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CITY ISLAND RESTORATION PROJECT

VEGETATION MONITORING

Quarter 3 Report

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INTRODUCTION

Mote Marine Laboratory (MML) began quarterly monitoring of vegetation regrowth on the Sarasota Bay National Estuary Program (NEP) vegetation restoration site on City Island in August, 1991 and has issued two previous reports. Tasks accomplished in this reporting period were the completion of the third quarterly sampling on the dates of March 10-11, 1992 and refinement of the master species list of plants found on the site.

SAMPLING METHOD SUMMARY

MML sampled the four permanent transects on the restoration site (Figure 1) using the same techniques employed in previous surveys (see Quarter 1 Report). A graduated surveyor's rope chain and a 1 square meter template defined 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 estimated, stem counts made of shrubs (>1/2" stem diameter at base), and individual DBH measurements made on each tree (>2" stem diameter at base). Areal coverage estimates of debris and trash plus the number of Fiddler Crab (*Uca* sp.) burrows were also recorded for each quadrat. The total length of the transects was 150 meters, and the total area sampled was 150 m².

RESULTS FROM MARCH

The raw data from the March sampling are tabulated by transect and quadrat 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 cumulative master species list is Table 1. There are now 33 species in this list, 28 of which occurred in the March sampling. Species list additions for March include the Varnish Leaf (*Dodonea viscosa*) and the entries 'Unidentified Grass' and 'Unidentified Sedge' which were added for species not yet identified.

The identity of the Australian Pine species formerly recorded as *Casuarina lepidophloia* has been changed to *Casuarina equisetifolia* after consulting the literature. Australian Pine and Brazilian Pepper (*Schinus terebithifolius*) are nuisance species on the site and are subject to control and removal. On April 3, 1992 several concentrations of these species were removed including those on the transects sampled in March.

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 was found in quadrats 24 and 25, almost completely covered these quadrats, was the only species within those quadrats, and was submerged.

Salt Jointgrass (Paspalum vaginatum) and Sea Blite (Suaeda linearis) were still the most widespread and abundant species within the transects (Figures 2-5, Table 2) other than the planted marshes. About 25.3 m² of Paspalum (16.9% of the total transect area) and 5.3 m² (3.5% of total transect area) of Suaeda were found. The Sea Oxeye (Borrichia frutescens), covering about 3.5 m² of the transects (2.3% of the total transect area), is also becoming abundant.

Spartina alterniflora, a planted marsh grass, is still the only species common near the pond and bay margins. It may be accompanied by small Black Mangroves (Avicennia germinans) where seeds were trapped in and behind the marsh fringe (Figures 2-5). About 19.0 m² of S. alterniflora and about 5.8 m² of the other planted marsh grass, Spartina patens, were found on the transects.

The herbaceous stratum covered over 50% of the shorter transects, over 40% of the longer transects, and was represented by 11 to 15 species on each transect (Table 2). Average coverage per species was between 1 m² and 2 m² on all transects.

Abundance and Distribution of Trees and Shrubs

Trees and shrubs as defined by the sampling criteria are still uncommon on the transects (Appendix Table 1) all 4 trees and 4 of the 11 shrubs were Black Mangroves (Avicennia germinans). Other shrubs on the transects were a Yellow Top (Flaveria floridana) and two Sea Grapes (Coccoloba uvifera) on transect C, a White Mangrove (Laguncularia racemosa) on transect A, and a Red Mangrove (Rhizophora mangle) plus a Buttonwood (Conocarpus erecta) on transect D. The Buttonwood, Red Mangrove, and one Sea Grape are new records. Finally, a Varnish Leaf (Dodonea viscosa) was planted on transect C.

Trash

Discarded cans, plastic, paper, concrete blocks or other items judged to be of human origin appeared in 26 quadrats or 17.3% of

all quadrats (Appendix Table 1). Trash accumulated on parts of all four transects. The largest accumulation was 6% of quadrat area and the mean accumulation was 2.1% where trash occurred. All trash found covered 0.55 m² or 0.37% of the total transect area. Transect routes were not oriented for an accurate sampling of the trash distribution on the site. More trash appeared to be near the paths, however.

Debris

Most quadrats, 117 out of 150 (78%), had some accumulation of leaf litter, wrack, sticks, or other debris judged to be of natural origin (Appendix Table 1). Transect D had the largest number of quadrats completely covered with debris (18), while transect C had the least (3). Thirty-two quadrats (21% of all quadrats and 27% of quadrats with debris) were completely covered with debris and did not have any bare, exposed soil surface.

Burrows

Fiddler Crab (Uca sp.) burrows were observed on all four transects. A total of 73 quadrats (47% of the total) had at least one burrow (Appendix Table 1). Transect C had the largest number of burrows, 876 on 27 quadrats while transect A had the smallest number of burrows, 100 burrows on 9 quadrats. The greatest observed burrow density was 95 burrows per square meter. Most burrows were near the edges of ponds and swales.

DISCUSSION

Ten herbaceous species (Paspalum vaginatum, Spartina alterniflora, Spartina patens, Suaeda linearis, Borrchia frutescens, Halodule wrightii, Avicennia germinans, Batis maritima, Sesuvium portulacastrum, and Lippia nodifolia) had total areal coverages of more than 1 m². These species covered about 68.6 m² of all transects (46% of total transect area). However, the first five of those listed above covered 58.8 m² of all transects or 86% of the area covered by the ten most abundant species. This low apparent diversity may be a result of tidal inundation of the transects through late summer and fall of 1991.

The frequency of quadrats having trash increased from 8% of all quadrats in August to 11% in December, to 17% in March. However, the total accumulation is about what it was in December.

Black Mangrove (Avicennia germinans) in the herbaceous stratum decreased in total transect coverage over the winter from about 3.2 m² in December to about 2.7 m² in March (Table 2). Most Avicennia individuals on the transects were new seedlings recruited in late August, 1991 when 1.6 m² of coverage was reported. This decrease in abundance may directly reflect mortality of the new recruits. A similar change was observed in the total number of Fiddler Crab (Uca sp.) burrows on the transects. Burrow counts totalled over all transects declined from a high of 1,805 in December to 1,415

in March after showing a dramatic increase since August when 257 burrows were counted on all transects.

Substantial additional plantings on the site in mid January, 1992 as well as the emplacement of seagrass (Ruppia maritima and Halodule wrightii) plugs in the ponds have changed the conditions of the study since the December sampling. Species and individuals were artificially added to the data for the March sampling from plantings on or near the permanent transects. Extrapolations of the data from the first 3 quarters following restoration should be made with caution.

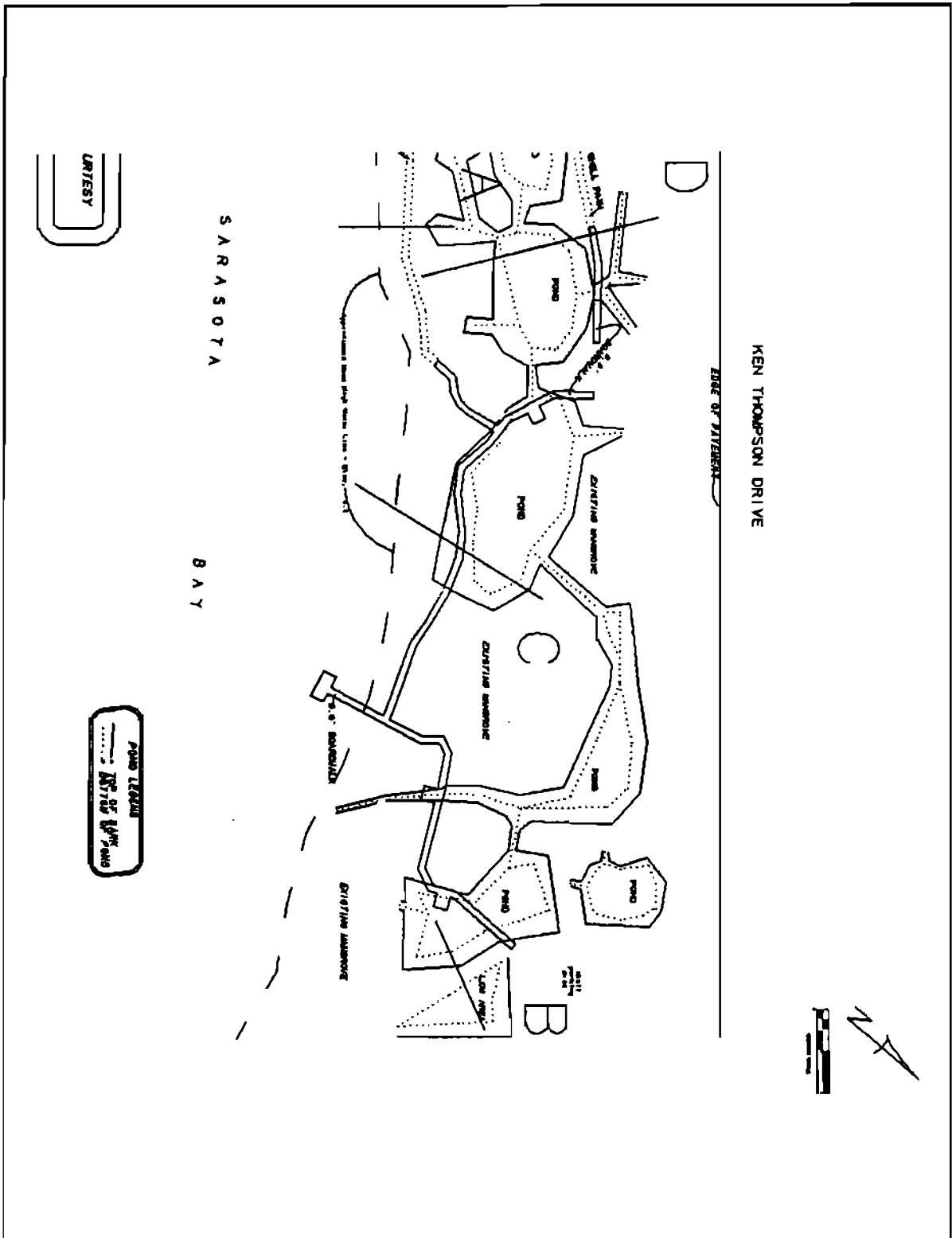


Figure 1. Transect locations.

Table 1. Master species list in alphabetical order by scientific name. (Annotations: * = new this sampling, + = name has changed)

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

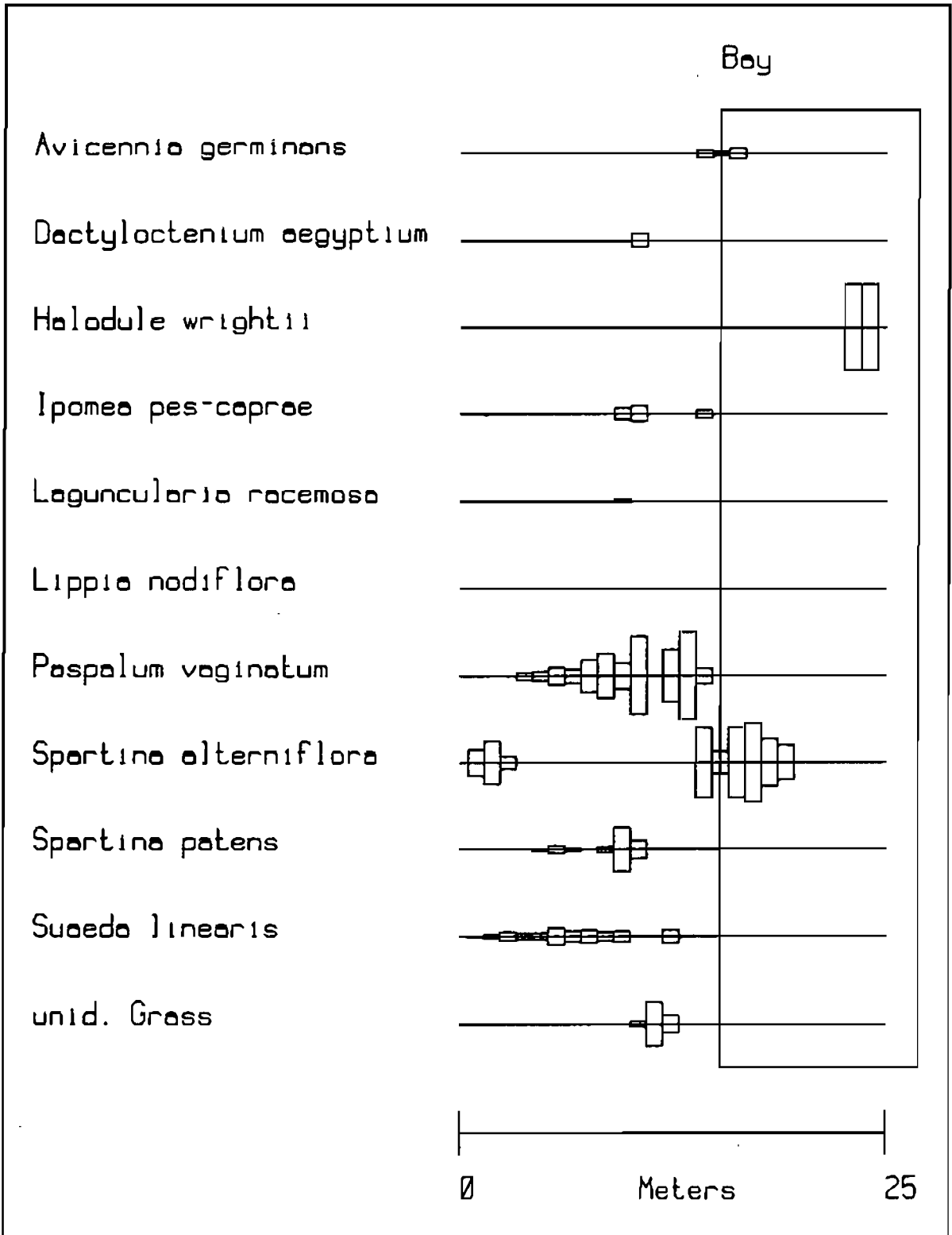


Figure 2. Distribution of species on transect A.

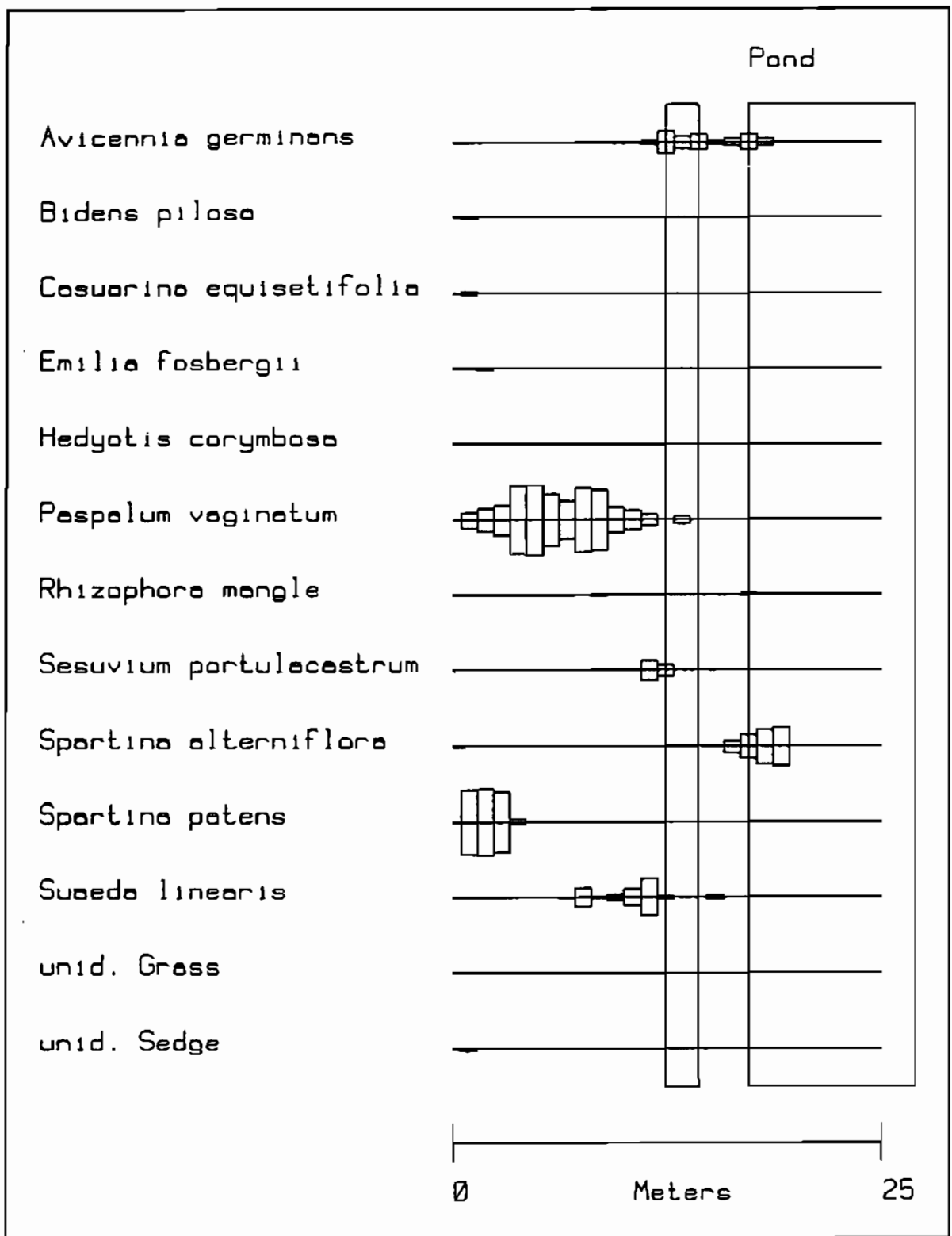


Figure 3. Distribution of species on transect B.

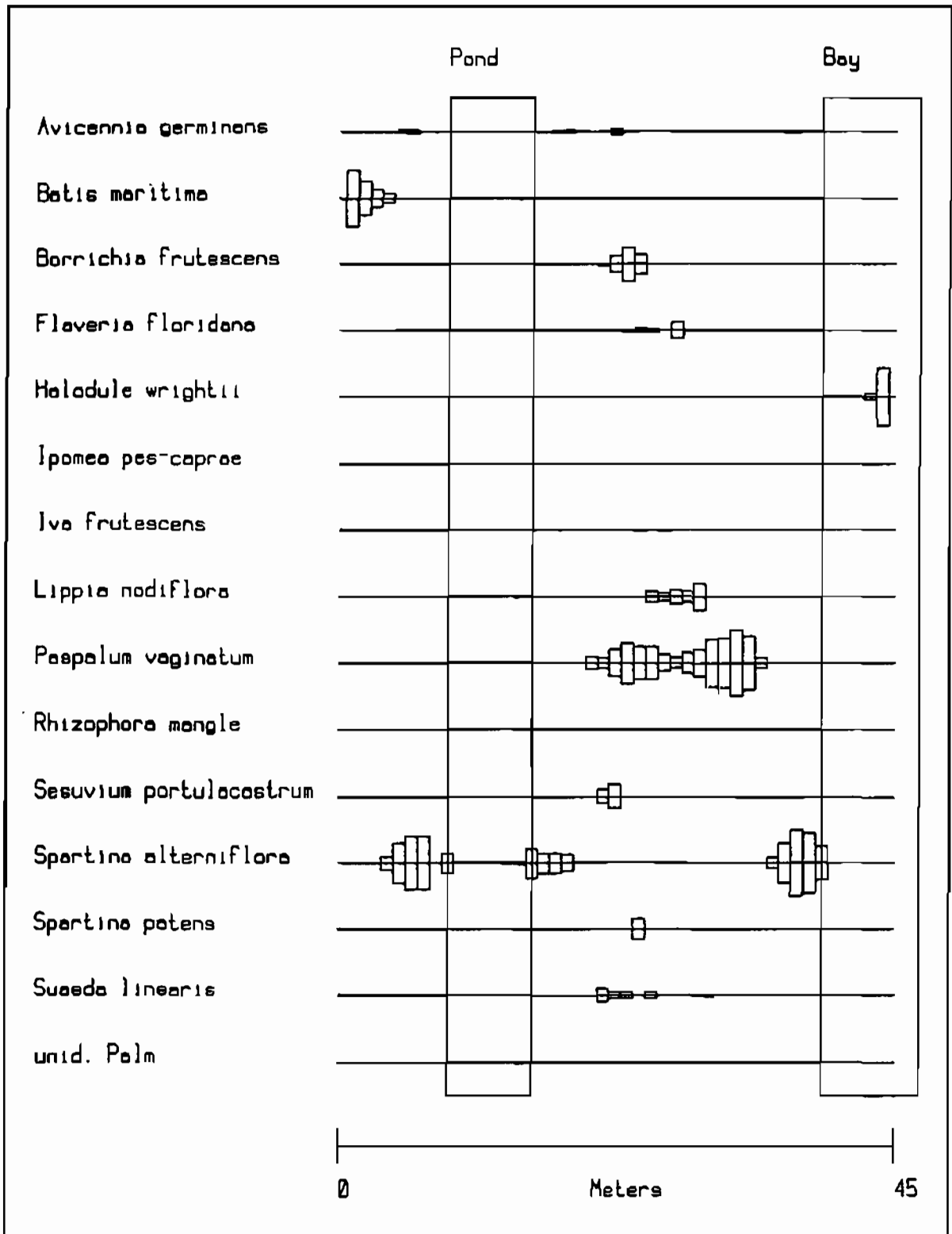


Figure 4. Distribution of species on transect C.

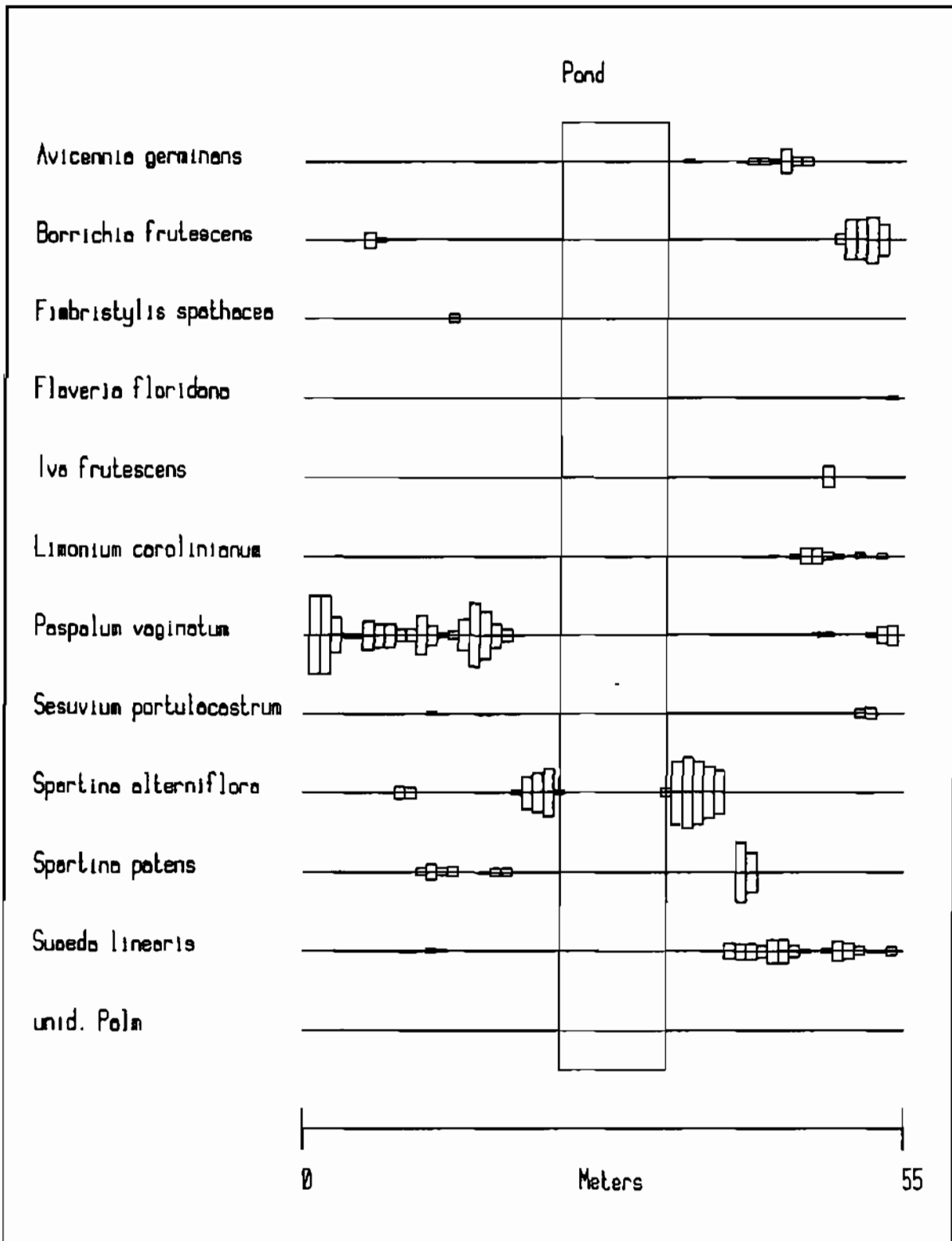


Figure 5. Distribution of species on transect D.

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

Species or Taxon Name	Total Cover (m2)	Relative Cover (% Transect)
Transect A		
<i>Spartina alterniflora</i>	4.66	18.64
<i>Paspalum vaginatum</i>	4.39	17.56
<i>Halodule wrightii</i>	2.00	8.00
<i>Suaeda linearis</i>	1.11	4.44
<i>Spartina patens</i>	.90	3.60
unid. Grass	.76	3.04
<i>Ipomea pes-caprae</i>	.43	1.72
<i>Avicennia germinans</i>	.25	1.00
<i>Dactyloctenium aegyptium</i>	.15	.60
<i>Laguncularia racemosa</i>	.05	.20
<i>Lippia nodiflora</i>	.02	.08
Number of Species	11	
Average Cover (m2)	1.34 (5.35 % Transect Area)	
Transect Area (m2)	25.00	
Total Coverage (m2)	14.72 (58.88 % Transect Area)	
Transect B		
<i>Paspalum vaginatum</i>	6.44	25.76
<i>Spartina patens</i>	2.60	10.40
<i>Spartina alterniflora</i>	1.40	5.60
<i>Avicennia germinans</i>	1.25	5.00
<i>Suaeda linearis</i>	1.21	4.84
<i>Sesuvium portulacastrum</i>	.40	1.60
<i>Rhizophora mangle</i>	.09	.36
<i>Casuarina equisetifolia</i>	.04	.16
<i>Hedyotis corymbosa</i>	.04	.16
unid. Sedge	.04	.16
<i>Bidens pilosa</i>	.02	.08
unid. Grass	.02	.08
<i>Emilia fosbergii</i>	.01	.04
Number of Species	13	
Average Cover (m2)	1.04 (4.17 % Transect Area)	
Transect Area (m2)	25.00	
Total Coverage (m2)	13.56 (54.24 % Transect Area)	

Transect C

<i>Spartina alterniflora</i>	7.21	16.02
<i>Paspalum vaginatum</i>	6.84	15.20
<i>Batis maritima</i>	1.73	3.84
<i>Borrichia frutescens</i>	1.10	2.44
<i>Lippia nodiflora</i>	1.00	2.22
<i>Halodule wrightii</i>	.95	2.11
<i>Sesuvium portulacastrum</i>	.55	1.22
<i>Suaeda linearis</i>	.54	1.20
<i>Flaveria floridana</i>	.37	.82
<i>Avicennia germinans</i>	.36	.80
<i>Spartina patens</i>	.30	.67
<i>Ipomea pes-caprae</i>	.05	.11
<i>Iva frutescens</i>	.04	.09
<i>Rhizophora mangle</i>	.02	.04
unid. Palm	.01	.02
Number of Species	15	
Average Cover (m2)	1.40	(3.12 % Transect Area)
Transect Area (m2)	45.00	
Total Coverage (m2)	21.07	(46.82 % Transect Area)

Transect D

<i>Paspalum vaginatum</i>	7.60	13.82
<i>Spartina alterniflora</i>	5.70	10.36
<i>Suaeda linearis</i>	2.45	4.45
<i>Borrichia frutescens</i>	2.38	4.33
<i>Spartina patens</i>	2.00	3.64
<i>Avicennia germinans</i>	.88	1.60
<i>Limonium carolinianum</i>	.76	1.38
<i>Sesuvium portulacastrum</i>	.37	.67
<i>Iva frutescens</i>	.25	.45
<i>Fimbristylis spathacea</i>	.11	.20
<i>Flaveria floridana</i>	.05	.09
unid. Palm	.01	.02
Number of Species	12	
Average Cover (m2)	1.88	(3.42 % Transect Area)
Transect Area (m2)	55.00	
Total Coverage (m2)	22.56	(41.02 % Transect Area)

Appendix

Appendix Table 1. Facsimile field sheets.

Species or Taxon Name	Cover (%)	Count	DBH (")
Transect A			
Quadrat 1			
Spartina alterniflora	30		
Suaeda linearis	1		
Debris	5		
Trash	0		
Burrows		41	
Quadrat 2			
Ipomea pes-caprae	2		
Spartina alterniflora	50		
Suaeda linearis	5		
Debris	18		
Trash	0		
Burrows		24	
Quadrat 3			
Spartina alterniflora	13		
Suaeda linearis	9		
Debris	3		
Trash	0		
Burrows		10	
Quadrat 4			
Paspalum vaginatum	8		
Suaeda linearis	7		
Debris	2		
Trash	2		
Burrows		11	
Quadrat 5			
Paspalum vaginatum	10		
Spartina patens	4		
Suaeda linearis	6		
Debris	11		
Trash	2		
Burrows		6	

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Quadrat 6			
Paspalum vaginatum	21		
Spartina patens	8		
Suaeda linearis	19		
Debris	50		
Trash	0		
Burrows		3	
Quadrat 7			
Paspalum vaginatum	15		
Spartina patens	3		
Suaeda linearis	11		
Debris	13		
Trash	0		
Burrows		1	
Quadrat 8			
Paspalum vaginatum	37		
Suaeda linearis	15		
Debris	25		
Trash	1		
Burrows		1	
Quadrat 9			
Paspalum vaginatum	50		
Spartina patens	5		
Suaeda linearis	9		
Debris	50		
Trash	1		
Burrows		3	
Quadrat 10			
Ipomea pes-caprae	13		
Laguncularia racemosa	5		
Paspalum vaginatum	30		
Spartina patens	50		
Suaeda linearis	12		
Debris	100		

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Trash	0		
Burrows		0	
 Quadrat 11			
Dactyloctenium aegyptium	15		
Ipomea pes-caprae	18		
Lippia nodiflora	2		
Paspalum vaginatum	90		
Spartina patens	20		
unid. Grass	6		
Debris	100		
Trash	0		
Burrows		0	
 * On edge of path. Grasses were mown, and difficult to I.D.			
 Quadrat 12			
unid. Grass	50		
Debris	18		
Trash	1		
Burrows		0	
 * On path. Mown grass			
 Quadrat 13			
Paspalum vaginatum	60		
Suaeda linearis	15		
unid. Grass	20		
Debris	70		
Trash	5		
Burrows		0	
 * On edge of path			
 Quadrat 14			
Laguncularia racemosa		1	
Paspalum vaginatum	100		
Spartina alterniflora	2		
Suaeda linearis	2		
Debris	100		
Trash	6		
Burrows		0	

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Quadrat 15			
Avicennia germinans	8		
Ipomea pes-caprae	10		
Paspalum vaginatum	18		
Spartina alterniflora	80		
Debris	100		
Trash	6		
Burrows		0	
* @ wrack line			
Quadrat 16			
Avicennia germinans	4		
Spartina alterniflora	26		
Debris	80		
Trash	0		
Burrows		0	
* @ waterline. Tide is high			
Quadrat 17			
Avicennia germinans	12		
Spartina alterniflora	80		
Debris	0		
Trash	0		
Burrows		0	
* Submerged			
Quadrat 18			
Spartina alterniflora	90		
Debris	0		
Trash	0		
Burrows		0	
* Submerged			
Quadrat 19			
Avicennia germinans	1		
Spartina alterniflora	55		
Debris	0		
Trash	0		
Burrows		0	
* Submerged			

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Quadrat 20			
Spartina alterniflora	40		
Debris	0		
Trash	0		
Burrows		0	
* Submerged. Quadrats A21-A23 (inclusive) are submerged, bare bottom			
Quadrat 24			
Halodule wrightii	100		
Debris	0		
Trash	0		
Burrows		0	
* Submerged			
Quadrat 25			
Halodule wrightii	100		
Debris	0		
Trash	0		
Burrows		0	
* Submerged			
Transect B			
Quadrat 1			
Bidens pilosa	2		
Casuarina equisetifolia	4		
Hedyotis corymbosa	3		
Paspalum vaginatum	20		
Spartina patens	85		
unid. Grass	2		
unid. Sedge	4		
Debris	100		
Trash	0		
Burrows		0	
Quadrat 2			
Emilia fosbergii	1		
Hedyotis corymbosa	1		
Paspalum vaginatum	30		
Spartina patens	88		

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Debris	100		
Trash	0		
Burrows		0	
Quadrat 3			
Paspalum vaginatum	40		
Spartina patens	80		
Debris	100		
Trash	0		
Burrows		0	
Quadrat 4			
Paspalum vaginatum	90		
Spartina patens	7		
Debris	100		
Trash	0		
Burrows		2	
Quadrat 5			
Paspalum vaginatum	95		
Debris	90		
Trash	0		
Burrows		0	
Quadrat 6			
Paspalum vaginatum	70		
Debris	50		
Trash	1		
Burrows		2	
Quadrat 7			
Paspalum vaginatum	50		
Suaeda linearis	3		
Debris	20		
Trash	3		
Burrows		5	

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Quadrat 8			
Avicennia germinans	1		
Paspalum vaginatum	85		
Suaeda linearis	25		
Debris	70		
Trash	0		
Burrows		2	
Quadrat 9			
Paspalum vaginatum	80		
Suaeda linearis	3		
Debris	20		
Trash	0		
Burrows		3	
Quadrat 10			
Avicennia germinans	2		
Paspalum vaginatum	35		
Suaeda linearis	7		
Debris	12		
Trash	0		
Burrows		5	
Quadrat 11			
Avicennia germinans	2		
Paspalum vaginatum	25		
Suaeda linearis	23		
Debris	20		
Trash	0		
Burrows		5	
Quadrat 12			
Avicennia germinans	6		
Paspalum vaginatum	14		
Sesuvium portulacastrum	25		
Suaeda linearis	50		
Debris	100		
Trash	4		
Burrows		15	

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
* @ edge of forested area			
Quadrat 13			
Avicennia germinans	30		
Sesuvium portulacastrum	15		
Suaeda linearis	5		
Debris	100		
Trash	1		
Burrows		22	
* @ water's edge, but not pond edge. Tide is high			
Quadrat 14			
Avicennia germinans	17		
Avicennia germinans			4.9
Paspalum vaginatum	10		
Rhizophora mangle	1		
Debris	0		
Trash	0		
Burrows		0	
* Submerged in backwash channel			
Quadrat 15			
Avicennia germinans			1.6
Avicennia germinans			1.4
Avicennia germinans	20		
Debris	100		
Trash	0		
Burrows		8	
* @ water's edge (of backwash channel)			
Quadrat 16			
Avicennia germinans	5		
Rhizophora mangle	1		
Suaeda linearis	5		
Debris	50		
Trash	0		
Burrows		37	
* @ edge of forested area			
Quadrat 17			
Avicennia germinans	10		
Rhizophora mangle	1		
Spartina alterniflora	15		

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Debris	20		
Trash	0		
Burrows		29	
Quadrat 18			
Avicennia germinans	20		
Rhizophora mangle	4		
Spartina alterniflora	30		
Debris	20		
Trash	0		
Burrows		4	
* @ water's edge (of pond)			
Quadrat 19			
Avicennia germinans	10		
Rhizophora mangle	2		
Spartina alterniflora	45		
Debris	0		
Trash	0		
Burrows		0	
* Submerged			
Quadrat 20			
Avicennia germinans	2		
Spartina alterniflora	50		
Debris	0		
Trash	0		
Burrows		0	
* Submerged. Quadrats B21-B25 (inclusive) are submerged, bare bottom			
Transect C			
Quadrat 1			
Batis maritima	85		
Debris	10		
Trash	1		
Burrows		21	

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Quadrat 2			
Avicennia germinans	2		
Batis maritima	50		
Debris	10		
Trash	0		
Burrows		23	
Quadrat 3			
Batis maritima	25		
Debris	2		
Trash	0		
Burrows		18	
Quadrat 4			
Batis maritima	13		
Spartina alterniflora	20		
Debris	5		
Trash	0		
Burrows		23	
* At edge of Marsh			
Quadrat 5			
Avicennia germinans	4		
Spartina alterniflora	60		
Debris	10		
Trash	0		
Burrows		31	
Quadrat 6			
Avicennia germinans	6		
Spartina alterniflora	80		
Debris	20		
Trash	0		
Burrows		40	
Quadrat 7			
Rhizophora mangle	2		
Spartina alterniflora	80		

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Debris	40		
Trash	0		
Burrows		50	
Quadrat 8			
Spartina alterniflora			
Debris	40		
Trash	0		
Burrows		70	
Quadrat 9			
Spartina alterniflora	30		
Debris	5		
Trash	1		
Burrows		52	
* @ water's edge			
Quadrat 14			
Spartina alterniflora	2		
Debris	1		
Trash	0		
Burrows		12	
* @ water's edge			
Quadrat 15			
Spartina alterniflora	2		
Debris	4		
Trash	0		
Burrows		38	
* @ water's edge			
Quadrat 16			
Spartina alterniflora	45		
Debris	20		
Trash	0		
Burrows		95	
* @ water's edge			

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Quadrat 17			
Spartina alterniflora	30		
Debris	20		
Trash	0		
Burrows		71	
Quadrat 18			
Avicennia germinans	3		
Spartina alterniflora	30		
Debris	15		
Trash	0		
Burrows		48	
* Prop root of a Red Mangrove shrub in this quad			
Quadrat 19			
Avicennia germinans	4		
Spartina alterniflora	25		
Debris	5		
Trash	0		
Burrows		38	
* Under edge of boardwalk			
Quadrat 20			
Avicennia germinans	2		
Paspalum vaginatum	1		
Debris	1		
Trash	0		
Burrows		28	
* Under boardwalk			
Quadrat 21			
Paspalum vaginatum	18		
Debris	5		
Trash	0		
Burrows		18	
* Under edge of boardwalk			
Quadrat 22			
Avicennia germinans	2		
Avicennia germinans		1	
Borrchia frutescens	5		

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Paspalum vaginatum	15		
Sesuvium portulacastrum	20		
Suaeda linearis	20		
Debris	30		
Trash	1		
Burrows		33	
Quadrat 23			
Avicennia germinans	10		
Borrichia frutescens	25		
Paspalum vaginatum	40		
Sesuvium portulacastrum	35		
Suaeda linearis	10		
Debris	40		
Trash	0		
Burrows		16	
Quadrat 24			
Borrichia frutescens	50		
Paspalum vaginatum	60		
Suaeda linearis	10		
Debris	20		
Trash	1		
Burrows		17	
Quadrat 25			
Borrichia frutescens	30		
Flaveria floridana	7		
Iva frutescens	2		
Paspalum vaginatum	50		
Spartina patens	30		
Debris	10		
Trash	0		
Burrows		6	
Quadrat 26			
Dodonea viscosa		1	
Flaveria floridana	5		
Lippia nodiflora	15		

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Paspalum vaginatum	50		
Suaeda linearis	10		
Debris	15		
Trash	1		
Burrows		0	
Quadrat 27			
Iva frutescens	2		
Lippia nodiflora	10		
Paspalum vaginatum	25		
unid. Palm	1		
Debris	30		
Trash	0		
Burrows		0	
Quadrat 28			
Coccoloba uvifera		1	
Flaveria floridana	25		
Lippia nodiflora	20		
Paspalum vaginatum	15		
Debris	50		
Trash	0		
Burrows		0	
Quadrat 29			
Coccoloba uvifera		1	
Lippia nodiflora	15		
Paspalum vaginatum	30		
Debris	60		
Trash	0		
Burrows		0	
Quadrat 30			
Ipomea pes-caprae	1		
Lippia nodiflora	40		
Paspalum vaginatum	40		
Debris	50		
Trash	0		
Burrows		0	

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Quadrat 31			
Ipomea pes-caprae	2		
Paspalum vaginatum	70		
Suaeda linearis	3		
Debris	70		
Trash	0		
Burrows		0	
Quadrat 32			
Flaveria floridana		1	
Ipomea pes-caprae	2		
Paspalum vaginatum	75		
Debris	85		
Trash	0		
Burrows		0	
Quadrat 33			
Paspalum vaginatum	100		
Debris	100		
Trash	0		
Burrows		0	
* @ edge of wrack line			
Quadrat 34			
Paspalum vaginatum	80		
Debris	100		
Trash	5		
Burrows		0	
* In wrack line			
Quadrat 35			
Paspalum vaginatum	15		
Suaeda linearis	1		
Debris	90		
Trash	2		
Burrows		0	
* In wrack line			
Quadrat 36			
Spartina alterniflora	15		

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Debris	20		
Trash	0		
Burrows		9	
* Just behind marsh			
Quadrat 37			
Avicennia germinans	3		
Spartina alterniflora	60		
Debris	20		
Trash	2		
Burrows		0	
* Planted marsh			
Quadrat 38			
Spartina alterniflora	100		
Debris	100		
Trash	0		
Burrows		34	
Quadrat 39			
Spartina alterniflora	90		
Debris	80		
Trash	0		
Burrows		43	
Quadrat 40			
Spartina alterniflora	50		
Debris	20		
Trash	0		
Burrows		35	
* @ water's edge			
Quadrat 41			
Spartina alterniflora	2		
Debris	0		
Trash	0		
Burrows		0	

* Submerged. Quadrats C42-C43 (inclusive) are submerged bare bottom

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Quadrat 44			
Halodule wrightii	10		
Debris	0		
Trash	0		
Burrows		0	
* Submerged			
Quadrat 45			
Halodule wrightii	85		
Debris	0		
Trash	0		
Burrows		0	
* Submerged			
Transect D			
Quadrat -10			
Paspalum vaginatum	100		
Debris	100		
Trash	0		
Burrows		0	
Quadrat -9			
Paspalum vaginatum	100		
Debris	100		
Trash	0		
Burrows		0	
Quadrat -8			
Paspalum vaginatum	45		
Debris	100		
Trash	0		
Burrows		0	
Quadrat -7			
Paspalum vaginatum	5		
Debris	50		
Trash	0		

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Burrows		0	
Quadrat -6			
Paspalum vaginatum	5		
Debris	20		
Trash	0		
Burrows		0	
Quadrat -5			
Borrichia frutescens	20		
Paspalum vaginatum	36		
Debris	100		
Trash	0		
Burrows		0	
Quadrat -4			
Borrichia frutescens	5		
Paspalum vaginatum	30		
Debris	100		
Trash	0		
Burrows		0	
Quadrat -3			
Paspalum vaginatum	30		
Spartina alterniflora	1		
Debris	60		
Trash	1		
Burrows		0	
* @ edge of swale			
Quadrat -2			
Paspalum vaginatum	15		
Spartina alterniflora	15		
Debris	100		
Trash	0		
Burrows		1	
* In swale			

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Quadrat -1			
Paspalum vaginatum	15		
Spartina alterniflora	14		
Suaeda linearis	4		
Debris	80		
Trash	0		
Burrows		2	
* In swale			
Quadrat 1			
Paspalum vaginatum	50		
Spartina patens	10		
Debris	50		
Trash	0		
Burrows		2	
Quadrat 2			
Paspalum vaginatum	25		
Sesuvium portulacastrum	5		
Spartina patens	20		
Suaeda linearis	5		
Debris	40		
Trash	0		
Burrows		0	
Quadrat 3			
Conocarpus erecta		1	
Paspalum vaginatum	5		
Sesuvium portulacastrum	3		
Spartina patens	10		
Suaeda linearis	2		
Debris	10		
Trash	0		
Burrows		0	
Quadrat 4			
Fimbristylis spathacea	11		
Paspalum vaginatum	10		
Spartina patens	12		
Debris	10		

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Trash	0		
Burrows		0	
* Touching boardwalk			
Quadrat 5			
Paspalum vaginatum	40		
unid. Palm	1		
Debris	40		
Trash	0		
Burrows		0	
* Partially on boardwalk. On path			
Quadrat 6			
Paspalum vaginatum	80		
Debris	70		
Trash	0		
Burrows		0	
Quadrat 7			
Paspalum vaginatum	60		
Sesuvium portulacastrum	3		
Spartina patens	2		
Debris	50		
Trash	0		
Burrows		0	
Quadrat 8			
Paspalum vaginatum	30		
Sesuvium portulacastrum	1		
Spartina patens	10		
Debris	15		
Trash	0		
Burrows		0	
Quadrat 9			
Paspalum vaginatum	15		
Spartina patens	10		
Debris	10		
Trash	0		

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Burrows		3	
Quadrat 10			
Paspalum vaginatum	3		
Spartina alterniflora	5		
Spartina patens	1		
Debris	3		
Trash	0		
Burrows		8	
* @ edge of planted S. alterniflora marsh			
Quadrat 11			
Spartina alterniflora	40		
Debris	5		
Trash	0		
Burrows		22	
Quadrat 12			
Avicennia germinans	1		
Spartina alterniflora	50		
Debris	20		
Trash	0		
Burrows		50	
Quadrat 13			
Avicennia germinans	2		
Rhizophora mangle		1	
Spartina alterniflora	60		
Debris	20		
Trash	0		
Burrows		34	
* Red Mangrove shrub from new planting			
Quadrat 14			
Spartina alterniflora	5		
Debris	10		
Trash	0		
Burrows		22	

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
* Quadrats D15-D23 (inclusive) are submerged, bare bottom. @ waterline			
Quadrat 24			
Spartina alterniflora	10		
Debris	3		
Trash	0		
Burrows		7	
* @ waterline			
Quadrat 25			
Spartina alterniflora	80		
Debris	50		
Trash	0		
Burrows		39	
* Dead Red Mangrove shrub from new planting			
Quadrat 26			
Avicennia germinans	4		
Spartina alterniflora	90		
Debris	50		
Trash	0		
Burrows		25	
Quadrat 27			
Avicennia germinans	3		
Spartina alterniflora	80		
Debris	50		
Trash	0		
Burrows		21	
* Dead Red Mangrove shrub from new planting			
Quadrat 28			
Avicennia germinans	2		
Spartina alterniflora	65		
Suaeda linearis	1		
Debris	40		
Trash	0		
Burrows		28	

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Quadrat 29			
Avicennia germinans	2		
Spartina alterniflora	55		
Suaeda linearis	3		
Debris	50		
Trash	0		
Burrows		8	
Quadrat 30			
Avicennia germinans	1		
Limonium carolinianum	1		
Suaeda linearis	20		
Debris	50		
Trash	0		
Burrows		3	
Quadrat 31			
Avicennia germinans	3		
Limonium carolinianum	1		
Spartina patens	75		
Suaeda linearis	20		
Debris	100		
Trash	0		
Burrows		5	
* Start of forested area			
Quadrat 32			
Avicennia germinans	8		
Spartina patens	50		
Suaeda linearis	20		
Debris	100		
Trash	1		
Burrows		2	
Quadrat 33			
Avicennia germinans	7		
Avicennia germinans			1.1
Suaeda linearis	15		
Debris	100		
Trash	2		

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Burrows		3	
* Dead Red Mangrove tree			
Quadrat 34			
Avicennia germinans	5		
Limonium carolinianum	1		
Suaeda linearis	30		
Debris	100		
Trash	0		
Burrows		0	
Quadrat 35			
Avicennia germinans	30		
Suaeda linearis	30		
Debris	95		
Trash	0		
Burrows		2	
Quadrat 36			
Avicennia germinans		4	
Avicennia germinans	10		
Limonium carolinianum	5		
Suaeda linearis	15		
Debris	95		
Trash	0		
Burrows		0	
Quadrat 37			
Avicennia germinans	10		
Avicennia germinans		1	
Limonium carolinianum	20		
Suaeda linearis	4		
Debris	100		
Trash	0		
Burrows		0	
Quadrat 38			
Avicennia germinans		1	

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Limonium carolinianum	20		
Paspalum vaginatum	6		
Debris	100		
Trash	0		
Burrows		0	
Quadrat 39			
Iva frutescens	25		
Limonium carolinianum	10		
Paspalum vaginatum	5		
Suaeda linearis	5		
Debris	100		
Trash	1		
Burrows		0	
Quadrat 40			
Borrichia frutescens	13		
Limonium carolinianum	5		
Suaeda linearis	25		
Debris	98		
Trash	0		
Burrows		2	
Quadrat 41			
Borrichia frutescens	50		
Suaeda linearis	20		
Debris	100		
Trash	0		
Burrows		3	
Quadrat 42			
Borrichia frutescens	50		
Limonium carolinianum	7		
Sesuvium portulacastrum	10		
Suaeda linearis	10		
Debris	100		
Trash	0		
Burrows		6	

Appendix Table 1 (continued).

Species or Taxon Name	Cover (%)	Count	DBH (")
Quadrat 43			
Borrichia frutescens	60		
Paspalum vaginatum	5		
Sesuvium portulacastrum	15		
Suaeda linearis	3		
Debris	100		
Trash	1		
Burrows			2
Quadrat 44			
Borrichia frutescens	40		
Limonium carolinianum	6		
Paspalum vaginatum	20		
Suaeda linearis	3		
Debris	100		
Trash	2		
Burrows			0
Quadrat 45			
Flaveria floridana	5		
Paspalum vaginatum	25		
Suaeda linearis	10		
Debris	100		
Trash	0		
Burrows			0