

*Establishment of Long-Term Monitoring of Vegetation Affected by  
Brine Deposition West of Buttonwood Canal*

2003 Report  
Cooperative Agreement # H5292-03-6081

Steven W. Woodmansee, Jimi L. Sadle, and George D. Gann  
November 25, 2003



Submitted by  
The Institute for Regional Conservation  
22601 S.W. 152 Avenue, Miami, Florida 33170  
George D. Gann, Executive Director



Submitted to  
Craig Smith  
Contracting Officer Technical Representative  
Everglades National Park  
40001 State Road 9336  
Homestead, FL 33034

## Table of Contents

<i>Introduction</i>	03
<i>Methods</i>	03
<i>Summary of Data</i>	04
<i>Table 1</i>	06
<i>Table 2</i>	07
<i>Figure 1</i>	08
<i>Figure 2</i>	09
<i>Figure 3</i>	10
<i>Figure 4</i>	11
<i>Figure 5</i>	12
<i>Figure 6</i>	13
<i>Figure 7</i>	14
<i>Figure 8</i>	15
<i>Figure 9</i>	16
<i>Figure 10</i>	17
<i>Figure 11</i>	18

## Introduction

In Fall 2003, The Institute for Regional Conservation (IRC) established 15 permanent transects in order to monitor the effects of proposed brine deposition near Flamingo as described on the scope of work for cooperative agreement # H5292-03-6081. Work was done between October 2 and November 17, 2003. Rare plant monitoring in the vicinity of the percolation pond was conducted on the 15<sup>th</sup> and 16<sup>th</sup> of October and 17<sup>th</sup> of November 2003.

## Methods

### **Plot design and implementation**

Transects were placed within three plots in the vicinity of the percolation pond (Figure 1). Five study plot transects were placed immediately east of the percolation pond, five control plot transects were placed north of the percolation pond, and five control plot transects were placed south of the percolation pond. Distance between each transect within the three plots was selected using a random number between 10 and 20 meters, in meter increments. These transects were then marked using 1.5 meter long PVC pipes with numbered aluminum tags. Seven plot markers were placed along each transect line. Distance between each marker was 50 meters apart except in special circumstances. All PVC marker locations were recorded using GPS equipment accurate to less than one meter.

Study plot transects were oriented east to west in the natural communities immediately east of the percolation pond, beginning 10 meters from the edge of the fill pad or canal. Transects run east toward Buttonwood Canal ending ten meters from Bear Lake Road. The study transects were marked at each beginning and ending based upon proximity to the fill pad to the west and proximity to Bear Lake Road to the east. Study transects measured 275 meters for transect #1, 280 meters for transect #2, 280 meters for transect #3, 280 meters for transect #4, and 245 meters for transect #5. Control plot transects were placed and marked in the same manner as the study plots, however all transects measured 300 meters in length. Control plot transects run east to west.

Plant data were recorded at 5 meter intervals beginning 5 meters from each transect origin and at the ending of the end of each transect line. All plants intersecting each intercept were recorded for ground (<2cm), herb (2cm-1m), shrub (1-3m), and canopy (>3m) layers. The health of plants intercepting at the canopy layer was recorded as either healthy (0-25% dead), intermediate (25-50% dead), mostly dead (50-99% dead), or dead (99-100% dead). The health of the two individuals of the three native species dominant within a 2.5 meter radius closest

to the intercept was also recorded. If a non-native taxon was dominant, the closest two individuals were also recorded in addition to the three dominant native species. In some cases, only one or two native species were present within a 2.5 meter radius of the intercept point. Individuals were defined as above ground stem (or pneumatophore as was the case for *Avicennia germinans*) portions of the plant. Stumps of trees were also counted as individuals. Health of individuals was relative to the 2.5 meter radius around the intercept. Plant taxonomy follows Wunderlin 1998. Plant community transitions along each transect were estimated to the nearest meter.

### **Rare Plant Inventory**

An extensive survey was conducted for all state-listed endangered and threatened species within a 250 meter radius of the percolation pond. Aerial photographs were used to number distinct habitats within the 250 m radius. (Figure 2). Surveys consisted of walking transects 10 meters apart. Populations were estimated for each state-listed species within each numbered habitat. Flowering and fruiting phenology, as well as, health of state-listed species were also recorded. State-listed species were mapped using a handheld GPS unit. For individuals or small populations a centroid was recorded. For larger yet discrete populations, a polygon was recorded. State-listed species that were located throughout a numbered habitat were recorded as such.

### **Data Organization**

Transect data recorded was entered into Access 2000. Tables were created for the transect background (named *Flamingo\_Transect*), intercept data (named *Flamingo\_InterceptData*), herb health data (named *Flamingo\_HerbHealthData*), plant community transition data (*Flamingo\_PlantCommunityTransitionData*) and for the rare plant data (named *Flamingo\_RarePlantsData*). A names table (*Flamingo\_AcceptedNames*) was provided for cross-referencing TXCode with the scientific name. Plot marker locations are also provided (*Flamingo\_PlotMarkers*).

### **Summary of Data**

#### **Plot Transect Summary**

In the herb layer within the 2.5 meter radius of each intercept point, 3943 individuals were determined to be healthy, 378 intermediate, 82 mostly dead, and 166 dead. In the canopy layer at each intercept point, 310 individuals were determined to be healthy, 1 intermediate, 0 mostly dead, and 1 dead. Between 6 and 16 native plant taxa were recorded for each transect (Table 1). A total of five state-listed plants were recorded along transects.

### **Rare Plant Inventory Summary**

Seven state threatened and seven state endangered taxa were observed in the vicinity of the percolation pond (Table 1). All state-listed species were observed in Buttonwood habitats or disturbed edges only. In addition, two species ranked as critically imperiled in South Florida by IRC (Gann et al., 2002) were observed in the vicinity of the percolation pond: *Scirpus robustus* and *Malachra urens*.

### **Acknowledgements**

The authors wish to thank Tom Armentano (Everglades National Park) and Craig Smith (Everglades National Park) for their assistance in project design. Keith Bradley, Melissa Abdo, and Hannah Thornton assisted with data entry and management.

### **Citations**

Gann, G.D, K.A. Bradley, and S.W. Woodmansee. 2002. Rare Plants of South Florida: Their History, Conservation, and Restoration. The Institute for Regional Conservation, Miami, Florida.

Wunderlin, R.P. 1998. Guide to the Vascular Plants of Florida. Gainesville: University Presses of Florida.

**Table 1**

Number of Native Plants along each Transect

Transect #	Number Of Native Plant Taxa
1	15
2	16
3	14
4	14
5	11
6	6
7	6
8	8
9	7
10	13
11	13
12	13
13	7
14	9
15	13

**Table 2**

State-listed Plants observed within a 250 meter radius of the Percolation Pond

<b>Scientific Name</b>	<b>State Status</b>	<b>Comments</b>
<i>Acanthocereus tetragonus</i>	T	see Figure 3
<i>Acoelorrhaphe wrightii</i>	T	see Figure 4
<i>Acrostichum aureum</i>	T	see Figure 5
<i>Colubrina arborescens</i>	E	see Figure 6
<i>Gossypium hirsutum</i>	E	see Figure 7
<i>Jacquemontia pentanthos</i>	E	see Figure 8
<i>Kosteletzkya depressa</i>	E	see Figure 9
<i>Opuntia stricta</i>	T	see Figure 10
<i>Paspalidium chapmanii</i>	E	see Figure 11
<i>Solanum verbascifolium</i> Buttonwood 1, 2, and 3	T	Throughout
<i>Tillandsia balbisiana</i> Buttonwood 1, 2, 3, and 5	T	Throughout
<i>Tillandsia fasciculata</i> var. <i>densispica</i> Buttonwood 3 and 5	E	Throughout
<i>Tillandsia flexuosa</i> Buttonwood 1, 2, 3, and 5	T	Throughout
<i>Tillandsia utriculata</i> Buttonwood 1, 2, 3, and 5	E	Throughout
T = Threatened E = Endangered		



Figure 1  
Transect Markers

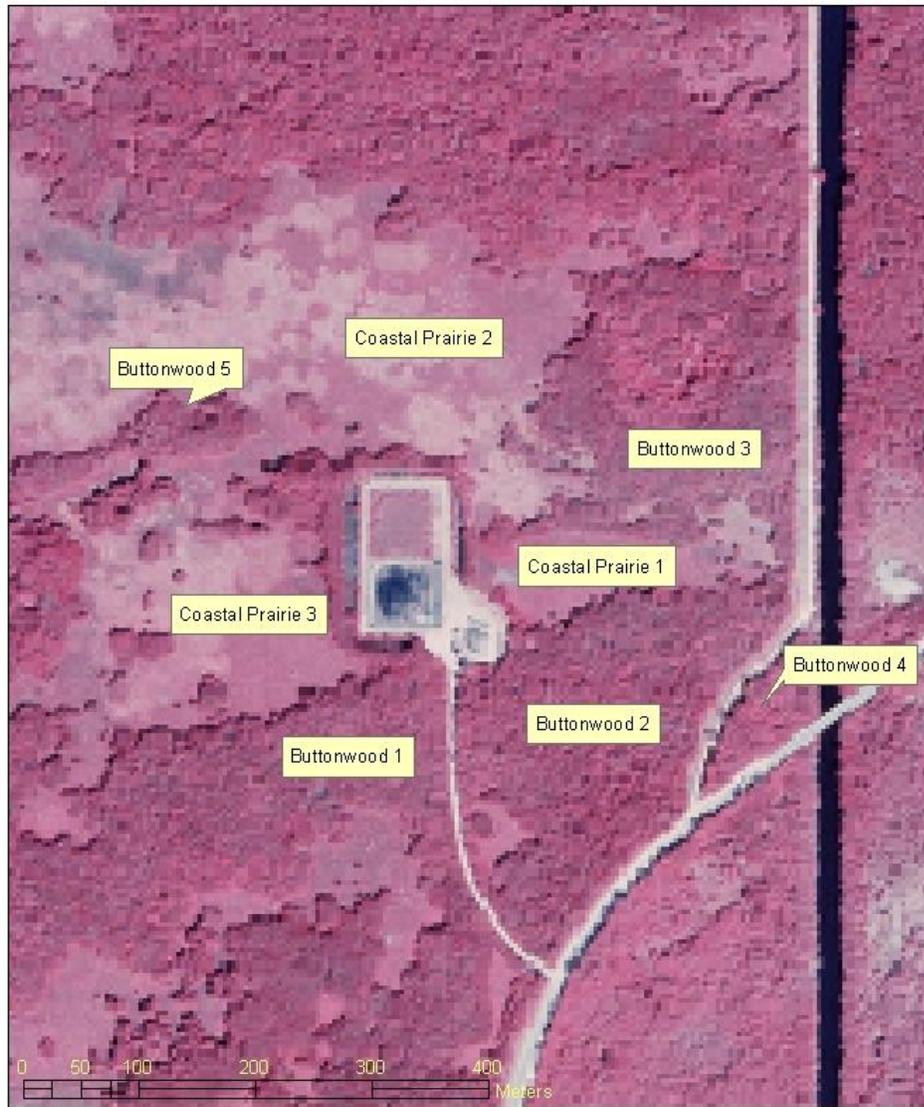


Figure 2

Numbered habitats within zone of brine influence



Figure 3

*Acanthocereus tetragonus* locations



Figure 4

*Acoelorrhaphe wrightii* locations



Figure 5

*Acrostichum aureum* locations



Figure 6

*Colubrina arborescens* locations



Figure 7

*Gossypium hirsutum* locations



Figure 8

*Jacquemontia pentanthos* locations



Figure 9

*Kosteletzkyia depressa* locations



Figure 10

*Opuntia stricta* locations



Figure 11

*Paspalidium chapmanii* locations