

# 2012 Monitoring Report

## YELLOW RIVER RANCH SITE

Santa Rosa County, Florida

ERC #: 12-196C

December 2012



## **2012 Monitoring Report**

### **YELLOW RIVER RANCH SITE Santa Rosa County, Florida**

ERC #: 12-196C

***Prepared for:***

Northwest Florida Water Management District  
81 Water Management Drive  
Havana, FL 32333-4712

***Prepared by:***

Ecological Resource Consultants, Inc.  
100 Amar Place  
Panama City Beach, FL 32413

***Contact:***

Joseph Schuster  
President and Principal Investigator  
Tel 850-230-1882

## EXECUTIVE SUMMARY

---

Annual monitoring of the 275 acre Yellow River Ranch Site located in Santa Rosa County, Florida was conducted in October 2012 to assess the hydrologic, vegetative, and ecological condition of the site. Assessments were conducted at specific transect sites located within discrete mapped delineations of Florida Land Use and Cover Classification (FLUCCS) restoration target habitats. Newly selected transect locations were marked with metal stakes in the field and located with sub-meter precision using GPS receivers. Fifteen sample points in each of two quantitative transects documented the coverage of each species, open water, and bare ground in a meter square grid. The quantitative transects were conducted in two locations recently used for Improved Pasture (FLUCCS 211) that are being restored to Hydric Pine Flatwoods (FLUCCS 625). One qualitative transect documented estimated coverage of graminoids and total groundcover in modified Braun/Blanquet Scale classes and general notes regarding the natural history of the site. Biostatistical parameters were calculated and presented in the report in tabular and graphic formats. The qualitative transect was conducted in a location recently used for Improved Pasture (FLUCCS 211) that is being restored to Hydric Pine Flatwoods (FLUCCS 625). Four belt transects were conducted including two transects at two locations recently used for improved pasture (FLUCCS 211) that are being restored to Cypress Swamp (FLUCCS 621) and at two locations of preserved Bottomland (FLUCCS 615). Belt Transects documented the health and condition of planted tree saplings. Quantitative and qualitative transects were documented with a panoramic photograph at a location that was marked in the field. All transects and photograph points are depicted on maps that accompany the monitoring report.

The results of the 2012 monitoring represent a baseline condition that can be compared to future monitoring events to assess the progress of restoration efforts. The monitoring report also documents compliance with permit conditions for the Yellow River Ranch Site. Data obtained during the October 2012 monitoring event for the disturbed areas is typical of a site used as pastureland and consequently the groundcover is dominated by ruderal species. The dominant plant lifeforms are herbaceous. Implementation of active restoration activities observed include installation of appropriate native canopy species, supplemental planting of appropriate native groundcover species, and treatments to eliminate and control invasive exotics plants. The progress of specific practice implementation combined with assurances for perpetual maintenance indicates that the restoration potential of the site is very good.

## TABLE OF CONTENTS

---

|   |           |
|---|-----------|
| <b>EXECUTIVE SUMMARY .....</b>                            | <b>ii</b> |
| <b>1.0 INTRODUCTION.....</b>                              | <b>1</b>  |
| 1.1 PURPOSE AND SCOPE.....                                | 1         |
| 1.1.1 Purpose.....  | 1         |
| 1.1.2 Scope.....  | 1         |
| 1.2. NATURAL SETTING OF THE YELLOW RIVER RANCH SITE ..... | 3         |
| 1.2.1 Physiography and Climate .....                      | 3         |
| 1.2.2 Soils.....  | 7         |
| 1.2.3 Vegetation .....                                    | 10        |
| 1.2.4 Anthropogenic Impacts .....                         | 16        |
| <b>2.0 METHODS .....</b>                                  | <b>17</b> |
| 2.1 FIELD METHODS .....                                   | 17        |
| 2.1.1 Linear Quantitative Transects .....                 | 21        |
| 2.1.2 Belt Quantitative Transects.....                    | 22        |
| 2.1.3 Qualitative Transects .....                         | 22        |
| 2.1.4 Panoramic Photographs .....                         | 23        |
| 2.1.5 Additional Observations .....                       | 23        |
| 2.2. ANALYTICAL METHODS .....                             | 31        |
| 2.2.1 Statistical Methods for Linear Transects .....      | 31        |
| 2.2.2 Relative Coverage.....                              | 31        |
| 2.2.3 Relative Density.....                               | 31        |
| 2.2.4 Relative Frequency .....                            | 31        |
| 2.2.5 Importance Value.....                               | 31        |
| 2.2.6 Statistical Methods for Belt Transects .....        | 32        |
| 2.2.7 Number of Trees/Acre .....                          | 32        |
| <b>3.0 DATA AND OBSERVATIONS.....</b>                     | <b>32</b> |
| 3.1 QUANTITATIVE DATA .....                               | 32        |
| 3.2 QUALITATIVE DATA .....                                | 39        |
| 3.3 PHOTOGRAPH POINT DATA .....                           | 40        |
| <b>4.0 RESULTS AND DISCUSSION .....</b>                   | <b>40</b> |
| <b>5.0 CONCLUSIONS AND RECOMMENDATIONS.....</b>           | <b>42</b> |
| <b>6.0 REFERENCES.....</b>                                | <b>44</b> |

---

|                                 |           |
|---------------------------------|-----------|
| <b>LIST OF FIGURES .....</b>    | <b>iv</b> |
| <b>LIST OF APPENDICES .....</b> | <b>v</b>  |

## LIST OF FIGURES

---

- Figure 1. General Location Map
- Figure 2. Ward Basin, FL Quadrangle, USGS 7.5 Minute Series 1994
- Figure 3. USDA-NRCS Soil Survey Map, Soil Survey of Santa Rosa County, Florida. 2004
- Figure 4. Current FLUCCS Map
- Figure 5. Target FLUCCS Map
- Figure 6. Vegetative Communities Correlated to Soils
- Figure 7. Harold FLA Quadrangle, USGS 15 Minute Series 1938
- Figure 8. Transect Locations
- Figure 9. Transect Locations and Current FLUCCS
- Figure 10. Transect Locations and Target FLUCCS
- Figure 11. 1940 Aerial Photograph
- Figure 12. 1974 Aerial Photograph
- Figure 13. 1999 Aerial Photograph
- Figure 14. 2010 Aerial Photograph
- Figure 15. 2012 Aerial Photograph

## **LIST OF APPENDICES**

---

Appendix A. Qualitative Data Sheets

Appendix B. Panoramic Photographs

Appendix C. Quantitative Monitoring Plot Photographs

## 1.0 INTRODUCTION

### 1.1. Purpose and Scope

#### 1.1.1 Purpose

The Yellow River Ranch Mitigation Area (YRR) is located on the floodplain of the Yellow River in Santa Rosa County, Florida. The 275 acre tract was acquired by the Northwest Florida Water Management District (NFWFMD) in December 2005 specifically for use as mitigation to offset current and future Florida Department of Transportation (FDOT) wetland impacts. The goal of the mitigation is to preserve and protect intact bottomland forest and restore disturbed portions of the site to natural conditions. Restoration activities include breaching of dikes and ditch plugging, prescribed fire, herbicide treatment, and planting native species. One hundred and fifty five acres of bottomland forest preservation and restoration of 55 acres are mitigation for a U.S. Army Corps of Engineers permit associated with State Road 87 wetland impacts. Additional mitigation credit is available from the restoration of an additional 65 acres of prior converted wetlands. The purpose of this study is to obtain data that reflect the current vegetative condition. The data is reported to document permit compliance and is used for a reference by which the success of future restoration efforts is assessed.

#### 1.1.2 Scope

The scope of this study is ecological monitoring in specific habitats and preparation of a report that summarizes the results of the data obtained during the monitoring activity. Critical evaluation allows the determination of current landscape scale conditions as reflected in the dominant species, species richness, invasive exotic plants, and plant lifeforms (herbs, vines, shrubs, and strata in the canopy). The monitoring data is used in the selection of appropriate restoration and management strategies, measurement of the success of implemented restoration practices, evaluation of trends in landscape responses to management, selection of future adaptive management strategies, and adherence to and completion of regulatory permit conditions.

For this study, field maps are prepared that depict prior habitat mapping and other pertinent spatial data including the most recent aerial photographs (2010 and 2012) and spatial data intersections. A review is conducted to evaluate existing habitat mapping and data intersections to select locations of 2 quantitative linear/quadrat sampling transects, 4 quantitative belt transects, and 1 qualitative transect. The goal for choosing the habitat evaluation sites is to select areas for the linear/quadrat quantitative transects that are not within ecotones and that are likely to represent the most acceptable example of the central concept for the habitats that are monitored. The goal for locating the belt transects is to sample a representative area that was planted with native wetland tree saplings. Qualitative transect locations are selected based upon habitats depicted in the existing

FLUCCS maps and areas of interest with respect to restoration management activities. Specifications of habitat and transect types and numbers provided by the Water Management District are in Table 1 below.

**Table 1: Yellow River Ranch Monitoring Scope by Activity**

| Project Name       | Transect/Activity Type          | Polygon Descriptor          | Number of Transects |
|--------------------|---------------------------------|-----------------------------|---------------------|
| Yellow River Ranch | Pedestrian Transect/Qualitative | 625 – Hydric Pine Flatwoods | 1                   |
| <b>Total</b>       |                                 |                             | <b>1</b>            |
| Yellow River Ranch | Quantitative Transect 150'      | 625- Hydric Pine Flatwoods  | 2                   |
| <b>Total</b>       |                                 |                             | <b>2</b>            |
| Yellow River Ranch | Belt Transect 20' X 150'        | 621 - Cypress               | 2                   |
| Yellow River Ranch | Belt Transect 20' X 150'        | 615 - Bottomland            | 2                   |
| <b>Total</b>       |                                 |                             | <b>4</b>            |

The data in this table was provided by the Northwest Florida Water Management District.

The locations for each of the transects are depicted on maps and submitted to the Water Management District for approval. Following approval, each of the transect sites is assessed in the field. The transect locations and paths are adjusted slightly in the field to assure that each selection is appropriate for accomplishing the goals of monitoring. Each linear/quadrat transect is staked at either end with half inch, 5 foot galvanized stake. Each belt transect is staked at each corner. The location of each stake is recorded with a GPS.

For each quantitative transect, a metal stake was placed at the terminus of the linear/quadrat transect. At each sample point, a meter square grid or quadrat is placed on the ground to demarcate the sample area. Coverage for each species, bare ground, and open water is determined and recorded. Each tree sapling is identified and measured for height and the health of each tree is assessed in each belt transect. Each sample point is photographed with the quadrat in place. A representative point is selected and located with a GPS to obtain a 360 degree (panoramic) photograph of the landscape.

For each qualitative transect, a metal stake is placed at a representative observation point. The representative observation point is subjectively selected after traversing the entire route of the qualitative transect. At the observation point, a panoramic photograph and a

qualitative assessment of site conditions are obtained. The qualitative assessment includes wildlife observations, fuel load estimation, presence of threatened and endangered species and other ecological and/or management notes. A standard qualitative assessment form was utilized to record data at each observation point. During the pedestrian survey through the selected habitats, all plant species encountered in each mapped FLUCCS unit was recorded until no new species were encountered for a time interval that is not less than 3 minutes.

For each belt transect, two permanent 20' X 150' belts are positioned in each of two representative plant communities selected. All belt transects are marked at each corner with metal stakes and labeled. In each belt transect all living tree seedlings are identified, counted and height is measured. The health of each sapling is also determined by inspecting leaf condition and noting if the sampling had active growth in the current growing season.

Following completion of the field assessment, data was summarized and parameters were calculated. For the 150' linear/quadrat quantitative transects, the percent cover, frequency and density for each species, bare ground and open water coverage, and nuisance or invasive exotic species was determined. A summary of species richness was determined for all transects. For the 20' X 150' belt transects, the number of tree saplings per acre was determined.

This report includes observations, photographs, calculations and data summaries, maps, plant species lists, and completed qualitative data forms. Percent cover and occurrence is depicted graphically in pie charts. Additional pertinent information about the nature of the Yellow River Ranch Site is provided in Section 1.2 of this report. New spatial data created for the assessment, including GPS points, is provided as shapefiles in a digital addendum to the report.

## **1.2 Natural Setting of the Yellow River Ranch Site**

### **1.2.1 Physiography**

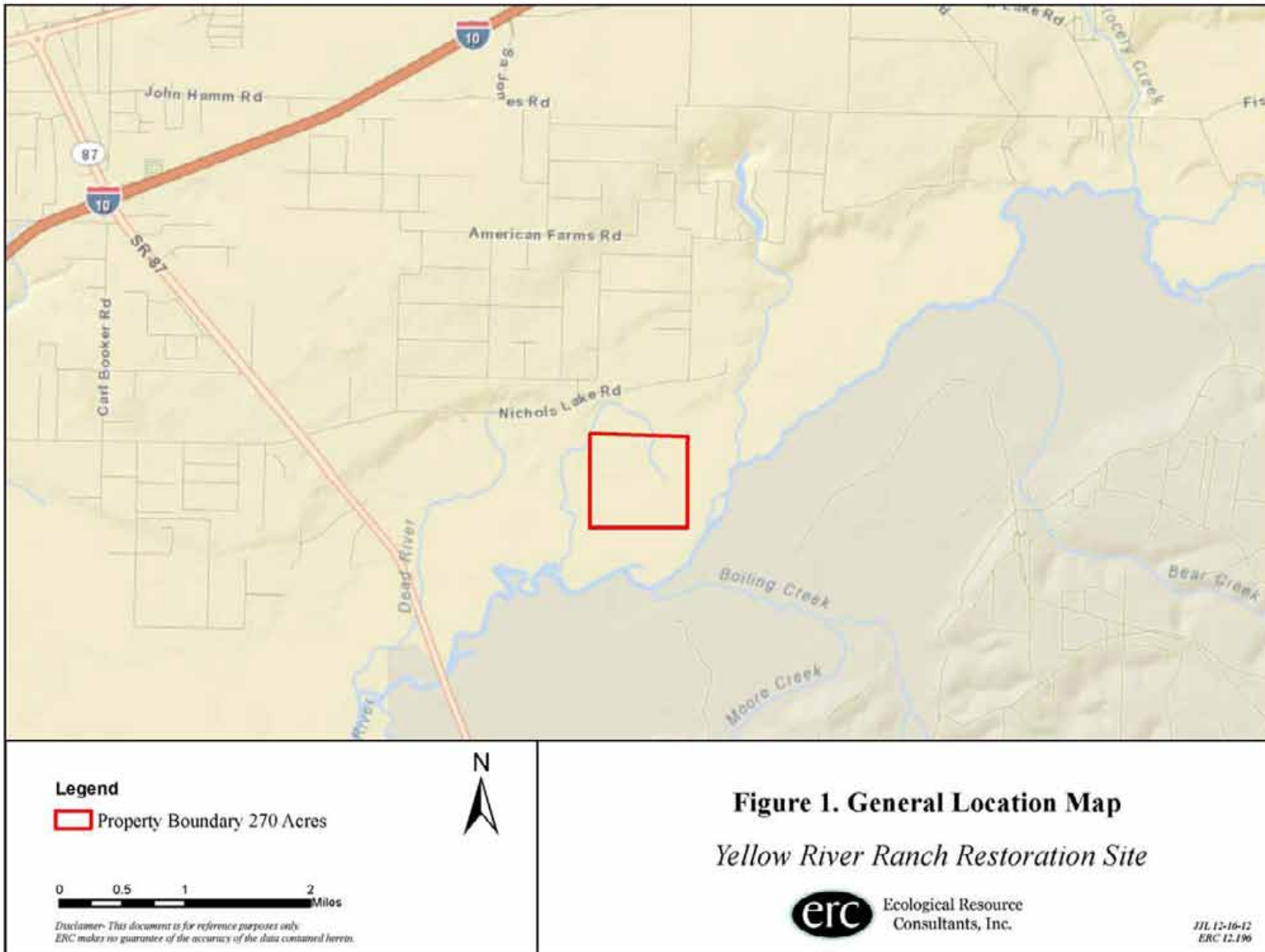
The Yellow River Ranch Restoration site is located in Santa Rosa County, approximately 1.5 miles east of SR 87 in Section 13, Township 1 North, Range 27 West (Figure 1). The matrix of the tract is intact bottomland forest that is contiguous with bottomland forest on the Yellow River alluvial plain. The former pastureland lies on a low erosional terrace that slopes gently to the south and west from the adjacent uplands to the north. Although the low terrace is on the floodplain and floods frequently, the origin of the parent material of terrace soils is not recent alluvium (Weeks et.al., 1980). North of the property boundary, the 100 Year Flood Zone extends to a line that corresponds approximately with

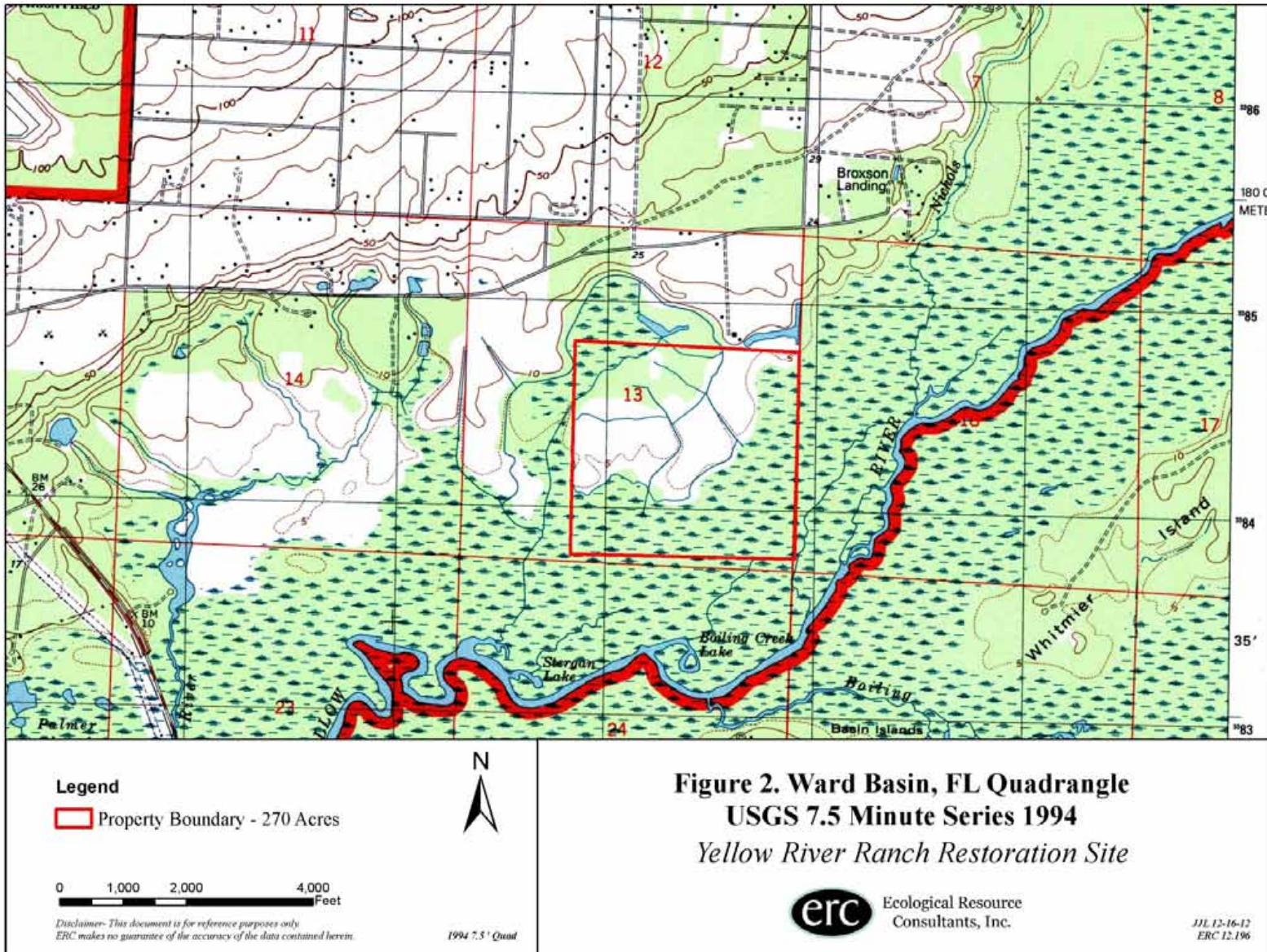
the 20 foot contour above which a river-parallel escarpment rises. The escarpment is abrupt at some points west and east of the tract but is broad and gradual near the restoration area.

When the Yellow River Ranch was acquired by the Water Management District, approximately 155 acres of the site remained in mostly undisturbed forested wetlands (Bottomland Forest, FLUCCS 615). Approximately 120 acres of floodplain habitat had previously been converted to Pasture (FLUCCS 211). Based upon an analysis of soil survey data, topographic maps and historic aerial photographs, the pasture land was likely a mosaic of less frequently flooded wetlands such as Hydric Pine Flatwoods (FLUCCS 625) prior to conversion. A summary of plant communities and habitat restoration goals is provided in Table 4.

Santa Rosa County averages approximately 65 inches of rain per year, with approximately 45 percent of the precipitation falling in the rainy season from June to September. October is typically the driest month of the year. The climate is humid-temperate, with average monthly temperatures ranging from 54°F in January to 81°F in August. (Weeks et.al. 1980)

The Yellow River Ranch Restoration site is located within the Pensacola Bay System watershed, on the floodplain of the Yellow River. The Yellow River has a basin that is approximately 1,334 square miles and extends from the site location in Santa Rosa County through Okaloosa and Walton Counties, Florida and into south Alabama. (NFWFMD, 2008) Many drainage ditches of varying size were constructed throughout the pasture land. Levees were constructed to prevent flooding of the pasture land between the bottomland and the low erosional terrace along the south and east boundaries of the pasture. Drainage ditches breach the levees at two locations.





### 1.2.2. Soils

This section describes soil conditions at the Yellow River Ranch Restoration Site and provides an update to soils information discussed in the Revised Mitigation Plan (NFWFMD, 2011). Soil, as used in this report, is defined as the uppermost layers of the surface of the earth to a depth of 6 feet or more. Soil is the most biologically active component of the planet's geology and thereby significantly affects the plant community that is supported at any given location. Soil Morphology refers to characteristics of the soil that formed from or were inherited from the parent material and that can easily be observed. The primary morphological units in soils are layers called horizons. Different types of soil horizons characterize soil conditions that can affect plant growth and other land uses.

All soils data and information in this report complies with the standards of the USDA-NRCS Soil Survey Program. Soil surveys have been produced by the US Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) for most counties in the United States. The Soil Survey of Santa Rosa County, Florida was published in 1980 at a map scale for detailed soil survey maps of 1:20,000 (Weeks et.al., 1980). The Survey data is updated by NRCS periodically and the most recent update indicated by the metadata for the digital soil survey data was performed in 2010. Soil survey map unit names have been changed since the original publication in 1980.

The entity that is delineated by soil scientists and is depicted on the soil survey maps is called the map unit. The map unit is typically comprised of one soil series (identified by geographic names such as Lynn Haven or Leon) but may contain several soils series or even components of non-soil such as urban land or water. Map units are identified by a numeric or alpha numeric symbols, the soil series name, the typical topsoil texture, and other information reflecting the geomorphic position where the soil is typically identified and mapped. In the map unit descriptions below, 29-Mulat loamy fine sand is an example of the map unit symbol and name.

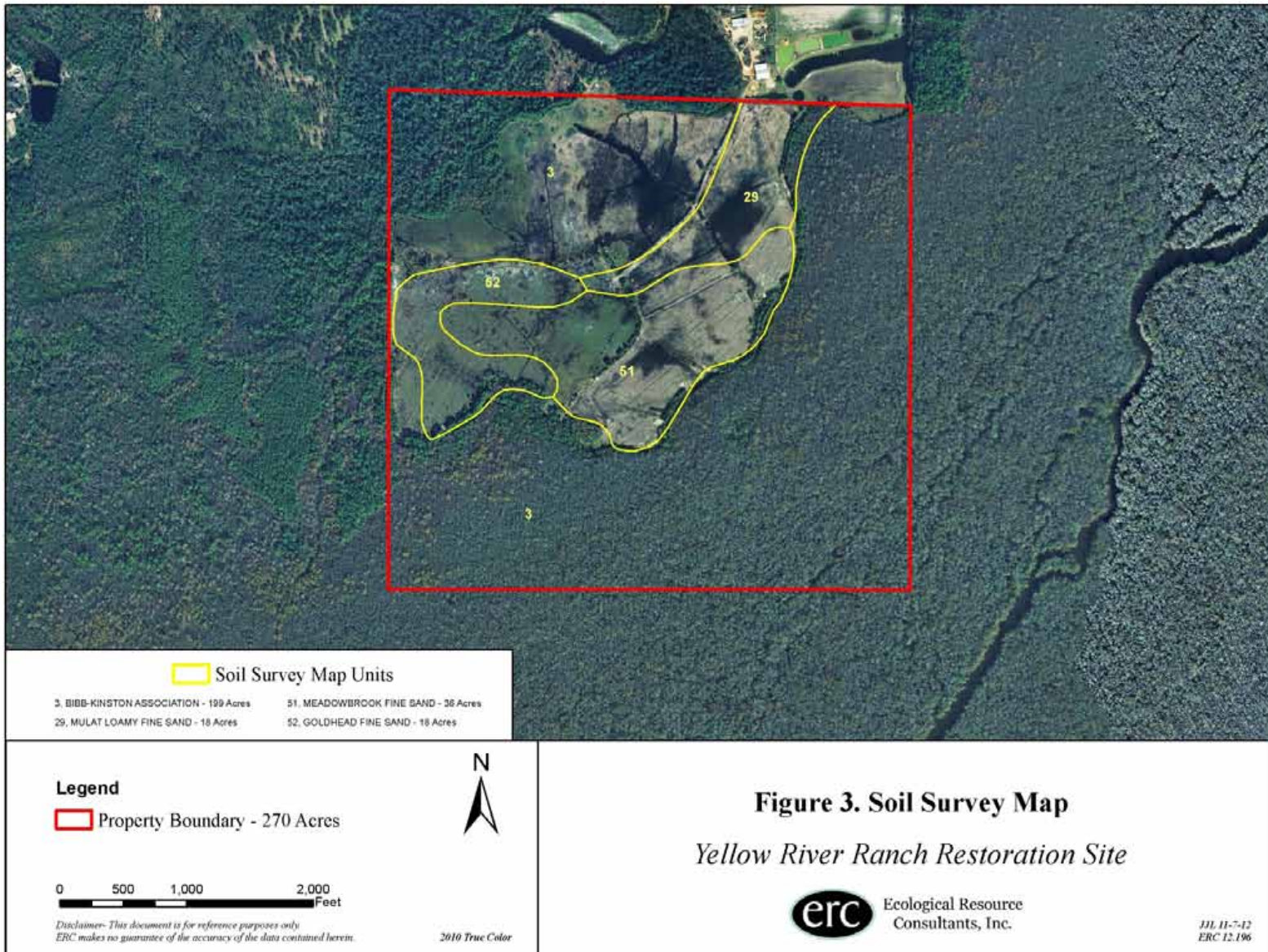
Soil series are distinguished from each other by their classification in Soil Taxonomy. Most of the soils at the Yellow River Ranch site vary primarily by the parent material, the thickness of sandy epipedons versus depth to fine texture subsoils or C horizons, and the degree of soil profile development. All of the soil survey map units at the Yellow River Ranch site are associated with wetlands hydrology and plants, and are described with 90 percent or greater hydric components.

The parent material of soils on the Yellow River Ranch site is recent alluvium on soils of the intact forested bottomlands and near shore deposits in the soils of the low erosional terrace occupied recently by pasture lands. Water tables in most soils fluctuate seasonally in response to rainfall, evaporation and transpiration (water used by photosynthesizing plants), and tides in coastal areas. The shallowest depth to sustained saturation is called the depth to seasonal high saturation/inundation or seasonal high water table (SHWT). In Santa Rosa County, the seasonal high water table is typically observed in the later winter months during years of normal precipitation amounts and

distribution. Water tables also rise during the summer thunderstorm season or at other times in response to prolonged heavy rains. Subaqueous water tables are present in shallow water bodies and represent permanent inundation. Subaqueous soils were not mapped nor distinguished from water in the Soil Survey of Santa Rosa County, Florida. Flooding is defined as the temporary inundation of an area caused by overflowing streams, runoff from adjacent slopes, or by tides. The depth of water during floods does not necessarily correlate with the depth of soil water tables and water tables can be above the soil surface even during periods when local rivers and streams are below flood stage.

The dominant soil types on the Yellow River Ranch site are poorly drained Fluvaquents and Fluvaquentic intergrades. (Weeks et.al.,1980). These are the stratified alluvial soils of the bottomland forest in map unit 3, Bibb-Kinston Association. Bibb soils are sandier Fluvaquents and lack pedogenic development while Kinston soils are Fluvaquentic Inceptisols and have a higher subsoil clay content and sufficient pedogenic development in the A and B horizons to indicate that they are on more stable landforms less affected by fluvial erosion and deposition.

Poorly drained Alfisols and Entisols are mapped in three different map units on the low erosional terrace. These soil map units are all poorly drained and have thick sandy surfaces underlain by loamy subsoils. The Meadowbrook and Goldhead soils are Alfisols indicating that the loamy subsoils have a relatively high base saturation. Mulat soils are Ultisols and have relatively low base saturation in the loamy subsoil. The thickness of the sandy surface in the Goldhead and Mulat soils is 20 to 40 inches while the sandy surface thickness is greater than 40 inches in the Meadowbrook soils. All of the soil map units mapped on the low erosional terrace have a flooding frequency of “None” assigned by the Soil Survey data; however, the associated landforms on the Yellow River Ranch site have at least an occasional flooding frequency. The apparent discrepancy is likely caused by limitations of the soil survey mapping scale. (Figure 3).



**Table 2. Soil Survey Map Unit Data for the Yellow River Ranch Restoration Site**

| Map Unit | Map Unit Name             | Acres | Landforms                | Percent of Site | Drainage Class | Ecological Community    |
|----------|---------------------------|-------|--------------------------|-----------------|----------------|-------------------------|
| 3        | Bibb-Kingston association | 199   | Floodplain               | 73              | Poorly Drained | Bottomland Hardwoods    |
| 51       | Meadowbrook fine sand     | 36    | Flats on Marine Terraces | 13.5            | Poorly Drained | North Florida Flatwoods |
| 29       | Mulat loamy fine sand     | 18    | Flats on Marine Terraces | 6.75            | Poorly Drained | North Florida Flatwoods |
| 52       | Goldhead fine sand        | 18    | Flats on Marine Terraces | 6.75            | Poorly Drained | North Florida Flatwoods |

1. 26 Ecological Communities of Florida. Soil Conservation Service, 198x.

2. Soil Survey data from Soil Survey of Santa Rosa County, Florida Update. NRCS. Accessed December, 2012.

### 1.2.3. Vegetation

Habitat mapping for the Yellow River Ranch Revised Mitigation Plan from April 22, 2011, was conducted using the Florida Land Use Cover Classification System (FLUCCS). Habitat descriptions and maps for existing conditions prior to commencement of restoration efforts and restoration goals were prepared using data from the Yellow River Ranch Revised Mitigation Plan (NFWFMD, 2011) and from spatial data obtained from the NFWFMD. (Figures 4 and 5)

Prior to commencement of restoration efforts, the FLUCCS wetland habitats mapped at the Yellow River Ranch Site were Bottomland (615) and Improved Pasture (211). Restoration targets for the pasture lands are Bottomland (615)/Mixed Forested Wetland (630), Cypress (621), Hydric Pine Flatwoods (625/626) and Non-Forested Wetlands (640). Bottomland habitat will also be preserved at Yellow River Ranch site.

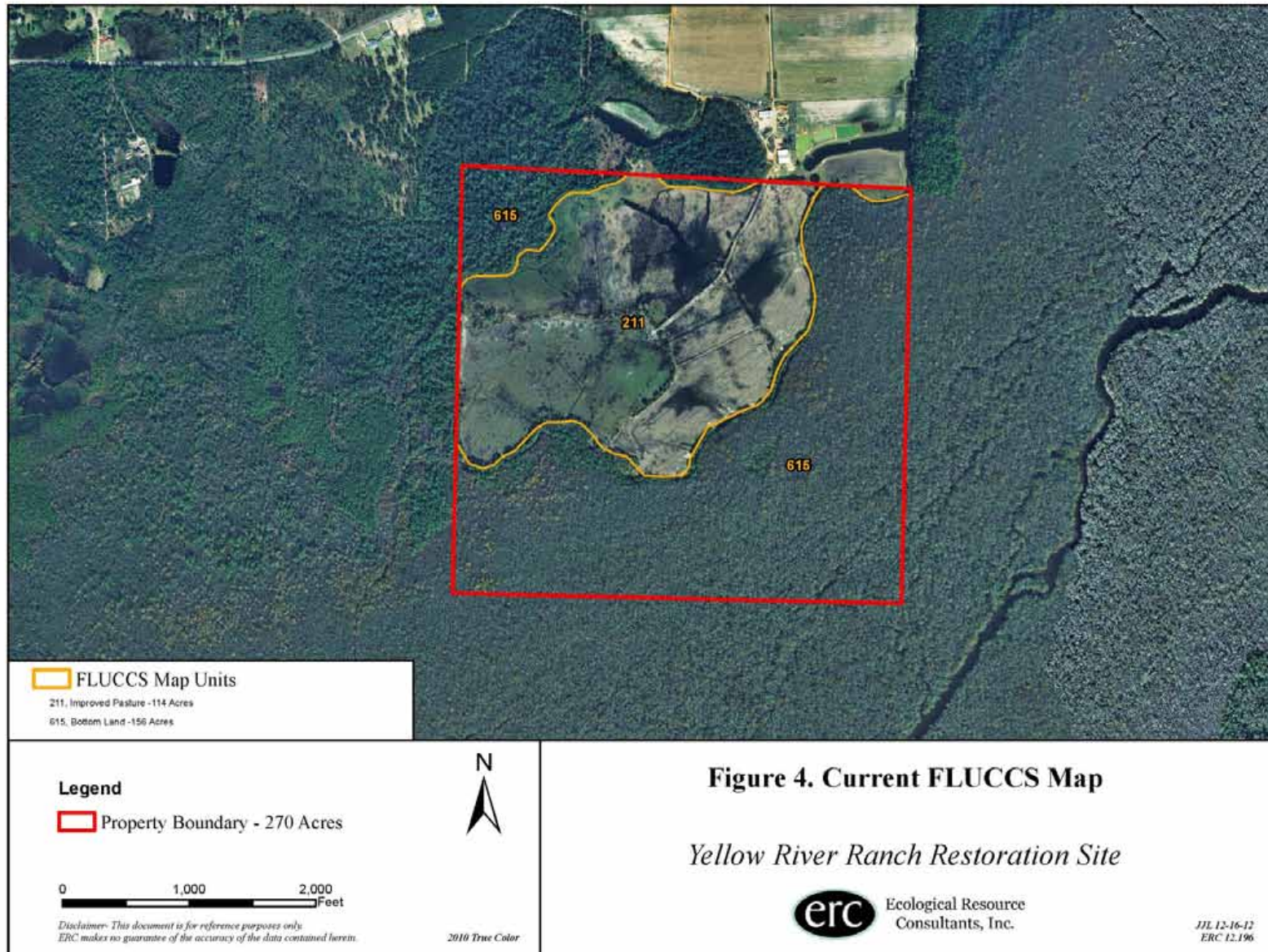
Numerous classification systems have been used in Florida to describe habitats often with a different focus and purpose. Habitats correlated with USDA-NRCS Soil Survey mapping for example are shown above in Table 3 for the Yellow River Ranch Restoration Site using the 26 Ecological Communities of Florida system. This classification system correlates soil conditions with vegetative communities (Figure 6).

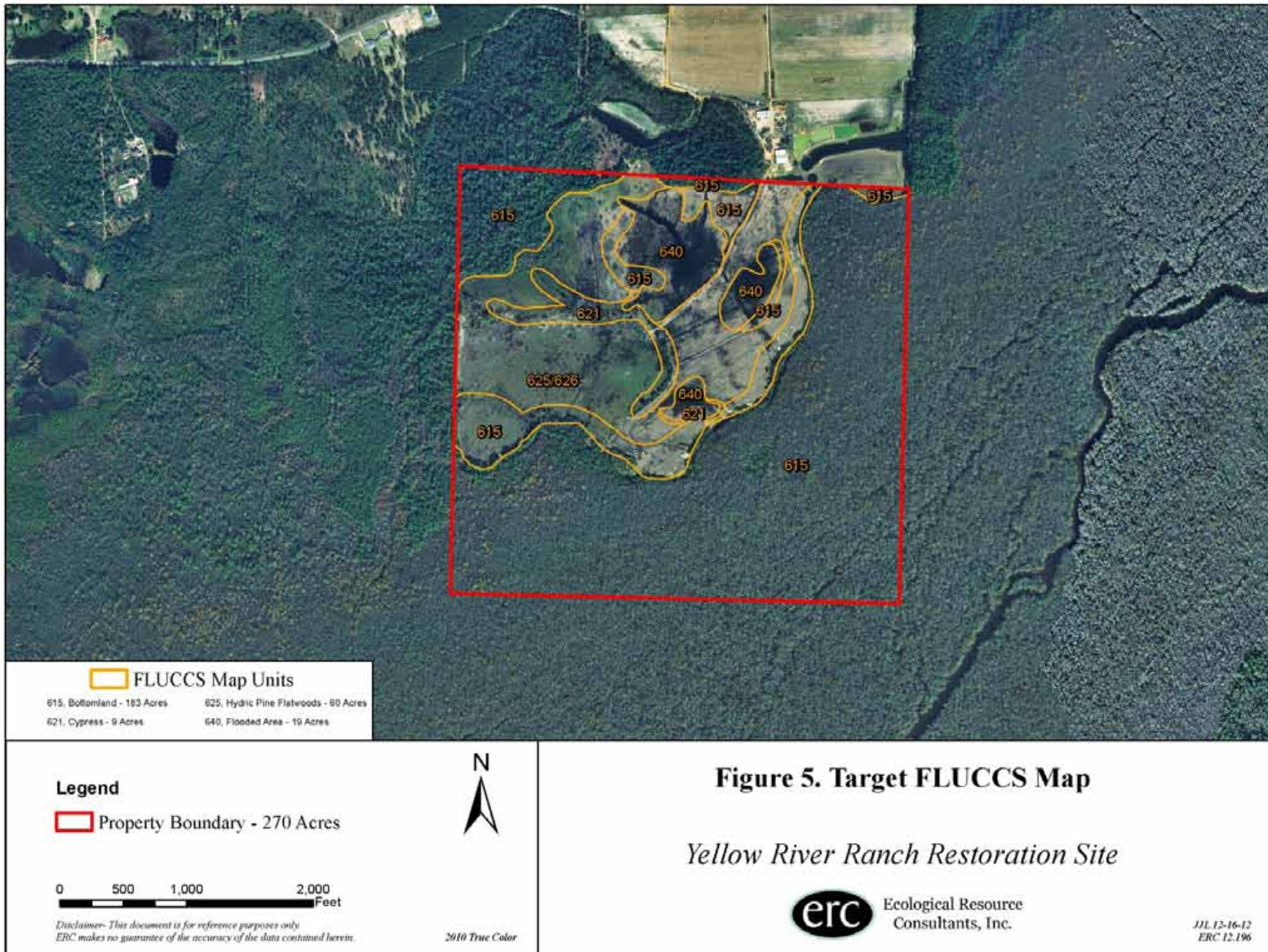
The NRCS system evolved from a rangeland classification system that was modified to portray ecological conditions of various soil properties and landforms. The Florida Natural Areas Inventory (FNAI) classification system has been favored by some restoration ecologists; however, neither the FNAI system nor the NRCS system emphasize land use to the extent utilized by the FLUCCS system. In 2009, the Florida Fish and Wildlife Conservation Commission published the results of an effort to correlate several habitat classification systems used in the state including FLUCCS, FNAI, and other classification schemes creating the Florida Land Cover Classification System (FLCCS). FLCCS is hierarchical and based primarily upon FLUCCS and attempts to incorporate FNAI habitats that could not be correlated into existing FLUCCS habitats. The FLCCS system does not consider the NRCS classification system and neither FLUCCS, FLCCS, nor FNAI systems correlate soil survey data with habitat types.

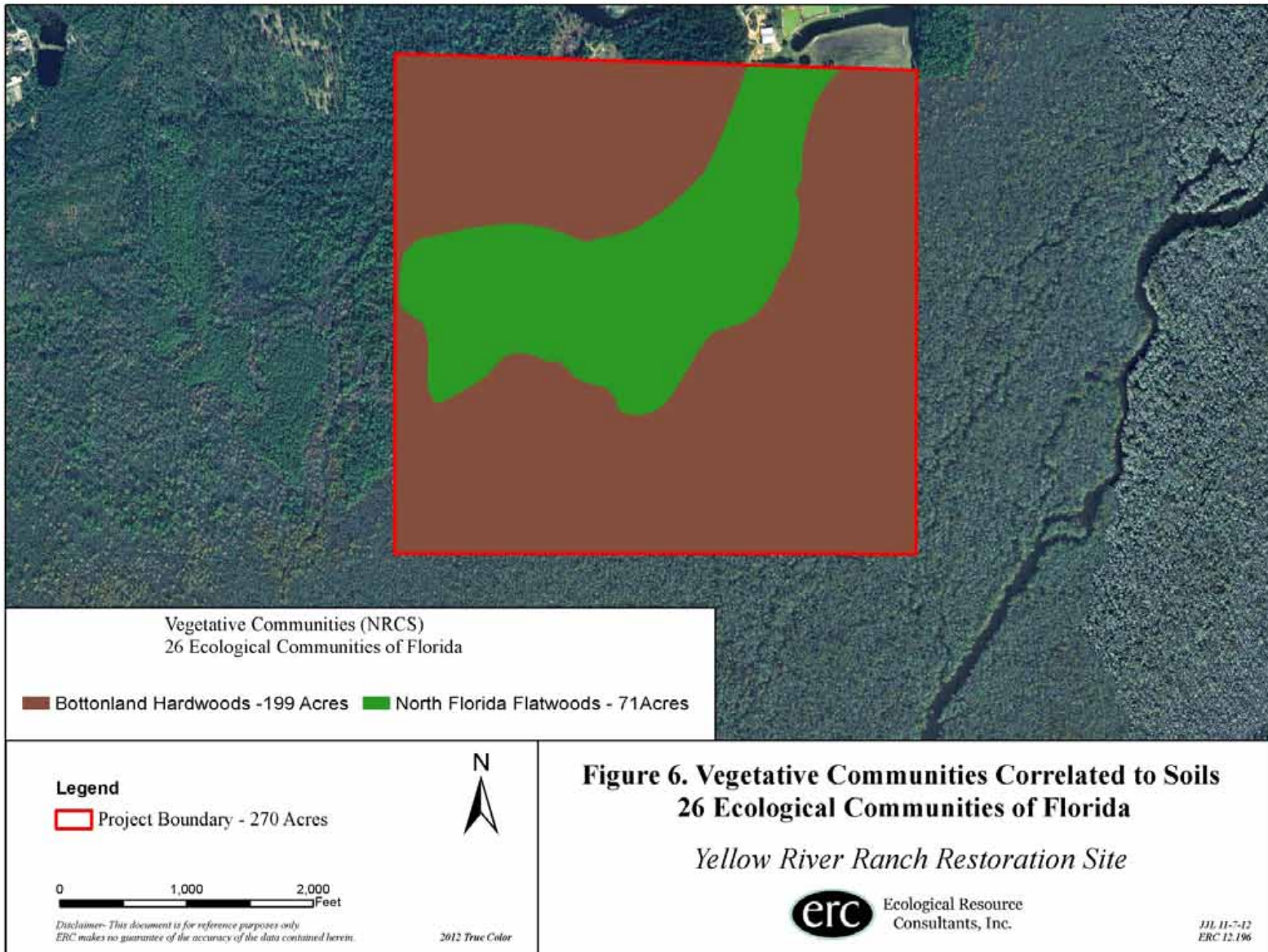
FLUCCS was used to characterize habitats at the Yellow River Ranch Restoration Site during planning and implementation and is therefore utilized in this report for consistency. FNAI is referenced for some habitats when it is useful to convey site conditions or restoration goals. NRCS soil survey data and classification from the 26 Ecological Communities of Florida is also provided for additional reference.

**Table 3: Existing FLUCCS Habitats**

| FLUCCS Habitat Descriptions and Acreages |  |
|--|--|
| Improved Pasture (FLUCCS 611), 120 Acres | <p>This non-forested wetland landscape includes most of the site landward of the floodplain of the Yellow River. A variety of successional wetland tolerant plant species dominates the groundcover. Historically these areas were occupied by Bottomland (615) and Hydric Pine Flatwoods/Savanna (625). Use as a pasture for many years, fire exclusion and hydrologic impacts created by large ditches have impacted the native vegetation on this site. Currently this landscape is recovering from many years of use as a pasture. The dominant plants include the following broomgrass (<i>Andropogon virginicus</i>), carpetgrass (<i>Axonopus furcatus</i>), caric sedge (<i>Carex</i> spp.), coinwort (<i>Centella asiatica</i>), toothache grass (<i>Ctenium aromaticum</i>), nut sedge (<i>Cyperus</i> spp.), witch grass (<i>Dicanthelium</i> spp.), poor joe (<i>Diodia virginica</i>), thoroughwort (<i>Eupatorium</i> spp.), rush (<i>Juncus</i> spp.), blackberry (<i>Rubus</i> spp.), bushy goldenrod (<i>Euthamia</i> spp.), water primrose (<i>Ludwigia</i> spp.), panic grass (<i>Panicum</i> spp.), meadow beauty (<i>Rhexia</i> spp.), goldenrod (<i>Solidago</i> spp.), beaksedge (<i>Rhynchospora</i> spp.) and lance-leaf violet (<i>Viola lanceolata</i>). The target is a landscape with large, scattered mature pines with a species rich groundcover that will carry fire across this landscape.</p> |
| Bottomland (FLUCCS 615), 155 Acres       | <p>This forested wetland community is mapped as the restoration target across a large portion of the property. Currently this landscape is recovering from many years of use as a pasture. The dominant plants include the following broomgrass (<i>Andropogon virginicus</i>), carpetgrass (<i>Axonopus furcatus</i>), caric sedge (<i>Carex</i> spp.), coinwort (<i>Centella asiatica</i>), toothache grass (<i>Ctenium aromaticum</i>), nut sedge (<i>Cyperus</i> spp.), witch grass (<i>Dicanthelium</i> spp.), poor joe (<i>Diodia virginica</i>), thoroughwort (<i>Eupatorium</i> spp.), rush (<i>Juncus</i> spp.), blackberry (<i>Rubus</i> spp.), bushy goldenrod (<i>Euthamia</i> spp.), water primrose (<i>Ludwigia</i> spp.), panic grass (<i>Panicum</i> spp.), meadow beauty (<i>Rhexia</i> spp.), goldenrod (<i>Solidago</i> spp.), beaksedge (<i>Rhynchospora</i> spp.) and lance-leaf violet (<i>Viola lanceolata</i>). The target is a landscape with large, scattered mature pines with a species rich groundcover that will carry fire across this landscape.</p>   |







The Florida Natural Area Inventory (FNAI) pre-restoration habitats at the Yellow River Ranch Site consist primarily of wetlands classified as Wet Flatwoods (FNAI 2010).

The focus for monitoring in this study is the pre-restoration habitat (land use) mapped as FLUCCS 211-Improved Pasture. Target restoration goals at the quantitative monitoring sites are FLUCCS 625-Hydric Pine Flatwoods, 615-Bottomland, 621-Cypress, and 640-Non-Forested Wetlands. The habitats are classified using FNAI descriptors as Wet Flatwoods. The landscapes that support these habitats are present on the majority of the site excluding the large area of intact Floodplain Forest.

Wet Flatwoods landscapes are typically forested lands with a canopy dominated by slash pine (*Pinus elliottii*). Pine density varies from 30 –60 trees/acre. The additional woody understory species are typically limited to low shrubby growth intermixed with a high diversity of herbaceous species. This low substrata and rich herbaceous layer is strongly influenced and maintained by a high frequency of natural fires which likely occurred over an area every 3-10 years historically and represents a fairly open landscape dominated by forbs and graminoids. The observed surviving constituents of the groundcover forbs and graminoids include: Toothache grass (*Ctenium aromaticum*), carpetgrass (*Axonopus furcatus*), coastal lovegrass (*Eragrostis virginica*), Flattop goldenrod (*Euthamia* spp.), beaksedge (*Rhynchospora* spp.), spadeleaf (*Centella asiatica*), lanceleaf violet (*Viola lanceolata*), meadow beauty (*Rhexia* spp.), partridgeberry (*Mitchella repens*), St Johns Wort (*Hypericum* spp.), and primrosewillow (*Ludwigia* spp). Additionally, there are a number of species commonly observed in wet flatwoods present in these areas which are also common in pastures, such as blackberries (*Rubus* spp.), broom grasses (*Andropogon* spp.), and thoroughworts (*Eupatorium* spp.)

#### **1.2.4 Anthropogenic Impacts**

The property comprising the Yellow River Ranch restoration areas is notably impacted by the past clearing of existing forest, construction of drainage ditches and levees, and conversion of the forested landscape to planted pasture as can be seen in historic aerial photographs.

The 1940, 1974, 1999 historic aerials depict an intensification of land use change throughout time. Drainage ditches were constructed before 1974. Portions of the site were converted to pasture prior to 1942 and the modern extent of improved pasture at the site was converted after 1974. The improved pasture was maintained until approximately 2005.

Landscape scale forest conversion to pasture lands, drainage ditch construction, grazing, maintenance of exotic pasture grass species such as Bahia grass (*Paspalum notatum*), and fire exclusion are significant anthropogenic factors that have altered this site from historic conditions and trajectories.

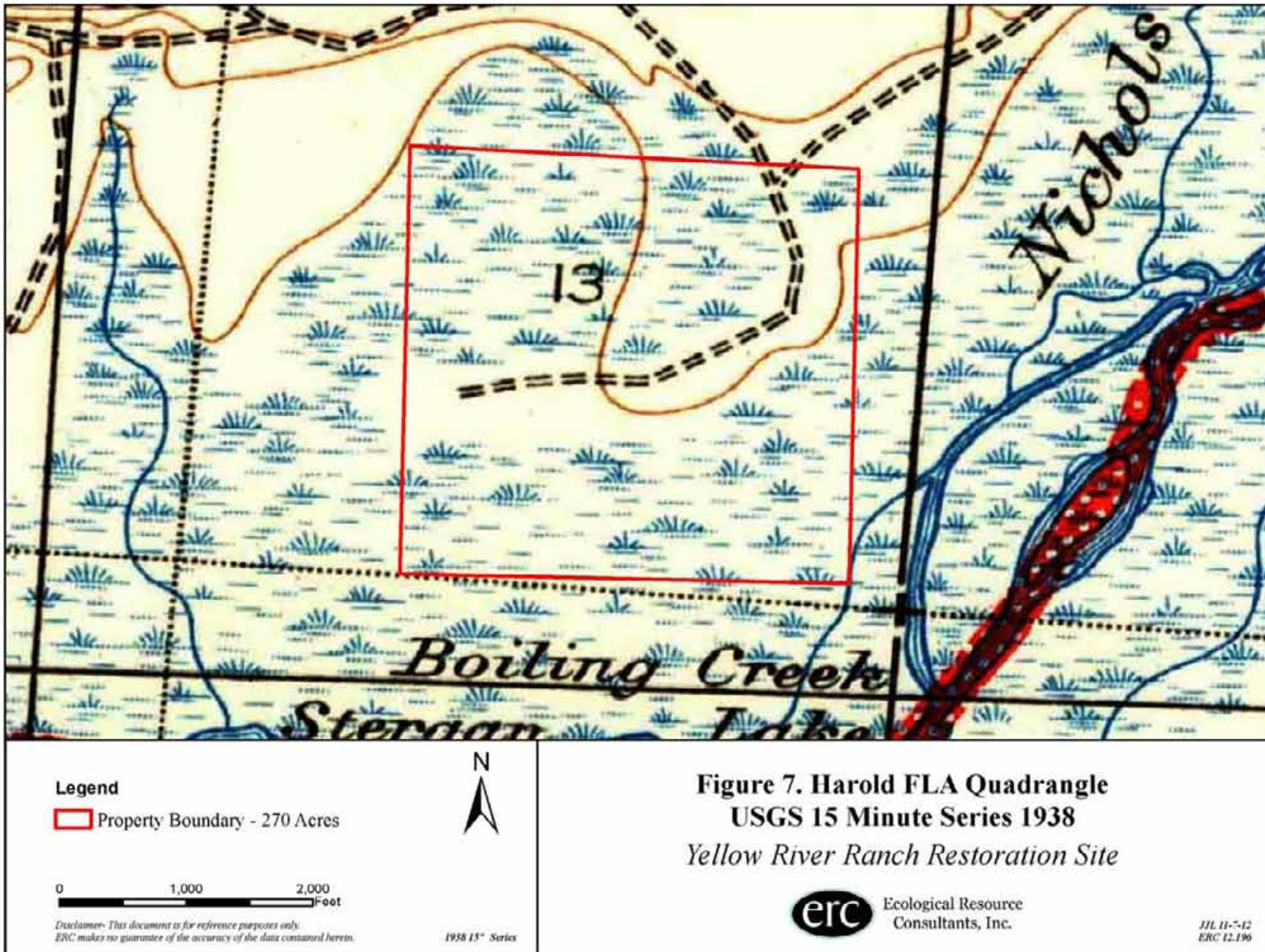
Functional lift for wetland mitigation at the Yellow River Ranch site is derived from 1) acquisition and perpetual preservation of the mitigation property, 2) cessation of cattle grazing, 3) filling and/or blocking drainage ditches, 4) breaching portions of the dike that impair hydrologic connection with the Yellow River floodplain, 5) eradication of non-native pasture grasses, 6) revegetation of former pastureland with bottomland hardwood forest and hydric pine flatwood species, 7) appropriate re-establishment of growing-season fire regime, and 8) long-term management including control of nuisance and exotic species. In areas of bottomland hardwood forest restoration, vegetation is planted that includes a mixture of Atlantic white cedar, possum haw, black gum, laurel oak, cypress and American elm. Areas that are to be restored as hydric pine flatwoods may be planted with a mixture of slash pine, cypress, myrtle leaf holly, wiregrass and other hydric flatwood species. Generally, areas at the Yellow River Ranch site with Bibb-Kinston Association soils will be restored as bottomland hardwood forest, whereas areas of Mulat Loamy Fine Sand soils will be restored as hydric pine flatwoods.

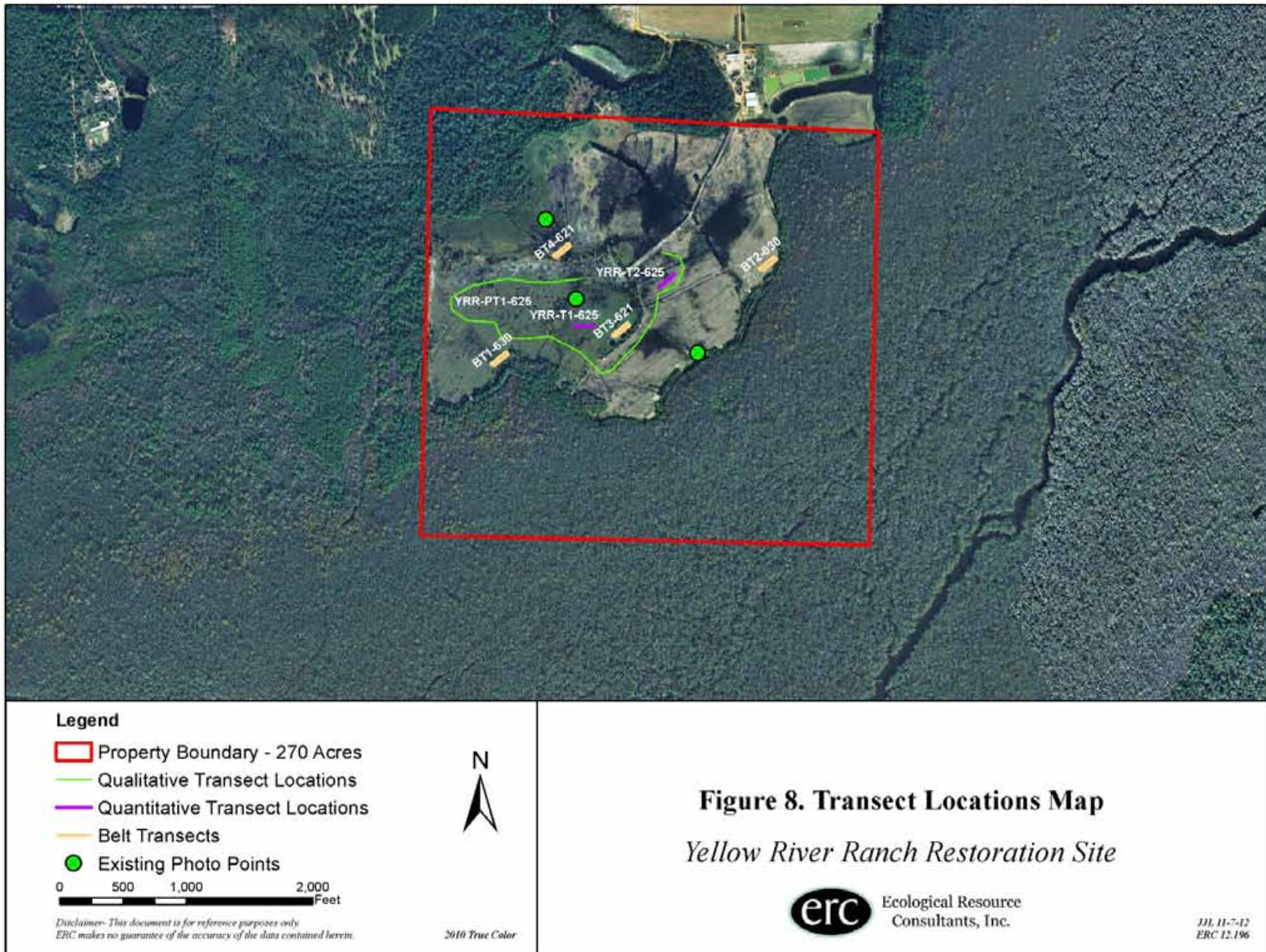
No structures appear on the Yellow River Ranch site in either aerial photographs or topographic maps (Figures 2 and 7) or historic photographs (Figures 11-15). An unimproved road traverses the pasture in the 1938 USGS Quadrangle.

## **2.0 METHODS**

### **2.1 Field Methods**

The location of all transects is depicted on Figure 8. A list of all the transect names appears in Table 4, Yellow River Ranch Transects, along with the current and target FLUCCS codes for each transect.





**Table 4: Yellow River Ranch Transects**

| <b>Transect Location</b>         | <b>Transect Type</b>   | <b>Transect Name</b> | <b>Current Polygon Descriptor (FLUCCS)</b> | <b>Target Polygon Descriptor (FLUCCS)</b> | <b>Number of Transects</b> |
|----------------------------------|------------------------|----------------------|--|---|----------------------------|
| Yellow River Ranch               | Pedestrian/Qualitative | YRRPT1-625           | 211- Improved Pasture                      | 625 - Hydric Pine Flatwoods               | 1                          |
| <b>Total Number of Transects</b> |                        |                      |  |   | <b>1</b>                   |
| Yellow River Ranch               | Quantitative Transect  | YRRT1-625            | 211- Improved Pasture                      | 625 - Hydric Pine Flatwoods               | 1                          |
| Yellow River Ranch               | Quantitative Transect  | YRRT2-625            | 211- Improved Pasture                      | 625 - Hydric Pine Flatwoods               | 1                          |
| <b>Total Number of Transects</b> |                        |                      |  |   | <b>2</b>                   |
| Yellow River Ranch               | Belt Transect          | YRRBT1-630           | 211- Improved Pasture                      | 621- Cypress                              | 1                          |
| Yellow River Ranch               | Belt Transect          | YRRBT2-630           | 211- Improved Pasture                      | 621- Cypress                              | 1                          |
| Yellow River Ranch               | Belt Transect          | YRRBT3-621           | 211- Improved Pasture                      | 615 – Bottomland (restoration)            | 1                          |
| Yellow River Ranch               | Belt Transect          | YRRBT4-621           | 211- Improved Pasture                      | 615 – Bottomland (restoration)            | 1                          |
| <b>Total Number of Transects</b> |                        |                      |  |   | <b>4</b>                   |

### 2.1.1 Quantitative Transects

Biological indicators are commonly used criteria for analyzing the value, health and restoration success of habitats. Indicators obtained from the monitoring methodology employed at the Yellow River Ranch Restoration Site include species diversity, relative cover, density and frequency for plant species. The sum of relative values (cover, density and frequency) is typically referred to as importance value. Ranking of plant species importance is used to describe the community structure, e.g. importance allows for discovery of dominant species, sensitive species and dominant lifeforms (i.e. herb, woody shrub, vine, or tree). Plant lifeform and community structure are typically measured in three plant strata: groundcover, shrub and canopy.

A summary of the measurements (importance, lifeform, diversity) for each plant community or habitat permits a critical evaluation of the landscape. The evaluation allows a determination of appropriate indicator species, species richness, invasive exotic plants and presence of appropriate lifeforms versus lifeforms indicative of a degraded landscape. Evaluations of the measurements are used to assist in the selection of the appropriate restoration and management strategies, determination of the successional landscape trending, the need for adaptive management strategies to enhance conditions for appropriate plant community structure, diversity and lifeforms; and successful adherence to and completion of regulatory permit conditions. The quantitative monitoring methodology includes the following steps:

*For measuring the Groundcover, Shrubs, and Vines a 150' linear transect with fifteen 1m X 1m quadrats will be employed:*

- a) Consultant and District Staff select polygons that are representative for Hydric Pine Flatwoods (FLUCCS 625), Cypress (621) and Bottomland (615).
- b) Establish two permanent 150' linear transects in each sampling polygon. Two 150' transects were established as representative sample areas within the polygon. All transects will be located and marked at each end with labeled metal stakes, and photographed for visual reference.
- c) Establish sample points every 10' per 150' transect. For each transect, the first sampling point is located at 10' and the final point is located at 150'. The configuration establishes a total of 15 points along the 150' transect.
- d) Measure and apply one 1m X 1m quadrat at each of the 15 points. Fifteen (15) quadrats are used to sample each transect. The methodology samples 15 square meters along each 150' transect.
- e) Photograph each sample point with the grid in place. A representative point is selected and located with a GPS to obtain a 360 degree (panoramic) photograph of the landscape.

f) Identify and estimate coverage for each species. All groundcover, shrub, and vine species are identified. Data collected for each plot includes species name, percent cover by species, percent bare ground, and notes. The total coverage of each species within the plot was estimated using the following percentage classes: 100%, 75%, 50%, 25%, 12%, 6%, 3%. The coverage classes represent successive divisions of the square by one-half (after 75%), and are readily and consistently applied in the field. Bare ground and/or open water is also recorded using the same coverage classes listed above.

### **2.1.2. Belt Transects**

Belt transects are used to measure the quantity and health of tree saplings and for this study, specifically the quantity and health of planted trees.

- a) Consultant and District Staff select polygons that are representative for Cypress (FLUCCS 621) and Bottomland (FLUCCS 615).
- b) Establish two permanent 20' X 150' belt transects in each polygon that are representative for Cypress (FLUCCS 621) and Bottomland (FLUCCS 615) for a total of four transects. All transects are located and marked at each corner with metal stakes, with one of the metal stake being labeled.
- d) Trees and saplings are located within the belt transect. Identify all trees and saplings, assign a height scale to all in the following increments: 0-1'; >1-2'; >2'-3'; >3'-4'; >4'-5'; >5'-6. Note overall health of plants qualitatively as healthy, growing, stunted and/or limited mortality.
- e) Tree species are recorded, along with a height class and the condition of the trees, for each belt transect.

### **2.1.3 Qualitative Transects**

The initial qualitative monitoring is conducted prior to implementation of restoration activities in the late summer/fall and annually thereafter for the duration specified in the permit. The length of the transect is variable and dependent upon the nature and size of the FLUCCS delineation that is being evaluated.

The monitoring is conducted by recording observations along the designated transect called the "walking path". Each walking path is designed to ensure maximal coverage of the selected plant community. The walking path is typically a loop for smaller ecosystem delineations and a line for larger ecosystem delineations. Approved transect locations are uploaded to a GPS unit to guide a walking traverse in the field. During the traverse, a record is maintained of species diversity and observations regarding overall ecosystem health and fecundity. Indications of wildlife usage and pertinent natural history notes are recorded. GPS locations are obtained for exotic invasive species and threatened and endangered species observed. Upon completion of the walking traverse, a

representative location is selected for monitoring. A permanent point is established at the selected monitoring location where data is collected annually. The permanent points are selected to represent the most typical condition of the specified habitat along the walking path. Each permanent point is marked with a 5 foot section of metal stakes.

The specific parameters observed and recorded at the observation point for all polygons include the following:

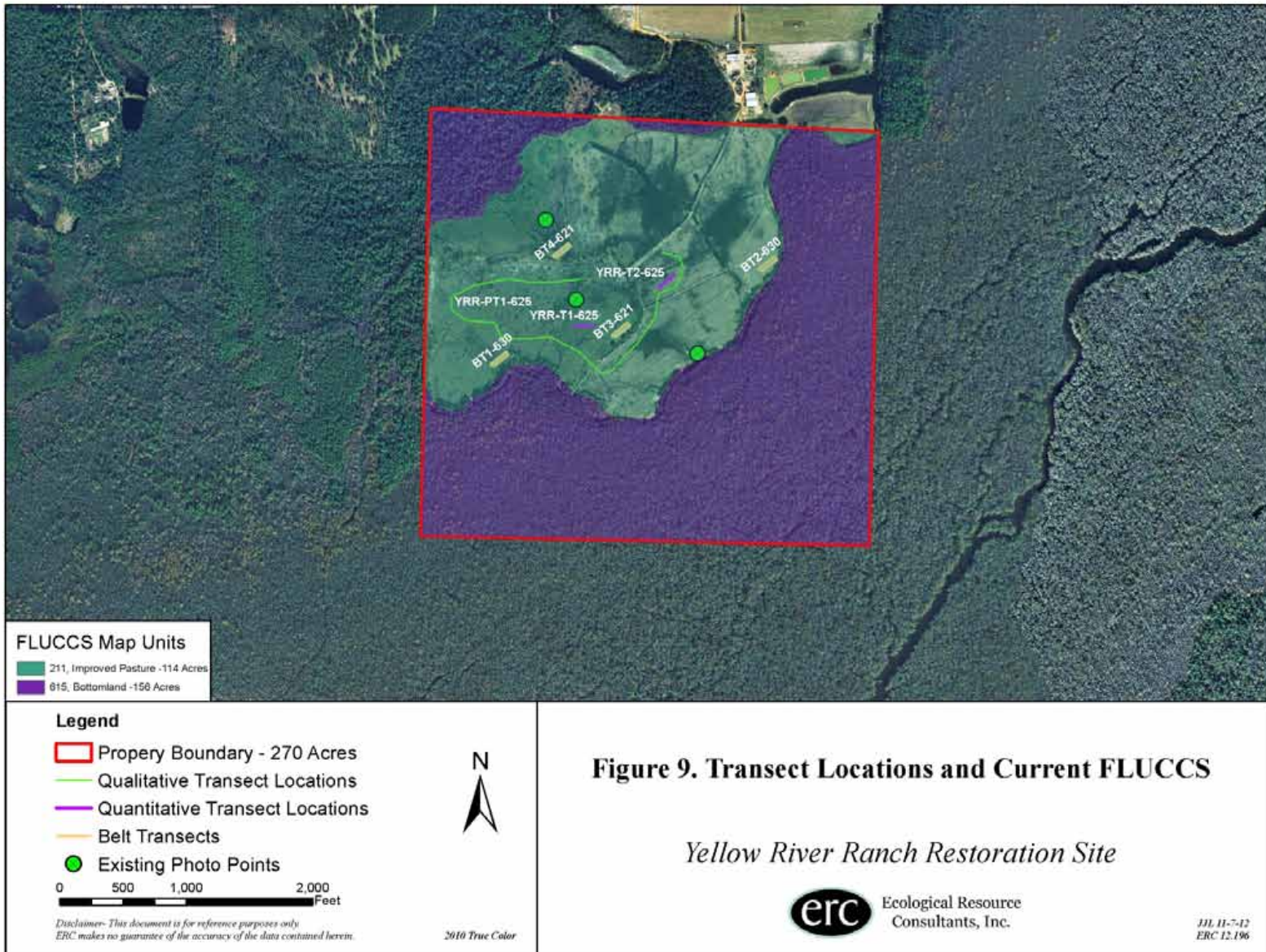
1. The type of plant community sampled.
2. The date, time and weather conditions.
3. An estimation of the aerial coverage of plants in the canopy, subcanopy and shrub strata and identification of the dominant species in the canopy, subcanopy and shrub strata.
4. An estimation of the coverage of graminoids (grasses, sedges and rushes) and total coverage of groundcover including graminoids and forbs, based on the following cover classes as per a modified Braun/Blanquet scale: 0-1%; 1-5%; 5-25%; 25-50%; 50-75%; 75-100%.
5. Identification of at least four dominant species in the groundcover.
6. Indications of wildlife usage and natural history including presence of any threatened or endangered species. Also note and obtain gps locations for threatened and endangered species observed at other points along the transect.
7. Identification of exotic species and estimated coverage of exotics as per Brower, et al., 1998. Also note and obtain gps locations for exotic invasive species observed at other points along the transect.
8. An estimation of the fuel load and aspects of the vegetative condition that might affect fire. Measure depth of litter and duff. Observe soil moisture conditions in upper 6 inches by inserting tiling spade into soil and using tactile method to determine moisture state.
9. A list of plant species encountered during the qualitative transect inspection.

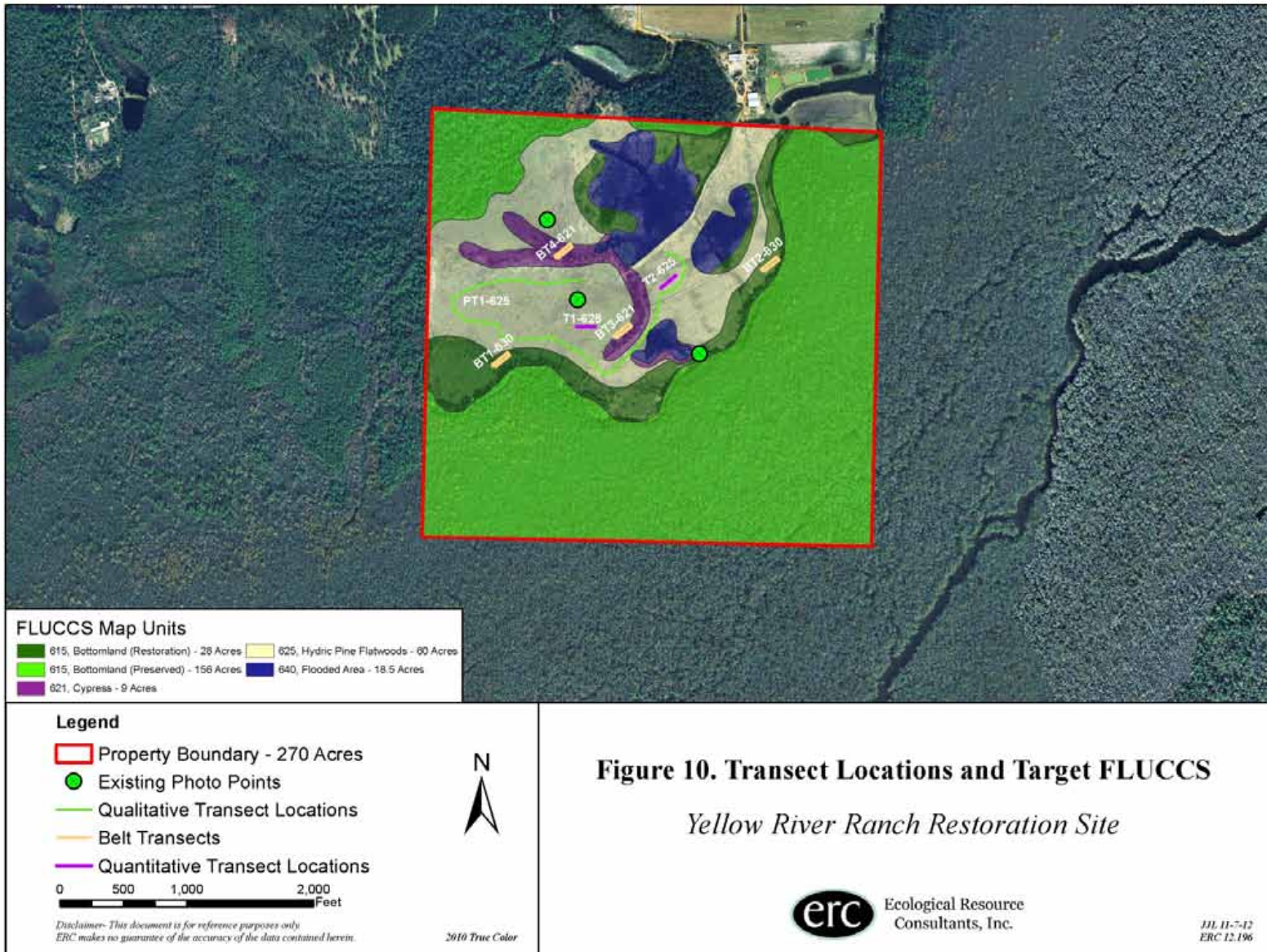
#### **2.1.4 Panoramic Photographs**

Representative photographs are obtained at specific locations for each quantitative and qualitative transect. The photographic documentation is a 360 degree panorama of the landscape at one end of the quantitative transect and at the representative data point for the qualitative transects. Photographic locations are depicted on Figures 9W, 9E, 10W, and 10E.

#### **2.1.5 Additional Observations**

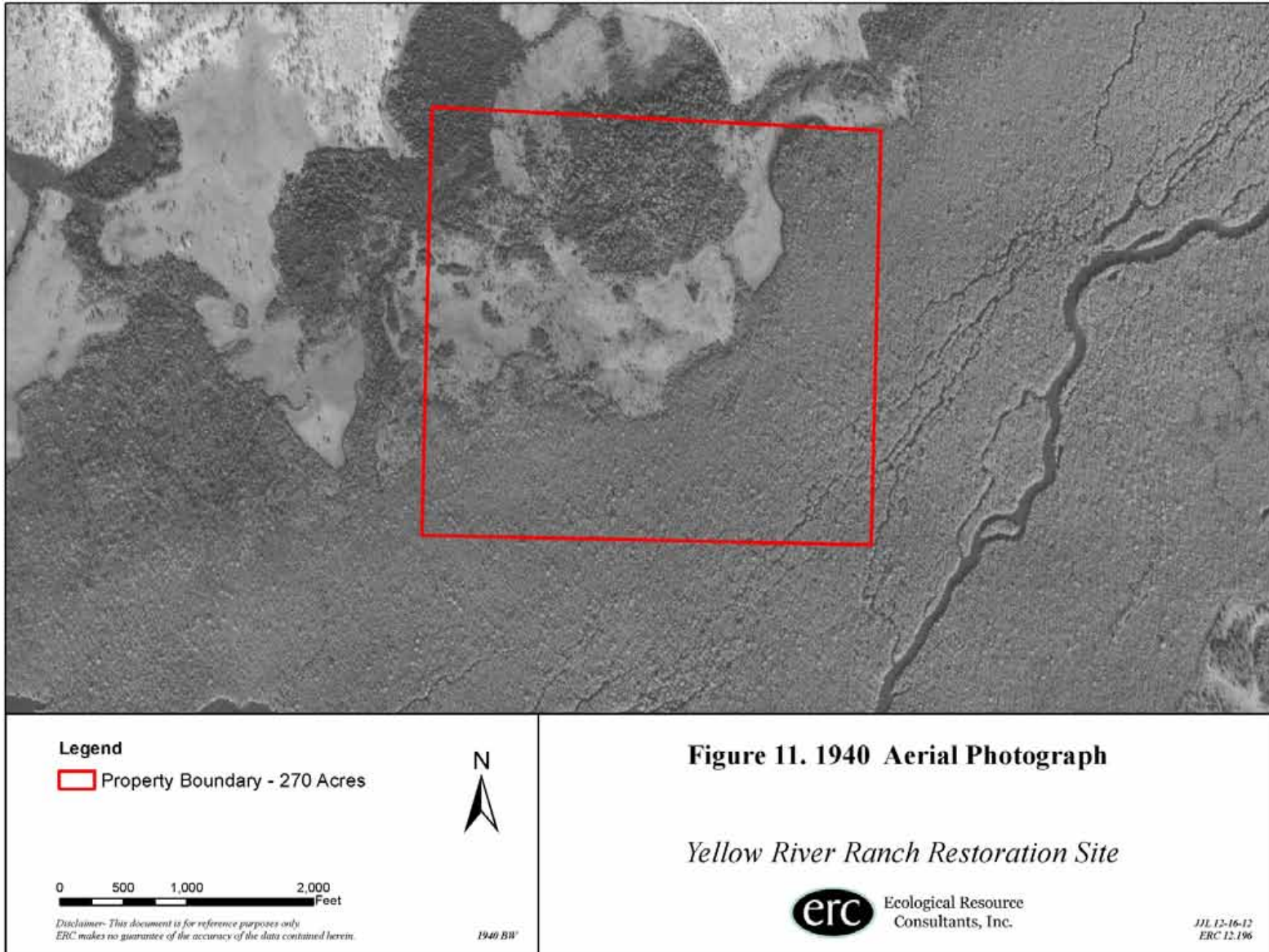
All incidental listed wildlife and botanical observations are recorded during site visits. Surveys are conducted concurrently with overall site assessments performed as part of quantitative and qualitative transect field work. No threatened or endangered species were observed during the site visit.

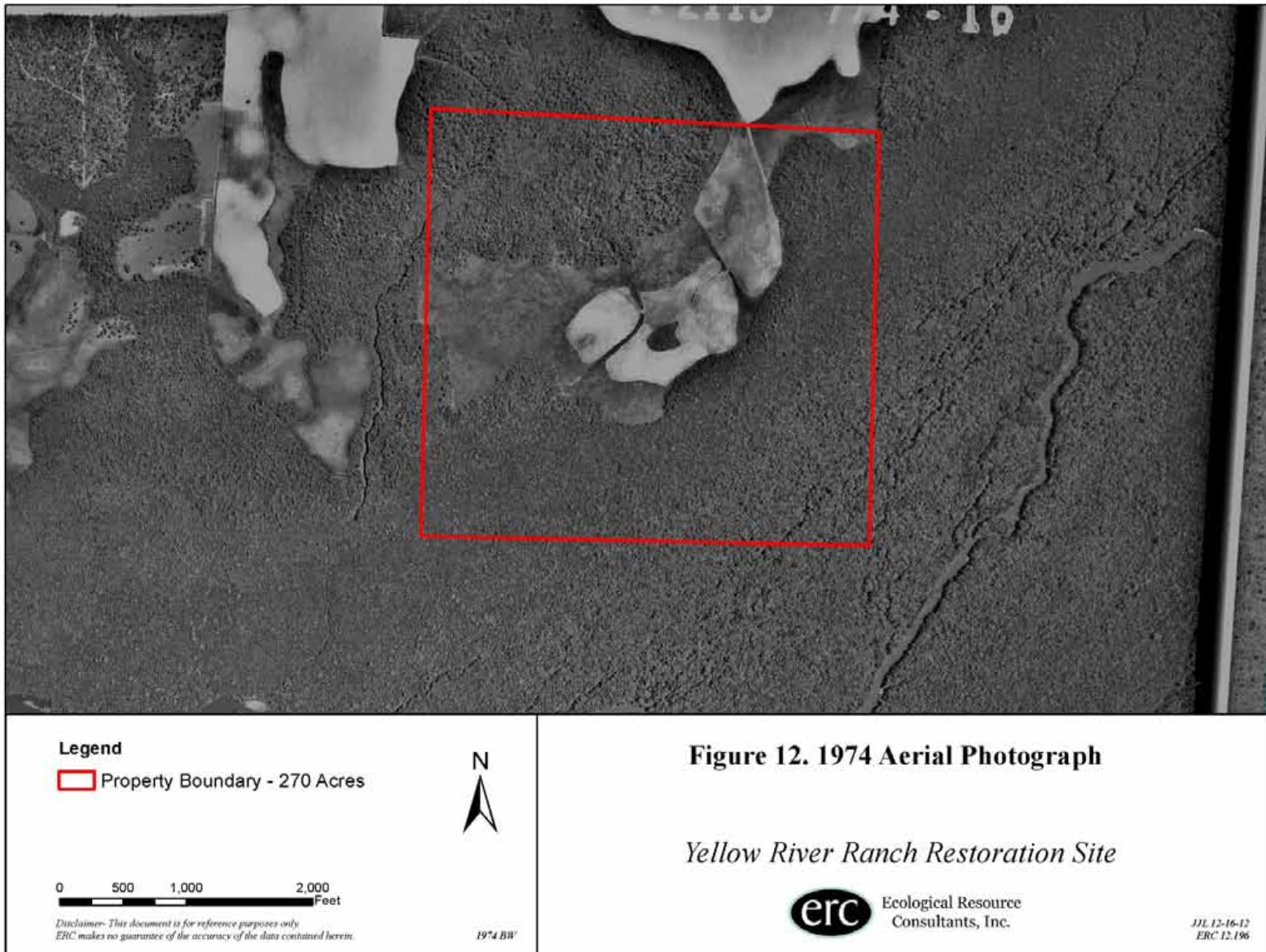


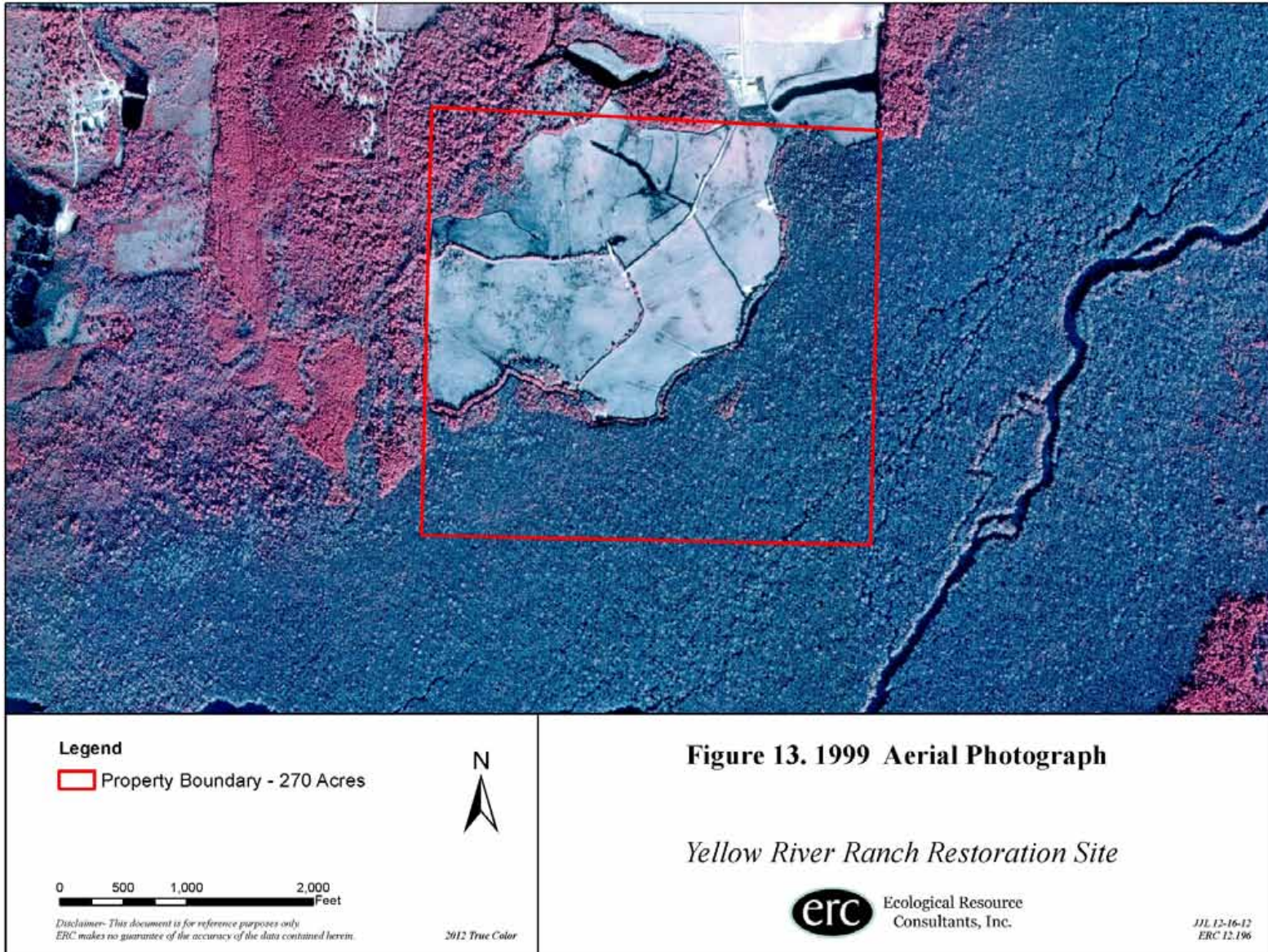


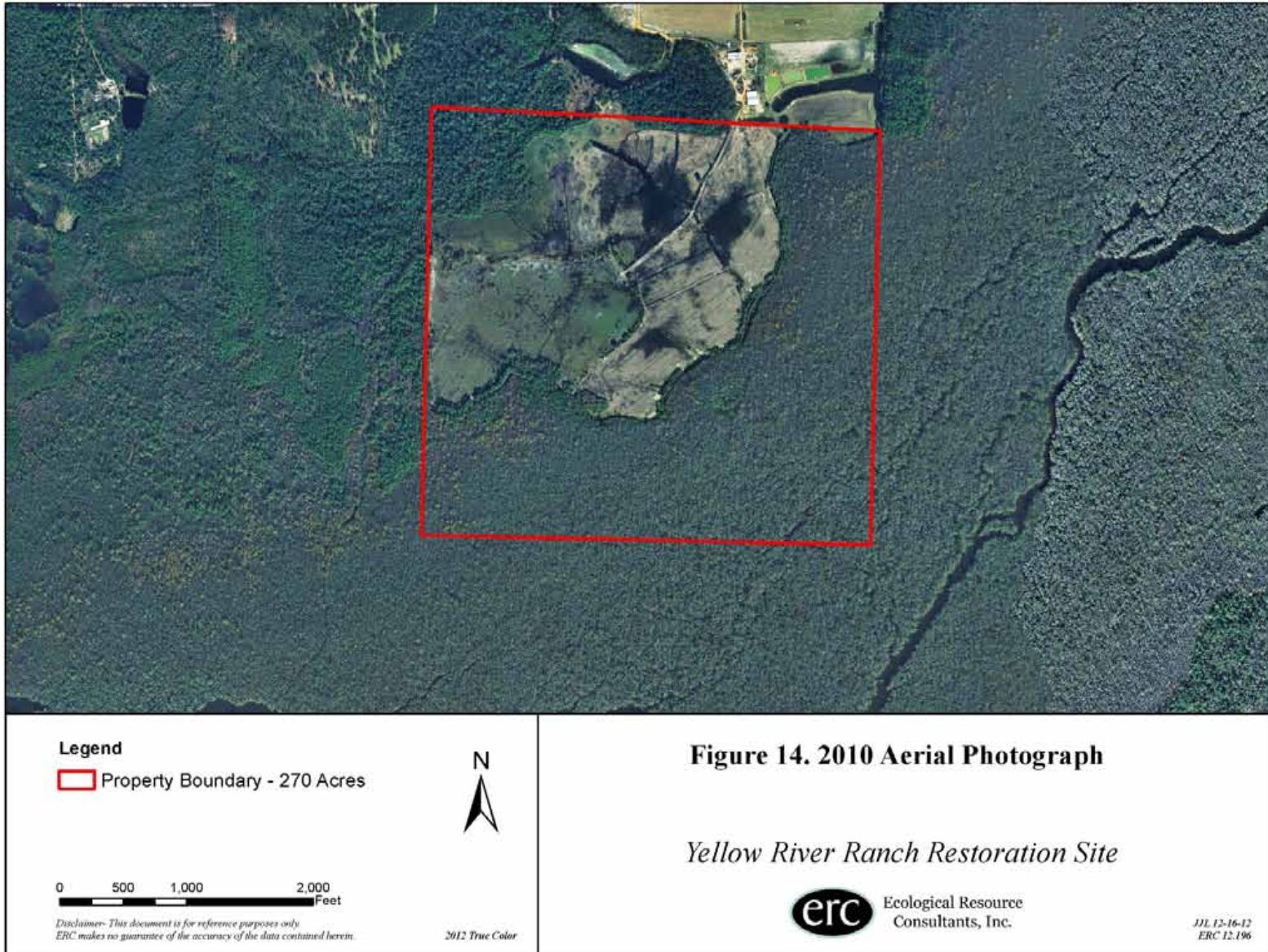
**Figure 10. Transect Locations and Target FLUCCS**

*Yellow River Ranch Restoration Site*











**Legend**

 Property Boundary - 270 Acres



0 500 1,000 2,000  
Feet

Disclaimer- This document is for reference purposes only.  
ERC makes no guarantee of the accuracy of the data contained herein.

2012 True Color

**Figure 15. 2012 Aerial Photograph**

*Yellow River Ranch Restoration Site*



Ecological Resource  
Consultants, Inc.

JUL 13-16-12  
ERC 12.196

## 2.2 Analytical Methods

Biostatistical methods are employed to quantitatively describe and summarize the monitoring field data. The data collected in quadrats along 150' linear transects and within a 20' X 150' belt transects is analyzed by calculating the proportional distribution of all plants in the groundcover quadrats and recorded. The transect data is treated as representative samples of larger plant community polygons. The basic units for describing populations and communities are relative density, frequency and coverage. From these parameters, species importance and diversity are calculated. Formulas are provided below for several measures used to analyze the data.

### 2.2.1 Statistical Methods for Linear Transects

From the raw data, sum separately:

- (1) the % coverage of each species from all plots
- (2) the # of individuals of each species from all plots
- (3) the % coverage of all species sampled in plots
- (4) the #'s of individuals of all species sampled in plots

### 2.2.2 Relative Coverage

Calculate the Relative Coverage by dividing the total coverage of each species by the total coverage of all species.

$$RC = (1)/(3)$$

### 2.2.3 Relative Density

Calculate the Relative Density by dividing the total # of individuals of each species by the total #'s of individuals of all species.

$$RD = (2)/(4)$$

### 2.2.4 Relative Frequency

Calculate the Relative Frequency by initially calculating the frequency for each species (5). This is the total number of sample plots in which a species occurred in divided by the total number of plots sampled. Sum the frequencies of each species (6). The Relative Frequency is obtained by dividing the frequency of each species by the total frequencies of all species.

$$RF = (5)/(6)$$

### 2.2.5 Importance Value

The Importance Value is the sum of all Relative values for each species.

$$\text{Importance Value} = RC + RD + RF$$

The Importance Value Percentage is the Importance Value multiplied by 100

$$\text{Importance Value Percentage} = \text{Importance Value} * 100$$

### **2.2.6 Statistical Methods for Belt Transects**

For the 20' X 150' belt transects the number of tree saplings per acre and total tree sapling diversity is calculated. From the raw data, sum separately:

(1) the individuals of each tree species with height measure/20' X 150' belt transects.

### **2.2.7 Number of Trees/Acre**

Calculate the Number of Trees/Acre by multiplying the total number of tree species recorded in the 150' X 20' belt transect by 14.28.

Trees/Acre = (1)(14.28)

## **3.0 DATA AND OBSERVATIONS**

### **3.1. Quantitative Transect Data**

Four standard calculations of the relative abundance of each species are given for each quantitative transect: Importance Value, Relative Cover, Relative Density, and Relative Frequency (See Tables 5a and 6a). Quantitative summary data is reported for each transect and broken down by plant community (See Tables 5b and 6b). Summary data for the Belt transects is provided in Tables 7, 8, 9, and 10.

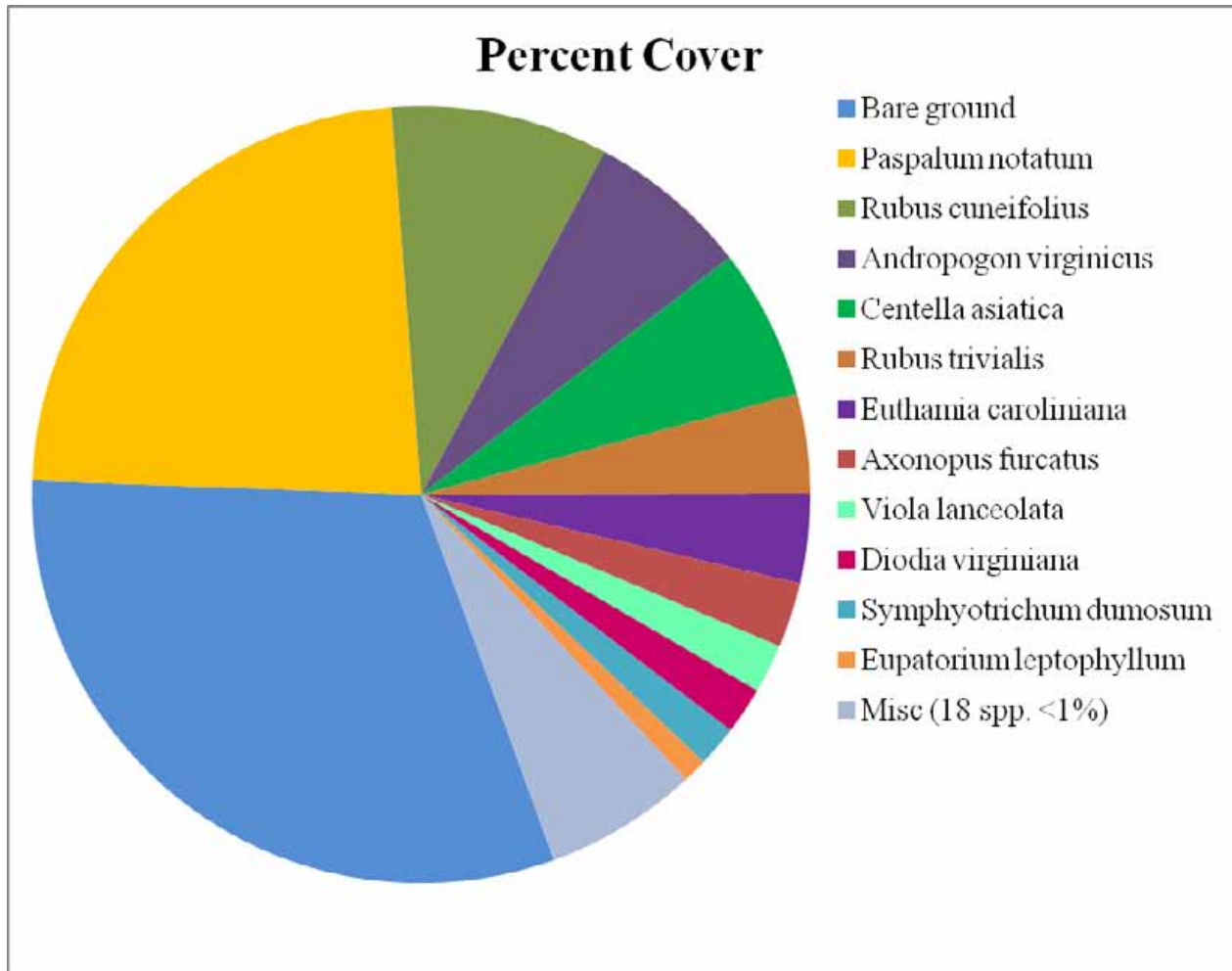
**Table 5a. Transect YRRT1-625 Hydric Pine Flatwoods**

| Species                           | Importance Value (%) | Relative Cover (%) | Relative Density (%) | Relative Frequency (%) |
|-----------------------------------|----------------------|--------------------|----------------------|------------------------|
| <b>Forbs</b>                      |                      |                    |                      |                        |
| <i>Rubus cuneifolius</i>          | 13.41                | 13.12              | 15.71                | 11.4                   |
| <i>Centella asiatica</i>          | 12.55                | 9.08               | 17.18                | 11.4                   |
| <i>Euthamia caroliniana</i>       | 8.2                  | 5.41               | 13.05                | 6.14                   |
| <i>Rubus trivialis</i>            | 6.47                 | 5.96               | 7.32                 | 6.14                   |
| <i>Diodia virginiana</i>          | 5.42                 | 2.84               | 6.39                 | 7.02                   |
| <i>Viola lanceolata</i>           | 4.8                  | 2.94               | 5.33                 | 6.14                   |
| <i>Symphotrichum dumosum</i>      | 3.11                 | 2.48               | 1.6                  | 5.26                   |
| <i>Eupatorium leptophyllum</i>    | 1.52                 | 1.47               | 1.33                 | 1.75                   |
| <i>Rubus argutus</i>              | 0.89                 | 0.46               | 1.33                 | 0.88                   |
| <i>Solidago fistulosa</i>         | 0.58                 | 0.46               | 0.4                  | 0.88                   |
| <i>Pluchea baccharis</i>          | 0.49                 | 0.46               | 0.13                 | 0.88                   |
| <i>Erechtites hieraciifolius</i>  | 0.44                 | 0.18               | 0.27                 | 0.88                   |
| <i>Agalinis fasciculata</i>       | 0.44                 | 0.18               | 0.27                 | 0.88                   |
| <i>Hypericum cistifolium</i>      | 0.4                  | 0.18               | 0.13                 | 0.88                   |
| <i>Lobelia glandulosa</i>         | 0.4                  | 0.18               | 0.13                 | 0.88                   |
| <b>Graminoids</b>                 |                      |                    |                      |                        |
| <i>Paspalum notatum</i>           | 18.6                 | 33.67              | 14.25                | 7.89                   |
| <i>Andropogon virginicus</i>      | 7.5                  | 9.83               | 4.79                 | 7.89                   |
| <i>Axonopus furcatus</i>          | 3.75                 | 3.94               | 2.93                 | 4.39                   |
| <i>Rhynchospora plumosa</i>       | 2.03                 | 0.73               | 1.86                 | 3.51                   |
| <i>Eremochloa ophiuroides</i>     | 1.42                 | 0.64               | 1.86                 | 1.75                   |
| <i>Carex albolutescens</i>        | 1.28                 | 0.55               | 0.67                 | 2.63                   |
| <i>Ctenium aromaticum</i>         | 1.16                 | 0.92               | 0.8                  | 1.75                   |
| <i>Cyperus strigosus</i>          | 0.94                 | 1.28               | 0.67                 | 0.88                   |
| <i>Juncus marginatus</i>          | 0.84                 | 0.37               | 0.4                  | 1.75                   |
| <i>Sporobolus indicus</i>         | 0.4                  | 0.18               | 0.13                 | 0.88                   |
| <b>Woody Plants</b>               |                      |                    |                      |                        |
| <i>Ilex vomitoria</i>             | 0.89                 | 0.64               | 0.27                 | 1.75                   |
| <i>Nyssa sylvatica v. biflora</i> | 0.8                  | 0.37               | 0.27                 | 1.75                   |
| <i>Myrica cerifera</i>            | 0.76                 | 1.28               | 0.13                 | 0.88                   |
| <i>Sapium sebiferum</i>           | 0.49                 | 0.18               | 0.4                  | 0.88                   |

**Table 5b. Transect YRRT1-625 Hydric Pine Flatwoods**

| Groundcover Vegetation Relative Cover (%) |            |              | Average Cover (%)              | Species Richness |
|---|------------|--------------|--------------------------------|------------------|
| Forbs                                     | Graminoids | Woody Plants | Bare ground/<br>Standing water |                  |
| 45%                                       | 52%        | 2.5%         | 31%                            | 29               |
| <b>Shrub Height (meters)</b>              |            |              |                                | 0.25             |

**Transect YRRT1-625 Hydric Pine Flatwoods**



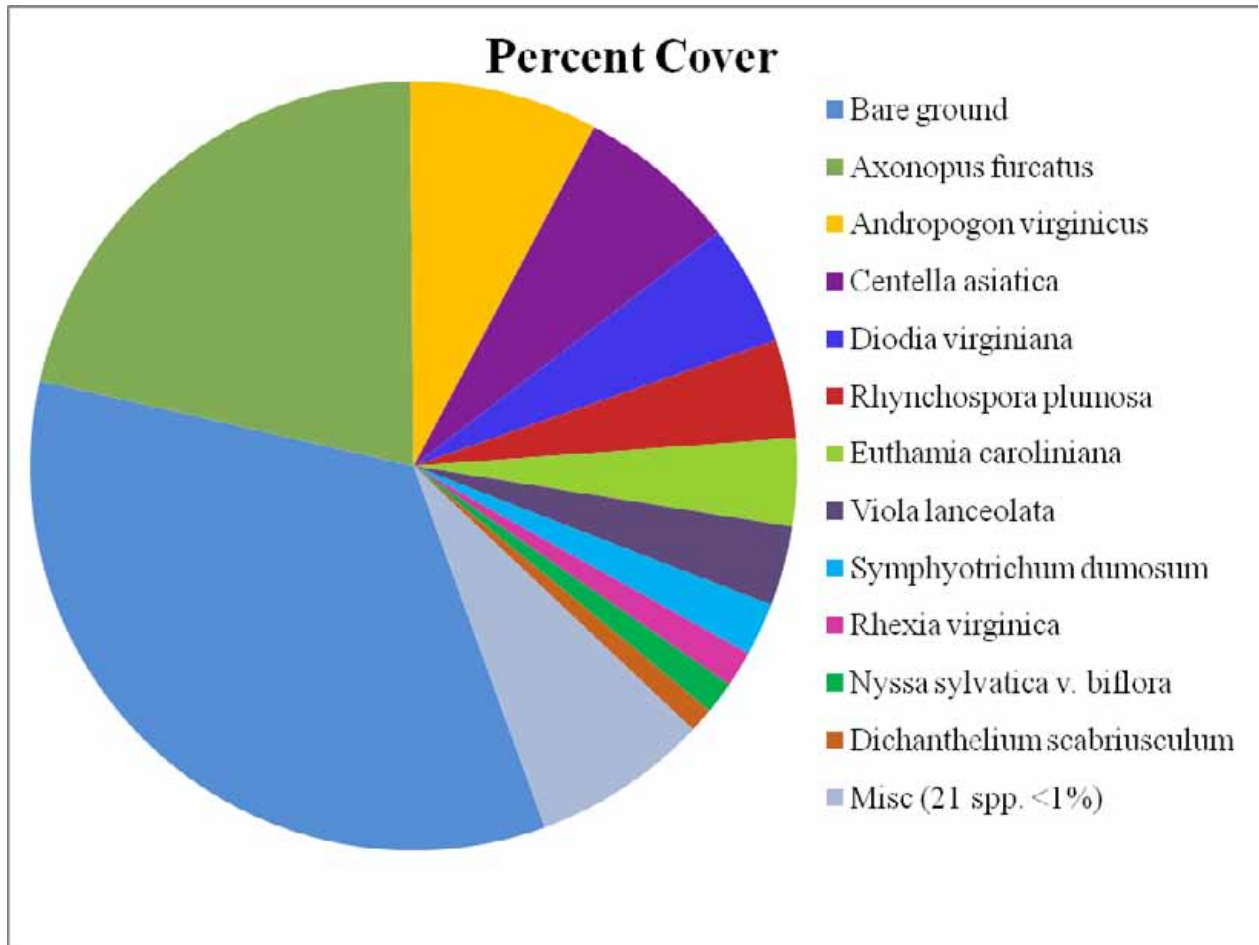
**Table 6a. Transect YRRT2-625 Hydric Pine Flatwoods**

| Species                           | Importance Value (%) | Relative Cover (%) | Relative Density (%) | Relative Frequency (%) |
|-----------------------------------|----------------------|--------------------|----------------------|------------------------|
| <b>Forbs</b>                      |                      |                    |                      |                        |
| <i>Centella asiatica</i>          | 16.83                | 10.32              | 30.89                | 9.29                   |
| <i>Diodia virginiana</i>          | 11.02                | 7.72               | 16.05                | 9.29                   |
| <i>Viola lanceolata</i>           | 6.3                  | 5.12               | 6.65                 | 7.14                   |
| <i>Euthamia caroliniana</i>       | 5.56                 | 5.59               | 5.37                 | 5.71                   |
| <i>Symphotrichum dumosum</i>      | 3.43                 | 3.39               | 2.62                 | 4.29                   |
| <i>Rhexia virginica</i>           | 2.32                 | 2.29               | 1.81                 | 2.86                   |
| <i>Polypremum procumbens</i>      | 2.19                 | 0.95               | 1.34                 | 4.29                   |
| <i>Eupatorium leptophyllum</i>    | 1.66                 | 1.1                | 1.01                 | 2.86                   |
| <i>Cuphea carthagenensis</i>      | 1.35                 | 0.71               | 1.21                 | 2.14                   |
| <i>Rhexia mariana</i>             | 1.31                 | 0.71               | 1.07                 | 2.14                   |
| <i>Eupatoriumcapillifolium</i>    | 0.63                 | 0.32               | 0.13                 | 1.43                   |
| <i>Rubus cuneifolius</i>          | 0.5                  | 0.39               | 0.4                  | 0.71                   |
| <i>Ludwigia pilosa</i>            | 0.48                 | 0.39               | 0.34                 | 0.71                   |
| <i>Lindernia dubia</i>            | 0.46                 | 0.39               | 0.27                 | 0.71                   |
| <i>Ludwigia linifolia</i>         | 0.43                 | 0.39               | 0.2                  | 0.71                   |
| <i>Hypericum cistifolium</i>      | 0.4                  | 0.16               | 0.34                 | 0.71                   |
| <i>Lobelia glandulosa</i>         | 0.36                 | 0.16               | 0.2                  | 0.71                   |
| <b>Graminoids</b>                 |                      |                    |                      |                        |
| <i>Axonopus furcatus</i>          | 20.02                | 32.31              | 16.32                | 11.43                  |
| <i>Andropogon virginicus</i>      | 7.13                 | 12.06              | 1.48                 | 7.86                   |
| <i>Rhynchospora plumosa</i>       | 6.5                  | 6.3                | 8.19                 | 5.0                    |
| <i>Eragrostis virginica</i>       | 1.54                 | 1.1                | 0.67                 | 2.86                   |
| <i>Dichantheiumscabriusculum</i>  | 1.12                 | 1.58               | 0.34                 | 1.43                   |
| <i>Rhynchospora microcarpa</i>    | 1.05                 | 1.26               | 0.47                 | 1.43                   |
| <i>Panicum hians</i>              | 0.92                 | 0.79               | 0.54                 | 1.43                   |
| <i>Carex albolutescens</i>        | 0.39                 | 0.39               | 0.07                 | 0.71                   |
| <i>Panicum verrucosom</i>         | 0.36                 | 0.16               | 0.2                  | 0.71                   |
| <i>Rhynchospora fascicularis</i>  | 0.31                 | 0.16               | 0.07                 | 0.71                   |
| <b>Woody Plants</b>               |                      |                    |                      |                        |
| <i>Nyssa sylvatica v. biflora</i> | 3.47                 | 2.05               | 1.21                 | 7.14                   |
| <i>Ilex glabra</i>                | 0.67                 | 0.32               | 0.27                 | 1.43                   |
| <i>Hypericum fasciculatum</i>     | 0.63                 | 1.1                | 0.07                 | 0.71                   |
| <i>Baccharis halimifolia</i>      | 0.31                 | 0.16               | 0.07                 | 0.71                   |

**Table 6b. Transect YRRT2-625 Hydric Pine Flatwoods**

| Groundcover Vegetation Relative Cover (%) |            |              | Average Cover (%)              | Species Richness |
|---|------------|--------------|--------------------------------|------------------|
| Forbs                                     | Graminoids | Woody Plants | Bare ground/<br>Standing water |                  |
| 40%                                       | 56%        | 4%           | 34%                            | 32               |
| <b>Shrub Height (meters)</b>              |            |              |                                | 0.25             |

**Transect YRRT2-625 Hydric Pine Flatwoods**



**Table 9. Belt Transect Summary for YJR-BT1-630**

| Species                         | Total Number | Height Scale (feet) |        |         |        |        |        | Condition       |
|---------------------------------|--------------|---------------------|--------|---------|--------|--------|--------|-----------------|
|                                 |              | 0-1'                | >1'-2' | >2' -3' | >3'-4' | >4'-5' | >5'-6' |                 |
| <i>Acer rubrum</i>              | 34           | 1                   | 2      | 31      | 0      | 0      |        | healthy/growing |
| <i>Chamaecyparis thyoides</i>   | 14           | 0                   | 0      | 4       | 3      | 0      | 7      | healthy/growing |
| <i>Nyssa biflora</i>            | 1            | 0                   | 1      | 0       | 0      | 0      | 0      | healthy/growing |
| <i>Pinus elliotii</i>           | 14           | 0                   | 2      | 3       | 3      | 3      | 3      | healthy/growing |
| <i>Sapium sebiferum</i>         | 6            | 2                   | 2      | 2       | 0      | 0      | 0      | healthy/growing |
| <i>Taxodium ascendens</i>       | 28           | 1                   | 7      | 12      | 5      | 1      | 2      | healthy/growing |
| <b>Total number of Saplings</b> | 97           |                     |        |         |        |        |        |                 |
| <b>Number of Saplings/Acre</b>  | 1,387.1      |                     |        |         |        |        |        |                 |

**Table 10. Belt Transect Summary for YJR-BT2-630**

| Species                         | Total Number | Height Scale (feet) |        |         |        |        |        | Condition       |
|---------------------------------|--------------|---------------------|--------|---------|--------|--------|--------|-----------------|
|                                 |              | 0-1'                | >1'-2' | >2' -3' | >3'-4' | >4'-5' | >5'-6' |                 |
| <i>Chamaecyparis thyoides</i>   | 24           | 0                   | 1      | 3       | 6      | 3      | 11     | healthy/growing |
| <i>Pinus palustris</i>          | 1            | 0                   | 1      | 0       | 0      | 0      | 0      | healthy/growing |
| <i>Quercus laurifolia</i>       | 2            | 1                   | 1      | 0       | 0      | 0      | 0      | healthy/growing |
| <b>Total number of Saplings</b> | 27           |                     |        |         |        |        |        |                 |
| <b>Number of Saplings/Acre</b>  | 386.1        |                     |        |         |        |        |        |                 |

**Table 11. Belt Transect Summary for YJR-BT3-621**

| Species                         | Total Number | Height Scale (feet) |        |         |        |        |        | Condition          |
|---------------------------------|--------------|---------------------|--------|---------|--------|--------|--------|--------------------|
|                                 |              | 0-1'                | >1'-2' | >2' -3' | >3'-4' | >4'-5' | >5'-6' |                    |
| <i>Chamaecyparis thyoides</i>   | 12           | 1                   | 2      | 2       | 4      | 2      | 1      | limited mortality  |
| <i>Pinus elliotii</i>           | 3            | 0                   | 0      | 2       | 0      | 1      | 0      | healthy/growing    |
| <i>Taxodium ascendens</i>       | 17           | 0                   | 3      | 7       | 7      | 0      | 0      | plants are stunted |
| <b>Total number of Saplings</b> | 32           |                     |        |         |        |        |        |                    |
| <b>Number of Saplings/Acre</b>  | 457.6        |                     |        |         |        |        |        |                    |

**Table 12. Belt Transect Summaries for Transect YR-BT3-621**

| Species                         | Total Number | Height Scale (feet) |        |         |        |        |        | Condition       |
|---------------------------------|--------------|---------------------|--------|---------|--------|--------|--------|-----------------|
|                                 |              | 0-1'                | >1'-2' | >2' -3' | >3'-4' | >4'-5' | >5'-6' |                 |
| <i>Chamaecyparis thyoides</i>   | 5            | 0                   | 1      | 4       | 0      | 0      | 0      | healthy/growing |
| <i>Cliftonia monophylla</i>     | 2            | 0                   | 0      | 2       | 0      | 0      | 0      | healthy/growing |
| <i>Pinus elliotii</i>           | 3            | 1                   | 1      | 0       | 1      | 0      | 0      | healthy/growing |
| <i>Taxodium ascendens</i>       | 80           | 10                  | 9      | 41      | 18     | 2      | 0      | healthy/growing |
| <b>Total number of Saplings</b> | 90           |                     |        |         |        |        |        |                 |
| <b>Number of Saplings/Acre</b>  | 1,287.0      |                     |        |         |        |        |        |                 |

### 3.2. Qualitative Transect Data

A summary of the qualitative data and a plant list (Table 12) are provided below for Qualitative Transect YRR-PT1-625. The qualitative data sheet recorded for this transect is located in Appendix A.

#### Qualitative Transect YRR-PT1-625 Hydric Pine Flatwoods

The plant community is a wet flatwoods using the FNAI classification. The location where this transect was conducted, was managed for pasture and is currently in the process of being restored. There is no canopy, subcanopy or well developed shrub strata. Shrub coverage is 0-1 percent and the majority of shrubs are in the 0-0.5m height class. The dominant shrub species are *Ilex glabra* and *Baccharis halimifolia*. The graminoid groundcover coverage class is 51-75% percent and the total groundcover cover class is 76-100% percent. The dominant groundcover species are *Andropogon virginicus*, *Axonopus furcatus*, *Centella asiatica*, *Diodia virginiana*, *Eupatorium leptophyllum*, *Euthamia caroliniana*, *Paspalum notatum*, *Rhynchospora* spp., *Rubus* spp., and *Symphotrichum dumosum*. The site has very little bare ground coverage because the area is open and abundant light and moisture are available to the herbaceous plant species.

Groundcover diversity was good, and diversity is expected to increase with increased management of the site. Wildlife observations included a northern harrier (*Circus cyaneus*), a sharp-shinned hawk (*Accipiter striatus*), a red-tailed hawk (*Buteo jamaicensis*), an eastern phoebe (*Sayornis phoebe*), a barn swallow (*Hirundo rustica*), a northern mockingbird (*Mimus polyglottos*), a monarch butterfly (*Danaus plexippus*), and a buckeye butterfly (*Junonia coenia*). Exotic species were observed, including the Chinese tallow (*Sapium sebiferum*), which is found in 1-5% coverage range, and evidence of feral hogs (*Sus scrofa*) rutting the soils. Natural regeneration of appropriate species is occurring. Thirty four species were observed and most of these are successional herbaceous species. Overall, the landscape is fire suppressed. The depth of duff is approximately 1 cm and there are many fine fuels in which to carry a fire across the landscape. The soil surface moisture class is moist.

**Table 12. Plant List for YRR-PT1 625 Hydric Pine Flatwoods**

| Scientific Name                                     | Common Name            |
|---|------------------------|
| <i>Andropogon virginicus</i> var. <i>virginicus</i> | Virginia broomgrass    |
| <i>Agalinis fasciculata</i>                         | beach false foxglove   |
| <i>Axonopus furcatus</i>                            | big carpetgrass        |
| <i>Baccharis halimifolia</i>                        | sea myrtle             |
| <i>Bidens mitis</i>                                 | smallfruit beggarticks |
| <i>Centella asiatica</i>                            | spade leaf             |
| <i>Chamaecyparis thyoides</i>                       | white cedar            |
| <i>Ctenium aromaticum</i>                           | toothachegrass         |

**Table 12. Plant List for YRR-PT1 625 Hydric Pine Flatwoods (Continued)**

| Scientific Name                  | Common Name                 |
|----------------------------------|-----------------------------|
| <i>Dichanthelium</i> sp.         | witchgrass                  |
| <i>Diodia virginiana</i>         | common persimmon            |
| <i>Erechtites hieraciifolius</i> | American burnweed           |
| <i>Euthamia caroliniana</i>      | slender flattop goldenrod   |
| <i>Fuirena breviseta</i>         | umbrellasedge               |
| <i>Juncus marginatus</i>         | shore rush                  |
| <i>Lachnanthes caroliniana</i>   | redroot                     |
| <i>Ludwigia linifolia</i>        | Southeastern primrosewillow |
| <i>Ludwigia maritima</i>         | seaside primrosewillow      |
| <i>Ludwigia pilosa</i>           | hairy primrosewillow        |
| <i>Lycopus virginicus</i>        | Virginia bugleweed          |
| <i>Myrica cerifera</i>           | wax myrtle                  |
| <i>Nyssa biflora</i>             | tupelo                      |
| <i>Panicum hians</i>             | gaping panicum              |
| <i>Paspalum notatum</i>          | bahiagrass                  |
| <i>Rhexia virginica</i>          | handsome Harry              |
| <i>Rhynchospora fascicularis</i> | fascicled beaksedge         |
| <i>Rhynchospora plumosa</i>      | beaksedge                   |
| <i>Rhynchospora inundata</i>     | horned beaksedge            |
| <i>Rubus argutus</i>             | blackberry                  |
| <i>Sapium sebiferum</i>          | Chinese tallow tree         |
| <i>Solidago fistulosa</i>        | pinebarren goldenrod        |
| <i>Symphotrichum dumosum</i>     | rice button aster           |
| <i>Viola lanceolata</i>          | bog white violet            |

### 3.3. Photographic Documentation

Panoramic photographs are located in Appendix B of the monitoring report. Quantitative monitoring plot photographs are located in Appendix C.

## 4.0 RESULTS AND DISCUSSION

The Yellow River Ranch Restoration site is located within the floodplain of the Yellow River. Intact native bottomland is located on the lowest portion of the floodplain while the restoration area is located on low erosional terrace that is generally flooded less frequently. The erosional terrace also has soil, landform and vegetative signatures of a seepage slope. Significant anthropogenic alteration and drainage of the erosional terrace resulted in a cultural landscape of drained pasture lands managed by the cultivation and grazing of non-native forage grasses. Restoration of the site involves hydrologic modification, installation the appropriate native species, control of invasive species, and prescribed fire in selected areas.

Approximately 155 acres of the Yellow River Ranch consists of existing forested Bottomland (615), with the remaining 120 acres converted to pasture from a previously forested landscape. Of the remaining 120 acres, 27 acres of Bottomland (615), 9 acres of Cypress (621) and 60 acres of Hydric Pine Flatwoods (625) are the focus of the quantitative monitoring.

The results of quantitative monitoring within the polygon identified as Hydric Pine Flatwoods (625) indicate that this is a landscape dominated by graminoids and forbs representing mostly herbaceous, perennial lifeforms. The presence of successional, herbaceous native species is indicative of a landscape that has been disturbed and is in the process of increasing species richness. Species richness ranges from 29 to 32 species in the quantitative transects. Specifically there are species such as beaksedge (*Rhynchospora plumosa*) and toothache grass (*Ctenium aromaticum*) that are associated with the historic landscape of Hydric Pine Flatwoods. Toothache grass, along with wiregrass (*Aristida stricta*), are species that require prescribed fire to flourish and spread. Wiregrass was not located within the transects; however, this species is one of the native groundcover species that has been planted in the Hydric Pine Flatwoods (625) polygon. As measured in transect YRR-T1-625, Bahia grass (*Paspalum notatum*) continues to be the most dominant groundcover species in this area of the Hydric Pine Flatwoods (625) polygon. Elsewhere on the site Bahia grass has mostly been eradicated by herbicide application.

Seedling swamp gum (*Nyssa sylvatica* var. *biflora*), white cedar (*Chamaecyparis thyoides*), Chinese tallow tree (*Sapium sebiferum*) and slash pine (*Pinus elliottii*) were also observed within the Hydric Pine Flatwoods (625) polygon.

The quantitative summary results for the tree saplings in the target FLUCCS communities identified as forested, such as Cypress (621) and Bottomland (615), indicate that there are at least 386 to 1,387 trees/acre in the Bottomland polygon sample area and 4,57 to 1,287 in the Cypress polygon sample area. All saplings are growing and healthy except those in the Cypress polygon sample area near an existing ditch at transect YRR-BT3-621. Planted cypress mortality, may be resolved by allowing this portion of the landscape to trend toward more slash pine, atlantic white cedar, and other associated native species as they are dispersed into the site. As the entire site is hydrologically restored, wetland tree saplings will likely recruit naturally from the adjacent, mature bottomland forest and augment the species richness already present in the Cypress and Bottomland polygons.

The landscape traversed during the pedestrian transect is entirely mapped as Hydric Pine Flatwoods (625). Overall the dominance of herbaceous plant lifeforms in the Hydric Pine Flatwoods is consistent with the quantitative measures of groundcover species in the Hydric Pine Flatwoods (625), Cypress (621) and Bottomland (615). These wetland polygons all are undergoing similar successional phases. As the canopy matures in the planted polygons of Cypress (621) and Bottomland (615), the groundcover coverage is expected to decrease as the woody strata begin to shade and dominate the landscape.

## 5.0. CONCLUSIONS AND RECOMMENDATIONS

A snapshot of the current conditions at the Yellow River Ranch restoration site was obtained from ecological monitoring in the autumn of 2012. The data indicates a landscape that is trending towards the restoration goals and habitat target. The goal of the ecological monitoring is to qualitatively and quantitatively assess the mitigation progress and use the information to adapt modifications or continue the application of planned restoration activities to achieve ongoing and future restoration goals for the site.

The converted pasture is being restored to a mosaic of bottomland (615), cypress (621) and, hydric pine flatwoods (625)/hydric pine savanna (626) and non-forested (640) wetlands. In the bottomland (615) restoration area, the existing vegetation includes saplings of red maple (*Acer rubrum*), white cedar (*Chamaecyparis thyoides*), swamp gum (*Nyssa sylvatica* var. *biflora*), slash pine (*Pinus elliotii*) and pond cypress (*Taxodium ascendens*). This landscape is trending toward the desired target; however, invasive exotic Chinese tallow tree saplings should be monitored and treated.

In the cypress (621) restoration area, existing tree sapling diversity is lower than in the bottomland restoration area; however, potential species richness gains are likely from continued natural recruitment of native species. The landscape is trending toward the desired target of a pond cypress dominated landscape. Invasive exotic Chinese tallow tree saplings are also a concern in this area and should be monitored and treated. There are small areas of pond cypress that are not thriving in the cypress restoration area. The solution may be to allow the small landscape inclusions to become mixtures of trees where cypress is a component but not the dominant species. This strategy does not appreciably alter the restoration target but rather recognizes the complexity of the landscape and associated habitat.

The hydric pine flatwoods restoration areas have scattered slash pine, pond cypress, limited areas of myrtle leaf holly (*Ilex cassine* var. *myrtifolia*), gallberry (*Ilex glabra*), wax myrtle (*Myrica cerifera*) and swamp bay (*Persea palustris*) and a diverse herbaceous groundcover that could be augmented by additional native groundcover plantings that are typical in wet savanna or wet prairie.

The monitoring results corroborate a qualitative assessment of severe landscape impacts caused by many years of pasture use. Herbaceous plants continue to comprise the majority of the vegetation within all the polygons that are mapped in the improved pasture. The high coverage by herbaceous species is not unexpected because the site is open with virtually no canopy and receives full sunlight throughout the day. All of the proposed restoration techniques as mentioned in Section 1.1.1., *Purpose*, of the report will result in a landscape trending toward restoration targets as listed in Table 4.

Threats to the inherent biodiversity of this site include fire suppression, hydrologic modification, non-native pasture grass and herbaceous weeds growth, exotic invasive vegetation, and climate change. The expansion of invasive exotic species incursions on the site will likely be a significant challenge to restoration. Chinese tallow (*Sapium sebiferum*), cogon grass (*Imperata*

*cylindrica*) and Japanese climbing fern (*Lygodium japonicum*) are significant invading species that should be monitored carefully. Seedlings of Chinese tallow were found throughout the areas of former pasture. In addition large areas of bare ground were noted during traverses across the site. Areas of bare soils are the result from the feeding practices of introduced feral hogs (*Sus scrofa*). ERC recommends removal of feral hogs from the site as soon as is feasible.

## 6.0 REFERENCES

Ashton, R. E. Jr, and Patricia S. Ashton. Handbook of Reptiles and Amphibians of Florida. Part One, The Snakes. Windward Publishing. 1988.

Ashton, R. E. Jr, and Patricia S. Ashton. Handbook of Reptiles and Amphibians of Florida. Part Two, Lizards, Turtles and Crocodilians. Windward Publishing. 1991.

Ashton, R. E. Jr, and Patricia S. Ashton. Handbook of Reptiles and Amphibians of Florida. Part Three, The Amphibians. Windward Publishing. 1991.

Brower, James E., Zar, Jerrold H. and Carl N. von Ende. Field and Laboratory Methods for General Ecology. Fourth Edition. The McGraw-Hill Company. 1998.

Chafin, Linda G. Field Guide to the Rare Plants of Florida. Tallahassee: Florida Natural Areas Inventory, 2000.

Clewell, Andre F. Guide to the Vascular Plants of the Florida Panhandle. Tallahassee: Florida State University Press, 1985.

Clewell, Andre F. Natural Setting and Vegetation of the Florida Panhandle: An Account of the Environments and Plant Communities of Northern Florida West of the Suwannee River. Mobile: U. S. Army Corps of Engineers, 1986.

Clewell, Andre F. and James Aronson. Ecological Restoration, Principles, Values and Structure of an Emerging Profession. Society for Ecological Restoration. Island Press. 2007.

Clewell, Andre F. and John D. Tobe. Cinnamomum-Ardisia Forest in Northern Florida. Castanea 76(3):245-254. September 2011.

Coile, Nancy C. and Mark A. Garland. Notes on Florida's Endangered and Threatened Plants. Fourth Edition. Gainesville: Florida Department of Agriculture and Consumer Services, 2003.

Egan, Dave and Evelyn A. Howell. The Historical Ecology Handbook, A Restorationist's Guide to Reference Ecosystems. Society for Ecological Restoration. Island Press. 2001.

Egan, Dave, Evan Hjerpe and Jesse Abrams. Human Dimensions of Ecological Restoration, Integrating Science, Nature and Culture. Society for Ecological Restoration. Island Press. 2011.

Florida Department of Transportation, Surveying and Mapping Office, Geographic Mapping Section. "Florida Land Use, Cover and Forms Classification System. Third Edition. Handbook. January 1999.

Florida Natural Areas Inventory. Guide to the Natural Communities of Florida. Tallahassee: Florida Natural Areas Inventory and Florida Department of Natural Resources, 2010.

Godfrey, Robert K. Trees, Shrubs, and Woody Vines of Northern Florida and Adjacent Georgia and Alabama. Athens: The University of Georgia Press, 1988.

Godfrey, Robert K. and Jean W. Wooten. Aquatic and Wetland Plants of Southeastern United States. Athens: The University of Georgia Press, 1981.

Hipes, Dan, et al. Field Guide to the Rare Animals of Florida. Tallahassee: Florida Natural Areas Inventory, 2001.

Kaufman, Kenn and Eric R. Eaton. Kaufman Field Guide to Insects of North America. Hillstar Editions, L.C. 2007.

Langeland, K. A. and K. Craddock Burks, editors. Identification & Biology of Non-Native Plants in Florida's Natural Areas. Gainesville: University of Florida IFAS Extension, 1998.

Lellinger, David B. A Field Manual of the Ferns and Fern-Allies of the United States and Canada. Smithsonian Institution. 1985.

Marsh, Owen T. Geology of Escambia and Santa Rosa Counties, Western Florida Panhandle. Bulletin No. 46. United States Geological Society. 1966.

Myers, Ronald J. and John J. Ewel, editors. Ecosystems of Florida. Orlando: University of Central Florida Press, 1990.

Northwest Florida Water Management District. Yellow River Ranch Mitigation Area Revised Mitigation Plan. April 22, 2011.

Northwest Florida Water Management District. Yellow River Ranch Mitigation Area Santa Rosa County, FL Hydrologic-Hydraulic Study. Revised February 22, 2008.

Sibley, David Allen. The Sibley Field Guide to Birds of Eastern North America. New York: Alfred A. Knopf, Inc., 2003.

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Soil Survey of Santa Rosa County, Florida in Web Soil Survey. Available online at <http://websoilsurvey.nrcs.usda.gov/>. Accessed [12/10/2012].

Tobe, John D., et al. Florida Wetland Plants: An Identification Manual. Tallahassee: Florida Department of Environmental Protection, 1998.

USDA Soil Conservation Service. 26 Ecological Communities of Florida. Gainesville, FL. 198x.

Weeks, Herbert H., Hyde, Adam G., Roberts, Alfred, Lewis, Doug, and Peters, Craig R.. Soil Survey of Santa Rosa County, Florida. U.S.D.A.-Natural Resources Conservation Service. Gainesville, FL. 1980.

Wunderlin, Richard P. Guide to the Vascular Plants of Florida, Third Edition. Gainesville: University Press of Florida, 2011.

APPENDIX A  
QUALITATIVE DATA SHEETS

**Qualitative assessment data sheet**

Transect ID: YRR-PT1-625

Date: 10/29/2012

Plant Community Type: Hydric pine savanna

Time (am/pm) 11:30:00 AM

1. Weather:  Full Sun  Part Sun  Cloudy  Cloudy with Rain/Fog  
 20-50 F  51-70 F  71-90 F  91-110 F  
 No evident  Restoration in progress  Pine Plantation (Rows)  Managed for Pine  Natural Forest

3. CANOPY % cover:  Absent  0-1%  1-5%  6-25%  26-50%  51-75%  76-100%  
 4. Estimated height class of the majority of TREES using the following scale:  absent  3-5m  6-10m  >10m

List 6 dominant TREE species observed in canopy:  
 1. none \_\_\_\_\_  
 2. \_\_\_\_\_  
 3. \_\_\_\_\_  
 4. \_\_\_\_\_  
 5. \_\_\_\_\_  
 6. \_\_\_\_\_

5. Estimated height class of the majority of SUBCANOPY using the following scale:  absent  3-5m  6-10m  >10m

List up to 6 dominant SUBCANOPY species observed:  
 1. none \_\_\_\_\_  
 2. \_\_\_\_\_  
 3. \_\_\_\_\_  
 4. \_\_\_\_\_  
 5. \_\_\_\_\_  
 6. \_\_\_\_\_

6. SHRUBS % cover:  Absent  0-1%  1-5%  6-25%  26-50%  51-75%  76-100%

List 3 dominant SHRUB species observed:  
 1. Baccharis halimifolia \_\_\_\_\_  
 2. Ilex glabra \_\_\_\_\_  
 3. \_\_\_\_\_

7. Estimated height class of the majority of SHRUBS using the following scale:  absent  0-5m  .6-1.5m  1.6-3m

List 3 of the most common SHRUB and/or TREE seedlings observed:  
 1. Pinus elliotii \_\_\_\_\_  
 2. Chamaecyparis thyoides \_\_\_\_\_  
 3. Baccharis halimifolia \_\_\_\_\_

8. GROUNDCOVER % cover of graminoids (grasses, sedges and rushes):  
 Absent  0-1%  1-5%  6-25%  26-50%  51-75%  76-100%

9. TOTAL GROUNDCOVER % cover (including graminoids and forbes):  
 Absent  0-1%  1-5%  6-25%  26-50%  51-75%  76-100%

List up to 9 dominant GROUNDCOVER species observed:  
 1. Andropogon virginicus \_\_\_\_\_  
 2. Paspalum notatum \_\_\_\_\_  
 3. Axonopus furcatus \_\_\_\_\_  
 4. Rhynchospora spp. \_\_\_\_\_  
 5. \_\_\_\_\_  
 6. \_\_\_\_\_  
 7. \_\_\_\_\_  
 8. \_\_\_\_\_  
 9. \_\_\_\_\_

List the NATIVE WEEDY or RUDERAL species observe - otherwise SEE 18. EXOTIC SPECIES BELOW  
 1. Paspalum notatum \_\_\_\_\_  
 2. Baccharis halimifolia \_\_\_\_\_  
 3. \_\_\_\_\_  
 4. \_\_\_\_\_  
 5. \_\_\_\_\_

Vegetation notes: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**Qualitative assessment data sheet**

Transect ID: YRR-PT11-625

Date: 10/29/2012

Plant Community Type: Hydric pine savanna

10. Tree density: absent  Why?:  too dense  too sparse  
11. Tree health:  trees healthy  trees stressed  too dense  too wet other:  
13. Water table:  at the surface  below surface Standing water:  present  absent  
14. Water color:  tannic  non-tannic/clear  cloudy

**Notes on wildlife usage observed:**

1. Northern harrier \_\_\_\_\_ 2. Eastern phoebe \_\_\_\_\_ 3. barn swallow \_\_\_\_\_  
4. sharp-shinned hawk \_\_\_\_\_ 5. red-tailed hawk \_\_\_\_\_ 6. mockingbird \_\_\_\_\_  
7. monarch butterfly \_\_\_\_\_ 8. crickets \_\_\_\_\_ 9. buckeye butterfly \_\_\_\_\_

17. Wildlife usage and natural history observations:  amphibian  reptiles  fish  birds  mammals  arthropods  
 footprint  scratch marks  songs or  scat

Wildlife notes:

**Notes on Exotic species observed:**

18. Exotic species:  present  absent

Sapium sebiferum (1%-5% cover) present as well as Paspalum notatum. There is a great deal of hog related soil disturbance.

**Notes on Restoration:**

**Notes on the general aspect of the site/techniques to meet restoration goals:**

- Is natural regeneration occurring?  yes  no and:  species appropriate  supplemental planting/seeding needed  
Landscape observation:  fire suppressed  well managed  secondary growth  planted  clear-cut  
If planted:  bedded and planted  not bedded but managed for pine ~Tree age:  0-5 yrs.  6-10 yrs.  11-20 yrs.  20+ yrs.  
Recommendations for restoration:  prescribed burn  mechanical treatment other:  
20. Notes on prescribed burning and fire conditions:  
Fuels: cluff (cm): 1 litter (cm) 0  hazard reduction recommended  reduction of shrub strata recommended  
Soil moisture: moist  canopy thinning recommended  reduction of subcanopy strata recommended

**Specific notes on restoration, observations, or adaptive management techniques:**

Control invasive exotics and burn the site. There are many graminoids and fine fuels in the groundcover, which are good for a prescribed fire.

APPENDIX B  
PANORAMIC PHOTOGRAPHS  
QUANTITATIVE AND QUALITATIVE TRANSECTS

**Yellow River Ranch Site - Quantitative Transect YRR-T1-625: Panoramic photograph depicted in two 180 degree sections.**



0°

180°



180°

360°

**Yellow River Ranch Site - Quantitative Transect YRR-T2-625: Panoramic photograph depicted in two 180 degree sections.**



0°

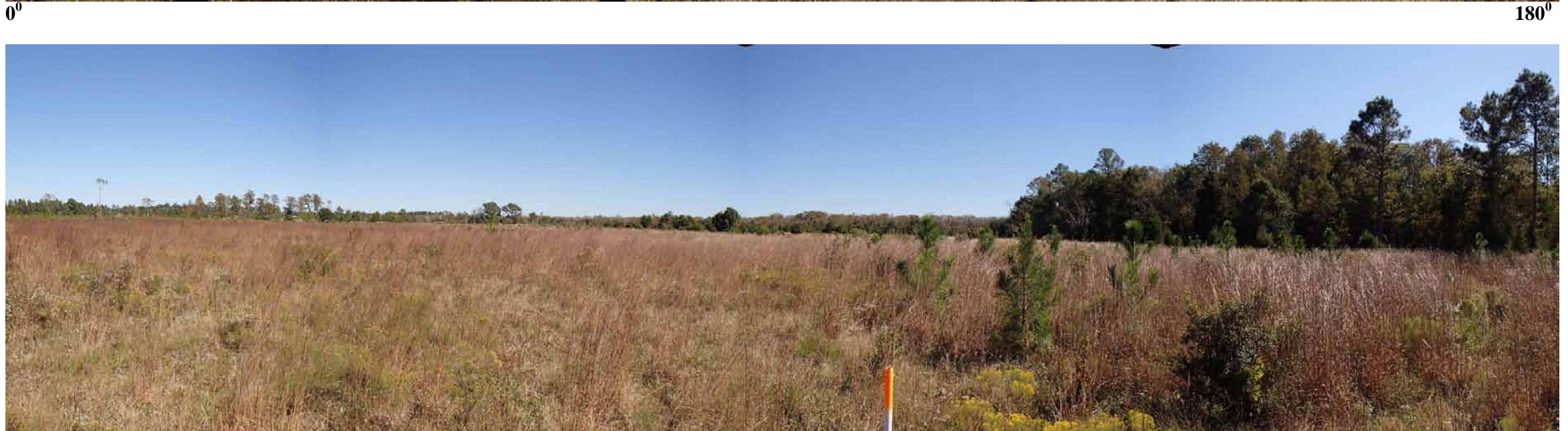
180°



180°

360°

**Yellow River Ranch Site - Qualitative Pedestrian Transect YRR-PT1-625: Panoramic photograph depicted in two 180 degree sections.**



Yellow River Ranch Site - Photo point YRR-PP1: Panoramic photograph taken at photo point depicted in two 180 degree sections.



0°

180°



180°

360°

Yellow River Ranch Site - Photo point YRR-PP2: Panoramic photograph taken at photo point depicted in two 180 degree sections.



0°

180°



180°

360°

**Yellow River Ranch Site - Photo point YRR-PP3: Panoramic photograph taken at photo point depicted in two 180 degree sections.**



0°

180°

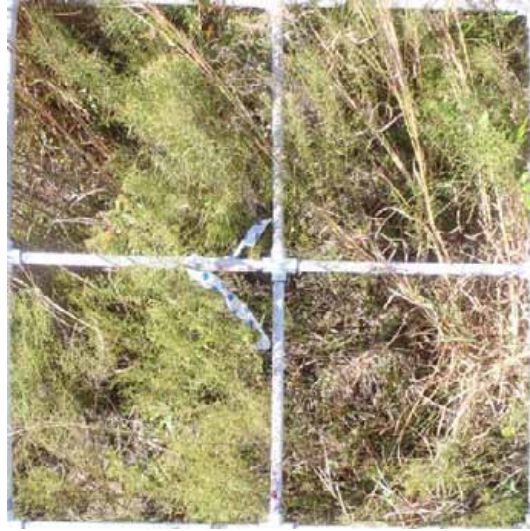


180°

360°

APPENDIX C  
QUANTITATIVE MONITORING PLOT PHOTOGRAPHS

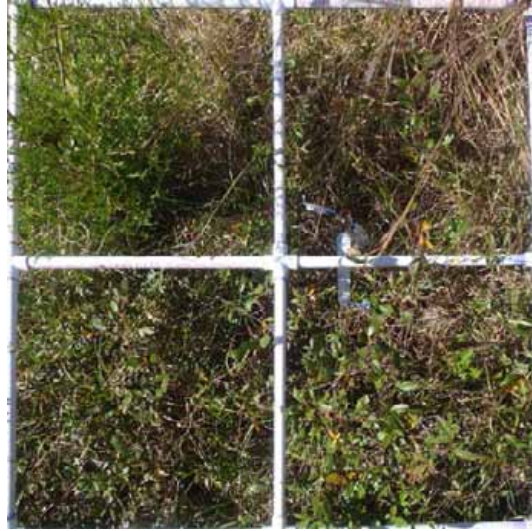
TRANSECT YRR-T1-625 HYDRIC PINE FLATWOODS



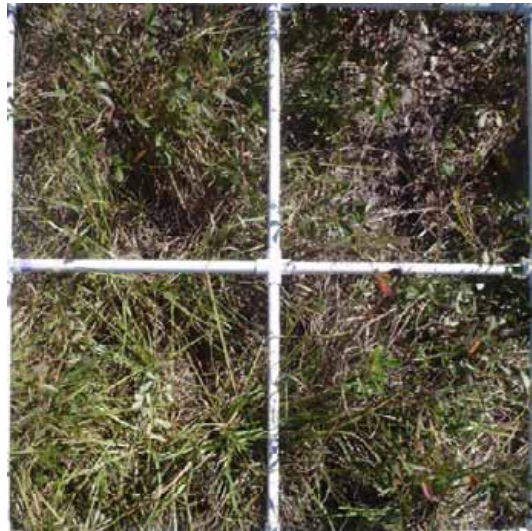
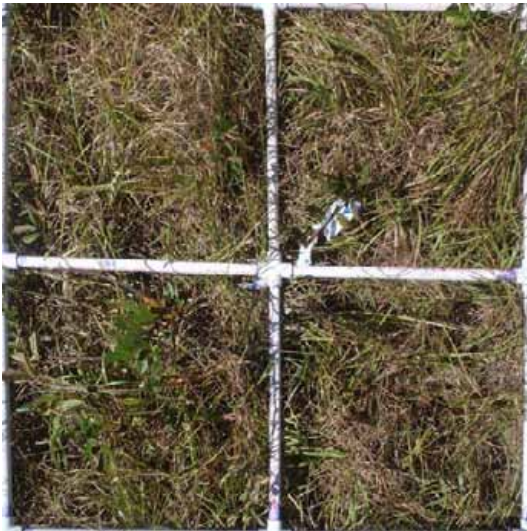
Photographs (left to right): 1) Transect YRRT1-625 Plot – 10 feet; 2) Transect YRRT1-625 Plot – 20 feet



Photographs (left to right): 1) Transect YRRT1-625 Plot – 30 feet; 2) Transect YRRT1-625 Plot – 40 feet



Photographs (left to right): 1) Transect YRRT1-625 Plot – 50 feet; 2) Transect YRRT1-625 Plot – 60 feet



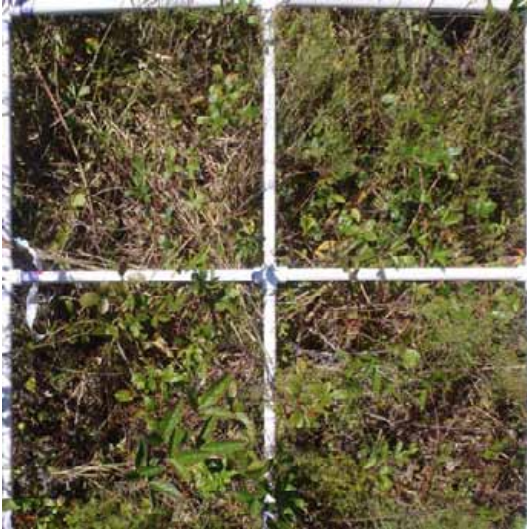
Photographs (left to right): 1) Transect YRRT1-625 Plot – 70 feet; 2) Transect YRRT1-625 Plot – 80 feet



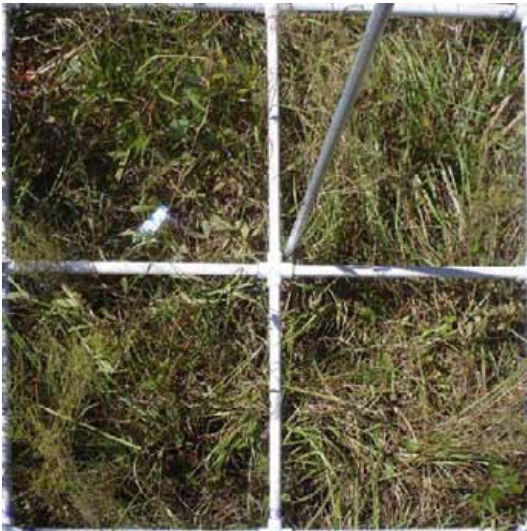
Photographs (left to right): 1) Transect YRRT1-625 Plot – 90 feet; 2) Transect YRRT1-625 Plot – 100 feet



Photographs (left to right): 1) Transect YRRT1-625 Plot – 110 feet; 2) Transect YRRT1-625 Plot – 120 feet

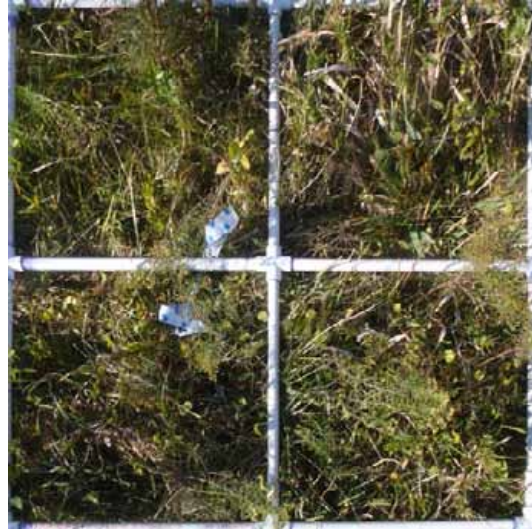
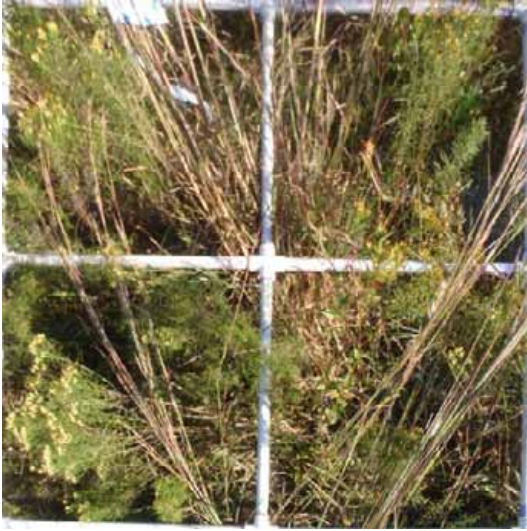


Photographs (left to right): 1) Transect YRRT1-625 Plot – 130 feet; 2) Transect YRRT1-625 Plot – 140 feet



Photographs (left to right): 1) Transect YRRT1-625 Plot – 150 feet

TRANSECT YRR-T2-625 HYDRIC PINE FLATWOODS



Photographs (left to right): 1) Transect YRRT2-625 Plot – 10 feet; 2) Transect YRRT2-625 Plot – 20 feet



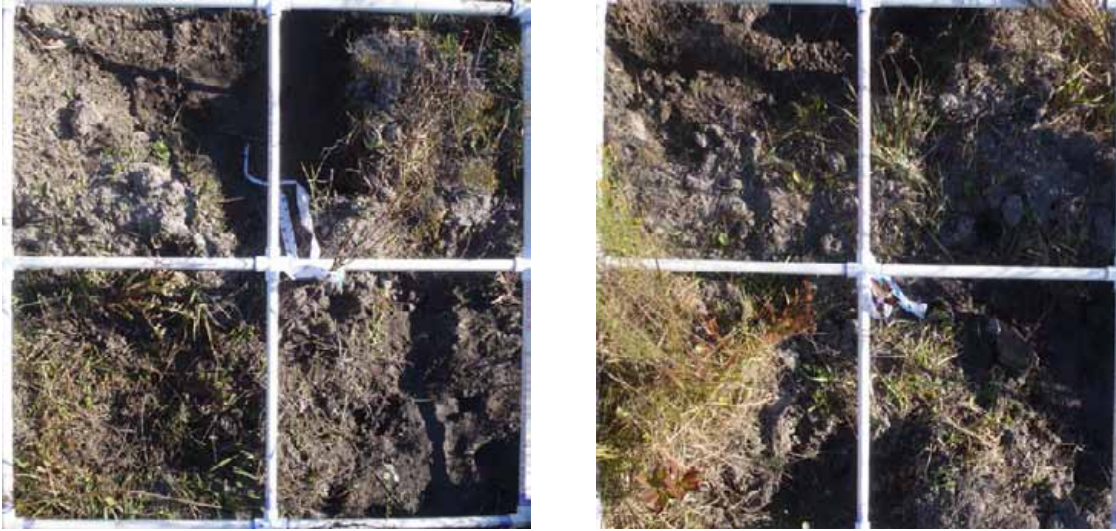
Photographs (left to right): 1) Transect YRRT2-625 Plot – 30 feet; 2) Transect YRRT2-625 Plot – 40 feet



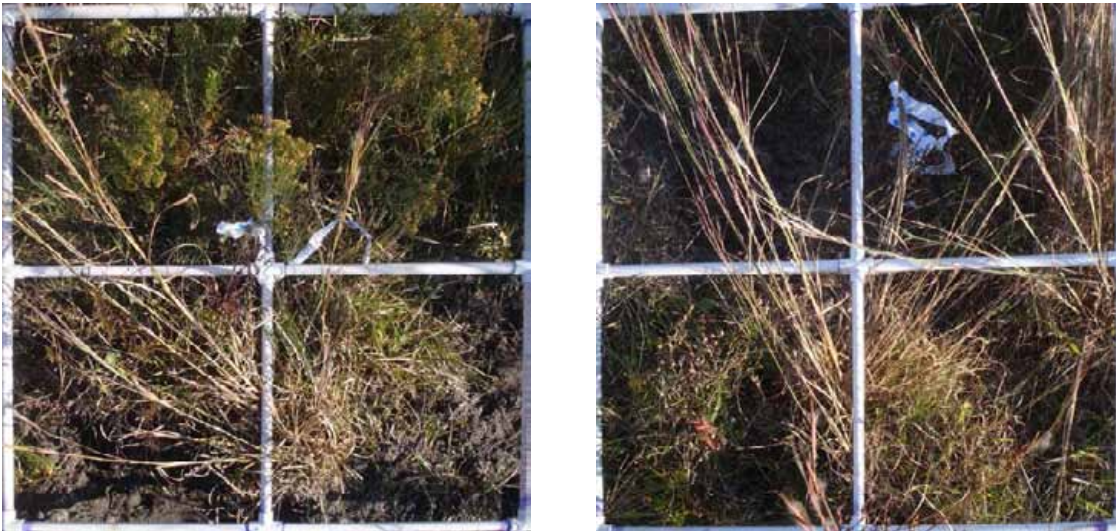
Photographs (left to right): 1) Transect YRRT2-625 Plot – 50 feet; 2) Transect YRRT2-625 Plot – 60 feet



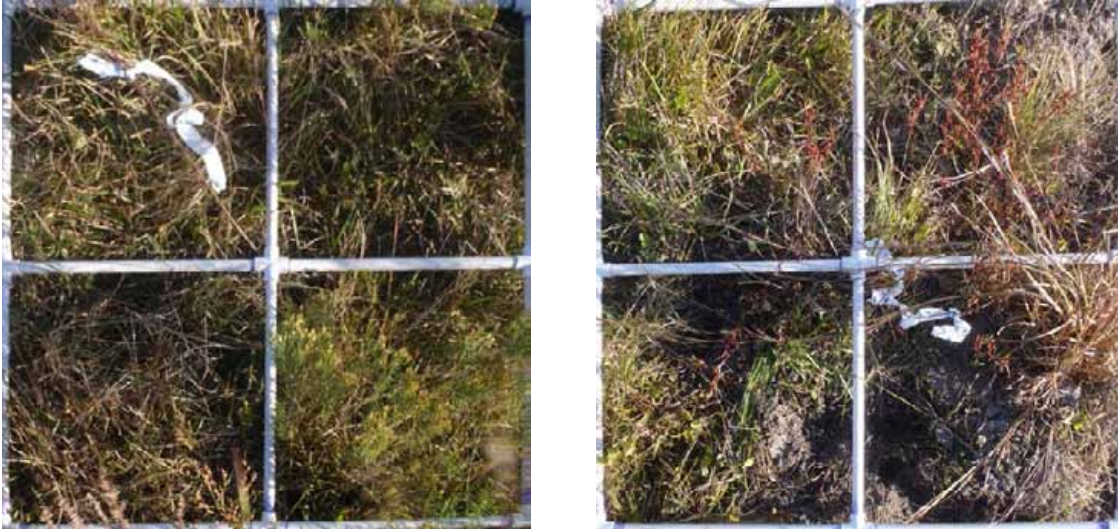
Photographs (left to right): 1) Transect YRRT2-625 Plot – 70 feet; 2) Transect YRRT2-625 Plot – 80 feet



Photographs (left to right): 1) Transect YRRT2-625 Plot – 90 feet; 2) Transect YRRT2-625 Plot – 100 feet



Photographs (left to right): 1) Transect YRRT2-625 Plot – 110 feet; 2) Transect YRRT2-625 Plot – 120 feet



Photographs (left to right): 1) Transect YRRT2-625 Plot – 130 feet; 2) Transect YRRT2-625 Plot – 140 feet



Photographs (left to right): 1) Transect YRRT2-625 Plot – 150 feet