2015 Monitoring Report

DUTEX RESTORATION SITE

Escambia County, Florida

ERC #: 15-196B

December 2015

Ecological Resource Consultants, Inc.

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Prepared for:
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EXECUTIVE SUMMARY

Annual monitoring of the DUTEX site was conducted in November 10-11, 2015 to assess the hydrological, vegetative, ecological, and natural history of the site.

The 2015 Monitoring Report documents the current site conditions, the results of the quantitative and qualitative monitoring, the photographic points. The results of the quantitative and qualitative data are compared to the performance standards approved by the Interagency Review Team (IRT) for the Northwest Florida Water Management District's (NWFWMD) Umbrella, watershed-based, regional mitigation plan (hereafter, Umbrella Plan).

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1.0 INTRODUCTION

1.1. Purpose and Scope

1.1.1 Purpose

The Dutex Restoration site (820 acres), which is located on Perdido Bay (Figure 1), was acquired June 12, 2009 specifically for use as mitigation to offset current and future Florida Department of Transportation (FDOT) wetland impacts. The goal of the mitigation is to restore the site to pre-disturbance conditions. Restoration activities include mechanical brush reduction, prescribed fire, herbicide treatments, selective planting and hydrologic enhancements. Full implementation of the approved mitigation plan will yield 107.16 UMAM credits (IRT-approval: 3/24/2011). The purpose of the study is to obtain data that reflect the current vegetative condition. The data will be reported to document permit compliance and will be used for a reference by which the success of future restoration efforts can be 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). Evaluations of the data is used in selection of the appropriate restoration and management strategies, measurement of the success of implemented restoration practices, evaluation of the trends in landscape responses to management, selection of future adaptive management strategies and reporting adherence to and completion of regulatory permit conditions.

2.0 METHODS

2.1 Field Methods

The location of all transects is depicted on Figures 2W and 2E. A list of all the transect names appears in Table 1.

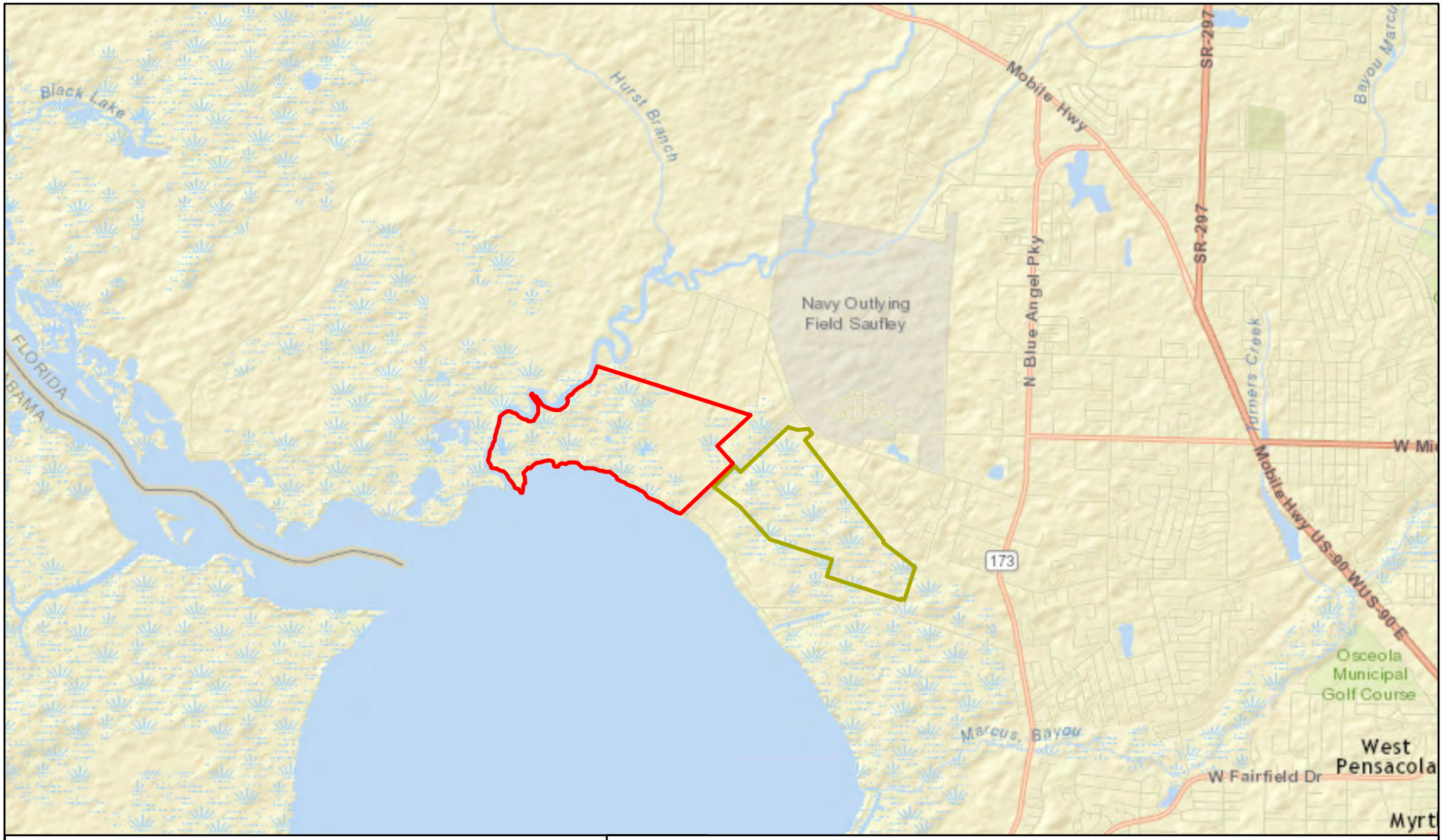

Figure 1. General Location Map

Dutex Restoration

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Table 1: Dutex Monitoring Scope by Activity

Project Name	Transect Name	Transect/Activity Type	Polygon Descriptor	Acres	Number of Transects
Dutex Restoration	Dutex:West Tract	Pedestrian Transect/Qualitative	411 - Mesic Pine Flatwoods	27.26	1
Dutex Restoration	Dutex:West Tract	Pedestrian Transect/Qualitative	611/613 - Bay Swamp	74.57	1
Dutex Restoration	Dutex:West Tract	Pedestrian Transect/Qualitative	625-Hydric Pine Flatwoods	28.94	1
Dutex Restoration	Dutex:West Tract	Pedestrian Transect/Qualitative	626-Hydric Pine Savanna	137.56	1
Dutex Restoration	Dutex:West Tract	Pedestrian Transect/Qualitative	641-Freshwater Marsh	77.99	1
Dutex Restoration	Dutex:West Tract	Pedestrian Transect/Qualitative	642-Saltwater Marsh	104.56	1
Total Number of Transects					6
Dutex Restoration	Dutex:East Tract	Pedestrian Transect/Qualitative	611- Bay Swamp	36.09	1
Dutex Restoration	Dutex:East Tract	Pedestrian Transect/Qualitative	614-Titi Swamp	56.54	1
Dutex Restoration	Dutex:East Tract	Pedestrian Transect/Qualitative	625-Hydric Pine Flatwoods	96.19	1
Dutex Restoration	Dutex:East Tract	Pedestrian Transect/Qualitative	626-Hydric Pine Savanna	52.86	1
Dutex Restoration	Dutex:East Tract	Pedestrian Transect/Qualitative	630-Wetland Forested Mixed	79.13	1
Total Number of Transects					
Dutex Restoration	Dutex:West Tract	Quantitative Transect	625-Hydric Pine Flatwoods	28.94	1
Dutex Restoration	Dutex:West Tract	Quantitative Transect	625-Hydric Pine Flatwoods	28.94	1
Dutex Restoration	Dutex:West Tract	Quantitative Transect	626-Hydric Pine Savanna	137.56	1
Dutex Restoration	Dutex:West Tract	Quantitative Transect	626-Hydric Pine Savanna	137.56	1
Total Number of Transects					4
Dutex Restoration	Dutex:East Tract	Quantitative Transect	625-Hydric Pine Flatwoods	96.19	1
Dutex Restoration	Dutex:East Tract	Quantitative Transect	625-Hydric Pine Flatwoods	96.19	1
Dutex Restoration	Dutex:East Tract	Quantitative Transect	626-Hydric Pine Savanna	52.86	1
Dutex Restoration	Dutex:East Tract	Quantitative Transect	626-Hydric Pine Savanna	52.86	1
Total Number of Transects					4

Legend

West Tract - 483.7 Acres

Panoramic Photo Points

N

2012 True Color

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.

Figure 2W. Transect Locations, West Tract Map

Dutex Restoration Site

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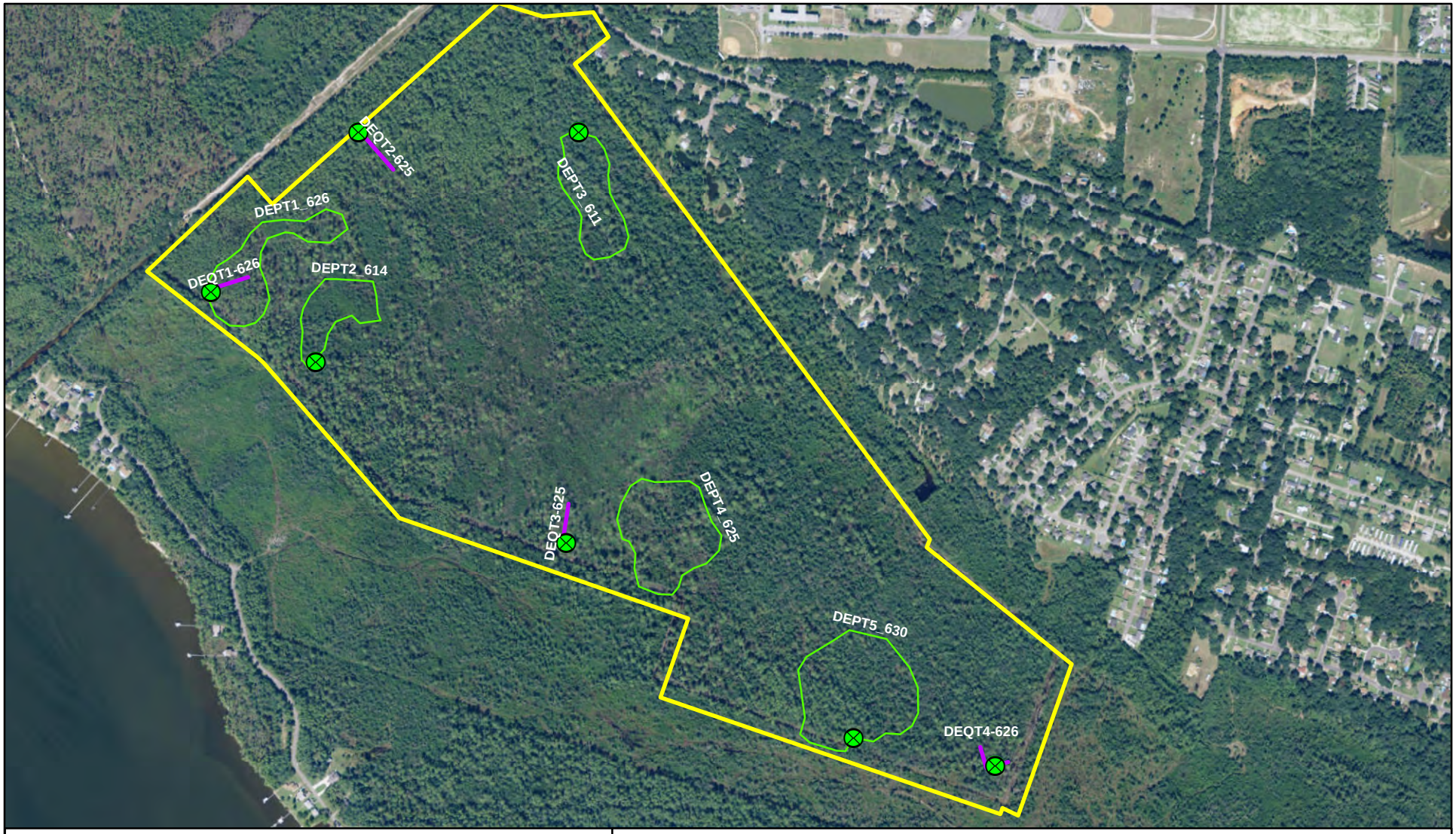

Legend

- East Tract - 326.15 Acres
- Quantitative Transect Locations
- Qualitative Transect Locations
- Panoramic Photo Points

0 500 1,000 2,000 Feet

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N

2012 True Color

Figure 2E. Transect Locations, East Tract Map

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2.1.1 Quantitative Transects

Biological indicators are commonly used criteria for analyzing the value, health and restoration success of habitats. Indicators employed in the monitoring methodology for the Dutex 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 the 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 the 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.

a) Measure and apply one 1m x 1m quadrat at each of the 30 points. Thirty (30) quadrats are used to sample each transect. The methodology samples 30 square meters along each 300 foot transect.

b) Photograph each sample point with the grid in place. A representative point is selected and located with GPS to obtain a 360 degree (panoramic) photograph of the landscape.

c) 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%, and 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 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 depends upon the nature and size of the FLUCCS delineation that is evaluated.

The monitoring is conducted by recording observations along the designated transect called the “walking path”. Each walking paths 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, specific parameters are observed and recorded at an observation point for all polygons. The specific parameters include the following:

1. Note the type of plant community sampled.
2. Record date, time and weather conditions.
3. Estimate 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. Estimate 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. Identify at least four dominant species in the groundcover.
6. Note any 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. Estimate fuel load and note aspects of 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. Compile a list of plant species encountered during the qualitative transect inspection.

2.1.3 Panoramic Photographs

Representative photographs are obtained at specific locations for each qualitative and quantitative 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. All photographic locations are depicted on Figures 3W, 3E, 4W, and 4E.

2.1.4. Additional Field Data Collection/Observations

All incidental listed wildlife and botanical observations are recorded during site visits. Surveys were 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.

2.2 Analytical Methods

Biostatistical methods are employed to quantitatively describe and summarize the field data. The data collected in quadrats or quadrants along a 300 foot transect 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 Methodology

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.
Importance Value = RC+RD+RF
The Importance Value Percentage is the Importance Value multiplied by 100
Importance Value Percentage = Importance Value * 100

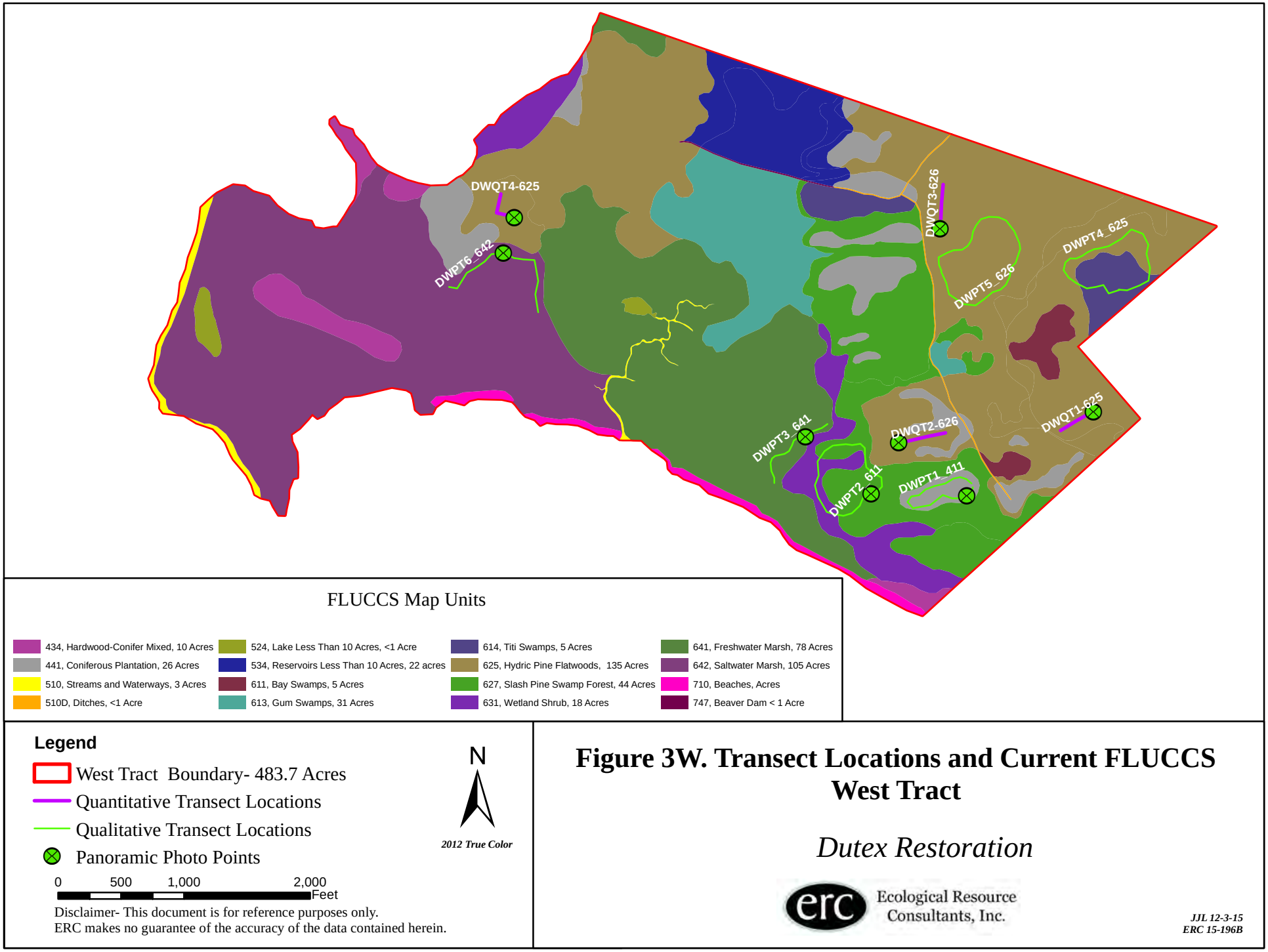

Figure 3W. Transect Locations and Current FLUCCS West Tract

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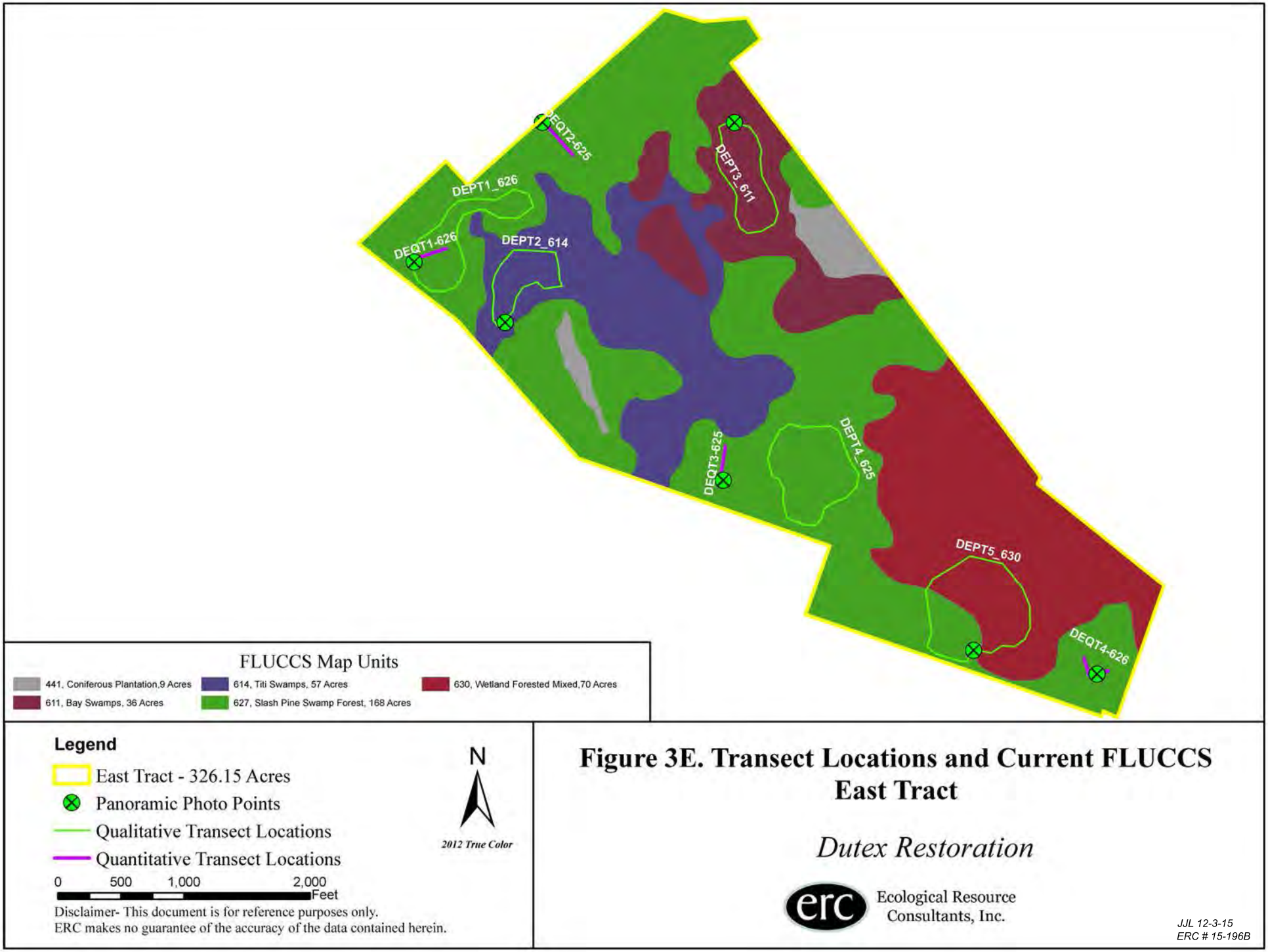

Figure 3E. Transect Locations and Current FLUCCS East Tract

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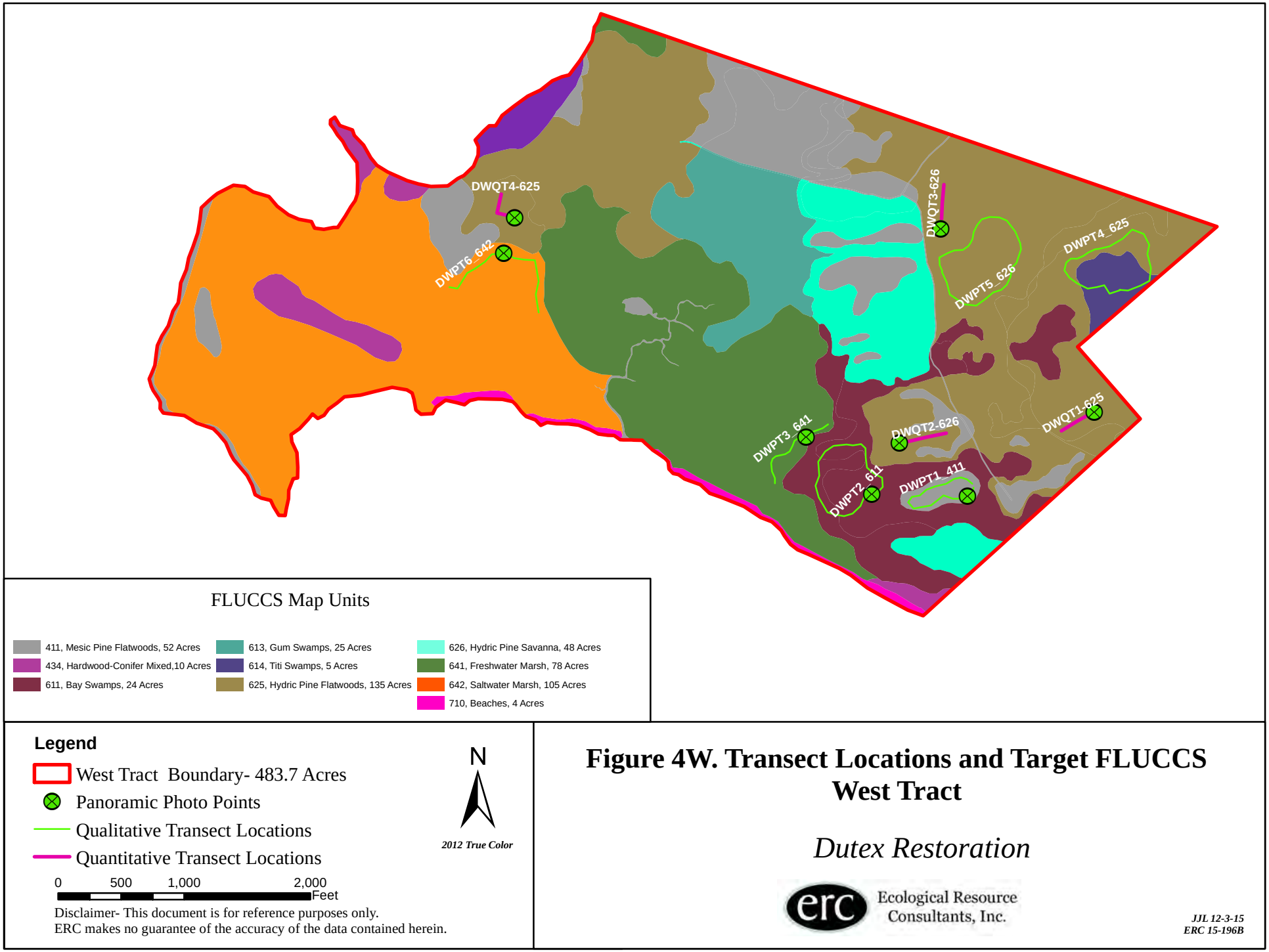

Figure 4W. Transect Locations and Target FLUCCS West Tract

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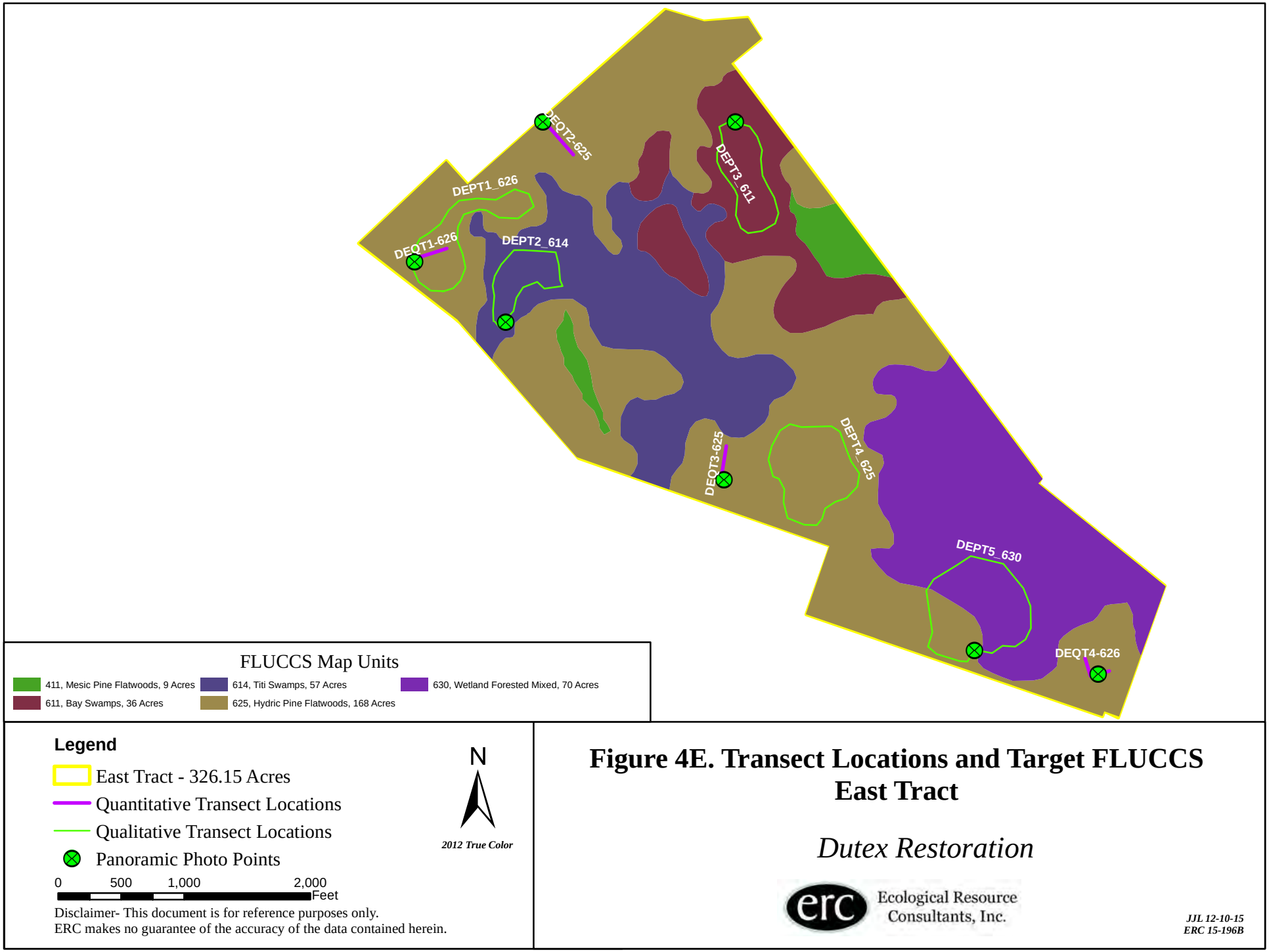

Figure 4E. Transect Locations and Target FLUCCS East Tract

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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 2a, 3a, 4a, 5a, 6a, 7a, 8a, and 9a). Quantitative summary data is reported for each transect and broken down by plant community (See Tables 2b, 3b, 4b, 5b, 6b, 7b, 8b, and 9b).

Table 2a: Transect DEQT1-626 Hydric Pine Savanna

Species	Importance Value (%)	Relative Cover (%)	Relative Density (%)	Relative Frequency (%)
Forbs				
Hypericum cistifolium	4.36	3.5	6.1	3.6
Rhexia petiolata	3.09	1.8	3.9	3.6
Rhexia virginica	1.94	1.6	1.5	2.7
Bidens mitis	1.4	0.9	1.5	1.8
Xyris serotina	1.17	1.3	1.3	0.9
Rubus trivialis	1.16	1.2	0.5	1.8
Rubus argutus	0.89	1.3	0.5	0.9
Lachnocaulon anceps	0.76	0.7	0.7	0.9
Eriocaulon decangulare	0.71	0.7	0.5	0.9
Eupatorium mohrii	0.71	0.7	0.5	0.9
Polygala cymosa	0.62	0.5	0.5	0.9
Rhexia alifanus	0.62	0.5	0.5	0.9
Xyris brevifolia	1.53	1.5	1.3	1.8
Xyris stricta	1.44	1.2	1.3	1.8
Graminoids				
Rhynchospora filifolia	7.7	9.6	6.4	7.1
Panicum verrucosum	6.27	12.5	4.5	1.8
Rhynchospora plumosa	3.86	3.9	3.2	4.5
Dichanthelium ensifolium	3.54	3.7	2.5	4.5
Andropogon glomeratus	2.41	2.6	1.0	3.6
Rhynchospora fascicularis	1.55	1.2	1.7	1.8
Panicum anceps	1.22	1.2	0.7	1.8
Rhynchospora microcarpa	0.76	0.7	0.7	0.9
Dichanthelium scabriusculum	0.71	0.7	0.5	0.9

Table 2a: Transect DEQT1-626 Hydric Pine Savanna (Continued)

Species	Importance Value (%)	Relative Cover (%)	Relative Density (%)	Relative Frequency (%)
Vines				
Smilax laurifolia	3.28	2.0	3.4	4.5
Vitis rotundifolia	2.3	2.2	2.0	2.7
Woody Plants				
Cyrilla racemiflora	13.12	9.4	17.5	12.5
Cliftonia monophylla	7.45	6.9	7.4	8.0
Ilex coriacea	5.92	6.5	7.7	3.6
Gaylussacia mosieri	4.29	3.7	6.6	2.7
Lyonia lucida	4.17	5.2	2.9	4.5
Hypericum fasciculatum	3.92	2.6	5.6	3.6
Magnolia virginiana	3.36	5.0	1.5	3.6
Ilex cassine v. myrtifolia	2.83	2.5	3.4	2.7
Pinus elliottii	0.41	0.2	0.2	0.9

Table 2b: Transect DEQT1-626 Hydric Pine Flatwoods

Groundcover Vegetation Relative Cover (%)				Average Cover (%)	Species Richness
Forbs	Graminoids	Vines	Woody Plants	Bare ground/ Standing water	
17.3%	36.6%	4.2%	41.9 %	75.8	35
Shrub Height (meters)					1.05

Transect DEQT1-626 Hydric Pine Flatwoods

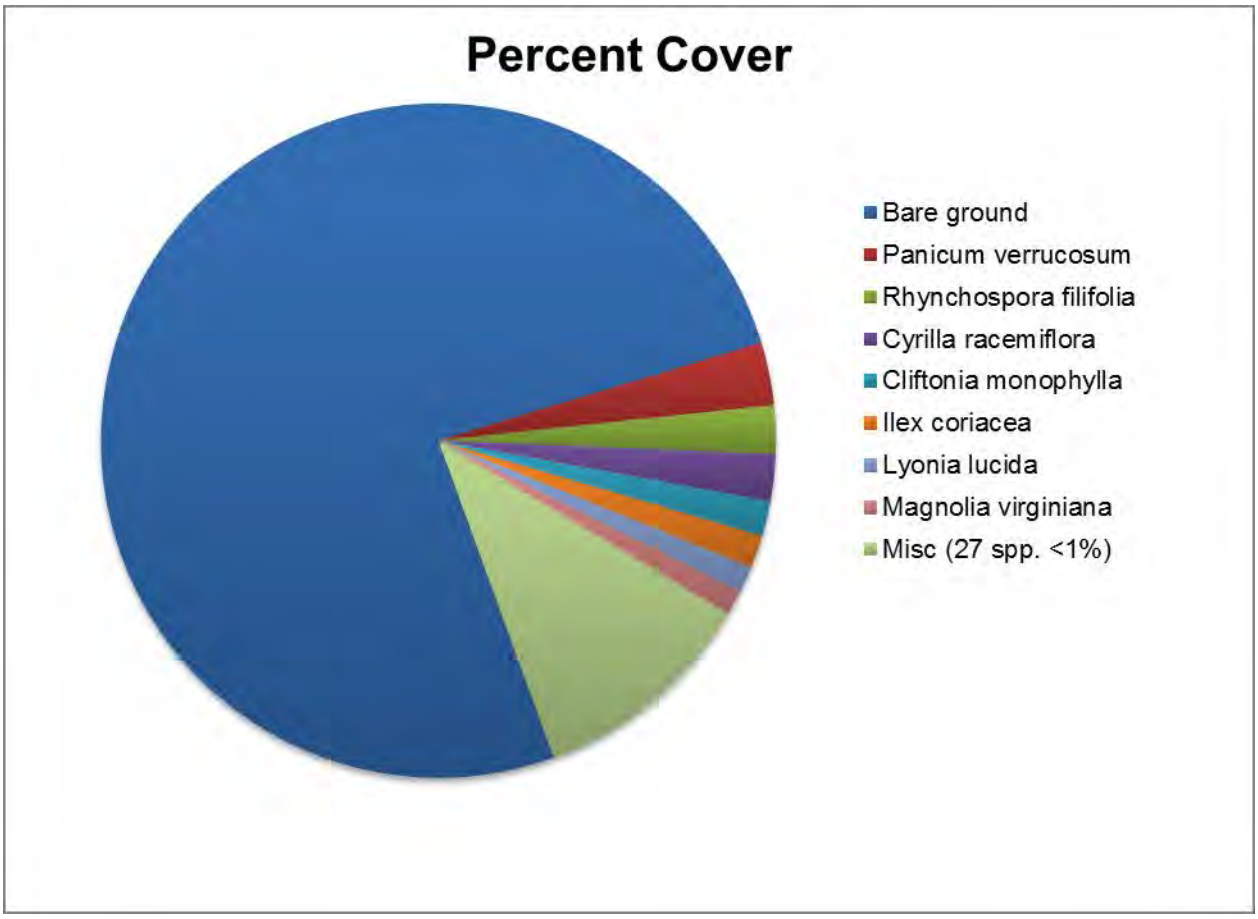


Table 3a: Transect DEQT2-625 Hydric Pine Flatwoods

Species	Importance Value (%)	Relative Cover (%)	Relative Density (%)	Relative Frequency (%)
Forbs				
Rhexia petiolata	2.44	2.4	2.3	2.6
Eriocaulon decangulare	1.78	2.0	1.6	1.7
Eupatorium mohrii	1.77	1.1	1.6	2.6
Ludwigia pilosa	1.73	2.0	1.5	1.7
Rhexia virginica	1.4	1.2	1.3	1.7
Rhexia mariana	1.21	1.6	1.1	0.9
Woodwardia virginica	1.03	1.3	1.0	0.9
Xyris brevifolia	0.91	0.7	1.1	0.9
Bigelowia nudata	0.87	1.3	0.5	0.9
Lachnocaulon anceps	0.86	0.7	1.0	0.9
Bidens mitis	0.86	0.7	1.0	0.9
Hypericum cistifolium	0.82	0.5	1.1	0.9
Viola lanceolata	0.8	0.7	0.8	0.9
Oldenlandia uniflora	0.77	0.5	1.0	0.9
Xyris stricta	0.6	0.5	0.5	0.9
Eriocaulon compressum	0.49	0.5	0.2	0.9
Graminoids				
Rhynchospora filifolia	7.14	9.9	5.4	6.1
Dichanthelium ensifolium	4.1	5.6	3.3	3.5
Rhynchospora fascicularis	3.82	5.4	2.6	3.5
Rhynchospora plumosa	2.87	4.2	1.8	2.6
Rhynchospora microcarpa	2.13	2.9	1.8	1.7
Andropogon glomeratus	1.63	2.3	0.8	1.7
Rhynchospora chapmanii	1.53	0.9	2.0	1.7
Panicum anceps	1.36	1.7	0.7	1.7
Dichanthelium scabriusculum	0.69	0.7	0.5	0.9
Panicum verrucosum	0.6	0.5	0.5	0.9
Andropogon gyrans	0.49	0.5	0.2	0.9
Vines				
Smilax laurifolia	4.86	1.8	6.7	6.1
Gelsemium rankinii	1.59	0.9	2.1	1.7
Vitis rotundifolia	1.01	0.6	0.7	1.7

Table 3a: Transect DEQT2-625 Hydric Pine Flatwoods (Continued)

Species	Importance Value (%)	Relative Cover (%)	Relative Density (%)	Relative Frequency (%)
Vines				
Smilax walteri	0.82	0.5	1.1	0.9
Woody Plants				
Cliftonia monophylla	17.99	17.3	18.4	18.3
Gaylussacia mosieri	8.68	9.1	10.0	7.0
Nyssa sylvatica v. biflora	8.08	3.1	15.0	6.1
Ilex coriacea	4.86	6.7	4.4	3.5
Ilex cassine v. myrtifolia	2.19	3.1	0.8	2.6
Cyrilla racemiflora	1.06	0.6	0.8	1.7
Magnolia virginiana	0.99	1.6	0.5	0.9
Lyonia lucida	0.98	1.3	0.8	0.9
Hypericum fasciculatum	0.77	0.5	1.0	0.9
Myrica caroliniensis	0.55	0.5	0.3	0.9
Sapium sebiferum	0.49	0.5	0.2	0.9
Pinus elliottii	0.4	0.2	0.2	0.9

Table 3b: Transect DEQT2-625 Hydric Pine Flatwoods

Groundcover Vegetation Relative Cover (%)					Average Cover (%)	Species Richness
Forbs	Graminoids	Bryophytes	Vines	Woody Plants	Bare ground/ Standing water	
17.4%	34.5%	<1%	3.77%	44.4%	76.2%	43
	Shrub Height (meters)					1.42

Transect DEQT2-625 Hydric Pine Flatwoods

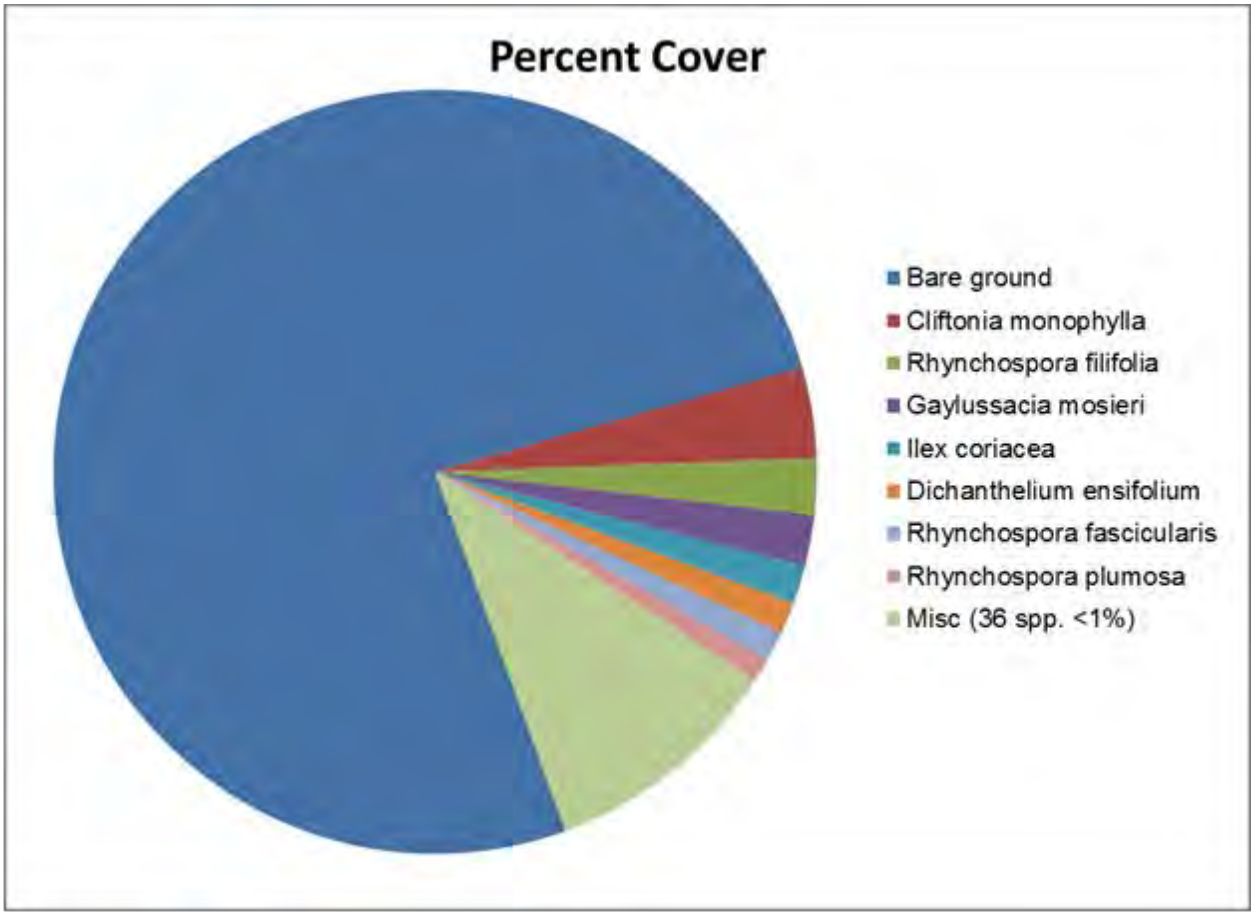


Table 4a: Transect DEQT3-625 Hydric Pine Flatwoods

Species	Importance Value (%)	Relative Cover (%)	Relative Density (%)	Relative Frequency (%)
Forbs				
Xyris stricta	0.67	0.3	0.5	1.3
Graminoids				
Rhynchospora chapmanii	0.83	0.5	0.8	1.3
Andropogon glomeratus	0.75	0.6	0.4	1.3
Rhynchospora plumosa	0.64	0.3	0.4	1.3
Vines				
Smilax laurifolia	1.41	0.9	0.9	2.5
Vitis rotundifolia	1.2	0.5	0.6	2.5
Toxicodendron radicans	0.73	0.3	0.7	1.3
Woody Plants				
Ilex coriacea	51.93	65.4	52.9	37.5
Gaylussacia mosieri	24.79	18.2	31.2	25.0
Cliftonia monophylla	3.4	3.4	3.0	3.8
Cyrilla racemiflora	3.16	3.2	2.5	3.8
Persea palustris	2.98	2.2	0.5	6.3
Lyonia lucida	2.36	0.8	2.5	3.8
Ilex glabra	2.04	1.5	2.1	2.5
Magnolia virginiana	1.91	1.2	0.8	3.8
Pinus elliottii	0.61	0.5	0.1	1.3
Photinia pyrifolia	0.6	0.3	0.3	1.3

Table 4b: Transect DEQT3-625 Hydric Pine Flatwoods

Groundcover Vegetation Relative Cover (%)				Average Cover (%)	Species Richness
Forbs	Graminoids	Vines	Woody Plants	Bare ground/ Standing water	
0.3%	1.3%	1.7%	96.7%	17.4%	17
Shrub Height (meters)					0.93

Transect DEQT3-625 Hydric Pine Flatwoods

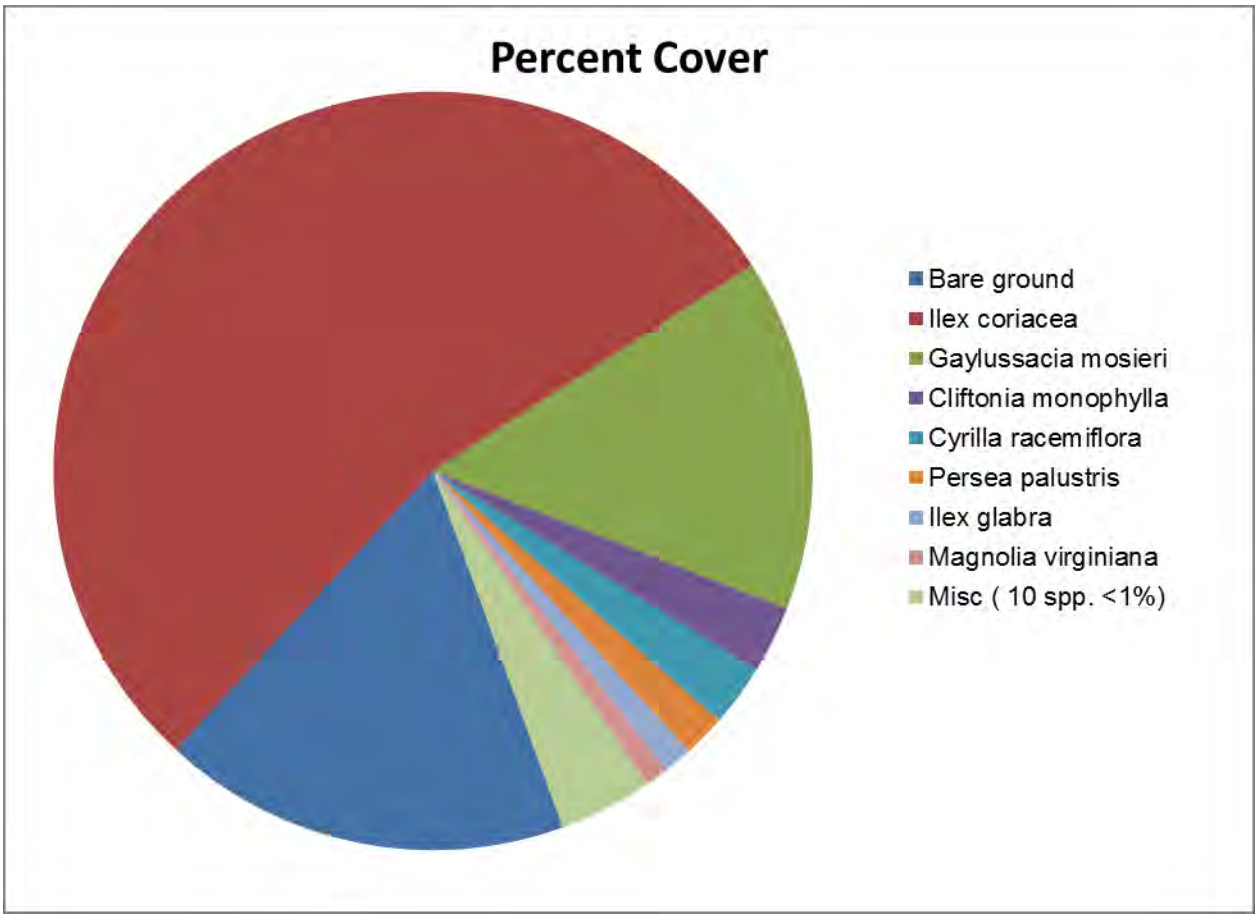


Table 5a: Transect DEQT4-626 Hydric Pine Savanna

Species	Importance Value (%)	Relative Cover (%)	Relative Density (%)	Relative Frequency (%)
Forbs				
Bidens mitis	7.39	8.7	8.2	5.3
Ludwigia pilosa	7	9.2	6.5	5.3
Rhexia virginica	5.23	6.4	5.0	4.4
Centella asiatica	4.96	2.7	6.8	5.3
Hypericum cistifolium	4.72	4.4	5.4	4.4
Xyris drummondii	3.19	2.0	5.7	1.9
Hypericum brachyphyllum	2.19	3.3	1.4	1.9
Rubus argutus	2.15	2.4	1.7	2.4
Lachnanthes caroliana	0.94	0.9	1.0	1.0
Rubus trivialis	0.67	0.4	0.6	1.0
Thelypteris palustris	0.63	0.4	0.5	1.0
Viola primulifolia	0.6	0.2	1.1	0.5
Eriocaulon decangulare	0.59	0.5	0.3	1.0
Xyris stricta	1.2	0.9	1.3	1.5
Pluchea baccharis	0.57	0.3	0.5	1.0
Mitchella repens	0.51	0.3	0.7	0.5
Osmunda cinnamomea	0.43	0.7	0.1	0.5
Ludwigia linifolia	0.38	0.2	0.5	0.5
Eupatorium mohrii	0.33	0.3	0.2	0.5
Ludwigia palustris	0.3	0.1	0.3	0.5
Eupatorium capillifolium	0.25	0.2	0.1	0.5
Graminoids				
Rhynchospora cephalantha	7	12.0	5.1	3.9
Dichanthelium ensifolium	5.07	6.0	5.8	3.4
Andropogon glomeratus	2.36	2.5	1.7	2.9
Rhynchospora chapmanii	2.3	1.4	4.1	1.5
Rhynchospora microcarpa	1.96	2.0	1.4	2.4
Rhynchospora filifolia	1.79	2.0	1.5	1.9
Andropogon gyrans v. stenophyllus	1.31	2.0	0.5	1.5
Rhynchospora fascicularis	1.24	1.5	0.8	1.5
Panicum verrucosum	0.58	0.7	0.5	0.5
Rhynchospora plumosa	0.53	0.6	0.5	0.5
Rhynchospora chalarocephala	0.37	0.6	0.1	0.5
Andropogon gyrans	0.33	0.3	0.2	0.5

Table 5a: Transect DEQT4-626 Hydric Pine Savanna (Continued)

Species	Importance Value (%)	Relative Cover (%)	Relative Density (%)	Relative Frequency (%)
Vines				
Vitis rotundifolia	5.05	5.7	3.6	5.8
Smilax laurifolia	2.96	2.6	2.4	3.9
Gelsemium rankinii	2.27	1.8	2.1	2.9
Toxicodendron radicans	0.57	0.3	0.5	1.0
Smilax walteri	0.21	0.1	0.1	0.5
Woody Plants				
Nyssa ursina	7.08	3.1	10.9	7.3
Cliftonia monophylla	2.85	1.8	3.4	3.4
Pinus elliottii	2.07	0.8	1.6	3.9
Ilex coriacea	1.47	1.8	1.2	1.5
Hypericum fasciculatum	1.33	1.5	1.6	1.0
Gaylussacia mosieri	1.12	0.7	1.2	1.5
Magnolia virginiana	0.94	1.0	0.4	1.5
Persea palustris	0.67	0.7	0.4	1.0
Myrica caroliniensis	0.56	0.5	0.2	1.0
Cyrilla racemiflora	0.54	0.7	0.4	0.5
Lyonia lucida	0.46	0.6	0.3	0.5
Acer rubrum	0.29	0.3	0.1	0.5
Stillingia aquatica	0.28	0.1	0.3	0.5
Sapium sebiferum	0.23	0.1	0.1	0.5

Table 5b: Transect DEQT4-626 Hydric Pine Savanna

Groundcover Vegetation Relative Cover (%)					Average Cover (%)	Species Richness
Forbs	Graminoids	Bryophytes	Vines	Woody Plants	Bare ground/ Standing water	
44.4%	31.6%	<1%	10.5%	13.5%	41.6%	52
	Shrub Height (meters)					1.0

Transect DEQT4-626 Hydric Pine Savanna

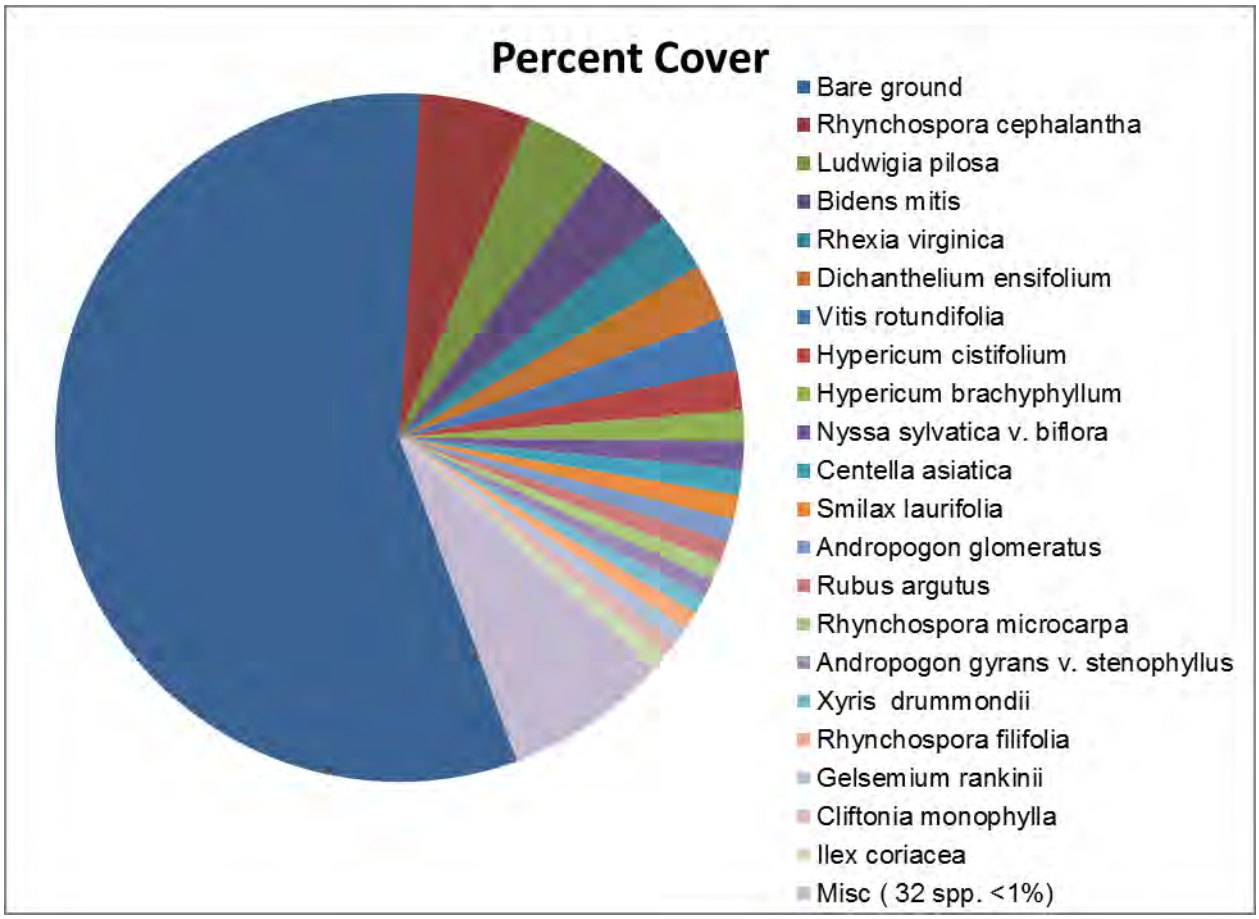


Table 6a: Transect DWQT1-625 Hydric Pine Flatwoods

Species	Importance Value (%)	Relative Cover (%)	Relative Density (%)	Relative Frequency (%)
Forbs				
Lachnanthes caroliana	12.59	11.3	17.5	9.0
Rhexia virginica	3.08	3.4	3.2	2.7
Woodwardia virginica	1.76	1.5	1.6	2.1
Rhexia petiolata	0.98	0.7	1.2	1.1
Ludwigia pilosa	0.86	0.7	0.8	1.1
Oldenlandia uniflora	0.66	0.5	0.4	1.1
Eupatorium leptophyllum	0.62	0.3	0.5	1.1
Hypericum brachyphyllum	3.76	3.5	2.5	5.3
Rhexia mariana	0.46	0.2	0.7	0.5
Hypericum cistifolium	0.46	0.5	0.4	0.5
Eriocaulon compressum	0.42	0.5	0.3	0.5
Xyris stricta	0.39	0.2	0.5	0.5
Euthamia graminifolia	0.35	0.3	0.3	0.5
Graminoids				
Rhynchospora filifolia	15.35	21.3	14.2	10.6
Rhynchospora fascicularis	10.23	10.3	10.9	9.5
Andropogon glomeratus	7.87	7.8	6.8	9.0
Panicum verrucosum	6.89	6.5	9.4	4.8
Rhynchospora chapmanii	4.34	3.2	6.1	3.7
Andropogon gyrans v. stenophyllus	1.94	2.8	0.9	2.1
Dichanthelium scabriusculum	0.6	0.6	0.7	0.5
Dichanthelium ensifolium	0.3	0.2	0.2	0.5
Rhynchospora ciliaris	0.28	0.2	0.1	0.5
Vines				
Smilax laurifolia	9.67	8.4	7.4	13.2
Woody Plants				
Cliftonia monophylla	12.51	12.9	10.9	13.8
Pinus elliottii	1.57	0.4	1.2	3.2
Lyonia lucida	1.39	1.5	1.1	1.6
Ilex coriacea	0.42	0.5	0.3	0.5
Magnolia virginiana	0.25	0.2	0.1	0.5

Table 6b: Transect DWQT1-625 Hydric Pine Flatwoods

Groundcover Vegetation Relative Cover (%)				Average Cover (%)	
Forbs	Graminoids	Vines	Woody Plants	Bare ground/ Standing water	Species Richness
23.5%	52.7%	8.3%	15.4%	25.5%	28
Shrub Height (meters)					0.3

Transect DWQT1-625 Hydric Pine Flatwoods

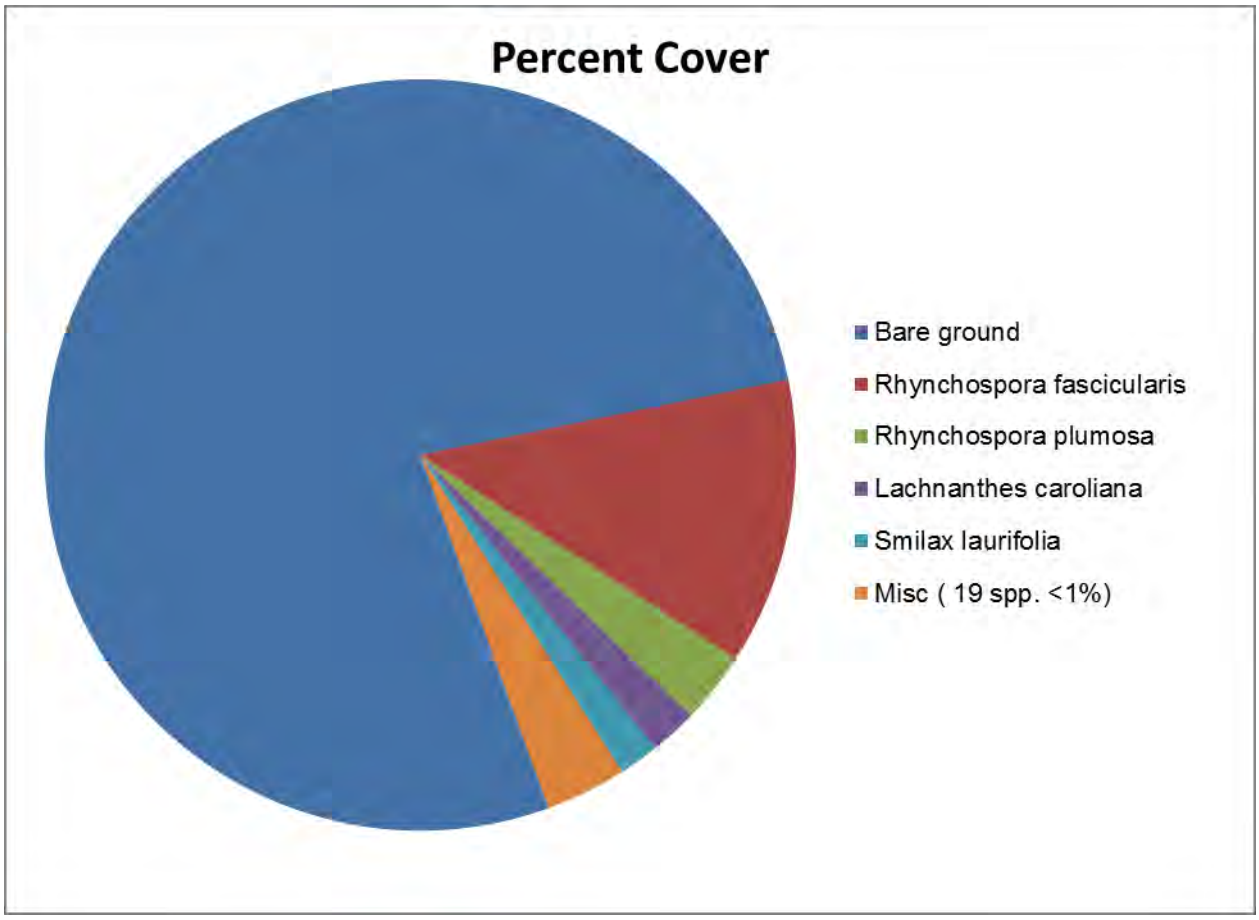


Table 7a: Transect DWQT2-626 Hydric Pine Savanna

Species	Importance Value (%)	Relative Cover (%)	Relative Density (%)	Relative Frequency (%)
Forbs				
Hypericum brachyphyllum	5.77	5.9	6.5	4.9
Lachnanthes caroliana	2.57	1.9	2.9	2.9
Sarracenia leucophylla	1.49	1.2	1.4	1.9
Xyris drummondii	0.77	0.4	0.9	1.0
Eriocaulon decangulare	0.67	0.4	0.6	1.0
Eriocaulon compressum	0.66	0.3	0.8	1.0
Rhexia petiolata	0.61	0.3	0.6	1.0
Graminoids				
Dichanthelium ensifolium	5.76	5.7	5.8	5.8
Aristida stricta v. beyrichiana	2.89	4.2	1.5	2.9
Andropogon glomeratus	2.57	2.0	1.8	3.9
Rhynchospora plumosa	1.82	1.7	1.8	1.9
Rhynchospora fascicularis	1.67	1.7	1.4	1.9
Aristida palustris	1.44	1.2	1.2	1.9
Panicum anceps	0.89	1.0	0.8	1.0
Andropogon arctatus	0.67	0.7	0.3	1.0
Vines				
Smilax laurifolia	1.44	1.0	1.4	1.9
Woody Plants				
Ilex coriacea	22.08	27.6	22.2	16.5
Cliftonia monophylla	12.87	14.9	12.0	11.7
Gaylussacia mosieri	10.96	8.0	13.2	11.7
Lyonia lucida	7.66	6.0	10.2	6.8
Cyrilla racemiflora	6.4	5.2	6.2	7.8
Ilex glabra	4.58	6.2	3.7	3.9
Myrica caroliniensis	1.96	1.6	1.4	2.9
Hypericum fasciculatum	0.87	0.4	1.2	1.0
Magnolia virginiana	0.51	0.4	0.2	1.0
Persea palustris	0.41	0.1	0.2	1.0

Table 7b: Transect DWQT2-626 Hydric Pine Savanna

Groundcover Vegetation Relative Cover (%)					Average Cover (%)	Species Richness
Forbs	Graminoids	Bryophytes	Vines	Woody Plants	Bare ground/ Standing water	
10.4%	18.2%	<1%	1.0%	70.4%	43.3%	26
	Shrub Height (meters)					1.61

Transect DWQT2-626

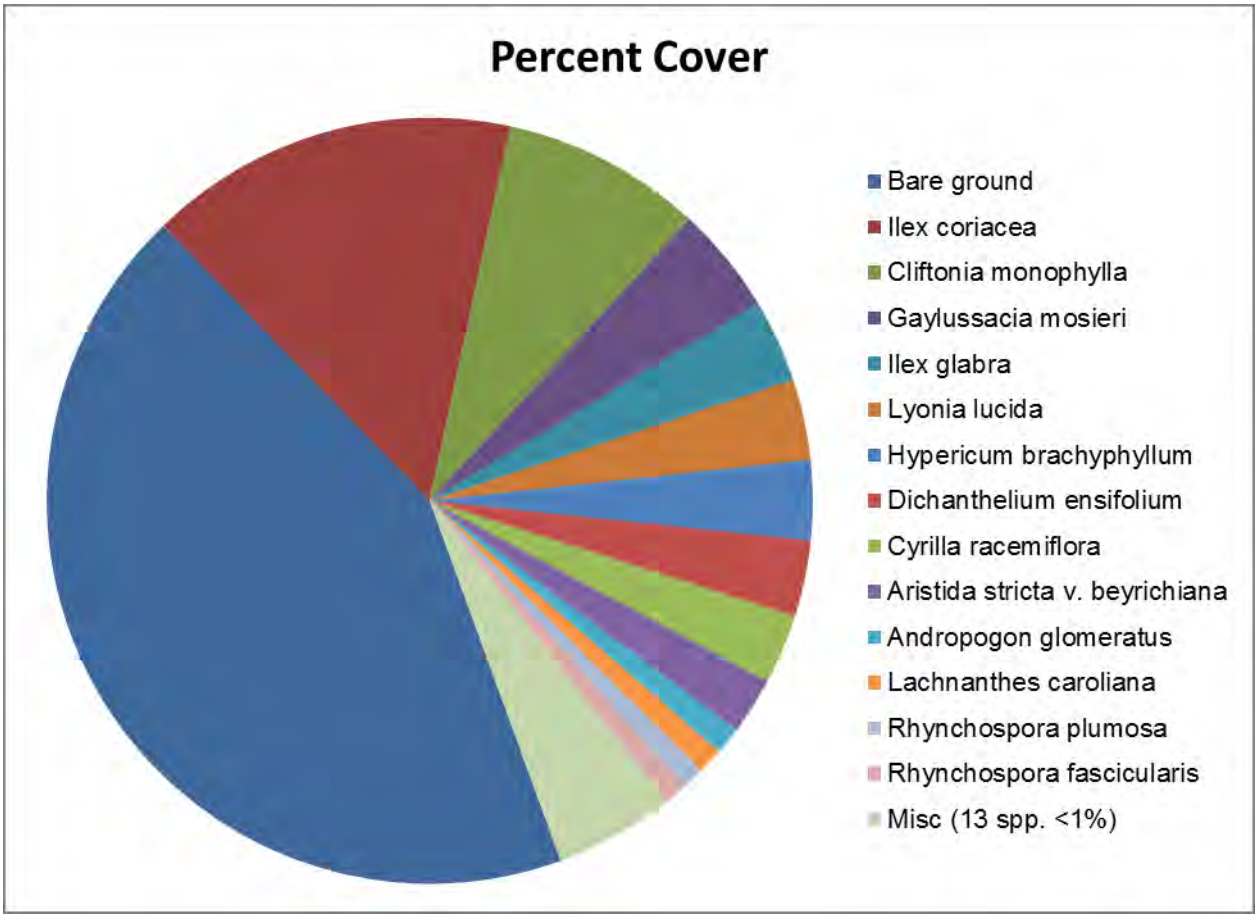


Table 8a: Transect DWQT3-626 Hydric Pine Savanna

Species	Importance Value (%)	Relative Cover (%)	Relative Density (%)	Relative Frequency (%)
Forbs				
Hypericum brachyphyllum	9.34	11.3	8.8	8.0
Eriocaulon decangulare	4.62	5.5	4.2	4.2
Lachnanthes caroliana	2.48	1.6	3.2	2.7
Xyris stricta	1.95	1.4	2.2	2.3
Rhexia petiolata	1.95	1.1	2.9	1.9
Eriocaulon compressum	1.92	1.0	3.2	1.5
Sarracenia leucophylla	1.64	1.4	1.6	1.9
Euthamia caroliniana	1.12	0.9	0.9	1.5
Osmunda regalis var. spectabilis	0.88	0.5	1.4	0.8
Xyris serotina	0.75	0.7	0.8	0.8
Hypericum cistifolium	0.62	0.3	0.8	0.8
Xyris elliottii	0.54	0.6	0.3	0.8
Eupatorium leptophyllum	0.42	0.3	0.2	0.8
Ludwigia pilosa	0.41	0.4	0.4	0.4
Lachnocaulon anceps	0.4	0.2	0.7	0.4
Bidens mitis	0.32	0.1	0.5	0.4
Centella asiatica	0.31	0.2	0.4	0.4
Xyris fimbriata	0.27	0.2	0.3	0.4
Solidago rugosa subsp. aspera	0.22	0.2	0.1	0.4
Eupatorium mohrii	0.2	0.2	0.1	0.4
Oxypolis filiformis	0.2	0.2	0.1	0.4
Oldenlandia uniflora	0.19	0.1	0.1	0.4
Lobelia glandulosa	0.17	0.1	0.1	0.4
Liatris spicata	0.17	0.1	0.1	0.4
Graminoids				
Andropogon glomeratus	9.72	11.7	11.0	6.4
Dichanthelium scabriusculum	6.15	9.7	4.2	4.6
Dichanthelium ensifolium	6.09	5.9	7.1	5.3
Rhynchospora fascicularis	5.33	5.4	5.7	4.9
Rhynchospora chapmanii	5.29	5.1	5.8	4.9
Rhynchospora plumosa	5.18	4.1	8.8	2.7
Aristida stricta v. beyrichiana	3.85	5.9	1.9	3.8
Rhynchospora filifolia	3.51	3.2	3.5	3.8

Table 8a: Transect DWQT3-626 Hydric Pine Savanna (Continued)

Species	Importance Value (%)	Relative Cover (%)	Relative Density (%)	Relative Frequency (%)
Graminoids				
Aristida palustris	2.51	3.3	1.2	3.0
Andropogon gyrans v. stenophyllus	0.94	0.8	0.9	1.1
Panicum anceps	0.7	1.2	0.1	0.8
Sporobolus floridanus	0.63	1.0	0.1	0.8
Rhynchospora pusilla	0.53	0.2	1.1	0.4
Juncus repens	0.31	0.2	0.4	0.4
Juncus marginatus	0.31	0.2	0.4	0.4
Andropogon virginicus v. glaucus	0.3	0.4	0.1	0.4
Dichanthelium erectifolium	0.17	0.1	0.1	0.4
Moss				
Sphagnum spp.	0.27	0.4	0.1	0.4
Vines				
Smilax laurifolia	3.5	3.0	2.2	5.3
Woody Plants				
Cliftonia monophylla	3.5	3.2	4.3	3.0
Pinus elliottii	2.06	0.6	1.8	3.8
Gaylussacia mosieri	1.12	0.9	0.9	1.5
Vaccinium corymbosum	0.8	0.5	0.8	1.1
Ilex glabra	0.76	0.5	0.7	1.1
Magnolia virginiana	0.76	0.9	0.7	0.8
Photinia pyrifolia	0.62	0.5	0.3	1.1
Ilex coriacea	0.6	0.3	0.7	0.8
Lyonia lucida	0.6	0.6	0.5	0.8
Nyssa sylvatica v. biflora	0.51	0.5	0.3	0.8
Hypericum fasciculatum	0.41	0.4	0.4	0.4
Sapium sebiferum	0.34	0.1	0.1	0.8
Myrica caroliniensis	0.32	0.4	0.1	0.4
Nyssa ursina	0.31	0.2	0.4	0.4
Myrica cerifera	0.2	0.2	0.1	0.4
Ilex cassine v. myrtifolia	0.2	0.2	0.1	0.4
Ilex vomitoria	0.2	0.2	0.1	0.4
Taxodium ascendens	0.17	0.1	0.1	0.4
Persea palustris	0.17	0.1	0.1	0.4

Table 8b: Transect DWQT3-626 Hydric Pine Savanna

Groundcover Vegetation Relative Cover (%)					Average Cover (%)	Species Richness
Forbs	Graminoids	Bryophytes	Vines	Woody Plants	Bare ground/ Standing water	
28.1%	53.3%	0.4%	3.0%	10.1%	15.9%	62
	Shrub Height (meters)					1.3

Transect DWQT3-626

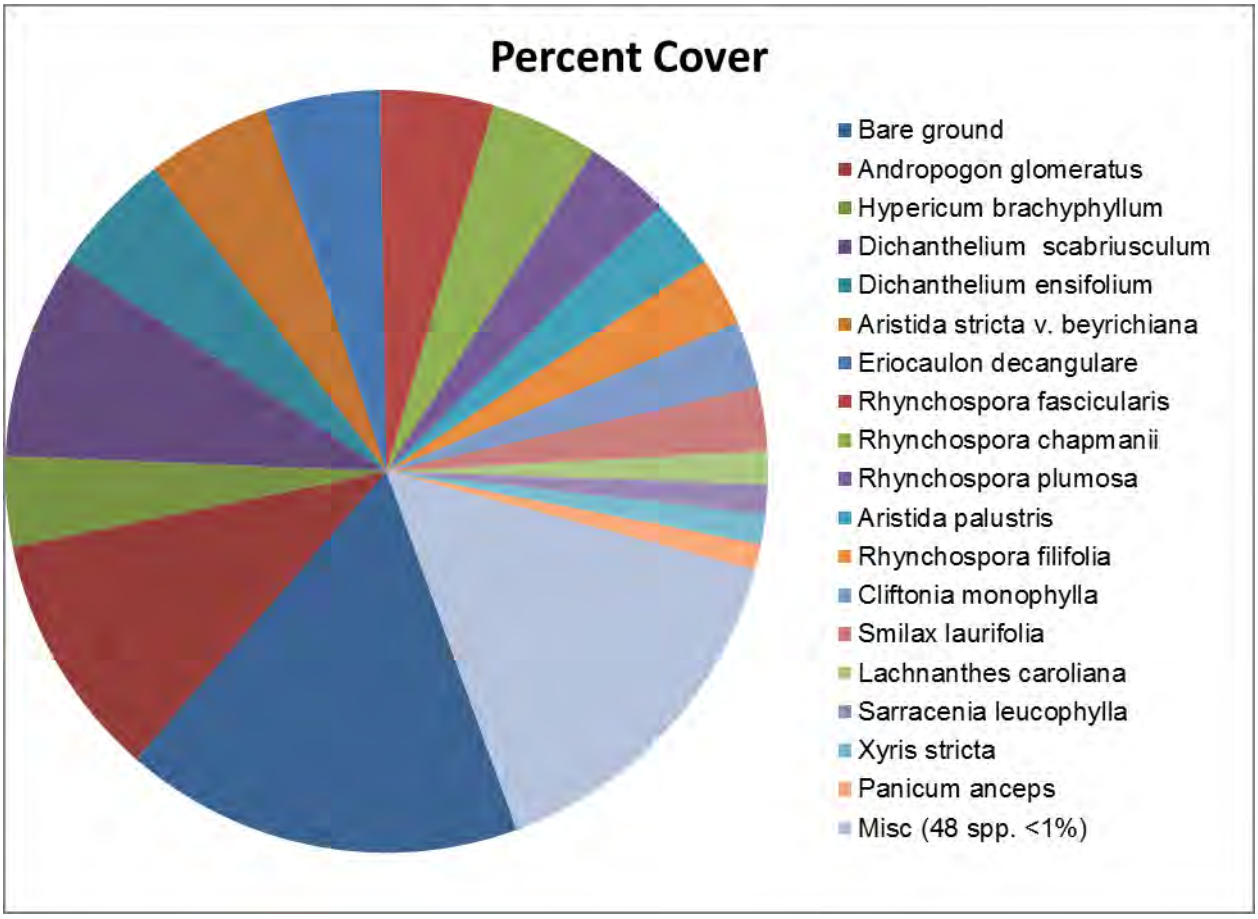


Table 9a: Transect DWQT4-625 Hydric Pine Flatwoods

Species	Importance Value (%)	Relative Cover (%)	Relative Density (%)	Relative Frequency (%)
Forbs				
Bidens mitis	3.72	0.8	6.2	4.2
Osmunda regalis var. spectabilis	2.94	3.5	1.7	3.6
Centella asiatica	2.78	0.7	4.5	3.1
Rubus trivialis	1.9	1.4	2.2	2.1
Osmunda cinnamomea	1.59	1.2	0.9	2.6
Polygala lutea	0.66	0.2	1.3	0.5
Rubus argutus	0.6	0.5	0.8	0.5
Woodwardia areolata	0.53	0.3	0.8	0.5
Sabal minor	0.41	0.6	0.1	0.5
Graminoids				
Panicum verrucosum	11.9	15.0	12.9	7.8
Rhynchospora plumosa	9.06	9.4	10.0	7.8
Aristida stricta v. beyrichiana	7.86	11.7	5.1	6.7
Panicum virgatum	7.27	8.3	6.3	7.3
Panicum hians	5.37	7.3	4.7	4.2
Rhynchospora fascicularis	5.05	4.9	5.6	4.7
Andropogon glomeratus	5.01	5.2	4.7	5.2
Dichanthelium scabriusculum	4.18	4.2	5.2	3.1
Amphicarpum muhlenbergianum	3.37	2.5	4.0	3.6
Paspalum floridanum	3.31	4.3	2.6	3.1
Aristida palustris	2.59	2.9	2.3	2.6
Carex glaucescens	1.72	2.2	0.9	2.1
Muhlenbergia capillaris	1.57	2.8	0.9	1.0
Andropogon gyrans v. stenophyllus	1.38	1.5	1.1	1.6
Andropogon gyrans	0.56	0.5	0.7	0.5
Andropogon arctatus	0.49	0.6	0.4	0.5
Eragrostis virginica	0.45	0.5	0.4	0.5
Rhynchospora chalarocephala	0.45	0.5	0.4	0.5
Coelorachis tuberculosa	0.42	0.3	0.5	0.5
Vines				
Toxicodendron radicans	5.12	1.1	7.0	7.3
Smilax laurifolia	0.66	0.2	0.7	1.0

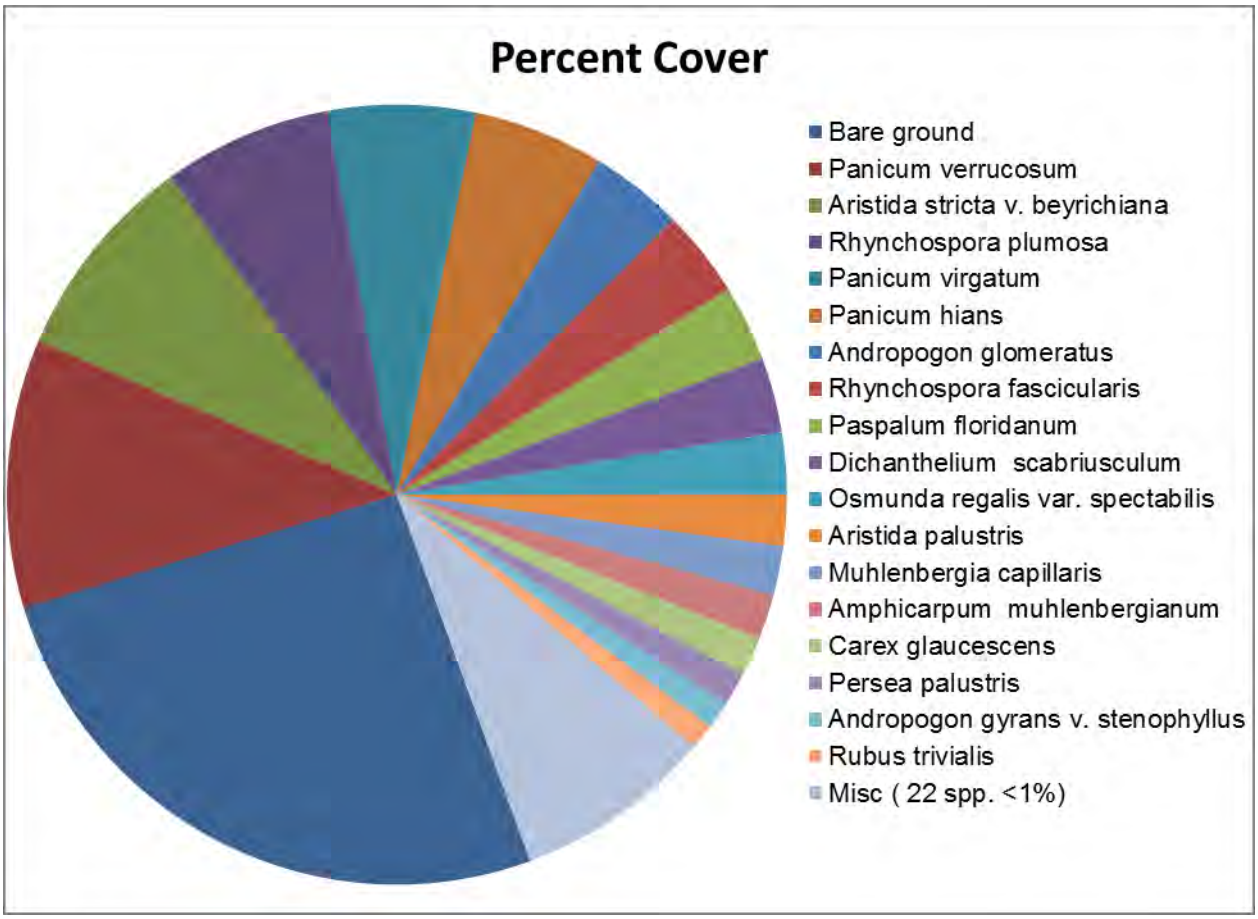
Table 9a: Transect DWQT4-625 Hydric Pine Flatwoods (Continued)

Species	Importance Value (%)	Relative Cover (%)	Relative Density (%)	Relative Frequency (%)
Vines				
Gelsemium rankinii	0.62	0.1	0.7	1.0
Woody Plants				
Persea palustris	2.42	1.9	1.7	3.6
Nyssa ursina	1.76	0.9	1.7	2.6
Pinus elliottii	0.6	0.5	0.2	1.0
Ilex vomitoria	0.45	0.5	0.4	0.5
Taxodium ascendens	0.41	0.6	0.1	0.5
Magnolia virginiana	0.34	0.3	0.2	0.5
Myrica caroliniensis	0.27	0.2	0.1	0.5
Ilex cassine v. myrtifolia	0.24	0.1	0.1	0.5

Table 9b: Transect DWQT4-625 Hydric Pine Flatwoods

Groundcover Vegetation Relative Cover (%)				Average Cover (%)	
Forbs	Graminoids	Vines	Woody Plants	Bare ground/ Standing water	Species Richness
9.2%	83.4%	1.5%	4.9%	25.9%	39
Shrub Height (meters)					1.5

Transect DWQT4-625



3.2. Qualitative Transect Data

A summary of the qualitative data and plant lists are provided below for each transect (See Tables 10-20 for the plant lists). The qualitative data sheets are in Appendix A.

Qualitative Transect DEPT1-626 Hydric Pine Savanna

The plant community is a wet prairie using the FNAI classification. The estimated canopy coverage class is 26-50 percent and the majority of the canopy trees are greater than 10 m high. The dominant canopy species are *Pinus elliottii.* The estimated height class for the majority of the subcanopy is 6 to 10 m. The dominant subcanopy species are *Cliftonia monophylla* and *Cyrilla racemiflora*. The shrub coverage is 51-75 percent and the majority of the shrubs are in the 0.5 m height class. The dominant shrub species are *Ilex coriacea, Cyrilla racemiflora, Gaylussacia mosieri* and *Cliftonia monophylla*. The graminoid groundcover coverage class is 0-1 percent and the total groundcover cover class is 0-1 percent. The dominant groundcover species are *Smilax laurifolia, Panicum verrucosum, Rubus argutus, Rhynchospora* spp., and *Vitis rotundifolia*. Shrubs have been reduced to coppice from a prescribed fire. The landscape is relatively open and the groundcover is dominated by coppice shrubs.

The tree density is high and coppiced shrubs are dense and have grown tall. Visual observation of wildlife is difficult in the dense shrub growth. The site was flooded at the time of the annual inspection; very few animals were seen or heard except for the calls of catbirds and eastern phoebe. Natural regeneration of appropriate species is occurring but the shrubs should be reduced to low coppice by fire and/or herbicide. The landscape is trending toward recovery due to prescribed fire, however control burns should be implemented as often as possible. The thickness of duff is approximately 2.5 cm and the depth of new litter is approximately 2 cm. There are numerous stems and some logs on the ground surface. The current fuel load and composition may increase local temperatures and fire duration during prescribed burns.

Table 10: Plant List for DEPT1-626

Scientific Name	Common Name
Cliftonia monoplylla	black titi
Cyrilla racemiflora	red titi
Gaylussacia mosieri	woolly huckleberry
Ilex coriacea	large gallberry
Magnolia virginiana	sweetbay
Myrica heterophylla	evergreen bayberry
Nyssa sylvatica var. *biflora*	tupelo
Panicum verrucosum	warty panicum
Persea palustris	silk bay
Pinus elliottii	slash pine
Rhynchospora sp.	beaked sedge
Rubus argutus	blackberry
Smilax laurifolia	laurel greenbrier
Vaccinium corymbosum	highbush blueberry
Vitis rotundifolia	muscadine grape

Qualitative Transect DEPT2-614 Titi Swamp

The plant community is a wet prairie/shrub bog using the FNAI classification. The estimated canopy coverage class is 6-25 percent and the majority of canopy trees are >10m tall. The dominant canopy species are *Pinus elliottii, Cliftonia monophylla, Magnolia virginiana,* and *Nyssa sylvatica* var. *biflora*. The estimated height class for the majority of the subcanopy is 6-10m. The dominant subcanopy species are *Magnolia virginiana* and *Nyssa sylvatica v. biflora*. The shrub coverage is 51-75 percent and the majority of shrubs are in the 1.6-3m height class. The dominant shrub species are *Ilex coriacea, Cliftonia monophylla, Lyonia lucida*, and *Gaylussacia mosieri*. The graminoid groundcover coverage class is 0-1 percent and the total groundcover coverage class is 1-5 percent. The dominant groundcover species are *Smilax laurifolia, Rhynchospora* spp., *Panicum verrucosum, Woodwardia virginica, Gaylussacia mosieri,* and *Sphagnum* spp. Shrubs have been reduced to coppice from a prescribed fire and have now grown tall. The landscape is moderately open and the groundcover is dominated by coppice shrubs. The tree density is high.

Wildlife observations include catbirds, northern mockingbird, Carolina chickadee, pine warbler, Carolina wren, red-bellied woodpecker. Natural regeneration of appropriate species is occurring. The landscape has been radically changed in the appropriate direction due to prescribed fire. The thickness of duff is approximately 2 cm and the depth of new litter is approximately 3 cm. Prescribed fire reduced most shrubs to ground level. Active coppice growth is occurring and shrub height is increasing rapidly. Selective herbicide treatment may be necessary to control woody shrub growth and is recommended. Seed bank regeneration should be monitored in the coming year to determine if supplemental seeding of appropriate native species is necessary. Invasive exotic species such as Chinese tallow have been mostly eliminated by fire.

Table 11: Qualitative Transect DEPT2-614 Plant List

Scientific Name	Common Name
Cliftonia monophylla	black titi
Cyrilla racemiflora	red titi
Gaylussacia mosieri	woolly huckleberry
Ilex coriacea	large gallberry
Lyonia lucida	fetterbush
Magnolia virginiana	sweetbay
Myrica heterophylla	evergreen bayberry
Nyssa sylvatica var. *biflora*	tupelo
Osmunda cinnamomea	cinnamon fern
Osmunda regalis	royal fern
Panicum verrucosum	warty panicum
Persea palustris	silk bay
Pinus elliottii	slash pine
Rhynchospora filifolia	beaksedge
Smilax laurifolia	laurel greenbrier
Sphagnum spp.	peat moss
Vaccinium corymbosum	highbush blueberry
Woodwardia virginica	Virginia chainfern

Qualitative Transect DEPT3-611 Bay Swamp

The plant community a baygall using the FNAI classification. The estimated canopy coverage class is 26-50 percent and the majority of canopy trees are >10m tall. The dominant canopy species are *Liriodendron tulipifera, Cliftonia monophylla, Magnolia virginiana,* and *Nyssa sylvatica* var. *biflora*. The estimated height class for the majority of the subcanopy is 6-10m. The dominant subcanopy species are *Cliftonia monophylla, Acer rubrum,* and *Nyssa sylvatica var. biflora*. The shrub coverage is 26-50 percent and the majority of the shrubs are in the 0.6-1.5 m height class. The dominant shrub species are *Ilex coriacea, Myrica heterophylla*, *Cliftonia monophylla,* and *Persea palustris*. The graminoid groundcover coverage class is 26-50 percent and the total groundcover cover class is 26-50 percent. The dominant groundcover species are *Scleria triglomerata, Rhynchospora* spp.*, Carex verrucosum, Osmunda cinnamomea, Sphagnum* spp., *Woodwardia areolata,* and *Vitis rotundifolia*. This transect contains appropriate habitat for the rare

Lilium iridollae, which was found on the Dutex site in August of 2013. This plant community is appropriately managed with prescribed fire. The canopy is diverse and multi-stratified and the groundcover is diverse.

Wildlife observations included catbird, Carolina anole, and cloudless sulfur butterfly. Natural regeneration of appropriate species is occurring. The landscape is now in the appropriate trajectory due to prescribed fire. The thickness of new litter is approximately 2 cm and the litter contains many twigs.

Table 12: Qualitative Transect DEPT3-611 Plant List

Scientific Name	Common Name
Acer rubrum	red maple
Apteria aphylla	nodding nixie
Carex verrucosum	swamp sedge
Cliftonia monophylla	black titi
Cyrilla racemiflora	red titi
Gaylussacia mosieri	woolly huckleberry
Ilex coriacea	large gallberry
Liriodendron tulipifera	tuliptree
Lyonia lucida	fetterbush
Magnolia virginiana	sweetbay
Mitchella repens	partridgeberry
Myrica heterophylla	evergreen bayberry
Myrica inodora	odorless bayberry
Nyssa sylvatica var. *biflora*	tupelo
Osmanthus americanus	American wild olive
Osmunda cinnamomea	cinnamon fern
Persea palustris	silk bay
Pinus elliottii	slash pine
Platanthera cristata	yellow-crested orchid
Rhynchospora sp.	beaksedge
Scleria triglomerata	nutrush
Smilax laurifolia	laurel greenbrier
Sphagnum spp.	peat moss
Toxicodendron radicans	poison ivy
Toxicodendron vernix	poison sumac
Vaccinium corymbosum	highbush blueberry
Viburnum nudum	possumhaw
Vitis rotundifolia	muscadine grape
Woodwardia areolata	netted chain fern
Woodwardia virginica	Virginia chain fern

Qualitative Transect DEPT4-625 Hydric Pine Flatwoods

The plant community is a wet prairie/shrub bog using the FNAI classification. The estimated canopy coverage class is 6-25 percent and the majority of canopy trees are 6-10m high. The dominant canopy species are *Pinus elliottii, Cliftonia monophylla, Magnolia virginiana, Nyssa sylvatica* var. *biflora,* and *Persea palustris*. The estimated height class for the majority of the subcanopy is 6-10m. The dominant subcanopy species are *Cliftonia monophylla* and *Magnolia virginiana*. The shrub coverage is 26-50 percent and the majority of the shrubs are in the 1.6-3 m height class. The dominant shrub species are *Ilex coriacea, Cliftonia monophylla* and *Persea palustris*. The graminoid groundcover coverage class is 1-5 percent and the total groundcover cover class is 1-5 percent. The dominant groundcover species are *Toxicodendron radicans*, *Smilax laurifolia* and *Vitis rotundifolia*. The transect has significant bare ground coverage and many shrubs have been reduced to coppice from a recent prescribed fire. The shrubs are rapidly growing in height. The landscape is becoming less as the groundcover is dominated by coppice shrubs.

Wildlife observations included catbirds, Carolina wren and, northern cardinal. Cricket frogs were also observed. Insects and spiders were common. Natural regeneration of appropriate species is occurring. Prescribed fire reduced most shrubs to ground level. Active coppice growth is occurring and shrub height is increasing rapidly. Selective herbicide treatment may be necessary to control woody shrub growth and is recommended. Seed bank regeneration should be monitored in the coming year to determine if supplemental seeding of appropriate native species is necessary. The thickness of duff is approximately 2 cm and the thickness of new litter is approximately 5 cm.

Table 13: Qualitative Transect DEPT4-625 Plant List

Scientific Name	Common Name
Cliftonia monoplylla	black titi
Cyrilla racemiflora	red titi
Gaylussacia mosieri	woolly huckleberry
Ilex coriacea	large gallberry
Ilex glabra	galberry
Lyonia lucida	fetterbush
Magnolia grandiflora	southern magnolia
Magnolia virginiana	sweetbay
Myrica heterophylla	evergreen bayberry
Myrica inodora	odorless bayberry
Nyssa sylvatica var. *biflora*	tupelo
Nyssa ursina	bear tupelo
Osmunda cinnamomea	cinnamon fern
Persea palustris	swamp bay
Pinus elliottii	slash pine
Smilax laurifolia	laurel greenbrier
Toxicodendron radicans	poison ivy

Table 13: Qualitative Transect DEPT4-625 Plant List (Continued)

Scientific Name	Common Name
Vaccinium corymbosum	highbush blueberry
Vitis rotundifolia	muscadine grape
Woodwardia areolata	netted chain fern
Woodwardia virginica	Virginia chain fern

Qualitative Transect DEPT5-630 Wetland Forested Mixed

The plant community is a Baygall using the FNAI classification. The estimated canopy coverage class is 51-75 percent and the majority of canopy trees are >10m high. The dominant canopy species are *Pinus elliottii, Cliftonia monophylla, Magnolia virginiana, Nyssa sylvatica* var. *biflora,* and *Persea palustris*. The estimated height class for the majority of the subcanopy is 3-5m. The dominant subcanopy species are *Ilex cassine*, *Cliftonia monophylla,* and *Magnolia virginiana*. The shrub coverage is 6-25 percent and the majority of shrubs are in the 0.6-1.5m height class. The dominant shrub species are *Ilex coriacea, Magnolia virginiana*, *Viburnum nudum*, and *Lyonia lucida*. The graminoid groundcover coverage class is 1-5 percent and total groundcover coverage class is 1-5 percent. The dominant groundcover species are *Woodwardia areolata, Woodwardia virginica, Osmunda cinnamomea, Sphagnum* spp*., Rhynchospora miliacea, Carex verrucosum,* and *Smilax laurifolia*.

Wildlife observations included birds, mammals, amphibians, insects, and spiders. Prescribed fire reduced most shrubs to ground level in part of this area. Active coppice growth is occurring and shrub height is increasing rapidly. Selective herbicide treatment may be necessary to control woody shrub growth and is recommended. Seed bank regeneration should be monitored in the coming year to determine if supplemental seeding of appropriate native species is necessary. The depth of duff is approximately 2 cm and the depth of litter is approximately 5 cm.

Table 14: Qualitative Transect DEPT5-630 Plant List

Scientific Name	Common Name
Carex verrucosum	caric sedge
Cliftonia monoplylla	black titi
Cyrilla racemiflora	red titi
Gaylussacia mosieri	woolly huckleberry
Erectites hieracifolia	fireweed
Ilex cassine	dahoon
Eupatorium capillifolium	dogfennel
Ilex coriacea	large gallberry
Lyonia lucida	fetterbush

Table 14: Qualitative Transect DEPT5-630 Plant List (Continued)

Scientific Name	Common Name
Magnolia virginiana	sweetbay

Mikania scandens	hempvine
Myrica heterophylla	evergreen bayberry
Nyssa biflora	tupelo
Osmunda cinnamomea	cinnamon fern
Panicum verrucosum	warty panicum
Persea palustris	swamp bay
Pinus elliottii	slash pine
Rhynchospora filifolia	beakrush
Rhynchospora miliacea	beakrush
Smilax laurifolia	laurel greenbrier
Sphagnum sp.	peat moss
Toxicodendron radicans	poison ivy
Toxicodendron vernix	poison sumac
Vaccinium corymbosum	highbush blueberry
Viburnum nudum	possumhaw
Vitis rotundifolia	muscadine grape

Qualitative Transect DWPT1-441 Coniferous Plantation

The plant community is Mesic Flatwoods using the FNAI classification. The estimated canopy coverage class is 26-50 percent and the majority of the canopy trees are >10m high. The dominant canopy species is *Pinus elliottii*. The estimated height class for the majority of the subcanopy is 6-10m. The dominant subcanopy species are *Cliftonia monophylla, Magnolia virginiana* and *Pinus elliottii*. The shrub coverage is 26-50 percent and the majority of the shrubs are in the 1.6-3m height class. The dominant shrub species are *Ilex coriacea, Ilex glabra* and *Clethra alnifolia*. The graminoid groundcover coverage class is 1-5 percent and total groundcover coverage class is 6-25 percent. The dominant groundcover species are *Pteridum aquilinum*, *Serenoa repens* and *Vitis rotundifolia*. The site has moderate bare ground coverage because of long term fire suppression, a deep duff layer, and competition from multiple woody strata above the groundcover. The shrubs have been reduced to coppice.

Wildlife observations included birds. Natural regeneration of appropriate groundcover species is occurring. The landscape is now in the appropriate trajectory due to prescribed fire. The thickness of duff is approximately 3 cm and the depth of new litter is approximately 12 cm.

Table 15: Qualitative Transect DWPT1-441 Plant List

Scientific Name	Common Name
Clethra alinfolia	sweet pepper bush
Ilex coriacea	large gallberry
Ilex glabra	gallberry
Lyonia lucida	fetterbush
Magnolia virginiana	sweetbay
Pinus elliottii	slash pine
Pteridium aquilinum	Bracken fern
Serenoa repens	saw-palmetto
Quercus hemispherica	laurel oak
Serenoa repens	saw-palmetto
Smilax laurifolia	laurel greenbrier
Symplocos tinctoria	common sweetleaf
Vaccinium arboreum	sparkleberry
Vaccinium corymbosum	highbush blueberry
Vitis rotundifolia	muscadine grape

Qualitative Transect DWPT2-626 Hydric Pine Savanna

The plant community is a Palustrine Marsh using the FNAI classification. The estimated canopy coverage class is 51-75 percent and the majority of canopy trees are 6-10 m high. The dominant canopy species are *Pinus elliottii, Taxodium ascendens, Acer rubrum, Magnolia virginiana, Nyssa sylvatica* var. *biflora,* and *Persea palustris*. The estimated height class for the majority of the subcanopy is 6-10m. The dominant subcanopy species are *Pinus elliottii, Acer rubrum, Nyssa sylvatica* var. *biflora,* and *Persea palustris*. The shrub coverage is 6-25 percent and the majority of the shrubs are in the 1.6-3m height class. The dominant shrub species are *Myrica cerifera, Lyonia lucida,* and *Myrica heterophylla*. The graminoid groundcover coverage class is 26-50 percent. The dominant groundcover species are *Smilax laurifolia, Aristida palustris, Fuirena scirpoidea, Cladium jamaicense, Spartina patens, Panicum virgatum, Anthaenanthia rufa, Andropogon glomeratus,* and *Bidens mitis*. The rare *Lilium iridollae* was also found in the seepage ecotone near this transect. The site is in the ecotone with extensive dominance by marsh vegetation. The trees in the marsh appear to be stunted, while the trees located in elevated areas are taller. This transect traverses a diverse ecotone between freshwater seepage wetlands (baygall) and the nearby tidal marsh.

Wildlife observations included birds such as eastern bluebirds, red-bellied woodpecker, pine warbler. Also observed amphibians, fish, insects and spiders. Fish were found in the surface waters. Natural regeneration of appropriate groundcover species is occurring. The landscape is now in the appropriate trajectory due to prescribed fire. The fire reduced the shrubs to coppice. The thickness of duff is approximately 4-7 cm and the depth of new litter is approximately 3-5 cm.

Table 16: Qualitative Transect DWPT2-441 Plant List

Scientific Name	Common Name
Acer rubrum	red maple
Andropogon glomeratus	broomgrass
Anthaenantia rufa	purple silky-scale grass
Aristida palustris	swamp three-awn grass
Aristida stricta	wiregrass
Asclepias lanceolata	fewflower milkweed
Bidens mitis	smallfruit beggarticks
Carex verrucosum	caric sedge
Cladium jamaicense	sawgrass
Cliftonia monoplylla	black titi
Cyrilla racemiflora	red titi
Dicanthelium ensifolium	panic grass
Dichanthelium scabriusculum	woolly witchgrass
Eriocaulon compressum	pipewort
Eriocaulon decangulare	ten-angled pipewort
Fuirena scirpoidea	southern umbrella sedge
Gaylussacia mosieri	woolly huckleberry
Ilex cassine	dahoon
Ilex coriacea	large gallberry
Ilex glabra	gallberry
Lachnanthes caroliana	redroot
Lilium iridollae	Henry's lily
Lyonia lucida	fetterbush
Magnolia virginiana	sweetbay
Myrica cerifera	wax myrtle
Rhynchospora spp.	beaksedge
Myrica heterophylla	evergreen bayberry
Nyssa sylvatica var. *biflora*	tupelo
Osmunda cinnamomea	cinnamon fern
Osmunda regalis	royal fern
Panicum virgatum	switchgrass
Persea palustris	swamp bay
Photinia pyrifolia	red chokeberry
Pinus elliottii	slash pine
Rubus argutus	blackberry
Sabal minor	bluestem palmetto
Smilax laurifolia	laurel greenbrier
Smilax walteri	Walter’s greenbrier
Sphagnum spp.	peat moss
Taxodium ascendens	pond cypress

Table 16: Qualitative Transect DWPT2-441 Plant List (Continued)

Scientific Name	Common Name
Toxicodendron radicans	poison ivy
Vitis rotundifolia	muscadine grape
Woodwardia areolata	netted chain fern
Woodwardia virginica	Virginia chain fern

Qualitative Transect DWPT3-641 Freshwater Marsh

The plant community is a Tidal Marsh (low salinity variant) using the FNAI classification. The estimated canopy coverage class is 0-1 percent and the majority of the canopy trees are 6-10m high. The dominant canopy species are *Pinus elliottii* and *Taxodium ascendens.* The hollies, titi, magnolia and tupelo subcanopy and shrub layer are coppiced and regrowing from past prescribed fire. The shrub coverage is 1-5 percent and the majority of the shrubs are in the 0.6-1.5m height class. The dominant shrub species are *Acer rubrum*, *Myrica cerifera, Ilex cassina var. myrtifolia,* and *Ilex glabra*. The graminoid groundcover coverage class is 76-100 percent and total groundcover coverage class is 76-100 percent. The dominant groundcover species are *Cladium jamaicense* and *Juncus roemarianus*. The site has less bare ground coverage because of the existing and naturally extensive dominance by marsh vegetation. The few trees in the marsh appear to be stressed because of saturated soils, this is natural and appropriate for a marsh.

Wildlife observations included birds, insects, and spiders. Natural regeneration of appropriate groundcover species is occurring. The landscape is in a strong trajectory towards restoration. The soil is saturated and the duff and litter are underwater during the observation period.

Table 17: Qualitative Transect DWPT3-641 Plant List

Scientific Name	Common Name
Acer rubrum	red maple
Cladium jamaicense	sawgrass
Cliftonia monoplylla	black titi
Ilex cassine	dahoon
Ilex coriacea	large gallberry
Ilex myrtifolia	myrtle-leaf holly
Ilex glabra	gallberry
Juncus roemerianus	black needle rush
Magnolia virginiana	sweetbay
Myrica cerifera	wax myrtle
Osmunda regalis	royal fern
Panicum virgatum	switchgrass
Persea palustris	swamp bay

Table 17: Qualitative Transect DWPT3-641 Plant List (Continued)

Scientific Name	Common Name
Pinus elliottii	slash pine
Rubus argutus	blackberry
Sabal minor	bluestem palmetto
Taxodium ascendens	pond cypress
Toxicodendron radicans	poison ivy

Qualitative Transect DWPT4-614 Titi Swamp

The plant community is a Wet Prairie ecotone using the FNAI classification; there are remnant species such as pitcherplants and bog buttons in the groundcover. The estimated canopy coverage class is 26-50 percent and the majority of canopy trees are >10m high. The dominant canopy species is *Pinus elliottii, Nyssa sylvatica* var *biflora, Taxodium ascendens,* and *Magnolia virginiana*. The estimated height class for the majority of the subcanopy is 6-10m. The dominant subcanopy species is *Nyssa sylvatica* var *biflora* and *Magnolia virginiana*. Shrub coverage is 1-5 percent and the majority of shrubs are in the 1.6-3m height class. The dominant shrub species are *Ilex vomitoria, Acer rubrum,* and *Persea palustris*. The graminoid groundcover coverage class is 51-75 percent and total groundcover cover class is 51-75 percent. The dominant groundcover species are *Smilax laurifolia, Rhynchospora chapmanii, R. fascicularis, R. plumosa, Eriocaulon decangulare, Drosera capillaris, Dichanthelium sp., Lachnanthes carolina,* and *Woodwardia virginica.* Prescribed fire has enhanced the herbaceous groundcover coverage and the trees are healthy.

Wildlife observations included birds, insects, and spiders. Natural regeneration of appropriate groundcover species is occurring. The landscape is in the appropriate trajectory due to prescribed fire. Past fires are successful in reducing shrubs to coppice. The site was flooded, and duff and litter were underwater during the observation period.

Table 18: Qualitative Transect DWPT4-626 Plant List

Scientific Name	Common Name
Acer rubrum	red maple
Andropogon glomeratus	broomgrass
Anthaenantia rufa	purple silky-scale grass
Aristida palustris	swamp three-awn grass
Aristida stricta	wiregrass
Baccharis halimifolia	sea myrtle
Biglowia nudata	rayless goldenrod
Carex glaucescens	caric sedge
Centella asiatica	coinwort
Clethra alinfolia	sweet pepper bush
Cliftonia monoplylla	black titi

Table 18: Qualitative Transect DWPT4-626 Plant List (Continued)

Scientific Name	Common Name
Coelorachis rugosa	wrinkled jointtail grass
Coreopsis linifolia	Texas tickseed
Cyperus odoratus	fragrant flatsedge
Cyrilla racemiflora	red titi
Dichanthelium aciculare	needleleaf witchgrass
Dicanthelium ensifolium	panic grass
Dichanthelium scabriusculum	woolly witchgrass
Drosera capillaris	pink sundew
Drosera intermedia	water sundew
Eleocharis baldwinii	Baldwin's spikerush
Erigeron vernus	early whitetop fleabane
Euthamia graminifolia	grass-leaved goldenrod
Gaylussacia mosieri	woolly huckleberry
Eriocaulon compressum	pipewort
Eriocaulon decangulare	pipewort
Fuirena breviseta	umbrellasedge
Hypericum brachyphyllum	coastalplain St. John's-wort
Ilex cassine	dahoon
Ilex coriacea	large gallberry
Ilex vomitoria	yaupon
Lachnanthes caroliana	redroot
Lachnocaulon anceps	whitehead bogbutton
Liatris spicata	shooting star
Lobelia glandulosa	glade lobelia
Lophiola americana	golden-crest
Ludwigia pilosa	hairy primrosewillow
Ludwigia virgata	savanna seedbox
Lycopus rubellus	water-hoarhound
Lyonia lucida	fetterbush
Magnolia virginiana	sweetbay
Mikania scandens	milk vine
Myrica cerifera	wax myrtle
Myrica heterophyla	evergreen bayberry
Nyssa sylvatica var. *biflora*	tupelo
Oldenlandia uniflora	clustered mille graines
Osmunda cinnamomea	cinnamon fern
Osmunda regalis	royal fern
Panicum verrucosum	warty panicum
Persea palustris	swamp bay
Photinia pyrifolia	red chokeberry

Table 18: Qualitative Transect DWPT4-626 Plant List (Continued)

Scientific Name	Common Name
Pinus elliottii	slash pine
Polygala cruciata	drumheads
Polygala lutea	orange milkwort
Proserpinaca pectinata	combleaf mermaidweed
Rhexia lutea	yellow flower meadow beauty
Rhexia petiolata	meadow beauty
Rhexia virginica	meadow beauty
Rhynchospora chapmanii	Chapman's beaksedge
Rhynchospora filifolia	threadleaf beaksedge
Rhynchospora plumosa	beaksedge
Rhynchospora inundata	horned beaksedge
Sapium sebiferum	popcorn tree
Sarracenia leucophylla	white top pitcher plant
Sarracenia psittacina	parrot pitcher plant
Sarracenia purpurea	purple pitcher plant
Scleria georgiana	Georgia nutrush
Scleria oligantha	littlehead nutrush
Scleria triglomerata	nutrush
Smilax laurifolia	laurel greenbrier
Smilax walteri	Walter's greenbrier
Solidago rugosa	goldenrod
Sphagnum spp.	peat moss
Sporobolus curtisii	Curtiss' dropseed grass
Styrax americana	snowbell
Toxicodendron radicans	poison ivy
Utricularia cornuta	bladderwort
Utricularia purpurea	purple flower bladderwort
Vaccinium corymbosum	highbush blueberry
Viburnum nudum	possumhaw
Viola primulifolia	primrose-leaf violet
Vitis rotundifolia	muscadine grape
Woodwardia areolata	netted chain fern
Woodwardia virginica	Virginia chain fern
Xyris flabelliformis	yellow-eyed grass
Xyris serotina	swamp yellow-eyed grass
Xyris stricta	pineland yellow-eyed grass

Qualitative Transect DWPT5-626 Hydric Pine Savanna

The plant community is a Wet Prairie/Shrub Bog using the FNAI classification. The estimated canopy coverage class is 6-25 percent and the majority of the canopy trees are >10m high. The dominant canopy species are *Pinus elliottii, Taxodium ascendens, Nyssa sylvatica var. biflora,* and *Magnolia virginiana*. The estimated height class for the majority of the subcanopy is 6-10m. The dominant subcanopy species are *Pinus elliottii, Magnolia virginiana* and *Nyssa sylvatica* var. *biflora*. The shrub coverage is 1-5 percent and the majority of the shrubs are in the 0.5m height class. Shrubs reduced to coppice by past prescribed fire. The dominant shrub species are *Gaylussacia mosieri, Cliftonia monophylla,* and *Ilex glabra*. The graminoid groundcover coverage class is 26-50 percent and the total groundcover coverage class is 26-50 percent. The dominant groundcover species are *Eriocaulon decangulare, Rhynchospora inundata, R. fascicularis,* and *Sarracenia leucophylla*.

Wildlife observations included birds, white tailed deer, animal tracks, insects, and spiders. Natural regeneration of appropriate groundcover species is occurring. The landscape is now in the appropriate trajectory due to past prescribed fire. The fire was successful in reducing shrubs to coppice. The site was flooded, the duff and litter were underwater during the observation period.

Table 19: Qualitative Transect DWPT5-626 Plant List

Scientific Name	Common Name
Clethra anifolia	sweet pepper bush
Cliftonia monoplylla	black titi
Coelorachis rugosa	wrinkled jointtail grass
Coreopsis linifolia	Texas tickseed
Cyperus odoratus	fragrant flatsedge
Cyrilla racemiflora	red titi
Dichanthelium aciculare	needleleaf witchgrass
Gaylussacia mosieri	woolly huckleberry
Eriocaulon compressum	pipewort
Eriocaulon decangulare	pipewort
Fuirena breviseta	umbrellasedge
Ilex coriacea	large gallberry
Ilex glabra	gallberry
Ilex myrtifolia	myrtle leaf holly
Lachnanthes caroliana	redroot
Lyonia lucida	fetterbush
Magnolia virginiana	sweetbay
Myrica heterophylla	evergreen bayberry
Nyssa sylvatica var. *biflora*	tupelo
Panicum verrucosum	warty panicum
Persea palustris	swamp bay
Pinus elliottii	slash pine
Rhynchospora chapmanii	Chapman's beaksedge

Table 19: Qualitative Transect DWPT5-626 Plant List (Continued)

Scientific Name	Common Name
Clethra anifolia	sweet pepper bush
Cliftonia monoplylla	black titi
Coelorachis rugosa	wrinkled jointtail grass
Coreopsis linifolia	Texas tickseed
Cyperus odoratus	fragrant flatsedge
Cyrilla racemiflora	red titi
Dichanthelium aciculare	needleleaf witchgrass
Gaylussacia mosieri	woolly huckleberry
Eriocaulon compressum	pipewort
Eriocaulon decangulare	pipewort
Fuirena breviseta	umbrellasedge
Ilex coriacea	large gallberry
Ilex glabra	gallberry
Ilex myrtifolia	myrtle leaf holly
Lachnanthes caroliana	redroot
Lyonia lucida	fetterbush
Magnolia virginiana	sweetbay
Myrica heterophylla	evergreen bayberry
Nyssa sylvatica var. *biflora*	tupelo
Panicum verrucosum	warty panicum
Persea palustris	swamp bay
Pinus elliottii	slash pine
Rhynchospora chapmanii	Chapman's beaksedge
Rhynchospora fascicularis	fascicled beaksedge
Rhynchospora microcarpa	southern beaksedge
Rhynchospora plumosa	beaksedge
Rhynchospora inundata	horned beaksedge
Sarracenia leucophylla	white top pitcher plant
Scleria triglomerata	nutrush
Smilax laurifolia	laurel greenbrier
Taxodium ascendens	pond cypress

Qualitative Transect DWPT6-642 Saltwater Marsh

The plant community is a Palustrine Marsh (very low salinity variant) using the FNAI classification. The estimated canopy coverage class is 1-5 percent and the majority of the canopy trees are >10m high. The dominant canopy species are *Pinus elliottii, Taxodium ascendens, Acer rubrum, Nyssa sylvatica* var. *biflora,* and *Juniperus virginiana*. The estimated subcanopy height is 6-10m. The subcanopy species are *Taxodium ascendens* and *Nyssa sylvatica* var. *biflora*. The shrub coverage is 1-5 percent and the majority of the shrubs are in the 0.6-1.5m height class. The dominant shrub species are *Myrica cerifera,*, *Ilex glabra* and *Gaylussacia mosieri*. The graminoid

groundcover coverage class is 76-100 percent and the total groundcover coverage class is 76-100 percent. The dominant groundcover species are *Juncus roemarianus, Panicum virgatum, Spartina patens*, *Fuirena breviseta, Osmunda cinnamomea, Toxicodendron radicans,* and *Rhynchospora inundata*. The trees in the marsh appear to be stressed because of saturated soils, this is natural and appropriate for a marsh.

Wildlife observations included birds, animal tracks, insects, and spiders. Natural regeneration of appropriate groundcover species is occurring. The landscape is in the appropriate trajectory due to prescribed fire. The fire reduced shrubs to coppice. The site was flooded, and the duff and litter were underwater during the observation period.

Table 20: Qualitative Transect DWPT6-642 Plant List

Scientific Name	Common Name
Acer rubrum	red maple
Clethra alinfolia	sweet pepper bush
Cliftonia monoplylla	black titi
Cyrilla racemiflora	red titi
Dichanthelium aciculare	needleleaf witchgrass
Gaylussacia mosieri	woolly huckleberry
Eriocaulon compressum	pipewort
Eriocaulon decangulare	pipewort
Fuirena breviseta	umbrellasedge
Ilex cassine	dahoon
Ilex glabra	gallberry
Ilex myrtifolia	myrtle leaf holly
Ilex vomitoria	yaupon
Ipomoea sagittata	salt marsh morning glory
Juncus roemerianus	black needle rush
Juniperus silicicola	coastal red cedar
Lachnanthes caroliana	redroot
Lyonia lucida	fetterbush
Magnolia virginiana	sweetbay
Myrica heterophylla	evergreen bayberry
Nyssa sylvatica var. *biflora*	tupelo
Osmunda cinnamomea	cinnamon fern
Osmunda regalis	royal fern
Panicum verrucosum	warty panicum
Panicum virgatum	switchgrass
Persea palustris	swamp bay
Pinus elliottii	slash pine
Rhynchospora chapmanii	Chapman's beaksedge
Rhynchospora fascicularis	fascicled beaksedge
Rhynchospora microcarpa	southern beaksedge

Table 20: Qualitative Transect DWPT6-642 Plant List (Continued)

Scientific Name	Common Name
Rhynchospora plumosa	beaksedge
Rhynchospora inundata	horned beaksedge
Rubus argutus	blackberry
Sabal minor	bluestem palmetto
Sarracenia leucophylla	white top pitcher plant
Scirpus cyperinus	wool-grass bulrush
Scleria triglomerata	nutrush
Smilax laurifolia	laurel greenbrier
Spartina patens	marsh hay cordgrass
Taxodium ascendens	pond cypress
Toxicodendron radicans	poison ivy
Woodwardia areolata	netted chain fern

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

This site was historically an open landscape dominated by relatively low density, mature slash pine. Continued prescribed fire, in combination with limited herbicide treatment of coppice shrubs when they are too dense for groundcover recovery, are the best ways to restore the landscape. This will create a landscape that is biodiverse, provide appropriate ecosystem functions and will be more resilient to catastrophic events.

Threats to the inherent biodiversity of this site are not restricted to fire suppression and climate. The expansion of exotic invasive species incursions on the site will likely be a significant challenge to restoration. Chinese tallow tree (*Sapium sebiferum)* is a significant invading species that has been observed throughout the site as seedling plants. Japanese climbing fern (*Lygodium japonicum*) was also observed. Frequent prescribed fire will control these species as they are not fire tolerant.

5.0. CONCLUSIONS AND RECOMMENDATIONS

Most of the site has been burned during site management and as part of the ecological restoration of this site. The fire was allowed to burn across the entire landscape which is appropriate. Where the site has been effectively burned, shrubs are reduced to coppice and in some areas the subcanopy layer was killed. As depicted in the panoramic photos of the site, the canopy is now more open, woody strata below the uppermost canopy has been significantly reduced. The reduction of fire suppressed woody plants has allowed more light and air circulation across the landscape. The management has resulted in an increase in total coverage of herbaceous species,

increased species richness, reduction of bare ground and a landscape dominated by appropriate plant lifeforms, i.e. herbaceous growth in the groundcover and coppiced shrubs. This landscape scale change has been observed and measured in both quantitative and qualitative sampling. The summary data that supports these observations and plant biometric measures is illustrated in the pie charts, species richness tables, and tables of plant lifeform (forbs, graminoids, moss, vines, woody plants) that are arranged by importance value.

Overall the Dutex Restoration site has greatly benefited from the landscape scale prescribed fire and selective use of herbicide to control shrub coverage. ERC recommends continued prescribed burning of the site as frequently as possible, elimination of any invasive exotics, continued selective herbicide use on shrubs when appropriate, and seeding of native groundcover species in areas that have not recovered the biodiversity from burning.

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