2017 Monitoring Report

DUTEX RESTORATION SITE

Escambia County, Florida

ERC #: 17-196B

October 2017

Ecological Resource Consultants, Inc.

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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

Tallahassee
631 E. 6th Ave.
Tallahassee, FL 32303
tel 850-224-0041
fax 850-224-0017

Panama City Beach
100 Amar Place
Panama City Beach, FL 32413
tel 850-230-1882
fax 850-230-1883

EXECUTIVE SUMMARY

Annual monitoring of the DUTEX site was conducted in October 19, 2017 to assess the hydrological, vegetative, ecological, and natural history of the site. This report includes monitoring results for the Dutex West Tract only.

The 2017 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 the transects in the West Tract is depicted on Figure 2W. A list of all the transect names in the West Tract appears in Table 1.

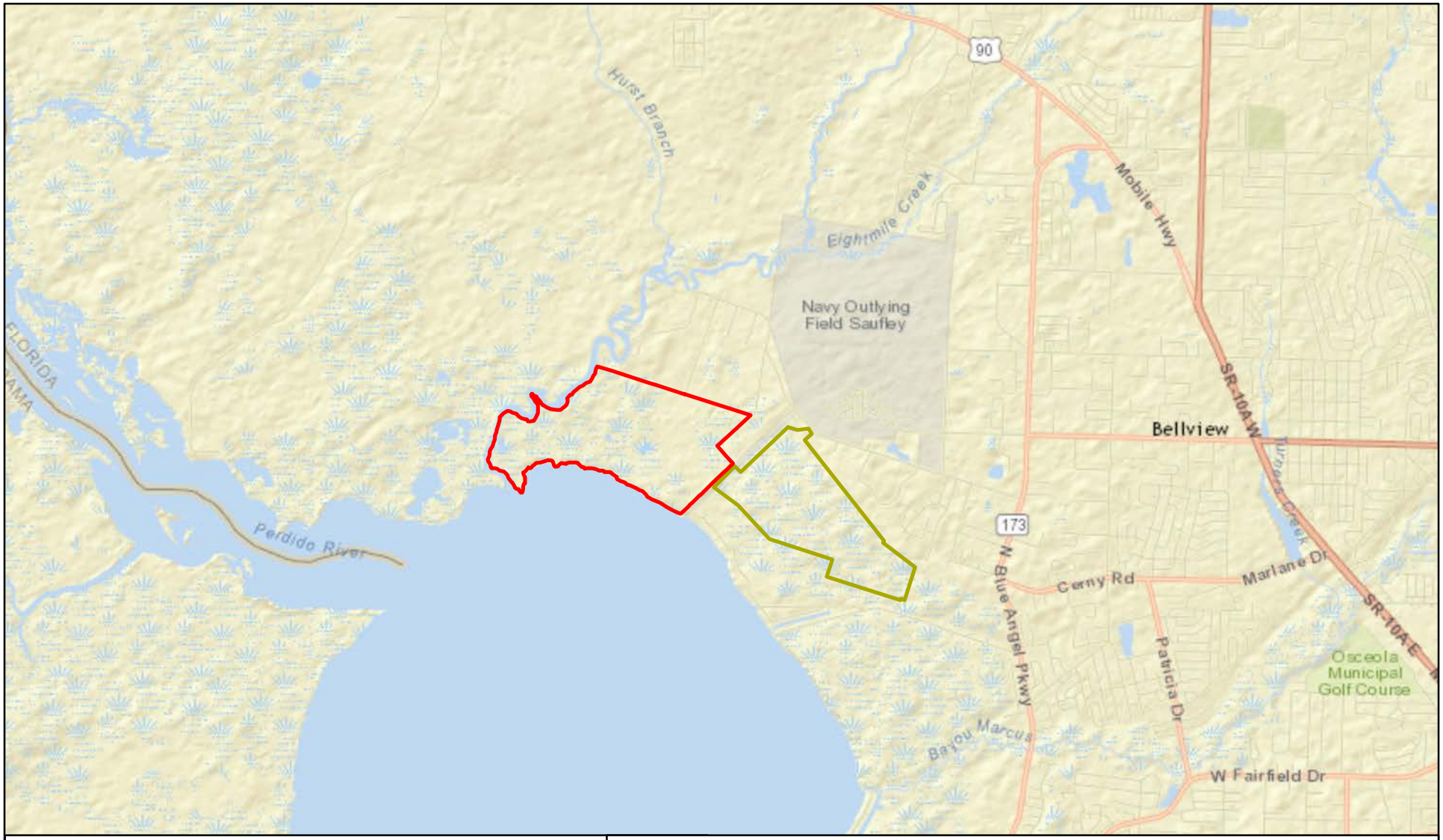

Figure 1. General Location Map

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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
Dutex Restoration	Dutex: West Tract	Quantitative Transect	625-Hydric Pine Flatwoods	36.09	1
Dutex Restoration	Dutex: West Tract	Quantitative Transect	625-Hydric Pine Flatwoods	56.54	1
Dutex Restoration	Dutex: West Tract	Quantitative Transect	626-Hydric Pine Savanna	96.19	1
Dutex Restoration	Dutex: West Tract	Quantitative Transect	626-Hydric Pine Savanna	52.86	1

Figure 2W. Transect Locations, West 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 being 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 2W, 3W, and 4W.

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. The following threatened or endangered species were observed during the monitoring: 1) *Lilium iridollae*-Endangered Florida; 2) *Platanthera ciliaris* – Threatened Florida; 3) *Pogonia ophioglossoides*-Threatened Florida; 4) *Sarracenia leucophylla*- Endangered Florida; 5) *Sarracenia psittacina*-Threatened Florida; and 6) *Sarracenia rosea*-Threatened Florida.

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

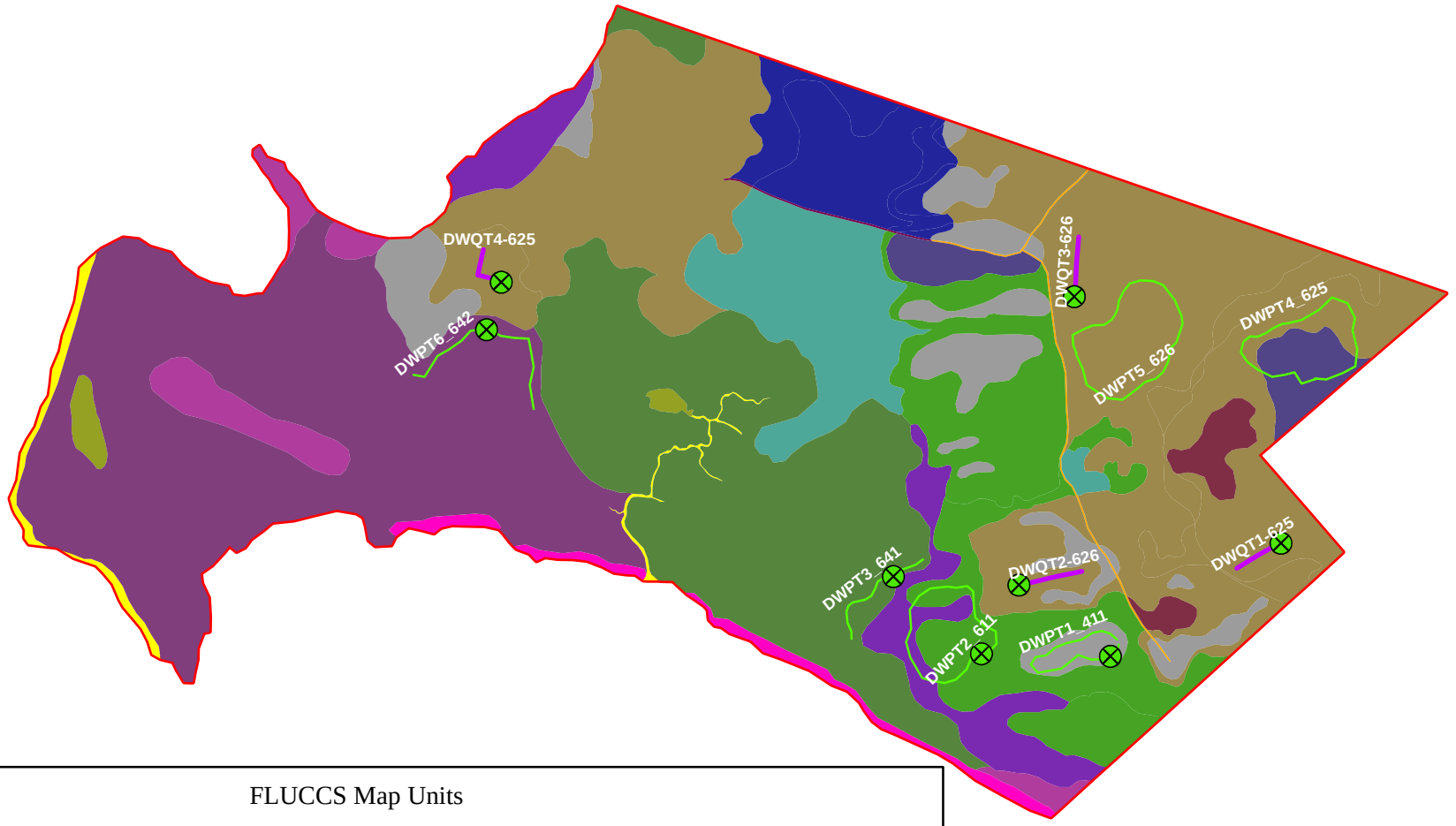
Calculate the Relative Density by dividing the total # of individuals of each species by the total #'s of individuals of all species
RD= (2) / (4)

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



FLUCCS Map Units

434, Hardwood-Conifer Mixed, 10 Acres	524, Lake Less Than 10 Acres, <1 Acre	614, Titi Swamps, 5 Acres	641, Freshwater Marsh, 78 Acres
441, Coniferous Plantation, 26 Acres	534, Reservoirs Less Than 10 Acres, 22 acres	625, Hydric Pine Flatwoods, 135 Acres	642, Saltwater Marsh, 105 Acres
510, Streams and Waterways, 3 Acres	611, Bay Swamps, 5 Acres	627, Slash Pine Swamp Forest, 44 Acres	710, Beaches, Acres
510D, Ditches, <1 Acre	613, Gum Swamps, 31 Acres	631, Wetland Shrub, 18 Acres	747, Beaver Dam < 1 Acre

Legend

- West Tract Boundary- 483.7 Acres
- Quantitative Transect Locations
- Qualitative Transect Locations
- Panoramic Photo Points

0 500 1,000 2,000 Feet

N

Figure 3W. Transect Locations and Current FLUCCS West Tract

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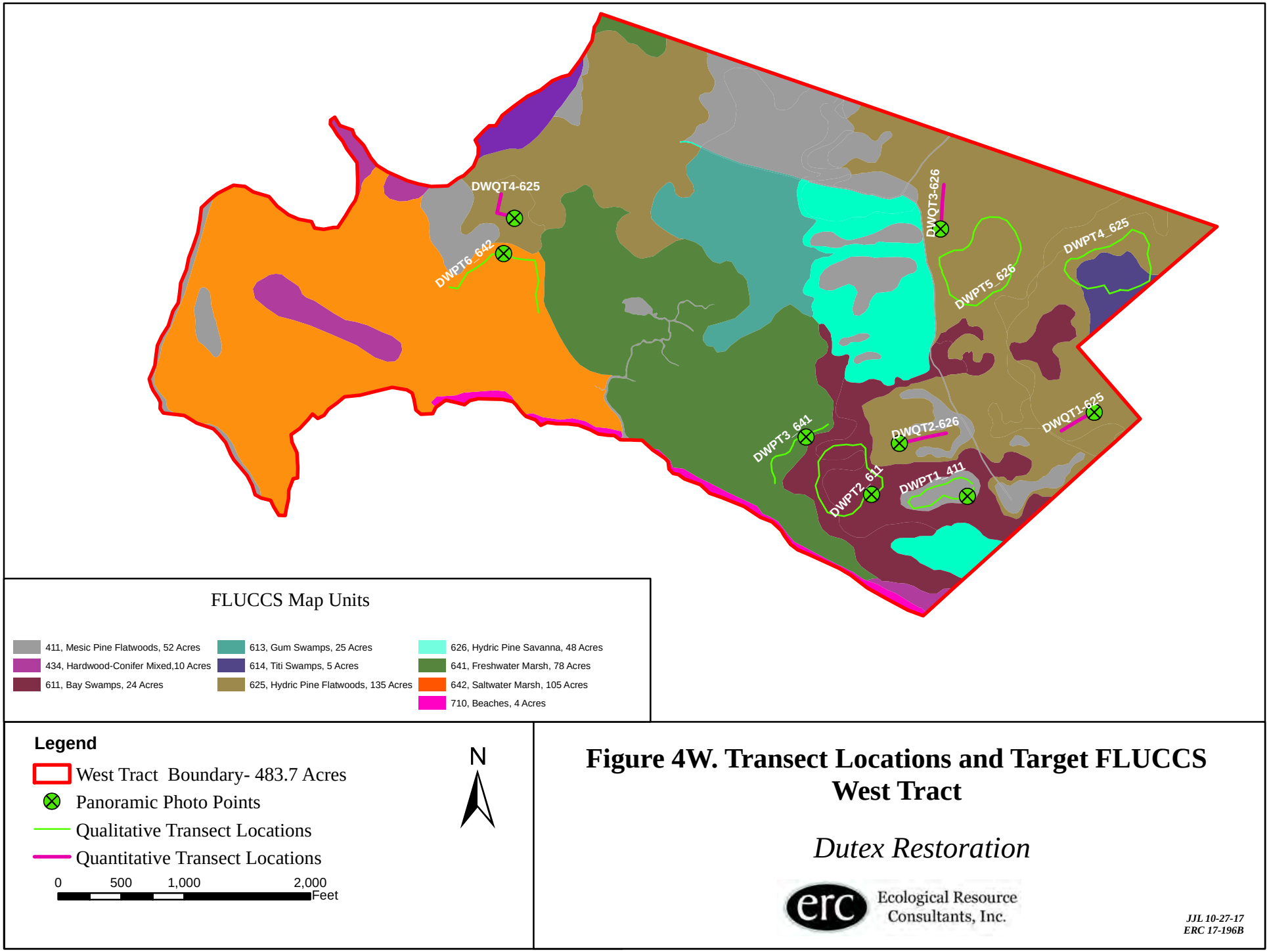

Figure 4W. Transect Locations and Target FLUCCS West Tract

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

Table 2a: Transect DWQT1-625 Hydric Pine Flatwoods

Species	Importance Value (%)	Relative Cover	Relative Density	Relative Frequency
Herbaceous Plants				
Andropogon glomeratus	17.86	0.2346	0.1432	0.1579
Lachnanthes caroliana	17.49	0.1274	0.2656	0.1316
Rhynchospora filifolia	15.57	0.1723	0.1632	0.1316
Andropogon gyrans	3.45	0.0442	0.0265	0.0329
Scleria triglomerata	3.14	0.0217	0.0329	0.0395
Hypericum cistifolium	2.73	0.0233	0.0258	0.0329
Dichanthelium ensifolium	1.43	0.0126	0.0172	0.0132
Rhynchospora fascicularis	1.4	0.0095	0.0129	0.0197
Rhynchospora plumosa	1.24	0.0091	0.015	0.0132
Carex glaucescens	1.19	0.0118	0.0043	0.0197
Dichanthelium scabriusculum	1.16	0.011	0.0107	0.0132
Hypericum brachyphyllum	1.08	0.0201	0.0057	0.0066
Panicum anceps	1.07	0.0103	0.0086	0.0132
Panicum verrucosum	0.87	0.0051	0.0079	0.0132
Xyris elliottii	0.52	0.0055	0.0036	0.0066
Xyris stricta	0.49	0.0032	0.005	0.0066
Xyris drummondii	0.48	0.002	0.0057	0.0066
Xyris caroliniana	0.41	0.002	0.0036	0.0066
Vines				
Smilax laurifolia	11.65	0.1017	0.0966	0.1513
Woody Plants				
Cliftonia monophylla	12.24	0.1262	0.116	0.125
Ilex coriacea	1.84	0.0256	0.0165	0.0132
Pinus elliottii	1.72	0.0122	0.0064	0.0329
Lyonia lucida	0.97	0.0087	0.0072	0.0132

Table 2b: Transect DWQT1-625 Hydric Pine Flatwoods

Groundcover Vegetation Relative Cover (%)				Average Cover (%)	
Forbs	Graminoids	Vines	Woody Plants	Bare ground/ Standing water	Species Richness
18.35%	54.22%	10.17%	17.27%	22.53%	23
Shrub Height (meters)					1.0

Transect DWQT1-625 Hydric Pine Flatwoods

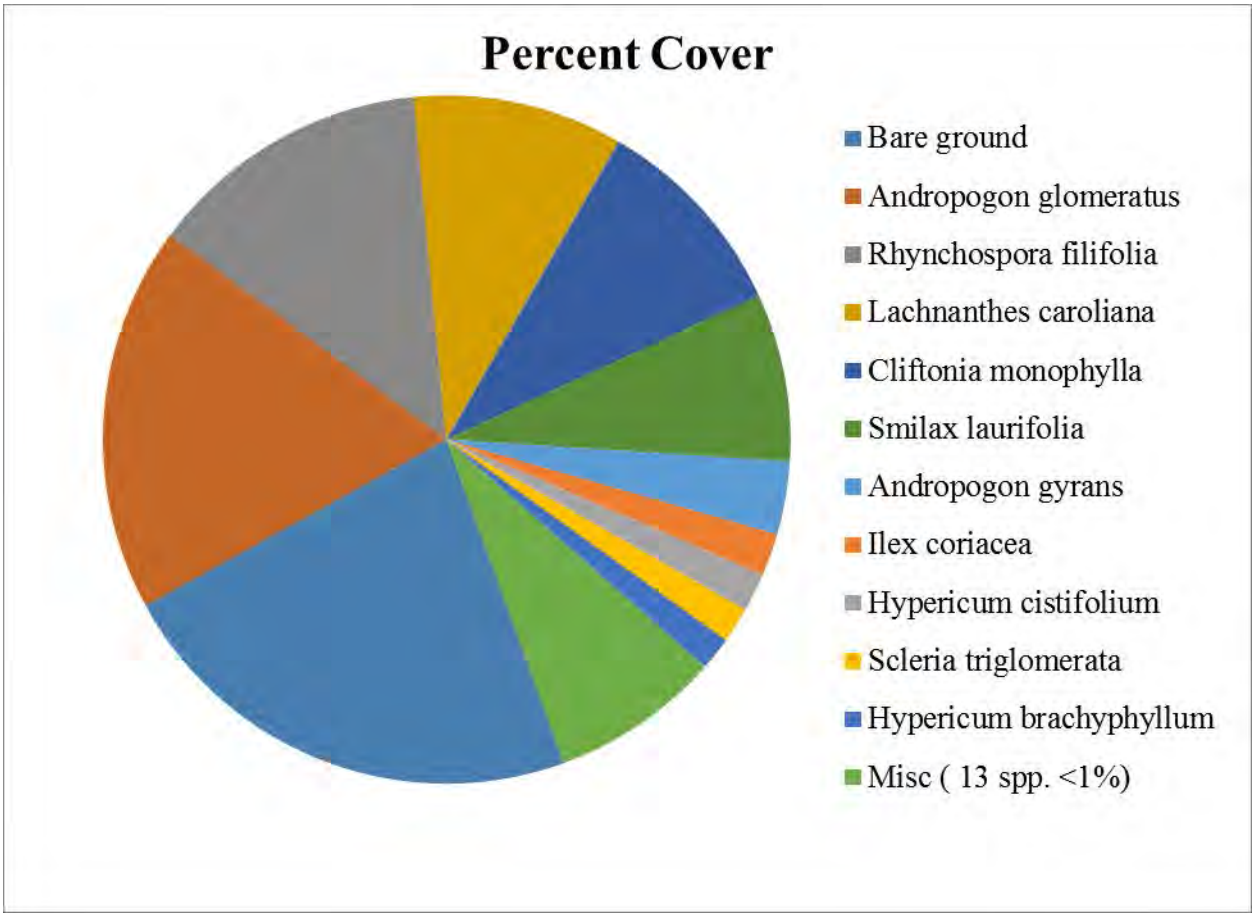


Table 3a: Transect DWQT2-626 Hydric Pine Savanna

Species	Importance Value (%)	Relative Cover	Relative Density	Relative Frequency
Herbaceous Plants				
Aristida stricta v. beyrichiana	4.54	0.0801	0.0253	0.0309
Hypericum brachyphyllum	3.39	0.0469	0.0239	0.0309
Syngonanthus flavidulus	3.19	0.0166	0.0585	0.0206
Xyris stricta	2.52	0.0119	0.0226	0.0412
Andropogon glomeratus	2.32	0.0202	0.0186	0.0309
Lachnanthes caroliana	1.5	0.0059	0.0186	0.0206
Dichanthelium ensifolium	0.99	0.0047	0.0146	0.0103
Eriocaulon decangulare	0.93	0.0083	0.0093	0.0103
Xyris serotina	0.81	0.0047	0.0093	0.0103
Sarracenia leucophylla	0.75	0.0083	0.004	0.0103
Scleria triglomerata	0.72	0.0047	0.0066	0.0103
Rhynchospora fascicularis	0.72	0.0047	0.0066	0.0103
Osmunda cinnamomea	0.63	0.0047	0.004	0.0103
Rhynchospora filifolia	0.58	0.003	0.004	0.0103
Xyris elliottii	0.54	0.0047	0.0013	0.0103
Andropogon gyrans	0.49	0.003	0.0013	0.0103
Rhexia alifanus	0.43	0.0012	0.0013	0.0103
Rhexia petiolata	0.43	0.0012	0.0013	0.0103
Vines				
Smilax laurifolia	3.17	.0131	0.0306	0.0515
Woody Plants				
Cliftonia monophylla	25.61	0.3015	0.2606	0.2062
Ilex coriacea	24.27	0.2255	0.2965	0.2062
Gaylussacia mosieri	8.3	0.0997	0.0771	0.0722
Ilex glabra	3.72	0.0386	0.0319	0.0412
Lyonia lucida	3.41	0.0315	0.0399	0.0309
Magnolia virginiana	3.28	0.0332	0.0239	0.0412
Ilex cassine v. myrtifolia	1.26	0.0131	0.004	0.0206
Acer rubrum	0.49	0.003	0.0013	0.0103
Myrica caroliniensis	0.49	0.003	0.0013	0.0103
Vaccinium elliottii	0.49	0.003	0.0013	0.0103

Table 3b: Transect DWQT2-626 Hydric Pine Savanna

Groundcover Vegetation Relative Cover (%)				Average Cover (%)	
Forbs	Graminoids	Vines	Woody Plants	Bare ground/ Standing water	Species Richness
11.44%	12.04%	1.31%	75.21%	54%	29
Shrub Height (meters)					1.61

Transect DWQT2-626 Hydric Pine Savanna

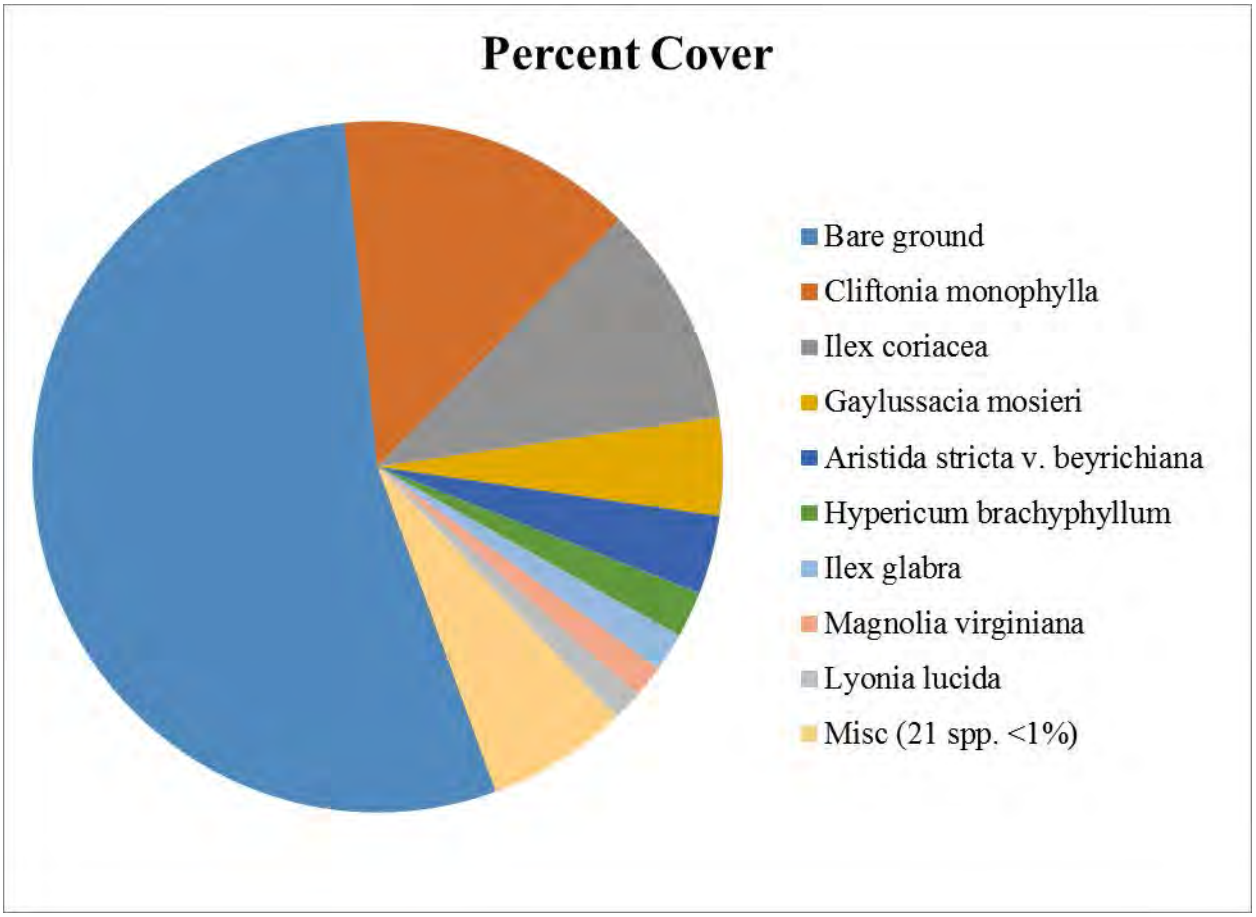


Table 4a: Transect DWQT3-626 Hydric Pine Savanna

Species	Importance Value (%)	Relative Cover	Relative Density	Relative Frequency
Herbaceous Plants				
Hypericum brachyphyllum	7.9	0.0909	0.0712	0.0749
Andropogon glomeratus	7.4	0.113	0.0471	0.0619
Rhynchospora plumosa	5.59	0.042	0.0898	0.0358
Eriocaulon decangulare	4.97	0.0546	0.0489	0.0456
Aristida stricta v. beyrichiana	4.39	0.0735	0.0223	0.0358
Dichanthelium scabriusculum	3.94	0.0409	0.0415	0.0358
Dichanthelium ensifolium	3.64	0.0309	0.0458	0.0326
Bidens mitis	3.18	0.0234	0.0427	0.0293
Lachnanthes caroliana	3.1	0.0154	0.0483	0.0293
Xyris fimbriata	3.1	0.0306	0.0297	0.0326
Rhynchospora filifolia	2.67	0.0203	0.0272	0.0326
Euthamia caroliniana	2.41	0.0143	0.0353	0.0228
Juncus repens	2.38	0.0203	0.0477	0.0033
Andropogon gyrans v. stenophyllus	1.94	0.0212	0.0142	0.0228
Rhynchospora fascicularis	1.69	0.0143	0.0136	0.0228
Sarracenia leucophylla	1.45	0.0174	0.0099	0.0163
Drosera capillaris	1.43	0.008	0.0285	0.0065
Scleria reticularis	1.39	0.0083	0.0204	0.013
Rhynchospora chapmanii	1.25	0.0089	0.0124	0.0163
Ludwigia pilosa	1.22	0.0069	0.0198	0.0098
Rhynchospora chalarocephala	0.92	0.0083	0.0062	0.013
Panicum anceps	0.92	0.0083	0.0062	0.013
Proserpinaca pectinata	0.87	0.0026	0.0136	0.0098
Xyris stricta	0.87	0.012	0.0043	0.0098
Anthaenantia rufa	0.85	0.0094	0.0062	0.0098
Ludwigia linifolia	0.79	0.0034	0.0105	0.0098
Fuirena breviseta	0.72	0.0086	0.0031	0.0098
Paspalum floridanum	0.7	0.0069	0.0043	0.0098
Woodwardia virginica	0.62	0.0054	0.0068	0.0065
Saccharum giganteum	0.54	0.0054	0.0043	0.0065
Ctenium aromaticum	0.52	0.008	0.0012	0.0065
Andropogon liebmannii	0.52	0.008	0.0012	0.0065
Carex glaucescens	0.5	0.0054	0.0031	0.0065
Andropogon virginicus	0.45	0.0089	0.0012	0.0033

Table 4a: Transect DWQT3-626 Hydric Pine Savanna (Continued)

Species	Importance Value (%)	Relative Cover	Relative Density	Relative Frequency
Eriocaulon compressum	0.45	0.004	0.0062	0.0033
Hypericum cistifolium	0.37	0.004	0.0037	0.0033
Rhexia virginica	0.35	0.002	0.0019	0.0065
Panicum verrucosum	0.34	0.0006	0.0062	0.0033
Xyris serotina	0.33	0.004	0.0025	0.0033
Polygala cymosa	0.32	0.0014	0.005	0.0033
Rubus argutus	0.32	0.002	0.0012	0.0065
Lachnocaulon anceps	0.3	0.0014	0.0043	0.0033
Lobelia brevifolia	0.29	0.0011	0.0012	0.0065
Rhexia petiolata	0.28	0.0014	0.0037	0.0033
Osmunda regalis var. spectabilis	0.27	0.0006	0.0043	0.0033
Sporobolus floridanus	0.26	0.004	0.0006	0.0033
Oldenlandia uniflora	0.25	0.0006	0.0037	0.0033
Solidago rugosa subsp. aspera	0.2	0.0014	0.0012	0.0033
Liatris spicata	0.19	0.0006	0.0019	0.0033
Aletris lutea	0.19	0.0006	0.0019	0.0033
Aristida palustris	0.18	0.0014	0.0006	0.0033
Eupatorium mohrii	0.18	0.0014	0.0006	0.0033
Juncus diffusissimus	0.18	0.0014	0.0006	0.0033
Pluchea baccharis	0.17	0.0006	0.0012	0.0033
Lycopus rubellus	0.15	0.0006	0.0006	0.0033
Solidago fistulosa	0.15	0.0006	0.0006	0.0033
Hypericum tetrapetalum	0.15	0.0006	0.0006	0.0033
Polygala cruciata	0.15	0.0006	0.0006	0.0033
Vines				
Smilax laurifolia	5.66	0.0555	0.0458	0.0684
Woody Plants				
Cliftonia monophylla	6.55	0.0924	0.0619	0.0423
Ilex glabra	1.27	0.0114	0.0105	0.0163
Gaylussacia mosieri	1.19	0.0089	0.0105	0.0163
Lyonia lucida	0.82	0.0049	0.0068	0.013
Photinia pyrifolia	0.7	0.0069	0.0043	0.0098
Myrica caroliniensis	0.61	0.008	0.0037	0.0065
Ilex coriacea	0.57	0.0043	0.0031	0.0098
Clethra alnifolia	0.38	0.0051	0.0031	0.0033
Taxodium ascendens	0.32	0.0051	0.0012	0.0033
Pinus elliottii	0.29	0.0011	0.0012	0.0065

Table 4a: Transect DWQT3-626 Hydric Pine Savanna (Continued)

Species	Importance Value (%)	Relative Cover	Relative Density	Relative Frequency
Nyssa ursina	0.29	0.0011	0.0012	0.0065
Myrica cerifera	0.2	0.0014	0.0012	0.0033
Acer rubrum	0.15	0.0006	0.0006	0.0033
Styrax americanus	0.15	0.0006	0.0006	0.0033

Table 4b: Transect DWQT3-626 Hydric Pine Savanna

Groundcover Vegetation Relative Cover (%)				Average Cover (%)	Species Richness
Forbs	Graminoids	Vines	Woody Plants	Bare ground/ Standing water	
32.38%	46.88%	5.55%	15.18%	18.33%	73
Shrub Height (meters)					1.3

Transect DWQT3-626 Hydric Pine Savanna

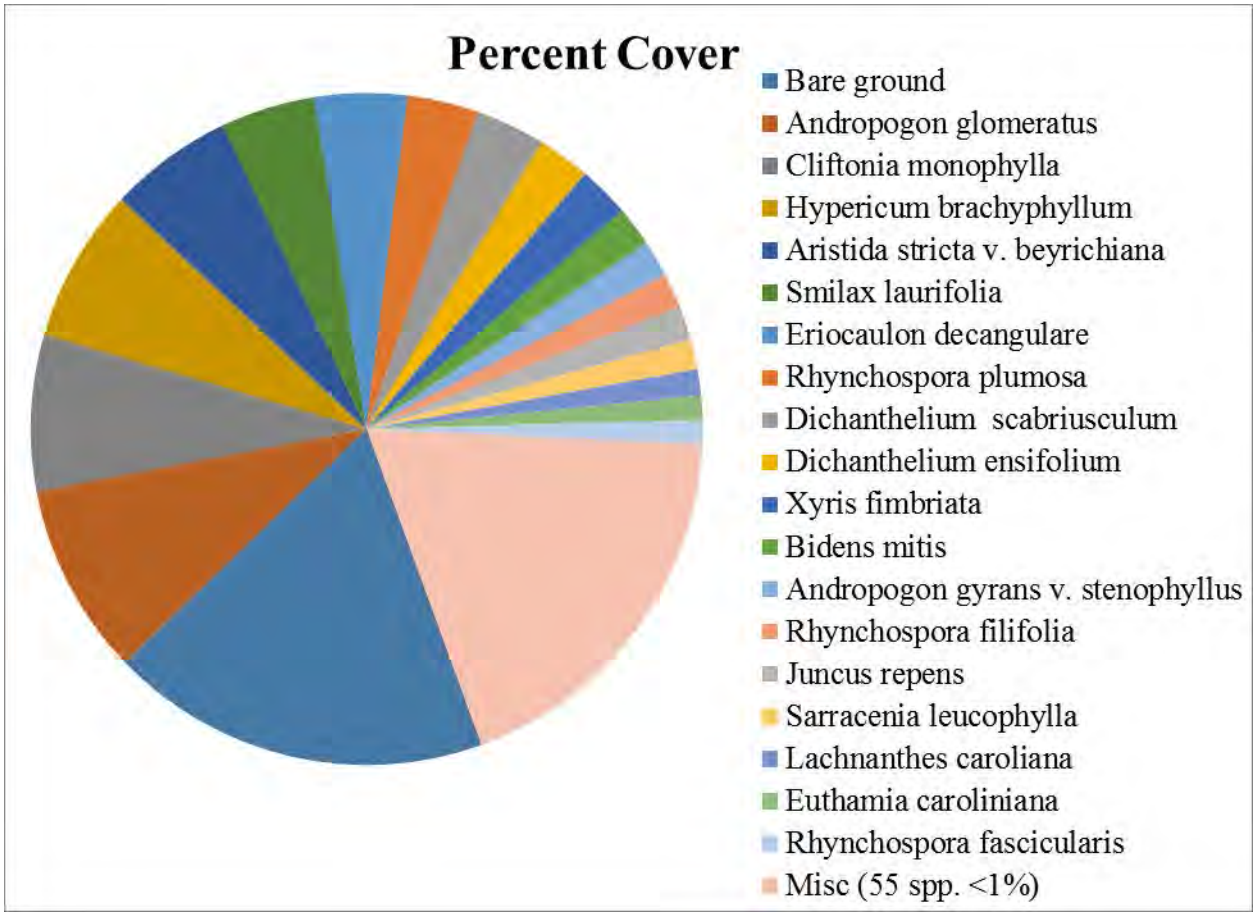


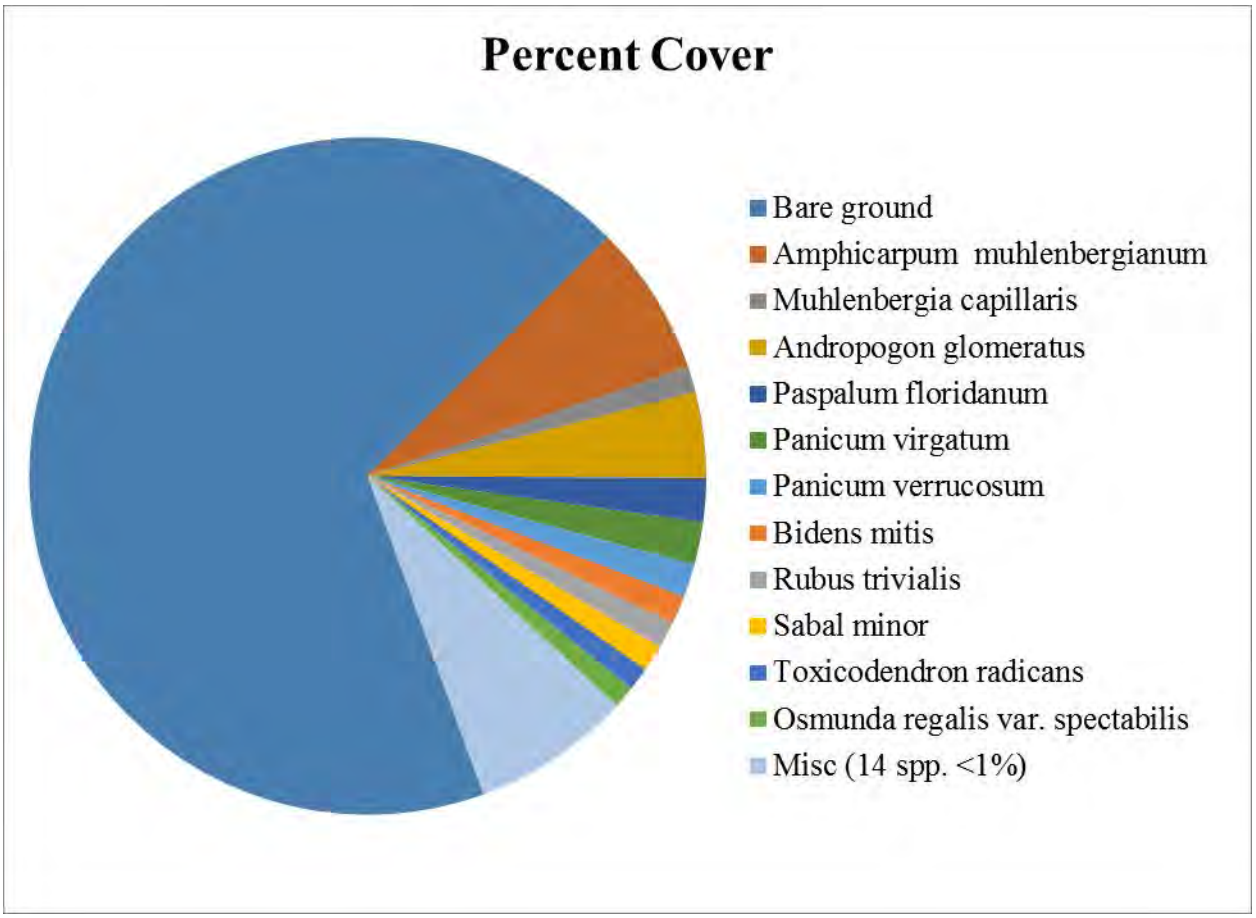
Table 5a: Transect DWQT4-625 Hydric Pine Flatwoods

Species	Importance Value (%)	Relative Cover	Relative Density	Relative Frequency
Herbaceous Plants				
Amphicarpum muhlenbergianum	23.26	0.277	0.3659	0.055
Andropogon glomeratus	13.17	0.131	0.1172	0.1468
Panicum virgatum	11.21	0.1151	0.0835	0.1376
Panicum verrucosum	4.95	0.0421	0.0515	0.055
Paspalum floridanum	4.7	0.0452	0.0409	0.055
Bidens mitis	3.81	0.0222	0.0462	0.0459
Carex glaucescens	3.59	0.0444	0.0266	0.0367
Rubus trivialis	3.08	0.0183	0.0373	0.0367
Ctenium aromaticum	3.06	0.0357	0.0195	0.0367
Muhlenbergia capillaris	2.73	0.031	0.0142	0.0367
Osmunda regalis	2.54	0.0254	0.0142	0.0367
Sabal minor	2.45	0.0516	0.0036	0.0183
Rhynchospora filifolia	2.43	0.0183	0.0178	0.0367
Dichanthelium scabriusculum	2.4	0.0143	0.0302	0.0275
Rhynchospora cephalantha	1.35	0.0151	0.0071	0.0183
Cladium jamaicense	0.97	0.0111	0.0089	0.0092
Dichanthelium ensifolium	0.68	0.004	0.0071	0.0092
Scleria triglomerata	0.62	0.004	0.0053	0.0092
Rubus argutus	0.62	0.004	0.0053	0.0092
Woodwardia virginica	0.62	0.004	0.0053	0.0092
Arundinaria gigantea	0.5	0.004	0.0018	0.0092
Vines				
Toxicodendron radicans	6.85	0.0317	0.0728	0.1009
Woody Plants				
Persea palustris	2.32	0.0206	0.0124	0.0367
Pinus elliottii	1.68	0.0286	0.0036	0.0183
Ilex cassine v. myrtifolia	0.42	0.0016	0.0018	0.0092

Table 5b: Transect DWQT4-625 Hydric Pine Flatwoods

Groundcover Vegetation Relative Cover (%)				Average Cover (%)	Species Richness
Forbs	Graminoids	Vines	Woody Plants	Bare ground/ Standing water	
12.55%	79.23%	3.17%	5.08%	65.87%	25
Shrub Height (meters)					1.5

Transect DWQT4-625 Hydric Pine Flatwoods



3.2. Qualitative Transect Data

A summary of the qualitative data and plant lists are provided below for each transect (See Tables 6-11 for the plant lists). The qualitative data sheets are in Appendix A.

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 and Magnolia virginiana*. 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 the total groundcover coverage class is 1-5 percent. The dominant groundcover species are *Pteridum aquilinum*, *Rhynchospora* spp., *Serenoa repens* and *Vitis rotundifolia*. The site has observable bare ground possibly due to a deep duff layer and competition from multiple woody strata above the groundcover. The shrubs have been reduced to coppice from a previous fire. Shrubs have continued to grow in height and the total groundcover coverage is low.

Wildlife observations included northern cardinal, catbird, Carolina wren, eastern phoebe and various insects and spiders. Natural regeneration of appropriate groundcover species is occurring. The landscape needs more management from a prescribed fire. The thickness of duff is approximately 2 cm and the depth of new litter is approximately 6+ cm.

Table 6: Qualitative Transect DWPT1-441 Plant List

Scientific Name	Common Name
Clethra alnifolia	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 26-50 percent and the majority of canopy trees are >10 m high. The dominant canopy species are *Pinus elliottii, Taxodium ascendens, Acer rubrum, 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 *Pinus elliottii, Acer rubrum, Nyssa sylvatica* var. *biflora, Taxodium ascendens, Magnolia virginiana,* 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 *Ilex glabra*. The graminoid groundcover coverage class is 51-75 percent and the total groundcover coverage class is 76-100% percent. The dominant groundcover species are *Smilax laurifolia, Aristida palustris, Fuirena scirpoidea, Cladium jamaicense, Panicum virgatum, Anthaenanthia rufa, Andropogon glomeratus, Eriocaulon decangelare,* and *Bidens mitis*. The Florida Endangered *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 catbirds, northern cardinal, pine warbler, palm warbler, sedge wren, eastern phoebe, Carolina wren, red-bellied woodpecker, frogs, and insects. Natural regeneration of appropriate groundcover species is occurring. The landscape in the appropriate trajectory due to

prescribed fire. The fire reduced the shrubs to coppice. The depth of new litter is approximately 1 cm. Soils are saturated.

Table 7: 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 monophylla	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

Table 7: Qualitative Transect DWPT2-441 Plant List (Continued)

Scientific Name	Common Name
Sphagnum spp.	peat moss
Taxodium ascendens	pond cypress
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 1-5 percent and the majority of the canopy trees are 6-10m high. The dominant canopy species are *Pinus elliottii* and *Taxodium ascendens.* 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 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, Hypericum spp., Osmunda regalis,* and *Juncus roemarianus*. There is minimal bareground. 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 Carolina wren, red bellied woodpecker, eastern phoebe, red winged blackbird, common grackle, green tree frog, fish, and a diversity of insects and spiders. Natural regeneration of appropriate groundcover species is occurring. The marsh landscape is in an appropriate trajectory towards restoration and was extensively burned in 2016. The soil is saturated, the duff is underwater, and the depth of new litter is approximately 6+ cm.

Table 8: Qualitative Transect DWPT3-641 Plant List

Scientific Name	Common Name
Acer rubrum	red maple
Cladium jamaicense	sawgrass
Cliftonia monophylla	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
Pinus elliottii	slash pine

Table 8: Qualitative Transect DWPT3-641 Plant List (Continued)

Scientific Name	Common Name
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, Taxodium ascendens,* and *Magnolia virginiana*. Shrub coverage is 1-5 percent and the majority of shrubs are in the 0.6-1.5m height class. The dominant shrub species are *Ilex vomitoria, Ilex myrtifolia,* and *Ilex coriacea*. The graminoid groundcover coverage class is 51-75 percent and total groundcover cover class is 76-100 percent. The dominant groundcover species are *Hypericum brachyphyllum*, *Rhynchospora* spp., *Eriocaulon decangulare, Dichanthelium scabrisculum, Xyris* spp., *Osmunda regalis,* and *Toxicodendron radicans.* Prescribed fire has enhanced the herbaceous groundcover coverage and the trees are healthy.

Wildlife observations included catbirds, red bellied woodpecker, pine warbler, eastern phoebe, frogs, insects, and spiders. Natural regeneration of appropriate groundcover species is occurring. The landscape is in the appropriate trajectory due to prescribed fire. Past fires were successful in reducing shrubs to coppice. The soil is moist and the depth of new litter is approximately 1+ cm.

Table 9: 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 alnifolia	sweet pepper bush
Cliftonia monophylla	black titi
Coelorachis rugosa	wrinkled jointtail grass
Coreopsis linifolia	Texas tickseed
Cyperus odoratus	fragrant flatsedge

Table 9: Qualitative Transect DWPT4-626 Plant List (Continued)

Scientific Name	Common Name
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
Pinus elliottii	slash pine
Polygala cruciata	drumheads
Polygala lutea	orange milkwort
Proserpinaca pectinata	combleaf mermaidweed
Rhexia lutea	yellow flower meadow beauty

Table 9: Qualitative Transect DWPT4-626 Plant List (Continued)

Scientific Name	Common Name
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* and *Taxodium ascendens*. The estimated height class for the majority of the subcanopy is 3-5m. The dominant subcanopy species are *Magnolia virginiana, Nyssa sylvatica* var. *biflora,* and *Taxodium ascendens*. The shrub coverage is 1-5 percent and the majority of the shrubs are in the 0.5m height class. The shrubs have been reduced to coppice by past prescribed fire. The dominant shrub species are *Myrica cerifera*, *Ilex coriacea*, 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, Fuirena breviseta, Hypericum brachyphyllum, Rhynchospora chapmanii, R. fascicularis, R. filifolia, R. plumosa, Sarracenia leucophylla, and *Xyris* sp.

Wildlife observations included palm warbler, pine warbler, catbird, Carolina chickadee, eastern phoebe, northern mockingbird, amphibians, and a diversity of insects and spiders. Natural regeneration of appropriate groundcover species is occurring. The landscape is now in the appropriate trajectory due to past prescribed fire and past herbicide treatments targeting shrubs. The fire was successful in reducing shrubs to coppice. The soil is saturated and in some areas it was flooded with up to 8 cm of water. The depth of new litter is approximately 2+ cm. There are many dead stems from subcanopy and shrubs on the ground.

Table 10: Qualitative Transect DWPT5-626 Plant List

Scientific Name	Common Name
Clethra alnifolia	sweet pepper bush
Cliftonia monophylla	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. It is also part of the overflow area associated with a nearby creek. Many hydrologic indicators created from flooding were observed such as rafted debris and silt covered objects. 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, Nyssa sylvatica* var. *biflora,* and *Magnolia virginiana*. The estimated subcanopy height is 6-10m. The subcanopy species are *Pinus elliottii, Taxodium ascendens, and Magnolia virginiana*. The shrub coverage is 1-5 percent and the majority of the shrubs are in the 0.6-1.5m height class due to recent fire. 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, Cladium jamaicense, Osmunda regalis, Panicum virgatum, Serenoa repens, Solidago fistulosa, Spartina patens*, *Toxicodendron radicans,* and *Vitis rotundifolia*. The trees in the marsh appear to be stressed due to saturated soils, this is natural and appropriate for a marsh.

Wildlife observations included catbirds, northern cardinal, Carolina wren, white tailed deer and raccoon tracks, cottonmouth, amphibians, and a diversity of 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 many of the remaining shrubs to coppice. The site is frequently flooded. The depth of litter is approximately 2+ cm.

Table 11: Qualitative Transect DWPT6-642 Plant List

Scientific Name	Common Name
Acer rubrum	red maple
Clethra alnifolia	sweet pepper bush
Cliftonia monophylla	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

Table 11: Qualitative Transect DWPT6-642 Plant List (Continued)

Scientific Name	Common Name
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
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 and pond cypress. 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. On site seed collection may also be used to augment groundcover species richness and coverage, especially in areas that have been fire suppressed and planted in pine. This will create a landscape that is biodiverse, provides 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 change. 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 invasive species that has been observed throughout the site as seedling plants and Japanese climbing fern (*Lygodium japonicum*) was also observed, especially along roadsides. 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 native groundcover species are diverse. A challenge to restoration is frequent application of prescribed fire at the landscape scale to continue shrub reduction. As depicted in the panoramic photos of the site, the canopy is now more open with the woody strata below the uppermost canopy significantly reduced. The reduction of fire suppressed woody plants has allowed for more light and air circulation across the landscape. The management has resulted in an increase in total coverage of herbaceous species and species richness, a reduction of bare ground, and a landscape dominated by appropriate plant lifeforms (*i.e*. herbaceous growth in the groundcover, coppiced shrubs, and control and suppression of invasive exotic plants). 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, selective use of herbicide to control shrub coverage, and hydrologic restoration resulting from canopy reduction. ERC recommends continued prescribed burning of the site as frequently as possible, elimination of any invasive exotics that are not controlled by prescribed fire, continued selective herbicide use on shrubs when appropriate, and seeding of native groundcover species in areas that have not recovered the biodiversity from burning.

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.

Healy, Henry G. Terraces and Shorelines of Florida. U.S. Geological Survey, Tallahassee, FL. 1975.

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.

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

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

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

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: DWPT1-441 **Date:** 10/19/2017

Plant Community Type: Pine Flatwoods **Time (am/pm):** 11:30 AM

1. Weather: ☑ Full Sun ☐ Part Sun ☐ Cloudy ☐ Cloudy with Rain/Fog

2. Temperature: ☐ 20-50 F ☐ 51-70 F ☑ 71-90 F ☐ 91-110 F

☑ Restoration in Progress

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. Pinus elliottii **2.** Magnolia virginiana **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. Pinus elliottii **2.** Cliftonia monophylla **3.** Magnolia virginiana

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. Ilex coriacea **2.** Ilex glabra **3.** Clethra alnifolia

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. Ilex coriacea **2.** Clethra alnifolia **3.** Vaccinium sp.

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. Serenoa repens **2.** Pteridium aquilinum **3.** Vitis rotundifolia

4. Rhynchospora spp. **5.** **6.**

7. **8.** **9.**

List the NATIVE **WEEDY** or **RUDERAL** species observe - otherwise SEE 18. EXOTIC SPECIES BELOW

1. **2.** **3.**

4. **5.** **6.**

Vegetation notes: Native groundcover species are recovering. Shrubs reduced to coppice by prescribed fire. Common to find dead, standing fire killed stems from magnolias, hollies, titi and tupelo. Much of the fire killed vegetation is on the ground. It is possible that the deadfall may be burned in the next prescribed fire. This may result in a longer and hotter fire.

Qualitative assessment data sheet

Transect ID: DWPT1-441 **Date:** 10/19/2017

Plant Community Type: Pine Flatwoods

10. Tree density: appropriate **Why?:** ☐ too dense ☐ too sparse

11. Tree health: ☑ trees healthy ☐ trees stressed **Why?:** ☐ 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. catbird
2. northern cardinal
3. Carolina wren
4. eastern phoebe
5. sulfur butterfly
6. various spider species
7. blue darner dragonfly
8. paper wasp
9.

17. Wildlife usage and natural history observations: ☑ amphibians ☐ reptiles ☐ fish ☑ birds ☐ mammals ☑ arthropods ☐ footprints ☐ scratch marks ☑ songs or calls ☐ scat

Wildlife notes: Coppiced shrubs have grown tall. Very few animals were seen. Mostly birds heard calling from thickets.

Notes on Exotic species observed:

18. Exotic species: ☐ present ☑ absent

Frequent fire will often eliminate and control invasive exotic plants.

Notes on Restoration:

19. 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: ☑ recently burned

If planted: ☑ in process of restoration **~Tree age:** ☐ 0-5 yrs. ☐ 6-10 yrs. ☑ 11-20 yrs. ☐ 20+ yrs.

Recommendations for restoration: ☑ continue prescribed burning **other:**

20. Notes on prescribed burning and fire conditions:

Fuels: duff (cm): 2 litter (cm) 6+ note: there are many dead stems from herbaceous plants and woody stems from subcanopy and shrubs on and/or near the ground.

Soil moisture: moist

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

Prescribed fire is recommended.

Allow fire to burn across entire landscape.

Qualitative assessment data sheet

Transect ID: DWPT2-626 **Date:** 10/19/2017

Plant Community Type: Hydric Pine Savanna **Time (am/pm):** 11:50 AM

1. Weather: ☑ Full Sun ☐ Part Sun ☐ Cloudy ☐ Cloudy with Rain/Fog

2. Temperature: ☐ 20-50 F ☐ 51-70 F ☑ 71-90 F ☐ 91-110 F

☑ Restoration in Progress

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. Pinus elliottii	**2.** Taxodium ascendens	**3.** Nyssa sylvatica v. biflora
4. Magnolia virginiana	**5.** Acer rubrum	**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. Nyssa sylvatica v. biflora	**2.** Pinus elliottii	**3.** Magnolia virginiana
4. Acer rubrum	**5.** Persea palustris	**6.** Taxodium ascendens

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

List 3 dominant **SHRUB** species observed:

1. Myrica cerifera	**2.** Ilex glabra	**3.** Lyonia lucida

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. Myrica cerifera	**2.** Persea palustris	**3.** Magnolia virginiana

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. Fuirena scirpoidea	**2.** Aristida palustris	**3.** Panicum virgatum
4. Eriocaulon decangulare	**5.** Andropogon glomeratus	**6.** Bidens mitis
7. Cladium jamaicense	**8.** Smilax laurifolia	**9.** Anthaenanthia rufa

List the NATIVE **WEEDY** or **RUDERAL** species observe - otherwise SEE 18. EXOTIC SPECIES BELOW

1.	**2.**	**3.**
4.	**5.**	**6.**

Vegetation notes: Native groundcover species are recovering. Shrubs reduced to coppice by prescribed fire. Common to find dead, standing fire killed stems from magnolias, hollies, titi and tupelo. Much of the fire killed vegetation is on the ground. It is possible that the deadfall may be burned in the next prescribed fire. This may result in a longer and hotter fire.

Qualitative assessment data sheet

Transect ID: DWPT2-626 **Date:** 10/19/2017

Plant Community Type: Hydric Pine Savanna

10. Tree density: appropriate for coastal wet pinelands **Why?:** ☐ too dense ☐ too sparse

11. Tree health: most trees are healthy ☐ trees stressed **Why?:** ☐ 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 **slightly tannic- nearly clear**

Notes on wildlife usage observed:

1. catbird
2. northern cardinal
3. pine warbler
4. jumping spider
5. mosquito
6. red bellied woodpecker
7. deerfly
8. Carolina wren
9. eastern phoebe

17. Wildlife usage and natural history observations: ☑ amphibians ☐ reptiles ☐ fish ☑ birds ☐ mammals ☑ arthropods ☐ footprints ☐ scratch marks ☑ songs or calls ☐ scat

Wildlife notes: Heard the calls from eastern phoebe, red bellied woodpecker, northern cardinal, pine warbler. Animal trails were observed.

Notes on Exotic species observed:

18. Exotic species: ☐ present ☑ absent

Notes on Restoration:

19. 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: ☑ recently burned

If planted: ☑ in process of restoration **~Tree age:** ☐ 0-5 yrs. ☐ 6-10 yrs. ☐ 11-20 yrs. ☑ 20+ yrs.

Recommendations for restoration: ☑ continue prescribed burning **other:**

20. Notes on prescribed burning and fire conditions:

Fuels: duff (cm): 1 litter (cm) 1+ note: there are many dead stems from subcanopy and shrubs on the ground.

Soil moisture: moist

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

Site is a forested seepage slope ecotone adjacent to a tidal marsh; canopy is healthy and fire was allowed to burn through this forest.

Part of transect travels through a Cladium marsh. Allow fire to burn across entire landscape.

Qualitative assessment data sheet

Transect ID: DWPT3-641 **Date:** 10/19/2017

Plant Community Type: Freshwater/Tidal Marsh **Time (am/pm):** 12:10 AM CT

1. Weather: ☑ Full Sun ☐ Part Sun ☐ Cloudy ☐ Cloudy with Rain/Fog

2. Temperature: ☐ 20-50 F ☐ 51-70 F ☑ 71-90 F ☐ 91-110 F

☑ Restoration in Progress

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. Pinus elliottii	**2.** Taxodium ascendens	**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. Pinus elliottii	**2.** Taxodium ascendens	**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. Myrica cerifera	**2.** Ilex cassine v. myrtifolia	**3.** Ilex glabra

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. Persea palustris	**2.** Acer rubrum	**3.** Pinus elliottii

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. Juncus roemerianus	**2.** Cladium jamaicense	**3.** Hypericum sp.
4. Osmunda regalis	**5.**	**6.**
7.	**8.**	**9.**

List the NATIVE **WEEDY** or **RUDERAL** species observe - otherwise SEE 18. EXOTIC SPECIES BELOW

1.	**2.**	**3.**
4.	**5.**	**6.**

Vegetation notes: This transect includes a tidal marsh ecotone. Fire burned into the tidal marsh.

Native graminoid species dominate the groundcover. Shrubs reduced to coppice by prescribed fire. Common to find dead, standing fire killed stems from magnolias, hollies, titi and tupelo. Much of the fire killed vegetation is on the ground. It is possible that the deadfall may be burned in the next prescribed fire. This may result in a longer and hotter fire.

Qualitative assessment data sheet

Transect ID: DWPT3-641 **Date:** 10/19/2017

Plant Community Type: Freshwater/tidal Marsh

10. Tree density: appropriate **Why?:** ☐ too dense ☐ too sparse

11. Tree health: ☐ trees healthy ☑ trees stressed **Why?:** ☐ 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:** **very low salinity brackish conditions**

Notes on wildlife usage observed:

1. Gambusia affinis mosquitofish
2. cloudless sulfur butterfly
3. common grackle
4. red bellied woodpecker
5. Carolina wren
6. green treefrog
7. eastern phoebe
8. red winged blackbird
9.

17. Wildlife usage and natural history observations: ☐ amphibians ☐ reptiles ☑ fish ☑ birds ☐ mammals ☑ arthropods ☐ footprints ☐ scratch marks ☑ songs or calls ☐ scat

Wildlife notes: Heard the calls from eastern phoebe, red bellied woodpecker, eastern bluebird, pine warbler.

Notes on Exotic species observed:

18. Exotic species: ☐ present ☑ absent

Exotic species notes: Frequent fire will often eliminate and control invasive exotic plants.

Notes on Restoration:

19. 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: ☑ well managed ☑ recently burned

If planted: ☑ in process of restoration **~Tree age:** ☐ 0-5 yrs. ☐ 6-10 yrs. ☐ 11-20 yrs. ☐ 20+ yrs.

Recommendations for restoration: ☑ continue prescribed burning **other:** primarily a tidal marsh without a canopy

20. Notes on prescribed burning and fire conditions:

Fuels: duff (cm): underwate litter (cm) 6+

Soil moisture: saturated

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

Site was burned in the near past and could use another prescribed fire. Fire should carry across the graminoid dominant groundcover.

Allow fire to burn across entire landscape. Regular burning will maintain the tidal marsh in perpetuity.

Qualitative assessment data sheet

Transect ID: DWPT4-614 **Date:** 10/19/2017

Plant Community Type: Titi Swamps **Time (am/pm):** 10:30 PM CT

1. Weather: ☑ Full Sun ☐ Part Sun ☐ Cloudy ☐ Cloudy with Rain/Fog

2. Temperature: ☐ 20-50 F ☐ 51-70 F ☑ 71-90 F ☐ 91-110 F

☐ Restoration in Progress

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. Pinus elliottii **2.** Nyssa sylvatica var biflora **3.** Taxodium ascendens

4. Magnolia virginiana **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. Nyssa sylvatica var biflora **2.** Magnolia virginiana **3.** Taxodium ascendens

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. Cliftonia monophylla **2.** Ilex myrtifolia **3.** Ilex coriacea

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. Taxodium ascendens **2.** Magnolia virginiana **3.** Ilex coriacea

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. Hypericum brachyphyllum **2.** Eriocaulon decangulare **3.** Sarracenia leucophylla

4. Toxicodendron radicans **5.** Osmunda regalis **6.** Rhynchospora spp.

7. Rhynchospora fascicularis **8.** Xyris spp. **9.** Dicanthelium scabrisculum

List the NATIVE **WEEDY** or **RUDERAL** species observe - otherwise SEE 18. EXOTIC SPECIES BELOW

1. **2.** **3.**

4. **5.** **6.**

Vegetation notes: Native groundcover species are diverse. Shrubs reduced to coppice by prescribed fire. Common to find dead, standing fire killed stems from magnolias, hollies, titi and tupelo. Much of the fire killed vegetation is on the ground. It is possible that the deadfall may be burned in the next prescribed fire. This may result in a longer and hotter fire.

Qualitative assessment data sheet

Transect ID: DWPT4-614 **Date:** 10/19/2017

Plant Community Type: Titi Swamps (it is actually a wet prairie)

10. Tree density: appropriate **Why?:** ☐ too dense ☐ too sparse

11. Tree health: ☑ trees healthy ☐ trees stressed **Why?:** ☐ 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. spiders
2. blue darner dragonfly
3. cricket frog
4. a diversity of insects
5. pine warbler
6. catbird
7. red bellied woodpecker
8. eastern phoebe
9.

17. Wildlife usage and natural history observations: ☑ amphibians ☐ reptiles ☐ fish ☑ birds ☑ mammals ☑ arthropods ☑ footprints ☐ scratch marks ☑ songs or calls ☐ scat

Wildlife notes: wintering catbirds, spiders, cloudless sulfur butterfly, deer scat, and raccoon prints in mud.

Notes on Exotic species observed:

18. Exotic species: ☑ present ☐ absent

Exotic species notes: a few Chinese tallow tree seedlings were seen.

Notes on Restoration:

19. 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: ☑ recently (partially) burned

If planted: ☑ in process of restoration **~Tree age:** ☐ 0-5 yrs. ☐ 6-10 yrs. ☑ 11-20 yrs. ☐ 20+ yrs.

Recommendations for restoration: ☑ continue prescribed burning **other:**

20. Notes on prescribed burning and fire conditions:

Fuels: duff (cm): 0 litter (cm) 1+ note: there are many dead stems from subcanopy and shrubs on the ground.

Soil moisture: saturated

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

Site has been burned, which killed the shrubs to the ground. The coppiced shrubs were then treated with herbicide. The landscape is open with a diversity of herbaceous groundcover species. Allow fire to burn across entire landscape.

Qualitative assessment data sheet

Transect ID: DWPT5-626 **Date:** 10/19/2017

Plant Community Type: Hydric Pine Savanna **Time (am/pm):** 12:55 AM CT

1. Weather: ☑ Full Sun ☐ Part Sun ☐ Cloudy ☐ Cloudy with Rain/Fog

2. Temperature: ☐ 20-50 F ☐ 51-70 F ☑ 71-90 F ☐ 91-110 F

☑ Restoration in Progress

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. Pinus elliottii **2.** Taxodium ascendens **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. Nyssa sylvatica var biflora **2.** Magnolia virginiana **3.** Taxodium ascendens

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. Myrica cerifera **2.** Ilex coriacea **3.** Ilex glabra

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. Magnolia virginiana **2.** Taxodium ascendens **3.** Myrica cerifera

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. Fuirena breviseta **2.** Rhynchospora fascicularis **3.** Rhynchospora filifolia

4. Eriocaulon decangulare **5.** Sarracenia leucophylla **6.** Xyris sp.

7. Rhynchospora plumosa **8.** Rhynchospora chapmanii **9.** Hypericum brachyphyllum

List the NATIVE **WEEDY** or **RUDERAL** species observe - otherwise SEE 18. EXOTIC SPECIES BELOW

1. **2.** **3.**

4. **5.** **6.**

Vegetation notes: Native groundcover species are recovering. Shrubs reduced to coppice by prescribed fire. Common to find dead, standing fire killed stems from magnolias, hollies, titi and tupelo. Much of the fire killed vegetation is on the ground. It is possible that the deadfall may be burned in the next prescribed fire. This may result in a longer and hotter fire.

Qualitative assessment data sheet

Transect ID: DWPT5-626 **Date:** 10/19/2017

Plant Community Type: Hydric Pine Savanna

10. Tree density: appropriate **Why?:** ☐ too dense ☐ too sparse

11. Tree health: ☑ trees healthy ☐ trees stressed **Why?:** ☐ 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. diversity of insects and spiders
2. catbird
3. northern mockingbird
4. cricket frog
5. palm warbler
6. Carolina chickadee
7. eastern phoebe
8. cicadas
9.

17. Wildlife usage and natural history observations: ☑ amphibians ☐ reptiles ☑ fish ☑ birds ☑ mammals ☑ arthropods ☑ footprints ☐ scratch marks ☑ songs or calls ☐ scat

Wildlife notes: bird calls include northern mockingbird, pine warbler and catbird. White tailed deer tracks observed.

Notes on Exotic species observed:

18. Exotic species: ☐ present ☑ absent

Exotic species notes: Invasive exotics were more common before the prescribed fire. Frequent fire will eliminate and control invasive exotic plants.

Notes on Restoration:

19. 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: ☑ recently burned

If planted: ☑ in process of restoration **~Tree age:** ☐ 0-5 yrs. ☐ 6-10 yrs. ☑ 11-20 yrs. ☐ 20+ yrs.

Recommendations for restoration: ☑ continue prescribed burning **other:**

20. Notes on prescribed burning and fire conditions:

Fuels: duff (cm): 0 litter (cm) 2+ note: there are many dead stems from subcanopy and shrubs on the ground.

Soil moisture: saturated

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

Site has been burned, which killed the shrubs to the ground. The coppiced shrubs were then treated with herbicide. The landscape is open with a diversity of herbaceous groundcover species. Allow fire to burn across entire landscape.

Qualitative assessment data sheet

Transect ID: DWPT6-626 **Date:** 10/19/2017

Plant Community Type: Hydric Pine Savanna **Time (am/pm):** 9 AM CT

1. Weather: ☑ Full Sun ☐ Part Sun ☐ Cloudy ☐ Cloudy with Rain/Fog

2. Temperature: ☐ 20-50 F ☐ 51-70 F ☑ 71-90 F ☐ 91-110 F

☑ Restoration in Progress

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. Pinus elliottii	**2.** Magnolia virginiana	**3.** Taxodium ascendens
4. Nyssa sylvatica v. biflora	**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. Pinus elliottii	**2.** Magnolia virginiana	**3.** Taxodium ascendens
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. Myrica cerifera	**2.** Gaylussacia mosieri	**3.** Ilex glabra

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. Ilex cassine	**2.** Persea palustris	**3.** Acer rubrum

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. Juncus roemarianus	**2.** Panicum virgatum	**3.** Paspalum floridanum
4. Toxicodendron radicans	**5.** Serenoa repens	**6.** Spartina patens
7. Cladium jamaicense	**8.** Solidago fistulosa	**9.** Osmunda regalis

List the NATIVE **WEEDY** or **RUDERAL** species observe - otherwise SEE 18. EXOTIC SPECIES BELOW

1.	**2.**	**3.**
4.	**5.**	**6.**

Vegetation notes: Native groundcover species dominate the groundcover. Many shrubs reduced to coppice by prescribed fire.

Much of the fire killed vegetation is on the ground. It is possible that the deadfall may be burned in the next prescribed fire. This may result in a longer and hotter fire.

Much of this area was flooded during the field inspection.

Qualitative assessment data sheet

Transect ID: DWPT6-626 **Date:** 10/19/2017

Plant Community Type: Hydric Pine Savanna

10. Tree density: appropriate **Why?:** ☐ too dense ☐ too sparse

11. Tree health: ☑ trees healthy ☐ trees stressed **Why?:** ☐ 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. sedge wren
2. white tailed deer footprints
3. catbird
4. northern cardinal
5. Carolina wren
6. raccoon footprints
7. grey squirrel
8. red shouldered hawk
9.

17. Wildlife usage and natural history observations: ☑ amphibians ☑ reptiles ☑ fish ☑ birds ☐ mammals ☑ arthropods ☑ footprints ☐ scratch marks ☑ songs or calls ☐ scat

Wildlife notes: Transect includes ecotone of saltmarsh. Frogs (cricket and leopard) and fish were seen in the flooded marsh, birds were calling from marsh vegetation and nearby forest, and raccoon and deer footprints were seen in the mud.

Notes on Exotic species observed:

18. Exotic species: ☐ present ☑ absent

Exotic species notes: Frequent fire will often eliminate and control invasive exotic plants.

Notes on Restoration:

19. 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: ☑ recently burned

If planted: ☑ in process of restoration **~Tree age:** ☐ 0-5 yrs. ☐ 6-10 yrs. ☐ 11-20 yrs. ☑ 20+ yrs.

Recommendations for restoration: ☑ continue prescribed burning **other:**

20. Notes on prescribed burning and fire conditions:

Fuels: duff (cm): underwater litter (cm) 2+ note: there are many dead stems from subcanopy and shrubs on the ground.

Soil moisture: saturated

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

Site was burned in past; shrubs are coppiced. Herbaceous species have benefited from the fire. Allow fire to burn across entire landscape.

This landscape is influenced by flooding from nearby creek, rafted debris and other hydrologic indicators of surface water are common.

APPENDIX B

PANORAMIC PHOTOGRAPHS

QUALITATIVE TRANSECTS

Dutex site West side- 2017 Qualitative Transect Dutex DW-PT1-441 photograph

0^0 **180^0**

180^0 **360^0**

Dutex site West side – 2017 Qualitative Transect Dutex DW-PT2-611 photograph

0^0 **180^0**

180^0 **360^0**

Dutex site West side – 2017 Qualitative Transect Dutex DW-PT3-641 photograph

0^0 180^0

180^0 360^0

Dutex site West side – 2017 Qualitative Transect Dutex DW-PT4-626 photograph

0^0 180^0

180^0 360^0

Dutex site West side – 2017 Qualitative Transect Dutex DW-PT5-626 photograph

0^0 **180^0**

180^0 **360^0**

Dutex site West side – 2017 Qualitative Transect Dutex DW-PT6-642 photograph

0^0 **180^0**

180^0 **360^0**

QUANTITATIVE TRANSECTS

Dutex site, west tract. 2017 Quantitative Transect DW-QT1-625: Panoramic Photograph depicted in two 180 degree sections.

0^0 **180^0**

180^0 **360^0**

Dutex site, west tract. 2017 Quantitative Transect DW-QT2-626: Panoramic Photograph depicted in two 180 degree sections.

0^0 180^0

180^0 360^0

Dutex site, west tract. 2017 Quantitative Transect DW-QT3-626: Panoramic Photograph depicted in two 180 degree sections.

0^0 180^0

180^0 360^0

Dutex site, west tract. 2017 Quantitative Transect DW-QT4-626: Panoramic Photograph depicted in two 180 degree sections.

0^0 **180^0**

180^0 **360^0**

APPENDIX C

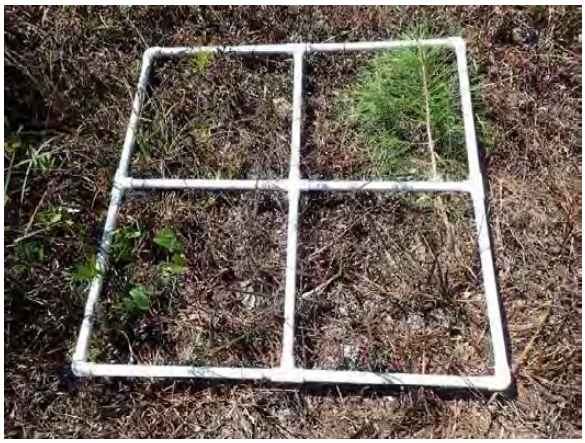
QUANTITATIVE MONITORING PLOT PHOTOGRAPHS

TRANSECT DWQT1-625 HYDRIC PINE FLATWOODS


Photographs (left to right): 1) Transect DWQT1-625 Plot – 10 feet; 2) Transect DWQT1-625 Plot – 20 feet


Photographs (left to right): 1) Transect DWQT1-625 Plot – 30 feet; 2) Transect DWQT1-625 Plot – 40 feet

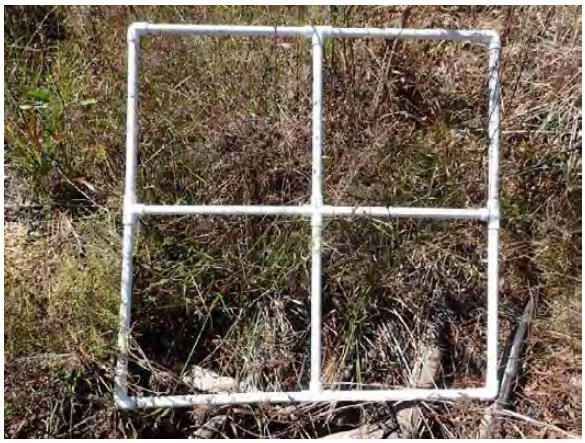

Photographs (left to right): 1) Transect DWQT1-625 Plot – 50 feet; 2) Transect DWQT1-625 Plot – 60 feet




Photographs (left to right): 1) Transect DWQT1-625 Plot – 70 feet; 2) Transect DWQT1-625 Plot – 80 feet


Photographs (left to right): 1) Transect DWQT1-625 Plot – 90 feet; 2) Transect DWQT1-625 Plot – 100 feet

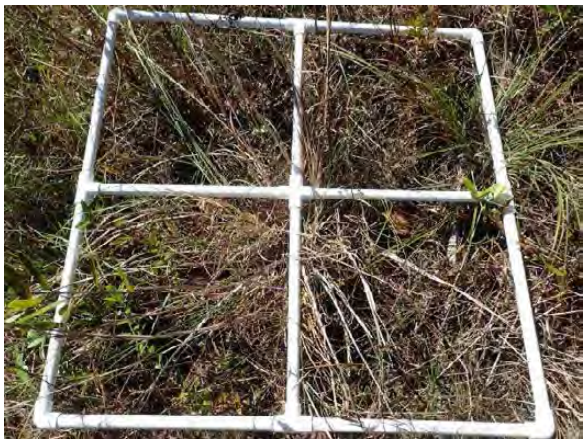

Photographs (left to right): 1) Transect DWQT1-625 Plot – 110 feet; 2) Transect DWQT1-625 Plot – 120 feet




Photographs (left to right): 1) Transect DWQT1-625 Plot – 130 feet; 2) Transect DWQT1-625 Plot – 140 feet


Photographs (left to right): 1) Transect DWQT1-625 Plot – 150 feet; 2) Transect DWQT1-625 Plot – 160 feet

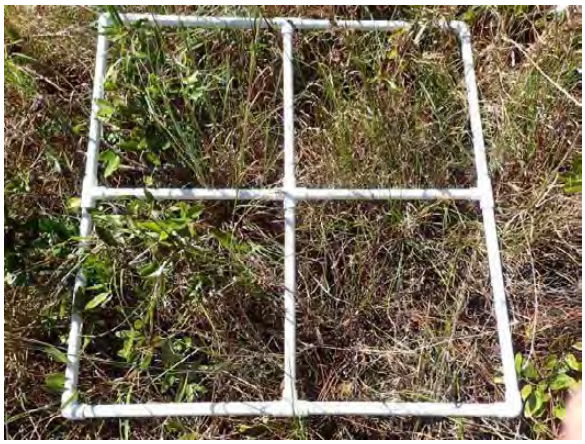

Photographs (left to right): 1) Transect DWQT1-625 Plot – 170 feet; 2) Transect DWQT1-625 Plot – 180 feet

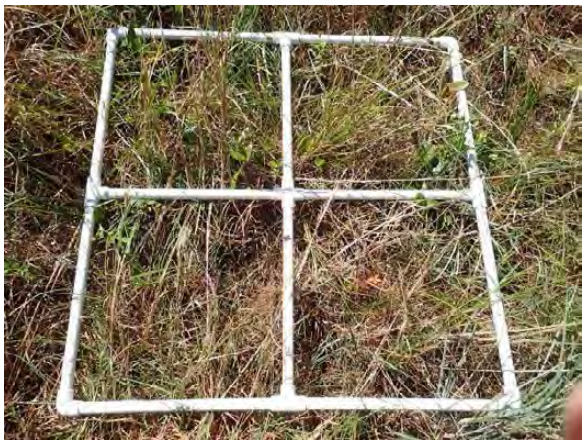
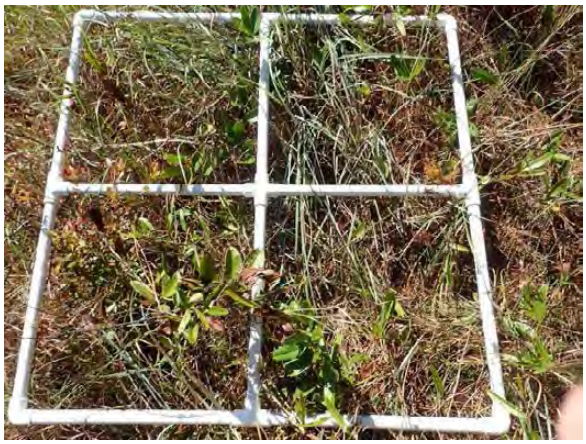
Photographs (left to right): 1) Transect DWQT1-625 Plot – 190 feet; 2) Transect DWQT1-625 Plot – 200 feet


Photographs (left to right): 1) Transect DWQT1-625 Plot – 210 feet; 2) Transect DWQT1-625 Plot – 220 feet

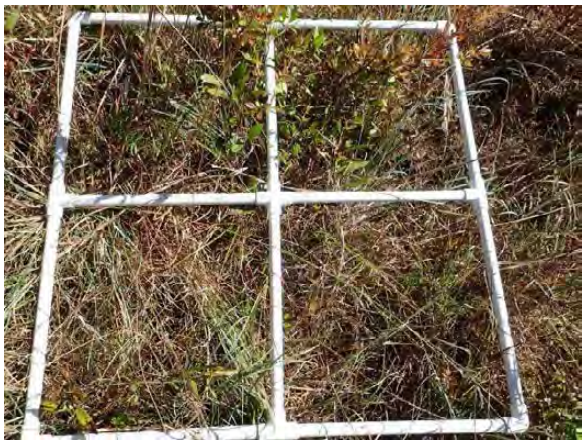

Photographs (left to right): 1) Transect DWQT1-625 Plot – 230 feet; 2) Transect DWQT1-625 Plot – 240 feet




Photographs (left to right): 1) Transect DWQT1-625 Plot – 250 feet; 2) Transect DWQT1-625 Plot – 260 feet

Photographs (left to right): 1) Transect DWQT1-625 Plot – 270 feet; 2) Transect DWQT1-625 Plot – 280 feet




Photographs (left to right): 1) Transect DWQT1-625 Plot – 290 feet; 2) Transect DWQT1-625 Plot – 300 feet

TRANSECT DWQT2-626 HYDRIC PINE SAVANNA


Photographs (left to right): 1) Transect DWQT2-626 Plot – 10 feet; 2) Transect DWQT2-626 Plot – 20 feet


Photographs (left to right): 1) Transect DWQT2-626 Plot – 30 feet; 2) Transect DWQT2-626 Plot – 40 feet


Photographs (left to right): 1) Transect DWQT2-626 Plot – 50 feet; 2) Transect DWQT2-626 Plot – 60 feet


Photographs (left to right): 1) Transect DWQT2-626 Plot – 70 feet; 2) Transect DWQT2-626 Plot – 80 feet


Photographs (left to right): 1) Transect DWQT2-626 Plot – 90 feet; 2) Transect DWQT2-626 Plot – 100 feet

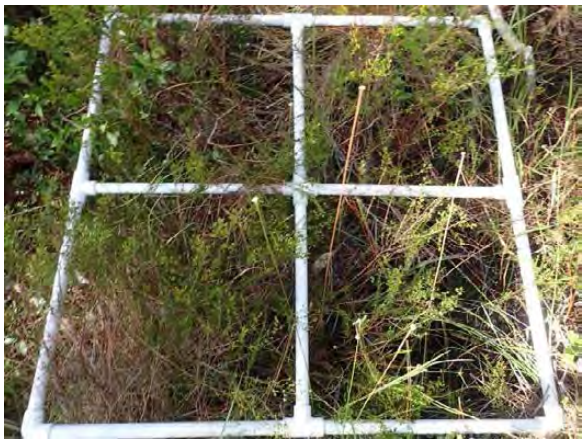

Photographs (left to right): 1) Transect DWQT2-626 Plot – 110 feet; 2) Transect DWQT2-626 Plot – 120 feet


Photographs (left to right): 1) Transect DWQT2-626 Plot – 130 feet; 2) Transect DWQT2-626 Plot – 140 feet


Photographs (left to right): 1) Transect DWQT2-626 Plot – 150 feet; 2) Transect DWQT2-626 Plot – 160 feet


Photographs (left to right): 1) Transect DWQT2-626 Plot – 170 feet; 2) Transect DWQT2-626 Plot – 180 feet

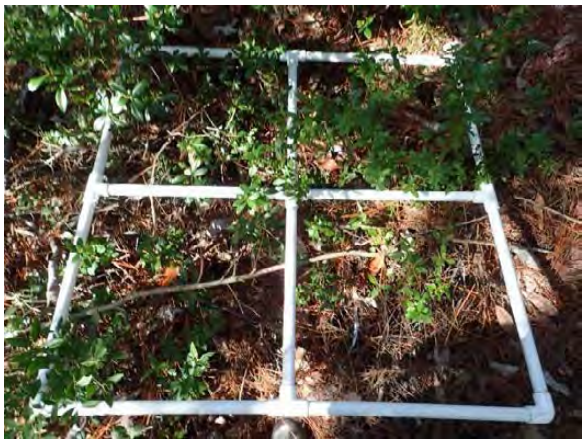

Photographs (left to right): 1) Transect DWQT2-626 Plot – 190 feet; 2) Transect DWQT2-626 Plot – 200 feet




Photographs (left to right): 1) Transect DWQT2-626 Plot – 210 feet; 2) Transect DWQT2-626 Plot – 220 feet


Photographs (left to right): 1) Transect DWQT2-626 Plot – 230 feet; 2) Transect DWQT2-626 Plot – 240 feet


Photographs (left to right): 1) Transect DWQT2-626 Plot – 250 feet; 2) Transect DWQT2-626 Plot – 260 feet

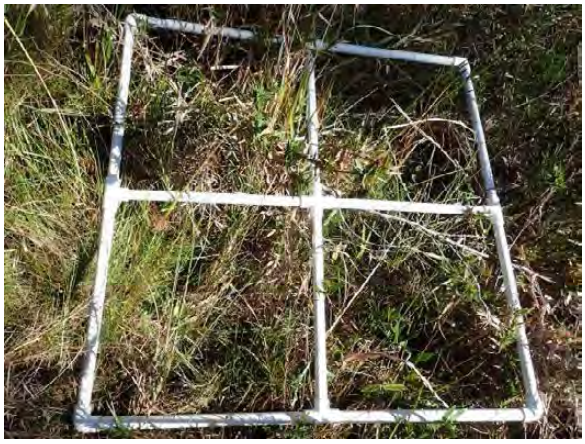
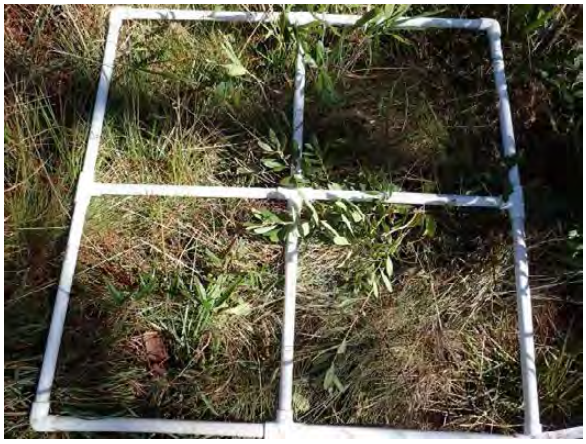



Photographs (left to right): 1) Transect DWQT2-626 Plot – 270 feet; 2) Transect DWQT2-626 Plot – 280 feet

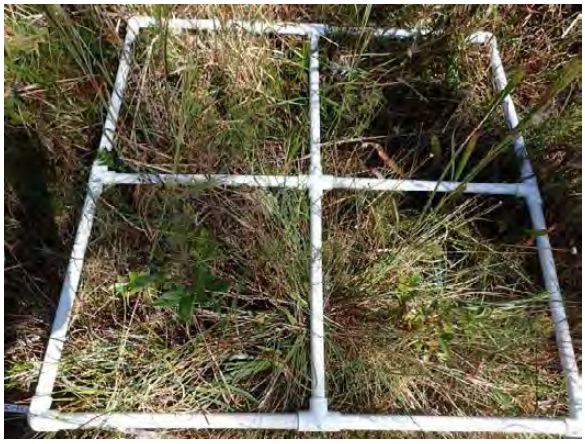

Photographs (left to right): 1) Transect DWQT2-626 Plot – 290 feet; 2) Transect DWQT2-626 Plot – 300 feet

TRANSECT DWQT3-626 HYDRIC PINE SAVANNA


Photographs (left to right): 1) Transect DWQT3-626 Plot – 10 feet; 2) Transect DWQT3-626 Plot – 20 feet

Photographs (left to right): 1) Transect DWQT3-626 Plot – 30 feet; 2) Transect DWQT3-626 Plot – 40 feet

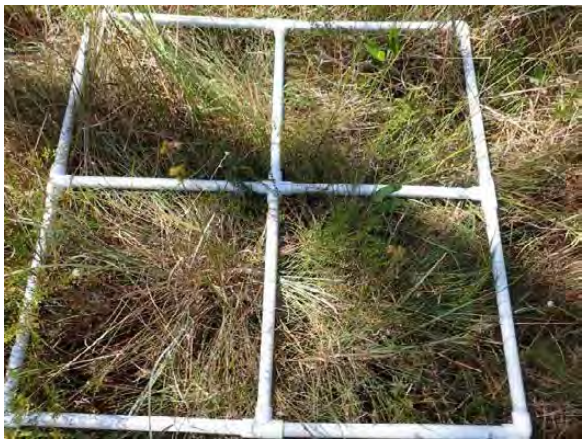



Photographs (left to right): 1) Transect DWQT3-626 Plot – 50 feet; 2) Transect DWQT3-626 Plot – 60 feet

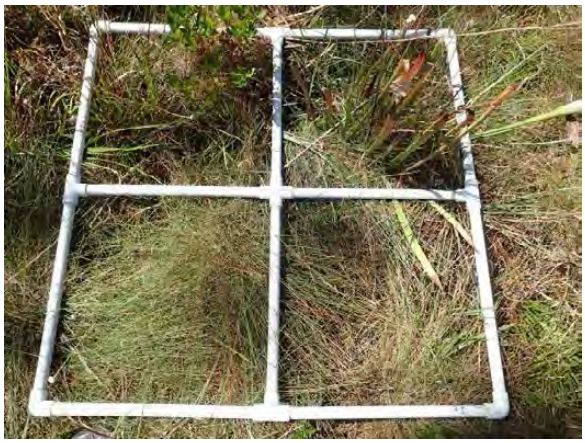
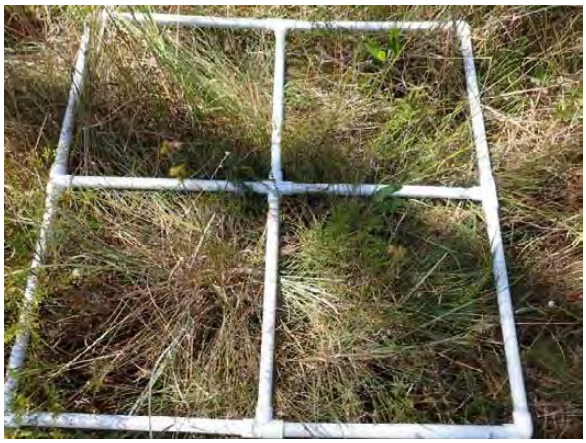

Photographs (left to right): 1) Transect DWQT3-626 Plot – 70 feet; 2) Transect DWQT3-626 Plot – 80 feet


Photographs (left to right): 1) Transect DWQT3-626 Plot – 90 feet; 2) Transect DWQT3-626 Plot – 100 feet

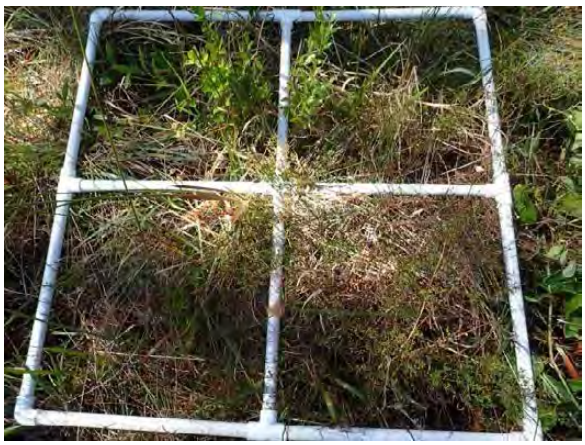

Photographs (left to right): 1) Transect DWQT3-626 Plot – 110 feet; 2) Transect DWQT3-626 Plot – 120 feet




Photographs (left to right): 1) Transect DWQT3-626 Plot – 130 feet; 2) Transect DWQT3-626 Plot – 140 feet

Photographs (left to right): 1) Transect DWQT3-626 Plot – 150 feet; 2) Transect DWQT3-626 Plot – 160 feet




Photographs (left to right): 1) Transect DWQT3-626 Plot – 170 feet; 2) Transect DWQT3-626 Plot – 180 feet

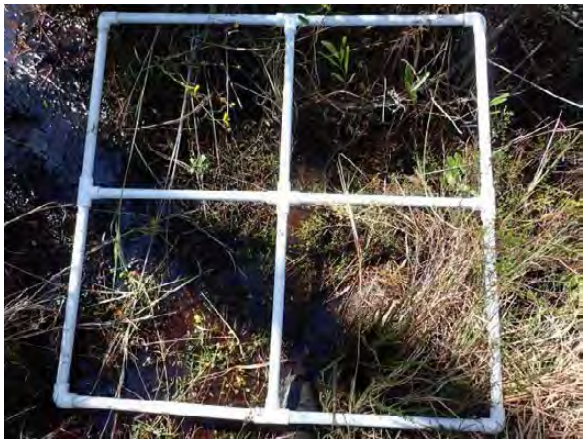

Photographs (left to right): 1) Transect DWQT3-626 Plot – 190 feet; 2) Transect DWQT3-626 Plot – 200 feet


Photographs (left to right): 1) Transect DWQT3-626 Plot – 210 feet; 2) Transect DWQT3-626 Plot – 220 feet


Photographs (left to right): 1) Transect DWQT3-626 Plot – 230 feet; 2) Transect DWQT3-626 Plot – 240 feet

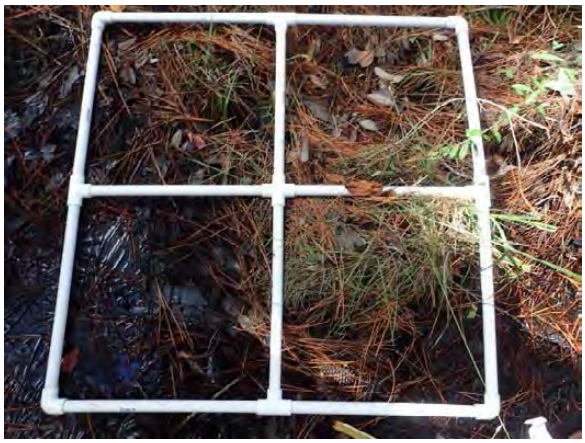

Photographs (left to right): 1) Transect DWQT3-626 Plot – 250 feet; 2) Transect DWQT3-626 Plot – 260 feet


Photographs (left to right): 1) Transect DWQT3-626 Plot – 270 feet; 2) Transect DWQT3-626 Plot – 280 feet

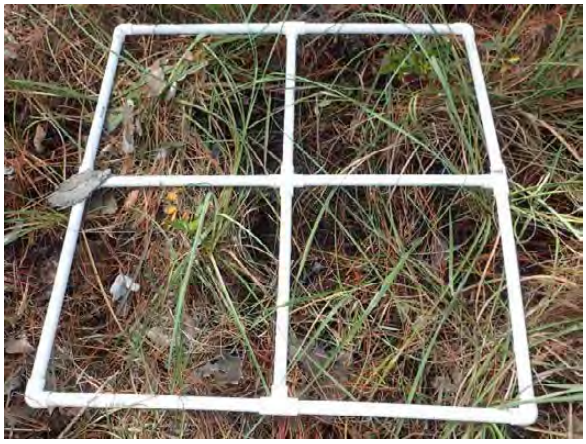
Photographs (left to right): 1) Transect DWQT3-626 Plot – 290 feet; 2) Transect DWQT3-626 Plot – 300 feet

TRANSECT DWQT4-625 HYDRIC PINE FLATWOODS



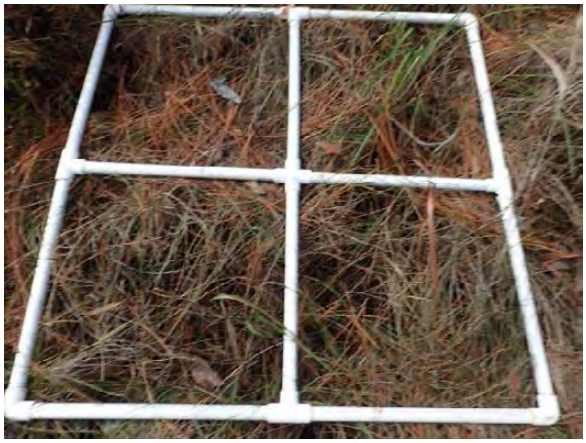

Photographs (left to right): 1) Transect DWQT4-625 Plot – 10 feet; 2) Transect DWQT4-625 Plot – 20 feet


Photographs (left to right): 1) Transect DWQT4-625 Plot – 30 feet; 2) Transect DWQT4-625 Plot – 40 feet

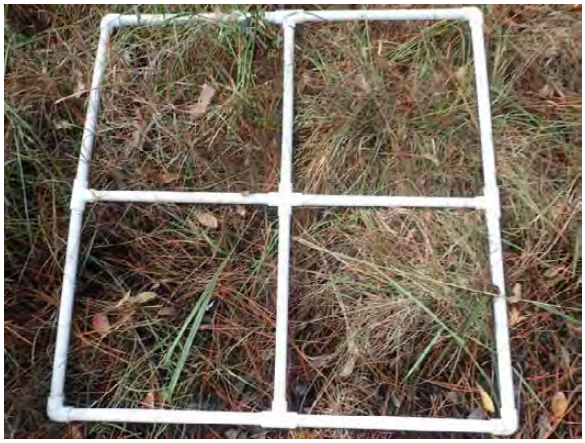



Photographs (left to right): 1) Transect DWQT4-625 Plot – 50 feet; 2) Transect DWQT4-625 Plot – 60 feet

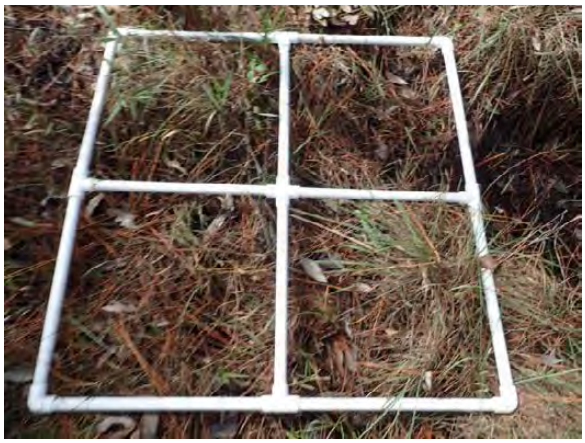
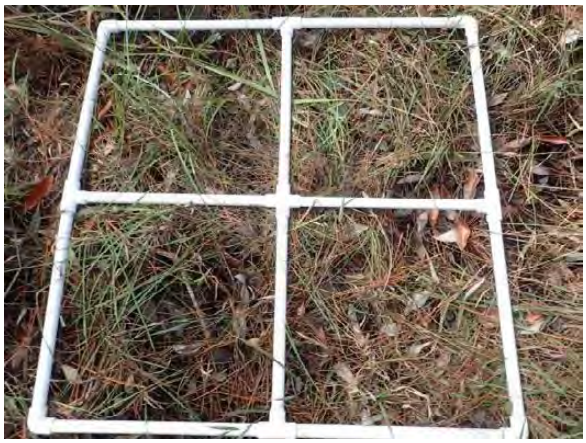

Photographs (left to right): 1) Transect DWQT4-625 Plot – 70 feet; 2) Transect DWQT4-625 Plot – 80 feet

Photographs (left to right): 1) Transect DWQT4-625 Plot – 90 feet; 2) Transect DWQT4-625 Plot – 100 feet

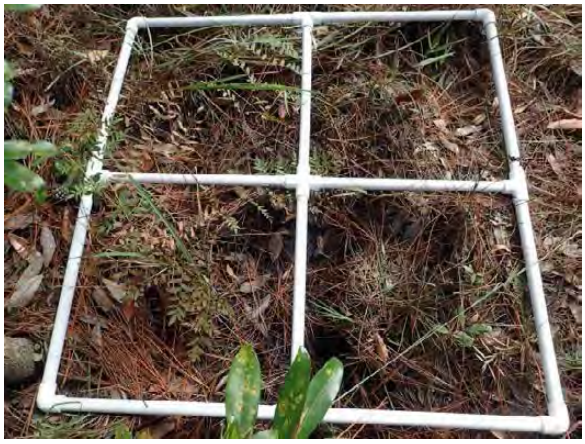



Photographs (left to right): 1) Transect DWQT4-625 Plot – 110 feet; 2) Transect DWQT4-625 Plot – 120 feet

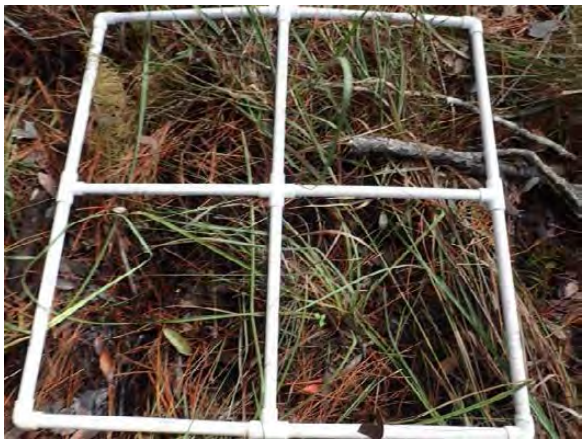



Photographs (left to right): 1) Transect DWQT4-625 Plot – 130 feet; 2) Transect DWQT4-625 Plot – 140 feet

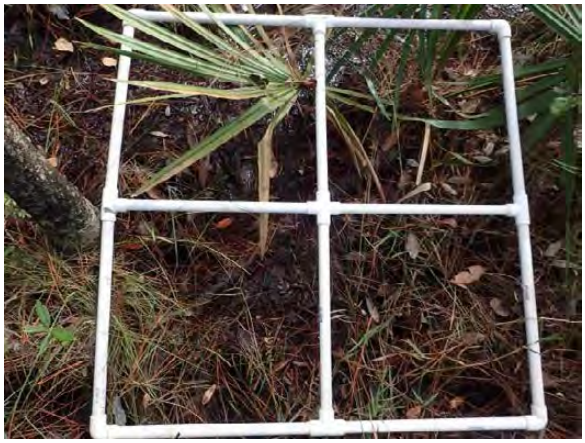

Photographs (left to right): 1) Transect DWQT4-625 Plot – 150 feet; 2) Transect DWQT4-625 Plot – 160 feet




Photographs (left to right): 1) Transect DWQT4-625 Plot – 170 feet; 2) Transect DWQT4-625 Plot – 180 feet



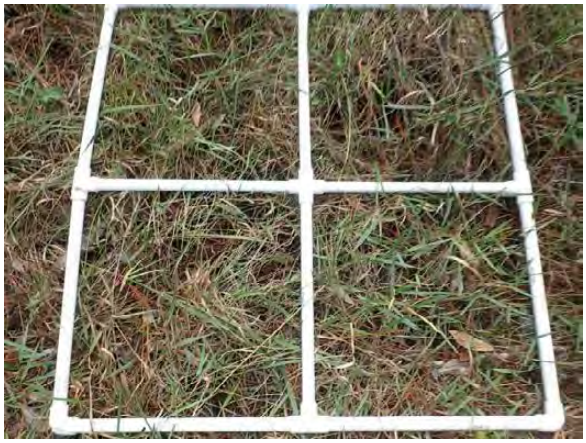

Photographs (left to right): 1) Transect DWQT4-625 Plot – 190 feet; 2) Transect DWQT4-625 Plot – 200 feet




Photographs (left to right): 1) Transect DWQT4-625 Plot – 210 feet; 2) Transect DWQT4-625 Plot – 220 feet


Photographs (left to right): 1) Transect DWQT4-625 Plot – 230 feet; 2) Transect DWQT4-625 Plot – 240 feet


Photographs (left to right): 1) Transect DWQT4-625 Plot – 250 feet; 2) Transect DWQT4-625 Plot – 260 feet

Photographs (left to right): 1) Transect DWQT4-625 Plot – 270 feet; 2) Transect DWQT4-625 Plot – 280 feet


Photographs (left to right): 1) Transect DWQT4-625 Plot – 290 feet; 2) Transect DWQT4-625 Plot – 300 feet