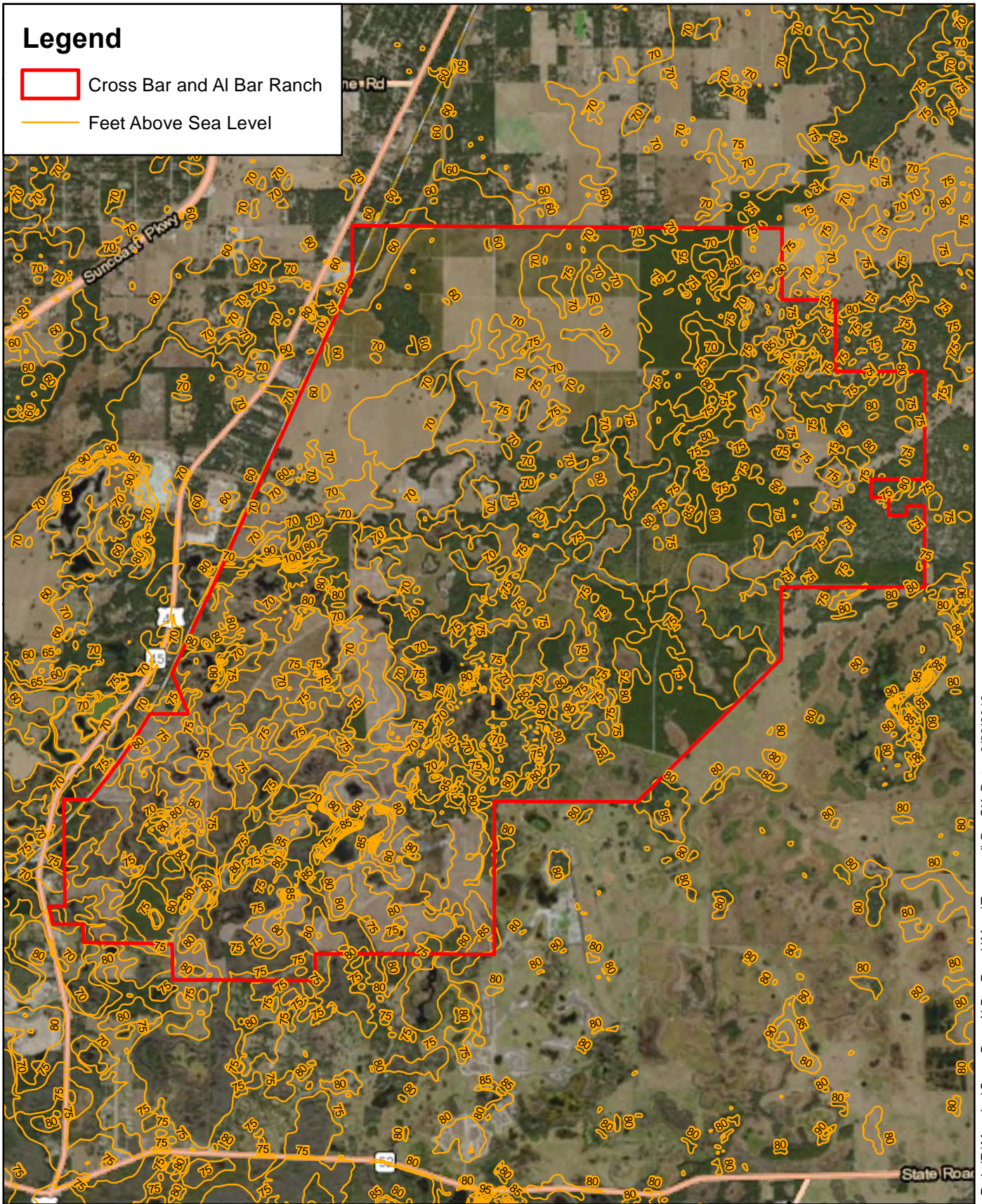
In October of 2000, Audubon of Florida designated CB/AB as part of the “Central Pasco Important Bird Area (IBA).” An IBA designation is given when a site meets one or more of the following criteria:

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.

Legend

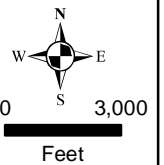
-  Cross Bar and Al Bar Ranch
-  Feet Above Sea Level

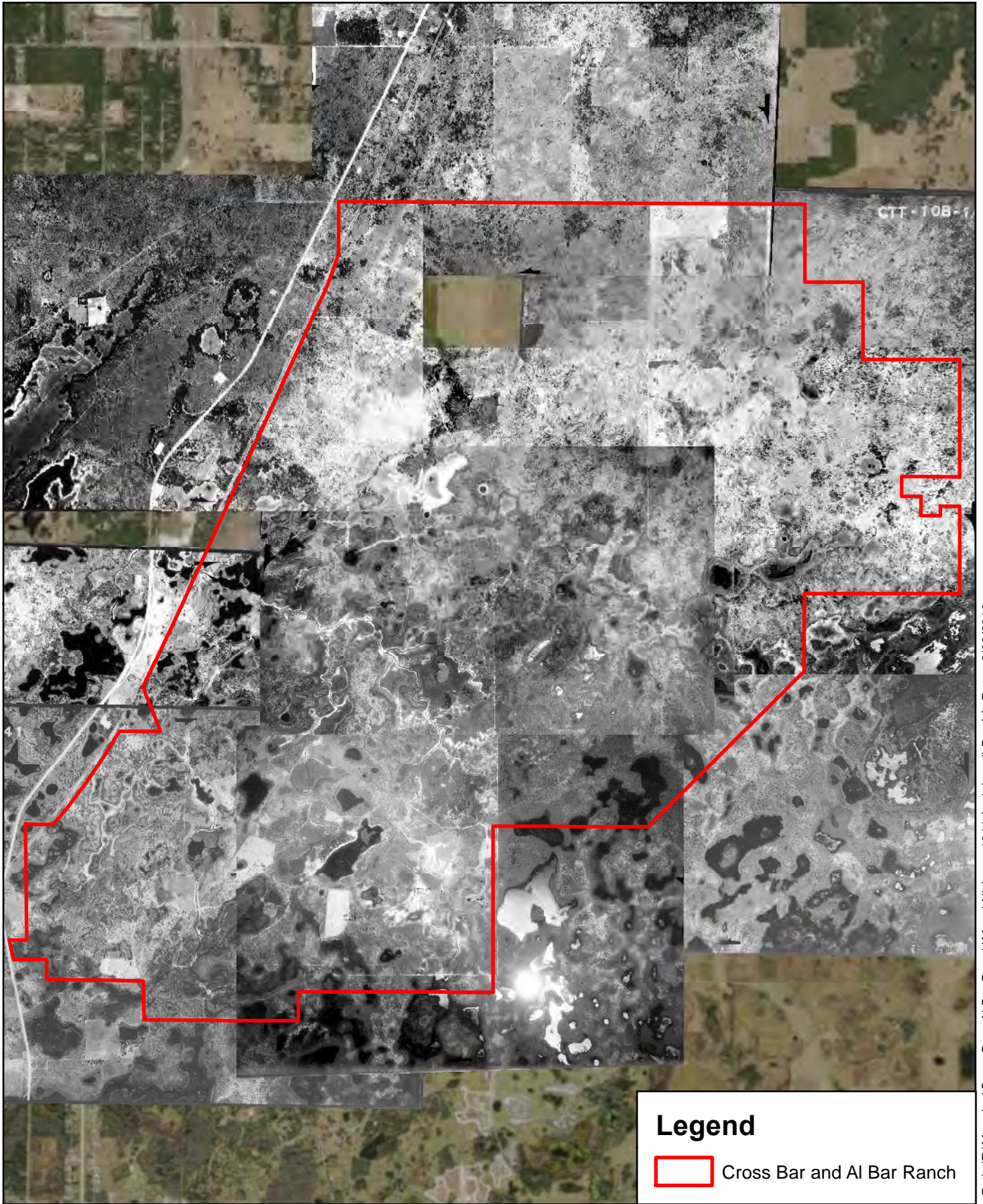


Path (E:\Mapping\Cross Bar - Al Bar Ranch\Maps\Topo.mxd) By: CK Date: 8/26/2019



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

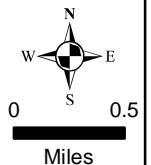


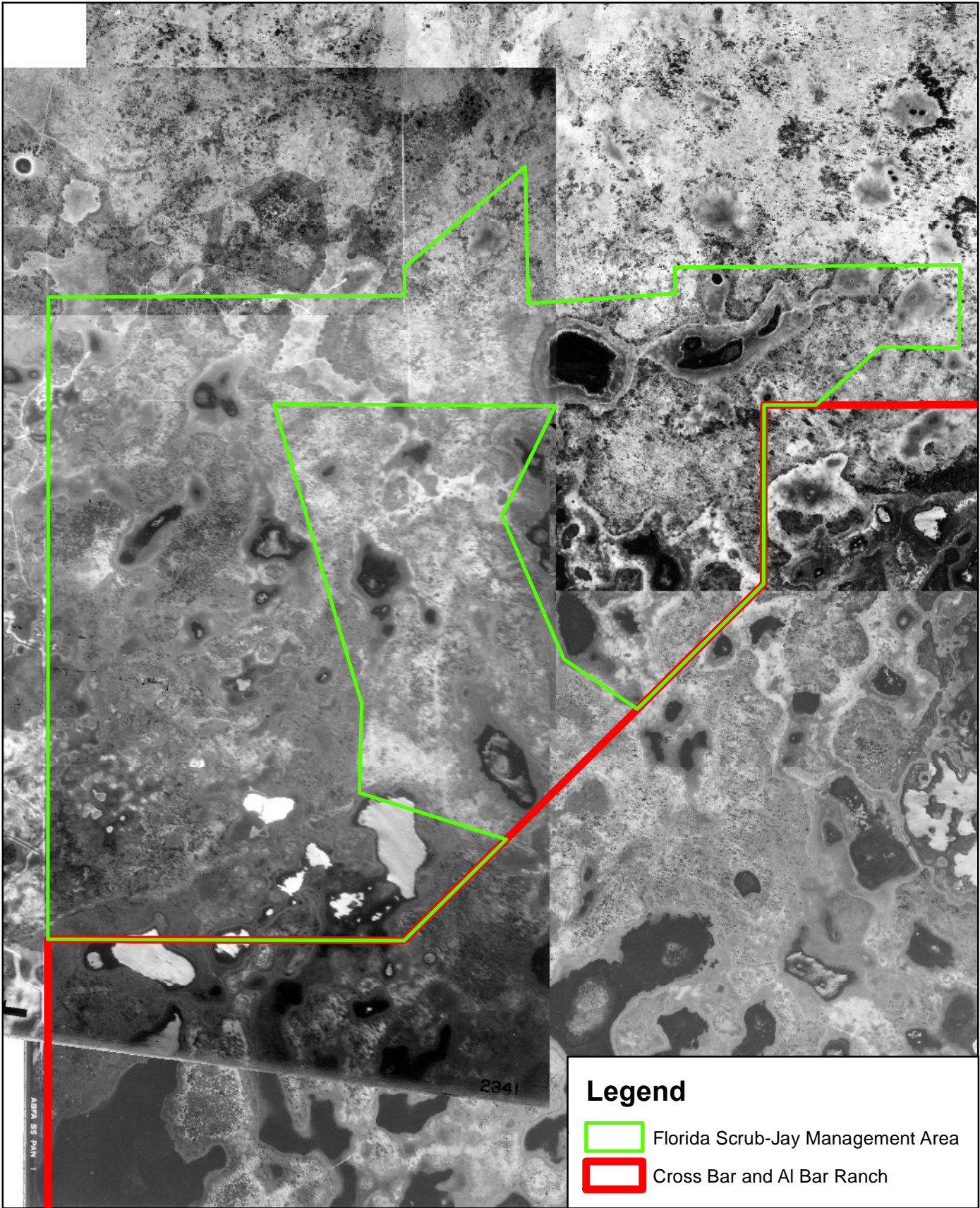


Path (E:\Mapping\Cross Bar - Al Bar Ranch\Maps\All Areas 1941 Aerial.mxd) By: AA Date: 8/26/2019



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

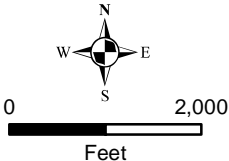




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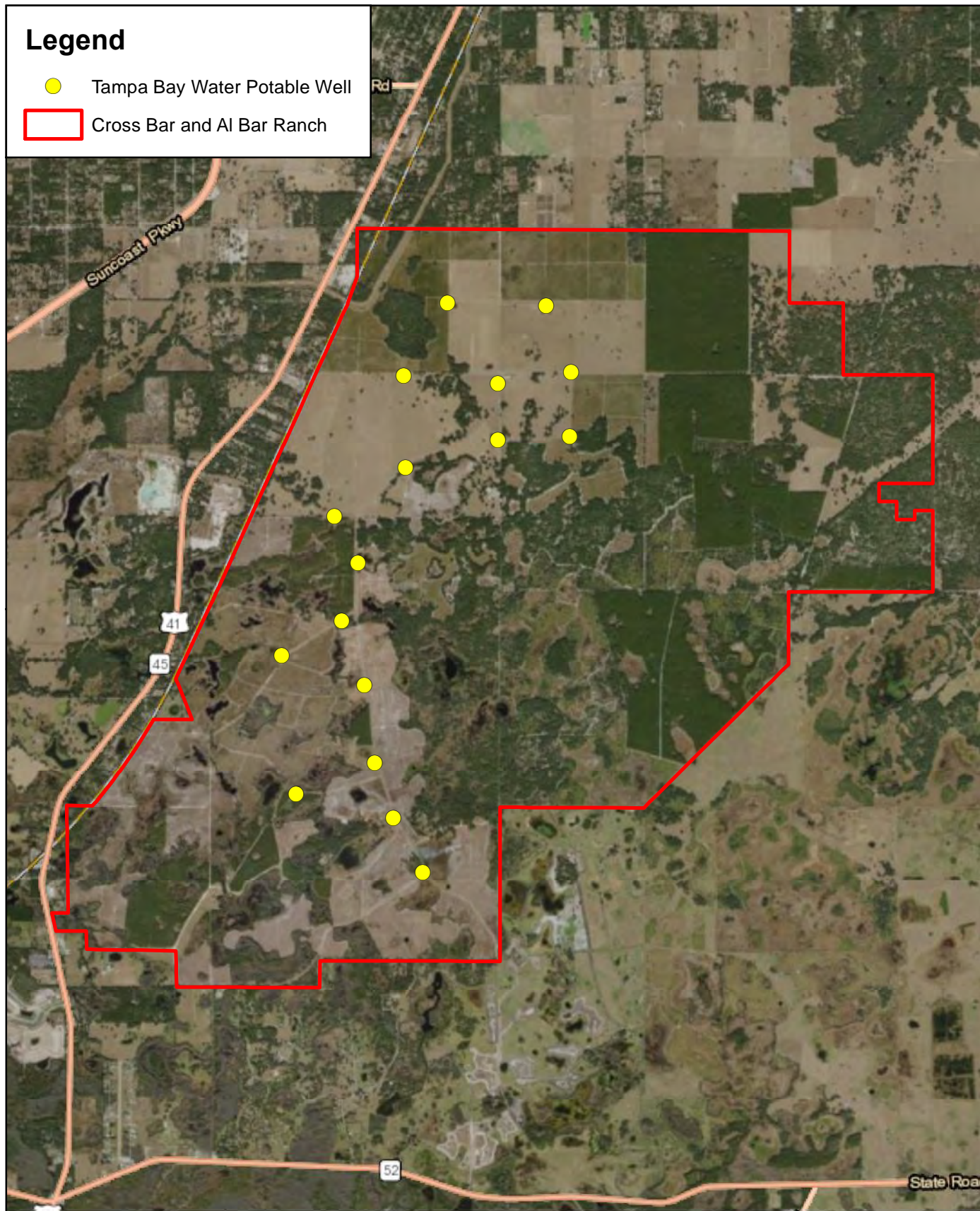
- Florida Scrub-Jay Management Area
- Cross Bar and Al Bar Ranch

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



Legend

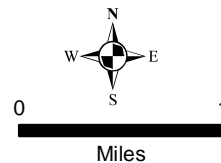
- Tampa Bay Water Potable Well
- Cross Bar and Al Bar Ranch



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

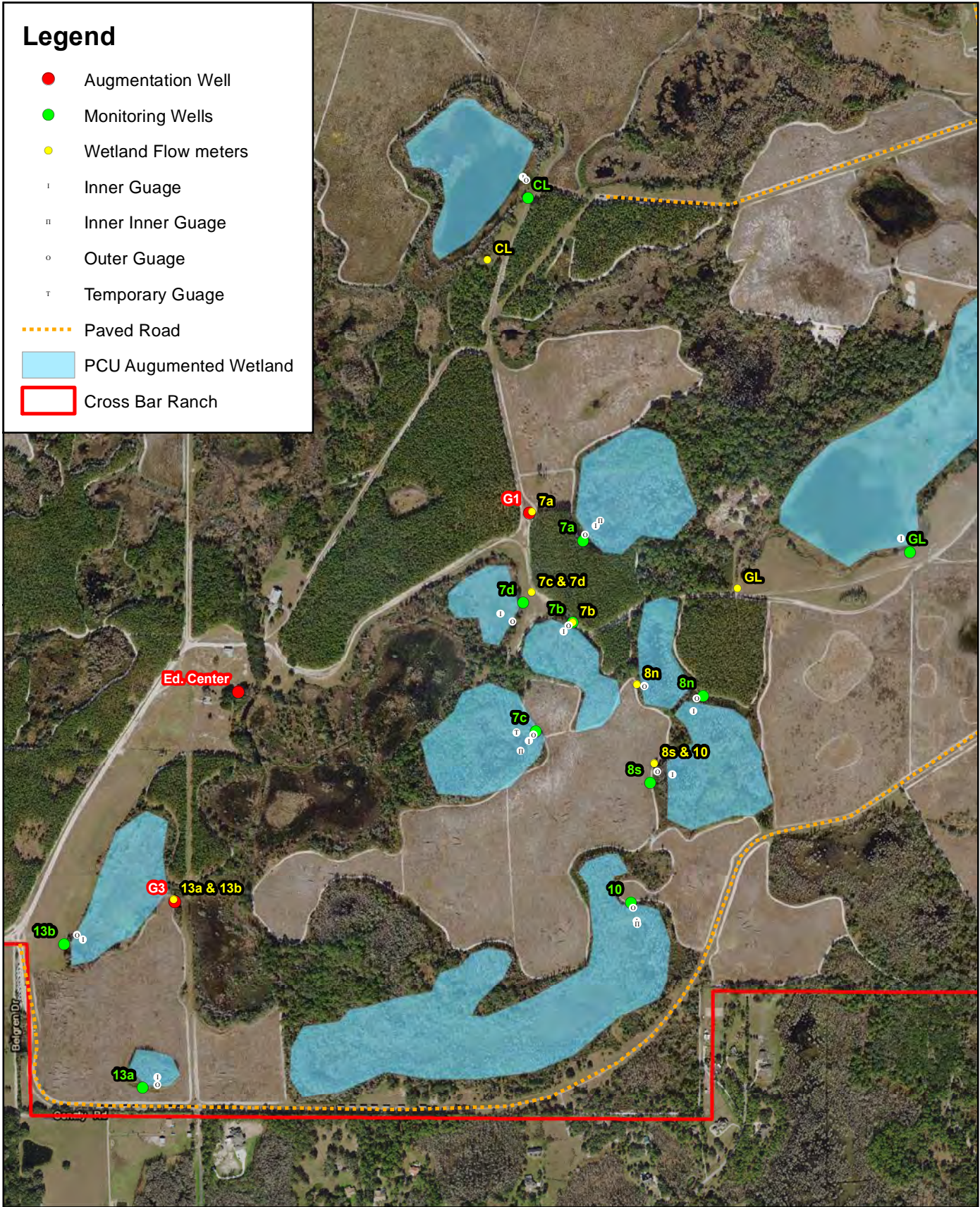


Figure 2-4
Tampa Bay Water Production Wells
Cross Bar and Al Bar Ranch
Pasco County, Florida



Legend

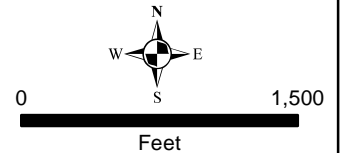
- Augmentation Well
- Monitoring Wells
- Wetland Flow meters
- I Inner Guage
- II Inner Inner Guage
- o Outer Guage
- T Temporary Guage
- Paved Road
- PCU Augumented Wetland
- ▭ Cross Bar Ranch



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

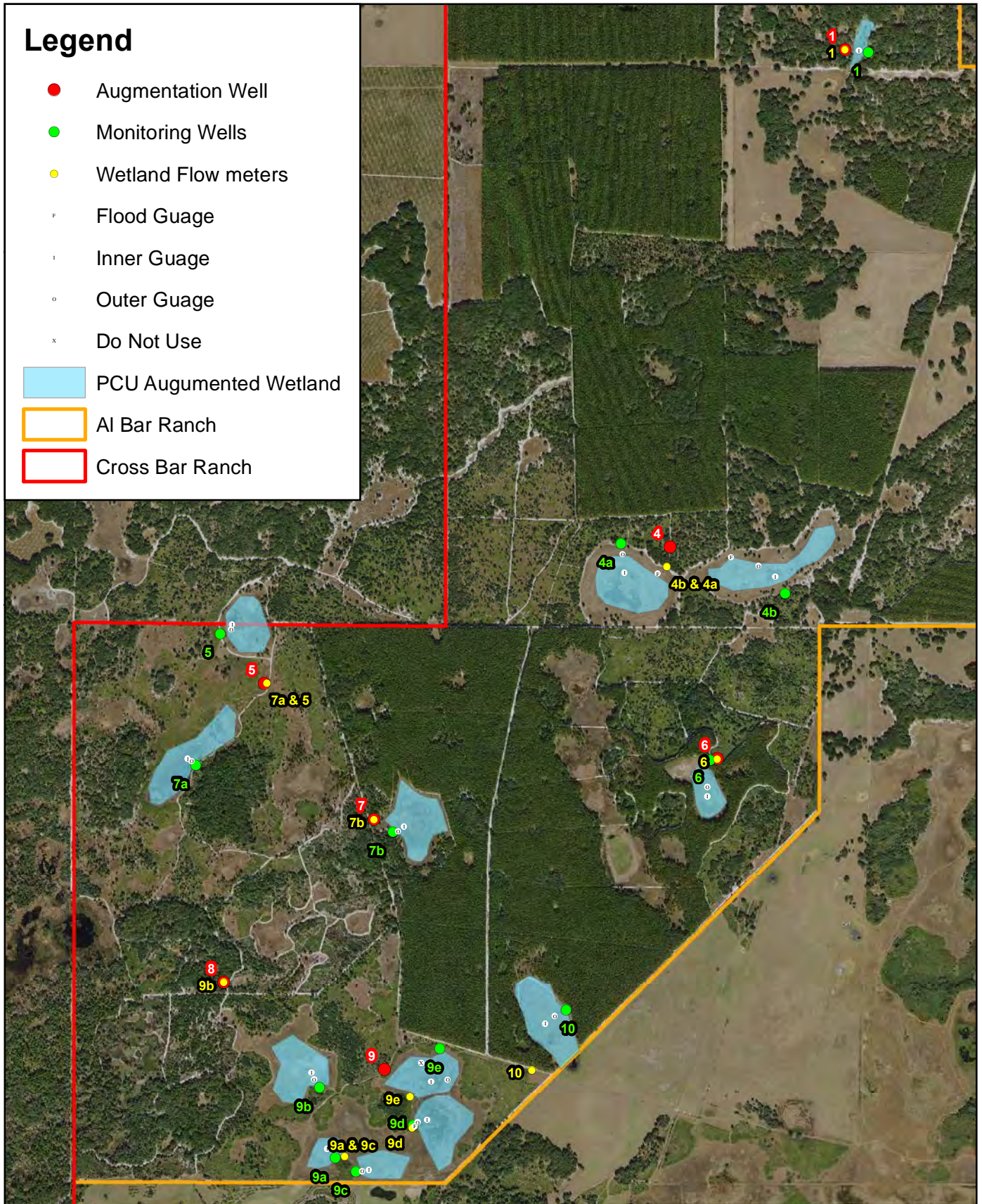


Figure 2-5
Augmented Wetlands
Cross Bar Ranch
Pasco County, Florida



Legend

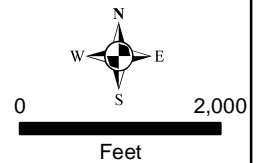
- Augmentation Well
- Monitoring Wells
- Wetland Flow meters
- ⋈ Flood Guage
- ⋈ Inner Guage
- Outer Guage
- × Do Not Use
- PCU Augumented Wetland
- AI Bar Ranch
- Cross Bar Ranch



Path (E:\Mapping\Cross Bar - AI Bar Ranch\Maps\AI-Bar Hydrology Monitoring.mxd) By: CK Date: 8/26/2019



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

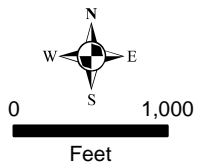


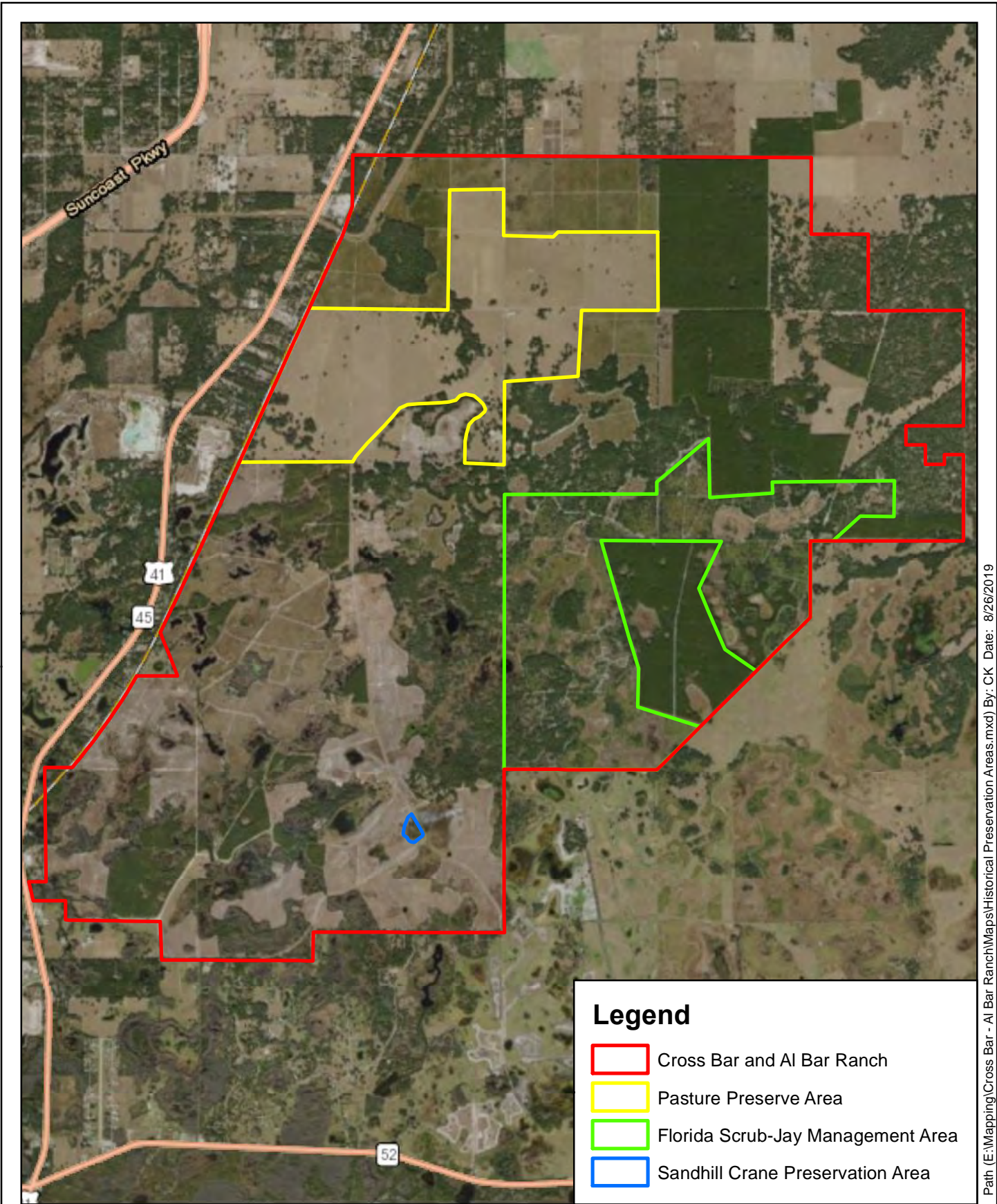


Path (E:\Mapping\Cross Bar - Al Bar Ranch\Maps\Ditch Blocks.mxd) By: CK Date: 8/26/2019



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

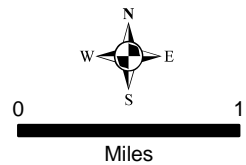


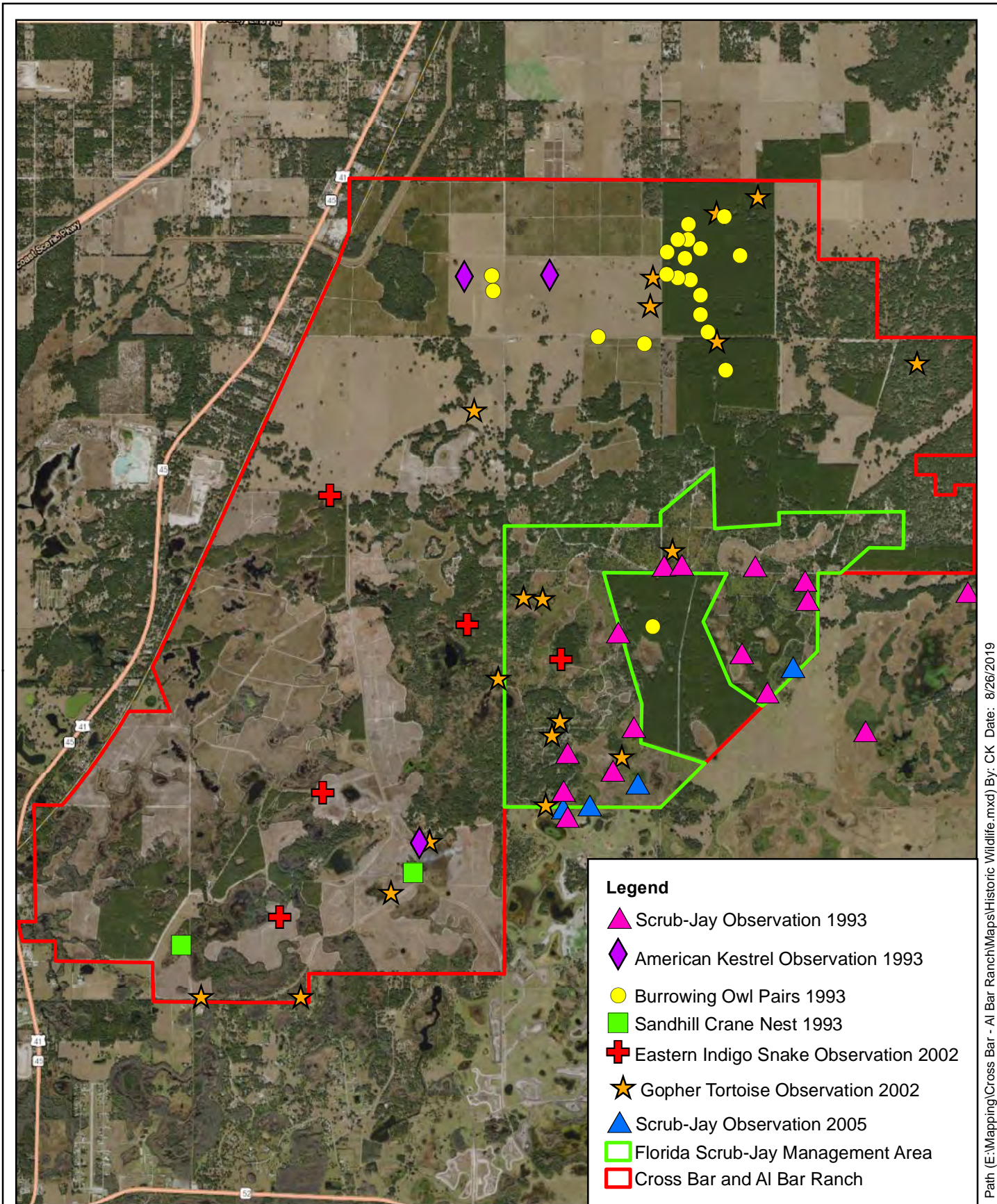


Path (E:\Mapping\Cross Bar - Al Bar Ranch\Maps\Historical Preservation Areas.mxd) By: CK Date: 8/26/2019



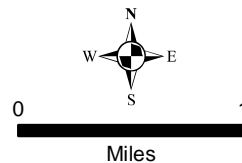
Figure 2-8
1995 Designated Preservation Areas
Cross Bar and Al Bar Ranch
Pasco County, Florida





Path (E:\Mapping\Cross Bar - AI Bar Ranch\Maps\Historic Wildlife.mxd) By: CK Date: 8/26/2019

Figure 2-9
Historical Protected Species Observations
Cross Bar and AI 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 elliotii*) 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 abundance 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 monotypical 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
<i>Agrimonia incisa</i>	incised groove-bur	FL-T	sandhills	Fall
<i>Asclepias curtissii</i>	Curtiss' milkweed	FL-E	scrub	Spring-Fall
<i>Asplenium verecundum</i>	modest spleenwort	FL-E	limestone outcrops	All year
<i>Bonamia grandiflora</i>	Florida bonamia	FL-E; US-T	scrub	Spring-Summer
<i>Calamintha ashei</i>	Ashe's savory	FL-T	sandhills, scrub	Spring-Fall
<i>Calopogon multiflorus</i>	many-flowered grass-pink	FL-T	flatwoods	Winter-Spring
<i>Campanula robinsiae</i>	Brooksville bellflower	FL-E, US-E	seepage slopes, pond margins	Spring
<i>Centrosema arenicola</i>	sand butterfly pea	FL-E	sandhills	Summer-Fall
<i>Chrysopsis floridana</i>	Florida goldenaster	FL-E; US-E	scrub; rarely oak hammocks	Fall
<i>Coelorachis tuberculosa</i>	pedont jointgrass	FL-T	pond/marsh margins	Summer-Fall
<i>Coleataenia abscissa</i>	cutthroat grass	FL-E	wet flatwoods, seepage slopes	Spring-Fall
<i>Eriogonum longifolium</i> var. <i>gnaphalifolium</i>	scrub buckwheat	FL-E; US-T	sandhills, scrub	Spring-Fall
<i>Garberia heterophylla</i>	garberia	FL-T	sand pine and oak scrub	Spring-Fall
<i>Glandularia tampensis</i>	Tampa mock vervain	FL-E	clearings in moist hammocks	Spring-Fall
<i>Justicia cooleyi</i> (=pringlei)	Cooley's waterwillow	FL-E, US-E	calcareous hammocks	All year
<i>Lechea cernua</i>	nodding pinweed	FL-T	scrub	Summer-Fall
<i>Lechea divaricata</i>	drysand pinweed	FL-E	flatwoods; scrub	Summer-Fall
<i>Lilium catesbaei</i>	Catesby's lily	FL-T	moist flatwoods; savannas	Summer-Fall
<i>Litsea aestivalis</i>	pondspice	FL-E	edges of baygalls, flatwoods ponds, and cypress domes	Spring
<i>Matelea floridana</i>	Florida spiny-pod	FL-E	hammocks	Spring
<i>Monotropis reynoldsiae</i>	pgymy pipes	FL-E	mesic-xeric hammocks	Winter
<i>Nemastylis floridana</i>	celestial lily	FL-E	swamps, marshes, wet flatwoods	Aug-Oct (4 pm-dusk)
<i>Nolina brittoniana</i>	Britton's beargrass	FL-E, US-E	sandhills, scrub	Spring
<i>Ophioglossum palmatum</i>	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
<i>Orthochilus ecristatus</i>	giant orchid	FL-T	sandhills, pinelands, oak hammocks	Summer-Fall
<i>Peperomia humilis</i>	low peperomia	FL-E	calcareous hammocks, cypress swamps	Summer
<i>Pycnanthemum floridanum</i>	Florida mountain-mint	FL-T	sandhills	Summer-Fall
<i>Schizachyrium niveum</i>	scrub bluestem	FL-E	scrub	Fall
<i>Spigelia loganioides</i>	pinkroot	FL-E	wet, calcareous hammocks	Spring
<i>Thelypteris reptans</i>	creeping star-hair fern	FL-E	hammocks around limestone outcrops	All year
<i>Thelypteris serrata</i>	toothed lattice-vein fern	FL-E	cypress swamps; occasionally epiphytic	All year
<i>Tillandsia balbisiana</i>	northern needleleaf	FL-T	hammocks; scrub	Fall
<i>Tillandsia fasciculata</i>	cardinal airplant	FL-E	cypress swamps; hammocks	Summer-Fall
<i>Tillandsia utriculata</i>	giant airplant	FL-E	hammocks; cypress swamps	Summer-Fall
<i>Triphora craigheadii</i>	Craighead's nodding caps	FL-E	hammocks	Summer
<i>Warea carteri</i>	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							
<i>Athene cunicularia</i>	Burrowing owl	X	X	X	ST		9
<i>Antigone canadensis pratensis</i>	Florida sandhill crane	X	X	X	ST		
<i>Aphelocoma coerulescens</i>	Florida scrub-jay	X	X	X	FT	T	
<i>Egretta caerulea</i>	Little blue heron	X	X	X	ST		
<i>Egretta rufescens</i>	Reddish egret		X		ST		
<i>Platalea ajaja</i>	Roseate spoonbill	X		X	ST		
<i>Falco sparverius paulus</i>	Southeastern American kestrel	X		X	ST		
<i>Egretta tricolor</i>	Tricolored heron	X	X	X	ST		
<i>Mycteria americana</i>	Wood stork	X	X	X	FT	T	
REPTILE SPECIES							
<i>Alligator mississippiensis</i>	American alligator	X	X	X	FT(S/A)	T(S/A)*	4
<i>Drymarchon corais couperi</i>	Eastern indigo snake	X		X	FT	FT	
<i>Pituophis melanoleucus mugitus</i>	Florida Pine Snake	X			ST		
<i>Gopherus polyphemus</i>	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					
<i>Epidonax virescens</i>	Acadian flycatcher		X		162
<i>Botaurus lentiginosus</i>	American bittern	X	X		
<i>Anas rubripes</i>	American black duck	X	X		
<i>Fulica americana</i>	American coot	X	X	X	
<i>Corvus brachyrhynchos</i>	American crow	X	X	X	
<i>Carduelis tristis</i>	American goldfinch		X		
<i>Falco sparverius</i>	American kestrel		X	X	
<i>Anthus rubescens</i>	American pipit	X	X		
<i>Setophaga ruticilla</i>	American redstart		X		
<i>Turdus migratorius</i>	American robin	X	X	X	
<i>Philohela minor</i>	American woodcock		X		
<i>Anhinga anhinga</i>	Anhinga	X	X	X	
<i>Peucaea aestivalis</i>	Bachman's sparrow	X	X		
<i>Haliaeetus leucocephalus</i>	Bald eagle	X	X	X	
<i>Tyto alba</i>	Barn owl	X			
<i>Hirundo rustica</i>	Barn swallow	X	X	X	
<i>Strix varia</i>	Barred owl	X	X	X	
<i>Ceryle alcyon</i>	Belted kingfisher	X	X	X	
<i>Mniotilta varia</i>	Black and white warbler	X	X		
<i>Setophaga fusca</i>	Blackburnian warbler		X		
<i>Dendroica striata</i>	Blackpoll warbler	X	X		
<i>Himantopus mexicanus</i>	Black-necked stilt		X		
<i>Dendroica caerulesens</i>	Black-throated blue warbler		X		
<i>Setophaga virens</i>	Black-throated green warbler		X		
<i>Coragyps atratus</i>	Black vulture	X	X	X	
<i>Polioptila caerulea</i>	Blue gray gnatcatcher	X	X	X	
<i>Guiraca caerulea</i>	Blue grosbeak		X		
<i>Vireo solitarius</i>	Blue-headed vireo		X		
<i>Cyanocitta cristata</i>	Blue jay	X	X	X	
<i>Anas discors</i>	Blue-winged teal	X	X	X	
<i>Vermivora cyanoptera</i>	Blue-winged warbler		X		
<i>Quiscalus major</i>	Boat-tailed grackle	X	X	X	
<i>Dolichonyx oryzivorus</i>	Bobolink	X	X		
<i>Molothrus ater</i>	Brown-headed cowbird		X	X	
<i>Tosostoma rufum</i>	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
<i>Poecile carolinensis</i>	Carolina chickadee	X	X	X	
<i>Thryothorus ludovicianus</i>	Carolina wren	X	X	X	
<i>Hydroprogne caspia</i>	Caspian tern			X	
<i>Bubulcus ibis</i>	Cattle egret	X	X	X	
<i>Bombycilla cedrorum</i>	Cedar waxwing	X	X		
<i>Setophaga cerulea</i>	Cerulean warbler		X		
<i>Dendroica pensylvanica</i>	Chestnut-sided warbler		X		
<i>Chaetura pelagica</i>	Chimney swift	X	X		
<i>Spizella passerina</i>	Chipping sparrow		X	X	
<i>Caprimulgus carolinensis</i>	Chuck-will's-widow		X		
<i>Gallinula galeata</i>	Common gallinule	X	X	X	
<i>Quiscalus quiscula</i>	Common grackle	X	X	X	
<i>Columbina passerina</i>	Common ground-dove	X	X	X	
<i>Chordeiles minor</i>	Common nighthawk		X	X	
AVIAN SPECIES CONTINUED					
<i>Geothlypis trichas</i>	Common yellowthroat	X	X	X	
<i>Accipiter cooperii</i>	Cooper's hawk	X	X	X	
<i>Phalacrocorax auritus</i>	Double-crested cormorant	X	X	X	
<i>Picoides pubescens</i>	Downy woodpecker		X	X	
<i>Calidris alpina</i>	Dunlin		X		
<i>Sialia sialis</i>	Eastern bluebird	X	X	X	
<i>Tyrannus tyrannus</i>	Eastern kingbird	X	X	X	
<i>Sturnella magna</i>	Eastern meadowlark	X	X	X	
<i>Sayornis phoebe</i>	Eastern phoebe	X	X	X	
<i>Megascops asio</i>	Eastern screech owl	X	X	X	
<i>Pipilo erythrophthalmus</i>	Eastern towhee	X	X	X	
<i>Caprimulgus vociferus</i>	Eastern whip-poor-will	X			
<i>Contopus virens</i>	Eastern wood-peewee	X	X	X	
<i>Streptopelia decaocto</i>	Eurasian collared dove		X	X	
<i>Sturnus vulgaris</i>	European starling	X	X	X	
<i>Corvus ossifragus</i>	Fish crow	X	X	X	
<i>Sterna forsteri</i>	Forster's tern		X		
<i>Plegadis falcinellus</i>	Glossy ibis	X		X	
<i>Ammodramus savannarum</i>	Grasshopper sparrow		X		
<i>Dumetella carolinensis</i>	Gray catbird	X	X	X	
<i>Ardea herodias</i>	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
<i>Myiarchus crinitus</i>	Great crested flycatcher	X	X	X	
<i>Casmerodias albus</i>	Great egret	X	X	X	
<i>Bubo virginianus</i>	Great horned owl	X	X		
<i>Tringa melanoleuca</i>	Greater yellowlegs	X	X	X	
<i>Butorides striatus</i>	Green heron	X	X	X	
<i>Dryobates villosus</i>	Hairy woodpecker		X		
<i>Lophodytes cucullatus</i>	Hooded merganser	X	X	X	
<i>Wilsonia citrina</i>	Hooded warbler		X		
<i>Podiceps auritus</i>	Horned grebe		X		
<i>Passer domesticus</i>	House Sparrow		X	X	
<i>Troglodytes aedon</i>	House wren	X	X	X	
<i>Passerina cyanea</i>	Indigo bunting		X		
<i>Geothlypis formosa</i>	Kentucky warbler		X		
<i>Charadrius vociferous</i>	Killdeer	X	X	X	
<i>Rallus elegans</i>	King rail		X		
<i>Ixobrychus exilis</i>	Least bittern		X		
<i>Tringa flavipes</i>	Lesser yellowlegs	X	X		
<i>Aramus guarana</i>	Limpkin	X	X	X	
<i>Lanius ludovicianus</i>	Loggerhead shrike	X	X	X	
<i>Limnodromus scolopaceus</i>	Long-billed Dowitcher		X		
<i>Dendroica magnolia</i>	Magnolia warbler		X		
<i>Falco columbarius</i>	Merlin	X	X		
<i>Ictinia mississippiensis</i>	Mississippi kite			X	
<i>Anas fulvigula</i>	Mottled duck	X	X	X	
<i>Zenaida macroura</i>	Mourning dove	X	X	X	
<i>Colinus virginianus</i>	Northern bobwhite	X	X	X	
AVIAN SPECIES CONTINUED					
<i>Cardinalis cardinalis</i>	Northern cardinal	X	X	X	
<i>Colaptes auratus</i>	Northern flicker	X	X	X	
<i>Circus cyaneus</i>	Northern harrier	X	X	X	
<i>Mimus polyglottos</i>	Northern mockingbird	X	X	X	
<i>Anas clypeata</i>	Northern shoveler		X		
<i>Parula americana</i>	Northern parula	X	X	X	
<i>Stelgidopteryx serripennis</i>	Northern rough-winged swallow		X		
<i>Pandion haliaetus</i>	Osprey	X	X	X	

**TABLE 3-5
NON-LISTED WILDLIFE SPECIES DOCUMENTED**

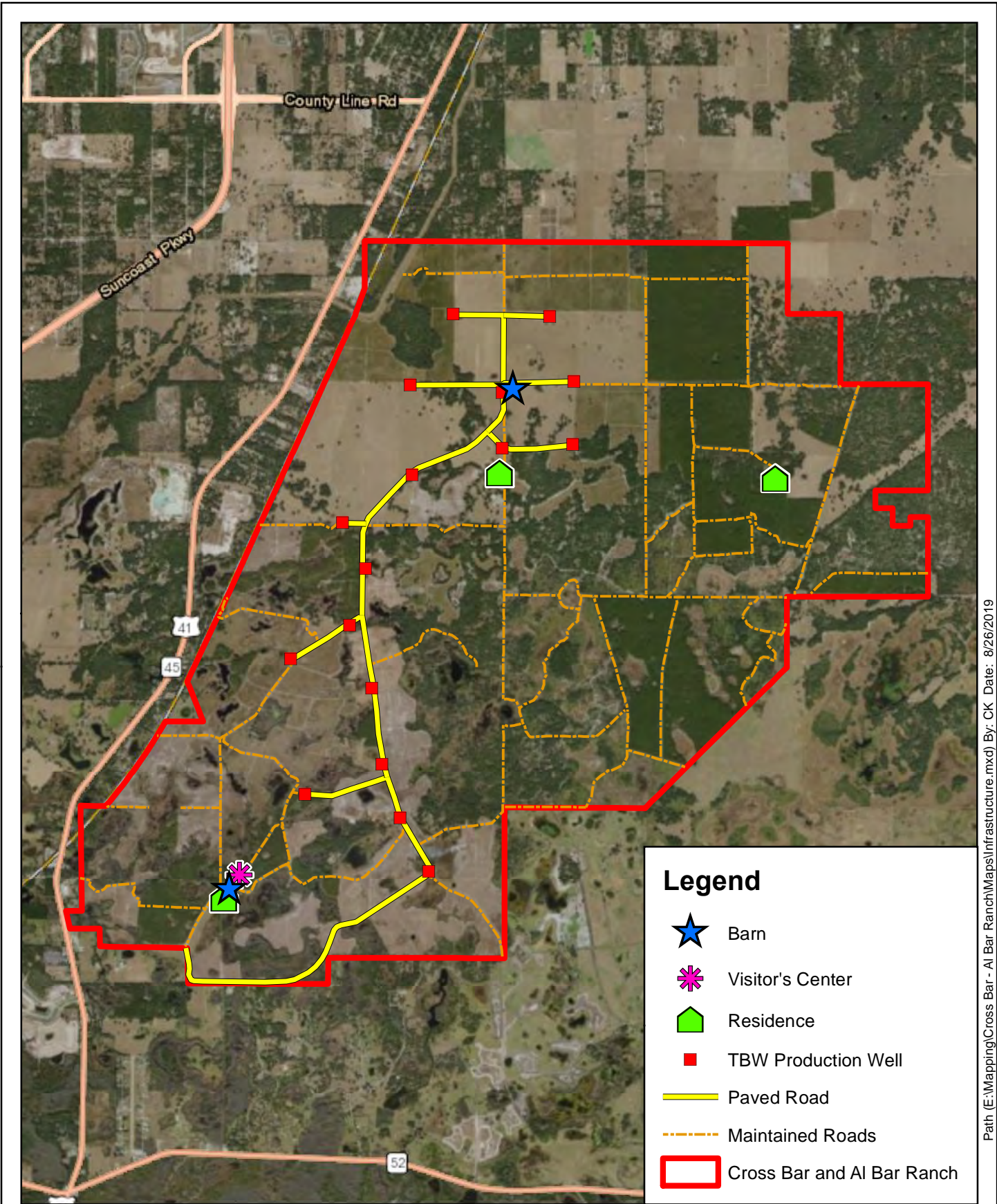
SPECIES	COMMON NAME	PEACOCK OBSERVED 1992 - 2018	AUDUBON OBSERVED 2000 - 2005	QUEST OBSERVED 2018 - 2019	TOTAL
<i>Seiurus aurocapillus</i>	Ovenbird		X		
<i>Dendroica palmarum</i>	Palm warbler	X	X	X	
<i>Calidris melanotos</i>	Pectoral sandpiper		X		
<i>Falco peregrinus</i>	Peregrine falcon	X	X		
<i>Podilymbus podiceps</i>	Pied-billed grebe	X	X	X	
<i>Dryocopus pileatus</i>	Pileated woodpecker	X	X	X	
<i>Dendroica pinus</i>	Pine warbler	X	X	X	
<i>Dendroica discolor</i>	Prairie warbler		X		
<i>Porphyryla martinica</i>	Purple gallinule	X	X		
<i>Progne subis</i>	Purple martin	X	X		
<i>Melanerpes carolinus</i>	Red-bellied woodpecker	X	X	X	
<i>Vireo olivaceus</i>	Red-eyed vireo	X	X	X	
<i>Melanerpes erthrocephalus</i>	Red-headed woodpecker	X	X	X	
<i>Buteo lineatus</i>	Red-shouldered hawk	X	X	X	
<i>Buteo jamaicensis</i>	Red-tailed hawk	X	X	X	
<i>Agelaius phoeniceus</i>	Red-winged blackbird	X	X	X	
<i>Larus delawarensis</i>	Ring-billed gull		X		
<i>Aythya collaris</i>	Ring-necked duck	X	X	X	
<i>Columba livia</i>	Rock dove		X		
<i>Regulus calendula</i>	Ruby-crowned kinglet		X	X	
<i>Archilochus colubris</i>	Ruby-throated hummingbird		X	X	
<i>Passerculus sandwichensis</i>	Savannah sparrow		X	X	
<i>Cistothorus platensis</i>	Sedge wren		X	X	
<i>Accipiter striatus</i>	Sharp-shinned hawk	X	X	X	
<i>Molothrus bonariensis</i>	Shiny cowbird	X	X		
<i>Anser caerulescens</i>	Snow goose	X	X		
<i>Egretta thula</i>	Snowy egret	X	X	X	
<i>Tringa solitaria</i>	Solitary sandpiper		X		
<i>Melospiza melodia</i>	Song sparrow		X		
<i>Porzana carolina</i>	Sora		X		
<i>Actitis macularius</i>	Spotted sandpiper		X		
<i>Calidris himantopus</i>	Stilt sandpiper		X		
<i>Piranga rubra</i>	Summer tanager	X	X	X	
<i>Elanoides forficatus</i>	Swallow-tailed kite	X	X		
<i>Melospiza georgiana</i>	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
<i>Oreothlypis peregrina</i>	Tennessee warbler		X		
<i>Tachycineta bicolor</i>	Tree swallow	X	X	X	
<i>Baeolophus bicolor</i>	Tufted titmouse	X	X	X	
<i>Cathartes aura</i>	Turkey vulture	X	X	X	
<i>Catharus fuscescens</i>	Veery		X		
<i>Rallus limicola</i>	Virginia rail		X		
<i>Calidris mauri</i>	Western Sandpiper		X		
<i>Eudocimus albus</i>	White ibis	X	X	X	
<i>Vireo griseus</i>	White-eyed vireo	X	X	X	
<i>Calidris fuscicollis</i>	White-rumped Sandpiper		X		
<i>Pelecanus erythrorhynchos</i>	White pelican	X			
<i>Meleagris gallopavo</i>	Wild turkey	X	X	X	
<i>Gallinago delicata</i>	Wilson's snipe	X	X	X	
<i>Cardellina pusilla</i>	Wilson's warbler		X		
<i>Aix sponsa</i>	Wood duck	X	X	X	
<i>Hylocichla mustelina</i>	Wood thrush	X	X		
<i>Syphyrapicus varius</i>	Yellow-bellied sapsucker				
<i>Coccyzus americanus</i>	Yellow-billed cuckoo		X		
<i>Dendroica coronata</i>	Yellow-rumped warbler	X	X	X	
<i>Colaptes a. auratus</i>	Yellow-shafted flicker		X	X	
<i>Dendroica dominica</i>	Yellow-throated warbler	X	X		
<i>Vireo flavifrons</i>	Yellow-throated vireo		X		
<i>Dendroica petechia</i>	Yellow warbler		X	X	
AMPHIBIAN SPECIES					
<i>Hyla gratiosa</i>	Barking tree frog	X			9
<i>Rana catesbeiana</i>	Bullfrog	X		X	
<i>Acris gryllus dorsalis</i>	Florida cricket frog	X		X	
<i>Hyla cinerea</i>	Green tree frog	X		X	
<i>Rana grylio</i>	Pig frog	X		X	
<i>Hyla femoralis</i>	Pinewoods tree frog			X	
<i>Pseudacris nigrita verrucosa</i>	Florida chorus frog	X		X	
<i>Rana sphenacephala</i>	Southern leopard frog	X		X	
<i>Bufo terrestris</i>	Southern toad	X			
FISH SPECIES					
<i>Lepomis macrochirus</i>	Bluegill			X	3

**TABLE 3-5
NON-LISTED WILDLIFE SPECIES DOCUMENTED**

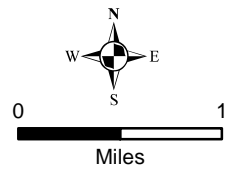
SPECIES	COMMON NAME	PEACOCK OBSERVED 1992 - 2018	AUDUBON OBSERVED 2000 - 2005	QUEST OBSERVED 2018 - 2019	TOTAL
<i>Micropterus salmoides</i>	Largemouth Bass	X			
<i>Gambusia holbrooki</i>	Mosquito fish			X	
MAMMAL SPECIES					
<i>Felis rufus</i>	Bobcat		X		15
<i>Canis latrans</i>	Coyote	X	X	X	
<i>Sylvilagus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



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

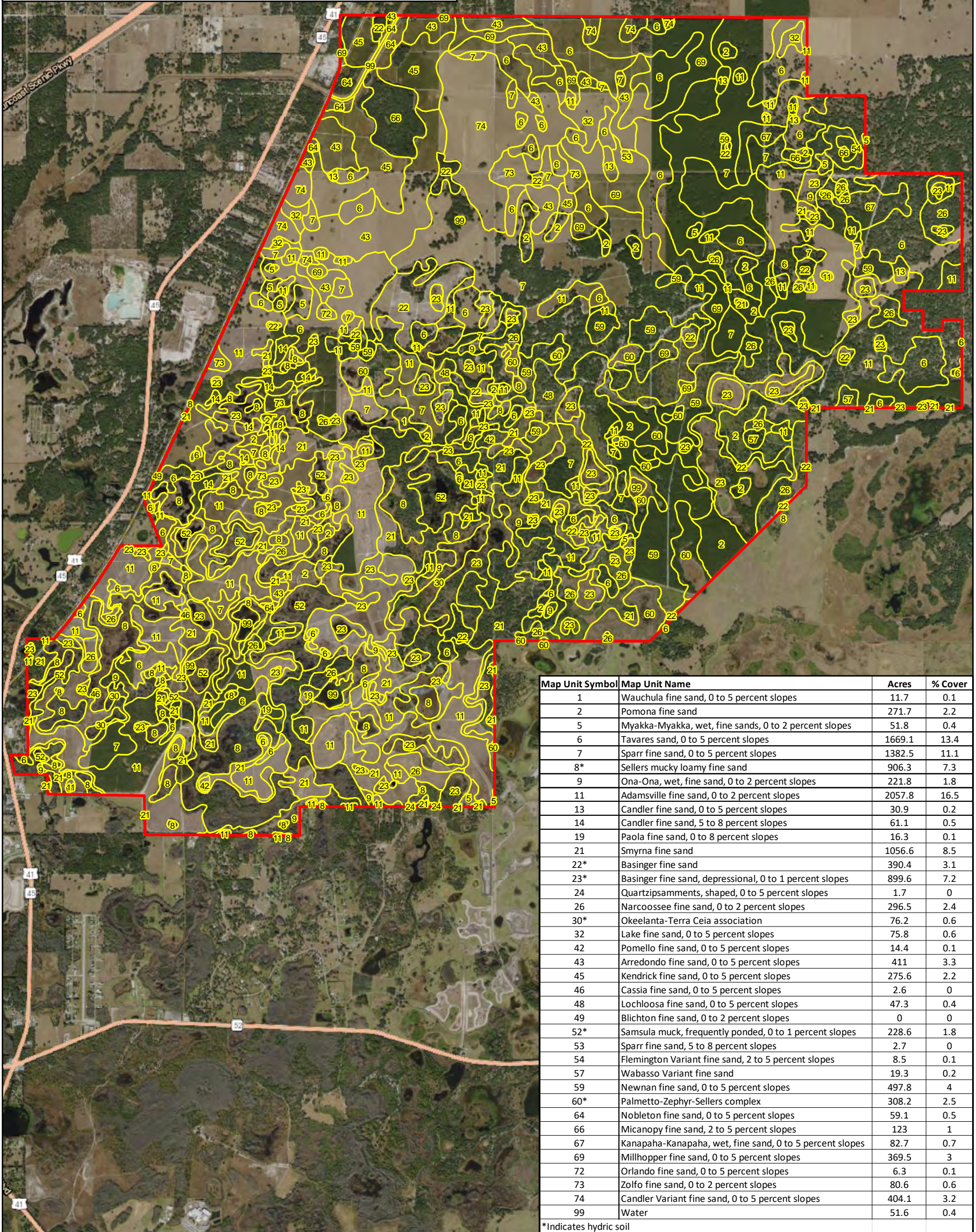


Figure 3-1
Major Infrastructure
Cross Bar and Al Bar Ranch
Pasco County, Florida



Legend

- Cross Bar and Al Bar Ranch
- Soils



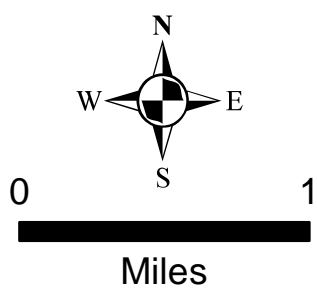
Map Unit Symbol	Map Unit Name	Acres	% Cover
1	Wauchula fine sand, 0 to 5 percent slopes	11.7	0.1
2	Pomona fine sand	271.7	2.2
5	Myakka-Myakka, wet, fine sands, 0 to 2 percent slopes	51.8	0.4
6	Tavares sand, 0 to 5 percent slopes	1669.1	13.4
7	Sparr fine sand, 0 to 5 percent slopes	1382.5	11.1
8*	Sellers 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

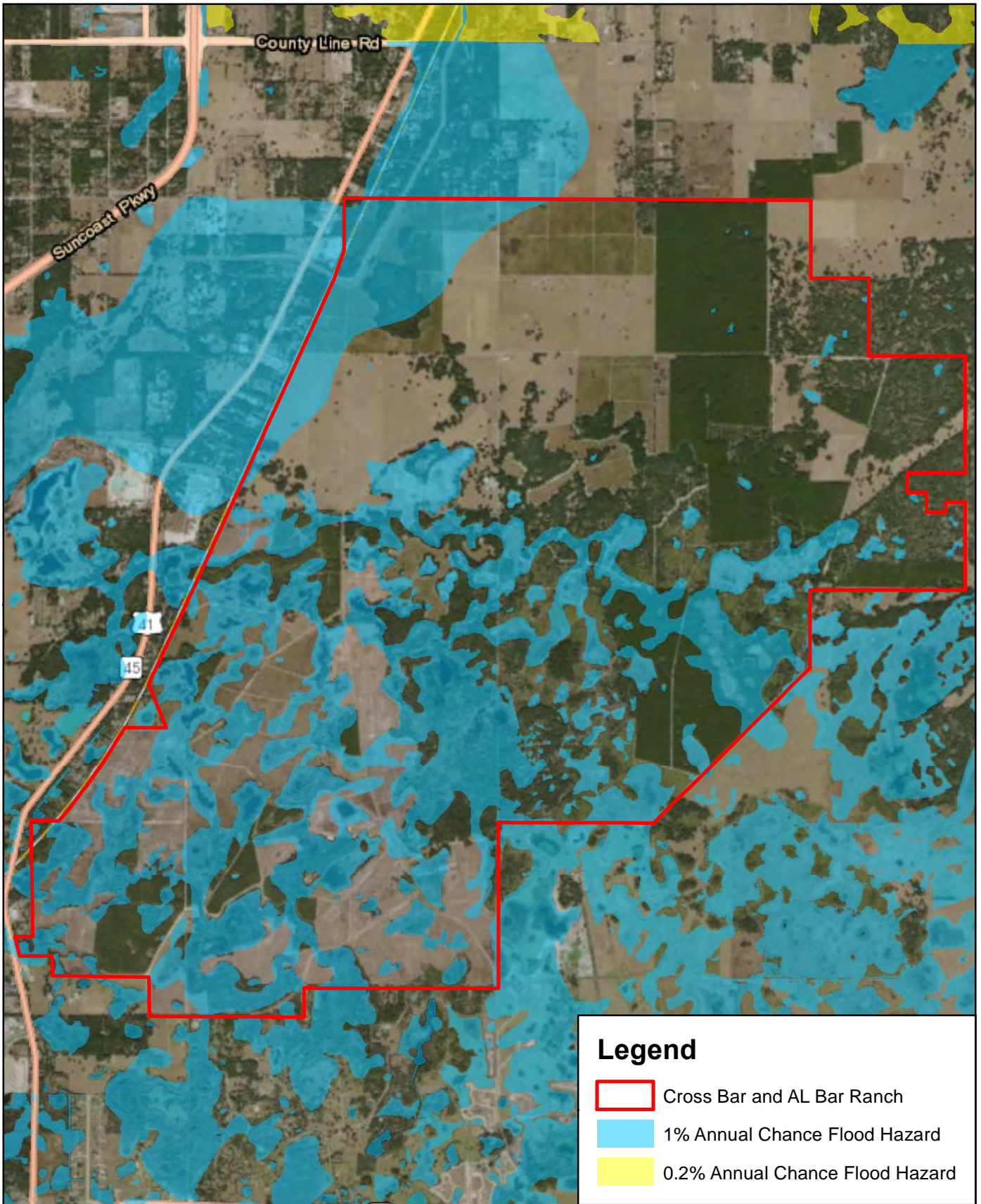
*Indicates hydric soil

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

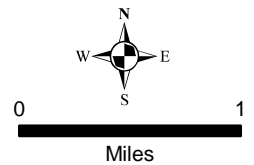




Path (E:\Mapping\Cross Bar - Al Bar Ranch\Maps\FEMA Flood Zones.mxd) By: CK Date: 8/26/2019

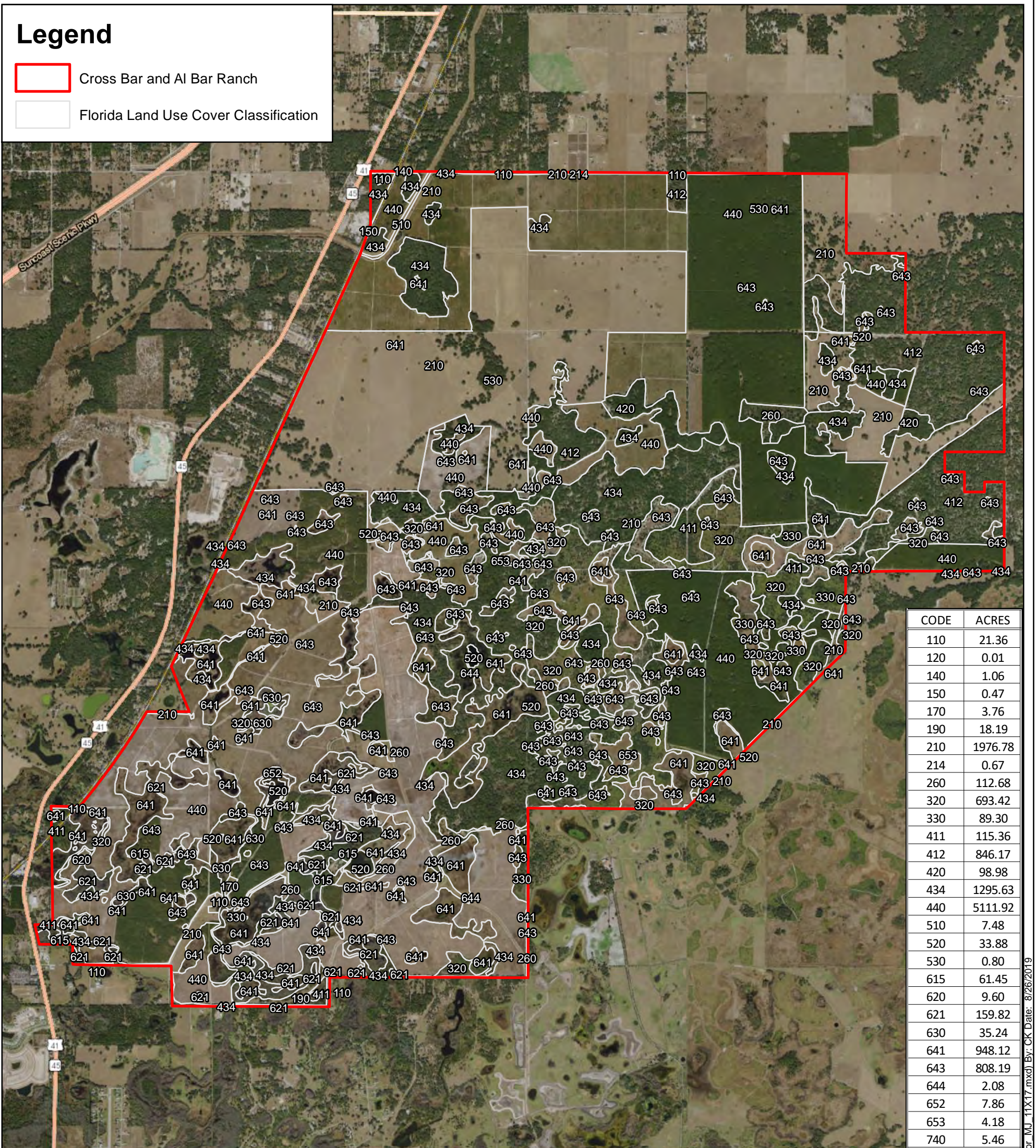


Figure 3-3
FEMA Flood Risks
Cross Bar and Al Bar Ranch
Pasco County, Florida



Legend

- Cross Bar and Al Bar Ranch
- Florida Land Use Cover Classification

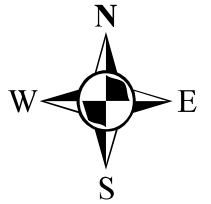


CODE	ACRES
110	21.36
120	0.01
140	1.06
150	0.47
170	3.76
190	18.19
210	1976.78
214	0.67
260	112.68
320	693.42
330	89.30
411	115.36
412	846.17
420	98.98
434	1295.63
440	5111.92
510	7.48
520	33.88
530	0.80
615	61.45
620	9.60
621	159.82
630	35.24
641	948.12
643	808.19
644	2.08
652	7.86
653	4.18
740	5.46

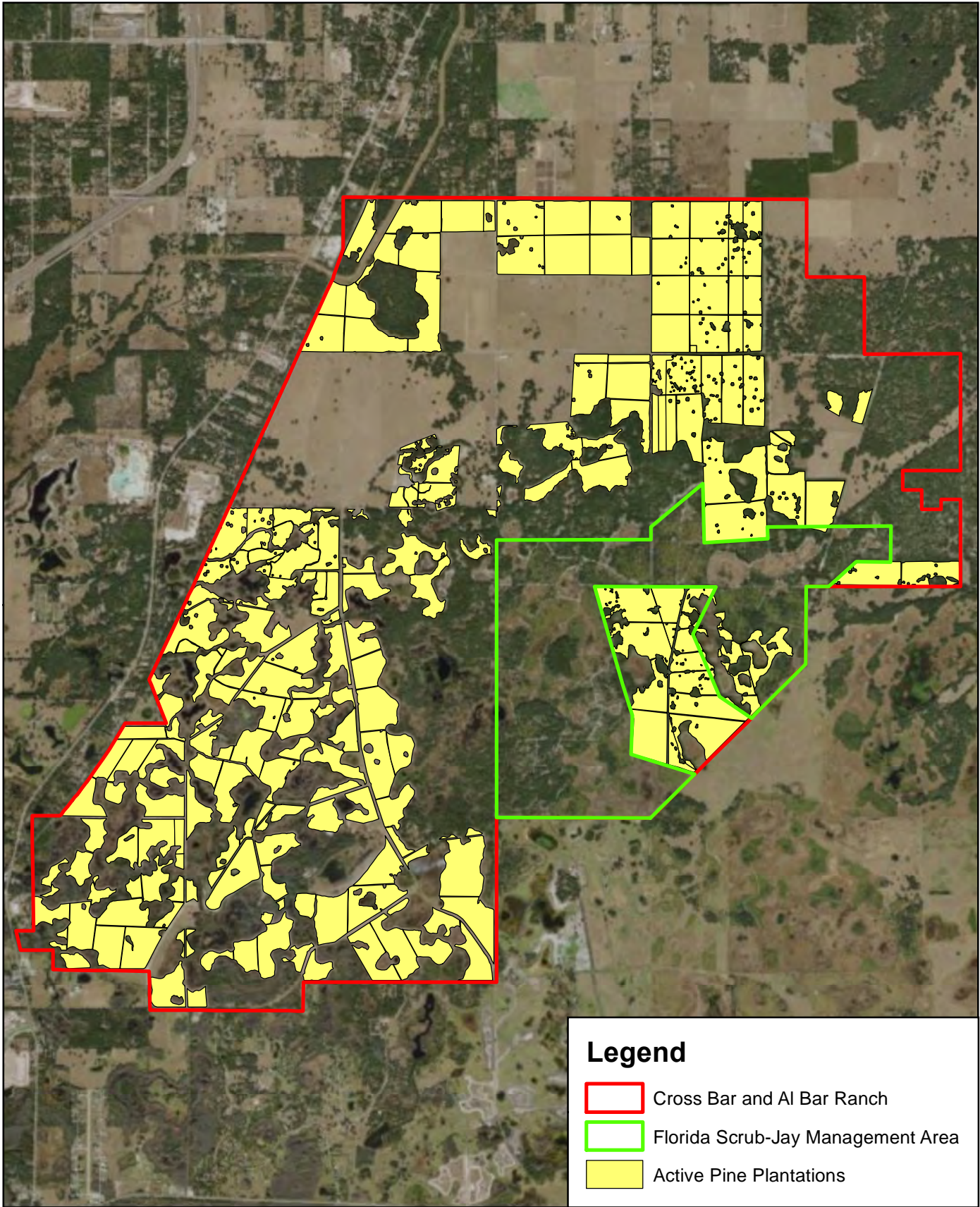
CODE	DESCRIPTION	CODE	DESCRIPTION
110	RESIDENTIAL LOW DENSITY < 2 DWELLING UNITS	440	TREE PLANTATIONS
120	RESIDENTIAL MED DENSITY 2->5 DWELLING UNIT	510	STREAMS AND WATERWAYS
140	COMMERCIAL AND SERVICES	520	LAKES
150	INDUSTRIAL	530	RESERVOIRS
170	INSTITUTIONAL	615	STREAM AND LAKE SWAMPS (BOTTOMLAND)
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		



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



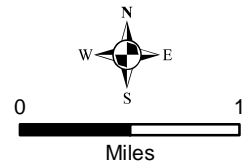
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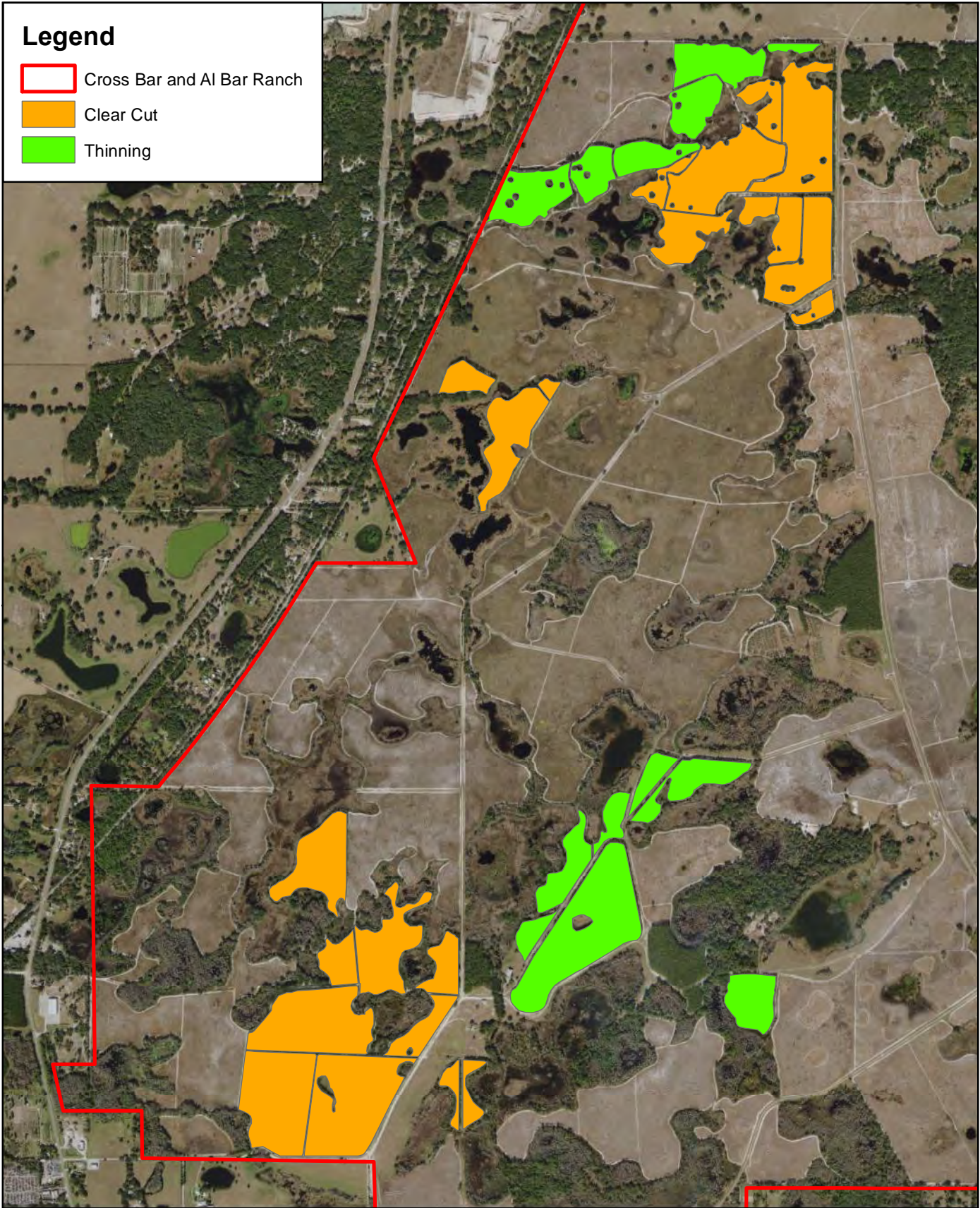


Path (E:\Mapping\Cross Bar - Al Bar Ranch\Maps\Active Pine Plantations.mxd) By: CK Date: 8/26/2019



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

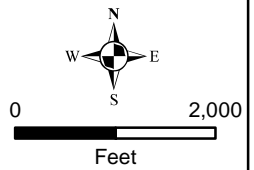







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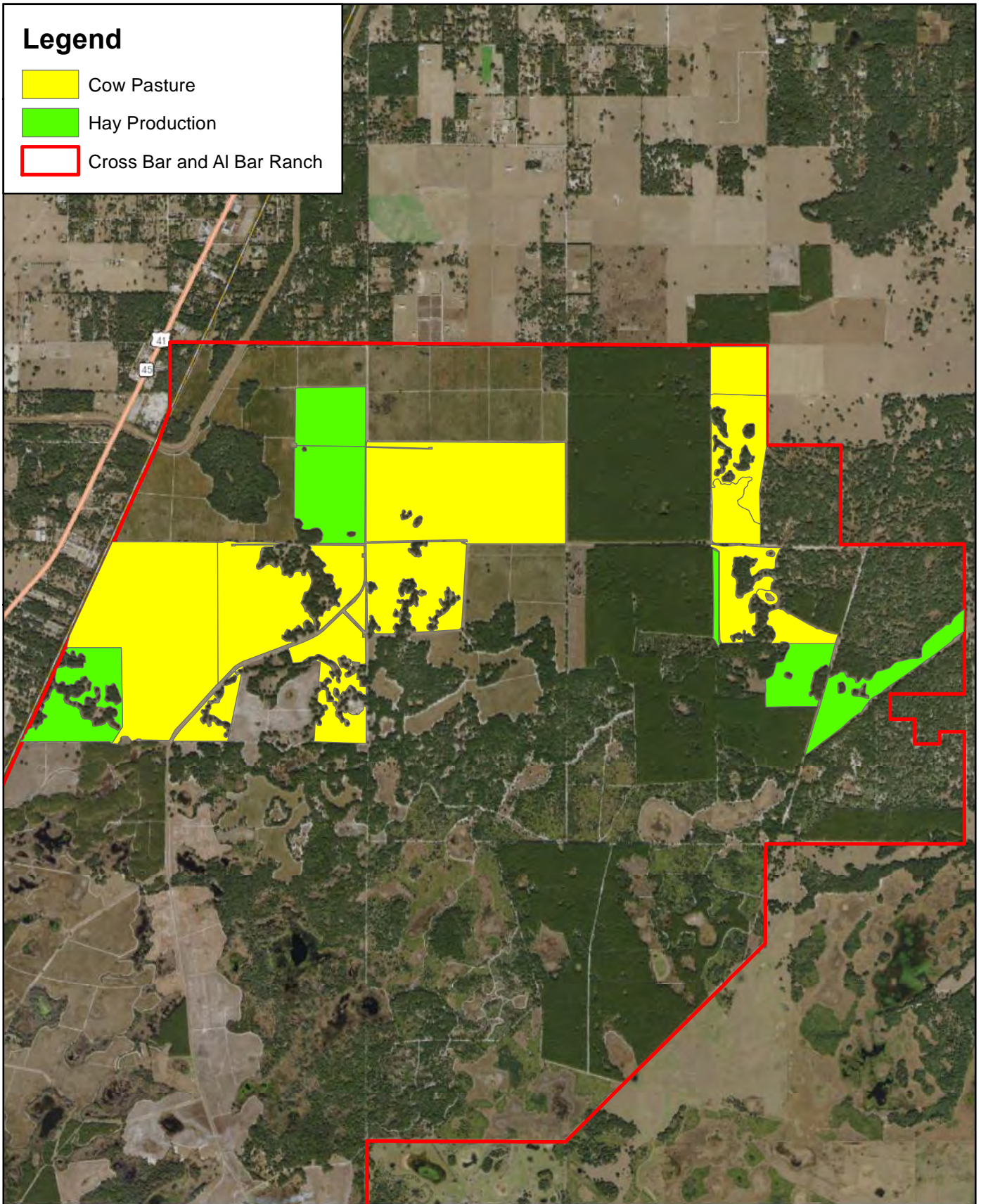


Figure 3-6
Longleaf Pine Harvest Plan
Cross Bar and Al Bar Ranch
Pasco County, Florida



Legend

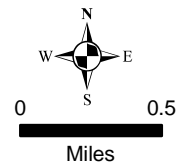
-  Cow Pasture
-  Hay Production
-  Cross Bar and Al Bar Ranch

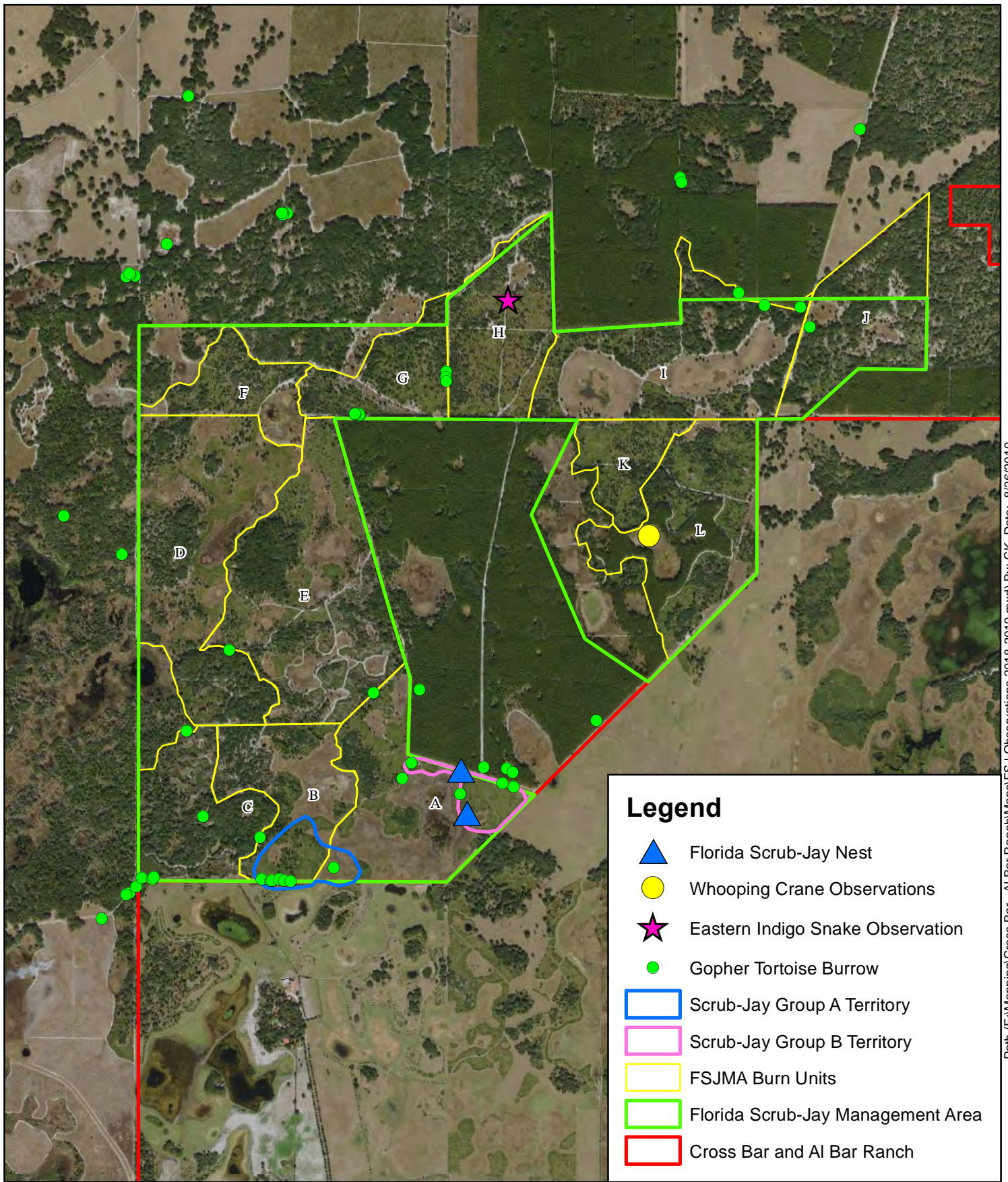


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Figure 3-7
Hay Fields and Cattle Pastures
Cross Bar and Al Bar Ranch
Pasco County, Florida





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

Legend










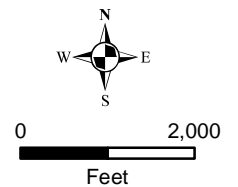
-  Florida Scrub-Jay Nest
-  Whooping Crane Observations
-  Eastern Indigo Snake Observation
-  Gopher Tortoise Burrow
-  Scrub-Jay Group A Territory
-  Scrub-Jay Group B Territory
-  FSJMA Burn Units
-  Florida Scrub-Jay Management Area
-  Cross Bar and Al Bar Ranch



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



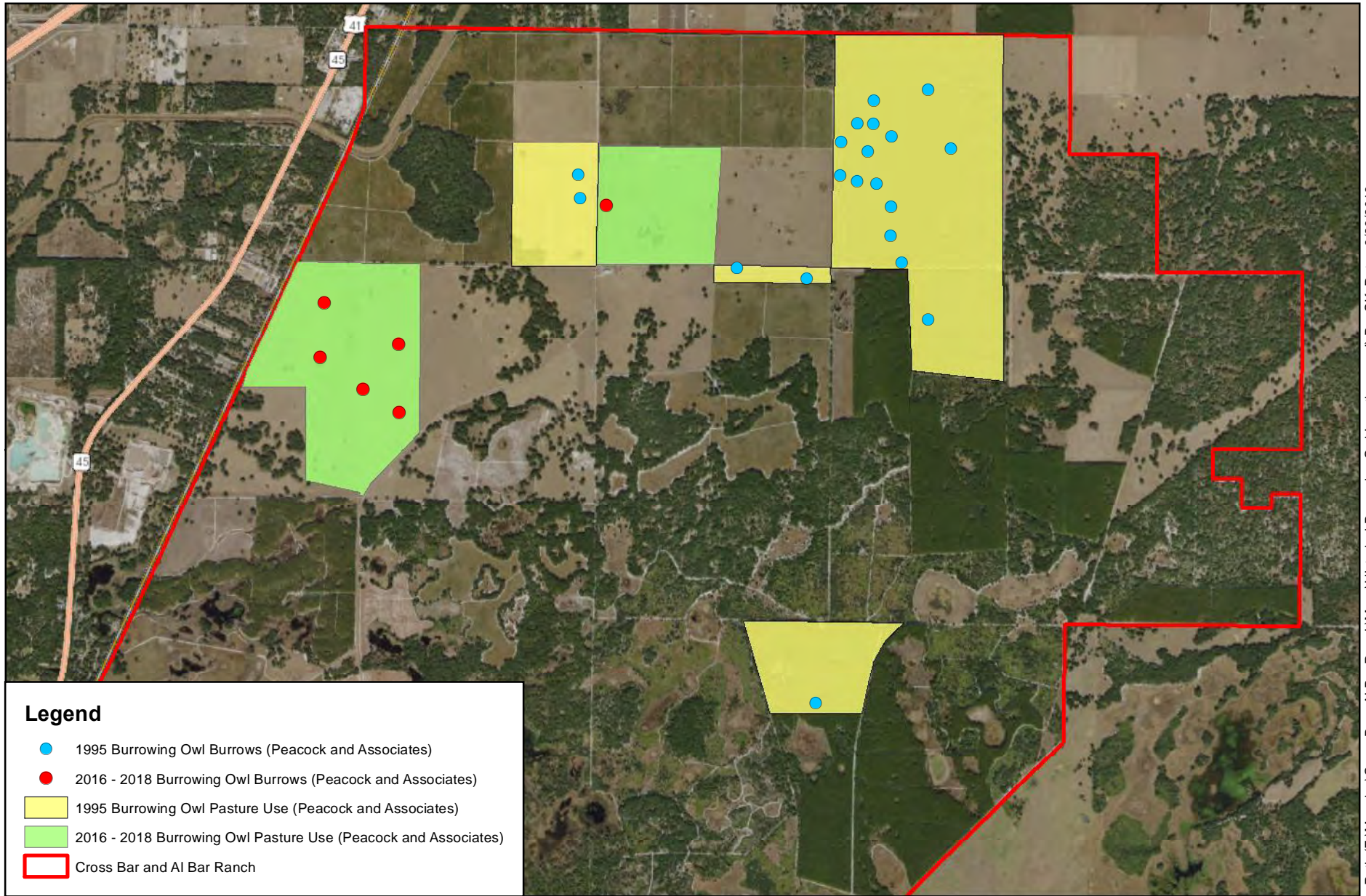
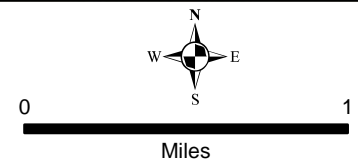


Figure 3-9
Historical Burrowing Owl Pasture Use
Cross Bar and Al Bar Ranch
Pasco County, Florida



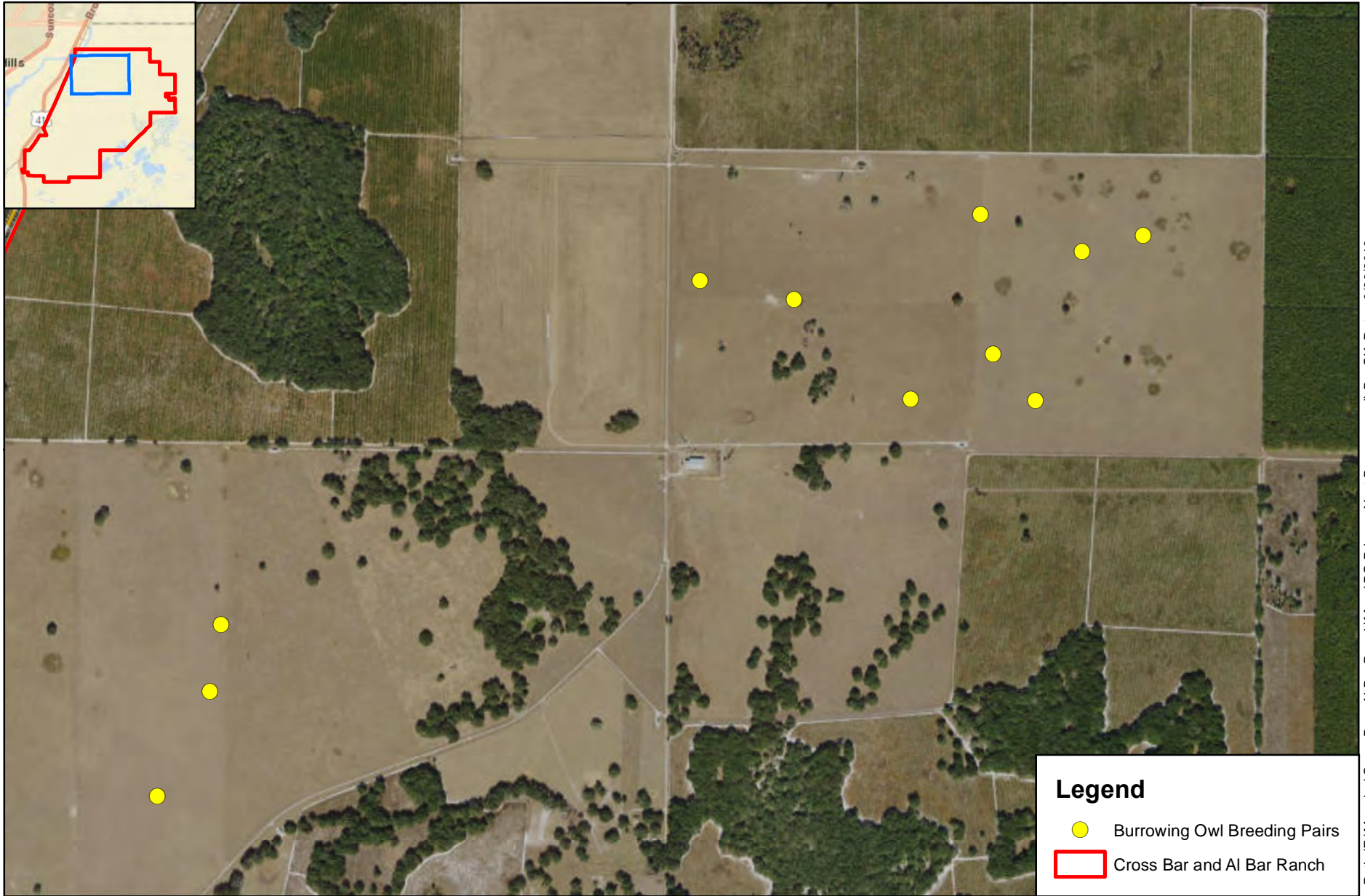
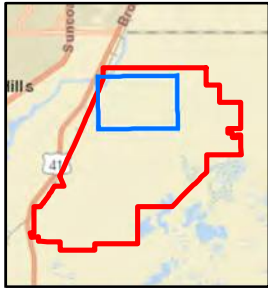
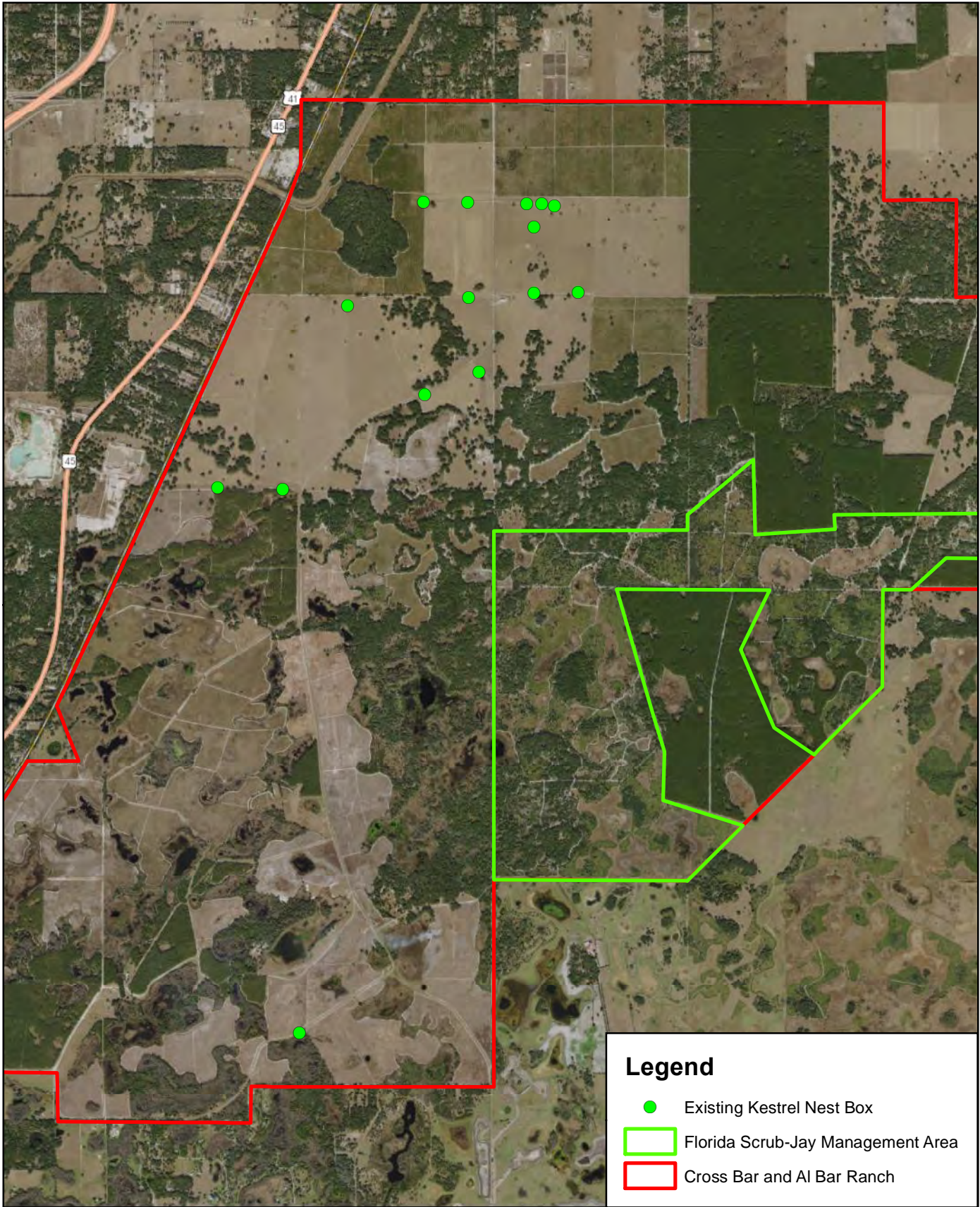


Figure 3-10
2019 Burrowing Owl Primary Nest Burrows
Updated 6/7/19
Cross Bar and Al Bar Ranch
Pasco County, Florida



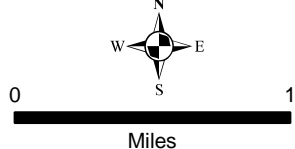
Path (E:\Mapping\Cross Bar - Al Bar Ranch\Maps\Existing Kestrel Boxes.mxd) By: CK Date: 8/26/2019

Legend

- Existing Kestrel Nest Box
- Florida Scrub-Jay Management Area
- Cross Bar and Al Bar Ranch

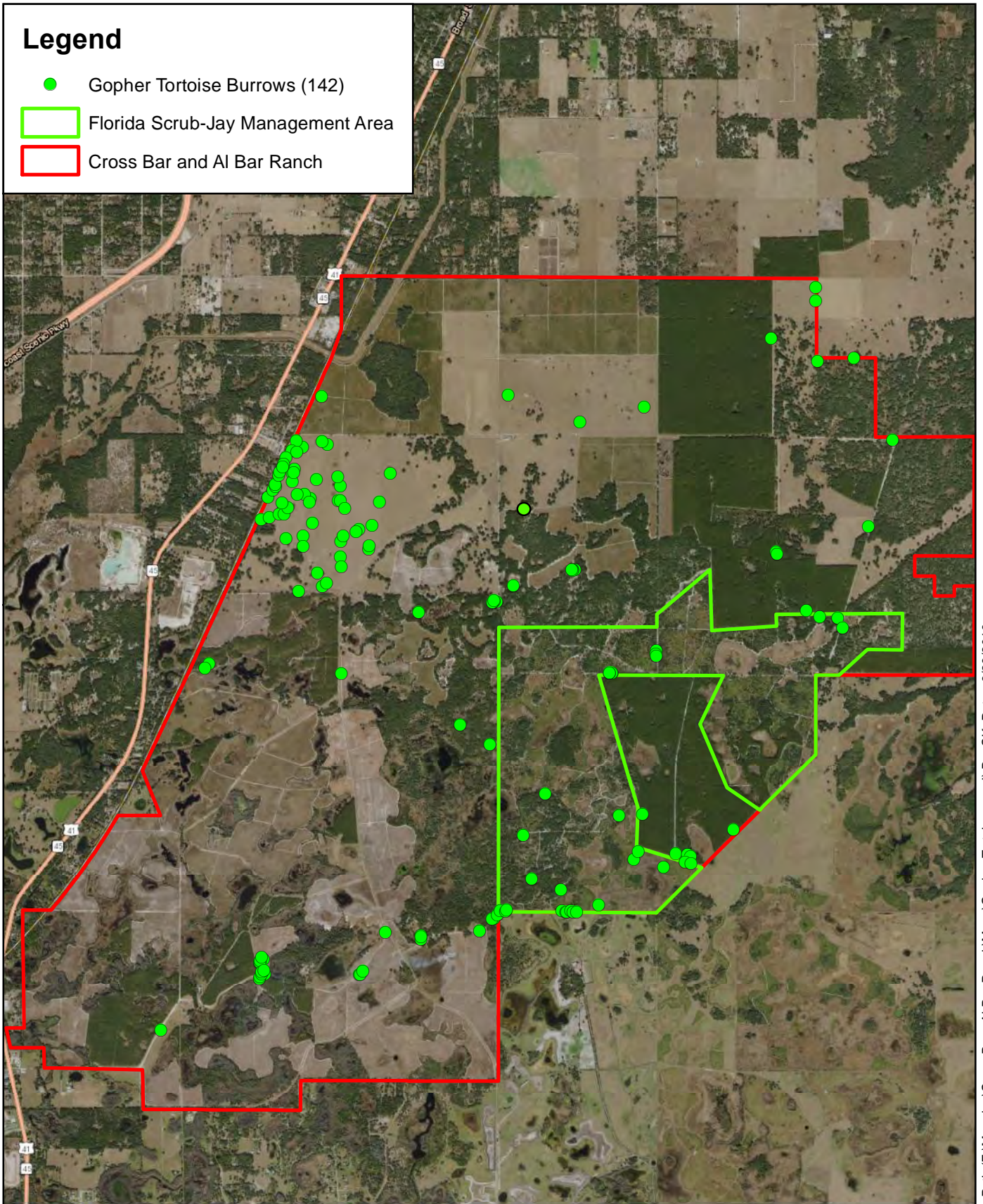


Figure 3-11
Kestrel Nest Boxes
June 2019
Cross Bar and Al Bar Ranch
Pasco County, Florida



Legend

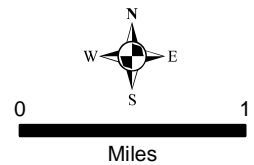
- Gopher Tortoise Burrows (142)
- Florida Scrub-Jay Management Area
- Cross Bar and Al Bar Ranch

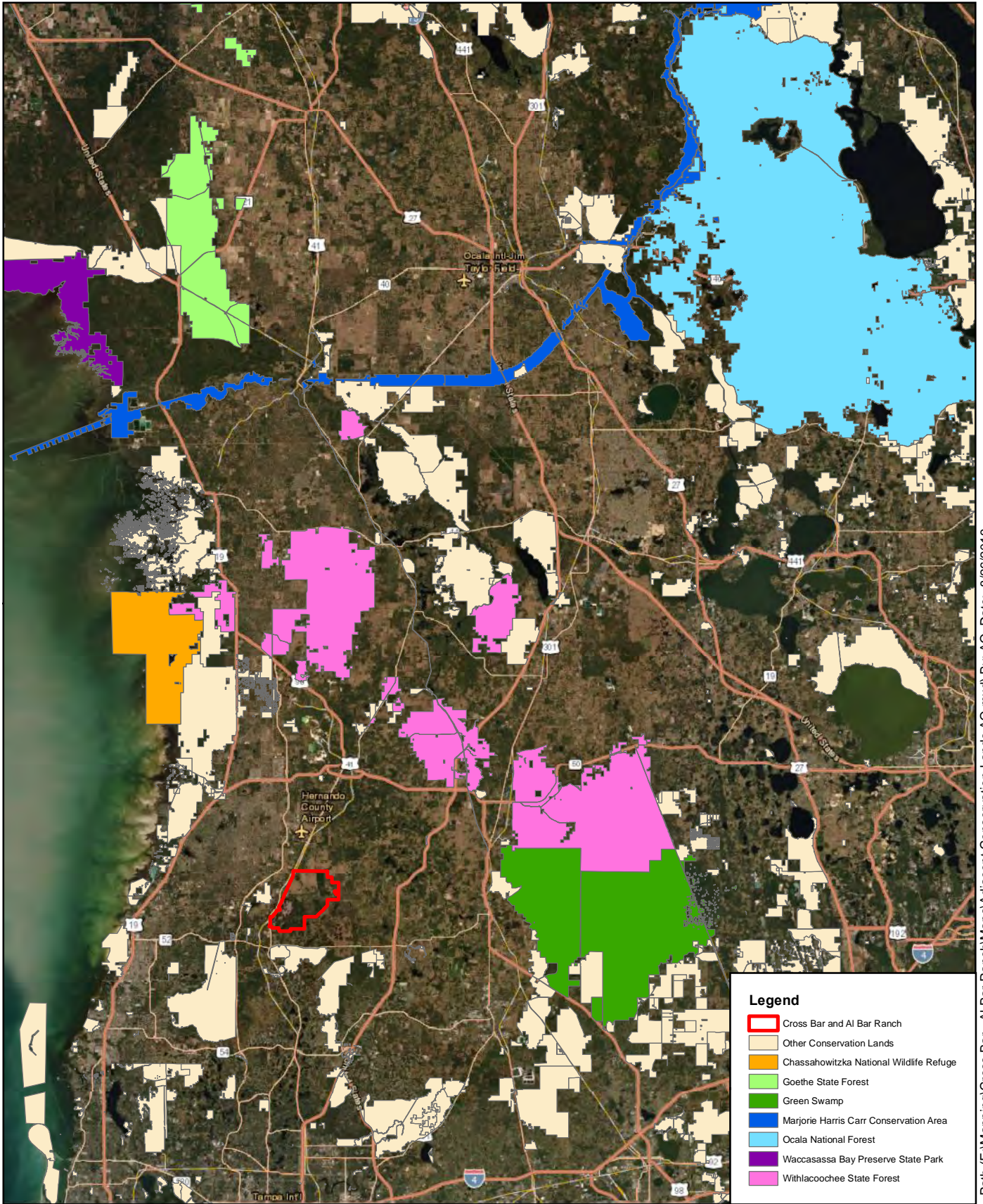


Path (E:\Mapping\Cross Bar - Al Bar Ranch\Maps\Gopher Tortoises.mxd) By: CK Date: 8/26/2019



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





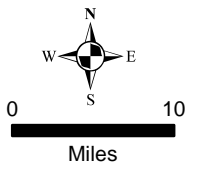
Path (E:\Mapping\Cross Bar - Al Bar Ranch)\Maps\Adjacent Conservation Lands (AQ.mxd) By: AQ Date: 8/26/2019

Legend

- Cross Bar and Al Bar Ranch
- Other Conservation Lands
- Chassahowitzka National Wildlife Refuge
- Goethe State Forest
- Green Swamp
- Marjorie Harris Carr Conservation Area
- Ocala National Forest
- Waccasassa Bay Preserve State Park
- Withlacoochee State Forest



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



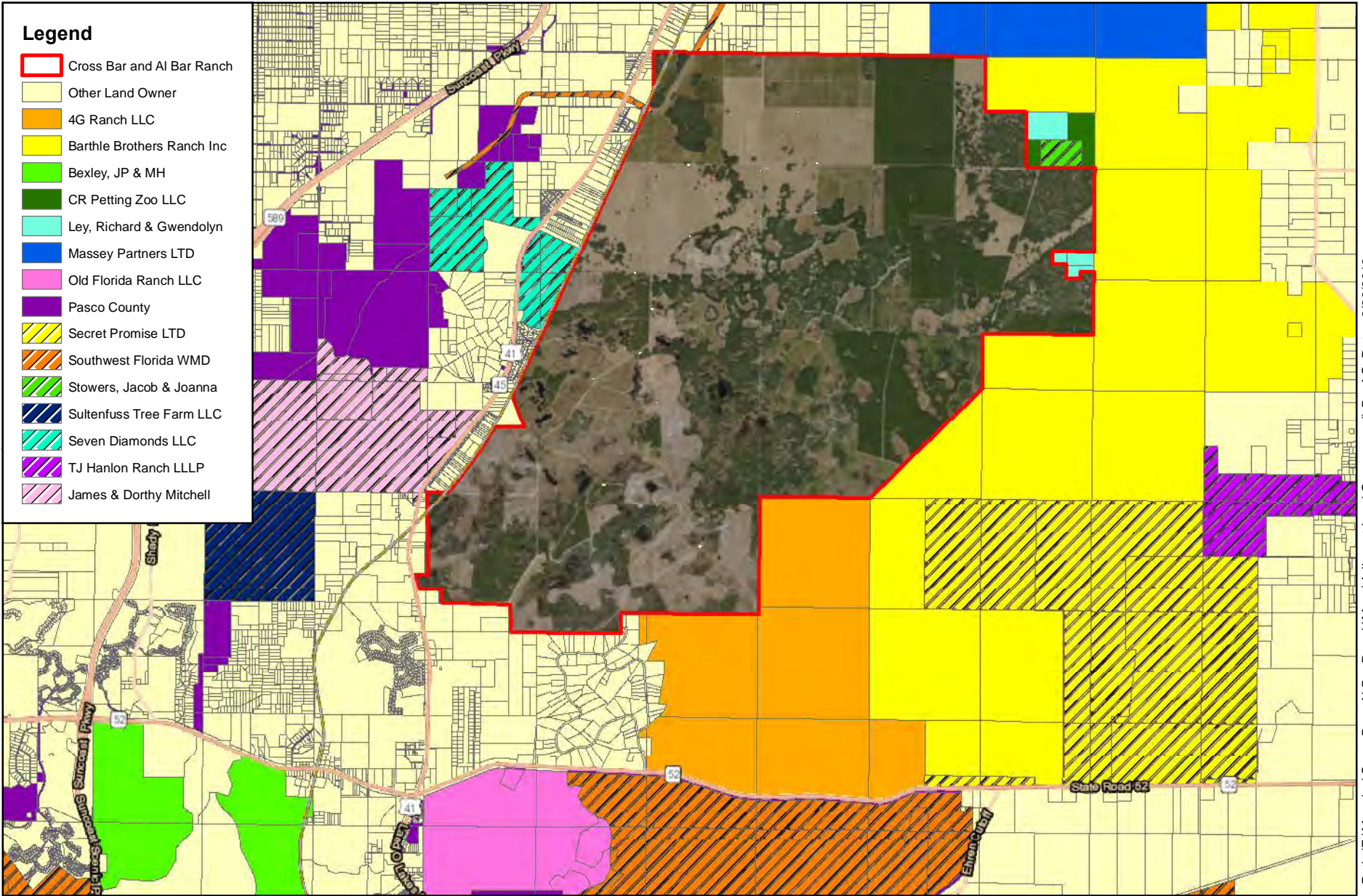
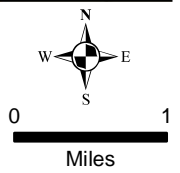


Figure 3-14
Adjacent Land Owners
Cross Bar and Al Bar Ranch
Pasco County, Florida



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

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 Tryclop pyr 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 Tryclop pyr amine (water soluble) solution should be used in conjunction with the cut stump method. Never apply any Tryclop pyr 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. $\geq 12''$ 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

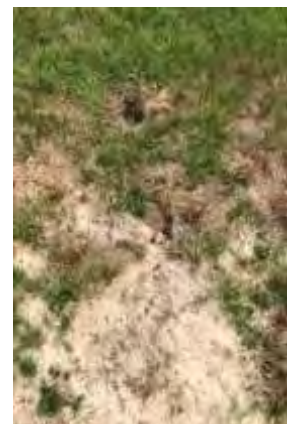
Forested areas and isolated large trees are typically avoided by burrowing owls, as forested structure provides perching, hunting, loafing, and nesting sites for aerial predators. This includes the large live oaks present within pastures and the planted pines that abut some pastures. Where this forest 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

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,



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

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 Tryclopypyr 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 Tryclopypyr ester (oil soluble) chemical, with an oil surfactant penetrating basal oil to produce a mixture of Tryclopypyr 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 Tryclopypyr 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 Tryclopypyr amine solution should be used for woody species control. No Tryclopypyr 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 Tryclopypyr 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 Imazapyr 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 Tryclopypyr 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 ludovicianus*), 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 lightning 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 predictable 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 lightning 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

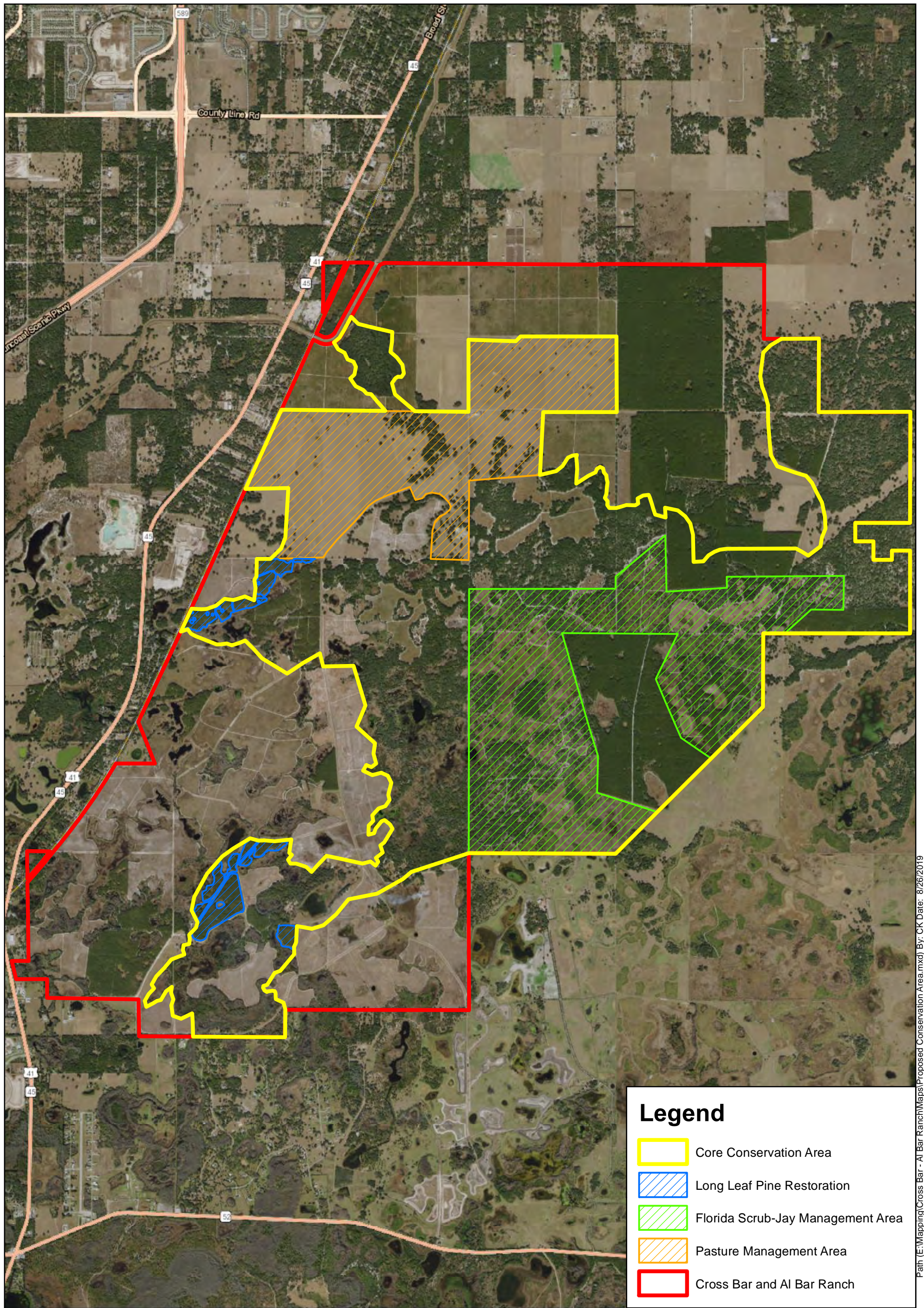
Considerations for listed plants and animals with regard to the above fire application considerations will be taken into account in order to enhance populations on CB/AB, and not adversely affect protected species. Species-specific recommendations for appropriate prescribed fire application will also 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.

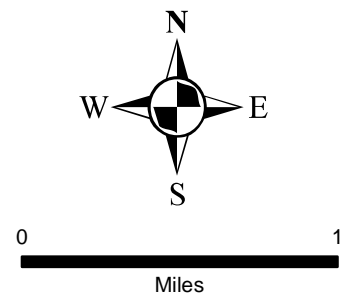
Natural Community	Fire Dependent	Fire Influenced	FNAI Fire Frequency/Interval
Glades marsh	Yes	-	Tied to surrounding matrix, estimate 2-5 yrs
Marl prairie	Yes	-	Frequent, 1-6 yrs
Seepage slope	Yes	-	Frequent to occasional, 2-3 yrs
Shrub bog	No	Yes	Shrubs, 3-8 yrs; woody, 50-150 yrs
Slough	Yes	-	Tied 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.

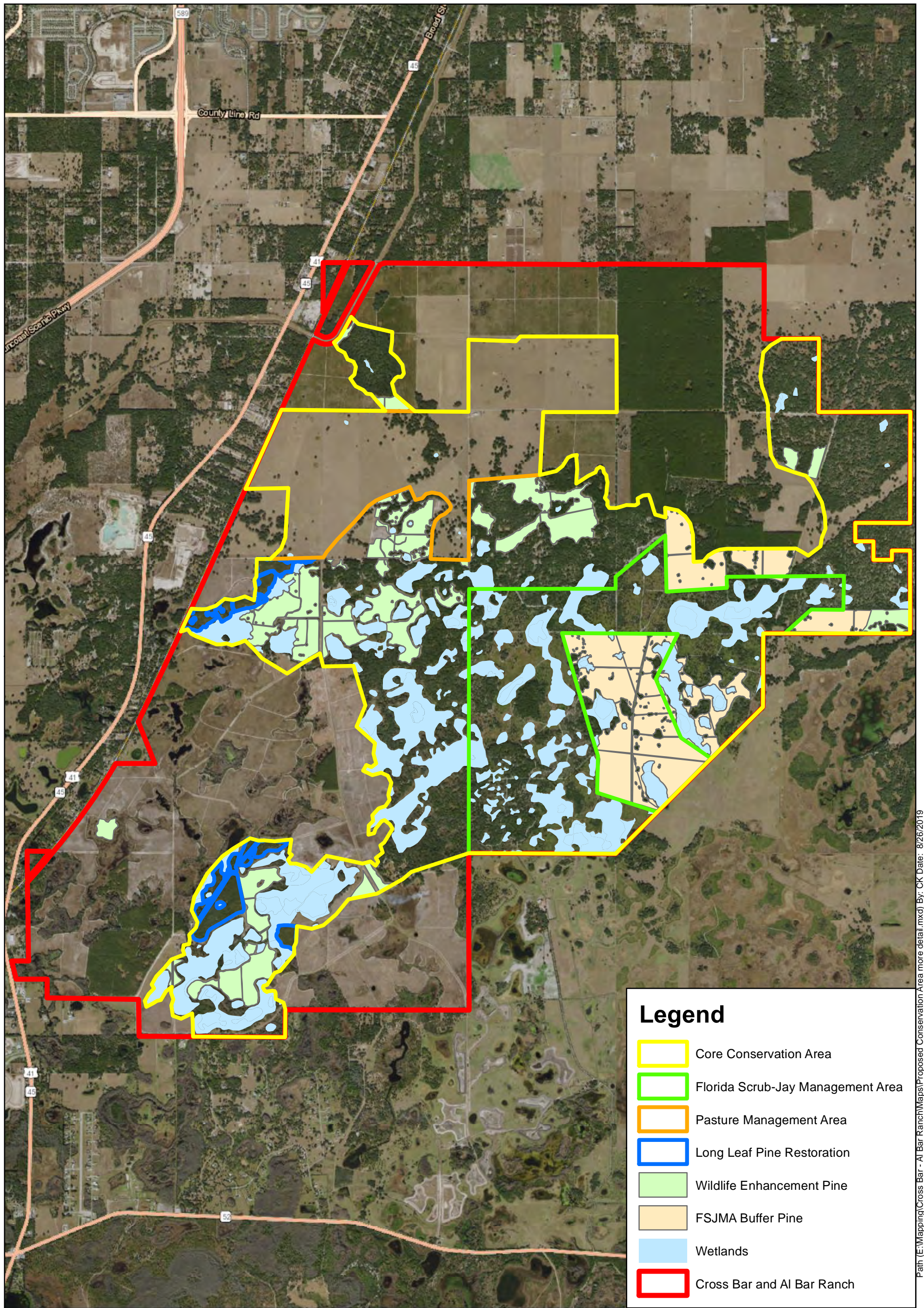


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Figure 4-1
Core Conservation Areas
Cross Bar and Al Bar Ranch
Pasco County, Florida

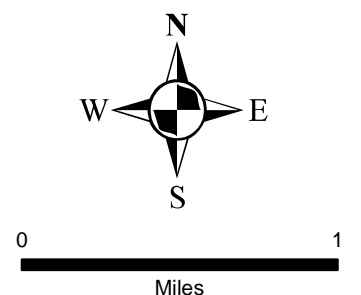




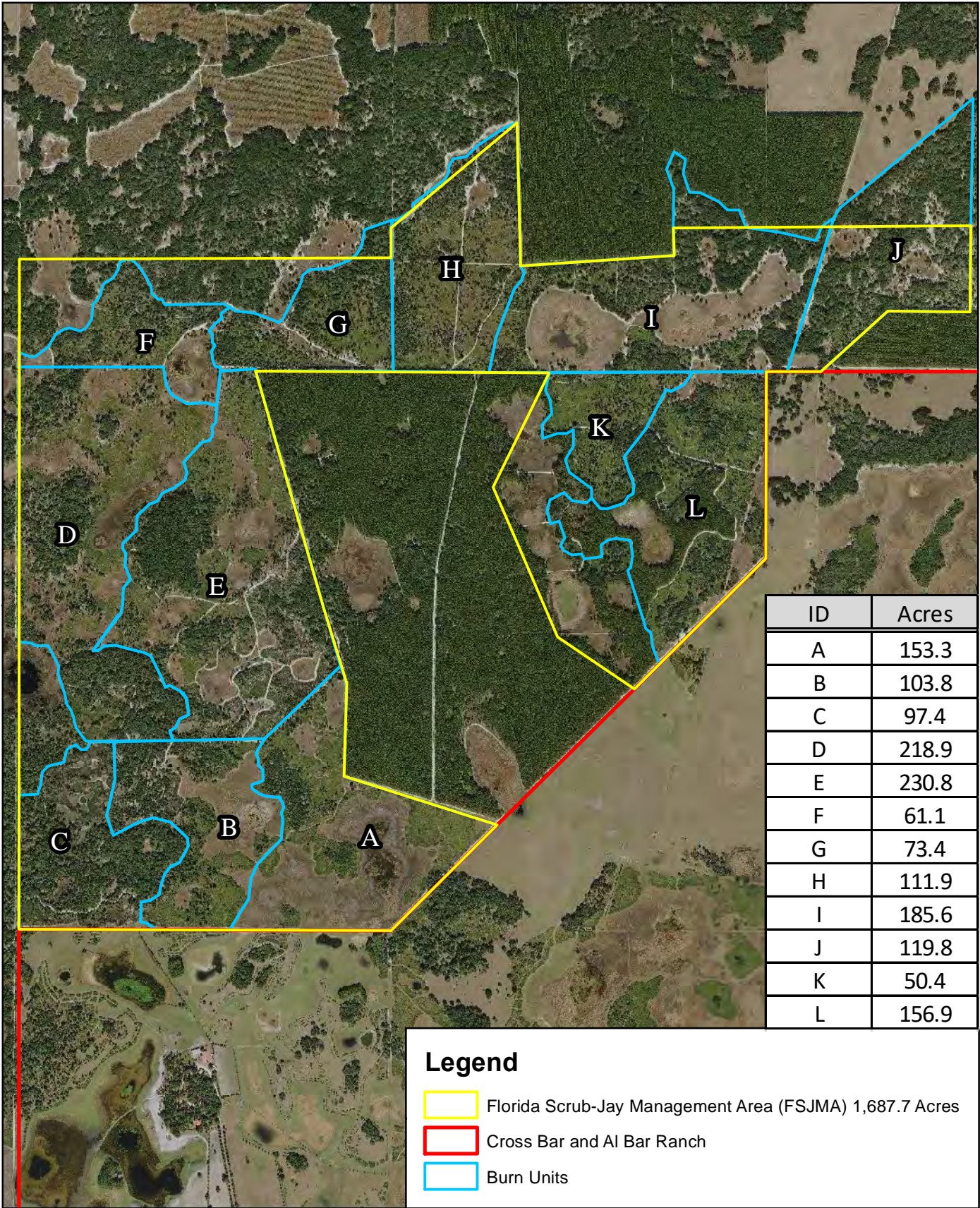
Legend

- Core Conservation Area
- Florida Scrub-Jay Management Area
- Pasture Management Area
- Long Leaf Pine Restoration
- Wildlife Enhancement Pine
- FSJMA Buffer Pine
- Wetlands
- Cross Bar and Al Bar Ranch

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



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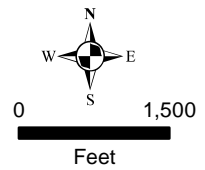
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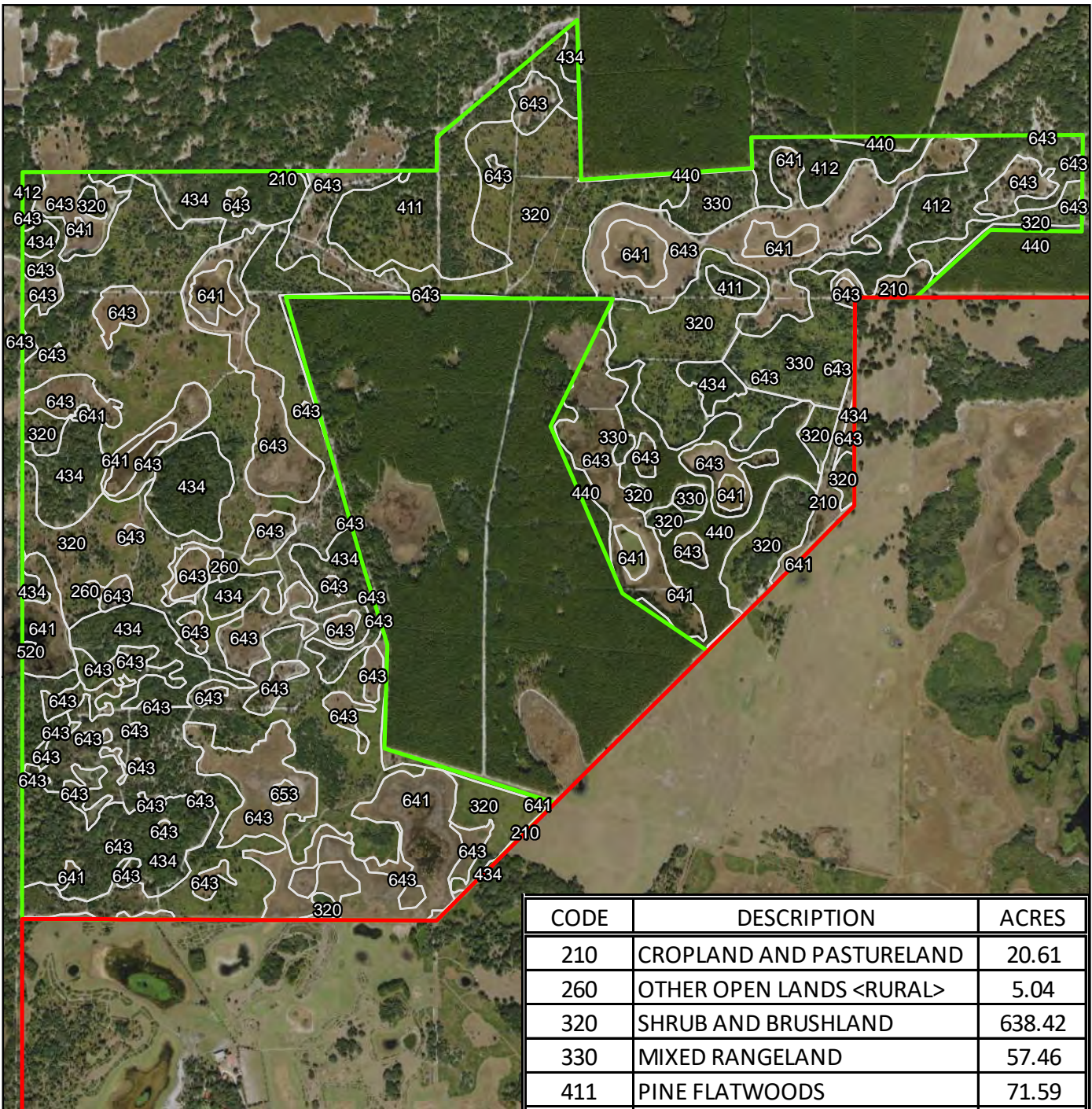
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- Florida Scrub-Jay Management Area (FSJMA) 1,687.7 Acres
- Cross Bar and Al Bar Ranch
- Burn Units



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





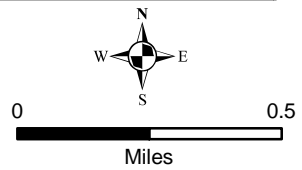
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- Cross Bar and Al Bar Ranch
- Florida Scrub-Jay Management Area
- Florida Land Use Cover Classification

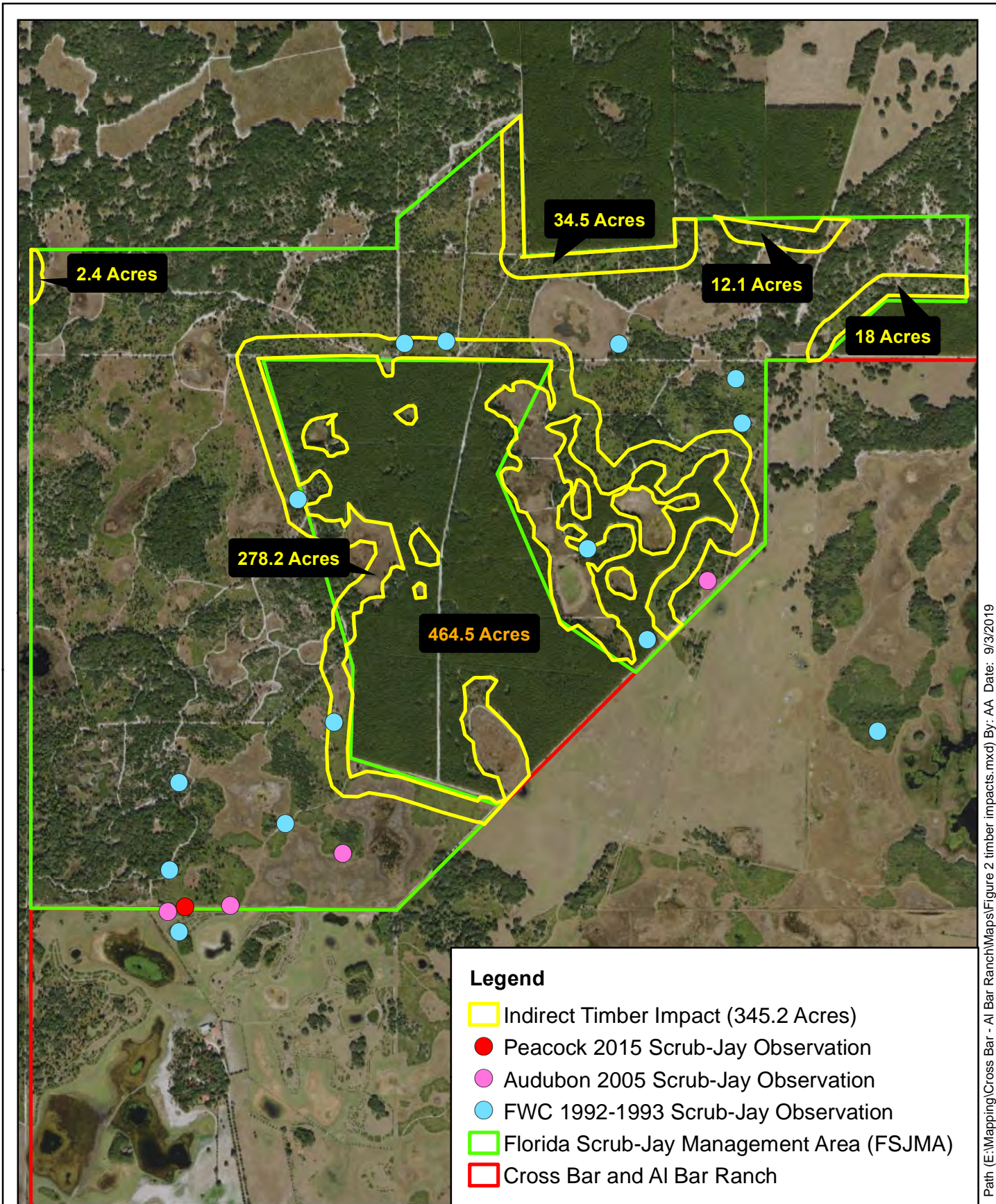
CODE	DESCRIPTION	ACRES
210	CROPLAND AND PASTURELAND	20.61
260	OTHER OPEN LANDS <RURAL>	5.04
320	SHRUB AND BRUSHLAND	638.42
330	MIXED RANGELAND	57.46
411	PINE FLATWOODS	71.59
412	LONGLEAF PINE - XERIC OAK	76.47
434	HARDWOOD CONIFER MIXED	213.60
440	TREE PLANTATIONS	84.49
520	LAKES	0.58
641	FRESHWATER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



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



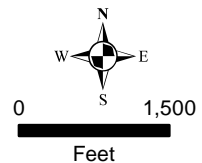
Path (E:\Mapping\Cross Bar - Al Bar Ranch\Maps\F_SJMA_FLUCFCS.mxd) By: CK Date: 8/26/2019



Path (E:\Mapping\Cross Bar - Al Bar Ranch\Maps\Figure 2 timber impacts.mxd) By: AA Date: 9/3/2019



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



Legend

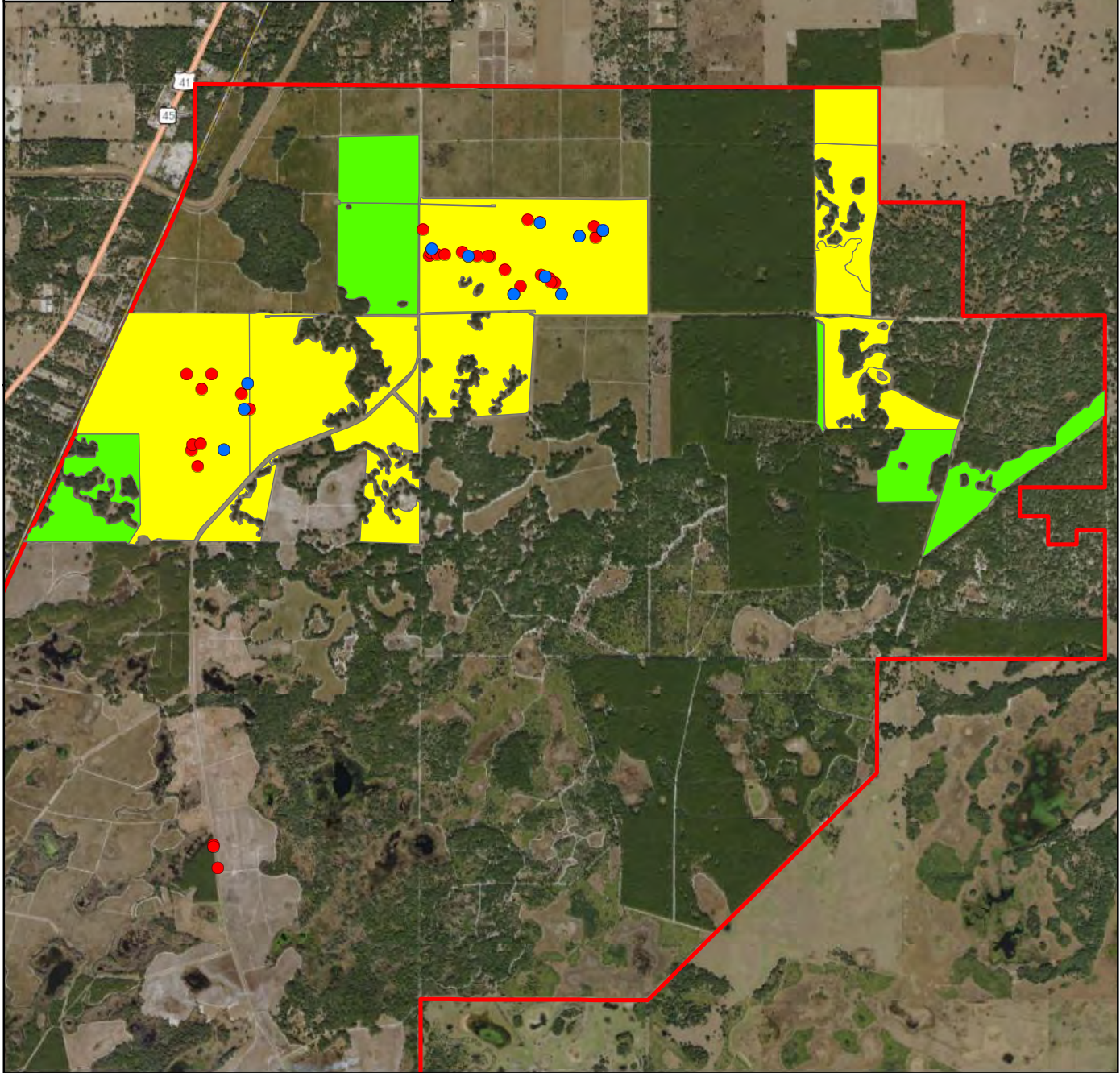
● Burrowing Owl Breeding Pairs (11)

● All Burrows (44)

■ Cow Pasture

■ Hay Production

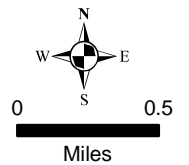
□ Cross Bar and Al Bar Ranch

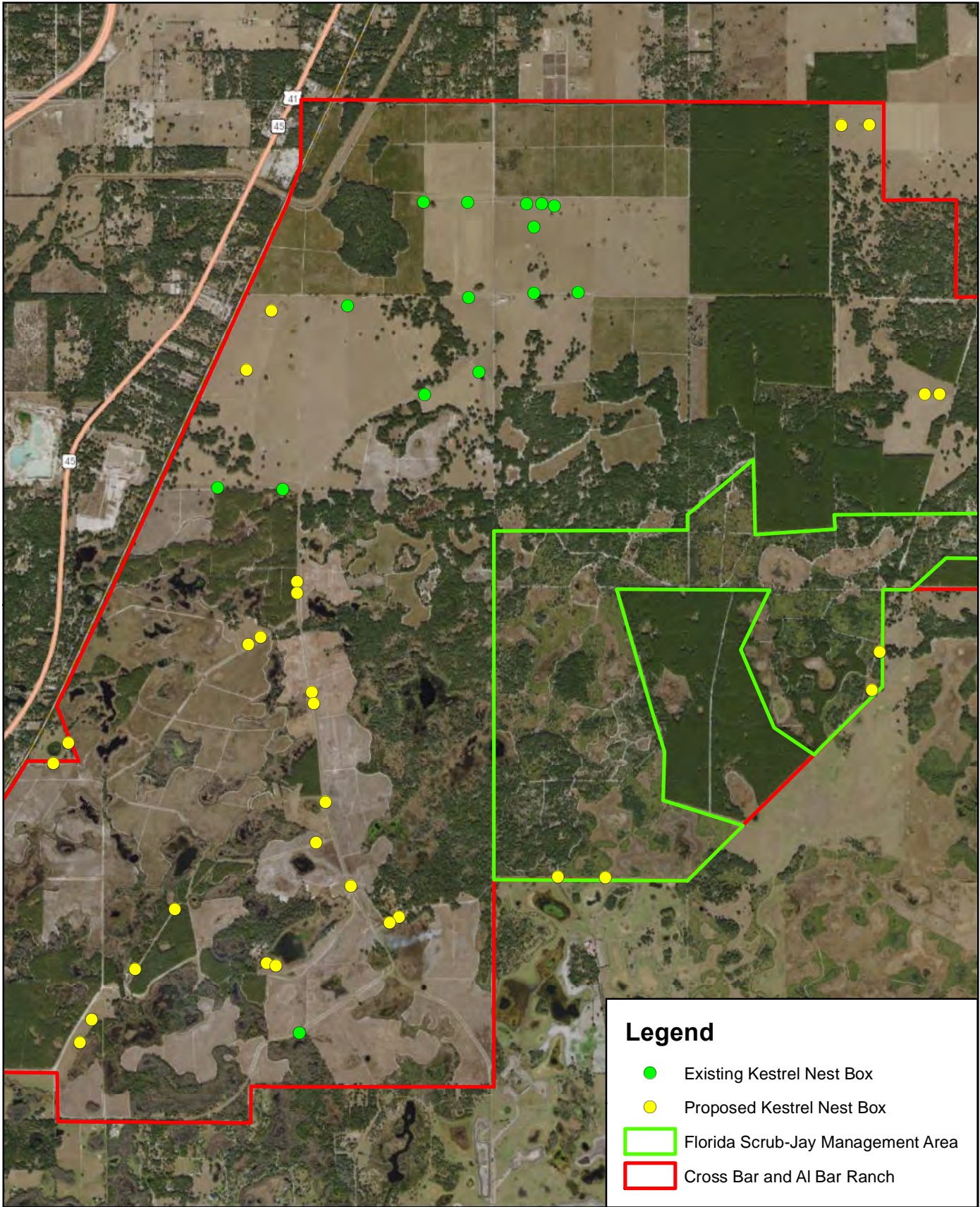


Path (E:\Mapping\Cross Bar - Al Bar Ranch\Maps\BO vs. Pasture Use.mxd) By: CK Date: 8/26/2019



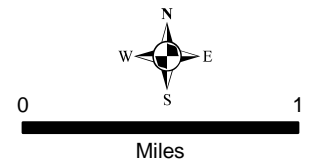
Figure 4-6
Burrowing Owl Pasture Use
Cross Bar and Al Bar Ranch
Pasco County, Florida

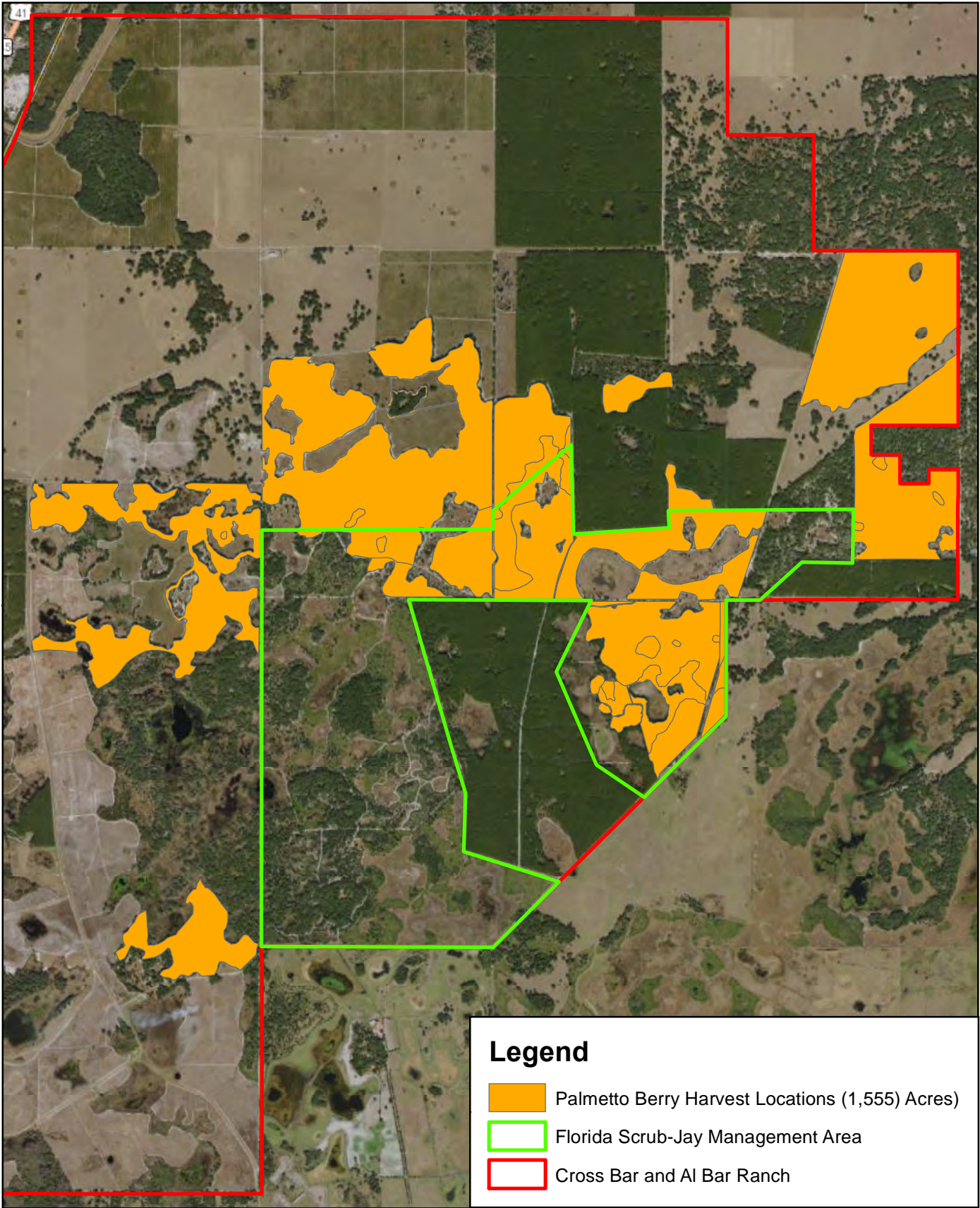




Path (E:\Mapping\Cross Bar - Al Bar Ranch\Maps\Existing and Proposed Kestrel Boxes.mxd) By: CK Date: 9/3/2019

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





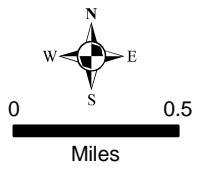
Legend

- Palmetto Berry Harvest Locations (1,555 Acres)
- Florida Scrub-Jay Management Area
- Cross Bar and Al Bar Ranch

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



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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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 <snbarthle@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
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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 (*Dichantheium 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,

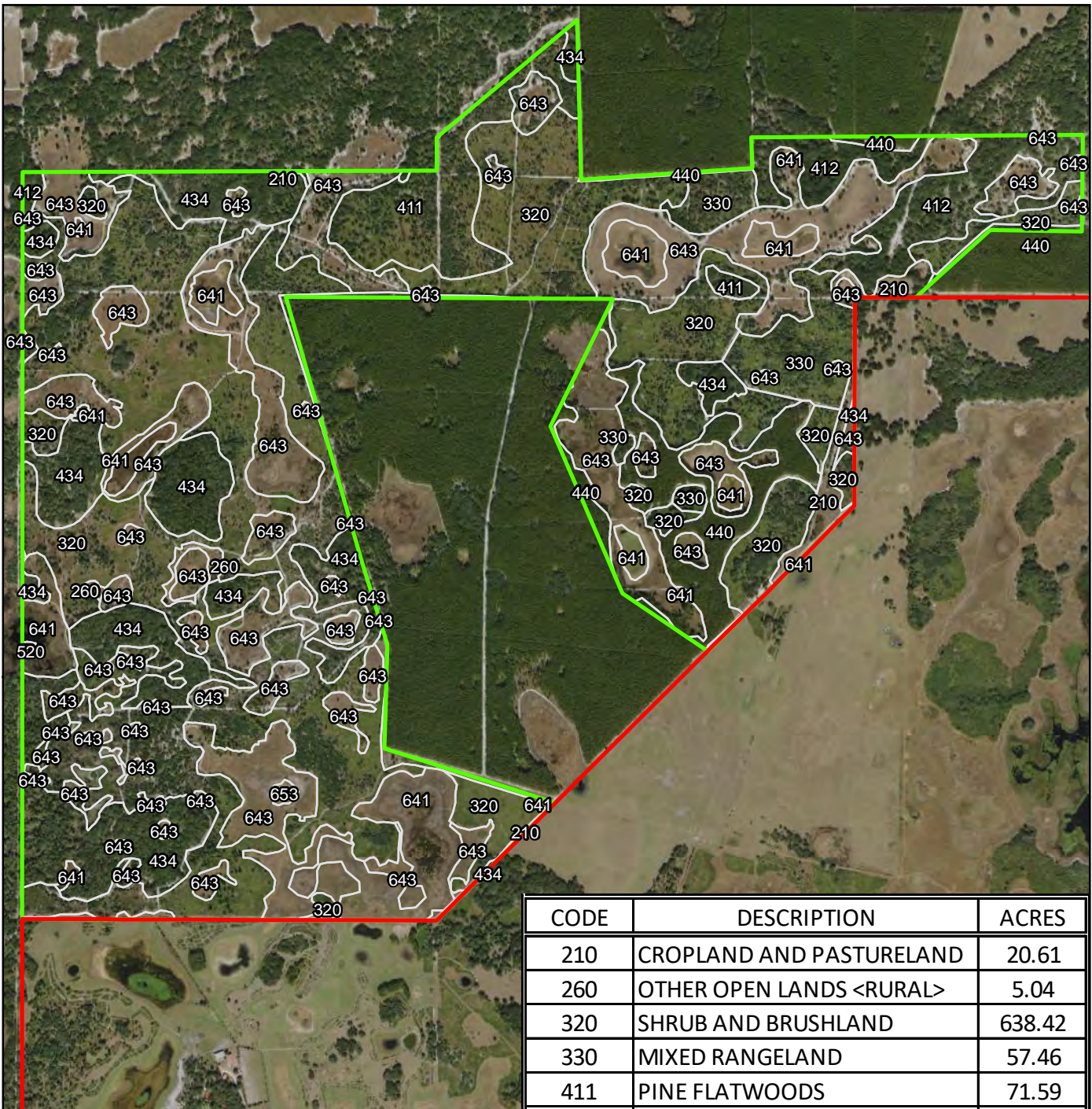
as well as the replanted areas, will start with using soils maps and field verifying existing contours to identify and delineate target habitat restoration units and types. Based on the surrounding habitats and observed recruitment, target habitat types would include scrubby flatwoods, pine flatwoods, 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.



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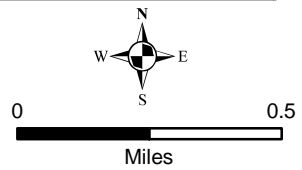
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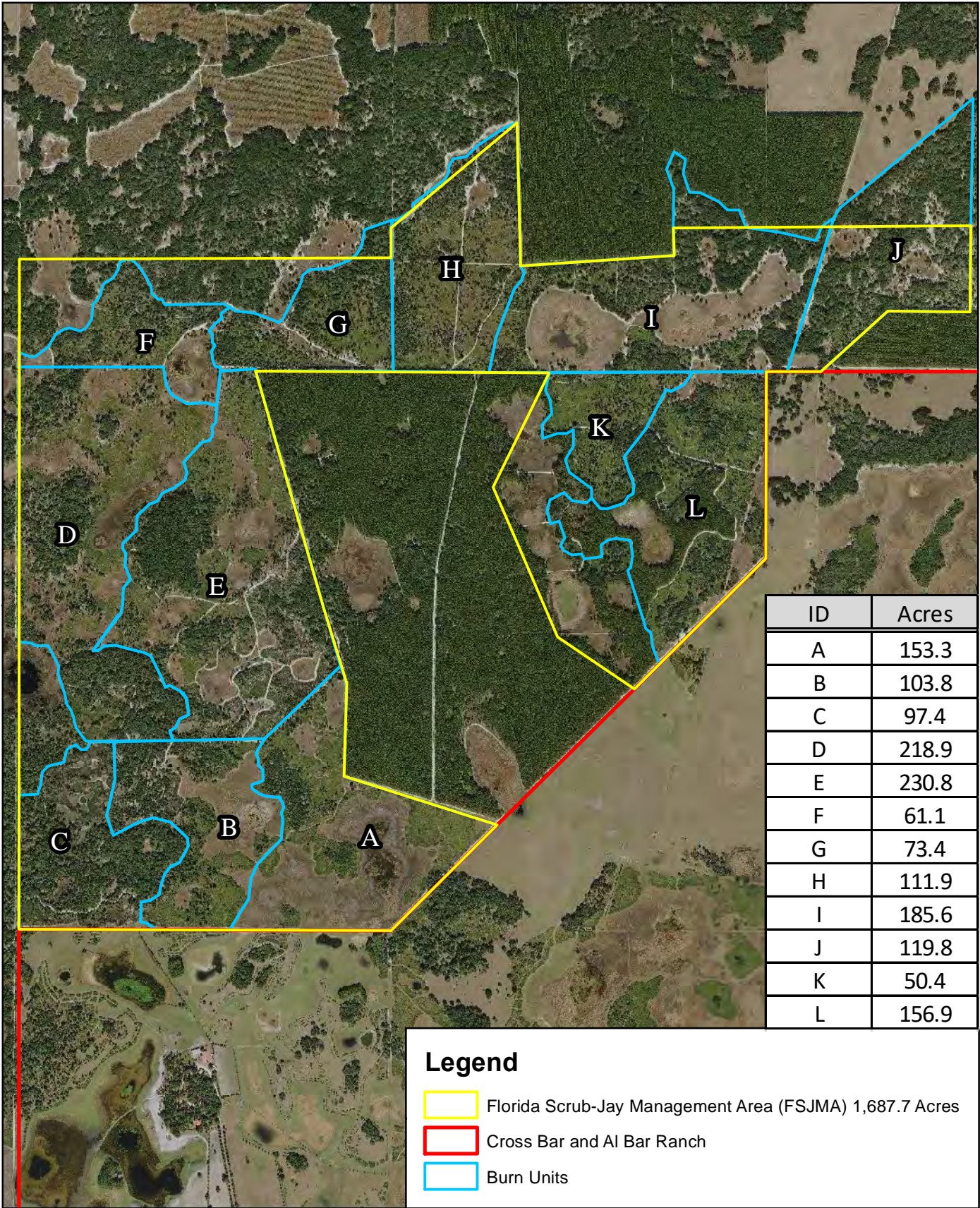
- Cross Bar and Al Bar Ranch
- Florida Scrub-Jay Management Area
- Florida Land Use Cover Classification

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



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





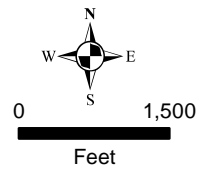
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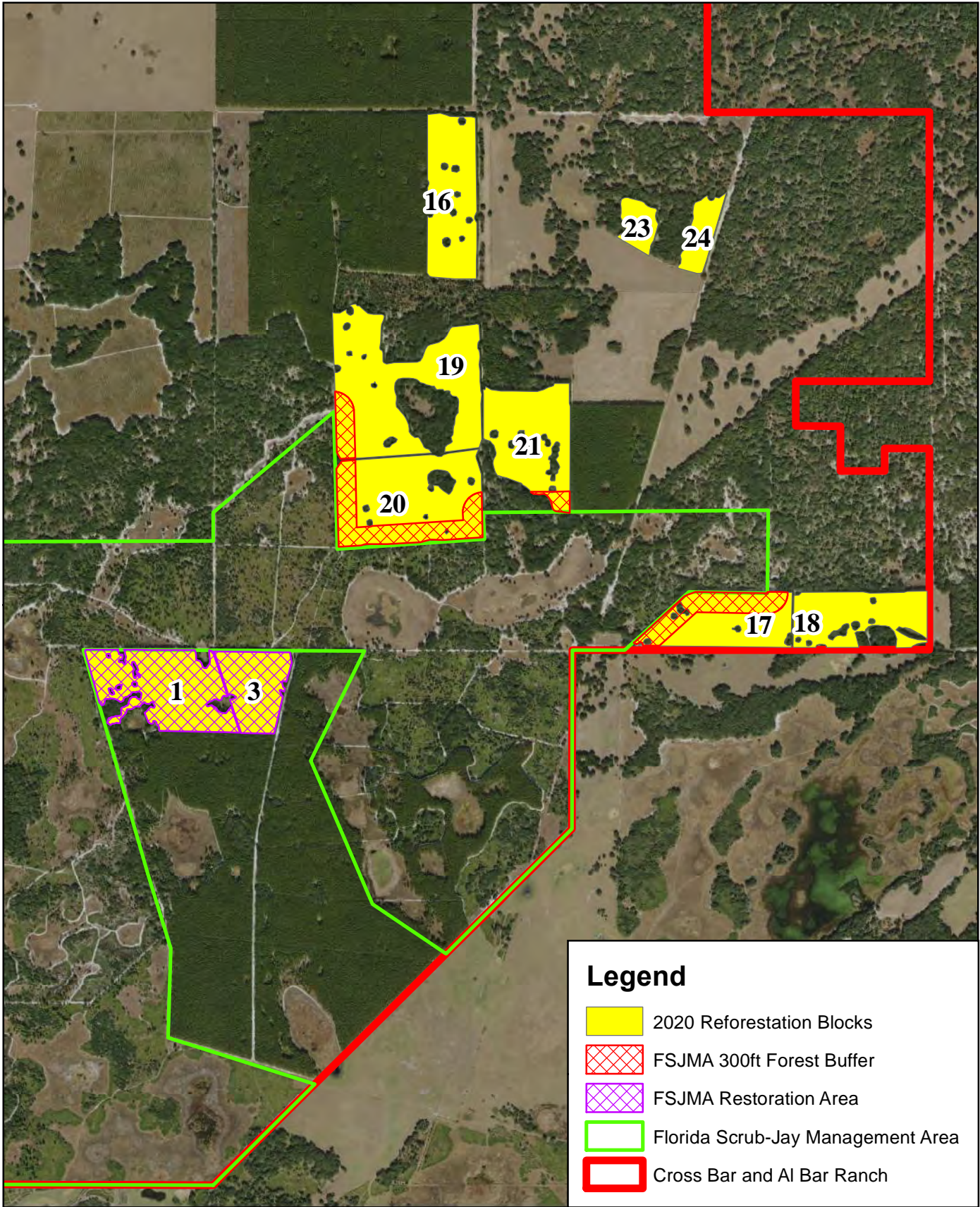
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- Florida Scrub-Jay Management Area (FSJMA) 1,687.7 Acres
- Cross Bar and Al Bar Ranch
- Burn Units



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

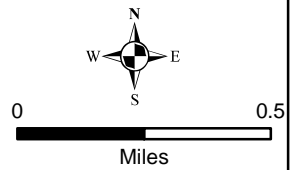




Legend

- 2020 Reforestation Blocks
- FSJMA 300ft Forest Buffer
- FSJMA Restoration Area
- Florida Scrub-Jay Management Area
- Cross Bar and Al Bar Ranch

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



Path (E:\Mapping\Cross Bar - Al Bar Ranch\Maps\2020 reforestation plan.mxd) By: CK Date: 8/26/2019

CROSS BAR AND AL BAR RANCH FOREST MANAGEMENT PLAN

May 2020

Prepared for:



Prepared by:



THE FORESTRY COMPANY

502 West Green Street

Perry, Florida 32347

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CROSS BAR AND AL BAR RANCH - FOREST MANAGEMENT PLAN

EXECUTIVE SUMMARY

The Cross Bar and 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 (Quest, 2019). The land uses and activities on CB/AB have evolved over this time period, requiring an update to the current program and development of a Forest Management Plan (FMP). The Objective of the FMP is to develop a plan which results in an economically efficient timber management operation that is compatible with the wildlife habitat restoration efforts and Tampa Bay Water's (TBW) operations (Pinellas County, 2017). The Forest Management Plan shall outline a program for the best and most economical use of this land, and provide updated timber and pine straw harvest plans and reforestation plans in accordance with the Florida Department of Agriculture and Consumer Services' *Silviculture Best Management Practices* (FDACS, 2008).

In May 2018, PCU Pinellas County (County) contracted with The Forestry Company (TFC) to lead a team of professionals with the required expertise to develop and implement a comprehensive forest management plan. Development of the FMP for the property is one of the deliverables required by the contract.

Pinellas County maintains a set of requirements for protecting water resources that it applies to the ownership and management of the Cross Bar and Al Bar Ranch. This FMP 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 protection of the water resources by following Best Management Practices as defined by the Florida Department of Agriculture and Consumer Services, and 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 forest 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 property taxing status is maintained.
- Public Perception - Use of the property shall enhance the area and maintain public support.

It is the intent of this FMP to recommend goals and strategies based on sound forest management principles to be implemented to meet the above stated management requirements. The

Forest Management Plan shall outline a program for the best and most economical use of this land, and provide updated timber and pine straw harvest plans and reforestation plans in accordance with the Florida Department of Agriculture and Consumer Services' *Silviculture Best Management Practices (SBMP)* (FDACS, 2008) and the Sustainable Forestry Initiative's clearcut size and green-up guidelines (SFI, 2015).

The Forest Management Plan (FMP) will concentrate on the commercial pine plantation forests and the longleaf pine restoration forests, although the other forest types will be discussed as well. Pasture lands are excluded from this plan.

The recommended wildlife management, vegetation restoration and habitat restoration practices are addressed in detail in the Cross Bar and Al Bar Ranch Ecosystem Management Plan (EMP) (Quest, 2019). The Forest Management Plan (FMP) and the EMP are designed to harmonize with the other and as such, the FMP references the EMP as may be appropriate.

This FMP and the EMP are envisioned to be evolving documents with a significant Adaptive Management component, whereas the County, along with the forestry consultant, ecological consultant and cattle ranch manager will collaborate to make any adaptive management changes.

CROSS BAR AND AL BAR RANCH - FOREST MANAGEMENT PLAN

1. INTRODUCTION

The Cross Bar and Al Bar Ranch (CB/AB) comprises 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 a Forest Management Plan (FMP).

In May, 2018 Pinellas County (County) entered into a Services Agreement with The Forestry Company (TFC) to provide a variety of land management services for their 12,381-acre water well field – the Cross Bar and Al Bar Ranch (CB/AB). One of the deliverables identified in the County/TFC Services Agreement (167-0365-P(SS)) was to create a Forest Management Plan (FMP) which is an “economically efficient timber management operation that is compatible with the wildlife habitat restoration efforts and Tampa Bay Water’s (TBW) operations” (Pinellas County, 2017). The Forest Management Plan shall outline a program for the best and most economical use of this land, and provide updated timber and pine straw harvest plans and reforestation plans in accordance with the Florida Department of Agriculture and Consumer Services’ *Silviculture Best Management Practices* (FDACS, 2008) and the Sustainable Forestry Initiative’s clearcut size and green-up guidelines (SFI, 2015).

The Forest Management Plan (FMP) will concentrate on the commercial pine plantation forests and the longleaf pine restoration forests, although the other forest types will be discussed as well. Pasture lands are excluded from this plan.

The recommended wildlife management, vegetation restoration and habitat restoration practices for these forests are addressed in detail in the Cross Bar and Al Bar Ranch Ecosystem Management Plan (Quest, 2019).

1.1 Background

The Cross Bar / Al Bar Ranch (CB/AB) is comprised of 12,381 acres of upland pine plantations and natural forests, forested wetlands, non-forested wetlands, prairies and pastures. It is 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 Map). 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 (Quest, 2019).

Pinellas County purchased the Cross Bar Ranch from the Norris Cattle Company in 1976 and constructed 17 potable water supply wells on the property. 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 well-field 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 previous management program for the site. Over 4,400 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 a new Ecosystem Management Plan (EMP) (Quest, 2019) and a new Forest Management Plan (FMP).

1.2 Management Requirements

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

- Ü Protection of Water Resources – No land use or management will be permitted that could adversely impact the wellfield operations or compromise the area hydrology.
- Ü Maintain or Enhance Property Security – A 24/7 onsite security mechanism will continue in order to prevent exposure of the County to liability or jeopardize the wellfield and silvicultural investments.
- Ü 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.
- Ü Wildlife Enhancement – Operations shall incorporate practices that increase and diversify habitat to encourage viable populations of important wildlife species.
- Ü Laws and Regulations – Operations on the property will comply with the laws, rules, and ordinances of regulatory agencies at all jurisdictional levels.
- Ü Sound Land Management – All practices shall adhere to standards that demonstrate responsible and ethical land use per above.
- Ü Tax Status Maintenance – Management of the property shall be that of accepted agricultural uses so that the current property taxing status is maintained.
- Ü Public Perception – Use of the property shall enhance the area and maintain public support.

1.3 Objectives, Goals and Strategies of the Forest Management Plan

The Objective of the Forest Management Plan (FMP) is to develop a plan which results in an economically efficient timber management operation that is compatible with the wildlife habitat restoration efforts and Tampa Bay Water's (TBW) operations. The Forest Management Plan shall outline a program for the best and most economical use of this land, and provide updated timber and pine straw harvest plans and reforestation plans in accordance with the Florida Department of Agriculture and Consumer Services' *Silviculture Best Management Practices* (FDACS, 2008) and the Sustainable Forestry Initiative's clearcut size and green-up guidelines (SFI, 2015) (Pinellas County, 2017).

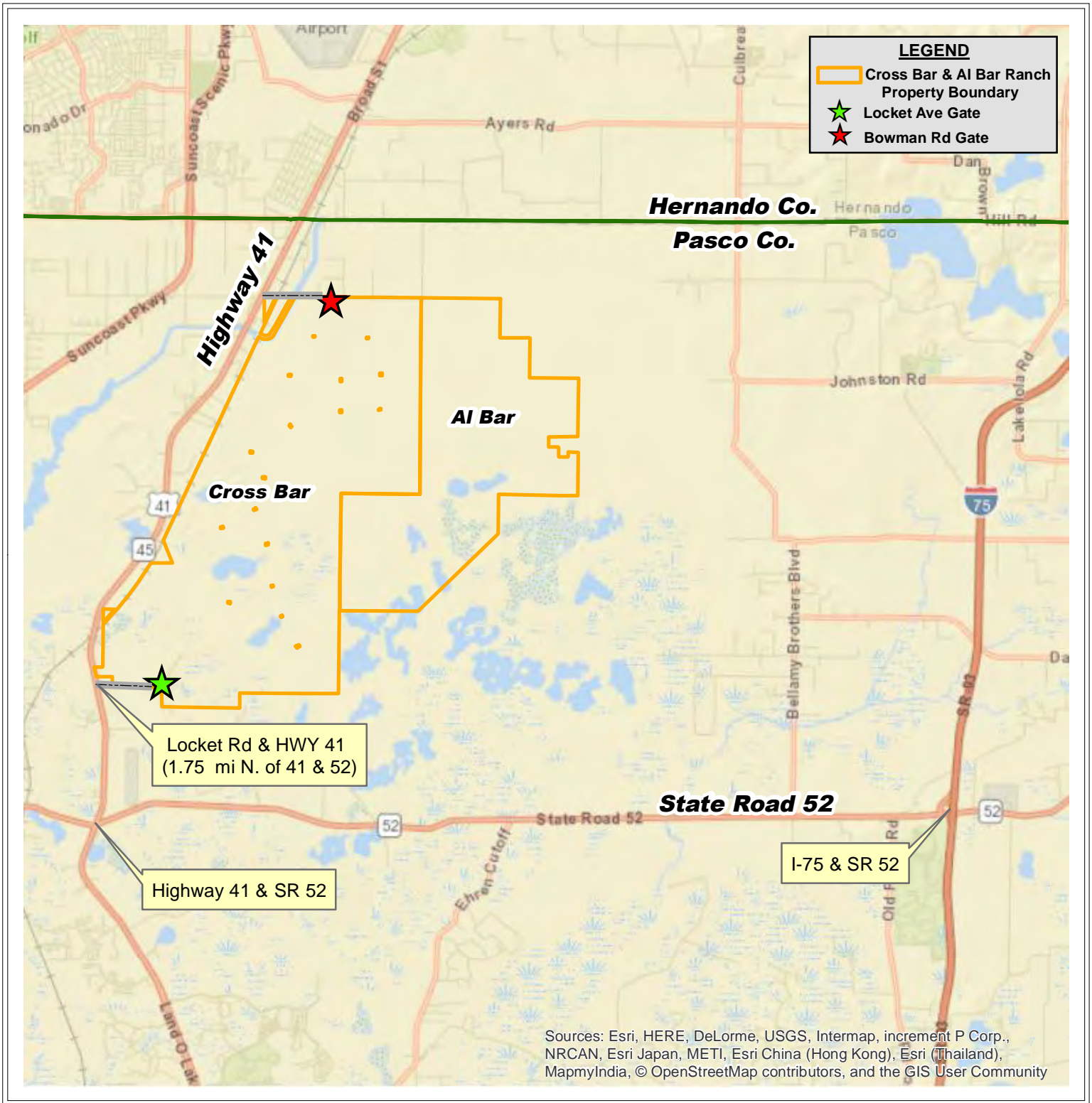
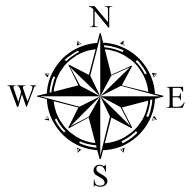
The FMP will identify long-term goals for the various forest types on the CB/AB Ranch and develop strategies based on sound forest management principles which, if implemented, will result in the forests achieving those goals, while adhering to the above Management Requirements. These goals are based on the mixed-use scenario of land management envisioned by PCU and subject to the need for significant Adaptive Management strategies due to the variability in a biological system.

The Forest Management Plan (FMP) will concentrate on the commercial pine plantation forests and the longleaf pine restoration forests, although the other forest types will be discussed as well. Pasture lands are excluded from this plan.

The recommended wildlife management, vegetation restoration and habitat restoration practices are addressed in detail in the Cross Bar and Al Bar Ranch EMP (Quest, 2019). The Forest Management Plan (FMP) and the EMP are designed to harmonize with the other and as such, the FMP references the EMP as may be appropriate.

This FMP and the EMP are envisioned to be evolving documents with a significant Adaptive Management component, whereas the County, along with the forestry consultant, ecological consultant and cattle ranch manager will collaborate to make any adaptive management changes.

Figure 1-1. Location Map
Cross Bar and Al Bar Ranch



Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, © OpenStreetMap contributors, and the GIS User Community



1:110,000

PROJECTION: NAD 83, UTM Z17 NORTH, METERS

NOTE: ACREAGE WAS DETERMINED ON THIS MAP THROUGH THE USE OF GLOBAL POSITIONING SYSTEMS (GPS) AND/OR GEOGRAPHIC INFORMATION SYSTEMS (GIS). THIS MAP IS NOT A SURVEY. THEREFORE, ACREAGE ON THIS MAP AND ANY SUBSEQUENT REPORT SHOULD BE VIEWED AS AN APPROXIMATION. FURTHERMORE, THE USE OF ANY OF THESE ACREAGES IN NEGOTIATIONS, SALES, OR CONTRACTUAL AGREEMENTS IS ENTIRELY AT THE RISK OF THE BUYER AND SELLER. REPRODUCTION OF OR EDITING OF THIS MAP IS FORBIDDEN WITHOUT EXPRESS WRITTEN PERMISSION OF THE FORESTRY COMPANY.

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09/16/19

2. SILVICULTURE BEST MANAGEMENT PRACTICES

The Forestry Company and its sub-contractors voluntarily employ the practices identified in the *Florida Silviculture Best Management Practices (SBMP)*, the *Florida Agriculture Wildlife Best Management Practices for State Imperiled Species (ABMP)* (FDACS 2015), and the *Florida Forestry Wildlife Best Management Practices for State Imperiled Species (WBMP)* (FDACS, 2014) at a minimum, in management of the Cross Bar and Al Bar Ranch in Pasco County, Florida. TFC has submitted the “Notice of Intent to Implement” these practices to the Florida Department of Agriculture and Consumer Services.

TFC staff reviews the SBMP expectations with all new sub-contractors that come on site to do forestry or agriculture work prior to work commencing; and then monitor compliance with these standards on an ongoing basis.

The basic BMP concept is the implementation of all practices that apply to a given forestry operation.

The Best Management Practices referenced above are over one hundred pages in length and will not be repeated verbatim in this FMP. However, listed below are the Silviculture BMP guidelines (FDACS, 2008) most commonly utilized on the Cross Bar and Al Bar Ranch.

2.1 Special Management Zones (SMZ)

The Special Management Zone (SMZ) is a BMP which consists of a specific area associated with a stream, lake, or other waterbody that is designated and maintained during silviculture operations. The purpose of the SMZ is to protect water quality by reducing or eliminating forestry related inputs of sediment, nutrients, logging debris, chemicals and water temperature fluctuations that can adversely affect aquatic communities. SMZs provide shade, streambank stability and erosion control, as well as detritus and woody debris which benefits the aquatic ecosystem in general. In addition, the SMZ is designed to maintain certain forest attributes that will provide

specific wildlife habitat values. Snags, den and cavity trees as well as mast producing trees, left in the SMZ, are necessary to meet habitat requirements for certain types of wildlife. The Special Management Zone has three principal components – the Primary Zone, the Secondary Zone and the Stringer. One or more of these components may apply on a given forestry operation, depending on the Site Sensitivity Class (SSC). The SSC is based on soil slope and erodibility and on the type and size of waterbodies on site.

2.1.1 Primary Zone

The Primary Zone width varies based on the stream width, stream type and slope/soil erodibility. Tables are found in the SBMP Manual to assist the forest manager in determining the appropriate primary zone width needed in each situation.

Clearcut harvesting is prohibited in the Primary Zone except for special conditions described in Appendix 11 of the SBMP manual.

- Clearcut harvesting is always prohibited within 35 feet of all perennial waters and within 50 feet of all waterbodies designated as Outstanding Florida Waters (OFW), Outstanding Natural Resource Waters (ONRW) or Class I Waters.
- Selective harvesting may be conducted to the extent that 50% of a fully stocked stand is maintained. The residual stand should conform to the following:
 - Trees should be left to maintain the approximate proportion of diameter classes and species present prior to harvesting, except that oaks (other than water oaks) and den trees may be favored. However, in mixed pine/hardwood forests the residual stand may be composed of up to 90% hardwood and 10% pine, and den trees may be favored.
- Repeated entry into a harvested Primary Zone in short time intervals for additional harvesting is prohibited.
- No trees will be harvested in stream channels or on the immediate stream bank.

Special emphasis should be given to protection of very large trees and/or old trees, protection of snags and cavity trees and protection of trees where any part of the canopy overhangs the water.

The following forestry activities are prohibited within the Primary Zone of the SMZ:

- Mechanical site preparation.
- Loading decks or landings, and log bunching points.
- Main skid trails, except to approach a designated stream crossing.
- Aerial application, mist blowing or operational application (See Glossary) of pesticides or fertilizer, including any drift from nearby applications.
- Cleaning spray equipment or discharging rinse water from pesticide or fertilizer applications.
- New road construction except when crossing a waterbody.
- Site preparation burning on slopes of 18% or greater.
- No plowed (fireline plow) pre-suppression firelines.

2.1.2 The Secondary Zone

The Secondary Zone applies to all intermittent streams, intermittent lakes and sinkholes with intermittent water. In addition, for perennial waterbodies, OFWs, ONRWs and Class I Waters, the Secondary Zone may apply as an “addon” to the Primary Zone.

For intermittent waterbodies, the Secondary Zone is always at least 35 feet wide on each side of a stream or around the circumference of lakes and sinkholes. Depending on the SSC, the width of the Secondary Zone for intermittent waterbodies may be as much as 300 feet. The SSC is used to determine the width of the Secondary Zone, in the case of intermittent waters, as well as the necessity for the Secondary Zone, in the case of perennial waters, OFWs, ONRWs and Class I waters. Generally, the more erodible the soil and the steeper the slope, the wider the Secondary

Zone, and/or the wider the entire SMZ. Appendix 1 of the SBMP manual lists the SSC for all combinations of soil and slope conditions, and provides the width requirements for the applicable SMZ under each condition. The Secondary Zone has no timber harvesting limitations. Unrestricted selective harvesting and clearcut harvesting are both permissible anywhere within the Secondary Zone. However, the following operational restrictions apply:

- No mechanical site preparation.
- No loading decks or landings
- No site prep broadcast burning on slopes greater than 18%
- No roads, except for crossings

2.1.3 Stringer

Intermittent streams are those that have a well-defined channel but maintain only seasonal flow under typical climatic conditions. This includes natural streams that have been altered by dredging and/or straightening. For all intermittent streams, the Stringer is required. The total SMZ for intermittent streams consists of the Stringer, which occupies the immediate stream bank, and the Secondary Zone. The Secondary Zone, like the Primary Zone, is measured from the stream, beginning at the break in slope at the top of the stream bank, out to the designated width. In addition, where the stream is connected to the inflow and/or discharge point of a flowing wetland, the Zone extends an additional 50 feet beyond the defined channel into the wetland. All intermittent waterbodies are afforded a Stringer and a Secondary Zone of at least 35 feet, regardless of the SSC. However, depending on the SSC, an intermittent stream could have a Secondary Zone as wide as 300 feet. Note that the total SMZ is composed of the Stringer and the Secondary Zone - no Primary Zone applies to intermittent streams.

2.2 Application of SMZs

2.2.1 Perennial Streams

Perennial streams are those that have a well-defined channel and maintain flow or continuous pools of water throughout most of the year under typical climatic conditions. This includes natural streams that have been altered by dredging and/or straightening. For perennial streams, the overall Special Management Zone is composed of a Primary Zone and, depending on the SSC, possibly a Secondary Zone. The Primary Zone for perennial streams ranges in width from 35 to 200 feet, depending on stream width or type. However, the Zone is applied to both sides of the stream. In addition, where the stream is connected to the inflow and/or discharge point of a flowing wetland, the Zone extends an additional 50 feet beyond the defined channel into the wetland (Figure 4). The Primary Zone is measured from the stream, beginning at the break in slope at the top of the stream bank, out to the designated width. Stream width is the typical bank to bank width of the stream within the harvest unit, measured in feet.

Selective timber harvesting is allowed within the Primary SMZ, consistent with the Primary Zone -Management Criteria. Clearcut harvesting is prohibited in the Primary SMZ, unless the operation qualifies as an exception as described in Appendix 11 in the SBMP manual. Depending on the SSC of the harvest unit, a Secondary Zone may also be required. If so, the Secondary Zone width is measured beginning at the outer boundary of the Primary Zone and continuing landward for the required distance as determined by the SSC. Note that where there is no Secondary Zone required, the Primary Zone is the total SMZ. Likewise, where the SSC is such that a Secondary Zone is required, the total SMZ width is the sum of the Primary Zone and Secondary Zone, up to a maximum of 300 feet.

2.2.2 Intermittent Streams

Intermittent streams are those that have a well - defined channel but maintain only seasonal flow under typical climatic conditions. This includes natural streams that have been altered by dredging and/or straightening. For all intermittent streams, the Stringer is required. The total SMZ for intermittent streams consists of the Stringer, which occupies the immediate stream bank, and the Secondary Zone. The Secondary Zone, like the Primary Zone, is measured from the stream, beginning at the break in slope at the top of the stream bank, out to the designated width. In addition, where the stream is connected to the inflow and/or discharge point of a flowing wetland, the Zone extends an additional 50 feet beyond the defined channel into the wetland. All intermittent waterbodies are afforded a Stringer and a Secondary Zone of at least 35 feet, regardless of the SSC. However, depending on the SSC, an intermittent stream could have a Secondary Zone as wide as 300 feet (Appendix 1 of the SBMP manual). Note that the total SMZ is composed of the Stringer and the Secondary Zone - no Primary Zone applies to intermittent streams.

2.2.3 Perennial Lakes and Sinkholes

A Primary Zone of 35' applies to all perennial lakes that are 2 acres or larger in size, and to sinkholes that maintain perennial surface waters. This Zone is measured from the lake or sinkhole, beginning at the break in slope at the top of the shoreline, out to the designated width. In addition, a Secondary Zone may apply to these waterbodies depending on the SSC associated with the harvest unit. The Secondary Zone, if required, would begin at the outer boundary of the Primary Zone and continue outward from the lake or sinkhole the specified distance.

2.2.4 Intermittent Lakes and Sinkholes

A Stringer and a Secondary Zone of at least 35 feet apply to all intermittent lakes that are 2 acres or larger in size and to sinkholes that maintain intermittent surface waters. Depending

on the SSC associated with the project site, the Secondary Zone could extend out as much as 300 feet.

2.3 Other Best Management Practices

The following sections of this FMP provide the listing and application of Best Management Practices (BMP) established for silviculture operations in Florida. The BMPs are arranged by specific application to various land types, waterbody types, forestry activities and special conditions. It should be noted that the Special Management Zone concept, described in the previous section, is also a BMP and is frequently referenced under the various BMP applications. The Best Management Practices in this Manual are generally presented as individual practices within a particular category. However, the basic BMP concept is the implementation of all practices that apply to a given forestry operation. In that regard, no single practice is designed to accomplish the total BMP objective.

2.3.1 Application of BMPs on Public Lands

Unlike forest management on private lands, the need to derive economic return may not be the dominant force that leads to public land ownership or drives public land management. Often, the acquisition and management of public land has as its objective, to maximize ecological restoration, preserve existing natural resources and facilitate optimum public use. When such is the case, the BMPs in this manual must be considered as minimum standards that, by themselves, will not always achieve public land management goals. Consequently, public land management agencies charged with developing and implementing management plans for public lands should do so in conformance with this Manual, and to the greatest extent practical, with the following enhancements.

Areas within the Special Management Zone designated as a Primary Zone should be managed as a no-cut zone. Any timber harvesting within these no-cut zones should be limited to operations that are in association with ecological restoration or wildlife habitat enhancement practices.

The Special Management Zone is only one of the BMP concepts that may warrant additional consideration by land managers prior to implementation on public lands. Public land management agencies are advised and encouraged to augment the BMPs where appropriate, particularly on lands that are managed for non-forestry objectives. Protection of forested wetlands within these lands should be given special consideration. In addition, such agencies should maintain environmental/ecological inventories of public lands and actively implement and study alternatives that exceed the BMPs in this manual. Results should be well documented to help facilitate future BMP revisions. Copies of enhanced management plans or any such studies should be forwarded to the Florida Department of Agriculture and Consumer Services, Florida Forest Service.

2.3.2 Application of BMPS in Wetlands

For regulatory purposes, wetlands are defined by the presence or absence of specific types of vegetation, soils and hydrologic conditions. However, it is not the intent nor within the scope of the SBMP manual, to define wetlands for regulatory purposes or to use any particular regulatory definition. Wetlands, for the purpose of the SBMP manual, are listed by type in Appendix 5 of the manual. In addition, areas of pine flatwoods may contain certain wetland types listed in this Manual, such as cypress ponds. However, for the purpose of the SBMP manual, pine flatwoods are not considered wetlands. Conversely, the presence of pine species within swamps, sloughs or floodplains does not necessarily make these areas “pine sites.” Because of the generally wet soil conditions associated with forested wetlands, some of these areas can be very sensitive to forestry activities, particularly during flooding or periods of soil saturation. Since logging will not be conducted in wetlands on the Cross Bar and Al Bar Ranch, most SBMPs for logging in wetlands

will be excluded in this FMP. However, the following SBMPs do apply and relate to the wetlands.

Drainage:

- Logging slash must not be pushed into or piled around ponds or other isolated wetlands.
- Avoid fireline plowing (with a fire plow) in wetlands.

Roads:

- Avoid fill road construction, especially in floodplains or other wetlands with flowing water. Roads constructed at ground level are less likely to restrict flowing water.
- Do not construct permanent roads in wetlands except to serve large and frequently used areas, provide access for a crossing, or provide fire protection.
- When crossing wetlands, ensure that fill roads are properly and adequately culverted and do not act to impound or divert normal stormflow, flood flow or sheet flow.

2.3.3 Application of BMPS for Canals

- During normal silvicultural operations, do not operate heavy equipment within canals or in such a manner as to result in damage to the canal bank.
- Avoid canal crossings when possible. Where necessary, construct crossings in accordance with the Stream Crossings section of the Silviculture BMP manual.
- Do not conduct bedding, chopping or other site preparation activities in such a way that results in direct surface water discharge into a canal.
- Avoid dropping logging slash in canals; remove significant amounts of logging slash from canals.
- Do not discharge pesticides not approved for aquatic use, fertilizer, or other pollutants into canals. Do not dispose of chemical containers and/or equipment rinse water in canal waters.

2.3.4 Application of BMPS for Sinkholes

- For sinkholes with perennial or intermittent open water, or which connect to an intermittent or perennial stream, apply the appropriate Special Management Zone to the sinkhole.
- Do not place any debris, trash, or waste in any sinkhole or in any surface drainage feature that flows into a sinkhole.
- Avoid mechanical operations such as harvest or site preparation, fertilization, or pesticide use in sinkholes.
- When working adjacent to sinkholes, do not alter land surface slope to direct surface drainage into the sinkhole - apply mechanical site preparation such as bedding on the contour.

2.3.5 Application of BMPS for Forest Roads

- All drainage structures should be periodically checked and maintained, especially following excessive rainfall events. If signs of sediment and/or turbid discharges are present, take immediate corrective actions for any problem.
- Ditches and culverts should be kept free of major obstructions and ditches should be allowed to revegetate as much as is practicable.
- Mulching or otherwise stabilizing critical segments of temporary and permanent roads will accelerate revegetation, ensure road utility in the future and protect nearby watercourses.
- The use of a culvert is the most common method for constructing stream crossings associated with forestry activities. Culverts are well suited for crossing both perennial and intermittent streams as well as other wet areas. However, several other types of stream crossings are also well suited for forestry related stream crossings under certain conditions.

- Place culverts in a section of the stream channel that is relatively straight and free from curves, meandering or major obstructions.
- Place the bottom of the culvert at the same elevation as the bottom of the stream, and at approximately the same slope.
- Keep the height of the entire structure (culvert plus fill) as low as possible to reduce the potential for impounding large areas of water.
- Use a culvert diameter that is sufficient to carry the normal flow expected. Culvert sizing for permanent installations should be based on the size and nature of the stream channel being crossed, or on the size and nature of the watershed above the crossing.
- When crossing broad channels or wetlands, several small culverts, spaced throughout the crossing, are normally preferable to a single large one.
- For temporary stream crossings, a culvert may be sized to reflect seasonal flow conditions. For example, during normally dry periods a small culvert may provide adequate stormflow capacity on a temporary basis. However, a culvert sized under such conditions must be removed immediately following the activity, or replaced with a size that will accommodate normal year-round flows.
- Periodically inspect all culverts to prevent clogging, plugging and eventual failure. Remove any debris or sediment deposits that have the potential to cause culvert clogging.
- Hard surface crossings or fords are commonly used for stream crossings during forestry operations. These crossings consist of lining the stream channel with rock, brick, logs, concrete, or other such material. In some cases, the stream bottom may be naturally armored and may accommodate light traffic without artificial substrate. Hard surface crossings may be constructed on both perennial and intermittent streams, and offer some important advantages over culverted crossings. In many cases, a hard surface crossing may cost considerably less than a culvert crossing, depending on the availability of surfacing material. Also, hard surface crossings are virtually maintenance free and normally do not become clogged or plugged because they maintain the natural shape of the stream channel. The material used in hard

surface crossings is relatively large and stable. Consequently, these type crossings usually do not fail or blow-out the way other structural crossings can. As long as the armoring material does not significantly impound flow or cause erosive currents, these crossings can accommodate normal streamflow while providing good access at very low risk to water quality.

- Do not use logs or logging slash as a permanent hard surface crossing material. Logs may be used to facilitate temporary crossings but must be removed from the channel upon completing the operation.
- Keep the height of the surfacing material at a minimum; hard surface crossings must not significantly restrict normal streamflow.

2.3.6 Application of BMPS for Timber Harvesting

Skid Trails

- Locate skid trails along the contour whenever practical to promote revegetation and reduce soil erosion. If skidding must be done up or down the slope, the operator should skid uphill and avoid long, continuous skid trails.
- After skidding activities are complete, stabilize skid trails where necessary by installing water bars or similar structures at recommended intervals - seeding and fertilizing skid trails will accelerate stabilization on erodible soils and/or steep slopes.
- When skidding in muck or peat (organic) soils such as in swamps, bogs or similar wetlands, concentrate skidding to as few trails as possible - this will confine soil compaction to small areas.
- When skidding on mineral soils, such as in uplands, skidding should be dispersed so that soil compaction is minimal even in individual trails.

- Keep main skid trails out of all Special Management Zones except to approach a designated crossing.
- Keep loading decks or landings out of all Special Management Zones. In addition, keep all log bunching points out of the Primary Zone of the SMZ.

Slash Disposal

- Logging slash, such as tops and limbs, which are incidental to timber harvesting activities may be left in place, as long as such material is not left in a waterbody.
- Remove logging slash from all waterbodies including both intermittent and perennial streams, lakes and sinkholes.
- Do not pile or push logging slash into cypress ponds or strands, swamps, marshes, grassy ponds, or waterbodies such as streams, lakes, sinkholes or similar water resource features.

2.3.7 Application of BMPs for Site Preparation and Planting

- Plan site preparation and planting procedures prior to timber harvesting activities.
- Select only the site preparation techniques that are necessary to establish seedlings and minimize vegetative competition - do not needlessly disturb the ground surface or expose the topsoil.
- Do not conduct mechanical site preparation within any part of the Special Management Zone.
- Do not conduct intensive mechanical site preparation such as bedding, raking and windrowing in wetlands.

- When chopping, pull chopper perpendicular to a waterbody to orient soil indentations along the contour (not necessary if chopping is followed by bedding or if the waterbody is separated from the chopped area by windrows or a similar barrier to overland flow).
- Arrange windrows and soil beds parallel to a waterbody or wetland in order to provide a barrier to overland flow, prevent concentration of runoff and reduce erosion.
- When using a blade to shear, push, or pile debris, keep the blade above the soil surface. This will minimize erosion and facilitate rapid site recovery and tree growth.
- Do not pile or push logging slash into cypress ponds or strands, swamps, marshes, grassy ponds, or waterbodies such as streams, lakes or similar water resource features.
- Do not conduct site preparation burning within the SMZ where slopes are 18% or greater.

2.3.8 Application of BMPs for Firelines

- Construct firelines only where necessary, making use of existing barriers such as roads, waterbodies, etc.
- Where possible, use alternatives to plowed lines such as harrowing, wet lines or permanent grass. *TFC and 3B have not used "plowed lines" at the Cross Bar and Al Bar Ranch. Plowed lines are made with large fire plow discs and the lines are recessed one or more feet below ground level. As per the recommended alternative, TFC and 3B use harrowed lines, wet lines and standing water most commonly for firebreaks at Cross Bar and Al Bar Ranch. TFC or 3B do not keep a fire plow on site at the Cross Bar and Al Bar Ranch.*
- Do not plow lines through sensitive areas such as wetlands, marshes, prairies and savannas unless absolutely necessary. Avoid these areas or use alternative line construction methods. *TFC and 3B use alternative line construction methods to create firebreaks such as harrowing to refresh firelines.*

- Maintain minimum plow depth at all times.
- When crossing waterbodies, raise the equipment to prevent connecting the line directly to the waterbody.
- Do not construct firelines which act as drainage systems, particularly those that might connect or drain isolated wetlands.
- Avoid constructing plowed firelines in the Special Management Zone, particularly the Primary Zone.
- Use water bars, turnouts and/or vegetation to stabilize firelines when erosion and sedimentation might otherwise result.
- When revegetating firelines, use native species when possible.
- Orient firelines along the contour wherever possible to prevent erosion and gullyng.
- Do not prescribe burn for site preparation purposes within the Special Management Zone when the slope of the site is 18% or greater (SSCs 5 and 6). Burning for ecological purposes on steep slopes is not restricted.

2.3.9 Application of BMPs for Pesticide and Fertilizer Use

Pesticides

- Choose equipment that directs the chemical only to the target area. Misdirected or excessive amounts of pesticides are wasteful, expensive and can pose a serious threat to water quality and aquatic life.

- Do not conduct aerial application, mist blowing or operational application of pesticides within the Primary Zone of the SMZ, including any drift from nearby applications.
- Do not leave pesticide containers on site - these should be rinsed and disposed of according to the directions on the label.
- Do not rinse spray equipment or discharge rinse water in waterbodies, wetlands or within the Special Management Zone.

Fertilizer

- Do not conduct aerial application, or operational application of fertilizer or locate fertilizer transfer/loading areas within the Primary Zone of the SMZ, including any drift from nearby applications.
- Whenever practical, apply fertilizer to maximize the uptake of nutrients, which might otherwise move off-site; consider the use of slow release fertilizer when conditions are appropriate.

2.3.10 Application of BMPs for Waste Disposal

Used Oil

- During equipment maintenance, used oil should be collected and stored until properly disposed.
- Do not discharge used oil or other pollutants on the ground, in sinkholes, or in waterbodies of any kind (including wetlands and canals).
- Do not mix used oil with other materials such as degreasing solvents, carburetor cleaners, etc. Such mixing may render the used oil unsuitable for recycling and therefore unacceptable at recycling centers.

Solid Waste

- Do not dispose of solid wastes, such as trash, litter, containers, etc. into waterbodies of any kind.
- Remove trash, litter and other solid wastes from project areas. In particular, remove and properly dispose of all chemical containers, hydraulic fluid and oil containers, oil filters, batteries, and tires.

2.3.11 Application of BMPs for Wet Weather Operations

- Avoid heavy equipment operations, especially skidding, during flooded or wet soil conditions. Under certain conditions, special low-ground pressure equipment or other alternatives to conventional skidding may be necessary.
- Do not operate heavy equipment, especially skidders, in floodplains when they are flooded or during conditions of flowing or standing floodwater.
- Confine skid trails to as small an area as possible when working in organic or muck soils, especially during wet conditions.

2.3.12 Application of BMPs During Emergencies

Wildfire

- Firelines, road construction and stream crossings will be unrestricted during emergencies, but stabilized according to Best Management Practices following the salvage and revegetation process.
- When necessary, mechanical site preparation techniques may be conducted within the Special Management Zone to help return the site to a productive, protective condition.

Insect and Disease

- During insect or disease epidemics, appropriate pesticides and/or harvesting may be used within the Special Management Zone to protect and maintain the health of the affected and surrounding forest.

Exotic/Invasive Trees

- For areas where exotic/invasive tree infestations are present, the exotic/ invasive trees may be harvested without regard to the leave-tree criteria that would otherwise apply to Wetlands and Special Management Zones.

BMPs other than the leave-tree criteria would still apply to the operation.

3. WILDLIFE BEST MANAGEMENT PRACTICES

The Forestry Company and its sub-contractors voluntarily employ the practices identified in the *Florida Forestry Wildlife Best Management Practices for State Imperiled Species* (FDACS, 2014) at a minimum, in management of the Cross Bar and Al Bar Ranch in Pasco County, Florida. TFC has submitted the “Notice of Intent to Implement” these practices to the Florida Department of Agriculture and Consumer Services.

In the Spring of 2013, the forestry Technical Advisory Committee (TAC) began a process to develop Wildlife Best Management Practices (WBMP) using the existing Silviculture BMP Manual as a model document. This effort was initiated in accordance with Section 570.94, Florida Statutes, whereby the Florida Department of Agriculture and Consumer Services (FDACS) and the Florida Fish and Wildlife Conservation Commission recognize that silviculture provides a valuable benefit to the conservation and management of fish and wildlife in the state. In that regard, these agencies have entered into a memorandum of agreement to develop and adopt (by rule) voluntary best management practices for State Imperiled Species of wildlife. The WBMP manual represents the TAC’s collective best efforts to establish and maintain sound, responsible practices that foster silvicultural land use and promote natural resource conservation.

TFC staff reviews the WBMP expectations with all new sub-contractors that come on site to do forestry work prior to work commencing; and then monitor compliance with these standards on an ongoing basis.

The WBMP practices referenced above are lengthy and will not be repeated verbatim in this FMP. However, listed below are the *Florida Forestry Wildlife Best Management Practices for State Imperiled Species* (WBMP) (FDACS, 2104) guidelines most commonly utilized on the Cross Bar and Al Bar Ranch.

The WBMP manual was developed to enhance silviculture's contribution to the conservation and management of freshwater aquatic life and wildlife in the state, and to provide guidance to landowners and others who choose to implement these important practices. As such, these WBMPs reflect a balance between natural resource conservation and forest resource utilization, and serve to benefit a multitude of species above and beyond the 16 species referenced in the document.

In addition, the WBMP manual addresses only State Imperiled Species in Florida and not those federally listed by the U.S. Fish and Wildlife Service. Fish and wildlife species currently on the state imperiled list were evaluated to determine the potential for incidental take (see Glossary) to occur during silviculture or agricultural activities. Based on current knowledge, 16 of the State Imperiled Species occur in areas where silviculture or other agricultural activities have the potential to influence habitat or directly impact individuals. The practices in the WBMP manual were developed specifically for silviculture, but may have application for other agricultural land uses. The practices are to minimize the potential impacts to State Imperiled Species from silviculture activities - not as a means of species recovery, expansion or habitat restoration. As such, the practices represent a practical approach for avoiding and minimizing loss of State Imperiled Species.

Throughout the WBMP manual, reference will be made to the Florida *Silviculture Best Management Practices Manual, Florida Department of Agriculture and Consumer Services, Florida Forest Service*, as incorporated in 5I-6.002, F.A.C. This reference is to acknowledge that many of the existing SBMPs that were developed primarily for water quality provide significant wildlife conservation benefits. Finally, the Wildlife BMPs are voluntary practices applied at the discretion of the landowner or other person or entity responsible for conducting silviculture activities on the property. In addition, Applicants who enroll in the Wildlife BMP Notice of Intent (NOI) process and implement the practices are not required to obtain a permit authorizing the incidental take

of State Imperiled Species associated with their operations. For NOI participants, monitoring may be conducted periodically to determine whether or not the WBMPs have been implemented.

3.1 Burrowing Animals

Two State Imperiled Species are in the burrowing animals species category and are generally associated with both forested and open area uplands. Specifically, they are the gopher tortoise (*Gopherus Polyphemus*) and the burrowing owl (*Athene cunicularia*).

This species occupies uplands with well-drained soils and significant depth. They may be found in forested or open areas throughout most of the state. The general habitat feature of the gopher tortoise is an underground burrow with a large open area at the mouth known as the “apron.” The apron of the burrow is especially important because the females usually lay and bury their eggs in a shallow nest there, typically between mid-May and mid-June. Incubation lasts 80 to 100 days. Therefore, disturbance of the apron should be avoided from early May through September when eggs or hatchlings may be present.

The burrowing owl occurs primarily in peninsular Florida, although isolated pairs and small colonies have been found as far west as Eglin Air Force Base. The owls spend most of their time on the ground. During the day they are usually seen standing erect at the mouth of their underground burrow or on a nearby post. The general habitat feature is an underground burrow, typically found in open habitats such as native dry prairies or modified landscapes such as pastures, agricultural fields, golf courses or other open grassy lands.

3.1.1 Wildlife BMPS for burrowing animals:

- Maintain habitat features by carrying out activity on forest lands, such as harvesting (including thinning), site preparation, burning, etc.
- Locate concentrated heavy equipment operations (e.g. log decks, landings, main skid

trails, ramps, etc.) away from known and visibly apparent active burrows, and especially known concentrations of active burrows. If concentrated heavy equipment operations must be located in such areas: a) identify and mark burrows, b) avoid damage to the burrow opening, and c) avoid damage to the gopher tortoise burrow apron during the nesting season (May through September).

- Advise heavy equipment operators to avoid direct contact year-round with all known and visibly apparent gopher tortoises and burrowing owls, as well as known and visibly apparent burrow aprons for tortoises during the period between May and September.
- When practical, minimize the use of heavy equipment during September and October when gopher tortoise hatchlings are more numerous and less visible due to their size during this time.

For both species of burrowing animals, burrows are not required to be located prior to silviculture operations, nor does the property in question need to be surveyed for the presence of the animals or their burrows.

Note: Forest management practices that foster herbaceous ground cover on sites with well drained soils, and known and visibly apparent gopher tortoise occupation will enhance habitat for this species. The following options are provided as some examples of how to foster herbaceous ground cover in such areas. These practices, while encouraged, are not WBMPs. Some of these practices are or will be utilized in pine stands that have been identified to be managed for conservation at the Cross Bar and Al Bar Ranch.

- Thin pine stands as appropriate to meet silvicultural objectives, such as opening up the canopy and provide more sunlight to ground cover.
- Use prescribed fire in pine stands where it is appropriate economically feasible and compatible with overall forest management objectives, and safety/smoke management considerations.

- Where appropriate and where stands are large enough, attempt to employ two or more stand ages within areas of known gopher tortoise occupation. This will lessen crown closure over the entire area at any one point in time.
- Leave herbaceous borders along forest roads, power lines and similar areas where practical and economically feasible.
- Clear heavy debris off log decks after logging operations are completed.
- Maintain minimum tree densities to meet silvicultural goals.

3.2 Nesting Birds

Four State Imperiled Species are in the Nesting Birds species category and are associated with both forested wetlands and uplands. Specifically, they are the little blue heron (*Egretta caerulea*), the tricolored heron (*Egretta tricolor*), the Florida sandhill crane (*Grus canadensis pratensis*) and the southeastern American kestrel (*Falco sparverius paulus*). Most instances of incidental take are the result of disturbances to wading bird rookeries (breeding colonies) and southeastern American kestrel or Florida sandhill crane nests during certain periods of the year. Such disturbances include damaging or removing nest trees, excessive noise from machinery in close proximity and frequent human presence. Nests or rookeries do not have to be located prior to silviculture operations, nor does the property in question need to be surveyed for the presence of nests or rookeries or the animals themselves.

There will be no planned tree harvesting in wetlands, thus there is low risk to these species. However, the following WBMPs for nesting birds should be considered when operating heavy equipment in the area.

3.2.1 Wildlife BMPs for Nesting Birds

- Avoid heavy equipment operation (except for prescribed burning and related activities) within 330 feet of active, known and visibly apparent Little Blue and Tricolored Heron rookeries (two or more nests) from February through May.
- Avoid heavy equipment operation (except for prescribed burning and related activities) within 400 feet of active, known and visibly apparent Florida sandhill crane nests from February through May.
- For southeast American kestrels, leave standing snags where they do not pose a safety issue, as per the Silviculture BMP Manual as incorporated in Rule 5I-6.002 F.A.C., and avoid damaging or felling known nest trees.
- Avoid prolonged heavy equipment operation (generally in excess of one day), except for prescribed burning and related activities, within 490 feet of active, known and visibly apparent kestrel nests from March through June.

Nests or rookeries do not have to be located prior to silviculture operations, nor does the property in question need to be surveyed for the presence of nests or rookeries or the animals themselves.

4. CONTROL OF EXOTIC PLANT SPECIES

There are a number of exotic/invasive plants found across the CB/AB Ranch. Locations of these species are noted as they are seen. The occurrence of exotics is so widespread across the ranch that treatment priorities are identified each year, given the needs and the allocated budget. For the immediate future, two priorities are paramount as follows: (1) treat areas that contain exotic plants before equipment is expected to operate and (2) treat exotic plants in augmented wetlands. For example, exotics will be sprayed before a pine plantation will be fertilized to minimize the potential for the exotic to be spread by the fertilization equipment. Another example, is that exotics will be sprayed before a mechanical tree planter is used to plant seedlings. Over time the priorities will probably change as progress is made toward eradication of the undesired species in the plantations and augmented wetlands.

Cogongrass (*Imperata cylindrica* (L.) *Raeusch*) is by far the most frequently observed species of exotic plant on the ranch. Other exotic/invasive plants and animals found on the CB/AB Ranch are camphor trees (*Cinnamomum camphora*), Caesarweed (*Urena lobata*), skunk vine (*Paederia foetida*), primrose willow (*Ludwigia peruviana*), Chinese tallow (*Triadica sebifera*), torpedograss (*Panicum repens*), smutt grass (*Sporobolus indicus*), Brunswick grass (*Paspalum nicorae*), and tropical soda apple (*Solanum viarum*) (Figures 4-1 through 4-4, Exotic Plants).

TFC and its contractors are attempting to prevent spread of exotics by requiring contractors to pressure wash equipment that moves to the site to do work, avoiding patches of the exotic plants, reporting locations of exotics, treating the exotics with herbicides, pressure washing on-site equipment if the equipment drives over exotic plants, and pre-treating the exotics with herbicide within pine stands that need to be mowed, for example. Many exotic plants require multiple treatments with herbicide to suppress and/or eliminate the plant.

TFC and its sub-contractors must work proactively in advance with TBW and PCU to ensure herbicide application is conducted in cooperation with TBW so as to protect the groundwater quality at the site.

Table 4-1 identifies the majority of the exotic plants found on site and the recommended herbicide for each plant (Table 4-1, Exotic / Invasive Plant Species on Site). Most of these plants require repeated treatments and all applications will conform to recommended rates and type of surfactant (if needed) for the particular type of plant.

The contract between PCU and TFC has very clear expectations about the treatment of invasive/exotic plants and what herbicides can be used for treatment. The ecological consultant inspects augmented wetlands monthly to note any new presence of these undesirable plants and the land managers note the location of exotics as they go about their business. Sites where equipment are expected to travel each coming year and noted wetlands, at a minimum, are prioritized for treatment each year. Eradication of these plants will likely take several years of repeated herbicide application. The ecological consultant is also monitoring cattails in the augmented wetlands and will notify PCU and TFC when and which cattails (*Typha latifolia*) need treating. Over time, different strategies and herbicides will be used to improve on effectiveness, once they are approved by TBW and PCU.

TABLE 4-1: Exotic / Invasive Plant Species On Site
Cross Bar and AI Bar Ranch

COMMON NAME OF PLANT	SCIENTIFIC NAME OF PLANT	HERBICIDE CONTROL Brand Name and (Active Ingredients)
Cogongrass	<i>Imperata cylindrica (L.) Raeusch</i>	Arsenal (Imazapyr) + Rodeo (glyphosate)
Torpedograss	<i>Panicum repens</i>	Arsenal (Imazapyr) + Rodeo (glyphosate)
Prim Rose Willow	<i>Ludwigia peruviana</i>	Renovate 3 (Triclopyr)
Camphor Trees	<i>Cinamomum camphora</i>	Renovate 3 (Triclopyr)
Skunk Vine	<i>Paederia foetida</i>	Renovate 3 (Triclopyr)
Smutt Grass	<i>Sporobolus indicus</i>	Velpar (Hexazinone)
Brunswick Grass	<i>Paspalum nicorae</i>	Velpar (Hexazinone)
Tropical Soda Apple	<i>Solanum viarum</i>	GrazonNext HL (Triisopropanolammonium salt of 2-pyridine carboxylic acid, 4-amino-3,6-dichloro; and Dimethyl amine salt of (2,4-dichlorophenoxy) acetic acid)
Caesarweed	<i>Urena lobata</i>	Renovate 3 (Triclopyr)
Chinese Tallow	<i>Triadica sebifera</i>	Renovate 3 (Triclopyr)

The recommended herbicide is the ideal product to use. TBW and PCU have not approved the use of any product other than the Rodeo brand of glyphosate for use in wetlands at the time of writing this report.

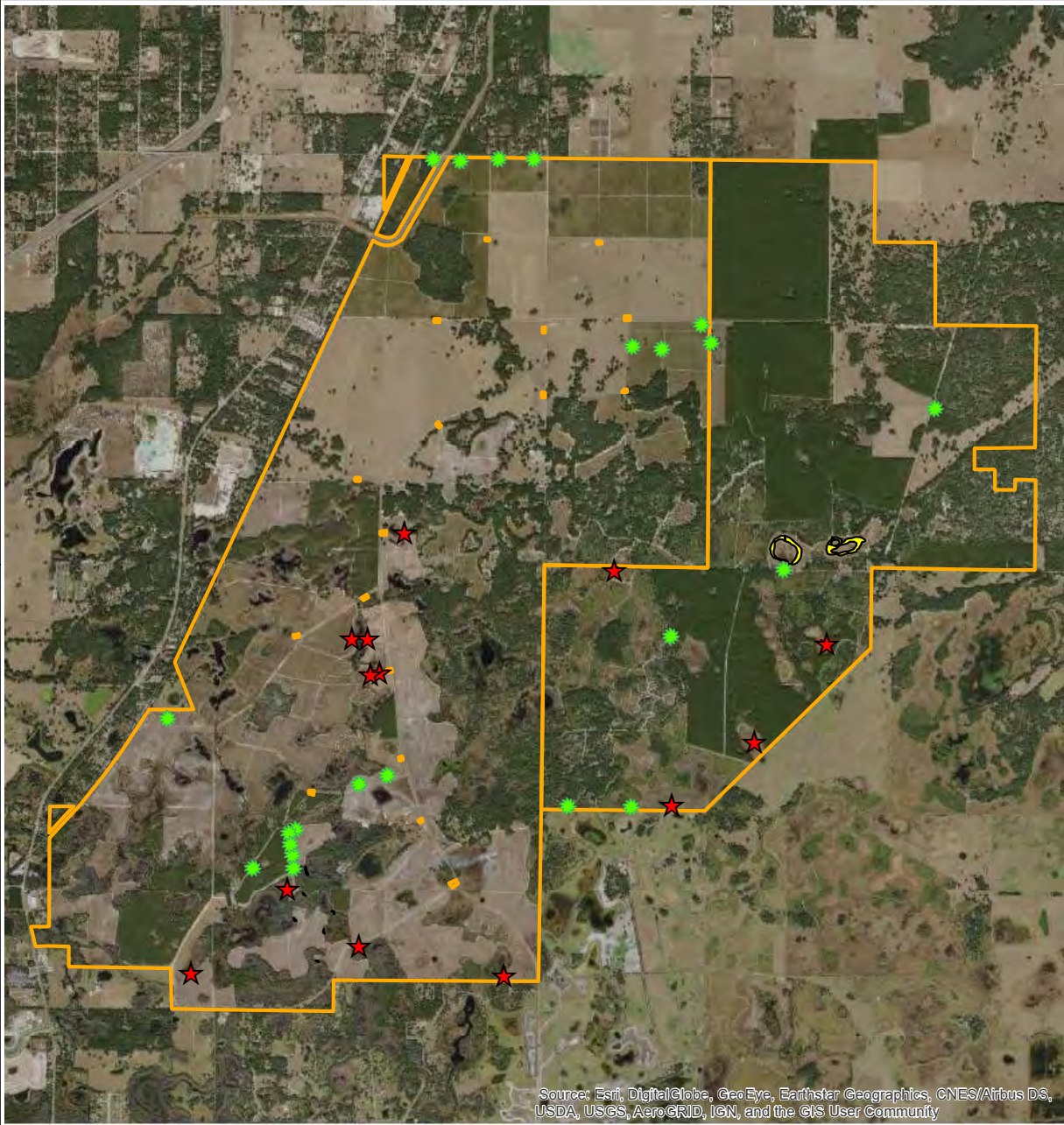
Figure 4-1. Exotic Plants

CROSS BAR AL BAR

EXOTICS

CATTAIL ★ & COGON ☆ IDENTIFIED BY SYMBOL

OTHER EXOTICS DISPLAYED WITH NAME (yellow)



0.5 0.25 0 0.5 1
Miles
1:52,000

PROJECTION: NAD 83, UTM ZONE 17, METERS

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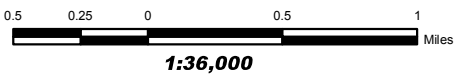
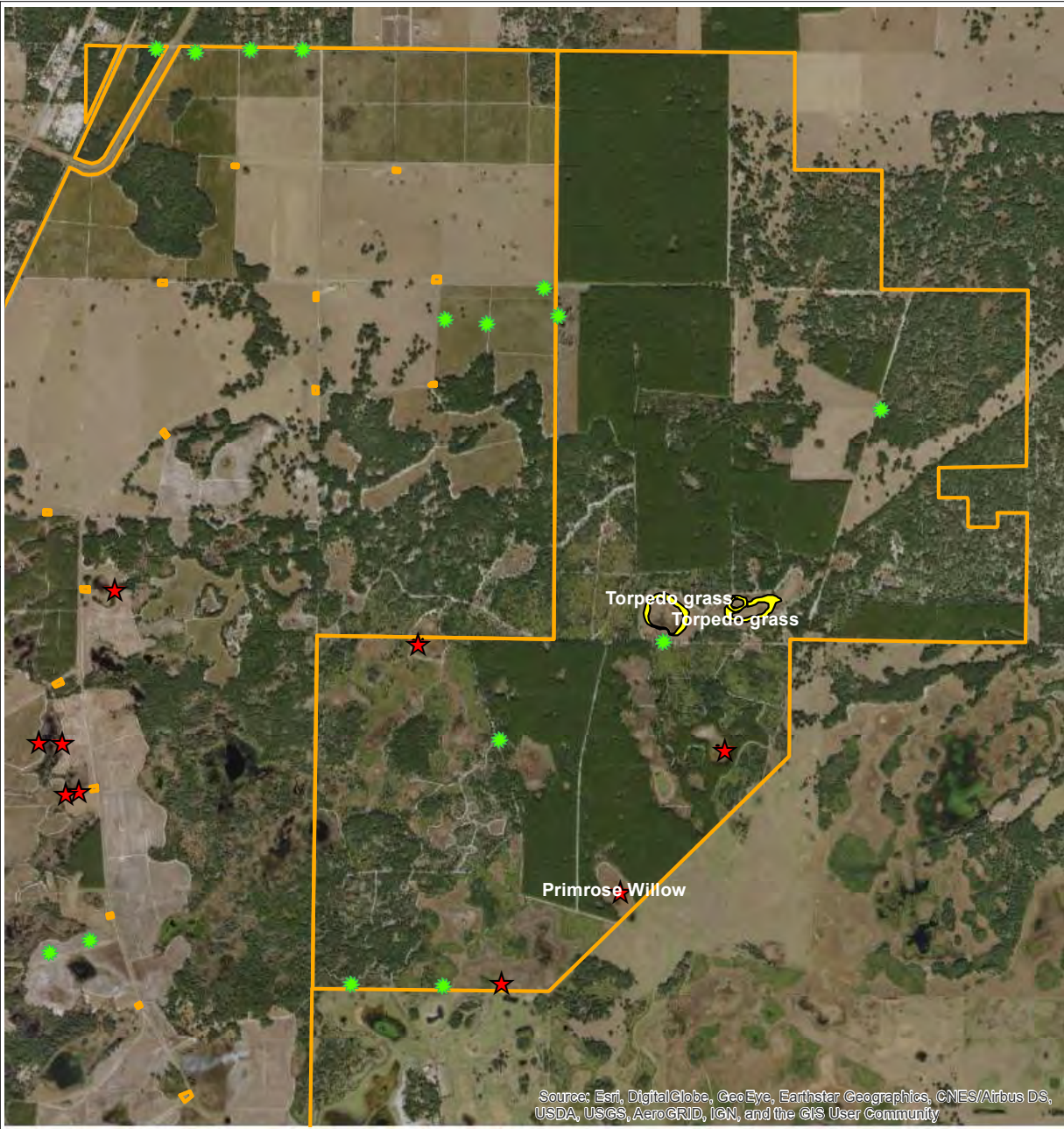
Figure 4-2. Exotic Plants

CROSS BAR AL BAR

EXOTICS

CATTAIL ★ & COGON ☆ IDENTIFIED BY SYMBOL

OTHER EXOTICS DISPLAYED WITH NAME (yellow)



PROJECTION: NAD 83, UTM ZONE 17, METERS

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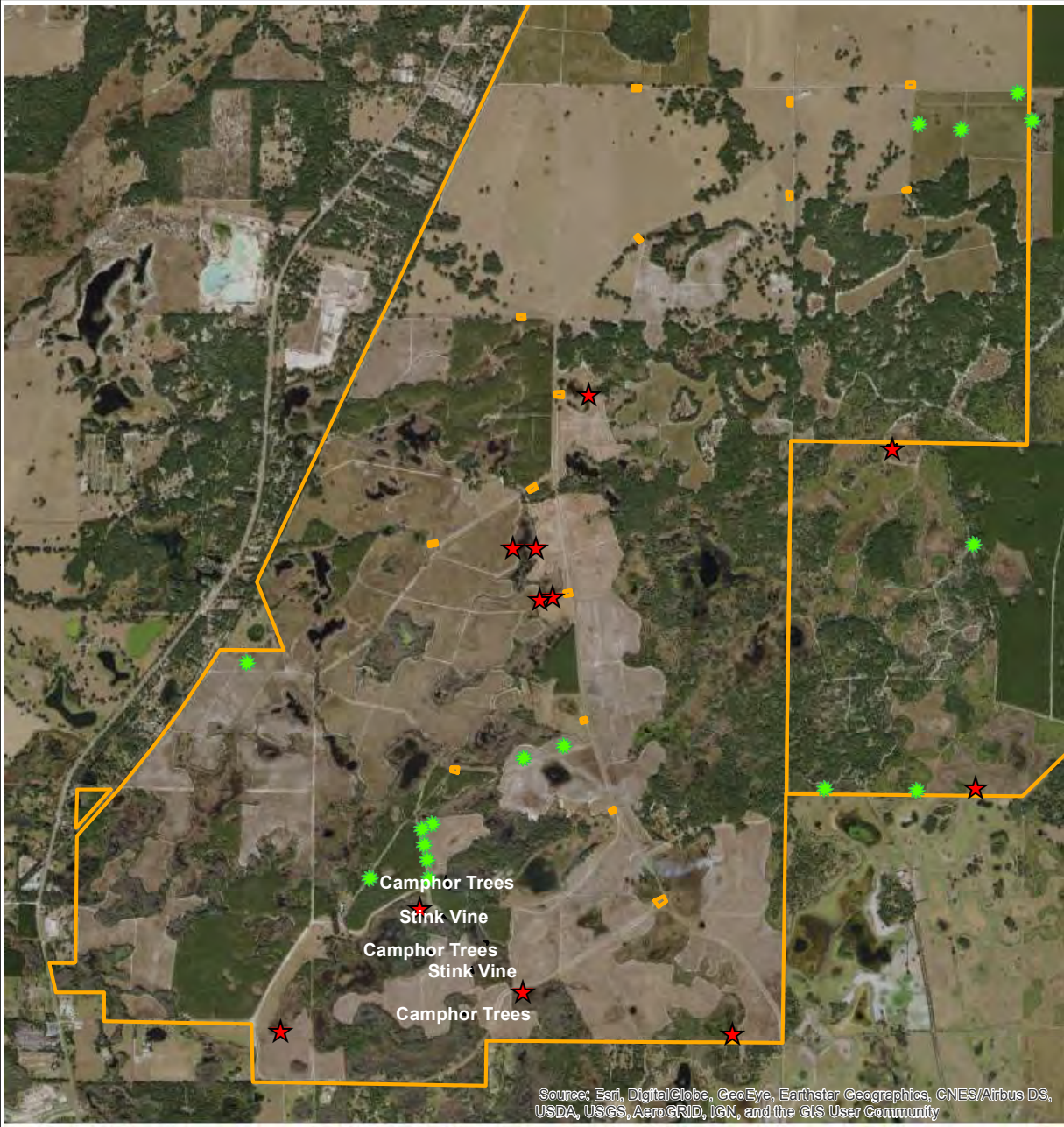
Figure 4-3. Exotic Plants

CROSS BAR AL BAR

EXOTICS

CATTAIL ★ & COGON ★ IDENTIFIED BY SYMBOL

OTHER EXOTICS DISPLAYED WITH NAME (yellow)



1:36,000

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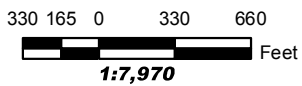
Figure 4-4. Exotic Plants

CROSS BAR AL BAR

EXOTICS

CATTAIL ★ & COGON ☆ IDENTIFIED BY SYMBOL

OTHER EXOTICS DISPLAYED WITH NAME (yellow)



PROJECTION: NAD 83, UTM ZONE 17, METERS

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5. FIRE MANAGEMENT

Management of fire risks at Cross Bar and Al Bar Ranch are high for some types of fires and much lower for other types of fires.

Fire risks are magnified due to the primary purpose of CB/AB being a wellfield. Drought conditions arrive sooner than other nearby lands and following wet periods, the land dries out quicker. The property has had some ditching in the distant past, so surface water leaves the land quickly, while groundwater continues to be pumped to supply the greater Tampa Bay area. Additional risks are due to the potential for smoke to impact traffic safety due to the ranch's proximity to U.S. Highway 41 near the western boundary, Highway 52 near the southern boundary and a small airport on Highway 52.

An additional concern regarding fire management and smoke management is the public-wildland interface where neighborhoods are adjacent to the CB/AB. There are over 130 adjacent landowners to the ranch. The adjacent landowners can be sources of wildfire that can spread from their land to the CB/AB. Conversely, wildfire could spread from CB/AB to neighboring landowners. Additionally, nearby landowners may complain about smoke emitted by prescribed burns or wildfires originating on the ranch.

When examining fire risks, it's useful to look at the Florida Forest Service's fire data. For the past 20 years in Florida, wildfire causes have been divided into 25 different ignition sources. There are only 4 categories of primary wildfire risks at CB/AB: 1) lightning fires, 2) equipment fires, 3) escaped authorized debris burning and 4) railroad fires. Each type will be discussed below. Broadly speaking, wildfires are either human-caused or lightning caused. For the past 20 years, 64% have been human-caused, 23% lightning, and 13% are of unknown origin (Fish, 2020).

5.1 Lightning Caused Fire

Lightning constitutes 23% of the wildfires in Florida. There's evidence at CB/AB of past wildfires, probably due to lightning.

Wildfires can cause major environmental, social and economic damages. The loss of timber, wild-life habitat, homes and even lives may result from a devastating wildfire. The wildfire that does not start is the one that does not have to be fought (Florida Forest Service, 2020). Risk management techniques and preparedness are key to helping reduce the impact from wildfires.

The best risk management tool to reduce the impact of lightning-caused wildfires is pre-suppression firelines, mowing between rows of pines for pine straw preparation, prescribed burning in some areas to keep vegetative fuel loads low and staff preparation. Preparing staff with fire training, purchasing radios that can be used to communicate with the Florida Forest Service, and keeping fire-fighting equipment maintained and ready to be used are key preparations that are made by the forest managers at CB/AB.

For years, Cross Bar has had an extensive network of pre-suppression firelines. Some are actually dirt roads that have a dual purpose – transportation infrastructure to more remote parts of the ranch, as well as serving as a firebreak. All current firelines and roads are maintained either by harrowing, mowing, or via the use of a box blade. Due to the wellfield usage creating drier than normal conditions, CB/AB has a practice of refreshing (harrowing) the firelines 3 times per year.

An experiment is underway in the Florida Scrub Jay Management Area at the ranch whereby firebreaks are mowed instead of harrowed, unless the Keech-Byrum Drought Index (KBDI) for Pasco County reaches 550 or above (see Figure 5-1, FSJMA Firelines and Roads). At this KBDI level of drought, grass firelines are ineffective as the vegetation is so dry, thus, the firelines and roads will be harrowed. At this stage of KBDI, it takes bare mineral soil to halt a wildfire.

Prescribed burning is utilized at Cross Bar for the following purposes: wildfire prevention, imperiled species habitat management, wetland vegetative reduction, logging debris reduction, fuel load reduction, an alternative to mowing grassy areas, and to stimulate palmetto berry production and sales. While prescribed burning is a versatile tool, its effect in a forest setting is limited to 4-5 years. After that much time following a prescribed burn, the vegetation fuel loads have often returned to pre-burn levels. Thus, prescribed burning must be repeated periodically. Figure 5-2, Historical Broadcast Burning, shows the prescribed burning history (excluding pile burning of logging debris) from 2013-present.

It should be noted that prescribed burning is not utilized in commercial pine plantations, as burning eliminates the pine straw that could be sold. Fuel loads are kept low from the pine straw preparation and sales, thus the risk of wildfire is lower. Prescribed burning is not conducted on the cattle pastures, near infrastructure, or in bodies of water. Therefore, about 50% CB/AB has the potential to be managed with prescribed fire.

The Forestry Company is responsible for all burning at the Ranch and are assisted by 3B Cattle's staff.

5.2 Equipment Fires

Equipment fires cause about 6% of the wildfires in Florida. This includes transportation, recreational, agriculture, and logging.

The majority of these fires occur from transportation vehicles. Often, they are caused by drivers parking vehicles over dry grasses. The catalytic converters on today's vehicles are super-heated and can ignite grasses easily. This type of fire can often be avoided by driver knowledge of conditions, and parking on bare dirt or pavement.

The equipment fires can usually be avoided by proper preventative maintenance which is periodic pressure washing of equipment to remove accumulated vegetation and oil or hydraulic

residues that accumulate over time. Pressure washing equipment also has the added benefit of reducing the spread of invasive, exotic plants. Lastly, daily inspecting equipment for oil, hydraulic, or fuel leaks, and making immediate repairs will reduce this type of wildfire.

5.3 Escaped Authorized Debris Burning

This cause of wildfires contributes about 4% of the fires caused in Florida. It occurs when authorized (legal) burning of acreage or piles escape, and spreads into other areas.

CB/AB has experienced some of this in the past, such as the 400-acre prescribed burn 15 years ago that escaped and burned a total of about 900 acres on the ranch. The prescribed burn was being conducted to improve Florida scrub Jay habitat.

The best way to avoid escaped authorized burning is to have a well thought through burn prescription, conducive burning weather conditions, firelines exposing mineral soil installed in advance of the burn, trained and experienced personnel conducting the burning, adequate suppression equipment on-site near the burn, and ongoing mop-up until the fire is dead out.

5.4 Railroad Fires

During dry conditions, railroads can cause wildfires mainly by throwing sparks into nearby vegetation. This cause of fire has been going down because many rail lines in Florida are no longer in service. For the past 20 years, it has dropped to about 1% of fires. However, CB/AB has an active rail line along its western boundary.

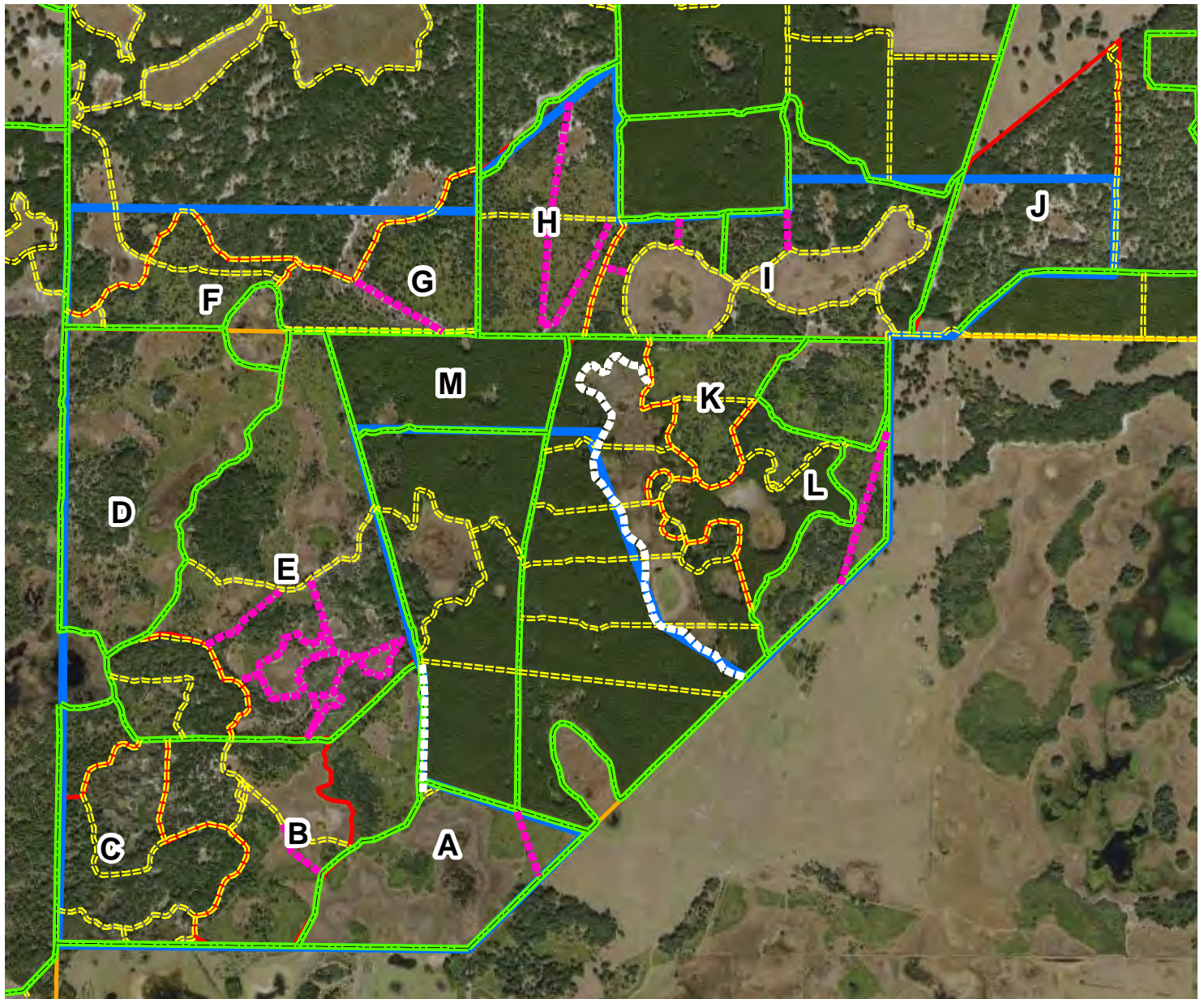
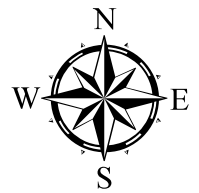
The best prevention is to continue maintaining existing firelines along the railroad. This is about the only form of risk management that can be exercised for railroads.

In summary, pre-suppression firelines, prescribed burning and preparedness helps reduce the risk from the most likely sources of wildfires at the ranch. In addition, CB/AB's site security

prevents many types of wildfire risks that other public and private landowners experience. For example, since the land is closed to the public, there are no wildfires from campgrounds, children, smokers, non-authorized prescribed or pile burning, and arsonists. This greatly reduces fire risk at the ranch.

Figure 5-1. FSJMA Firelines and Roads

CROSS BAR & AL BAR RANCH - CHANGES TO FIRELINES IN THE FSJMA
ROADS - GREEN, FIREBREAKS - YELLOW
ELIMINATED FIREBREAKS - PINK, NEW FIREBREAKS - WHITE
FSJMA BOUNDARY BLUE & BURN BLOCKS RED



COMMENTS FOR FIRELINES MAP CHANGES IN THE FSJMA

10/29/2019

BLOCK C	WAIT UNTIL HARDWOOD REDUCTION IS COMPLETE TO DISCUSS REDUCTION OF FIRELINES OR ROADS
BLOCK D	MAY NEED ADDITIONAL FIRELINES ESTABLISHED BEFORE BURNING
PERIMETER AROUND PLANTATIONS	FIRELINES ARE TO BE HARROWED OR ESTABLISHED
PERIMETER OF FSJMA	FIRELINES ARE TO BE HARROWED, EXCEPT MOW THE SOUTH BOUNDARY OF BLOCKS A & B
ROADS AND FIRELINES INTERNAL TO THE FSJMA	FIRELINES AND ROADS ARE TO BE MOWED EXCEPT WHEN KBDI EXCEEDS 550; AT WHICH POINT THE FIRELINES WILL BE HARROWED



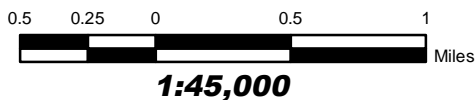
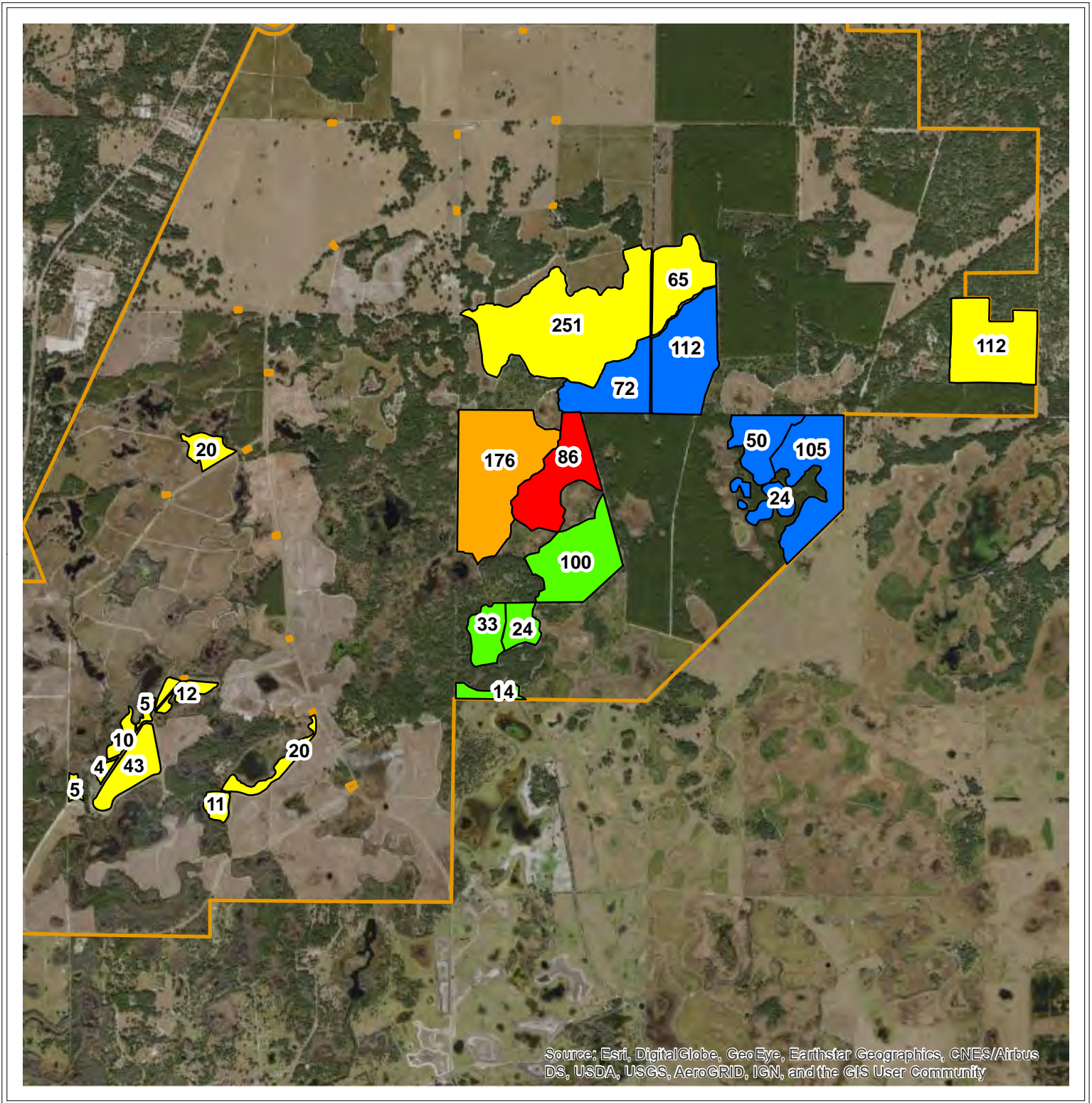
1:24,000

PROJECTION: NAD 83, UTM Z17 NORTH, METERS

NOTE: ACREAGE WAS DETERMINED ON THIS MAP THROUGH THE USE OF GLOBAL POSITIONING SYSTEMS (GPS) AND/OR GEOGRAPHIC INFORMATION SYSTEMS (GIS). THIS MAP IS NOT A SURVEY. THEREFORE, ACREAGE ON THIS MAP AND ANY SUBSEQUENT REPORT SHOULD BE VIEWED AS AN APPROXIMATION. FURTHERMORE, THE USE OF ANY OF THESE ACREAGES IN NEGOTIATIONS, SALES, OR CONTRACTUAL AGREEMENTS IS ENTIRELY AT THE RISK OF THE BUYER AND SELLER. REPRODUCTION OF OR EDITING OF THIS MAP IS FORBIDDEN WITHOUT EXPRESS WRITTEN PERMISSION OF THE FORESTRY COMPANY.

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Figure 5-2. Historical Broadcast Burning
CROSS BAR & AL BAR RANCH - BURN LAYER MAP
1,356 TOTAL ACRES (MOL), AREAS LABELED WITH ACRES
Burn years - Red 2013, Orange 2014, Green 2016 (170 ac)
Blue 2019 (362 ac) , Yellow 2020 (562 ac)



PROJECTION: NAD 83, UTM Z17 NORTH, METERS

NOTE: ACREAGE WAS DETERMINED ON THIS MAP THROUGH THE USE OF GLOBAL POSITIONING SYSTEMS (GPS) AND/OR GEOGRAPHIC INFORMATION SYSTEMS (GIS). THIS MAP IS NOT A SURVEY. THEREFORE, ACREAGE ON THIS MAP AND ANY SUBSEQUENT REPORT SHOULD BE VIEWED AS AN APPROXIMATION. FURTHERMORE, THE USE OF ANY OF THESE ACREAGES IN NEGOTIATIONS, SALES, OR CONTRACTUAL AGREEMENTS IS ENTIRELY AT THE RISK OF THE BUYER AND SELLER. REPRODUCTION OF OR EDITING OF THIS MAP IS FORBIDDEN WITHOUT EXPRESS WRITTEN PERMISSION OF THE FORESTRY COMPANY.

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6. COMMERCIAL PINE PLANTATION FORESTS

In 1992, Pinellas County contracted with a forestry consultant to expand the agricultural uses on the property to include commercial pine plantation operations. Pine seedlings were planted on approximately 4,400 acres of former pasture on CB/AB between 1993 and 1996. Pine straw raking/sales began within the pine plantations in 2001, timber harvest operations began in approximately 2010/2011, and reforestation operations began in 2012 (NRPS, 2017). The pine straw income and timber income generated from the commercial forest operations have nearly offset the expenses required to manage all aspects of the property maintenance over the 20-year timber production cycle (Pinellas County, 2017).

Most of the commercial pine plantations that were planted initially have been thinned, clearcut and reforested, or are scheduled for harvest and reforestation. There are 4,136.6 acres being managed for commercial pine plantations (Figure 6-1, Commercial Pine Plantations). Two hundred eighty-eight point seven (288.7) acres of previous commercial pine plantation stands have been converted to wildlife habitat conservation uses in 2019 (Figure 6-2, Previous Commercial Plantations Planned for Conservation).

While a detailed Forest Management Plan and Schedule of Work is developed for the next 20+ years, forests and markets are dynamic and the plan should be reviewed and updated every five years to reflect any changes in the forest, markets or PCU objectives.

6.1 Objective and Goal of Commercial Pine Plantation Management

The objective of commercial pine plantation management is to manage the lands for the best and most economical use of this land (Pinellas County, 2017). The goal of the commercial pine management is to maximize income /net present value from the land

while adhering to PCU's requirements; and implementing sound forest management practices (Mendell, 2013; Samuelson, Luce, 2014; Shiver, 2014).

All pine plantation management on the Cross Bar and Al Bar Ranch will be in accordance with the Florida Department of Agriculture and Consumer Services' *Silviculture Best Management Practices* and the *Florida Forestry Wildlife Best Management Practices for State Imperiled Species*; and the SFI Performance Measures 5.2 and 5.3 (SFI, 2015).

The *Sustainable Forestry Initiative Forest Management Standard* (SFI) for clearcut size will also be followed in the future harvest and reforestation plans at the Cross Bar and Al Bar Ranch. The SFI Standard Performance Measure 5.2. states, "Program Participants shall manage the size, shape and placement of clearcut harvests". The indicator of compliance with that performance measure is that the average annual size of clearcut harvest areas does not exceed 120 acres, except when necessary to meet regulatory requirements, achieve ecological objectives, or respond to forest health emergencies or other natural catastrophes. Additionally, SFI Standard Performance Measure 5.3, commonly referred to as the 'green-up guideline', states that "trees in clearcut harvest areas are at least 3 years old or 5 feet high at the desired level of stocking before adjacent areas are clearcut" (SFI, 2015).

The EMP recommends increasing the amount of "edge habitat" by reducing pine densities to encourage ground cover and shrubs in areas adjacent to pastures and other open lands. This is an example of the adaptive management component, whereas the County, along with the forestry consultant, ecological consultant and cattle ranch manager will collaborate to make any adaptive management changes.

6.2 Maximizing Income from Commercial Pine Plantations

Maximizing income, a primary goal for the commercial pine plantations will be accomplished by:

- Ø Utilizing fast growing pine species suitable to the soil type (Shiver, 2014; Dickens et al, 2002; Dickens 2019; Samuelson, 2014; White, 2014);
- Ø Planting pine tree densities that will support increased wood and pine straw production and increased carbon sequestration (Shiver, 2014);
- Ø Utilizing mechanical and chemical site preparation to reduce vegetative competition prior to planting seedlings (Shiver, 2014; Dickens et al, 2002, Dickens 2019; Samuelson, Luce, 2014);
- Ø Applying fertilizers to boost tree and needle growth (Dougherty, 2014; Shiver, 2014; Dickens et al, 2002; Dickens 2019; Samuelson, Luce, 2014);
- Ø Utilizing mechanical and chemical vegetation control to support the sale of pine straw (Dickens 2019); and
- Ø Selling/harvesting pine straw and timber (Dickens et al, 2002; Dickens, 2019; Mendell, 2013; Samuelson, Luce, 2014; Shiver, 2014; Pienaar et al, 1996).

6.3 Forest Soils and Species Selection for Commercial Pine Plantations

The predominant soils found where the commercial pine plantation management is to occur are soil types 6 - Tavares sand (16.1% of the acres), 7-Sparr fine sand (13.8% of the acres), 11-Adamsville fine sand (25.1% of the acres), 21- Smyrna fine sand (9.1% of the acres), 23- Bassinger fine sand, depressional (4.6% of the acres), 43-Arrendo fine sand (4.1% of the acres), 45-Kendrick fine sand (3.6% of the acres) and 69-Millhopper fine sand (5.7% of the acres) (Figures 6-3 – 6-3.4, Commercial Plantation Soil Types).

The USDA Soils Web Survey includes potential forest productivity information for wood crops. The predominant soil types underlying the commercial pine plantations are capable of growing slash pine (*Pinus elliotii* var. *elliotii*), longleaf pine (*Pinus palustris*), and

South Florida Slash Pine (*Pinus elliottii* var. *densa*); and some are also capable of growing Loblolly pine (*Pinus taeda*) (Table 6-1, Potential Productivity Information Based on Soils Characteristics). In all cases, slash pine is the most productive (highest cubic feet/acre/year growth) as compared to other pine species that will grow on the specific soil type and as such, will be utilized on stands managed for commercial pine plantations.

6.4 Schedule of Work for Managing Commercial Pine Plantations

There is a normal order of operation in managing any commercial pine plantation operation. The timber harvest schedule will be the starting place addressed in the flow of work for this FMP and will drive all of the other parts of the process and resulting budget.

The general order of work for managing commercial pine plantations is as follows:

- Exotic/Invasive Vegetation Herbicide Application
- Harvest
- Site Preparation
- Pre-Plant Herbicide
- Tree Planting
- Mowing
- Fertilization at age 4
- Pine Straw Preparation (mowing and herbicide application)
- Pine Straw Sales/Raking
- Possible Fertilization at Age 12
- Timber Sales

Some of the various types of work in the forest can occur throughout the year but some work needs to be done during certain months; such as tree planting (Table 6-2,

Approximate Annual Schedule for Work In Commercial Pine Plantations At Cross Bar And Al Bar Ranch). This schedule will be the normal time you may see TFC and its sub-contractors performing these tasks.

6.5 Growth and Yield Modeling for Commercial Pine Plantations

Growth, yield and financial models are used in forest management to project future timber volumes, determine the value of conducting various practices on the land and to determine the optimal economic harvest cycles of pine plantation stands (Borders, Shiver, 2008).

TFC utilizes the SIMS growth and yield modeling software to model the optimal harvest age of the timber stands, to project future potential income and determine the net present value of the timber stands given various cultural practices. The SIMS runs and other research data indicate that it is best to fertilize at age 4 and only fertilize at age 12 IF the basal area of the stand at age 12 is less than 100 ft²/acre. The background SIMS model information supporting this conclusion follows.

TFC gathered some representative timber stand data for the 2018 and the 2019 slash pine timber stands on the Cross Bar and Al Bar Ranch, such that growth, yield and financial models could be run to project future volumes and to determine the optimal economic rotations of the commercial plantation stands.

Since the pre-merchantable trees are young when the growth and yield and financial models are run, the type of data that can be collected are species, number of tree stems per acre, tree height, soil type, site index, and cultural treatments on the land. Also considered are the planned fertilizations, the planned herbicide application at age 6, the potential pine straw income and potential harvest income.

Site Index Curves are used to determine the appropriate Site Index to use in the SIMS Growth and Yield Modeling, based on actual tree height and age of the trees measured. Based on this data The Forestry Company used a Site Index of 68 in its modeling.

These data are input into the SIMS growth and yield model and multiple simulation scenarios are run by varying harvest age and number of times fertilizer is applied, etc. The net present values and the harvest product mixes are evaluated to ensure the model results make sense. This information is considered while establishing the harvest schedule and the fertilizer treatment regime.

While the models for the 2018 and 2019 stands predict that a second fertilization will not be needed since the age 12 basal area is predicted to be above 100 ft²/ac, that will need to be determined once the stands are actually age 12; as many factors influence what will exist when the trees are 12 years old.

6.5.1 SIMS Growth and Yield Model Results

The slash pine stand that was planted in 2018 was modeled with the SIMS software and is designated as PSL 18 on the SIMS reports. TFC ran the first SIMS model run assuming (a) the 2018 stand will be fertilized at age 4, (b) pine straw is sold at ages 7 through 19, then (c) clear cut the stand at age 20 and (d) the model used a 5% discount rate in calculating NPV. The model indicated PSL 18 stand would produce a NPV of \$1289.88/acre and 130.15 tons/acre. (Table 6-3.1 and 6-3.2, 2018 Stand Harvest Report- Clearcut at Age 20). A second fertilization at age 12 was not modeled because the basal area at age 12 was predicted to be 113 ft²/ac (Table 6-4, 2018 Stand Development Report). TFC ran the model again and only changed it to allow the computer to select the harvest year based on best economic value and it indicated an NPV of \$1293.52/ac and a final clearcut harvest at age 21 and 136 tons/acre (Table 6-5, 2018 Stand Harvest Report - Optimal Harvest Age). The model indicated that PCU could potentially make \$3.64 more per acre if the stand was clearcut at age 21 vs. age 20. However, the additional year of growth is additional exposure to potential risks of fire, beetles, disease or hurricane; and since the income difference is minimal, it is best to harvest the stand at age 20.

For those reasons the typical plantation harvest age is planned for age 20. Two fertilizations are built into this plan - at ages 4 and 12, although the age 12 fertilization may not be needed if the stand has at least 100 ft²/ac of basal area at age 12. In some cases, the scheduled harvest year is different than age 20 for SFI green-up standards reasons.

6.6 Commercial Pine Plantation Harvest Schedule

Four thousand one hundred thirty-six point six acres (4,136.6 acres) are managed for commercial pine plantations (Figure 6-1, Commercial Pine Plantations).

PCU executed a timber sales contract with South Florida Timber (SFT) in February of 2018 for the sale of the mature slash pines on the site prior to TFC assuming management of the property. The three-year harvest schedule associated with that sale was described on a map as part of the SFT contract (Figure 6-4, Original South Florida Timber Harvest Schedule).

SFT completed the harvest of blocks in their previous contract before starting the harvest of the 2018 contract. During the first year (7/2018-6/2019) of the 2018 SFT contract with PCU, SFT completed harvest of blocks 23, 24, 20, 21, 16, and started harvesting block 19. It was mutually agreed (by PCU, SFT and Central Florida Mulch (CFM)) for SFT to harvest block 16 in year 1 of the contract and defer block 22 until year 2 of the contract.

CFM evaluated the stands for the pine straw production and requested a change to the order of the pine plantation harvest schedule in early 2019 in order to maximize straw harvest. The order of pine harvest in these stands has no negative economic impact on PCU and thus, the updated harvest schedule was approved by PCU, SFT and CFM (Figure 6-5, Revised Short-Term Harvest Schedule). In addition, PCU supported the clearcut harvest of 15 acres of slash pines surrounding the stilt house due to beetle infestation that were not included in any harvest schedule in the past (Figure 6-6, Stilt House Harvest Area). The year 2 harvest shown on the Revised Short-Term Harvest Schedule and the Stilt House harvest is nearly complete.

The final harvest of the mature slash pines from the commercial pine plantations, 346.7 acres (year 3 harvest as shown on the Revised Short-Term Harvest Schedule) is planned to take place 7/1/20-6/31/21. The next scheduled pine harvest after that is scheduled to take place in 2032; the year the 2012 stands reach 20 years old. Thus, there will be no timber harvest income for ten years - from 2022 through 2031. Catastrophic situations could change this, but for planning purposes, it is appropriate to make this assumption.

The future commercial pine plantation harvest plan is based on the markets available for wood in the region at the time of this writing. This plan typically schedules clearcut harvests to take place when the trees are age 20, except when the harvest age has to change to remain in accord with the SFI green-up guidelines and clearcut size requirements (Table 6-14 Future Timber Sales and Figure 6-7, Long-Term Commercial Pine Harvest Schedule). In order to comply with the SFI green-up guidelines and clearcut size requirements, part of one stand age may be harvested in one year and adjacent parts of the same aged stand will be harvested approximately three (3) years later (Figure 6-8, SFI Impacts on the Long-Term Harvest Schedule). This results in smaller adjacent clearcut areas, conforms with SFI's green-up guidelines and provides wildlife closer adjacent cover.

If markets improve for solid wood products in this region in the future, the optimal economic harvest rotation and straw raking strategy should be re-evaluated at CB/AB.

6.7 Commercial Pine Plantation Site Preparation

Once a pine plantation stand is clearcut, the land is then prepared for re-planting (site preparation). This is ideally completed within one year of harvest. Site preparation typically includes raking the logging debris into piles, burning the piles, then applying herbicide to control competing vegetation.

The time between harvest and reforestation must include one summer season because the pales weevil (*Hylobius pales*) and pitch-eating weevil (*Pachylobius picivorus*) are attracted to freshly harvested pines, where they breed in logging slash, stumps, and old root

systems. Control is unnecessary after winter or spring harvests because most weevils are gone before the next winter's planting. (Wear, Greis, 2002).

Raking involves the use of a large root rake attached to a front-end loader or articulated machine to pile debris for burning. The ash from burning the debris piles returns nutrients to the soil and burning reduces the amount of solid material left on site to hamper the planting and growth of the new stand of pine seedlings.

Hardwood and weed competition greatly reduce pine growth due to competition for water and nutrients. Research conducted has demonstrated a significant increase in pine growth with different cultural treatments such as site preparation, fertilization and weed control (via herbicide use) (Jokela, Long 2018) (Figure 6-9, Contribution of Silvicultural Practices to Productivity Improvements and Rotation Lengths in Managed Southern Pine Stands). These improved silvicultural practices produce more wood volume, pine straw and carbon sequestration in fewer years vs. what a natural stand of pines will produce.

All herbicides used at CB/AB must be approved in advance by the PCU and Tampa Bay Water (TBW) representatives. Advanced notice and pre-approvals are needed before any herbicides are applied within the 1000' buffer around each production water well.

In August of 2018, TFC met with PCU and TBW representatives to discuss appropriate herbicide use protocol for the forests on site (Table 6-6, Forest Fertilization, Herbicide & Pesticide Use Guidelines For Cross Bar Al Bar Ranch). TFC, PCU and TBW also reviewed several types of herbicides used to control vegetative competition in forests and agreed upon the use of three aquatic friendly herbicides and brands – Rodeo (glyphosate), Arsenal (imazapyr) and Renovate 3 (triclopyr).

The type of herbicide used is based on the type of vegetation needing control and which herbicides have been approved for use on site. Approved herbicides are then applied to control the competing vegetation in the late summer to fall (August-October). Each

herbicide defines a wait period before planting seedlings to ensure there is no adverse impact from the herbicide on the pine seedlings (Minogue, 2017).

The site preparation plan is developed based on the best information available at the time of the writing of this plan. The site preparation tables show what year the particular operation - raking and pile burning and herbicide application is expected to take place at CB/AB (Table 6-7, Rake and Pile Burning Schedule and Table 6-8, Herbicide Application Schedule).

6.8 Seedling Purchase and Planting

The pine seedling nurseries usually plant seed in the nurseries during April for seedlings to be out-planted the following December, January or February (Mizell, 1984). Most of the time the nurseries guess how many seedlings will be needed by landowners the next winter and plant accordingly. Very large landowners work with the nurseries in advance to ensure the nurseries plant enough seed for their orders. CB/AB's needs are fairly small in the big scheme of things, so seedlings can be ordered during the summer for the following winter plantings without pre-ordering before seed is sown in the nursery.

Andrews Nursery has provided the seedlings for CB/AB and the quality has been typically good over time. They also produce wire grass containerized plugs (tubelings) and longleaf containerized seedlings (tubelings).

TFC orders genetically improved, rust-resistant, 2nd or 3rd generation-bare root seedlings for the slash pine plantings; improved 1st generation longleaf pine containerized seedlings (tubelings) or better, as they become available; and wire grass containerized plugs (tubelings) for out-planting at CB/AB. The disease resistance and genetic qualities of seedlings grown today are superior to those planted in the 1990s due to breeding programs at the various seed orchards. Seedlings and wire grass are expected to be planted according to the schedule shown in Table 6-9 (Table 6-9, Planting Schedule).

The seedlings are either hand or machine planted; typically, during December through February, given appropriate soil moisture and enough time has elapsed since herbicide application to avoid toxicity to seedlings (Minogue, 2017; Mizell, 1984). Hand-planting is sometimes used if a site has a lot of hardwood stumps or is on a steep slope for example; as it may be difficult for a machine planter to effectively or safely plant in those conditions.

6.9 Stand Maintenance - Mowing

Three years after planting the seedlings, the area between the rows of pines is mowed to reduce competing vegetation and to keep the stand fairly clean of hardwoods so it can be raked for pine straw starting in year 7 (Shiver, 2014; Dickens, 2019) (Table 6-10, Pine Straw Maintenance – Mowing Schedule).

6.10 Fertilization at Age 4

Research shows that while utilizing herbicides or fertilizers produces significant yield improvement above the control plots; utilizing both herbicides and fertilizers produces a much greater gain in volume above the control plots. Herbicide impact is seen for the entire life of the stand of trees, while the fertilizer impact lasts 5 to 8 years (Jokela, Long 2018).

Research indicates that stands that are raked annually for pine straw require repeated fertilizations (approximately every 5 years) to avoid growth rate decline in the timber. Trees that have >25% fusiform rust (*Cronartium quericum f. sp. Fusiforme*), or have moderate to high risk for annosus root rot (*Heterobasidion annosum*), or where pitch canker (*Fusarium circinatum*) is prevalent in the stand should not be fertilized (Osiecka, Minogue, Dickens, 2015). Additionally, slash pine stands should not be fertilized if the stand has at least 100 ft² of basal area/ac at age 12 as the additional nutrients can create tree stress and encourage pest infestations (Dickens, Moorehead and McElvaney, 2019).

This information was considered and modeled using SIMS growth and yield model for CB/AB and it is for that reason that TFC recommends utilizing herbicide prior to planting, fertilizing at age 4 or 5; and fertilizing at age 12 if there is <100 sq. ft. of basal area in the stand.

Before applying fertilizer at age 4 or 5, the tree crowns are typically visually inspected for color and crown density. A healthy stand will have long crowns with a crown to tree height ratio of 40% with dark green foliage that is hard to see through. When nutrients become limiting, the crown will start getting thinner and may become yellowish. Several additional tools may be used collectively or individually to improve the effectiveness of fertilization such as consideration of soil profile characteristics (soil type), soil sampling and foliar sampling. The soil types, the fact that these plantations are the 2nd rotation of plantations, and that they were raked for pine straw in the first rotation, indicate the need to fertilize at age 4 or 5 without the need for foliar analysis.

The stand may be fertilized via ground or aerial application methods in the spring. The most common limiting forest nutrients in sandy soils are nitrogen and phosphorous. Phosphorous deficiencies can result in stands stagnating before reaching merchantability. Typically, nutrient supply is sufficient in years 0-3 as the sun accelerates the breakdown of logging debris providing nutrients to the seedlings. Seedlings need less nutrients than larger trees do. Fast growth rates are only possible with large thick crowns on the trees. A typical “generic” fertilization for slash pines of this age include diammonium phosphate (DAP), some potassium, some nitrogen and a blend of micronutrients. Positive impacts of fertilization last approximately 5 to 8 years. (Jokela, 2019; Shiver, 2014, Dickens, 2019). Table 6-11 shows the fertilization schedule for the first fertilization at age 4 (Table 6-11, Fertilization Schedule).

6.11 Pine Straw Preparation

The final preparation of a stand to be raked for pine straw is as follows at age 6 (Clabo, 2019):

6.11.1 Shorter/Smaller Weeds & Woody Vegetation

The competing vegetation under the crowns of the young pines (age 6) is sprayed with a foliar active herbicide in the summer; then the site is mowed after 60 to 90 days. It is then ready to be raked for pine straw that winter.

Table 6-12 shows the schedule for herbicide application and the final mowing before starting to rake pine straw (Table 6-12, Pine Straw Preparation Schedule).

6.12 Pine Straw Sales

Pine straw sales and raking begin typically in the winter when the trees are entering their 7th year. Pine straw is typically sold either by the bale or by the acre until the trees start declining in straw production (~age 20). Straw should only be raked once per year as soil moisture evaporation can lead to fine root mortality and tree stress when trees are raked more often (Clabo, 2019). The removal of needles removes nutrients that would normally return to the soil and allows more soil moisture evaporation, thus another reason to fertilize stands that will be raked (Dickens, Moorehead, McElvaney, 2019). In fact, research indicates that stands that are raked for pine straw annually should be considered for fertilization every 5 years after straw raking begins (Osiecka, Minogue, Dickens, 2015). Table 6-13, Pine Straw Raking Schedule, shows the anticipated years each stand of pines will be raked.

6.13 Fertilization at Age 12

Research indicates that stands that are raked annually for pine straw require repeated fertilizations (approximately every 5 years) to avoid growth rate decline in the timber. Trees that have >25% fusiform rust (*Cronartium quericum f. sp. Fusiforme*), or have moderate to high risk for annosus root rot (*Heterobasidion annosum*), or where pitch canker (*Fusarium circinatum*) is prevalent in the stand should not be fertilized. (Osiecka, Minogue, Dickens, 2015). Additionally, slash pine stands should not be fertilized if the

stand has at least 100 ft² of basal area/ac at age 12 as the additional nutrients can create tree stress and encourage pest infestations (Dickens, Moorehead, McElvaney, 2019).

If the stand of trees has less than 100 ft²/ac of basal area at age 12, DAP and urea (nitrogen) fertilizer may be applied again boosting tree growth and pine straw production. The stand may be fertilized via ground or aerial application methods in the spring. The tree crowns should be visually inspected and foliar analyses of the pine needles should be done to determine the type and amount of fertilizer needed (Dickens, 2019).

Some SIMS growth and yield projections predict that the 12-year-old trees that were fertilized at age 4 may have more than 100 sq/ft/ac of basal area and thus, should not be fertilized at age 12. It is for that reason that a thorough stand evaluation should be done prior to deciding to fertilize the pine plantations at age 12, as each stand's characteristics are different and there are many variables impacting the basal area such as soil type, tree density, tree genetics, soil moisture, etc.

The fertilization schedule for age 12 is shown in Table 6-11 and assumes all stands will need fertilization (Table 6-11, Fertilization Schedule).

6.14 Timber Sales

The pine timber (stumpage) is typically scheduled for sale and harvest when the trees are age 20, but may be scheduled earlier or later as may be needed to follow the clearcut size and green-up guidelines described in the SFI Forest Management Standard; or if there is a forest health problem that needs to be managed. The estimated future timber sales shown in Table 6-14 indicates estimated volumes of timber that can be harvested in the future (Table 6-14, Future Timber Sales).

6.15 Forest Sustainability and Ecosystem Services

Forests are renewable resources; and the Cross Bar and Al Bar Ranch commercially managed planted pine resources are sustainably managed. The science of forestry is a sustainable cycle - harvest, reforest, maintain and harvest again, etc.

Reforestation and management of the pine crop provides not only income to the landowner, but valuable ecosystem services, such as carbon sequestration, the release of oxygen to the environment, recharge of the aquifer, recreational uses and wildlife habitat.

Trees use photosynthesis to remove carbon dioxide (CO₂) from the air and turn the CO₂ into sugars, then use the energy stored in the sugars to live and grow. Trees and other woody plants have the ability to store carbon in the form of cellulose (wood). Storing wood in living trees and long-lasting wood products such as lumber reduces atmospheric CO₂. Southern pine plantations account for approximately 33% of the nation's annual carbon stored in all of the United States' forests (Maggard, Bobby, Monroe, 2017).

Table 6-1.
CROSS BAR AND AL BAR RANCH
POTENTIAL PRODUCTIVITY INFORMATION BASED ON SOIL CHARACTERISTICS

USDA WEB SOIL SURVEY				
Pasco County, Florida				
Map unit symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site Index	Volume of wood fiber	
			<i>Cu ft/ac/yr</i>	
6—Tavares sand, 0 to 5 percent slopes	Bluejack oak	—	0	Longleaf pine, Slash pine, South florida slash pine
Tavares	Longleaf pine	70	86	
	Slash pine	80	143	
	South florida slash pine	45	57	
	Turkey oak	—	0	
7—Sparr fine sand, 0 to 5 percent slopes	Live oak	—	0	Loblolly pine, Longleaf pine, Slash pine, South florida slash pine
Sparr	Loblolly pine	80	114	
	Longleaf pine	70	86	
	Slash pine	80	143	
11—Adamsville fine sand, 0 to 2 percent slopes	Black cherry	—	—	Slash pine, South florida slash pine
Adamsville	Hickory	—	—	
	Laurel oak	—	—	
	Live oak	—	—	
	Longleaf pine	65	72	
	Slash pine	80	143	
	Water oak	—	—	
21—Smyrna fine sand	Longleaf pine	70	86	Slash pine, South florida slash pine
Smyrna, non-hydric	Slash pine	80	143	
	South florida slash pine	45	57	
	Longleaf pine	70	86	
Smyrna, hydric	Slash pine	80	143	Slash pine, South florida slash pine
	South florida slash pine	45	57	
23—Basinger fine sand, depressionnal, 0 to 1 percent slopes	Baldcypress	100	0	Slash pine, South florida slash pine
Basinger, depressionnal	Pond pine	60	0	
	Pondcypress	75	29	
43—Arredondo fine sand, 0 to 5 percent slopes	Loblolly pine	80	114	Loblolly pine, Longleaf pine, Slash pine, South florida slash pine
Arredondo	Longleaf pine	70	86	
	Magnolia	—	—	
	Slash pine	80	143	
45—Kendrick fine sand, 0 to 5 percent slopes	Hickory	—	0	Loblolly pine, Longleaf pine, Slash pine, South florida slash pine
Kendrick	Laurel oak	—	0	
	Live oak	—	0	
	Loblolly pine	90	129	
	Longleaf pine	75	86	
	Magnolia	—	0	
	Slash pine	90	157	
	South florida slash pine	45	—	
	Turkey oak	—	—	
69—Millhopper fine sand, 0 to 5 percent slopes	Laurel oak	—	—	Longleaf pine, Slash pine, South florida slash pine
Millhopper	Live oak	—	—	
	Loblolly pine	80	114	
	Longleaf pine	65	72	
	Slash pine	80	143	
Forestland Productivity				

This table can help forestland owners or managers plan the use of soils for wood crops. It shows the potential productivity of the soils for wood crops.

Potential productivity of merchantable or *common trees* on a soil is expressed as a site index and as a volume number. The *site index* is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that forestland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability. More detailed information regarding site index is available in the "National Forestry Manual," which is available in local offices of the Natural Resources Conservation Service or on the Internet.

The *volume of wood fiber*, a number, is the yield likely to be produced by the most important tree species. This number, expressed as cubic feet per acre per year and calculated at the age of culmination of the mean annual increment (CMAI), indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

Trees to manage are those that are preferred for planting, seeding, or natural regeneration and those that remain in the stand after thinning or partial harvest.

Reference:

Table 6-2. Approximate Annual Schedule for Work in Commercial Pine Plantations at Cross Bar and Al Bar Ranch

TASK	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT
rake and pile burn	X	X				X	X	X	X	X	X	X
site prep herbicide	X										X	X
invasive species spraying	X									X	X	X
pine straw prep spraying							X	X	X			
order seedlings									X	X	X	
tree planting			X	X	X							
mow 3 yr old pines - pine straw prep										X	X	X
mow 6 yr old pines - pine straw prep										X	X	X
fertilize 4 yr old pines					X	X						
fertilize 12 yr old pines- Evaluate BA and fertilize if BA<100					X	X	X					
potential longleaf natural regeneration burning when pine cones are developing before seeds drop in the fall											X	X
Broadcast Burning	X	X	X	X	X						X	X
Seedling Survival Cruise												X
Logging	X	X	X	X	X	X	X	X	X	X	X	X
Pine Straw Raking	X	X	X	X	X	X	X	X	X	X	X	X
Forest Health Monitoring	X	X	X	X	X	X	X	X	X	X	X	X

Table 6-3.1 2018 Stand Harvest Report - Clearcut at Age 20

Stand Harvest Report

12/20/2019

Stand Identification

Client Name	PINELLAS	State	Florida
Purchase Unit	CBAB	County	Pasco
Tract Name	Cross Bar/Al Bar	Cover Type	Pine Stand
Compartment	PSL PREMERCH	Stand Origin	Planted
Stand Name	PSL18	Phys. Region	Lower CP
Acres	369.6	Estab. Date	1/1/2018
Soil Group	Spodosol	Species : Model	Slash Pine:6002
Forest Type	PinePlt_premersch	Site Index	68

Regime ID: CBAB 5% 1- fert at age 4, PS90\$/Ac
7-19yrs oldCC20

Regime Valuation Criteria

Criterion	Value	<input checked="" type="checkbox"/> Historical Cash Flows Included
NPV	\$1289.88	<input type="checkbox"/> Optimum Economic Value

Figure 6-3.2 2018 Stand Harvest Report Continued
Clearcut at Age 20

Stand Harvest Report

12/20/2019

Final Harvest Stand and Stock Table and Products Age: 20

Dbh Class	Trees per Acre	Yield Unit:		OB Green Tons		TQI
		Average Height	Basal Area	Volume per Acre	Species	
3.	0.02	28.33	0.00	0.00	111	0
4.	1.23	38.34	0.11	0.04	111	0
5.	7.59	46.30	1.04	0.58	111	0
6.	22.17	52.64	4.35	2.92	111	0
7.	44.19	57.69	11.81	8.88	111	0
8.	66.23	61.71	23.12	18.75	111	0
9.	75.66	64.91	33.43	28.60	111	0
10.	64.31	67.46	35.08	31.20	111	0
11.	38.87	69.48	25.66	23.48	111	0
12.	15.75	71.09	12.37	11.56	111	0
13.	3.98	72.38	3.67	3.49	111	0
14.	0.63	73.40	0.67	0.65	111	0
Totals	340.63		151.29	130.15		

TQI	PG	Product Class	Yield OB Green Tons	Stumpage (\$/Unit)	Revenue (\$/acre)
Main Products					
0	0	Othr Pulp	83.41	14.00	1,167.68
0	0	Specialty Prod-1	23.00	15.00	345.01
0	0	Chip-N-Saw	20.16	16.00	322.52
0	0	Small Pole	3.58	25.00	89.60
			130.15		1,924.81

OB means that the tree diameters were measured outside the bark when they were cruised.

Table 6-4. 2018 Stand Development Report

Stand Identification

Client Name	PINELLAS	State	Florida
Purchase Unit	CBAB	County	Pasco
Tract Name	Cross Bar/AI Bar	Cover Type	Pine Stand
Compartment	PSL PREMERCH	Stand Origin	Planted
Stand Name	PSL18	Phys. Region	Lower CP
Acres	369.6	Estab. Date	1/1/2018
Soil Group	Spodosol	Species : Model	Slash Pine:6002
Forest Type	PinePit_premersch	Site Index	68

Stand Development Report

Regime ID: CBAB 5% 1- fert at age 4, PS90\$/Ac 7-19yrs oldCC20

Yield Unit: OB Green Tons

Year	Thinning Age tatus	Dom Ht (feet)	Trees/ Acre	BA/ Acre	QMD inches	Total Yield	Topwood Yield	Prod1 Yield	Prod2 Yield	Prod3 Yield	Prod4 Yield
2018	0	0.0	702.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2019	1	0.0	527.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2020	2	0.0	519.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2021	3	0.0	511.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2022	4	0.0	503.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
								Chip-N-Saw	Specialty Prod-1	Small Pole	Othr Pulp
2023	5	21.8	496.1	39.3	3.8	7.6	0.0	0.0	0.0	0.0	7.6
2024	6	26.1	489.0	53.2	4.5	15.1	0.0	0.0	0.0	0.0	15.1
2025	7	30.2	481.0	65.9	5.0	23.0	0.0	0.0	0.1	0.0	22.9
2026	8	34.0	472.1	77.4	5.5	31.4	0.0	0.0	0.9	0.0	30.5
2027	9	37.7	462.5	87.7	5.9	40.1	0.0	0.2	2.3	0.0	37.6
2028	10	41.2	452.3	97.0	6.3	49.0	0.1	0.8	3.9	0.0	44.2
2029	11	44.6	441.6	105.4	6.6	57.9	0.3	2.0	5.5	0.0	50.1
2030	12	47.8	430.6	113.0	6.9	66.8	0.5	3.6	7.3	0.0	55.5
2031	13	50.9	419.3	119.8	7.2	75.6	0.7	5.6	9.3	0.0	60.1
2032	14	53.8	407.8	126.0	7.5	84.3	0.9	7.7	11.3	0.1	64.2
2033	15	56.7	396.3	131.5	7.8	92.6	1.1	9.9	13.4	0.3	67.9
2034	16	59.4	384.9	136.4	8.1	100.8	1.2	12.2	15.5	0.7	71.2
2035	17	62.0	373.5	140.8	8.3	108.6	1.4	14.3	17.5	1.2	74.2
2036	18	64.4	362.3	144.8	8.6	116.2	1.6	16.4	19.5	1.9	76.9
2037	19	66.8	351.3	148.2	8.8	123.3	1.7	18.3	21.3	2.7	79.3
2038	20	69.1	340.6	151.3	9.0	130.1	1.8	20.2	23.0	3.6	81.6

Table 6-5 2018 Stand Harvest Report - Optimal Harvest Age

Stand Harvest Report

12/20/2019

Stand Identification

Client Name	PINELLAS	State	Florida
Purchase Unit	CBAB	County	Pasco
Tract Name	Cross Bar/Al Bar	Cover Type	Pine Stand
Compartment	PSL PREMERCH	Stand Origin	Planted
Stand Name	PSL18	Phys. Region	Lower CP
Acres	369.6	Estab. Date	1/1/2018
Soil Group	Spodosol	Species : Model	Slash Pine:6002
Forest Type	PinePlt_premersch	Site Index	68

Regime ID: CBAB 5% 2- fert at age 4, PS90\$/Ac
7-19yrs old-SD

Regime Valuation Criteria

Criterion	Value	<input checked="" type="checkbox"/> Historical Cash Flows Included
NPV	\$1293.52	<input checked="" type="checkbox"/> Optimum Economic Value

Table 6-5 Continued, 2018 Stand Harvest Report - Optimal
Harvest Age

Stand Harvest Report

12/20/2019

Final Harvest Stand and Stock Table and Products Age: 21

Dbh Class	Trees per Acre	Yield Unit:		OB Green Tons		TQI
		Average Height	Basal Area	Volume per Acre	Species	
4.	0.87	38.65	0.08	0.03	111	0
5.	6.12	46.87	0.84	0.47	111	0
6.	18.72	53.45	3.67	2.51	111	0
7.	38.34	58.72	10.25	7.84	111	0
8.	59.27	62.93	20.69	17.11	111	0
9.	70.88	66.31	31.31	27.36	111	0
10.	64.61	69.01	35.24	32.04	111	0
11.	43.34	71.17	28.60	26.79	111	0
12.	20.37	72.90	16.00	15.32	111	0
13.	6.33	74.28	5.84	5.68	111	0
14.	1.36	75.39	1.45	1.43	111	0
Totals	330.21		153.96	136.59		

TQI	PG	Product Class	Yield OB Green Tons	Stumpage (\$/Unit)	Revenue (\$/acre)
Main Products					
0	0	Othr Pulp	85.57	14.00	1,197.99
0	0	Specialty Prod-1	24.61	15.00	369.19
0	0	Chip-N-Saw	21.89	16.00	350.20
0	0	Small Pole	4.52	25.00	112.88
			136.59		2,030.26

Table 6-6. Forest Fertilization, Herbicide & Pesticide Use Guidelines

Cross Bar Al Bar Ranch

STANDARD OPERATING PROCEDURES

8/16/18

- a) No herbicides or pesticides will be sprayed within 235' of any Tampa Bay Water (TBW) water production well.
- b) Pinellas County Utilities (PCU) and its contractors can apply fertilizer as needed on the forests. If fertilizer is applied within 235' of a TBW production water well, TBW (Andrew Greenbaum) is to be notified 1 day in advance of the fertilizer application.
- c) PCU and its contractors can apply aquatic friendly herbicides – Rodeo (Glyphosate), Arsenal (Imazapyr) and Renovate 3 (Trichlopyr) in the forests as long as they are outside of a 1000' buffer around production water wells, without notification to TBW. The Forestry Company (TFC) and its Sub-Contractors will notify PCU per our contract with them.
- d) PCU and its contractors can apply aquatic friendly herbicides – Rodeo (Glyphosate), Arsenal (Imazapyr) and Renovate 3 (Trichlopyr) in the forests within the 1000' buffer around production water wells as long as they give TBW ample prior notice (several weeks), such that TBW can turn off the well for a period of time after the application of the herbicide. TFC and its Sub-Contractors will notify PCU per our contract with them.
- e) TFC will use some of these herbicides sometime between July and October, depending on the type vegetation needing control, in preparation for planting pine seedlings. Rodeo will also be used to spray under young pine trees in preparation for bringing a stand of trees into the pine straw raking lease. This takes place in the spring of the year before straw is to be raked the first time. The pine straw raking vendor may also choose to herbicide during the 13-year time that straw is raked in a pine plantation. This same process will be used if re-application is to be done by that vendor.
- f) TBW would like PCU and its contractors to share the names of all of the chemicals being applied within 1000' of a production water well.

Table 6-7. Rake and Pile Burning Schedule	
YEAR (PCU FISCAL YEAR)	ACRES
2020	383.00
2021	346.7
2022	0
2023	0
2024	0
2025	0
2026	0
2027	0
2028	0
2029	0
2030	0
2031	0
2032	0
2033	99.8
2034	214.4
2035	298.7
2036	247.5
2037	657.6
2038	357.6
2039	436.6
2040	316.1
2041	829.8
2042	269.8
2043	0
2044	408.5

Table 6-8. Herbicide Application Schedule	
YEAR (PCU FISCAL YEAR)	ACRES
2020	383.00
2021	346.70
2022	0
2023	0
2024	0
2025	0
2026	0
2027	0
2028	0
2029	0
2030	0
2031	0
2032	0
2033	99.8
2034	214.4
2035	298.7
2036	247.5
2037	657.6
2038	357.6
2039	436.6
2040	316.1
2041	829.8
2042	269.8
2043	0
2044	408.5

Table 6-9. Planting Schedule	
YEAR (PCU FISCAL YEAR)	SLASH PINE ACRES
2020	412.00
2021	383.00
2022	346.70
2023	0
2024	0
2025	0
2026	0
2027	0
2028	0
2029	0
2030	0
2031	0
2032	0
2033	99.8
2034	214.4
2035	298.7
2036	247.5
2037	657.6
2038	357.6
2039	436.6
2040	316.1
2041	829.8
2042	269.8
2043	0
2044	408.5

Table 6-10. Pine Straw Maintenance - Mowing Schedule							
Age 3 Trees							
YEAR PLANTED	ACRES PLANTED	2020	2021	2022	2023	2024	2025
2012	82.1	82.1					
2013	323.8	323.8					
2014	483.7	483.7					
2015	441.9						
2016	372.9	372.9					
2017	454.0		454.0				
2018	369.6		369.6				
2019	432.9			432.9			
2020	412.0				412.0		
2021	383.0					383.0	
2022	346.7						346.7
TOTAL AC	4102.6	1262.5	823.6	432.9	412.0	383.0	346.7

**Table 6-11. Fertilization Schedule
ACRES TO FERTILIZE EACH YEAR**

YEAR PLANTED	ACRES PLANTED	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
2012	82.1		82.1				82.1										
2013	323.8		323.8					323.8									
2014	483.7		483.7						483.7								
2015	441.9		441.9							441.9							
2016	372.9		372.9								372.9						
2017	454.0		454.0									454.0					
2018	369.6				369.6								369.6				
2019	432.9					432.9								432.9			
2020	412.0						368.2								368.2		
2021	383.0							383.0								383.0	
2022	346.7								346.7								346.7
TOTAL AC FIRST FERTILIZATION		0.0	2158.4	0.0	369.6	432.9	368.2	383.0	346.7								
TOTAL AC SECOND FERTILIZATION							82.1	323.8	483.7	441.9	372.9	454.0	369.6	432.9	368.2	383.0	346.7

WILL NOT FERTILIZE 43.8 acres of longleaf pines planted

Table 6-12. Pine Straw Sales Preparation Schedule
Age 6 Trees: Herbicide Early Summer, Mow 60 Days Later, Then Rake

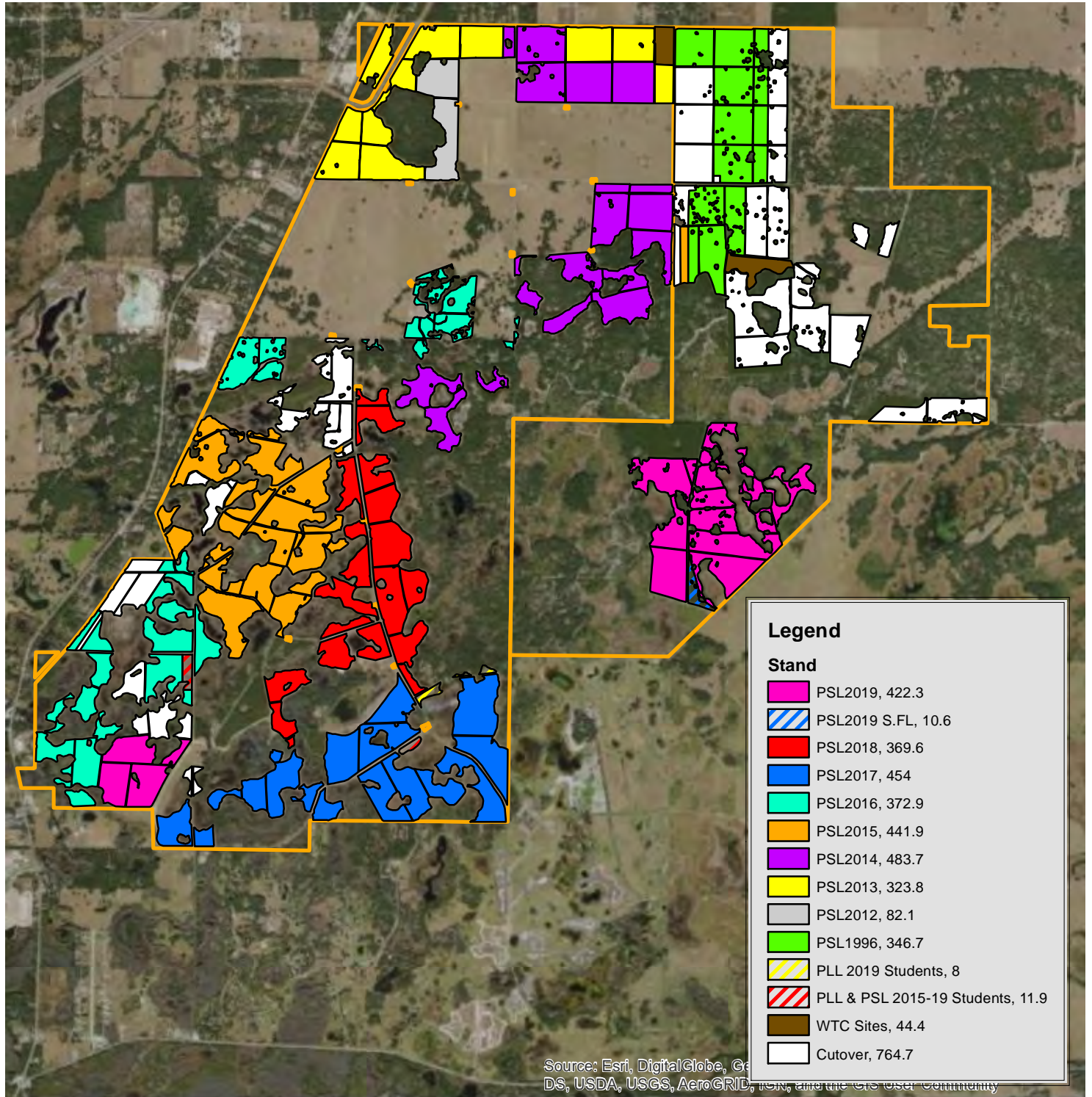
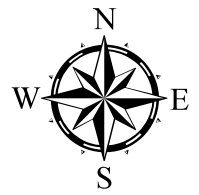
YEAR PLANTED	ACRES PLANTED	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
2012	82.1	82.1									
2013	323.8	323.8									
2014	483.7		483.7								
2015	441.9			441.9							
2016	372.9				372.9						
2017	454.0					454.0					
2018	369.6						369.6				
2019	432.9							432.9			
2020	412.0								412.0		
2021	383.0									383.0	
2022	346.7										346.7
TOTAL AC	4102.6	405.9	483.7	441.9	372.9	454.0	369.6	432.9	412.0	383.0	346.7

Table 6-13. Pine Straw Raking Schedule

YEAR PLANTED	ACRES PLANTED	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
1996	346.7	307.5																					
2012	82.1	82.1	82.1	82.1	82.1	82.1	82.1	82.1	82.1	82.1	82.1	82.1	82.1										
2013	323.8	323.8	323.8	323.8	323.8	323.8	323.8	323.8	323.8	323.8	323.8	323.8	323.8										
2014	483.7		483.7	483.7	483.7	483.7	483.7	483.7	483.7	483.7	483.7	483.7	483.7	483.7	483.7								
2015	441.9			441.9	441.9	441.9	441.9	441.9	441.9	441.9	441.9	441.9	441.9	441.9	441.9	441.9							
2016	372.9				372.9	372.9	372.9	372.9	372.9	372.9	372.9	372.9	372.9	372.9	372.9	372.9	372.9						
2017	454.0					454.0	454.0	454.0	454.0	454.0	454.0	454.0	454.0	454.0	454.0	454.0	454.0	454.0					
2018	369.6						369.6	369.6	369.6	369.6	369.6	369.6	369.6	369.6	369.6	369.6	369.6	369.6	369.6				
2019	432.9							432.9	432.9	432.9	432.9	432.9	432.9	432.9	432.9	432.9	432.9	432.9	432.9	432.9			
2020	412.0								412.0	412.0	412.0	412.0	412.0	412.0	412.0	412.0	412.0	412.0	412.0	412.0	412.0		
2021	383.0									383.0	383.0	383.0	383.0	383.0	383.0	383.0	383.0	383.0	383.0	383.0	383.0	383.0	383.0
2022	346.7										346.7	346.7	346.7	346.7	346.7	346.7	346.7	346.7	346.7	346.7	346.7	346.7	346.7
TOTAL AC	4102.6	713.4	889.6	1331.5	1704.4	2158.4	2528.0	2960.9	3372.9	3755.9	4102.6	4102.6	4102.6	3696.7	3696.7	3213.0	2771.1	2398.2	1944.2	1574.6	1141.7	729.7	346.7

Table 6-14. Future Timber Sales				
PLANTING YEAR(S)	FUTURE HARVEST YEAR	PINE CLEARCUT HARVEST ACRES	PINE HARVEST TONS	HARDWOOD CLEAR CUT ACRES
1996	2020	221.7	20,618	44.4
1996	2021	125	11,625	
	2022	0	-	
	2023	0	-	
	2024	0	-	
	2025	0	-	
	2026	0	-	
	2027	0	-	
	2028	0	-	
	2029	0	-	
	2030	0	-	
	2031	0	-	
2012, 2013	2032	99.8	12,974	
2013, 2014	2033	214.4	27,872	
2014	2034	298.7	38,831	
2015	2035	247.5	32,175	
2013, 2014, 2016,	2036	657.6	85,488	
2017	2037	357.6	46,488	
2015, 2018	2038	436.6	56,758	
2018, 2019	2039	316.1	41,093	
2017, 2020	2040	829.8	107,874	
2018, 2019	2041	269.8	35,074	
	2042	0	-	
2020, 2021, 2022	2043	408.5	53,105	

Figure 6-1. Commercial Pine Plantations - Year Pines Planted
 4,136 Acres
 Cross Bar and Al Bar Ranch
 Pasco County, FL



Source: Esri, DigitalGlobe, GeoEye, IGN, GeoEye, USDA, USGS, AeroGRID, IGN, and the GIS User Community



1:56,600

PROJECTION: NAD 83, UTM Z17 NORTH, METERS

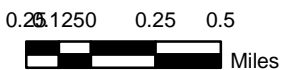
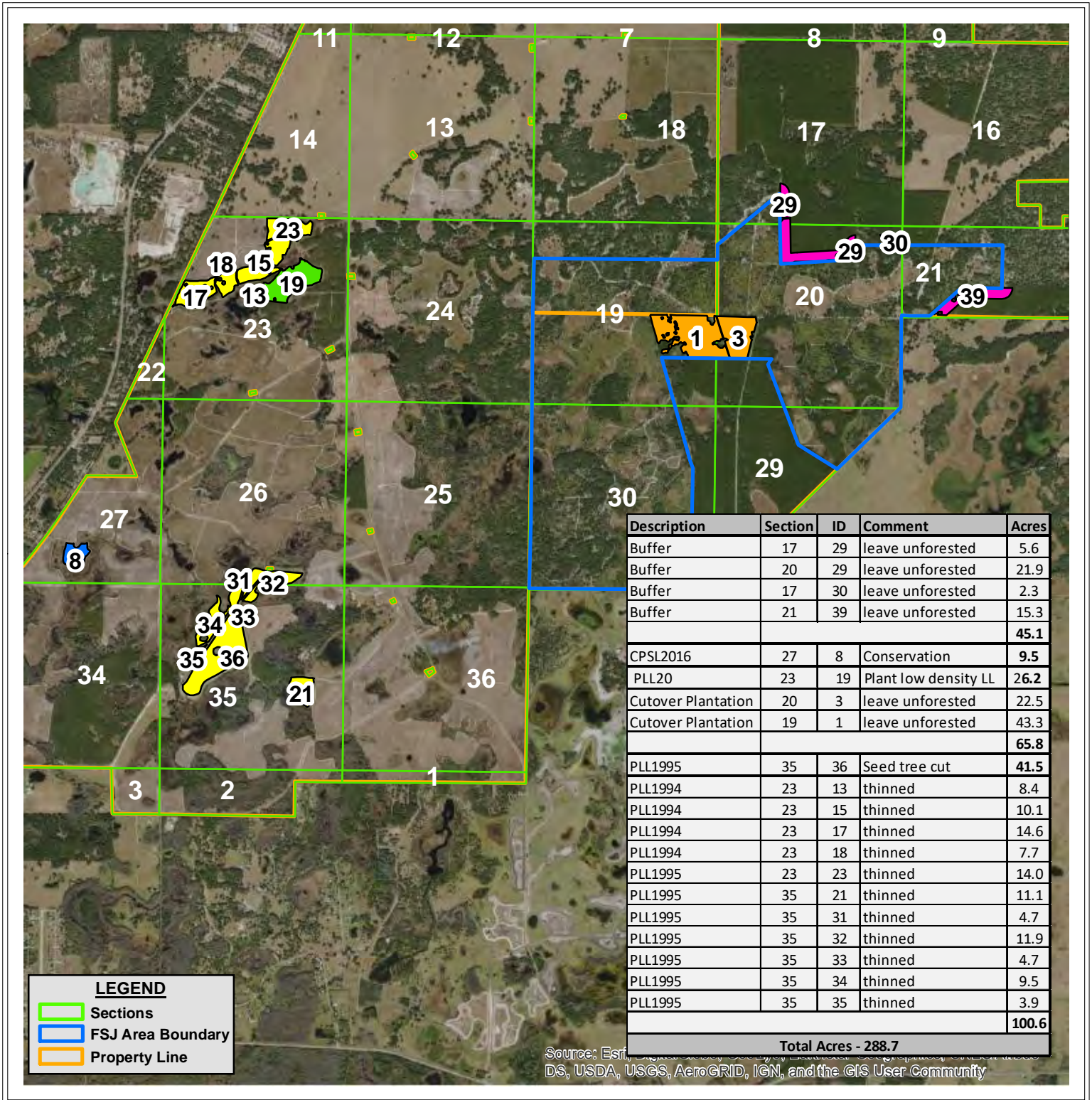
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Figure 6-2. Previous Commercial Plantations Planned for Conservation

288.7 Acres

Cross Bar and Al Bar Ranch



1:46,984

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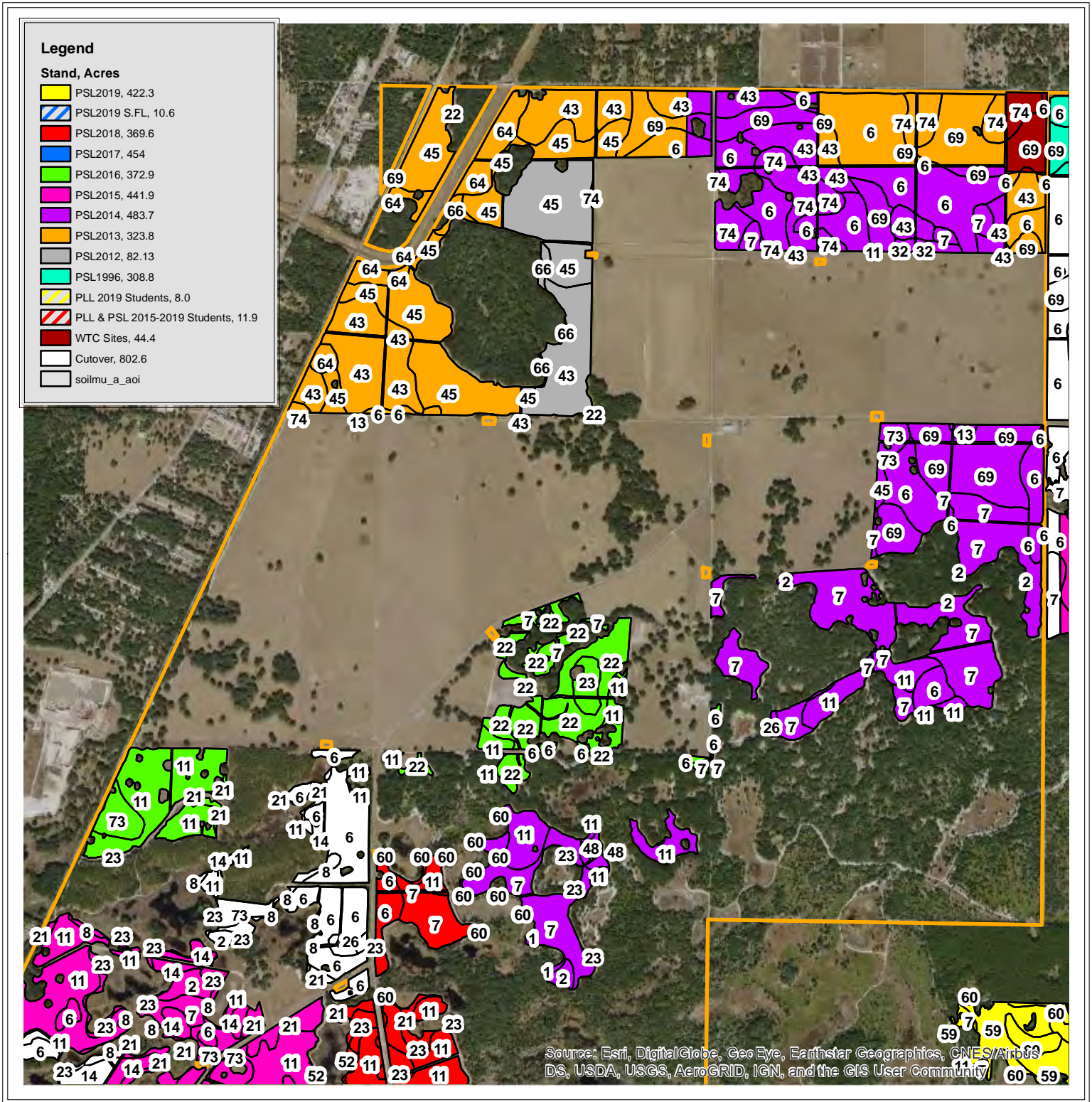
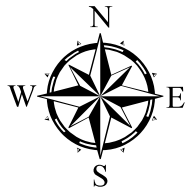
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Pasco County, Florida (FL101)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1	Wauchula fine sand, 0 to 5 percent slopes	0.6	0.00%
2	Pomona fine sand	92	2.20%
5	Myakka-Myakka, wet, fine sands, 0 to 2 percent slopes	11.4	0.30%
6	Tavares sand, 0 to 5 percent slopes	667.6	16.10%
7	Sparr fine sand, 0 to 5 percent slopes	571.5	13.80%
8	Sellers mucky loamy fine sand	46.6	1.10%
9	Ona-Ona, wet, fine sand, 0 to 2 percent slopes	21.8	0.50%
11	Adamsville fine sand, 0 to 2 percent slopes	1,037.70	25.10%
13	Candler fine sand, 0 to 5 percent slopes	9.3	0.20%
14	Candler fine sand, 5 to 8 percent slopes	29.1	0.70%
19	Paola fine sand, 0 to 8 percent slopes	8.5	0.20%
21	Smyrna fine sand	378.3	9.10%
22	Basinger fine sand	83	2.00%
23	Basinger fine sand, depressional, 0 to 1 percent slopes	192.1	4.60%
26	Narcoossee fine sand, 0 to 2 percent slopes	65.6	1.60%
30	Okeelanta-Terra Ceia association	3.3	0.10%
32	Lake fine sand, 0 to 5 percent slopes	4.1	0.10%
42	Pomello fine sand, 0 to 5 percent slopes	3.4	0.10%
43	Arredondo fine sand, 0 to 5 percent slopes	170.5	4.10%
45	Kendrick fine sand, 0 to 5 percent slopes	147.5	3.60%
46	Cassia fine sand, 0 to 5 percent slopes	1.2	0.00%
48	Lochloosa fine sand, 0 to 5 percent slopes	3.4	0.10%
49	Blichton fine sand, 0 to 2 percent slopes	0	0.00%
52	Samsula muck, frequently ponded, 0 to 1 percent slopes	4.7	0.10%
57	Wabasso Variant fine sand	2	0.00%
59	Newnan fine sand, 0 to 5 percent slopes	144.3	3.50%
60	Palmetto-Zephyr-Sellers complex	53.7	1.30%
64	Nobleton fine sand, 0 to 5 percent slopes	30.9	0.70%
66	Micanopy fine sand, 2 to 5 percent slopes	5.5	0.10%
67	Kanapaha-Kanapaha, wet, fine sand, 0 to 5 percent slopes	25.6	0.60%
69	Millhopper fine sand, 0 to 5 percent slopes	235.1	5.70%
73	Zolfo fine sand, 0 to 2 percent slopes	31.2	0.80%
74	Candler Variant fine sand, 0 to 5 percent slopes	56	1.40%
Totals for Area of InterestFigure		4,137	100.00%

FIGURE 6-3.1

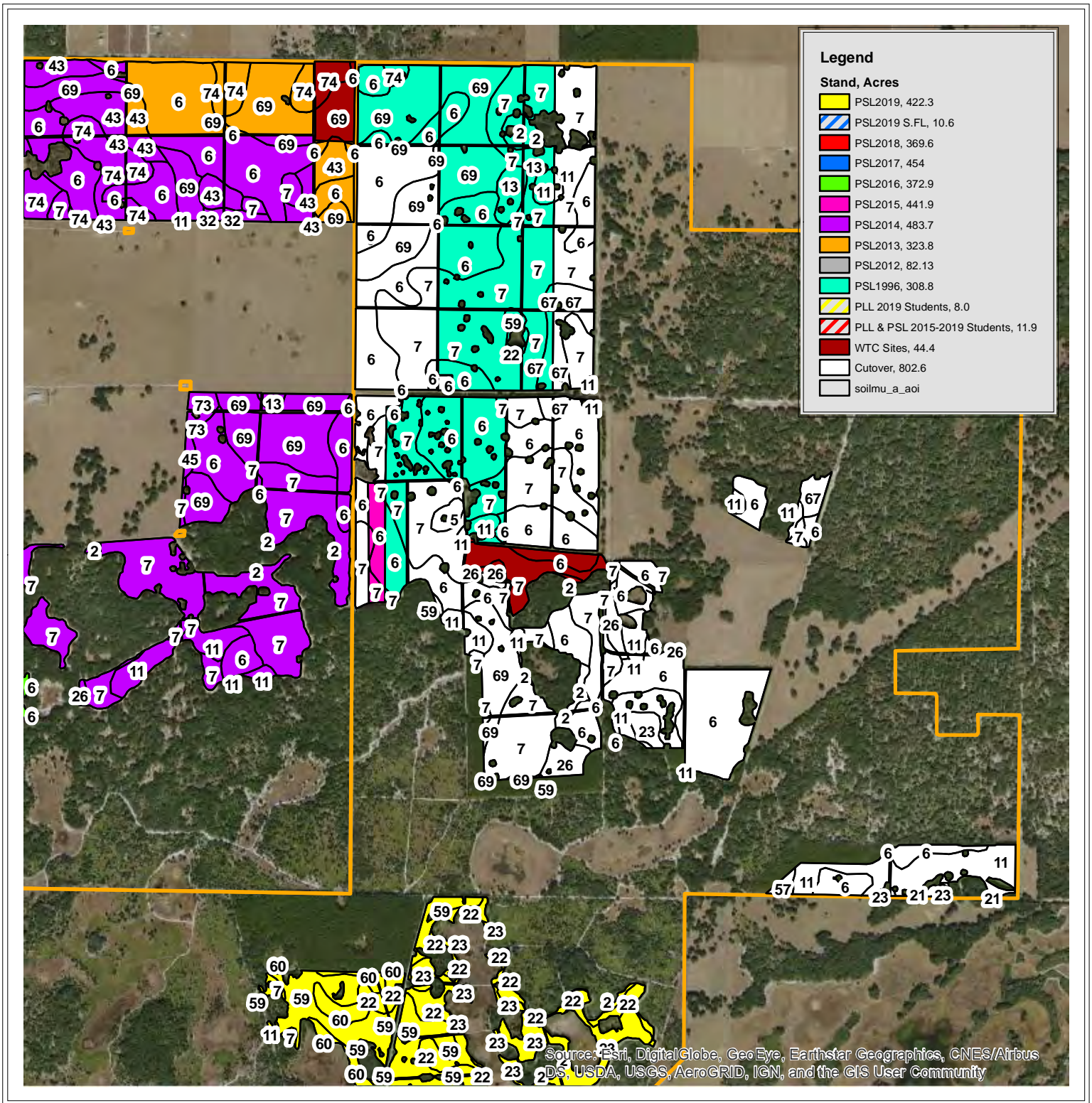
CROSS BAR AND AL BAR RANCH COMMERCIAL PLANTATION SOIL TYPES
NORTHWEST AREA



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FIGURE 6-3.2
 CROSS BAR AND AL BAR RANCH COMMERCIAL PLANTATION SOIL TYPES
 NORTHEAST AREA



0.5 0.25 0 0.5 1
 Miles
1:25,951

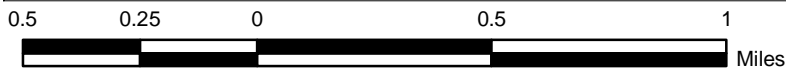
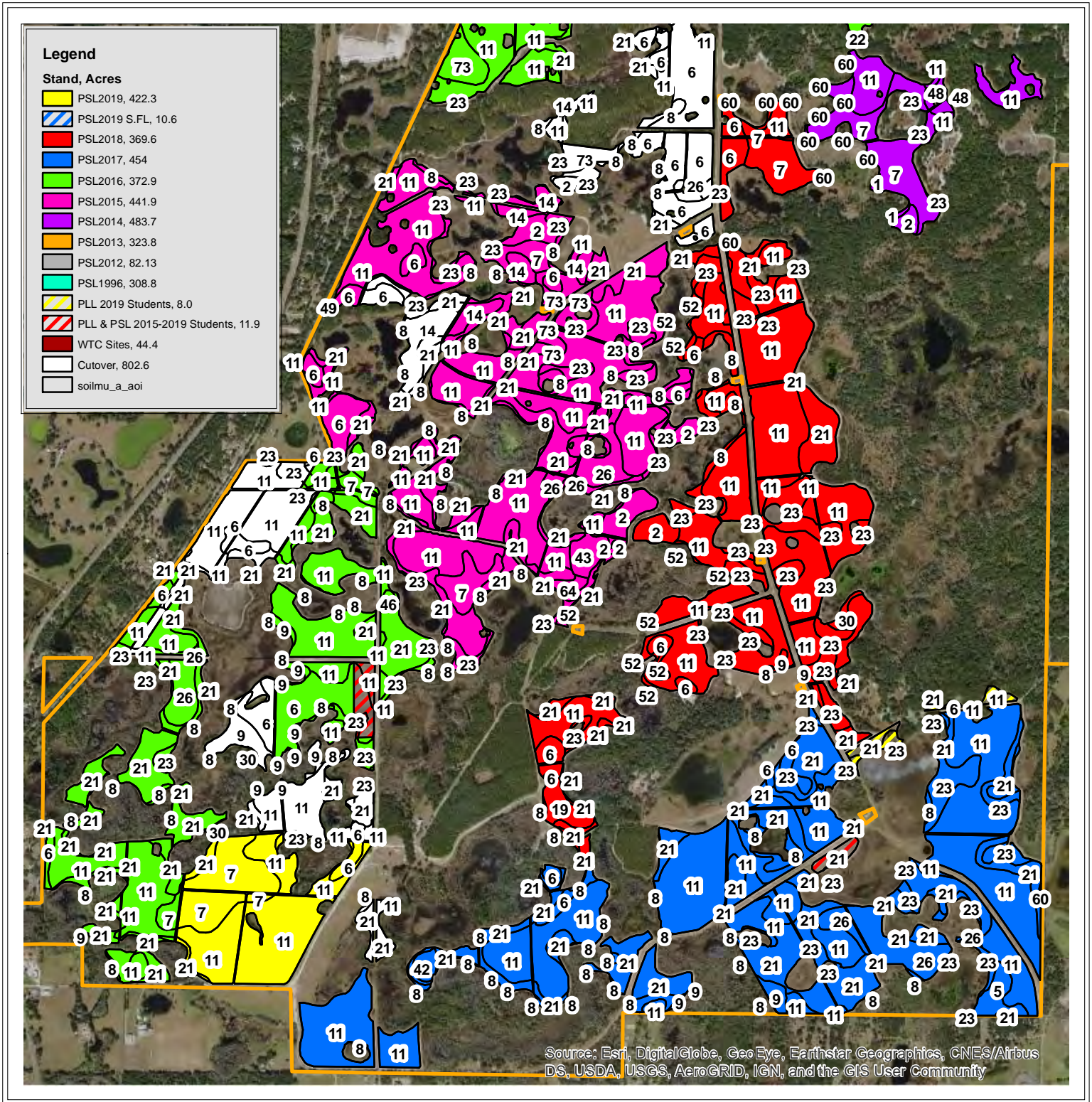
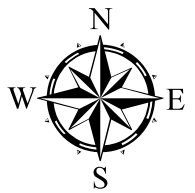
PROJECTION: NAD 83, UTM Z17 NORTH, METERS

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FIGURE 6-3.3

CROSS BAR AND AL BAR RANCH COMMERCIAL PLANTATION SOIL TYPES
SOUTHWEST AREA



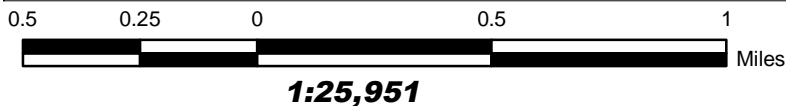
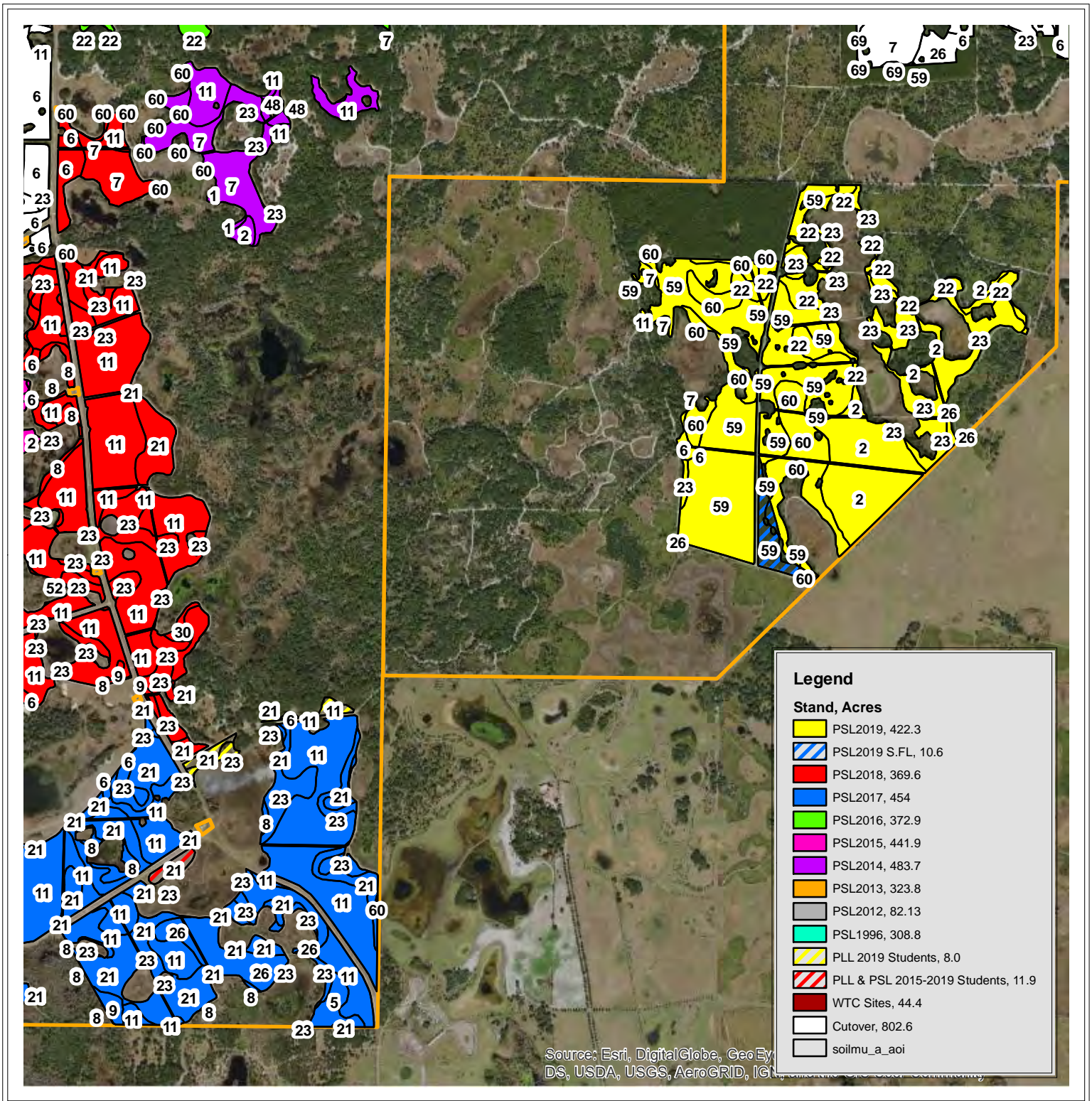
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FIGURE 6-3.4
 CROSS BAR AND AL BAR RANCH COMMERCIAL PLANTATION SOIL TYPES
 SOUTHEAST AREA



PROJECTION: NAD 83, UTM Z17 NORTH, METERS

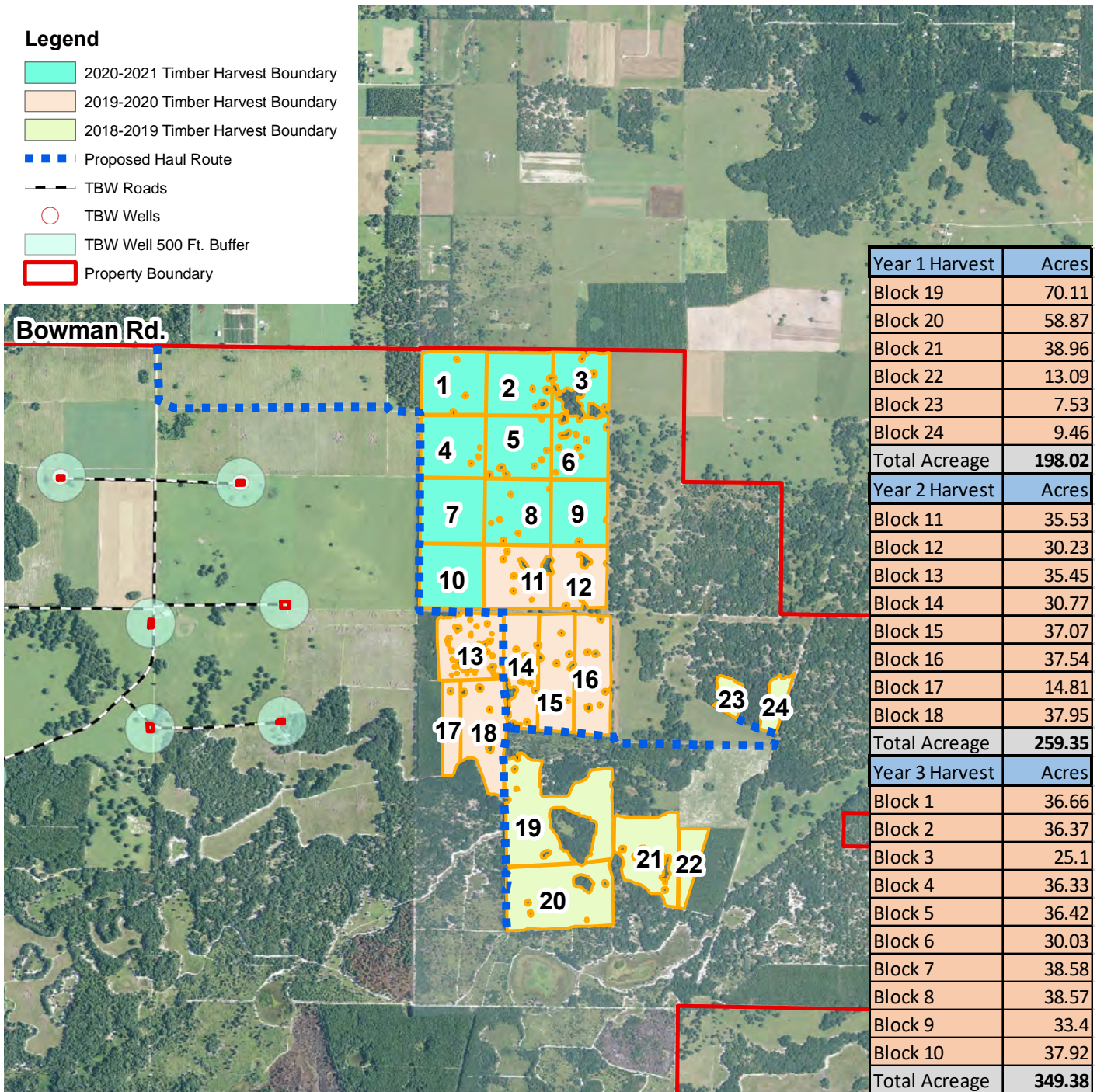
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Cross Bar - Albar Ranch
2018-2021 Timber Harvests

Legend

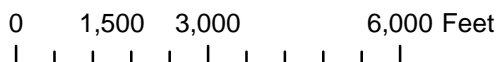
- 2020-2021 Timber Harvest Boundary
- 2019-2020 Timber Harvest Boundary
- 2018-2021 Timber Harvest Boundary
- Proposed Haul Route
- TBW Roads
- TBW Wells
- TBW Well 500 Ft. Buffer
- Property Boundary



NOTICE:

This map is not a survey. Therefore, any derived acreage numbers on this map or accompanying report are approximate and should only be used for planning and management.

This map is not suitable for engineering design or construction. Further, the use of any associated acreage numbers for sales or negotiations is entirely at the risk of the buyer and seller.

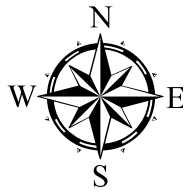


Projection: NAD 1983 UTM Zone 17 North
2013 Ortho Imagery Aerial Map Updated on: 11/16/2017
Map Scale: 1"= 3,000ft Map Edited by: J.T. Vogel

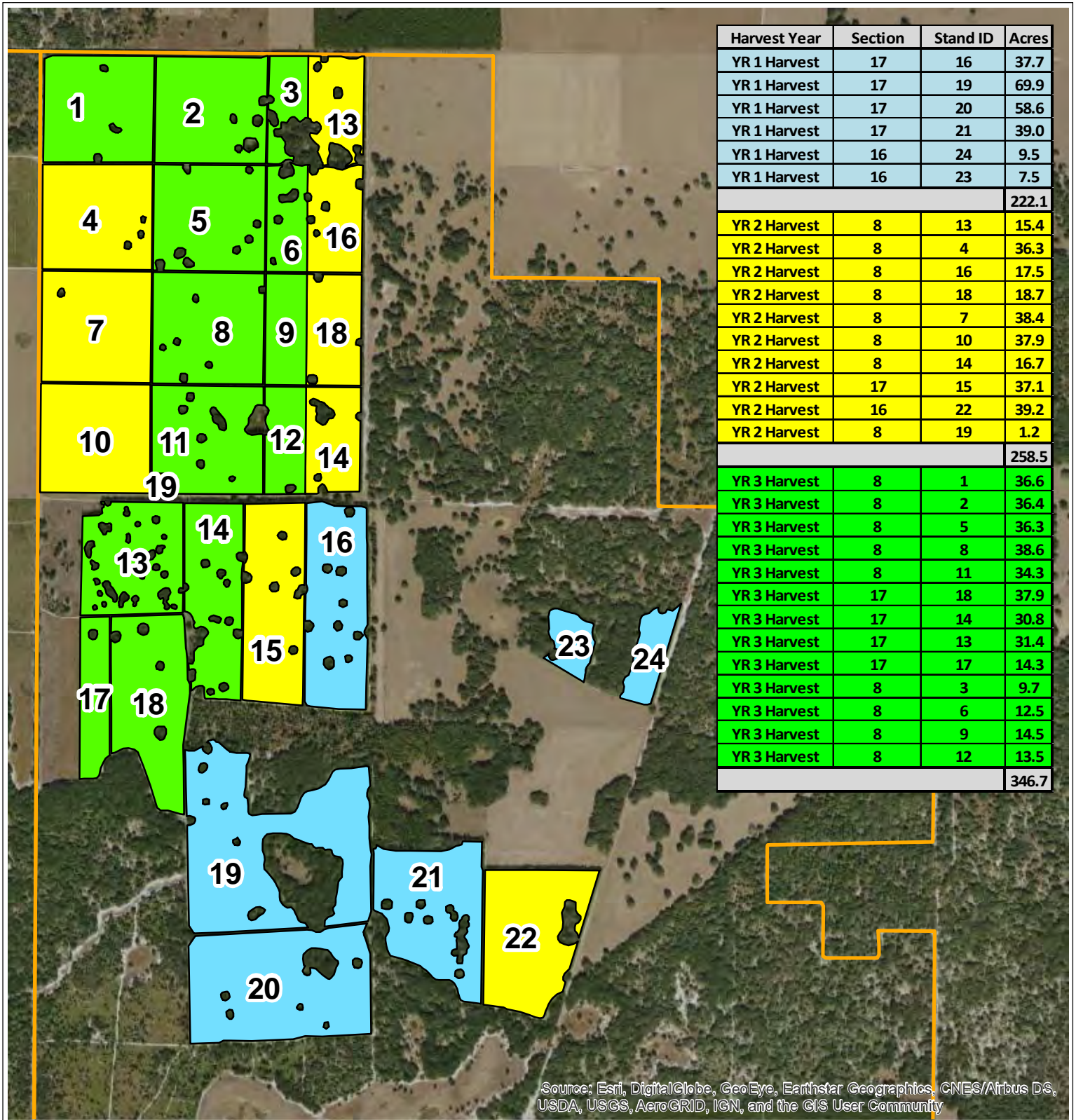


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P.O. Box 564
San Antonio, FL 33576
(352) 588-2580

Figure 6-5. Revised Short-Term Harvest Schedule
 Cross Bar and Al Bar Ranch: 2018-2021



TOTAL ACRES - 827 (MOL)



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



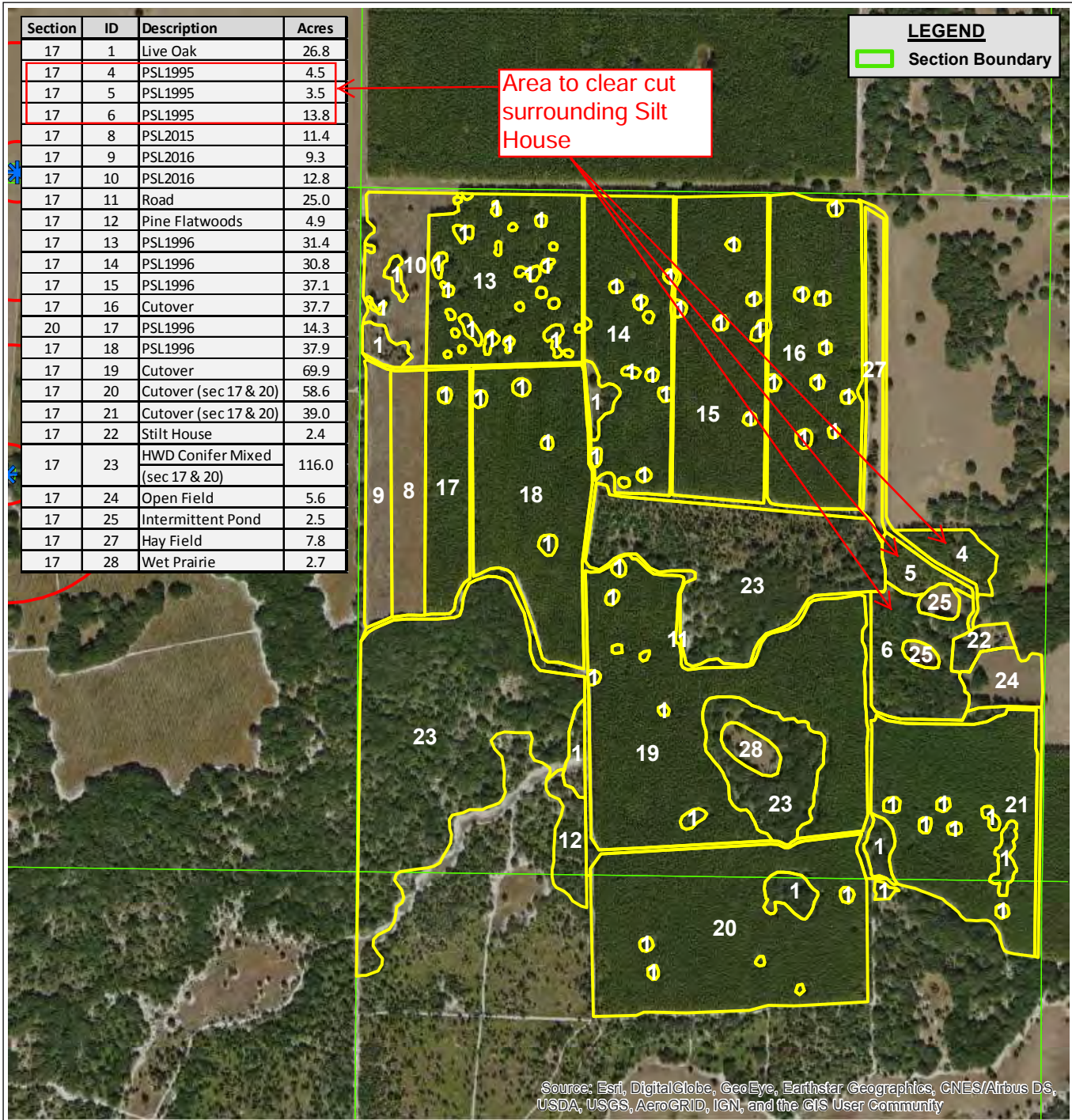
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PROJECTION: NAD 83, UTM ZONE 17, METERS

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Figure 6-6. Stilt House Harvest Area



660 330 0 660 1,320
Feet

1:12,500

PROJECTION: NAD 83, UTM ZONE 17, METERS

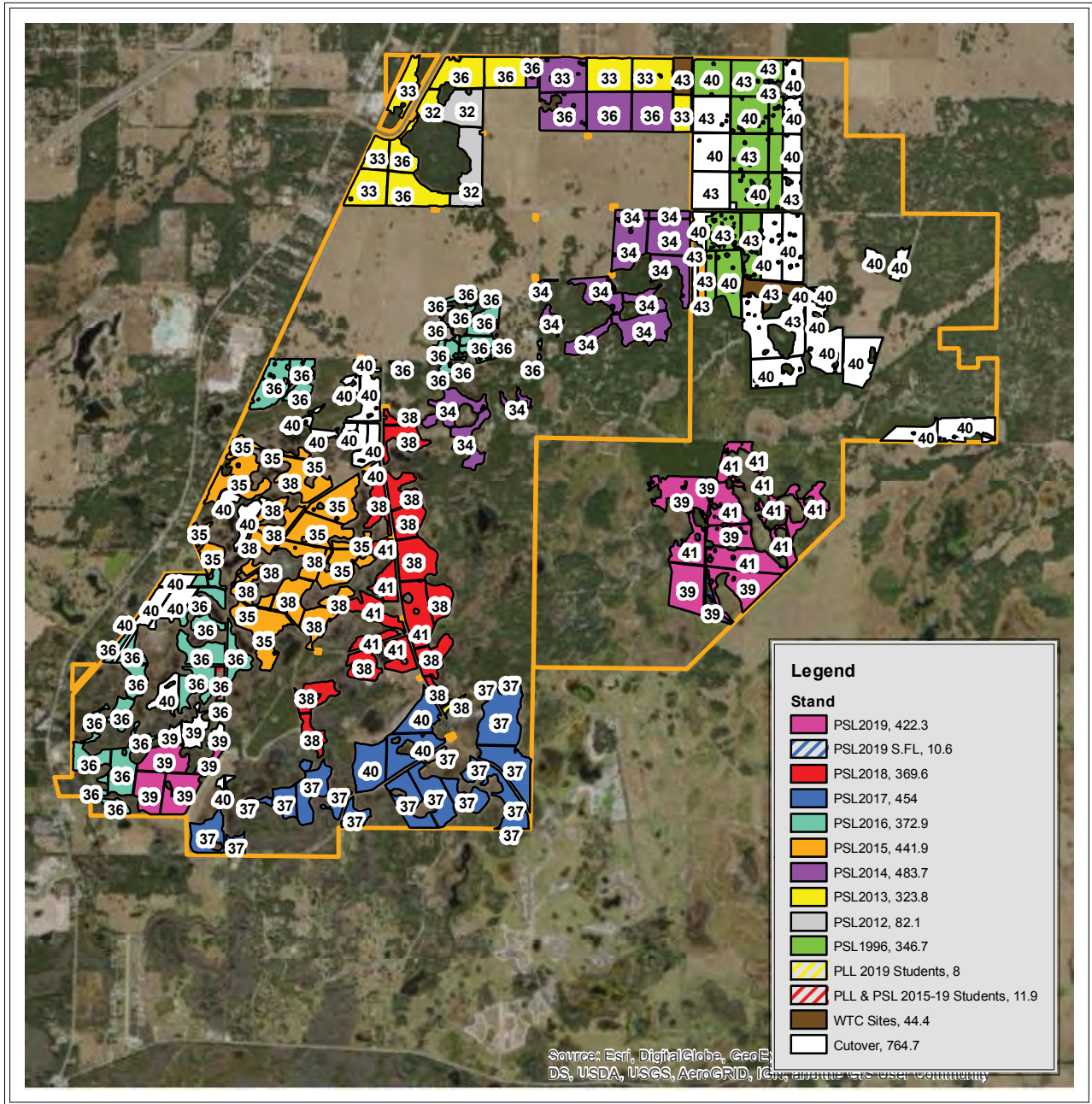
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Figure 6-8. SFI Impacts on Long-Term Harvest Schedule

Cross Bar and Al Bar Ranch

Colors Indicate Year Pines Planted
 Numbers Indicate Future Harvest Year

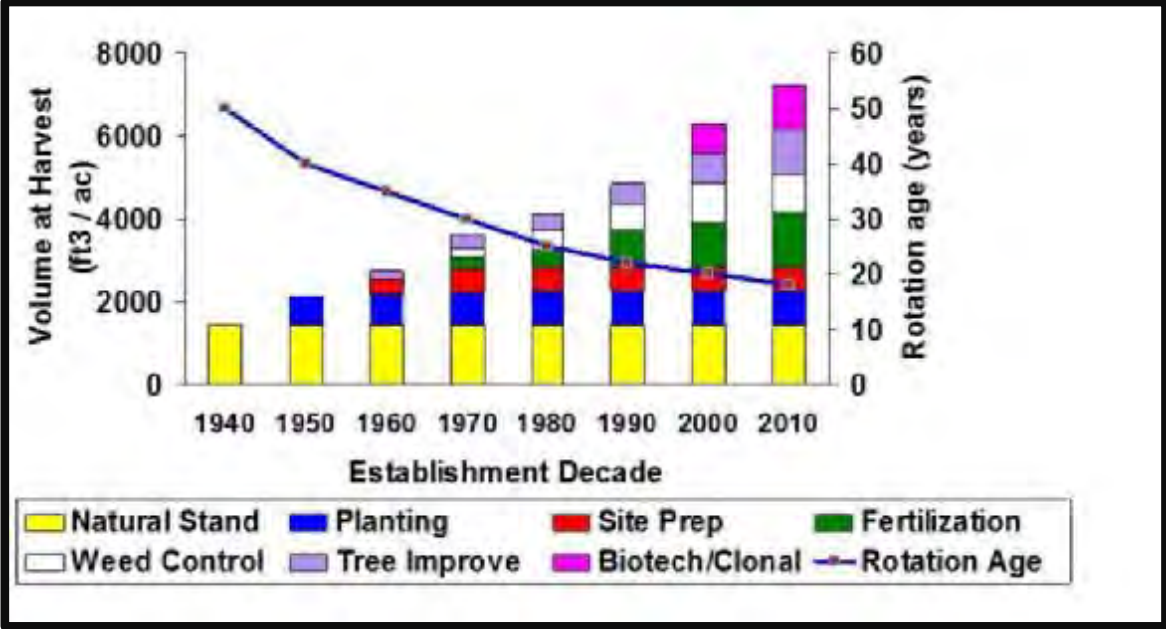


PROJECTION: NAD 83, UTM Z17 NORTH, METERS

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Figure 6-9. Contribution of Silvicultural Practices to Productivity Improvements and Rotation Lengths in Managed Southern Pine Stands.



Source: Jokela, Long, 2018. Using Soils to Guide Fertilizer Recommendations in Southern Pines.

7. Longleaf Pine Restoration Forest

There were approximately 436.3 acres of longleaf pine timber plantations established on CB/AB in 1994 and 1995 (Figure 7-1, Current State of 1994 and 1995 Longleaf Pine Timber Plantation Areas). All of these stands 1994 and 1995 longleaf pine stands suffered from severe infestations by Ips engraver beetles (*Ips* spp.), black turpentine beetle (*Dendroctonus terebrans*) and some had significant fusiform rust disease (*Cronartium quercuum* f. *sp. Fusiforme*). These pine bark beetles normally do not infest healthy trees, but tend to attack stressed and dying pine trees (Eickwort, 2018). The infestations were so severe that harvesting was implemented as a “salvage emergency cutting”. Dr. Jeffrey Eickwort, the lead forest entomologist with the Florida Forest Service inspected the infected longleaf stands in June of 2018 and recommended a combination of clearcuts and thinnings. Salvage harvests of these stands began in 2017 and were completed in 2019.

Efforts to contain the beetle infestation have included clearcutting severely infected stands (292.4 acres) or thinning stands with lower levels of infestation (143.9 acres).

Most (248.6 acres) of these clearcut areas have been or will be planted back in slash pine for commercial pine plantation management.

Forty-three point eight (43.8) acres of these clearcut areas were planted with longleaf pines in January of 2020 due to the land elevation and soil type (Figure 7-1, Current State of 1994 and 1995 Longleaf Pine Timber Plantations). Seventeen point six (17.6) acres (Figure 7-1 ID # 20) of the recently planted longleaf pines were planted with 726 trees/acre (high density) and will be managed as commercial pine plantations; and 26.2 acres (Figure 7-1 ID # 19) were planted at a lower density (363/trees/acre) and will be managed to promote natural regeneration and will be managed in the same manner as the longleaf pine thinning that is adjacent to the lower density planting.

The objectives of the 143.9 acres of longleaf pine thinning harvest were to:

- ü remove the diseased and beetle infested trees;
- ü remove the trees with very poor form;
- ü open the forest canopy such that light can reach the forest floor; and,
- ü 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 and was the first step in moving the 1994 and 1995 planted longleaf stands toward naturally regenerating stands. The goal is to create at least 3 age classes in the future with approximately 10 to 15 years between the age classes of longleaf pines, creating an uneven aged stand (Gagnon, Jokela, 2002; Schmiege, 2020). 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 found in a natural stand, but the desire is to save enough seed trees for the future in the event the beetle infestation reemerges. If beetles move into these thinned stands again (for the 3rd infestation), they may need to be clearcut and reforested.

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 pines normally produce a good cone crop (for seeding) intermittently, supplemental planting of containerized longleaf pine seedlings is also used to accelerate regeneration of an uneven aged longleaf stand.

The 143.9 acres of remaining longleaf pine plantation are located in two (2) general areas. The southern thinned area (Area 1) is located east and northeast of the Education Center and consists of approximately 87.3 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. Approximately 41.5 acres immediately east of the Education Center received the seed-tree thin, and the third-row thinning occurred on the remaining 45.8 acres. These thinning activities were to remove the dead, dying, insect infested, and/or diseased trees and those with very poor form. The 41.5 acre stand had an exceptionally high incidence of fusiform rust disease, active beetles and very poor form.

The northern thinned area (Area 2) consists of approximately 56.6 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 and 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.

This longleaf restoration program provides an excellent opportunity to promote PCU's long-term goal of restoring longleaf pine habitat on-site and enhancement of public perception.

The longleaf pine stands that were thinned (~143.9 acres) will be managed to create a more natural looking forest that will be maintained by prescribed fire going forward. The vision is to have future longleaf stands mimic a natural forest with multiple tree ages and sizes; and with varied densities of trees per acre. The future forest will also have wire grass and other natural vegetation growing on the floor of the forest (Gagnon, Jokela, 2002).

The thinning harvest of the planted longleaf stands left the better-quality trees remaining to provide good seed stock for the future forest.

Prescribed burning is a critical component in longleaf pine natural regeneration. Prescribed burns will be planned to coincide with the natural seed drop when possible, as seeds need to fall on bare mineral soil to germinate. This is an example of the adaptive management component, whereas the County, along with the forestry consultant, ecological consultant and cattle ranch manager will collaborate to make any adaptive management changes.

Longleaf pine cones take two years to mature and drop seed, therefore when mature longleaf trees begin to grow male and female strobili, the forest manager should begin planning to control burn the stand under the longleaf pine stand the next year. The second year the cones grow from 1" long in February to 6"-8" long in May or June. Prescribed burning should be done in early September in the second year to expose the mineral soil. The seedfall usually occurs September through December (USDA Forest Service, 1965). Avoid control burning the new seedlings for the first three years after they germinate as seedlings in those phases are susceptible to being killed by fire (Ober, Printiss, Friedel, 2015). Later on, or beginning at age 4 the stands should be control burned every 2 to 4 years, depending on the vegetative fuels that accumulate over time, the target species to control and the hardiness of young longleaf in the area to be burned (Ober, Printiss, Friedel, 2015). This type of fire regime with longleaf pine and native understory will mimic a natural longleaf pine ecosystem.

Pasco environmental education students and professional hand-planters may also be used to supplement the natural seed drop to create un-even aged stands as are found in nature - by planting longleaf pine containerized seedlings, wiregrass and other native vegetation within the thinned areas, as may be needed. The plantings will be in random patterns and should be planted over several years to create uneven aged stands, as happens in nature. Once several age classes of longleaf pines have been established by plantings or seed drop, further thinning of the mature trees may be in order (Gagnon, Jokela, 2002). This is an adaptive process that should be evaluated on an ongoing basis.

The areas managed for natural regeneration will not be fertilized, and herbicides will only be used in these areas to control exotic/invasive species ongoing.

These longleaf pine ecosystem acres are considered conservation areas that will be managed for the restoration of the longleaf pine ecosystem and for wildlife habitat improvement. The restoration of the longleaf pine ecosystem is an example of the adaptive management component which is addressed both in the EMP and in the FMP, whereas the County, along with the forestry consultant, ecological consultant and cattle ranch manager will collaborate to make any adaptive management changes.

Ongoing forest health monitoring of the stands will take place to detect any potential reemergence of beetles or other forest pests, cone crop development, native grasses development and tree density.

The forest 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 thinned areas are provided below and are in accordance with the EMP recommendations, with some additional clarification.

Area 1 (~87.3 acres of Thinned Longleaf Pines) – Flatwoods Target Community

- Conduct a prescribed burn during the winter following the first growing season after thinning to remove logging debris, release nutrients to the soil, kill beetles in piles of logging debris and promote native vegetation regrowth for wildlife.
- Subsequent burns should occur on a 2 to 4-year cycle, depending on the vegetative fuels that accumulate over time, the target species to control and the hardiness of young longleaf in the area to be burned (Ober, Printiss, Friedel, 2015; Schmiede, 2020).

- Conduct baseline timber cruise of stand conditions within one year of thinning completion, and every ten years thereafter.
- Once several age classes of trees have been established in the longleaf stand, the basal area of the longleaf stand can be reduced to approximately 30-50 ft²/acre of mature trees.
- Conduct qualitative monitoring quarterly during Year 1 to assess for vegetation recruitment, seed catch and beetle mortality and annually thereafter (Quest, 2019).
- Apply appropriate herbicide to control non-native or nuisance groundcover vegetation at less than 5% cover, as needed (Quest, 2019).
- Inventory existing groundcover, then install an appropriate and diverse mixture of flatwoods groundcover and shrub species where desirable remnant vegetation is lacking as soon as possible following herbicide treatments, if any. Plant groundcover and shrub species when soil moisture is high and/or precipitation anticipated, as feasible (Schmiege, 2020; Quest, 2019).
- Engage Pasco County school groups and other interested parties in restoration activities (supplemental planting of appropriate flatwoods species, follow-up visits to observe restoration success) (Quest, 2019).

Area 2 (~56.6 acres of Thinned Longleaf Pines) – Sandhill Target Community

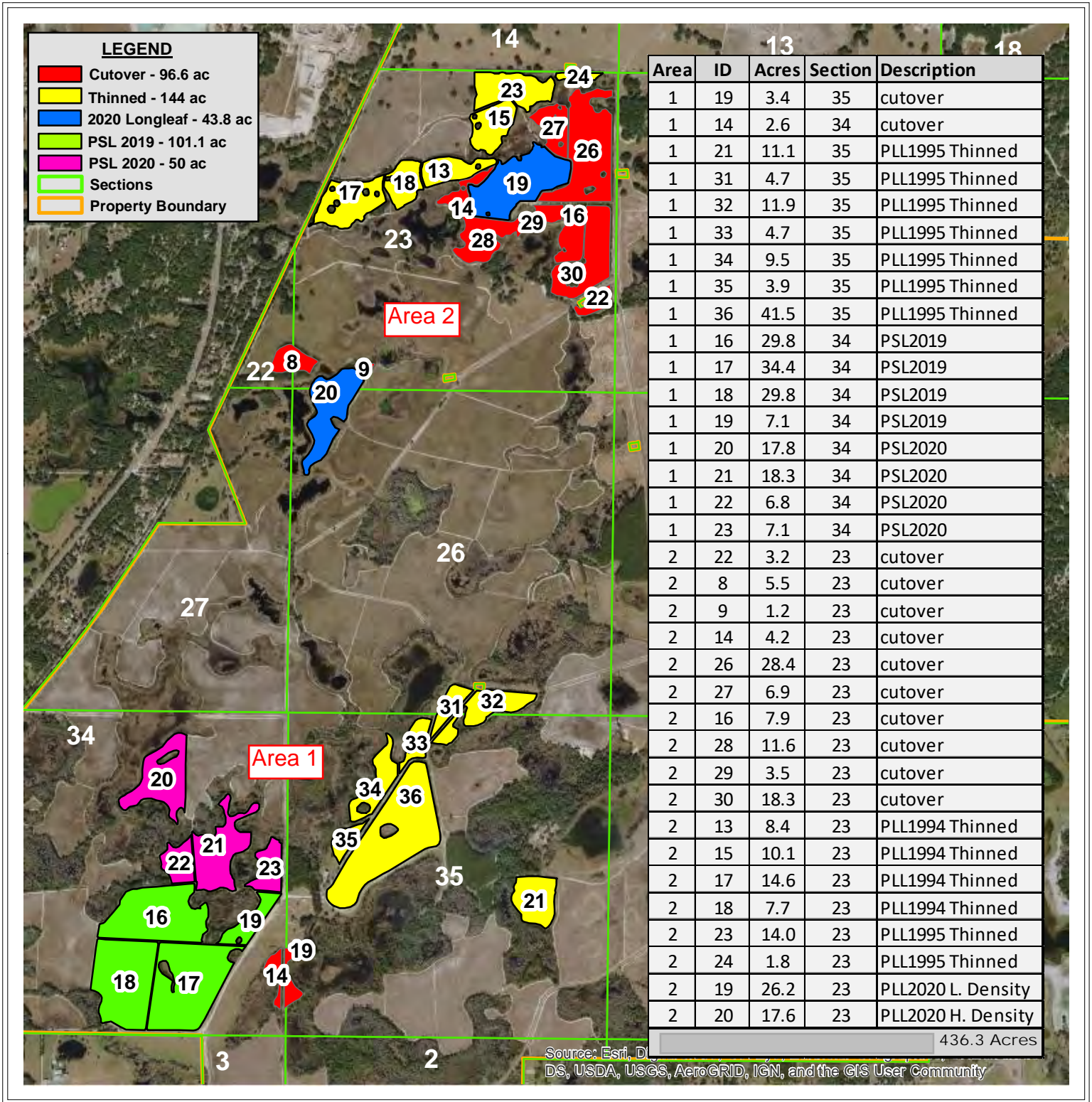
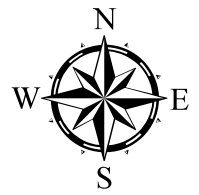
Conduct a prescribed burn during the winter following the first growing season after thinning to remove logging debris, release nutrients to the soil, kill beetles in piles of logging debris and promote native vegetation regrowth for wildlife.

- Subsequent burns should occur on a 2 to 3-year cycle, depending on the vegetative fuels that accumulate over time, the target species to control and the hardiness of young longleaf in the area to be burned (Ober, Printiss, Friedel, 2015; Schmiege, 2020).

- Conduct baseline timber cruise of stand conditions within one year of thinning completion, and every ten years thereafter.
- Once several age classes of trees have been established in the longleaf stand, the basal area of the longleaf stand can be reduced to approximately 30-50 ft²/acre of mature trees.
- Conduct qualitative monitoring quarterly during Year 1 to assess for vegetation recruitment, seed catch and beetle mortality and annually thereafter (Quest, 2019).
- Apply appropriate herbicide to control non-native or nuisance groundcover vegetation at less than 5% cover, as needed (Quest, 2019).
- Inventory existing groundcover, then install an appropriate and diverse mixture of sandhill groundcover and shrub species where desirable remnant vegetation is lacking as soon as possible following herbicide treatments, if any. Plant groundcover and shrub species when soil moisture is high and/or precipitation anticipated, as feasible (Quest, 2019).
- Engage Pasco County school groups and other interested parties in restoration activities (supplemental planting of appropriate flatwoods species, follow-up visits to observe restoration success) (Quest, 2019).

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 citizens, demonstrated commitment to restoration goals, and opportunities to share successes and lessons learned with public interest groups and other land managers.

Figure 7-1. Current State of 1994 and 1995 Longleaf Pine Timber Plantation Areas



1:26,800

PROJECTION: NAD 83, UTM Z17 NORTH, METERS

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8. Forest Health and Seedling Survival

8.1 Forest Health

Forest management staff needs to constantly monitor forest health as they travel about the property; looking for signs of tree stress, beetle infestation, disease, flooding, undetected wildfire, etc. When forest health concerns are identified, the forest manager will involve the appropriate resources to properly identify the root cause of the problem, make recommendations to PCU for addressing the problem, then implement the solution to the problem, given PCU concurrence.

8.2 Seedling Survival Monitoring

The forest manager conducts seedling survival checks (inventory) each year in the fall for the plantation pines that were planted the previous winter. This allows the forester to assess how the trees fared through the first growing season. This also allows for potential inter-planting in the winter of that year should stocking be too low to maximize NPV.

The seedling survival inventory is a statistical sample of the number of stems per acre of live pine trees. The trees are measured - 1 inventory plot (16.65' radius) for every 5 acres. Maps are generated with color-coding by plot such that the forest manager can identify the areas where there is low stocking. Any stands with less than 400 live stems per acre after the first growing season should be inter-planted or replanted in order to maximize production of pine straw and timber (NPV) per acre. Inter-planting is not successful on stands that are over a year old as the surviving trees are too tall and will shade out the interplanting.

In 2018 and 2019 as the forest manager, TFC, did visual inspections of all of the pine stands and became concerned about potentially low stocking in the 2016 pine plantation stand. It is for that reason that TFC did an inventory of the 466.8 acres of trees planted in 2016 to determine if the tree stocking was sufficient to support a viable stand that

could be pine strawed in the future. Survival was poor with an average of 370 live trees/acre. The statistics for the 2016 planting show that there is a 90% chance that the actual stems/acre will fall between 343 and 398 stems/acre with the average being 370 stems/acre. Thirty-seven plots had less than 400 stems/ac, which represents approximately 185 acres. After field inspection and aerial mapping TFC recommended to PCU, and PCU concurred, that 78 acres should be chopped and reforested.

The ecological consultant encouraged PCU to re-purpose the management of 9.8 acres of the low density 2016 pine plantation plantings for conservation, as it is surrounded on 3 sides by wetlands; and PCU concurred.

The forest manager also completed the seedling survival checks for the 369.6 acres of the 2018 slash pine planting. Survival was good with an average of 527 live trees/acre. The statistics for the 2018 planting data show that there is a 90% chance that the actual stems/acre will fall between 504 and 551 stems/acre with the average being 527 stems/acre.

Since a crop of slash pines requires approximately 20 years until harvest, it is important to have a well-stocked stand to generate a typical rate of return from the investment in reforestation.

9. PINE PLANTATIONS MANAGED FOR CONSERVATION

The Cross Bar and Al Bar Ecosystem Management Plan that was developed for the Cross Bar and Al Bar Ranch in 2019 identified various strategies that could be employed to improve the compatibility of some planted pine stands with a broader array of wildlife habitat uses. As a result of that plan, PCU identified several areas of pine plantations that have been re-purposed to support wildlife habitat conservation and will be managed accordingly (Figure 6-2, Previous Commercial Plantations Planned for Conservation). These lands may be managed as longleaf pine restoration forests, natural upland forests, scrub or buffers to separate plantations from conservation lands.

10. UPLAND NATURAL FORESTS

Native (natural) forest restoration is covered in great detail in the EMP. This FMP is envisioned to coordinate with, be consistent with, and build on the EMP.

This section of the FMP addresses those areas of naturally forested uplands that were historically a natural pine/hardwood forest which fall within the Core Conservation Area. The upland natural forests in that area make up approximately 2,750 acres and are the un-colored areas within the Core Conservation area on the Figure 10-1 map (Figure 10-1, Core Conservation Area). These natural forests have, for the most part, become upland hardwood forests because the natural pine seed trees were removed and thus the natural forest lost its pine component. The current natural upland forest consists of species such as live oak (*Quercus virginiana*), water oak (*Quercus nigra*), blackjack oak (*Quercus marilandica*), pignut hickory (*Carya glabra*), southern magnolia (*Magnolia grandiflora*), laurel oak (*Quercus laurifolia*), etc. The few pines that have been observed are mostly slash pine (*Pinus elliotii*) and longleaf pine (*Pinus palustris*), with a very small amount of sand (*Pinus clausa*) and loblolly pine (*Pinus taeda*). None of these natural upland forest areas have received a quantitative baseline forest inventory for species, species distribution, groundcover (e.g. wiregrass, saw palmetto, etc.), and presence and distribution of exotic/invasive plants. Also, prescribed burning has been excluded for many years allowing oaks to propagate the open spaces that once contained pines. There are areas that appear to have experienced some wildfire over time.

The following goals have been developed to coordinate with and compliment the goals identified in the EMP for the Native Forest Restoration within the Core Conservation Area.

UPLAND NATURAL FOREST GOALS

- Ø Re-establish a longleaf pine forest component where it is void in the current upland natural forest.
- Ø Remove mid-story and over-story hardwood cover to 5% in areas surrounding existing natural longleaf and slash pines such that there will be open areas receiving full sunlight during the day to support natural pine seed catch and germination.
- Ø Plan prescribed burns to take place one to two months before an expected natural pine seed drop to prepare the seed bed surrounding the exiting mature longleaf and slash pines.
- Ø Control of nuisance and exotic plants and wildlife that threaten the integrity of native habitats, land uses, and the achievement of management goals.
- Ø Employ compatible land uses that generate revenue to offset management costs. Examples include palmetto berry harvesting and gopher tortoise recipient site.

The County, along with the forestry consultant, ecological consultant and cattle ranch manager will collaborate to make any adaptive management changes to the natural upland forest plan as may be needed in the future.

Restoration of the pine component of the forest may provide PCU with potential timber income in the future and the pine needles and native grass component of these forests will provide the fuels needed to enable more prescribed burning. When examining the predominant soil types of these areas (Figures 10-2 through 10-2.5), slash, longleaf, sand, loblolly, and South Florida Slash pine can grow on the sites. However, longleaf pine is the predominant target species for this restoration work.

When the County determines that the funds are available to support restoration of the upland natural forests in the Core Conservation Area, a quantitative baseline forest assessment of the target natural forest restoration area should be conducted to determine

the tree species to keep, and those to remove, to open up areas for longleaf pines to be re-established. The quantitative baseline forest inventory will allow for flagging desired “leave” trees such as persimmon, dogwood, hickory, or magnolia, for example, so they will not be removed. Also, if there is a “grove” or concentration of large mature live oaks within a stand, these can also be “flagged” as “leave” trees.

The typical site preparation prescription should include removing the undesired hardwood trees and hand-spraying herbicide on fresh stumps to prevent some hardwoods from re-sprouting. If significant wiregrass is noted during the inventory, then a herbicide prescription recently developed by the University of Florida should be considered following hardwood removal. It allows wiregrass to remain, while other undesirable species are treated. If wiregrass is not present, then a more conventional herbicide prescription may be used to prepare the land for reforestation. The next step will be hand-planting longleaf containerized seedlings at an appropriate density in the open areas (Ober, Printiss, Friedel, 2015).

In an ideal world where ample funds are available, native groundcover species could be planted in areas that are void of wiregrass and other native grasses to help re-establish an ideal ground cover that will carry a fire. However, over time, native grasses and ground covers should return if prescribed fire is used to control vegetation, as those native grasses and ground covers are present on the Cross Bar and Al Bar site.

A natural longleaf pine forest would typically have at least three age classes of trees, at a minimum (Gagnon, Jokela, 2002; Schmiege, 2020). It is for that reason that three different plantings of longleaf pines are recommended to take place approximately 10 to 15 years apart during the winter months (Schmiege, 2020). Once the initial planting of pines and ground cover has been established for at least three years and the groundcover fuels are heavy enough to carry a fire, prescribed burning can begin. Approximately 10 to 15 years after the first planting of pines, the next round of hand-planting of longleaf pines

should be done. Once the second planting of pines has been established for at least three years and the groundcover fuels are heavy enough to carry a fire, prescribed burning can be done again. The third round of hand-planting of pines should be done approximately 10 to 15 years after the second planting. Once the third planting of pines has been established for at least three years and the groundcover fuels are heavy enough to carry a fire, the stand should transition to the ongoing 2 to 4-year prescribed burn cycle (Ober, Printiss, Friedel, 2015; Schmiege, 2020).

A quantitative timber cruise (inventory) should be considered every 10 to 15 years once the planted longleaf forest is re-established to determine if a thinning would be appropriate to establish a density of pines that will best support natural regeneration of the longleaf pines. Once several age classes of trees have been established in the longleaf stand, the basal area of the mature longleaf trees can be reduced to approximately 30-50 ft²/acre such that natural regeneration/natural seeding can take the place of planting to regenerate the forest (Ober, Printiss, Friedel, 2015).

Prescribed burning is a critical component in longleaf pine natural regeneration. Prescribed burns will be planned to coincide with the natural seed drop when possible, as seeds need to fall on bare mineral soil to germinate. Longleaf pine cones take two years to mature and drop seed, therefore when mature longleaf trees begin to grow male and female strobili, the forest manager should begin planning to control burn the stand under the longleaf pine stand the next year. The second year the cones grow from 1" long in February to 6"-8" long in May or June. Prescribed Burning should be done in early September in the second year to expose the mineral soil. The seedfall usually occurs September through December (USDA Forest Service, 1965).

Once the seed germinates, avoid control burning the new seedlings for the first three years after they germinate as longleaf seedlings in those phases are susceptible to being killed by fire (Ober, Printiss, Friedel, 2015). Once the natural regeneration is well

established, the stands should be control burned every 2 to 4 years, depending on the vegetative fuels that accumulate over time, the target species to control and the hardiness of young longleaf in the area to be burned (Ober, Printiss, Friedel, 2015; Schmiege, 2020). Implementation of this plan should re-establish the natural longleaf pine ecosystem.

Prescribed burning also encourages palmetto flowering, which ultimately produces berries that are a wildlife food source, as well as the raw material for a valued medicine for people. Palmetto berry harvests and sales are one avenue to generate revenue from the forests to offset management costs and should be continued. While literature searches produce somewhat conflicting theories as to which season to burn to produce the most berries, the 2019 berry harvest at CB/AB was very successful after a winter burn.

Public perception will be enhanced as PCU shares the longleaf forest restoration vision, restoration plan and brings guests on site to tour the restoration work.

Natural forest restoration is an adaptive process and once the first area is restored to a more natural mix of pines, hardwoods and native vegetation, the effectiveness should be evaluated and the restoration plan adjusted before selecting the next area to restore.

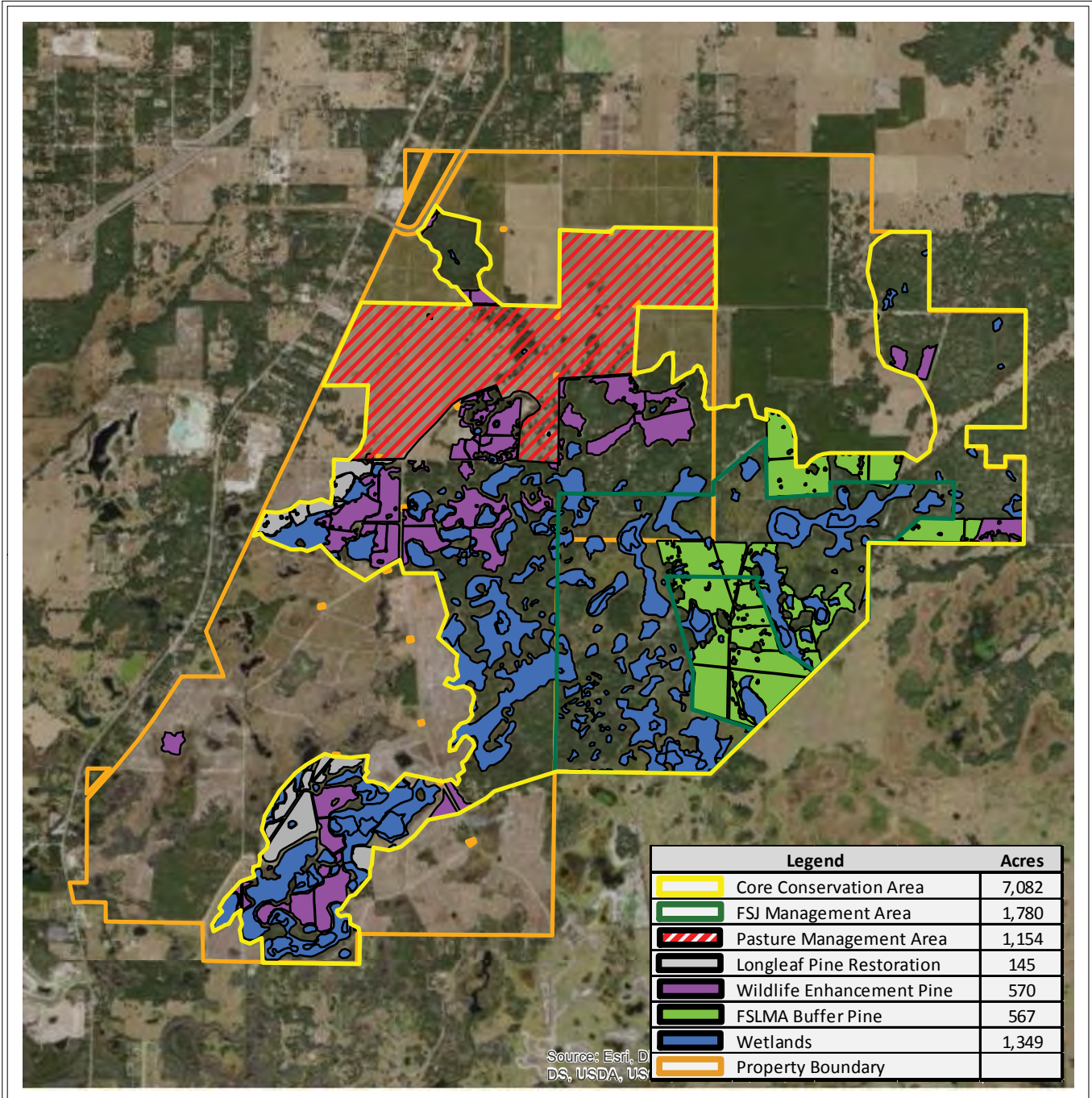
In summary, beginning in the 1930s when the longleaf seed trees were removed and prescribed fire was not used as a management tool, the natural pine-hardwood forests transitioned to a primarily hardwood forest. It is likely to take several decades to restore these upland forests to mixed pine-hardwood natural forest conditions due to biological conditions. It will take even longer if budgetary restrictions delay the longleaf forest restoration activities.

Figure 10-1. Core Conservation Area

Total Acres - 5,565



Cross Bar and Al Bar Ranch



Source: Esri, D
DS, USDA, US



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PROJECTION: NAD 83, UTM Z17 NORTH, METERS

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Figure 10-2. Soils Key

Cross Bar and Al Bar Ranch

Cross Bar Al Bar Soils Key			
Pasco County, Florida (FL101)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1	Wauchula fine sand, 0 to 5 percent slopes	11.7	0.10%
2	Pomona fine sand	271.4	2.20%
5	Myakka-Myakka, wet, fine sands, 0-2 percent slopes	50.6	0.40%
6	Tavares sand, 0 to 5 percent slopes	1,604.90	13.40%
7	Sparr fine sand, 0 to 5 percent slopes	1,382.00	11.10%
8	Sellers mucky loamy fine sand	908.1	7.30%
9	Ona-Ona, wet, fine sand, 0 to 2 percent slopes	218.4	1.80%
11	Adamsville fine sand, 0 to 2 percent slopes	2,068.40	16.60%
13	Candler fine sand, 0 to 5 percent slopes	30.9	0.20%
14	Candler fine sand, 5 to 8 percent slopes	61.1	0.50%
19	Paola fine sand, 0 to 8 percent slopes	16.3	0.10%
21	Smyrna fine sand	1,055.30	8.50%
22	Basinger fine sand	389.1	3.10%
23	Basinger fine sand, depressionnal, 0-1 percent slopes	899.9	7.20%
24	Quartzipsammments, shaped, 0 to 5 percent slopes	1.1	0.00%
26	Narcoossee fine sand, 0 to 2 percent slopes	297.7	2.40%
30	Okeelanta-Terra Ceia association	76.2	0.60%
32	Lake fine sand, 0 to 5 percent slopes	75.9	0.60%
42	Pomello fine sand, 0 to 5 percent slopes	14.4	0.10%
43	Arredondo fine sand, 0 to 5 percent slopes	408.3	3.30%
45	Kendrick fine sand, 0 to 5 percent slopes	268.6	2.20%
46	Cassia fine sand, 0 to 5 percent slopes	2.6	0.00%
48	Lochloosa fine sand, 0 to 5 percent slopes	47.3	0.40%
49	Blichton fine sand, 0 to 2 percent slopes	0.2	0.00%
52	Samsula muck, frequently ponded, 0-1 percent slopes	228.6	1.80%
53	Sparr fine sand, 5 to 8 percent slopes	2.7	0.00%
54	Flemington Variant fine sand, 2 to 5 percent slopes	8.5	0.10%
57	Wabasso Variant fine sand	19.4	0.20%
59	Newnan fine sand, 0 to 5 percent slopes	497.8	4.00%
60	Palmetto-Zephyr-Sellers complex	306.5	2.50%
64	Nobleton fine sand, 0 to 5 percent slopes	46.7	0.40%
66	Micanopy fine sand, 2 to 5 percent slopes	122.2	1.00%
67	Kanapaha-Kanapaha, wet, fine sand, 0-5 percent slopes	82.7	0.70%
69	Millhopper fine sand, 0 to 5 percent slopes	368.1	3.00%
72	Orlando fine sand, 0 to 5 percent slopes	6.3	0.10%
73	Zolfo fine sand, 0 to 2 percent slopes	81.8	0.70%
74	Candler Variant fine sand, 0 to 5 percent slopes	405.2	3.30%
99	Water	44.4	0.40%
Totals for Area of Interest		12,381.00	100.00%

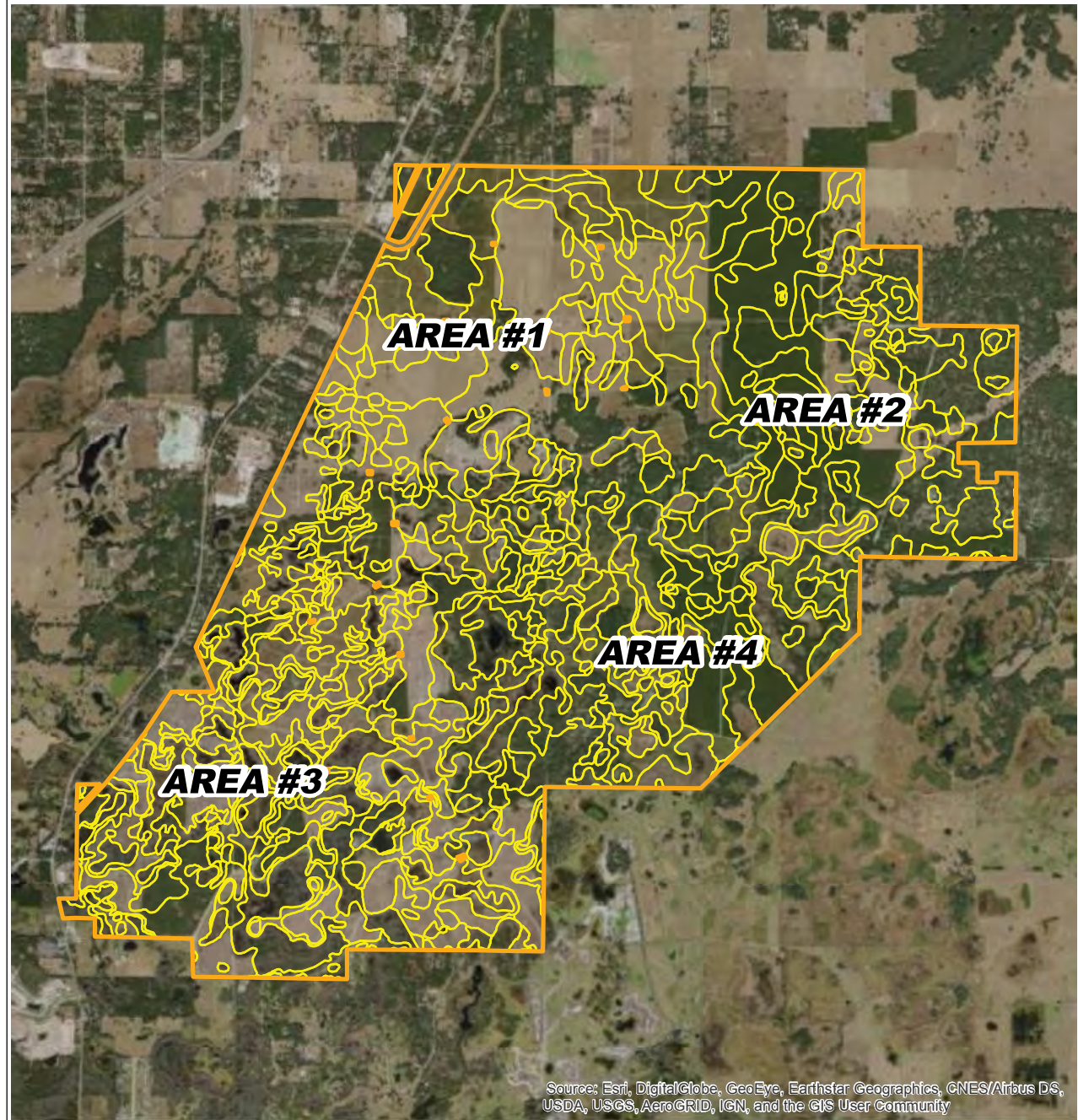
Figure 10-2.1 Soil Map Areas

CROSS BAR & AL BAR RANCH

PASCO CO., FL

SHAPE FILE PROVIDED BY:

USDA - Natural Resources Conservation Service - Soil Survey



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



1:55,000

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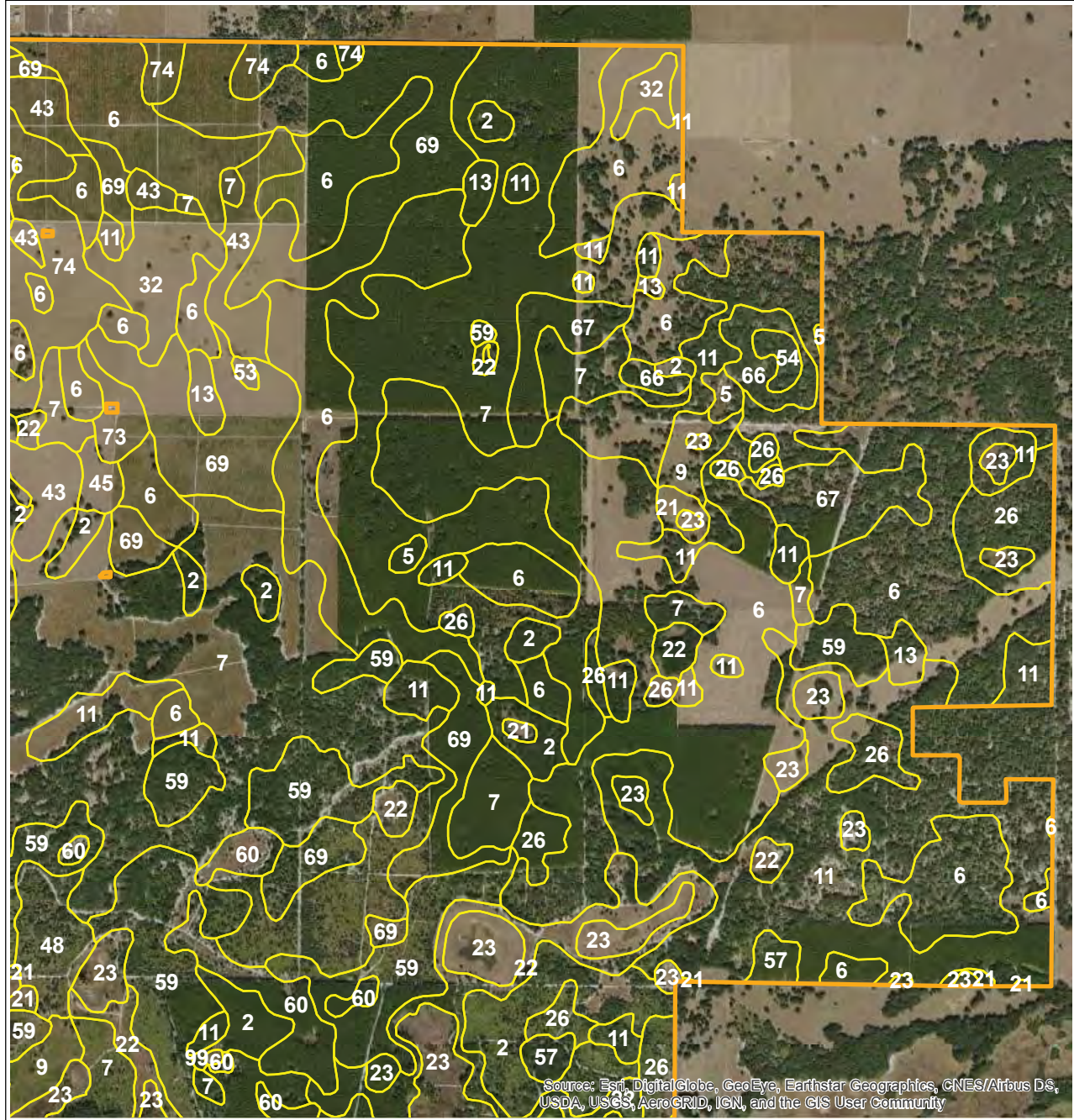
Figure 10-2.3 Soil Map Area #2

**CROSS BAR & AL BAR RANCH - SOIL MAPS
PASCO CO., FL**

AREA #2



Polygons labeled by Map Unit Symbol



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



1:22,660

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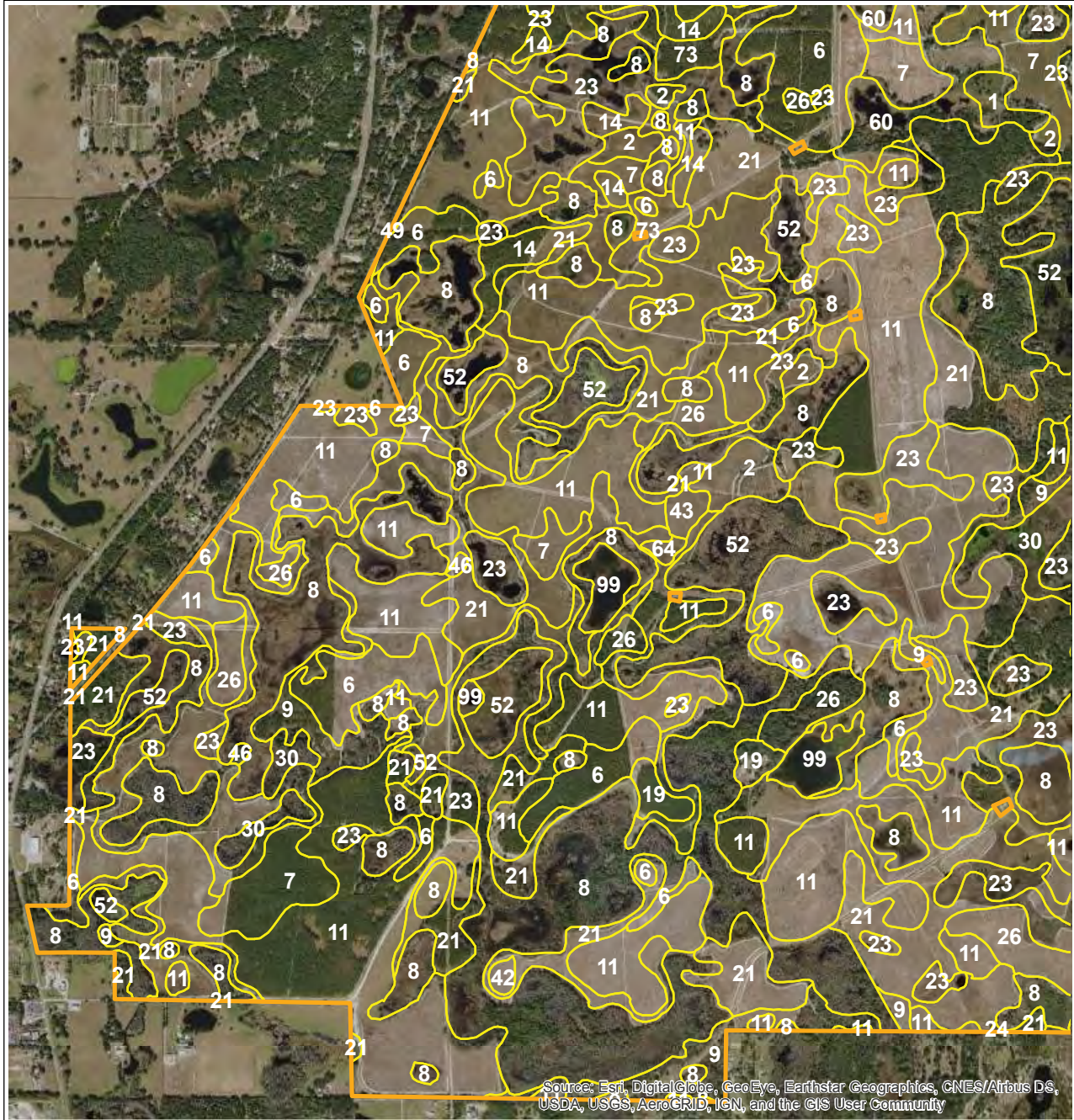
Figure 10-2.4 Soil Map Area # 3

CROSS BAR & AL BAR RANCH - SOIL MAPS

PASCO CO., FL

Polygons labeled by Map Unit Symbol

AREA #3



0.5 0.25 0 0.5 1 Miles

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PROJECTION: NAD 83, UTM ZONE 17, METERS

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11. WETLAND FORESTS

The recommended wildlife management, vegetation restoration and habitat restoration practices for general wetland management are addressed in detail in the Cross Bar and Al Bar Ranch EMP (Quest, 2019). The Forest Management Plan (FMP) and the EMP are designed to harmonize with the other and as such, the FMP references the EMP as may be appropriate.

This section of the Forest Management Plan (FMP) addresses those areas of the ranch that are forested wetlands. The forested wetlands are usually composed of pond cypress (*Taxodium ascendens*), some slash or pond pine (*Pinus serotina*), and some occasional wetland hardwood species. Within the wetland forests, there is no evidence of any recent timber harvests. However, these are not “virgin” forests either. They appear to be second growth forests, a condition common to most wetland forests in Florida.

It is important to note there has been no quantitative baseline forest inventory conducted on the forested wetlands. Therefore, stocking levels within various wetlands are unknown, as well as species composition and distribution within any particular forested wetland.

PCU does not wish to harvest the standing timber in the wetlands, thus harvesting of wetland timber will not be included in the FMP.

The EMP elaborates about the need for quarterly wetland monitoring, nuisance species control, improving the edges of the wetlands through the use of fire and elimination of

some fire lines. With that in mind, the following goals for Wetland Forests have been developed, which in some cases, further elaborates on the goals spelled out in the EMP.

FORESTED WETLANDS GOALS

- Ø Treat invasive/exotic plant species with herbicides approved by PCU and TBW along the perimeters of the wetland forests.
- Ø Utilize fire to improve the edge structure of wetlands where possible.
- Ø Reduce firelines adjacent to wetlands where possible, while maintaining protection for adjacent pine plantations.
- Ø Inventory the forested wetlands to identify exotic plants needing eradication, tree species, pest/disease problems, and wetlands that may need supplemental plantings of wetland tree species (e.g. pond cypress).

11.1 Treat Invasive/Exotic Plant Species With Herbicides

The largest short-term risk to the wetland forests is the further spread of invasive/exotic plants. One can surmise by the size of the camphor trees (*Cinnamomum camphora*) that not much attention has been paid by past management to the spread of these plants. However, the new contract with PCU and TFC has very clear expectations about the treatment of invasive/exotic plants and what herbicide can be used for treatment. The ecological consultant inspects augmented wetlands monthly to note any new presence of these undesirable plants. To date, they have identified the following plants in wetland areas: Caesarweed (*Urena lobata*), skunk vine (*Paederia foetida*), camphor tree, primrose willow (*Ludwigia peruviana*), and Chinese tallow (*Triadica sebifera*). Herbicide treatment of these plants began in 2019 and will take several years of repeated treatments to eradicate. The ecological consultant is also monitoring cattails (*Typha latifolia*) in the

augmented wetlands and will notify PCU and TFC which cattails need treating. Girdling of large trees, hand-sprayers and hack-n-squirt tools containing herbicide will be used to treat the wetland edges. Each year the specific target areas will be identified by the team and treated. Over time, different strategies and herbicides will be used, once approved by TBW and PCU.

11.2 Utilize Fire To Improve The Edge Structure Of Wetlands

The previous land managers mowed the non-forested perimeters of select wetlands. The current team re-evaluated that approach and have stopped mowing the perimeters of select wetlands and will now use prescribed fire to manage the grassy structure. Additionally, when prescribed broadcast burning is being conducted, wetlands will be burned through where possible. Since the team agreed to that approach, several wetlands were either burned through or burned into until the dampness in the wetland extinguished the fire. The grassy area on the south perimeter of Goose Lake is an example of that change in strategy. The grassy area was burned into the lake's perimeter and the dampness of the wetland extinguished the fire. When the hardwood reduction project in Blocks A and B in the FSJMA are broadcast burned, the wetlands will be burned vs. being protected by firelines. Where wetland edges can be burned when broadcast burning is being conducted, they will be burned. Many wetlands do not have control burning conducted adjacent to the wetland and thus burning may not be an option for those wetlands.

11.3 Reduce Firelines Adjacent To Wetlands Where Possible

There is a very extensive network of firelines protecting the forests on the ranch. The team has addressed firelines in the FSJMA and identified some firelines to be eliminated, some to be established and some firelines/roads to be mowed unless the fire danger as measured by Keetch Byram Drought Index (KBDI) exceeds 550. When the KBDI exceeds 550, the roads and firelines in the FSJMA will be harrowed vs. mowed for wildfire management purposes.

When broadcast burning is conducted on the property, firelines will be minimized as much as practical and safe as determined by the “fire boss” for that fire. Where wetlands can be burned when broadcast burning, they will be burned and firelines along the wetland not installed as long as it is safe to do so. When the hardwood reduction project in Blocks A and B in the FSJMA are broadcast burned, the wetlands will be burned vs. being protected by firelines.

The County, along with the forestry consultant, ecological consultant and cattle ranch manager will collaborate to make any adaptive management changes to the fireline plan as may be needed in the future.

11.4 Forest Stocking, Disease, Wildfire Or Other Natural Disaster Impacts To Forested Wetlands

The ecological consultant is identifying exotic plants that need treatment with herbicides when they are monitoring the wetlands. There has been no inventory of the plants or trees found in the forested wetlands to identify exotic plants needing eradication, tree species, pest/disease problems, and wetlands that may need supplemental plantings of wetland tree species (e.g. pond cypress).

As time and funding permits a quantitative baseline forest inventory will identify areas of wetlands with substandard or little stocking. It is possible to do supplemental wetland tree species planting should the County desire that in the future. Inventorying and supplemental plantings are a lower priority, given limited funds.

Since PCU does not wish to monetize (sell) the standing timber in these wetland forests, the stocking in those forests will remain fairly static except for the slow process of natural regeneration, unless damaged or destroyed by natural causes.

Should a hurricane or other natural disaster occur, then any efforts to salvage fallen timber and restore the wetland forest to a “pre-disaster” condition should be considered. Logging would be in compliance with Florida Silvicultural Best Management Practices. While the possibility of a natural disaster seems remote, all one has to do is see the thousands of wetland forested acres leveled by Hurricane Michael in the Florida panhandle region.

Insect or disease problems can occur and cause a die-off of some hardwood wetland forest species. For example, laurel wilt, caused by a fungus (*Raffaella lauricola*), is transmitted by the red bay ambrosia beetle (*Xyleborus glabratus*). The disease was first observed in Georgia and has spread to Florida and other southern states. It kills trees in the laurel family such as red bay (*Persea borbonia*), swamp bay (*Persea palustris*), and sassafras (*Sassafras albidum*). There is no known cure at this time.

During extreme drought, wildfires may also devastate wetland forests, and then require restoration efforts. However, with wildfires in wetlands, TFC usually waits and observes the health of the forests for several months after the fire to see if the forests recover from the wildfire. If the forests do not rebound, TFC would assess forest restoration options and review those options with the team. The County, along with the forestry consultant, ecological consultant and cattle ranch manager will collaborate to make any adaptive management changes to the plan for the wetland forests.

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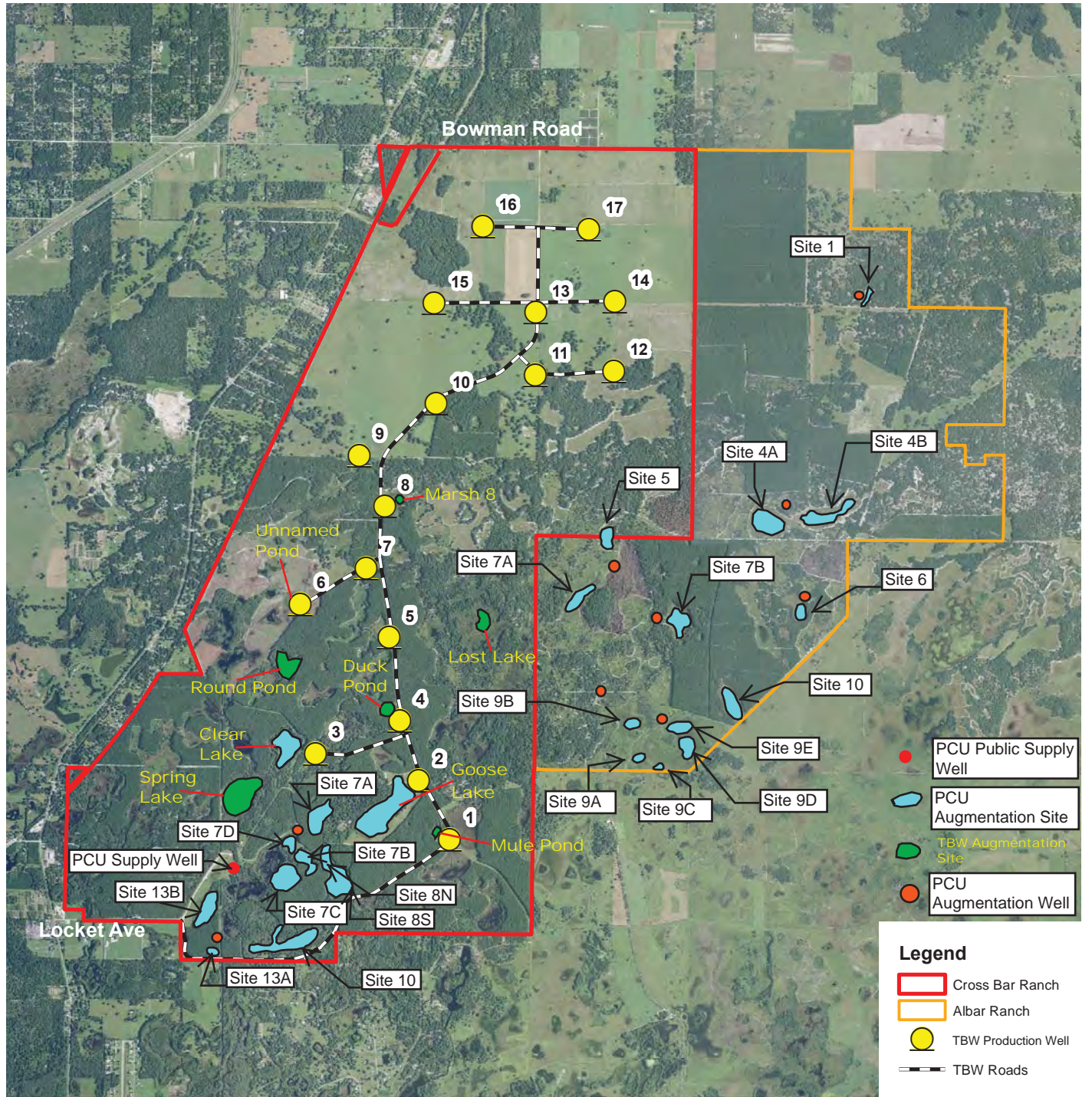
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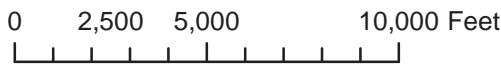
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- PCU Public Supply Well
- PCU Augmentation Site
- TBW Augmentation Site
- PCU Augmentation Well

- Legend**
- Cross Bar Ranch
 - Albar Ranch
 - TBW Production Well
 - TBW Roads



ATTACHMENT 8

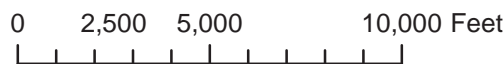
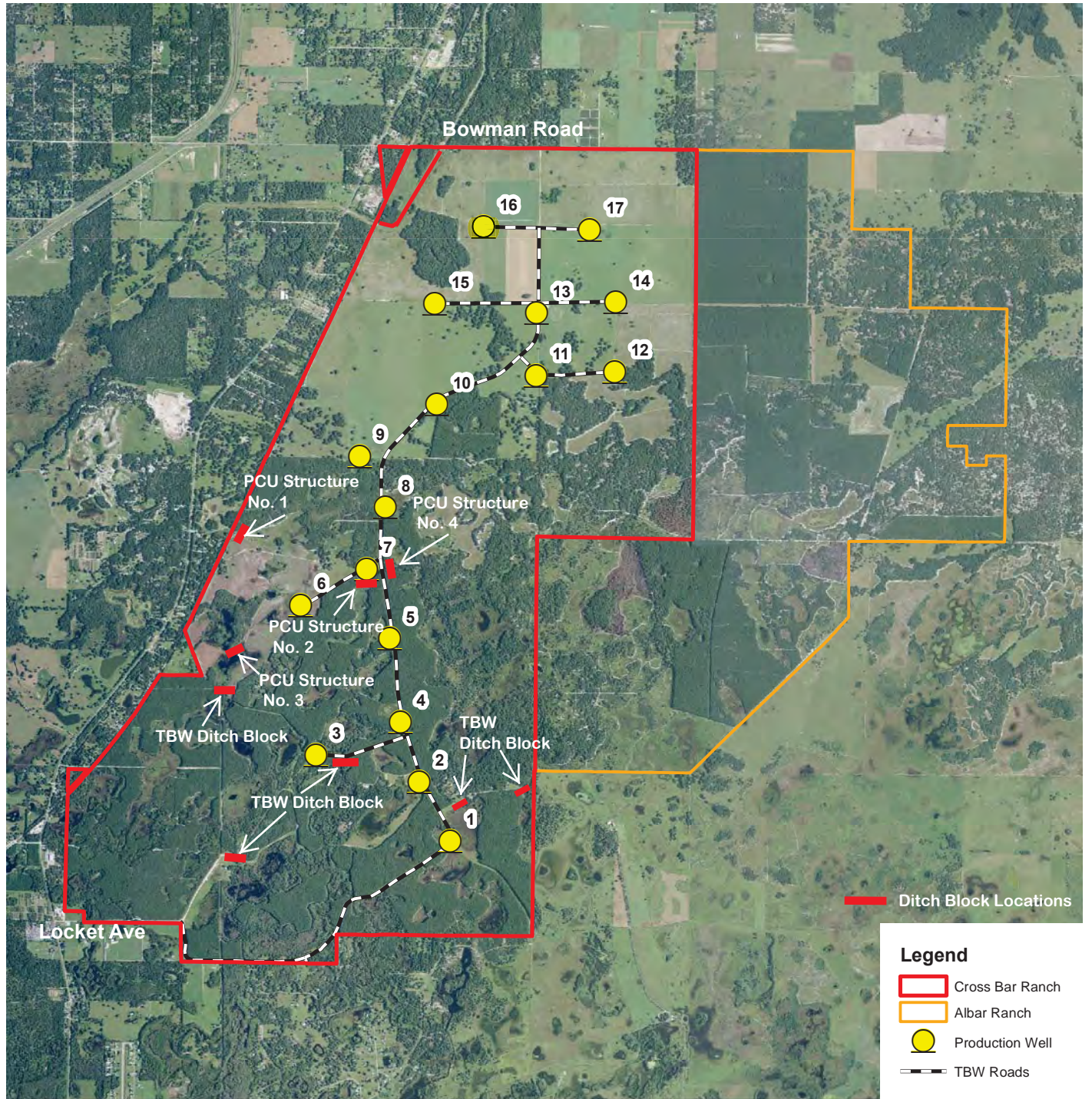
NOTICE:

This map is not a survey. Therefore, any derived acreage numbers on this map or accompanying report are approximate and should only be used for planning and management.

This map is not suitable for engineering design or construction. Further, the use of any associated acreage numbers for sales or negotiations is entirely at the risk of the buyer and seller.

Projection: NAD 1983 UTM Zone 17 North
 2013 Ortho Imagery Aerial Map Edited on: 04/03/16
 Map Scale: 1"= 5,000 ft Map Created by: E. Given
 Map Modified by: PCU 12/7/16

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ATTACHMENT 9



NOTICE:

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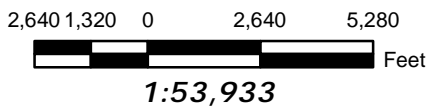
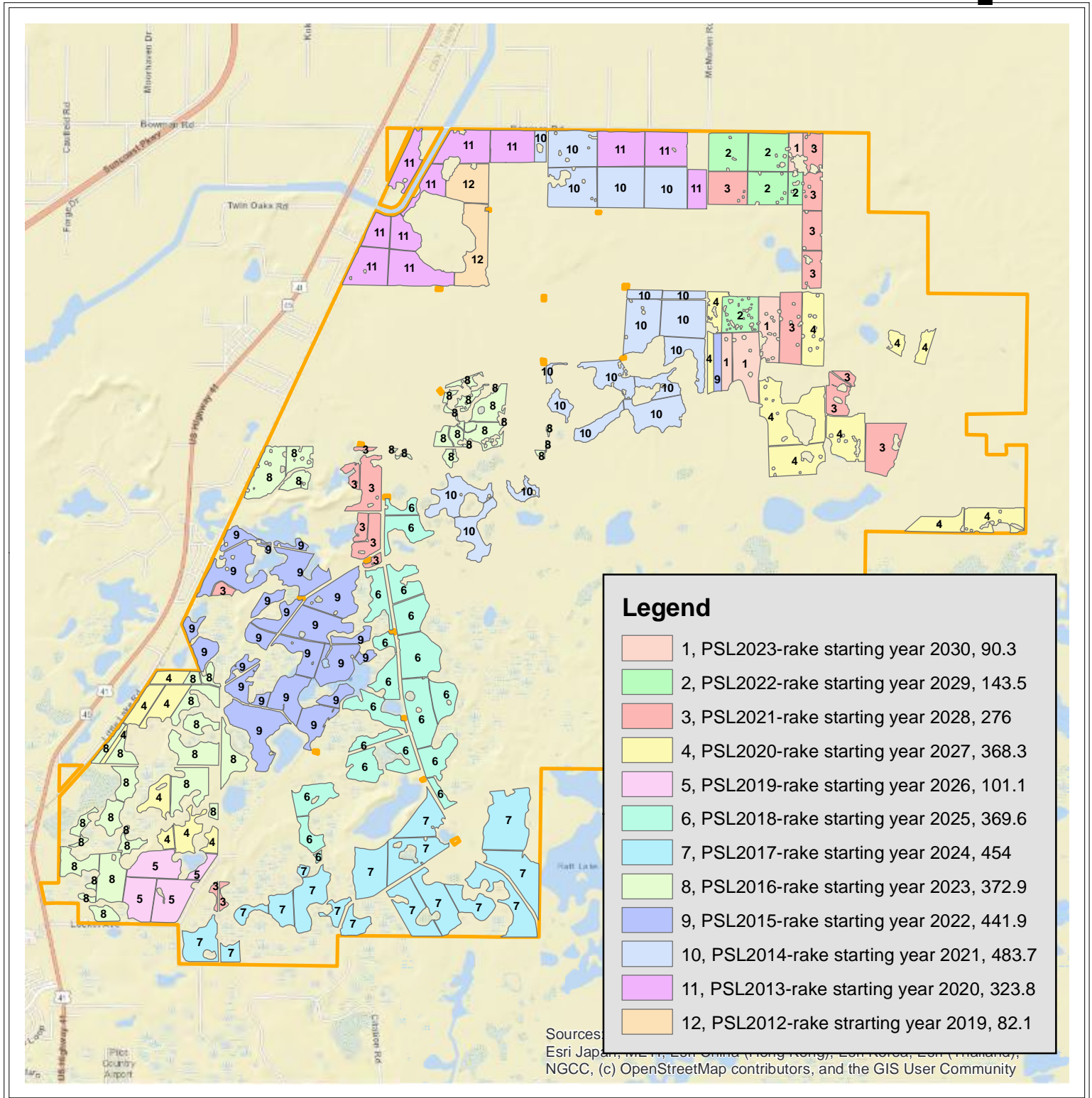
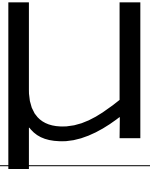
This map is not suitable for engineering design or construction. Further, the use of any associated acreage numbers for sales or negotiations is entirely at the risk of the buyer and seller.

Projection: NAD 1983 UTM Zone 17 North
 2013 Ortho Imagery Aerial Map Edited on: 04/03/16
 Map Scale: 1"= 5,000 ft Map Created by: E. Givens
 Map Modified by: PCU 12/9/16

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CROSS BAR & AL BAR RANCH
PINE STRAW MAP
 Total Acres - 3,507.1 (MOL GIS))

ATTACHMENT 10



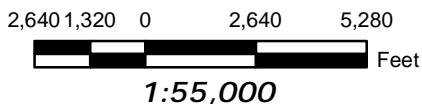
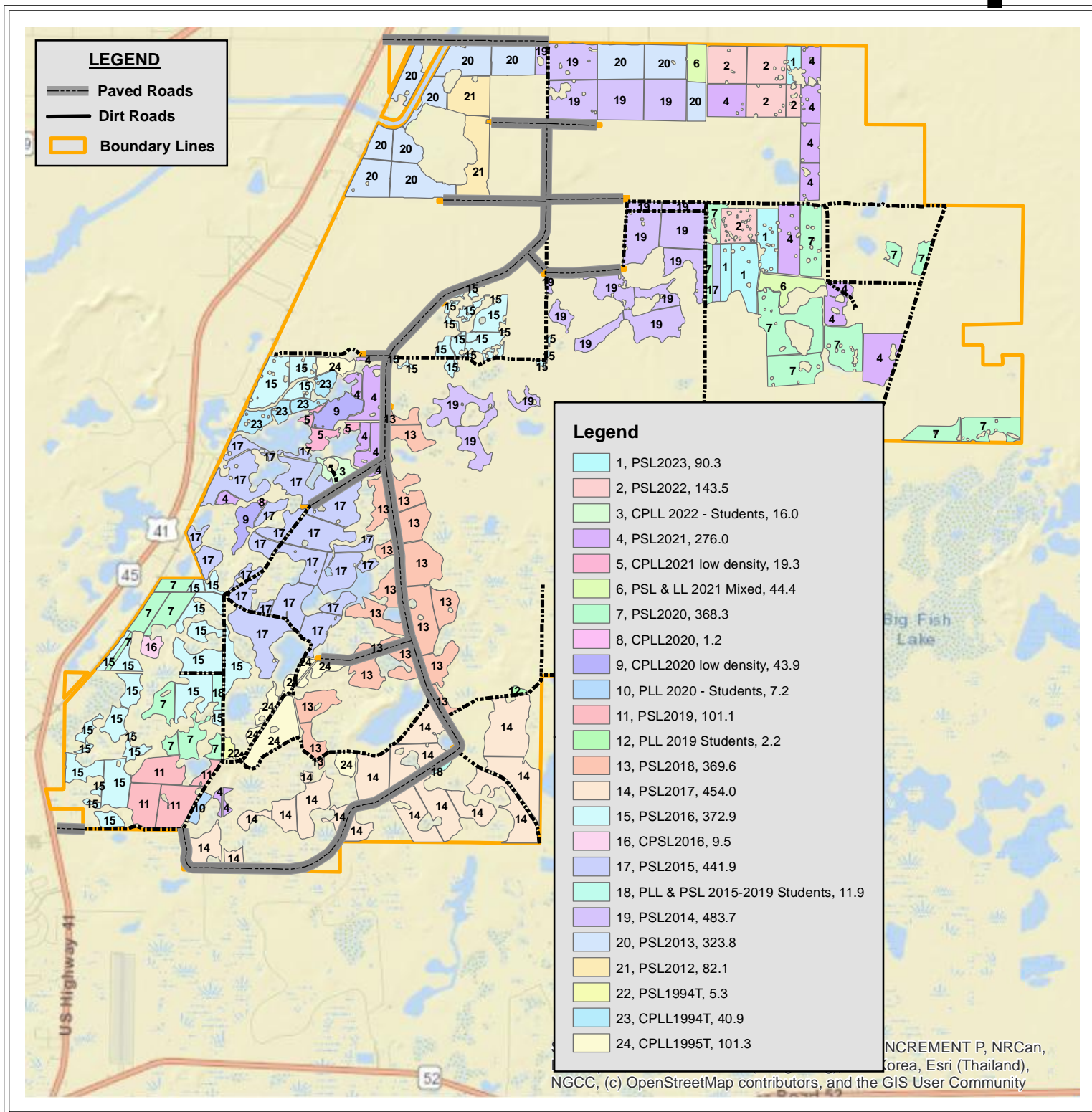
PROJECTION: NAD 83, UTM Z17, METERS

NOTE: ACREAGE WAS DETERMINED ON THIS MAP THROUGH THE USE OF GLOBAL POSITIONING SYSTEMS (GPS) AND/OR GEOGRAPHIC INFORMATION SYSTEMS (GIS). THIS MAP IS NOT A SURVEY. THEREFORE, ACREAGE ON THIS MAP AND ANY SUBSEQUENT REPORT SHOULD BE VIEWED AS AN APPROXIMATION. FURTHERMORE, THE USE OF ANY OF THESE ACREAGES IN NEGOTIATIONS, SALES, OR CONTRACTUAL AGREEMENTS IS ENTIRELY AT THE RISK OF THE BUYER AND SELLER. REPRODUCTION OF OR EDITING OF THIS MAP IS FORBIDDEN WITHOUT EXPRESS WRITTEN PERMISSION OF THE FORESTRY COMPANY.

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CROSS BAR & AL BAR RANCH
ALL PINE PLANTATIONS
 Total Acres - 3,810.2 (MOL GIS))

ATTACHMENT 11



PROJECTION: NAD 83, UTM Z17, METERS

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