



CITY ISLAND RESTORATION PROJECT

VEGETATION MONITORING

Quarter 1 Report

Submitted to:

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INTRODUCTION

Mote Marine Laboratory (MML) began monitoring vegetation regrowth on the Sarasota Bay National Estuary Program (NEP) vegetation restoration site on City Island in August, 1991. Tasks accomplished to date include: 1) the establishment of permanent sampling transects for quarterly sampling episodes; 2) development of an initial species list of plants found on the site; and 3) completion of the first quarterly sampling which was done on the dates of August 30, September 3, and after extending one transect, September 9, 1991.

METHODS

Transects

MML determined the routes of four permanent transects after inspecting the site with the as-built survey and after consultation with the Florida Department of Environmental Regulation (FDER). Additional adjustments to transect length and orientation were made during the first sampling episode. Final transect locations are shown on Figure 1. The transects are described:

Transect A

Transect A is 25 meters in length. It originates in the center of the swale south of the intersection of the two western-most ponds. The route of transect A is oriented to the southeast. It continues up and over the shell path, down the beach slope where it crosses the planted marsh fringe, and ends in a pre-existing seagrass bed.

Transect B

Transect B originates at the edge of the planted area in front of the MML perimeter fence next to the NEP office parking lot. It is 25 meters in length. The transect route proceeds to the south across the planted marsh, through the pre-existing mangrove fringe, and ends in the center of the small pond south of the parking lot.

Transect C

Transect C is 45 meters in length. It originates in front of the pre-existing mangrove stand north of the largest pond. The transect route crosses the pond in a southerly direction passing twice through fringes of planted salt marsh, goes under the boardwalk, crosses the berm that divides the ponds from the bay, passes through another planted marsh fringe, and ends in a pre-existing seagrass bed.

Transect D

Transect D originates northwest of the largest pond near the bollards delimiting the boundary of the site. It is 55 meters in length and oriented southeasterly. The transect route crosses the small swale northwest of the path, passes the end of the boardwalk, continues across the pond through the planted marsh fringe on both sides, enters a forested area on the bay side of the project, and stops just before the shell path.

The total transect length is 150 meters. MML marked transect endpoints and stations at 10 meter intervals with 2" by 2" by 24" wooden hubs. MML will either replace the hubs with durable markers or will maintain them.

Sampling Technique

MML used a graduated surveyor's rope chain and a 1 square meter template to define sampling areas such that each transect was sampled as a line of adjacent 1 meter square quadrats. In each quadrat, plants were identified and areal coverages of herbaceous plants were estimated, stem counts made of shrubs (>1/2" stem diameter), and individual DBH measurements made on each tree (>2" stem diameter). Areal coverage estimates of debris and trash plus the number of Fiddler Crab (Uca sp.) burrows were also recorded for each quadrat.

RESULTS AND DISCUSSION

The raw data tabulated by transect and quadrat are in Appendix Table 1. Quadrats are numbered from the transect origin, which is the end with the transect identification label in Figure 1. Quadrat numbers represent the distance from the transect origin in meters.

Species List

The plant species found on the transects are listed in Table 1. There are 27 species in this list. The three Mangroves (Avicennia germinans, Laguncularia racemosa, Rhizophora mangle) and the Buttonwood (Conocarpus erecta) are trees when mature. The Sea Grape (Coccoloba uvifera) becomes a large shrub that will be considered a tree by the sampling criteria. Other shrubs on the list include the Marsh Elder (Iva frutescens) and Yellow Top (Flaveria sp.). The species list contains 9 grasses and sedges including the two Spartina species forming the planted marsh fringes (Spartina alterniflora, Spartina patens) and the only submerged aquatic species on the transects, the seagrass Halodule wrightii, which occurred in the embayment next to the site. The remaining species are mostly low or spreading herbaceous plants.

Abundance and Distribution of Herbaceous Cover

The abundance and distribution of herbaceous cover on the transects is summarized in Table 2 and shown schematically in Figures 2-5. The schematic diagrams (Fig. 2-5) qualitatively display relative abundance of a species in percentage coverage with respect to position. Directions for interpretation of these figures are:

Schematic Diagrams

The line next to each species name represents the axis of a transect and the height of the open bars on the axis, reflected above and below the axis for visibility, represent coverage. Bar position along the axis represents distance along the transect from its origin. Where the transect was submerged at the time of sampling is shown by a box enclosing the set of axis lines. For example, in Figure 2 the seagrass Halodule wrightii covered quadrats 23-25 almost completely, was the only species within those quadrats, and was submerged.

Salt Jointgrass (Paspalum vaginatum) and Sea Blite (Suaeda linearis) were the most widespread and abundant species within the transects (Figures 2-5, Table 2) outside of the planted marshes. About 19.3 m² of Paspalum (12.9% of the total transect area) and 10.3 m² (6.9% of total transect area) of Suaeda were found. Spartina alterniflora, one of the planted marsh grasses, is currently the only species common near the pond and bay margins. More species are more abundant away from the ponds and bay margins (Figures 2-5). The herbaceous stratum covered about 40% of each transect and was made up of 10 to 15 species (Table 2). The longer transects had the most species and the lowest average coverage per species. Average coverage per species was between 2.8% and 4.5% of transect areas.

Site elevation data has recently become available from the DSA as-built survey used as the base map for some of the figures in this report. Additionally, selected elevations along transects C and D were taken by FDER on September 17, 1991 and these may be reconcilable with the DSA data when the FDER measurements become available. MML will attempt to correlate changes in the abundance and distribution of herbaceous cover to elevations after gridding the data and generating elevation contours for the transects.

Abundance and Distribution of Trees and Shrubs

Trees and shrubs as defined by the sampling criteria were uncommon on the transects. One Black Mangrove (Avicennia germinans) of about 5" DBH was included on transect B and there were 6 shrubs distributed among transects A, B, D (Appendix Table 1). Transect C had only herbaceous cover. Shrub abundance should increase on all transects. Transect routes are not oriented for representative

sampling of the trees on the site.

Trash

Discarded cans, plastic, paper, concrete blocks or other items judged to be of human origin were found on 12 quadrats or 8% of all quadrats (Appendix Table 1). Trash was encountered on parts of all four transects. The largest accumulation was only 5% of quadrat area and the mean accumulation was 2.25% where trash occurred. All trash found covered 0.27 m² or 0.18% of the total transect area. Transect routes were not oriented for an accurate sampling of the trash distribution on the site. Whether or not the observed frequency of occurrence of trash is significant or excessive is a subjective judgement.

Debris

Most quadrats, 109 out of 150 (73%), had some accumulation of leaf litter, wrack, sticks, or other debris judged to be of natural origin (Appendix Table 1). Of these, 20 quadrats (13% of all quadrats and 18% of quadrats with debris) were completely covered with debris and did not have any bare, exposed soil surface. Transect D had the largest number of quadrats completely covered with debris (8), while transect B had the least number (3). Both of these transects crossed forested areas, and leaf litter from the canopies there were major components. Seagrass wrack where transects A and C crossed the bay's shoreline accounted for most of the completely covered quadrats on those transects. MML will compare the variability of this parameter to changes in plant distribution and abundance after more data is collected.

Burrows

Fiddler Crab (*Uca* sp.) burrows were observed on all four transects. A total of 24 quadrats had at least one burrow (Appendix Table 1). No quadrat had more than 33 burrows. Transect C had the largest number, 167 burrows within 13 quadrats while transect B had the smallest number 25 burrows within 4 quadrats. Burrows were most common near the edges of the ponds (transect A, C). Burrow distribution and density probably reflected physical characteristics of the beach more than anything else. The burrow densities observed are expected to increase.

Other Issues

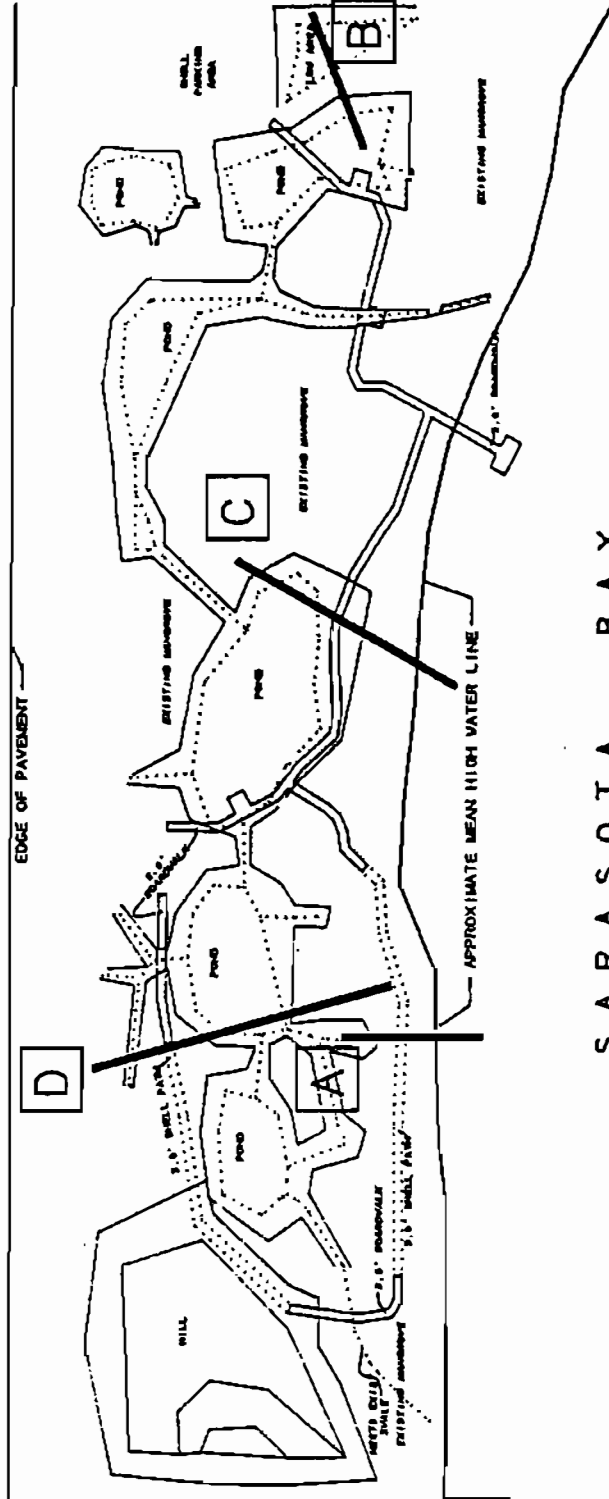
Some areas of the restoration site appear to be too fragile to withstand foot traffic based on the types of herbaceous cover or abundance of mangrove seedlings within them. Figure 6 shows sensitive areas near our transects. There may be other sensitive areas on the site.

Inappropriate fill material was used in some areas when the site

was prepared for revegetation. One example of such an area is the berm between the two largest ponds and the bay. Soil in this area has much more shell than desirable. Plant abundance and distribution is probably affected by the soil conditions on the berm.

Finally, additional plantings within the site are expected as part of the volunteer planting effort coordinated by the City of Sarasota. Some of these may occur on or near the permanent transects and affect the interpretation and useability of this study's data.

KEN THOMPSON DRIVE



SARASOTA BAY

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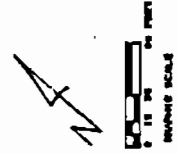


Figure 1. Transect locations.

Table 1. Master species list in alphabetical order by scientific name.

Species or Taxon Name	Common Name
Avicennia germinans	Black Mangrove
Batis maritima	Saltwort
Bidens pilosa	Beggar's Tick
Borrichia frutescens	Sea Oxeye
Cenchrus inserta	Sandspur
Chamaesyce sp.	Spurge
Coccoloba uvifera	Sea Grape
Conocarpus erecta	Buttonwood
Cyperus sp.	
Dactyloctenium aegyptium	Crowfoot Grass
Emilia fosbergii	
Fimbristylis sp.	Hurricane Grass
Flaveria sp.	Yellow Top
Halodule wrightii	Cuban Shoalweed
Hedyotis corymbosa	
Ipomea pes-caprae	Railroad Vine
Iva frutescens	Marsh Elder
Juncus sp.	
Laguncularia racemosa	White Mangrove
Limonium carolinianum	Sea Lavender
Paspalum vaginatum	Salt Jointgrass
Rhizophora mangle	Red Mangrove
Sesuvium portulacastrum	Sea Purslane
Solidago cf. sempervirens	Seaside Goldenrod
Spartina alterniflora	Smooth Cordgrass
Spartina patens	Saltmeadow Cordgrass
Suaeda linearis	Sea Blite

Table 2. Abundance of herbaceous cover by transect in rank order of areal coverage on the transect.

Species or Taxon Name	Total Cover (m ²)	Relative Cover (% Transect)
Transect A		
<i>Spartina alterniflora</i>	3.16	12.64
<i>Halodule wrightii</i>	2.50	10.00
<i>Suaeda linearis</i>	2.06	8.24
<i>Paspalum vaginatum</i>	1.42	5.68
<i>Dactyloctenium aegyptium</i>	1.10	4.40
<i>Ipomea pes-caprae</i>	.47	1.88
<i>Spartina patens</i>	.38	1.52
<i>Cyperus</i> sp.	.07	.28
<i>Avicennia germinans</i>	.03	.12
<i>Juncus</i> sp.	.01	.04
Number of Species	10	
Average Cover (m ²)	1.12 (4.48 % Transect Area)
Transect Area (m ²)	25.00	
Total Coverage (m ²)	11.20 (44.80 % Transect Area)
Transect B		
<i>Paspalum vaginatum</i>	5.02	20.08
<i>Suaeda linearis</i>	1.54	6.16
<i>Spartina patens</i>	1.53	6.12
<i>Spartina alterniflora</i>	1.06	4.24
<i>Chamaesyce</i> sp.	.75	3.00
<i>Avicennia germinans</i>	.29	1.16
<i>Sesuvium portulacastrum</i>	.25	1.00
<i>Emilia fosbergii</i>	.04	.16
<i>Dactyloctenium aegyptium</i>	.03	.12
<i>Bidens pilosa</i>	.01	.04
<i>Cyperus</i> sp.	.01	.04
<i>Hedyotis corymbosa</i>	.01	.04
Number of Species	12	
Average Cover (m ²)	.88 (3.51 % Transect Area)
Transect Area (m ²)	25.00	
Total Coverage (m ²)	10.54 (42.16 % Transect Area)

Table 2 (continued).

Species or Taxon Name	Total Cover (m ²)	Relative Cover (% Transect)
Transect C		
Paspalum vaginatum	6.42	14.27
Spartina alterniflora	4.95	11.00
Batis maritima	1.96	4.36
Flaveria sp.	1.60	3.56
Halodule wrightii	1.13	2.51
Borrichia frutescens	.99	2.20
Suaeda linearis	.92	2.04
Avicennia germinans	.34	.76
Sesuvium portulacastrum	.22	.49
Spartina patens	.20	.44
Coccoloba uvifera	.18	.40
Bidens pilosa	.15	.33
Cenchrus inserta	.12	.27
Limonium carolinianum	.10	.22
Rhizophora mangle	.02	.04
Number of Species	15	
Average Cover (m ²)	1.29 (2.86 % Transect Area)
Transect Area (m ²)	45.00	
Total Coverage (m ²)	19.30 (42.89 % Transect Area)
Transect D		
Paspalum vaginatum	6.48	9.97
Suaeda linearis	5.78	8.89
Spartina alterniflora	4.53	6.97
Limonium carolinianum	2.29	3.52
Spartina patens	1.72	2.65
Borrichia frutescens	1.24	1.91
Flaveria sp.	1.00	1.54
Avicennia germinans	.92	1.42
Sesuvium portulacastrum	.13	.20
Fimbristylis sp.	.10	.15
Solidago sempervirens?	.09	.14
Iva frutescens	.04	.06
Dactyloctenium aegyptium	.02	.03
Number of Species	13	
Average Cover (m ²)	1.87 (2.88 % Transect Area)
Transect Area (m ²)	65.00	
Total Coverage (m ²)	24.34 (37.45 % Transect Area)

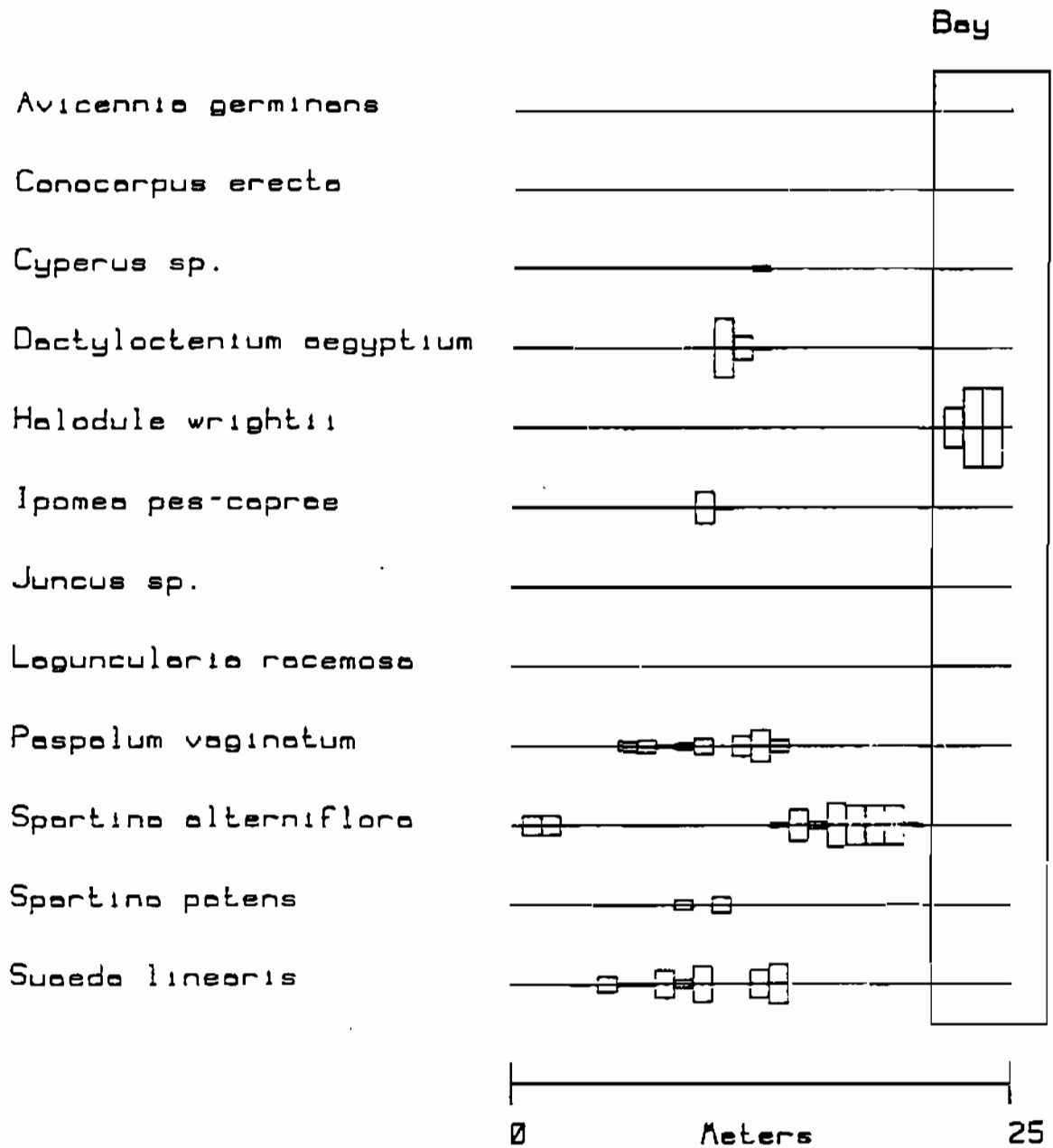


Figure 2. Distribution of species on transect A.

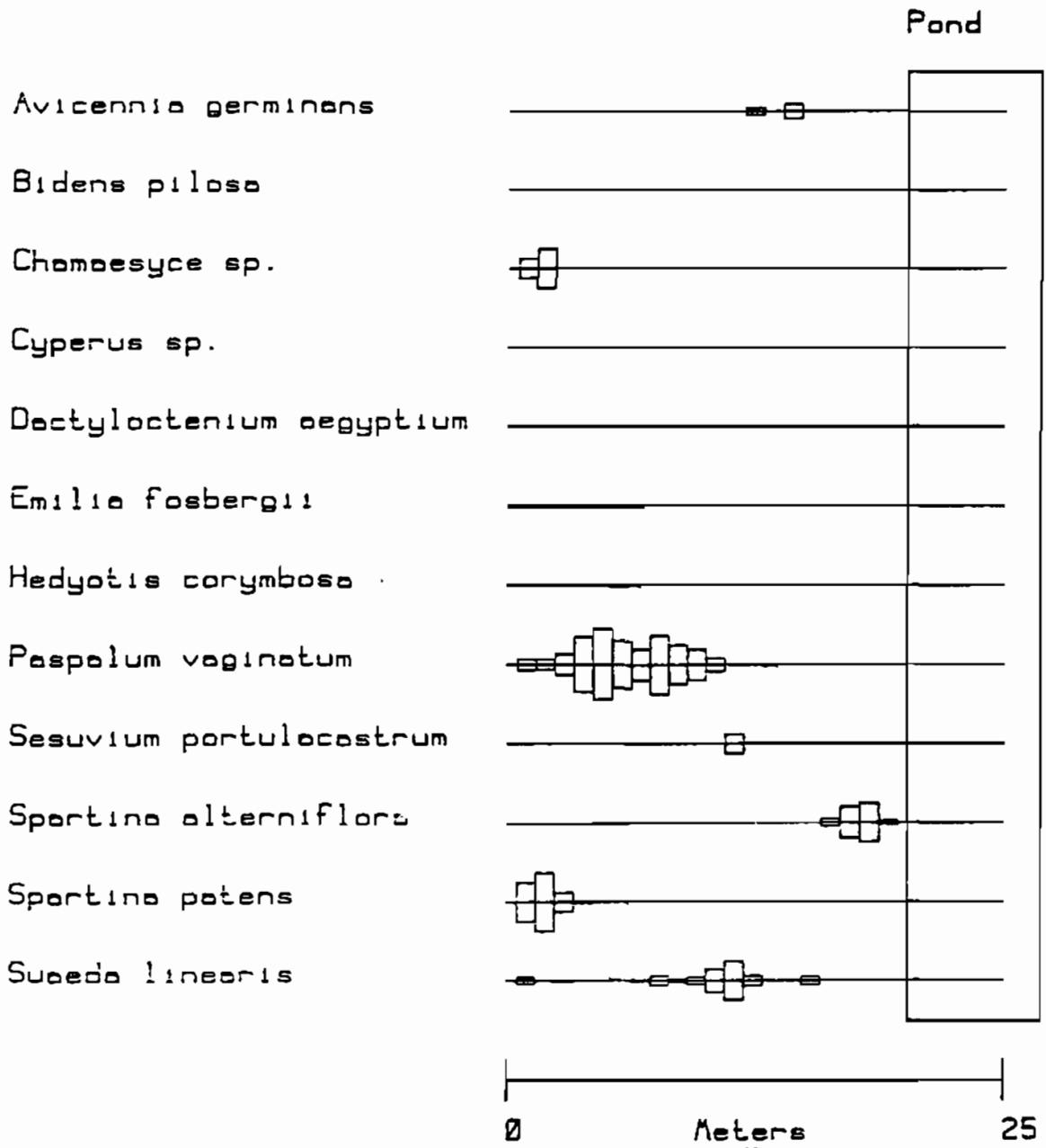


Figure 3. Distribution of species on transect B.

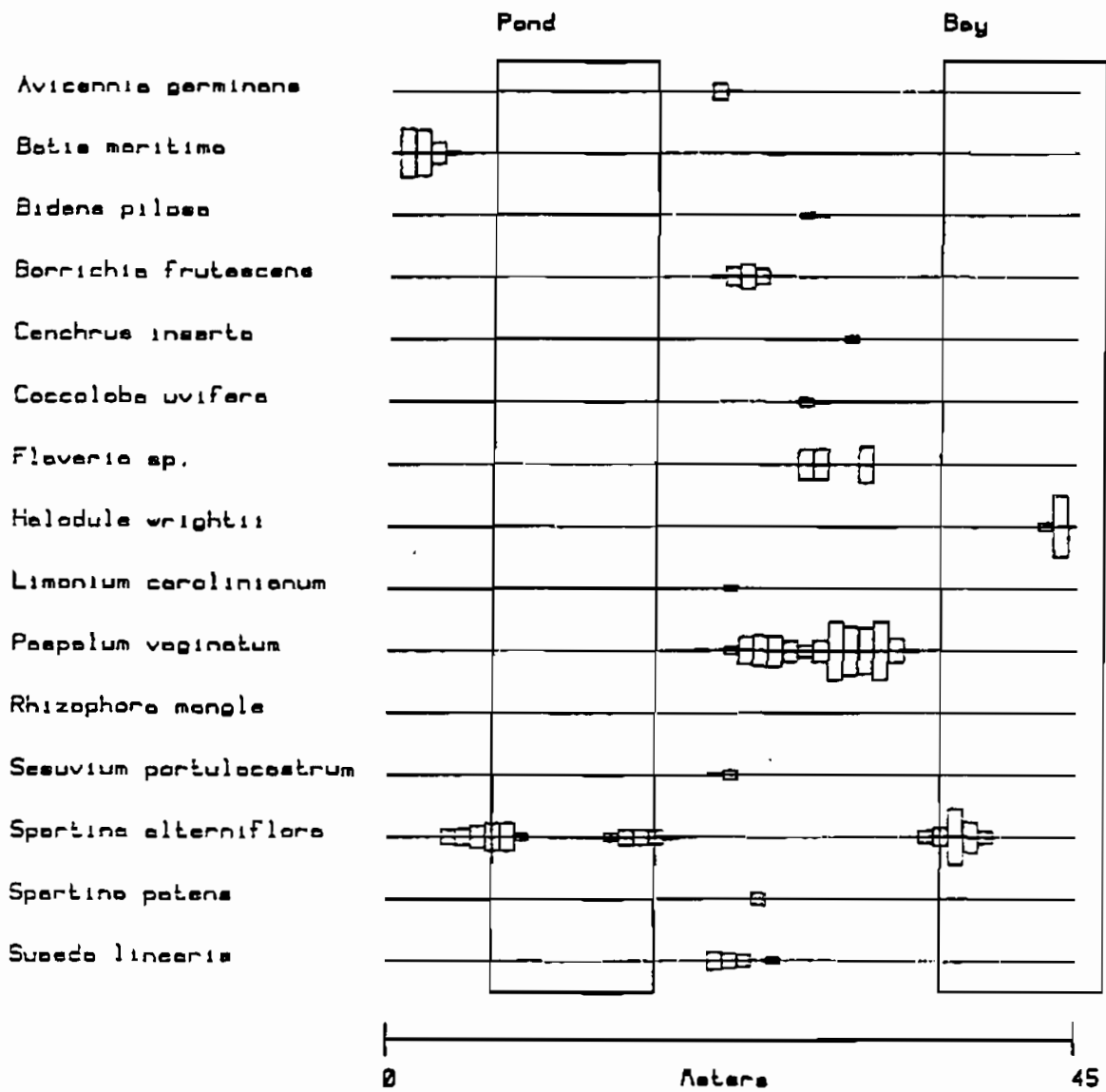


Figure 4. Distribution of species on transect C.

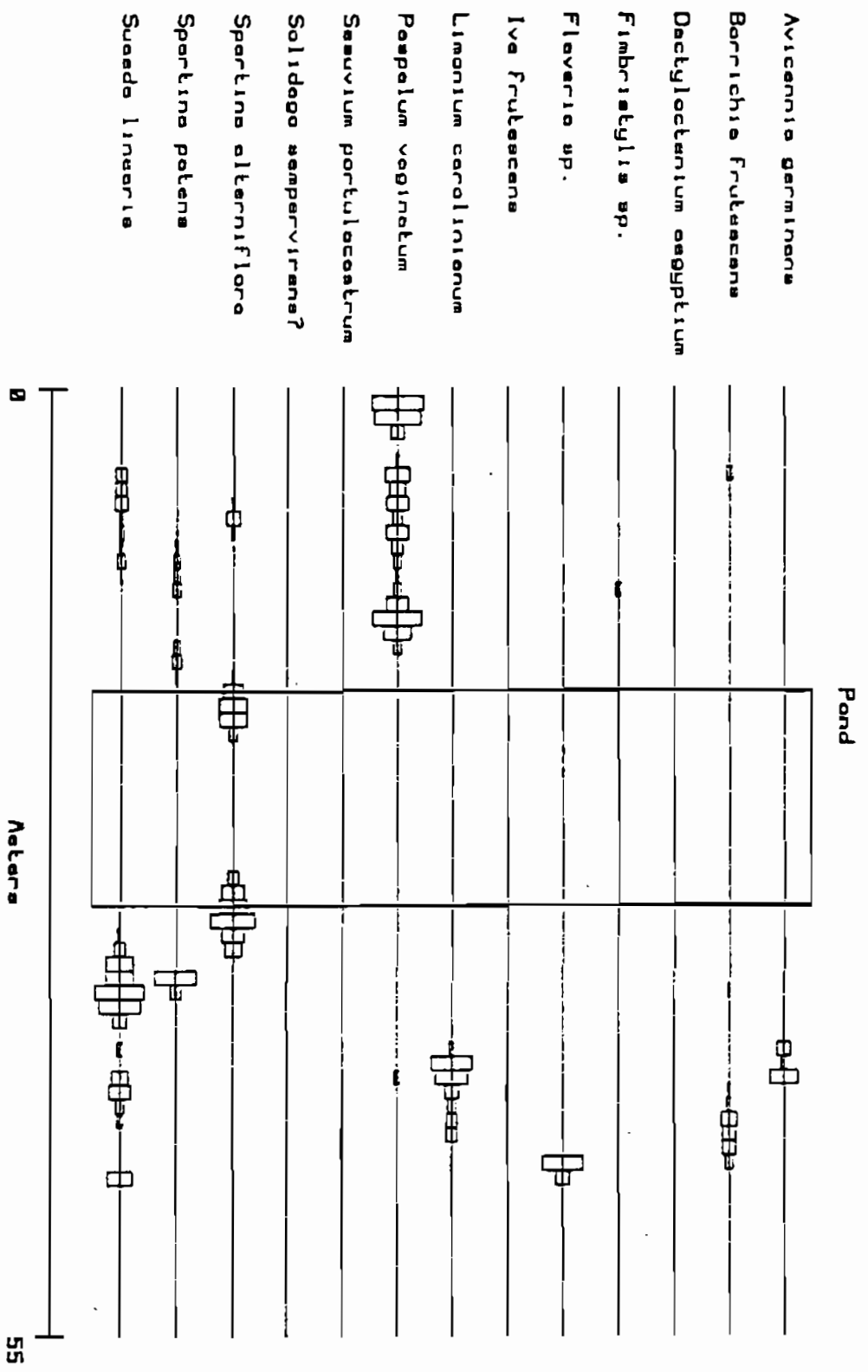


Figure 5. Distribution of species on transect D.

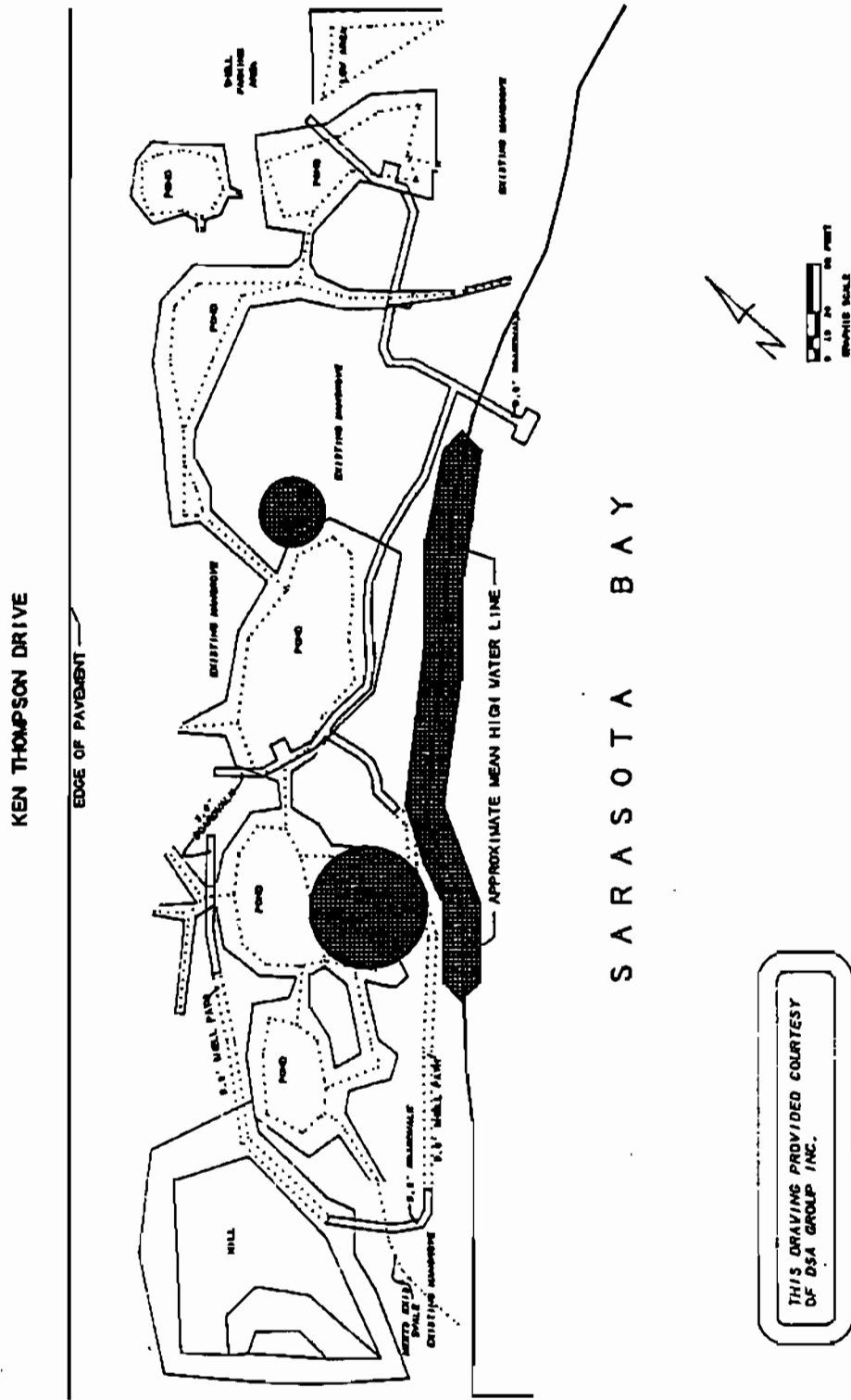


Figure 6. Sensitive areas.

Appendix

Appendix Table 1. Facsimile field sheets.

Species or Taxon Name	Cover (%)	Count	DBH (")
Transect A			
Quadrat 1			
Spartina alterniflora	25		
Debris	0		
Trash	0		
Burrows		0	
Quadrat 2			
Spartina alterniflora	25		
Debris	0		
Trash	0		
Burrows		2	
Quadrat 3			
Spartina alterniflora	1		
Suaeda linearis	1		
Debris	0		
Trash	0		
Burrows		0	
Quadrat 4			
Suaeda linearis	1		
Debris	1		
Trash	0		
Burrows		0	
Quadrat 5			
Paspalum vaginatum	2		
Spartina patens	1		
Suaeda linearis	20		
Debris	1		
Trash	0		
Burrows		0	
Quadrat 6			
Paspalum vaginatum	12		
Spartina patens	3		

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Transect A			
Quadrat 6			
Suaeda linearis	4		
Debris	11		
Trash	0		
Burrows		0	
Quadrat 7			
Paspalum vaginatum	16		
Spartina patens	2		
Suaeda linearis	5		
Debris	8		
Trash	0		
Burrows		0	
Quadrat 8			
Paspalum vaginatum	4		
Suaeda linearis	35		
Debris	6		
Trash	0		
Burrows		0	
Quadrat 9			
Ipomea pes-caprae	2		
Paspalum vaginatum	8		
Spartina patens	12		
Suaeda linearis	10		
Debris	15		
Trash	0		
Burrows		0	
Quadrat 10			
Conocarpus erecta		1	
Ipomea pes-caprae	40		
Paspalum vaginatum	20		
Suaeda linearis	45		

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Transect A			
Quadrat 10			
Debris	85		
Trash	0		
Burrows		0	
Quadrat 11			
Dactyloctenium aegyptium	75		
Ipomea pes-caprae	5		
Juncus sp.	1		
Spartina patens	20		
Debris	100		
Trash	0		
Burrows		0	
Quadrat 12			
Dactyloctenium aegyptium	30		
Paspalum vaginatum	25		
Debris	30		
Trash	0		
Burrows		0	
* Middle of path			
Quadrat 13			
Cyperus sp.	7		
Dactyloctenium aegyptium	5		
Paspalum vaginatum	40		
Suaeda linearis	35		
Debris	25		
Trash	0		
Burrows		0	
Quadrat 14			
Laguncularia racemosa		1	
Paspalum vaginatum	15		
Spartina alterniflora	6		
Suaeda linearis	50		

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Transect A			
Quadrat 14			
Debris	100		
Trash	1		
Burrows		0	
Quadrat 15			
Avicennia germinans	3		
Spartina alterniflora	40		
Debris	82		
Trash	0		
Burrows		0	
Quadrat 16			
Spartina alterniflora	9		
Debris	100		
Trash	0		
Burrows		0	
* Sargassum, Thalassia, Halodule wrack. Mangrove seedlings			
Quadrat 17			
Spartina alterniflora	55		
Debris	100		
Trash	0		
Burrows		0	
* Sargassum, Thalassia, Halodule wrack			
Quadrat 18			
Spartina alterniflora	50		
Debris	75		
Trash	0		
Burrows		14	
* Sargassum, Thalassia, and Halodule wrack			
Quadrat 19			
Spartina alterniflora	50		

Appendix Table 1 (continued).

Species or Taxon Name -----	Cover (%) -----	Count -----	DBH (" -----
Transect A			
Quadrat 19			
Debris	10		
Trash	0		
Burrows		22	
* Sargassum, Thalassia, and Halodule wrack			
Quadrat 20			
Spartina alterniflora	50		
Debris	10		
Trash	0		
Burrows		0	
* Sargassum, Thalassia, and Halodule wrack			
Quadrat 21			
Spartina alterniflora	5		
Debris	3		
Trash	0		
Burrows		0	
* At edge of planting			
Quadrat 23			
Halodule wrightii	50		
Debris	25		
Trash	0		
Burrows		0	
* Submerged. Halodule and Thalassia wrack.			
Quadrat 24			
Halodule wrightii	100		
Debris	0		
Trash	0		
Burrows		0	
* Submerged			
Quadrat 25			
Halodule wrightii	100		
Debris	0		
Trash	0		
Burrows		0	
* Submerged			

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Transect B			
Quadrat 1			
<i>Bidens pilosa</i>	1		
<i>Chamaesyce</i> sp.	25		
<i>Dactyloctenium aegyptium</i>	3		
<i>Emilia fosbergii</i>	3		
<i>Hedyotis corymbosa</i>	1		
<i>Paspalum vaginatum</i>	15		
<i>Spartina patens</i>	50		
<i>Suaeda linearis</i>	9		
Debris	10		
Trash	0		
Burrows		0	
* On edge of planted area			
Quadrat 2			
<i>Chamaesyce</i> sp.	50		
<i>Emilia fosbergii</i>	1		
<i>Paspalum vaginatum</i>	14		
<i>Spartina patens</i>	75		
<i>Suaeda linearis</i>	2		
Debris	10		
Trash	0		
Burrows		0	
Quadrat 3			
<i>Cyperus</i> sp.	1		
<i>Paspalum vaginatum</i>	27		
<i>Spartina patens</i>	25		
<i>Suaeda linearis</i>	5		
Debris	15		
Trash	0		
Burrows		0	
Quadrat 4			
<i>Paspalum vaginatum</i>	70		
<i>Spartina patens</i>	3		
<i>Suaeda linearis</i>	1		

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Transect B			
Quadrat 4			
Debris	17		
Trash	0		
Burrows		0	
Quadrat 5			
Paspalum vaginatum	90		
Suaeda linearis	3		
Debris	14		
Trash	0		
Burrows		0	
Quadrat 6			
Paspalum vaginatum	60		
Debris	14		
Trash	0		
Burrows		0	
Quadrat 7			
Paspalum vaginatum	40		
Suaeda linearis	2		
Debris	22		
Trash	3		
Burrows		0	
Quadrat 8			
Paspalum vaginatum	75		
Suaeda linearis	13		
Debris	19		
Trash	0		
Burrows		0	
Quadrat 9			
Paspalum vaginatum	50		
Suaeda linearis	5		

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Transect B			
Quadrat 9			
Debris	10		
Trash	0		
Burrows		6	
Quadrat 10			
Paspalum vaginatum	40		
Suaeda linearis	10		
Debris	5		
Trash	0		
Burrows		3	
Quadrat 11			
Paspalum vaginatum	17		
Suaeda linearis	30		
Debris	19		
Trash	1		
Burrows		0	
Quadrat 12			
Sesuvium portulacastrum	25		
Suaeda linearis	50		
Debris	95		
Trash	2		
Burrows		0	
* At edge of mangroves. Mangrove litter			
Quadrat 13			
Avicennia germinans	10		
Avicennia germinans			5
Suaeda linearis	13		
Debris	100		
Trash	0		
Burrows		0	
* Mangrove and Sea Grape litter			

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Transect B			
Quadrat 14			
<i>Paspalum vaginatum</i>	4		
Debris	100		
Trash	0		
Burrows		0	
* In pneumatophore area			
Quadrat 15			
<i>Avicennia germinans</i>	19		
<i>Avicennia germinans</i>		3	
Debris	100		
Trash	0		
Burrows		7	
* Mangrove litter			
Quadrat 16			
<i>Suaeda linearis</i>	11		
Debris	80		
Trash	1		
Burrows			0
* Mangrove litter			
Quadrat 17			
<i>Spartina alterniflora</i>	10		
Debris	40		
Trash	0		
Burrows		9	
* Leaving mangrove area into an area of planted marsh. Mangrove litter			
Quadrat 18			
<i>Spartina alterniflora</i>	40		
Debris	25		
Trash	0		
Burrows		0	
* leaf litter			
Quadrat 19			
<i>Spartina alterniflora</i>	50		

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Transect B			
Quadrat 19			
Debris	12		
Trash	0		
Burrows		0	
 Quadrat 20			
Spartina alterniflora	6		
Debris	0		
Trash	0		
Burrows		0	
 * At water's edge. Next 5 quadrats are submerged bare bottom (21-25 inclusive)			
Transect C			
Quadrat 1			
Batis maritima	80		
Suaeda linearis	4		
Debris	25		
Trash	3		
Burrows		19	
 Quadrat 2			
Batis maritima	75		
Suaeda linearis	3		
Debris	13		
Trash	0		
Burrows		6	
 Quadrat 3			
Batis maritima	35		
Debris	4		
Trash	0		
Burrows		1	

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Transect C			
Quadrat 4			
Batis maritima	6		
Spartina alterniflora	24		
Debris	0		
Trash	0		
Burrows		11	
* At edge of planted marsh			
Quadrat 5			
Spartina alterniflora	27		
Debris	0		
Trash	0		
Burrows		9	
Quadrat 6			
Spartina alterniflora	36		
Debris	2		
Trash	0		
Burrows		15	
Quadrat 7			
Rhizophora mangle	1		
Spartina alterniflora	45		
Debris	0		
Trash	0		
Burrows		0	
* At water's edge			
Quadrat 8			
Spartina alterniflora	45		
Debris	0		
Trash	0		
Burrows		0	
* In water			
Quadrat 9			
Spartina alterniflora	11		

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Transect C			
Quadrat 9			
Debris	0		
Trash	0		
Burrows		0	
* In water. Quadrats 10-13 (inclusive) are bare, submerged bottom			
Quadrat 14			
Spartina alterniflora	2		
Debris	0		
Trash	0		
Burrows		0	
* In water			
Quadrat 15			
Spartina alterniflora	13		
Debris	0		
Trash	0		
Burrows		0	
* In water			
Quadrat 16			
Spartina alterniflora	25		
Debris	0		
Trash	0		
Burrows		0	
* In water			
Quadrat 17			
Rhizophora mangle	1		
Spartina alterniflora	25		
Debris	0		
Trash	0		
Burrows		0	
* In water			
Quadrat 18			
Spartina alterniflora	23		

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Transect C			
Quadrat 18			
Debris	0		
Trash	0		
Burrows		15	
* At edge of water			
Quadrat 19			
Spartina alterniflora	9		
Debris	0		
Trash	0		
Burrows		33	
* Under boardwalk			
Quadrat 21			
Paspalum vaginatum	4		
Debris	1		
Trash	0		
Burrows		12	
* Clear area by boardwalk			
Quadrat 22			
Avicennia germinans	28		
Borrichia frutescens	4		
Sesuvium portulacastrum	7		
Suaeda linearis	30		
Debris	15		
Trash	0		
Burrows		0	
Quadrat 23			
Avicennia germinans	6		
Borrichia frutescens	30		
Limonium carolinianum	10		
Paspalum vaginatum	13		
Sesuvium portulacastrum	15		
Suaeda linearis	25		
Debris	50		
Trash	0		
Burrows		13	

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Transect C			
Quadrat 24			
<i>Borrichia frutescens</i>	40		
<i>Paspalum vaginatum</i>	45		
<i>Suaeda linearis</i>	20		
Debris	25		
Trash	0		
Burrows		7	
Quadrat 25			
<i>Borrichia frutescens</i>	25		
<i>Paspalum vaginatum</i>	50		
<i>Spartina patens</i>	20		
Debris	25		
Trash	0		
Burrows		2	
Quadrat 26			
<i>Paspalum vaginatum</i>	50		
<i>Suaeda linearis</i>	10		
Debris	10		
Trash	2		
Burrows		0	
Quadrat 27			
<i>Paspalum vaginatum</i>	35		
Debris	5		
Trash	2		
Burrows		0	
Quadrat 28			
<i>Bidens pilosa</i>	10		
<i>Coccoloba uvifera</i>	14		
<i>Flaveria</i> sp.	50		
<i>Paspalum vaginatum</i>	20		

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Transect C			
Quadrat 28			
Debris	25		
Trash	0		
Burrows		0	
Quadrat 29			
Bidens pilosa	5		
Coccoloba uvifera	4		
Flaveria sp.	50		
Paspalum vaginatum	35		
Debris	40		
Trash	0		
Burrows		0	
Quadrat 30			
Paspalum vaginatum	95		
Debris	5		
Trash	0		
Burrows		0	
Quadrat 31			
Cenchrus inserta	12		
Paspalum vaginatum	80		
Debris	30		
Trash	0		
Burrows		0	
Quadrat 32			
Flaveria sp.	60		
Paspalum vaginatum	75		
Debris	50		
Trash	0		
Burrows		0	

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Transect C			
Quadrat 33			
Paspalum vaginatum	95		
Debris	100		
Trash	0		
Burrows		0	
* Edge of wrack line. Luxuriant fringe of Paspalum.			
Quadrat 34			
Paspalum vaginatum	40		
Debris	100		
Trash	0		
Burrows		0	
* In wrack. Mixed seagrasses			
Quadrat 35			
Paspalum vaginatum	5		
Debris	100		
Trash	0		
Burrows		0	
* In wrack			
Quadrat 36			
Spartina alterniflora	20		
Debris	75		
Trash	0		
Burrows		0	
* At water line, in wrack			
Quadrat 37			
Spartina alterniflora	30		
Debris	30		
Trash	0		
Burrows		0	
* Submerged			
Quadrat 38			
Spartina alterniflora		90	
Debris		20	
Trash		0	
Burrows			0

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Transect C			
Quadrat 38			
* Submerged. 'Debris' is seagrass wrack trapped around bases of plantings			
Quadrat 39			
Spartina alterniflora	50		
Debris	100		
Trash	0		
Burrows		0	
* At edge of Spartina. Submerged. 'Debris' is sunken Thalassia and Halodule blades			
Quadrat 40			
Spartina alterniflora	20		
Debris	100		
Trash	0		
Burrows		0	
* Submerged. At edge of Spartina. 'Debris' is waterlogged seagrass blades.			
Quadrat 44			
Halodule wrightii	13		
Debris	12		
Trash	0		
Burrows		0	
* Submerged. At edge of seagrass bed. Waterlogged seagrass blades.			
Quadrat 45			
Halodule wrightii	100		
Debris	0		
Trash	0		
Burrows		0	
* Submerged. Not entering debris in a seagrass bed			
Transect D			
Quadrat -10			
Paspalum vaginatum	95		
Sesuvium portulacastrum	5		

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Transect D			
Quadrat -10			
Debris	90		
Trash	0		
Burrows		0	
* Low spot near bollard line. Fine litter			
Quadrat -9			
Paspalum vaginatum	85		
Debris	90		
Trash	0		
Burrows		0	
* Low spot near bollard line. Fine litter			
Quadrat -8			
Paspalum vaginatum	25		
Debris	40		
Trash	0		
Burrows		0	
Quadrat -6			
Paspalum vaginatum	7		
Debris	10		
Trash	0		
Burrows		0	
Quadrat -5			
Borrichia frutescens	11		
Paspalum vaginatum	45		
Suaeda linearis	20		
Debris	60		
Trash	0		
Burrows		0	
Quadrat -4			
Paspalum vaginatum	30		
Suaeda linearis	20		
Debris	50		

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Transect D			
Quadrat -4			
Trash	0		
Burrows		0	
Quadrat -3			
Paspalum vaginatum	40		
Spartina alterniflora	5		
Suaeda linearis	24		
Debris	50		
Trash	5		
Burrows		0	
Quadrat -2			
Paspalum vaginatum	18		
Spartina alterniflora	25		
Suaeda linearis	8		
Debris	25		
Trash	0		
Burrows		0	
* In swale			
Quadrat -1			
Paspalum vaginatum	40		
Spartina alterniflora	8		
Suaeda linearis	10		
Debris	50		
Trash	0		
Burrows		0	
Quadrat 1			
Paspalum vaginatum	21		
Spartina patens	6		
Suaeda linearis	9		
Debris	25		
Trash	1		
Burrows		0	

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Transect D			
Quadrat 2			
Paspalum vaginatum	15		
Spartina patens	11		
Suaeda linearis	15		
Debris	10		
Trash	0		
Burrows		0	
Quadrat 3			
Paspalum vaginatum	7		
Spartina patens	12		
Suaeda linearis	2		
Debris	5		
Trash	0		
Burrows		0	
Quadrat 4			
Fimbristylis sp.	10		
Paspalum vaginatum	15		
Spartina patens	15		
Debris	5		
Trash	0		
Burrows		0	
* Partially on boardwalk			
Quadrat 5			
Paspalum vaginatum	40		
Debris	5		
Trash	0		
Burrows		0	
* 1/2-3/4 on boardwalk			
Quadrat 6			
Paspalum vaginatum	90		
Debris	5		
Trash	0		
Burrows		0	
* Partially on boardwalk			

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Transect D			
Quadrat 7			
Paspalum vaginatum	50		
Debris	5		
Trash	0		
Burrows		0	
Quadrat 8			
Paspalum vaginatum	15		
Spartina patens	13		
Debris	18		
Trash	0		
Burrows		0	
Quadrat 9			
Spartina patens	17		
Debris	23		
Trash	0		
Burrows		0	
* Sticks			
Quadrat 10			
Spartina alterniflora	5		
Spartina patens	3		
Debris	1		
Trash	0		
Burrows		0	
Quadrat 11			
Spartina alterniflora	35		
Debris	8		
Trash	0		
Burrows		0	
* At waters edge			
Quadrat 12			
Spartina alterniflora	50		
Debris	4		
Trash	0		

Appendix Table 1 (continued).

Species or Taxon Name -----	Cover (%) -----	Count -----	DBH (") -----
Transect D			
Quadrat 12			
Burrows		0	
* At water's edge			
Quadrat 13			
Spartina alterniflora	50		
Debris	10		
Trash	0		
Burrows		0	
* Submerged. 'Debris' is waterlogged leaves			
Quadrat 14			
Spartina alterniflora	15		
Debris	0		
Trash	0		
Burrows		0	
* Submerged. Bare submerged bottom in quadrats D15-D23 (inclusive)			
Quadrat 24			
Spartina alterniflora	20		
Debris	0		
Trash	0		
Burrows		0	
* Submerged			
Quadrat 25			
Spartina alterniflora	40		
Debris	0		
Trash	0		
Burrows		0	
* Submerged			
Quadrat 26			
Spartina alterniflora	50		
Debris	0		
Trash	0		
Burrows		11	
* At water's edge			

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Transect D			
Quadrat 27			
Spartina alterniflora	80		
Suaeda linearis	2		
Debris	18		
Trash	0		
Burrows		16	
Quadrat 28			
Spartina alterniflora	40		
Suaeda linearis	8		
Debris	20		
Trash	0		
Burrows		6	
Quadrat 29			
Spartina alterniflora	30		
Suaeda linearis	20		
Debris	20		
Trash	0		
Burrows		5	
Quadrat 30			
Suaeda linearis	50		
Debris	60		
Trash	0		
Burrows		0	
* Leaving S. alterniflora planting. Leaf litter			
Quadrat 31			
Solidago sempervirens?	2		
Spartina patens	75		
Suaeda linearis	50		
Debris	90		
Trash	0		
Burrows		0	
* Entering heavily vegetated area. Leaf litter			

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Transect D			
Quadrat 32			
<i>Borrichia frutescens</i>	3		
<i>Spartina patens</i>	20		
<i>Suaeda linearis</i>	90		
Debris	100		
Trash	0		
Burrows		0	
* Leaf litter			
Quadrat 33			
<i>Avicennia germinans</i>		1	
<i>Suaeda linearis</i>	75		
Debris	100		
Trash	4		
Burrows		0	
Quadrat 34			
<i>Avicennia germinans</i>	2		
<i>Solidago sempervirens?</i>	5		
<i>Suaeda linearis</i>	25		
Debris	100		
Trash	0		
Burrows		0	
* Leaf litter			
Quadrat 35			
<i>Avicennia germinans</i>	5		
Debris	100		
Trash	0		
Burrows		0	
* Overhanging vegetation. Leaf litter			
Quadrat 36			
<i>Avicennia germinans</i>	25		
<i>Limonium carolinianum</i>	10		
<i>Suaeda linearis</i>	10		
Debris	100		
Trash	0		
Burrows		0	
* Leaf litter			

Appendix Table 1 (continued).

<u>Species or Taxon Name</u>	<u>Cover (%)</u>	<u>Count</u>	<u>DBH (")</u>
Transect D			
Quadrat 37			
Avicennia germinans	10		
Limonium carolinianum	75		
Debris	100		
Trash	0		
Burrows		0	
* Leaf litter			
Quadrat 38			
Avicennia germinans	50		
Limonium carolinianum	60		
Paspalum vaginatum	10		
Suaeda linearis	30		
Debris	100		
Trash	0		
Burrows		0	
* Leaf litter			
Quadrat 39			
Borrichia frutescens	5		
Iva frutescens	4		
Limonium carolinianum	25		
Suaeda linearis	40		
Debris	100		
Trash	0		
Burrows		0	
* Fragile area. Leaf litter			
Quadrat 40			
Borrichia frutescens	10		
Limonium carolinianum	15		
Suaeda linearis	15		
Debris	100		
Trash	0		
Burrows		0	
* Fragile area. Leaf litter			
Quadrat 41			
Borrichia frutescens	30		
Limonium carolinianum	20		
Suaeda linearis	10		

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Transect D			
Quadrat 41			
Debris	100		
Trash	0		
Burrows		0	
* Fragile area. Leaf litter			
Quadrat 42			
Borrichia frutescens	25		
Limonium carolinianum	20		
Sesuvium portulacastrum	4		
Debris	100		
Trash	0		
Burrows		0	
* Leaf litter			
Quadrat 43			
Borrichia frutescens	25		
Sesuvium portulacastrum	4		
Debris	100		
Trash	0		
Burrows		0	
* Overhanging Flaveria. Leaf litter			
Quadrat 44			
Borrichia frutescens	15		
Flaveria sp.	75		
Limonium carolinianum	4		
Debris	100		
Trash	2		
Burrows		0	
* Leaf litter			
Quadrat 45			
Dactyloctenium aegyptium	2		
Flaveria sp.	25		
Solidago sempervirens?	2		
Suaeda linearis	45		
Debris	50		
Trash	0		
Burrows		0	
* Leaf litter			