

Port Botany Post Construction Environmental Monitoring

Saltmarsh
Monitoring
Summary Report

October 2012

EL1112046



Prepared for Sydney Ports
Corporation
15 October 2012

Document Information

Prepared for Sydney Ports Corporation
Project Name Port Botany Expansion – Post Construction Environmental Monitoring
Date 15 October 2012

Document Control

Version	Date	Author	Author Initials	Reviewer	Reviewer Initials
1	20 July 2012	Rick Johnson	RJ	Peggy O'Donnell	POD
2	15 Oct 2012	Rick Johnson	RJ	Belinda Crichton	BC

Cardno (NSW/ACT) Pty Ltd

Level 9, The Forum
203 Pacific Highway
St. Leonards NSW 2065
Telephone: 02 9496 7700
Facsimile: 02 9499 3902
www.cardno.com.au

"© 2012 Cardno All Rights Reserved. Copyright in the whole and every part of this document belongs to Cardno and may not be used, sold, transferred, copied or reproduced in whole or in part in any manner or form or in or on any media to any person without the prior written consent of Cardno."

Table of Contents

1	Introduction	1
1.1	Background	1
1.2	Purpose of this report	1
2	Monitoring Methodology	2
2.1	Sampling Design	2
2.2	Field Procedures	2
3	Monitoring Works	4
4	Preliminary Findings	5

Tables

Indicators and Sampling Methodology
Percentage Cover Data

Figures

Field Sampling Locations

Appendices

Field Data

1 Introduction

1.1 Background

As part of the Port Botany Expansion Project, Sydney Ports has rehabilitated Penrhyn Estuary, located in Botany Bay adjacent to the port expansion. Penrhyn Estuary is a small waterway of approximately 30 ha located to the west of Brotherson Dock, which was artificially created during the reclamation of the Botany foreshore between 1975 and 1978. Since its creation, it has been utilised by a diverse group of migratory birds. The purpose of the rehabilitation works was to enhance the existing intertidal habitat and to expand the estuary as a long term habitat for migratory shorebirds. This involved the removal of mangroves, weeds and introduced species, the enhancement of existing saltmarsh and the creation of new saltmarsh habitat. An extensive area of fore dune was also levelled to create an intertidal feeding and roosting habitat for key species of migratory shorebird that currently use the estuary and to potentially attract a greater number of shorebirds upon completion.

The design, methodology and ongoing maintenance for the estuary is outlined within the Penrhyn Estuary Habitat Enhancement Plan (PEHEP). The key objectives of the PEHEP are to expand the existing shorebird habitat, to continue to attract migratory shorebirds, to create seagrass habitat and to expand the area of saltmarsh habitat.

The aim of the saltmarsh monitoring program is:

- To monitor changes in existing saltmarsh habitats that were retained, in terms of the impacts of port construction and operation; and
- To assess the success of created saltmarsh habitat, including its ecological function.

The saltmarsh monitoring plan aims to provide data to test the prediction that appropriate, ecologically functional saltmarsh habitat has been created and that the habitats are sustainable under the conditions of port operation. The plan is linked to the goal of improving numbers of migratory shorebirds by providing quality saltmarsh habitat used by the shorebirds for roosting and (to a lesser extent) feeding.

1.2 Purpose of this report

This report provides a summary of the data collected for Survey 1 in March and September 2012 as part of the saltmarsh monitoring program. This report documents the progress of the monitoring works performed and provides preliminary discussion, and identifies any important observations during field work and inspection of the raw data collected. A more detailed annual report will be submitted May 2013.

2 Monitoring Methodology

Penrhyn Estuary has undergone extensive modification as part of the Port Botany Expansion. The Penrhyn Estuary includes saltmarsh communities, which have undergone various levels of disturbance during the port expansion works. These include the new saltmarsh areas created by new planting, areas of existing saltmarsh that received saltmarsh plants transplanted from other areas within the estuary, areas of existing saltmarsh that were left undisturbed and areas of existing saltmarsh that had weeds and mangroves removed.

2.1 Sampling Design

In the Penrhyn Estuary there are four saltmarsh treatments to be surveyed as part of the post monitoring program (see Figure 1):

1. **New Saltmarsh Habitat:** 13 sites with the prefix “N” are located in Penrhyn Estuary; a large rectangular area along the northern estuary boundary (N1-1 to N1-6) and fringing the southern shore, extending along the base of the new arm of the port (N1-9 to N1-13 and N1-21). New saltmarsh was also created fringing the kidney-shaped bird roost and two circular roost areas, however the latter two habitats will not be sampled to minimise disturbance of roosting birds.
2. **Transplanted Saltmarsh Habitat:** three sites with prefix “TR” are located along the northern bank of Springvale Creek (TR-8, TR-17 and TR-18). These areas received saltmarsh that was previously located along the western bank of Floodvale Creek. Transplantation was done prior to removing weed and dune habitats and levelling to create the New Saltmarsh habitats mentioned above.
3. **Retained, Undisturbed Saltmarsh Habitat:** four sites with prefix “R”; located along the eastern bank of Floodvale Creek (R1-7 and R1-14) and south-eastern bank of Springvale Creek (R2-20 and R2-22). These areas were saltmarsh habitats prior to and during the habitat enhancement, and were undisturbed during construction and rehabilitation processes.
4. **Altered Saltmarsh Habitat:** three sites with prefix “A” located fringing the southern shore adjacent to Springvale Creek. These areas had weeds and mangroves (trees and pneumatophores) removed as part of habitat rehabilitation.

Two reference locations with undisturbed saltmarsh habitats were sampled at Quibray Bay and Woolooware Bay, located on the southern side of Botany Bay (Figures 2 and 3). These sites were surveyed as part of the baseline monitoring. Two treated reference locations with newly planted or replanted saltmarsh habitats were sampled at Scotts Park, Sans Souci and Salt Pan Creek, Padstow (Figures 4 and 5).

2.2 Field Procedures

The sampling methodology for each indicator is described in Table 1 below. The lengths from the shoreline of each transect were different for every site – with the width of saltmarsh habitat determining the length of each transect. Indicators such as percentage cover were standardised to the length of each transect. Four replicate quadrats (1 x 1 m in dimension) were sampled at random points along the length of each transect.

Table 1. Indicators and sampling methods for saltmarsh monitoring.

Indicator	Parameter	Sampling Methodology
Saltmarsh Distribution	Area	The area of saltmarsh habitats was derived from interpretation of aerial photos and ground verification using a DGPS using MapInfo software.
Growth (success of transplantation)	Percentage Cover (%)	The cover of each species of saltmarsh was recorded along a single transect within each site and expressed as a percentage of the total transect length.
Species Diversity	Number of Species	The number of species was recorded in quadrats along each transect.
Species Abundance	Number of Individuals	The number of individuals of each saltmarsh species was recorded in quadrats along each transect.
Overall Condition	Plant Morphology	The condition of each plant within each 1m ² quadrat was categorised on the following scale: <ul style="list-style-type: none"> • Good condition – >50 % of the plant with living green bases; • Poor condition - < 50 % of the plant with living green bases; and • Dead/near dead – no living green bases on plant.
Growth	Height (cm)	The height of the tallest plant was recorded in quadrats along each transect
Ecological Function	Epifaunal Invertebrates	The abundance of epifaunal invertebrates associated with saltmarsh habitat (including crabs, gastropod molluscs, etc.) was recorded in quadrats along each transect. Crab holes were used as an index of crab abundance.
Invasion by Mangroves	Number of sprouting mangrove trunks, pneumatophores, and seedlings.	The number of mangrove trunks, pneumatophores, seeds and seedlings was recorded in quadrats along each transect.

3 Monitoring Works

The first post construction monitoring survey of saltmarsh occurred between 5 and 7 March 2012 (Penrhyn Estuary and Reference Sites) and 3 September 2012 (Treated Reference Sites). The conditions at the time of the survey were fine, with no rain during either of the two sampling periods. All sampling of the saltmarsh sites in Penrhyn Estuary, the Reference Sites (Quibray Bay and Woolooware Bay) and the Treated Reference Sites (Sans Souci and Salt Pan Creek) for the 2012 survey was successfully completed.

The sampling methodology was followed as outlined within the Monitoring Services Management Plan. GPS co-ordinates and photographs were taken at the landward and seaward end of each transect. The boundaries of the saltmarsh communities at Penrhyn Estuary were recorded on foot on 6 March 2012 using a differential GPS (DGPS). The DGPS had an accuracy of 0.1 m and waypoints were automatically recorded every 2 m.

During the field works no HSE incidents or near misses were recorded for the saltmarsh monitoring works, while no non-compliance reports (NCR) required issuing for corrective actions.

4 Preliminary Findings

The location of field sampling transect sites are shown in Figures 1 – 5. Figure 1 also shows the boundaries of the saltmarsh communities at all the locations at Penrhyn Estuary. The raw data from the field sampling are shown in Appendices 1 – 4, with quadrat data presented as means and standard errors for the four random quadrats sampled within each transect.

The results indicated that the cover within the saltmarsh habitat at Penrhyn Estuary and the two reference and two treated reference locations was dominated by three species of saltmarsh (*Sarcocornia quinqueflora*, *Sporobolus virginicus* and *Suaeda australis*) and bare ground. The percentage cover data, recorded along the length of each transect and within the quadrats, for these three species and bare ground, are shown in Table 2.

Table 2. Percentage cover data recorded along the length of each transect and within the quadrats, for saltmarsh species and bare ground.

Plant species or habitat	Percentage cover along length of transect	Percentage cover within quadrats
Bare ground	16.90	31.73
<i>Sarcocornia quinqueflora</i>	43.23	31.83
<i>Sporobolus virginicus</i>	16.94	16.46
<i>Suaeda australis</i>	12.86	10.08
Total cover for above species/habitat	89.93	90.10

The most common epifauna invertebrate species were gastropods (*Ophicardelus ornatus* and *Salinator fragilis*) and crab holes. These three taxa combined made up 90.98% of the recorded invertebrate taxa.

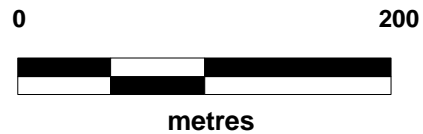
Very few dead plants or plants in poor condition were observed. 178 *Suaeda* plants were recorded during the survey, of which 12 were dead (6.7%) and one in poor condition (0.6%). Of the seven dead *Suaeda* plants, only one was recorded in the new saltmarsh treatment locations. 1,168 *Sarcocornia* plants were recorded during the survey, of which only one was dead (< 0.1%) at Woolooware Bay.

There was no invasion of grey mangroves (tree regrowth, seedlings or pneumatophores) recorded at any of the treatment locations within Penrhyn Estuary. The only mangroves recorded were at the reference and treated reference sites.

Port Botany Expansion –
Post Construction
Environmental
Monitoring

FIGURES

FIELD SAMPLING
LOCATIONS



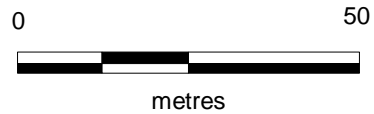
Penrhyn Estuary Saltmarsh Sites

PORT BOTANY EXPANSION -
POST CONSTRUCTION ENVIRONMENTAL MONITORING

Figure 1



Map Produced by Cardno Ecology Lab
Date: 19 March 2012
Coordinate System: Zone 56 WGS 84
GIS MAP REF:
EL112046_Figure1.Penrhyn Saltmarsh



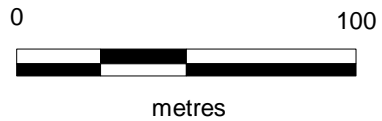
Quilbray Bay Reference Sites

PORT BOTANY EXPANSION -
POST CONSTRUCTION ENVIRONMENTAL MONITORING

Figure 2



Map Produced by Cardno Ecology Lab
Date: 24 May 2012
Coordinate System: Zone 56 MGA/WGS 84
GIS MAP REF: Google Maps Images
EL1112046_Figure 2. Saltmarsh Reference Sites



Woollooware Bay Reference Sites

PORT BOTANY EXPANSION -
POST CONSTRUCTION ENVIRONMENTAL MONITORING

Figure 3



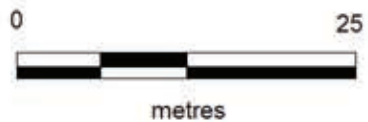
Map Produced by Cardno Ecology Lab
Date: 24 May 2012
Coordinate System: Zone 56 MGA/WGS 84
GIS MAP REF: Google Map Images
EL1112046 Figure 3. Saltmarsh Reference Sites



Sans Souci Treated Reference Sites

PORT BOTANY EXPANSION -
 POST CONSTRUCTION ENVIRONMENTAL MONITORING

Figure 4



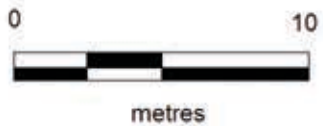
Map Produced by 2812
 Date: September 2012
 Coordinate System: Zone 56 MGA/WGS 84
 GIS MAP REF: Google Map Images
 EL1112046 Figure 4. Saltmarsh Reference Sites



Salt Pan Creek Treated Reference Sites

PORT BOTANY EXPANSION -
POST CONSTRUCTION ENVIRONMENTAL MONITORING

Figure 5



Map Produced by 2812
Date: September 2012
Coordinate System: Zone 56 MGA/WGS 84
GIS MAP REF: Google Map Images
EL1112046 Figure 4. Saltmarsh Reference Sites

Port Botany Expansion –
Post Construction
Environmental
Monitoring

APPENDICES

FIELD DATA

Appendix 1: The cover of each species of saltmarsh recorded along the length of a single transect at each site from Penrhyn Estuary and Reference Sites (sampled 5 - 7 March 2012) and Treated Reference Sites (sampled 3 September 2012). Data are expressed as a percentage of the total transect length.

Species Name	Common Name	Treatment Transect Transect length (m)	New Saltmarsh 1						New Saltmarsh 2					
			N1-1	N1-2	N1-3	N1-4	N1-5	N1-6	N2-9	N2-10	N2-11	N2-12	N2-13	N2-21
Bare	bare ground	43.1	6.7	4.1	22.8	31.2	13.8	26.7	24.5	17.5	37.1	42.5	1.2	21.8
<i>Acacia sp.</i>	unidentified Wattle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.7
<i>Aegiceras corniculatum</i>	River Mangrove	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Atriplex australasica</i>	Green Saltbush	2.3	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Avicennia marina</i>	Grey Mangrove tree	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Avicennia marina</i>	Grey Mangrove seedling	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Avicennia marina</i>	Grey Mangrove pneumatophores	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Bidens pilosa</i>	Farmers Friend	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Carpobrotus sp.</i>	Pigface	0.0	0.0	0.0	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
<i>Hydrocotyle sp.</i>	Pennywort	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Isolepis nodosa</i>	Knobby Club-rush	0.0	4.4	0.0	1.6	4.8	0.0	0.0	0.0	3.4	0.0	0.0	0.0	0.0
<i>Juncus kraussii</i>	Sea Rush	0.5	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
<i>Pennisetum clandestinum</i>	Kikuya Grass	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Plantago coronopus</i>	Plantain	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.9
<i>Samolus repens</i>	Creeping Brookweed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Sarcocornia quinqueflora</i>	Beaded Glasswort	78.0	71.5	57.3	52.5	68.7	18.0	63.6	65.5	51.5	50.1	86.0	49.0	
<i>Sarcocornia quinqueflora</i> (Dead)	Dead Beaded Glasswort	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
<i>Spinifex sericeus</i>	Hairy Spinifex grass	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
<i>Sporobolus virginicus</i>	Salt Couch	9.3	20.0	16.3	7.5	12.8	50.6	11.9	17.0	8.0	7.4	12.8	18.4	
<i>Stenotaphrum secundatum</i>	Buffalo Grass	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
<i>Suaeda australis</i>	Seablite	1.2	0.0	0.6	0.4	0.0	4.7	0.0	0.0	0.0	0.0	0.0	0.2	
<i>Suaeda australis</i> (Dead)	Dead Seablite	2.1	0.0	0.0	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
<i>Tetragonia tetragonioides</i>	New Zealand Spinach	0.0	0.0	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.5	
<i>Triglochin striata</i>	Streaked Arrowgrass	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
<i>Westringia fruticosa</i>	Native Rosemary	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
unidentified rush	unidentified rush	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
unidentified rush (dead)	dead unidentified rush	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
unidentified herb	unidentified herb	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

continued...

Appendix 1: continued

Species Name	Common Name	Treatment Transect Transect length (m)	Transplanted Saltmarsh			Retained Saltmarsh 1		Retained Saltmarsh 2		Altered Saltmarsh 2		
			TR-8	TR-17	TR-18	R1-7	R1-14	R2-20	R2-22	A2-15	A2-16	A2-19
Bare	bare ground		15.5	36.2	0.0	12.0	47.3	1.3	0.7	64.3	26.3	30.1
<i>Acacia sp.</i>	unidentified Wattle		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.5	0.0
<i>Aegiceras corniculatum</i>	River Mangrove		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Atriplex australasica</i>	Green Saltbush		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Avicennia marina</i>	Grey Mangrove tree		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Avicennia marina</i>	Grey Mangrove seedling		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Avicennia marina</i>	Grey Mangrove pneumatophores		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Bidens pilosa</i>	Farmers Friend		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Carpobrotus sp.</i>	Pigface		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0
<i>Hydrocotyle sp.</i>	Pennywort		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Isolepis nodosa</i>	Knobby Club-rush		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.9	0.0
<i>Juncus kraussii</i>	Sea Rush		22.9	0.0	0.0	0.0	0.0	36.6	0.0	0.0	3.5	0.0
<i>Pennisetum clandestinum</i>	Kikuya Grass		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Plantago coronopus</i>	Plantain		0.0	0.0	0.0	6.8	0.0	0.0	0.0	0.0	0.0	0.0
<i>Samolus repens</i>	Creeping Brookweed		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Sarcocornia quinqueflora</i>	Beaded Glasswort		3.8	0.0	7.5	28.2	44.6	35.1	21.5	1.1	0.0	17.8
<i>Sarcocornia quinqueflora</i> (Dead)	Dead Beaded Glasswort		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Spinifex sericeus</i>	Hairy Spinifex grass		0.0	0.0	0.0	8.5	0.0	0.0	0.0	0.0	7.0	0.0
<i>Sporobolus virginicus</i>	Salt Couch		30.5	36.2	83.6	0.0	0.0	13.9	37.7	6.6	0.0	37.0
<i>Stenotaphrum secundatum</i>	Buffalo Grass		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Suaeda australis</i>	Seablite		27.3	15.1	7.0	34.2	8.1	13.1	37.1	28.0	0.0	15.1
<i>Suaeda australis</i> (Dead)	Dead Seablite		0.0	12.4	0.0	10.3	0.0	0.0	3.0	0.0	0.0	0.0
<i>Tetragonia tetragonioides</i>	New Zealand Spinach		0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Triglochin striata</i>	Streaked Arrowgrass		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Westringia fruticosa</i>	Native Rosemary		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
unidentified rush	unidentified rush		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
unidentified rush (dead)	dead unidentified rush		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
unidentified herb	unidentified herb		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

continued...

Appendix 1: continued

Species Name	Common Name	Treatment Transect Transect length (m)	Reference Quibray Bay 1			Reference Quibray Bay 2			Reference Woolooware Bay 1			Reference Woolooware Bay 2		
			Q1-1	Q1-2	Q1-3	Q2-4	Q2-5	Q2-6	W1-1	W1-2	W1-3	W2-4	W2-5	W2-6
Bare	bare ground		4.7	6.5	9.7	7.2	2.1	9.1	12.0	7.1	6.3	9.3	8.5	18.0
<i>Acacia sp.</i>	unidentified Wattle		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Aegiceras corniculatum</i>	River Mangrove		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0
<i>Atriplex australasica</i>	Green Saltbush		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Avicennia marina</i>	Grey Mangrove tree		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Avicennia marina</i>	Grey Mangrove seedling		0.0	0.0	0.0	3.4	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0
<i>Avicennia marina</i>	Grey Mangrove pneumatophores		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	0.0
<i>Bidens pilosa</i>	Farmers Friend		0.0	0.0	0.0	0.0	4.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Carpobrotus sp.</i>	Pigface		0.0	0.0	6.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Hydrocotyle sp.</i>	Pennywort		0.4	2.7	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Isolepis nodosa</i>	Knobby Club-rush		2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Juncus kraussii</i>	Sea Rush		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Pennisetum clandestinum</i>	Kikuya Grass		0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Plantago coronopus</i>	Plantain		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Samolus repens</i>	Creeping Brookweed		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Sarcocornia quinqueflora</i>	Beaded Glasswort		51.6	49.8	30.5	24.2	38.4	8.3	53.8	66.1	51.5	64.0	35.8	57.0
<i>Sarcocornia quinqueflora</i> (Dead)	Dead Beaded Glasswort		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.4	0.0
<i>Spinifex sericeus</i>	Hairy Spinifex grass		0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Sporobolus virginicus</i>	Salt Couch		30.3	29.4	25.5	47.7	0.0	70.3	9.8	3.8	6.6	6.5	7.2	7.5
<i>Stenotaphrum secundatum</i>	Buffalo Grass		0.0	0.0	0.0	1.1	40.8	1.8	0.0	0.0	0.0	0.0	0.0	0.0
<i>Suaeda australis</i>	Seablite		6.3	8.9	27.1	10.6	10.7	9.4	24.5	22.0	34.3	20.3	31.1	17.5
<i>Suaeda australis</i> (Dead)	Dead Seablite		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Tetragonia tetragonioides</i>	New Zealand Spinach		0.0	0.0	0.5	1.5	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Triglochin striata</i>	Streaked Arrowgrass		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Westringia fruticosa</i>	Native Rosemary		3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
unidentified rush	unidentified rush		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
unidentified rush (dead)	dead unidentified rush		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
unidentified herb	unidentified herb		0.0	0.0	0.0	4.2	1.4	1.1	0.0	0.0	0.0	0.0	0.0	0.0

continued...

Appendix 1: continued

Species Name	Common Name	Treatment Transect Transect length (m)	Treated Reference Sans Souci			Treated Reference Salt Pan Creek		
			SS1-1	SS1-2	SS1-3	SPC1-1	SPC1-2	SPC1-3
Bare	bare ground		20.7	21.1	17.9	21.5	23.7	23.8
<i>Acacia sp.</i>	unidentified Wattle		64.3	34.6	24.0	0.0	0.0	2.9
<i>Aegiceras corniculatum</i>	River Mangrove		0.0	0.0	0.0	0.0	0.0	0.0
<i>Atriplex australasica</i>	Green Saltbush		0.0	0.0	0.0	0.0	0.0	0.0
<i>Avicennia marina</i>	Grey Mangrove tree		0.0	1.9	0.0	9.8	16.5	20.2
<i>Avicennia marina</i>	Grey Mangrove seedling		0.0	1.4	0.0	0.0	0.0	0.0
<i>Avicennia marina</i>	Grey Mangrove pneumatophores		0.0	0.0	0.0	0.0	0.0	0.0
<i>Bidens pilosa</i>	Farmers Friend		0.0	0.0	0.0	0.0	0.0	0.0
<i>Carpobrotus sp.</i>	Pigface		0.0	0.0	0.0	0.0	0.0	0.0
<i>Hydrocotyle sp.</i>	Pennywort		0.0	0.0	0.0	0.0	0.0	0.0
<i>Isolepis nodosa</i>	Knobby Club-rush		0.0	0.0	0.0	0.0	0.0	0.0
<i>Juncus kraussii</i>	Sea Rush		12.1	4.7	7.3	14.0	1.7	10.9
<i>Pennisetum clandestinum</i>	Kikuya Grass		0.0	0.0	0.0	0.0	0.0	0.0
<i>Plantago coronopus</i>	Plantain		0.0	0.0	0.0	0.0	0.0	0.0
<i>Samolus repens</i>	Creeping Brookweed		0.0	0.0	0.0	35.8	7.2	0.0
<i>Sarcocornia quinqueflora</i>	Beaded Glasswort		23.7	57.3	68.7	0.0	0.0	0.0
<i>Sarcocornia quinqueflora</i> (Dead)	Dead Beaded Glasswort		0.0	0.0	0.0	0.0	0.0	0.0
<i>Spinifex sericeus</i>	Hairy Spinifex grass		0.0	0.0	0.0	0.0	0.0	0.0
<i>Sporobolus virginicus</i>	Salt Couch		0.0	0.0	0.0	0.0	30.8	8.0
<i>Stenotaphrum secundatum</i>	Buffalo Grass		0.0	0.0	0.0	0.0	0.0	0.0
<i>Suaeda australis</i>	Seablite		0.0	0.0	0.0	40.5	27.0	44.5
<i>Suaeda australis</i> (Dead)	Dead Seablite		0.0	0.0	0.0	0.0	8.4	0.0
<i>Tetragonia tetragonioides</i>	New Zealand Spinach		0.0	0.0	0.0	0.0	0.0	0.0
<i>Triglochin striata</i>	Streaked Arrowgrass		0.0	0.0	0.0	0.0	3.0	0.0
<i>Westringia fruticosa</i>	Native Rosemary		0.0	0.0	0.0	0.0	0.0	0.0
unidentified rush	unidentified rush		0.0	0.0	0.0	0.0	0.0	8.4
unidentified rush (dead)	dead unidentified rush		0.0	0.0	0.0	0.0	5.5	5.0
unidentified herb	unidentified herb		0.0	0.0	0.0	0.0	0.0	0.0

Appendix 2: The percent cover of each species of saltmarsh recorded within four random quadrats (1m²) along the transect at each site from Penrhyn Estuary and Reference Sites (sampled 5 - 7 March 2012) and Treated Reference Sites (sampled 3 September 2012). Data are presented as means and standard errors for four quadrats.

Species Name	Common Name	Treatment Transect	New Saltmarsh 1											
			N1-1		N1-2		N1-3		N1-4		N1-5		N1-6	
			Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Bare	bare ground		42.00	9.95	29.50	9.80	45.25	15.36	50.00	7.36	32.25	5.17	57.50	10.90
<i>Acacia sp.</i>	unidentified Wattle		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Aegiceras corniculatum</i>	River Mangrove		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Atriplex australasica</i>	Green Saltbush		2.50	2.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Avicennia marina</i>	Grey Mangrove seedling		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Avicennia marina</i>	Grey Mangrove pneumatophores		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Carpobrotus sp.</i>	Pigface		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Hydrocotyle sp.</i>	Pennywort		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Isolepis nodosa</i>	Knobby Club-rush		0.00	0.00	0.00	0.00	0.00	0.00	1.25	1.25	0.00	0.00	0.00	0.00
<i>Juncus kraussii</i>	Sea Rush		0.00	0.00	0.00	0.00	0.00	0.00	7.50	7.50	0.00	0.00	0.00	0.00
<i>Plantago coronopus</i>	Plantain		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Samolus repens</i>	Creeping Brookweed		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Sarcocornia quinqueflora</i>	Beaded Glasswort		52.50	13.31	47.50	14.79	35.50	14.73	38.75	13.44	51.50	17.60	18.75	13.90
<i>Sarcocornia quinqueflora</i> (Dead)	Dead Beaded Glasswort		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Spinifex sericeus</i>	Hairy Spinifex grass		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Sporobolus virginicus</i>	Salt Couch		1.25	1.25	22.50	22.50	18.75	18.75	0.00	0.00	16.25	16.25	21.25	12.64
<i>Stenotaphrum secundatum</i>	Buffalo Grass		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Suaeda australis</i>	Seablite		1.25	1.25	0.00	0.00	0.50	0.50	0.00	0.00	0.00	0.00	2.50	1.44
<i>Suaeda australis</i> (Dead)	Dead Seablite		0.00	0.00	0.00	0.00	0.00	0.00	2.50	2.50	0.00	0.00	0.00	0.00
<i>Tetragonia tetragonioides</i>	New Zealand Spinach		0.50	0.50	0.50	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified rush	unidentified rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified rush (dead)	dead unidentified rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified herb	unidentified herb		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified plant	unidentified plant		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

continued...

Appendix 2: continued

Species Name	Common Name	Treatment Transect	New Saltmarsh 2											
			N2-9		N2-10		N2-11		N2-12		N2-13		N2-21	
			Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Bare	bare ground		12.60	52.50	38.00	10.16	51.25	9.87	57.50	12.50	43.75	6.57	30.00	9.79
<i>Acacia sp.</i>	unidentified Wattle		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Aegiceras corniculatum</i>	River Mangrove		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Atriplex australasica</i>	Green Saltbush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Avicennia marina</i>	Grey Mangrove seedling		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Avicennia marina</i>	Grey Mangrove pneumatophores		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Carpobrotus sp.</i>	Pigface		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Hydrocotyle sp.</i>	Pennywort		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Isolepis nodosa</i>	Knobby Club-rush		0.00	0.00	0.00	0.00	5.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Juncus kraussii</i>	Sea Rush		0.00	0.00	0.00	0.00	1.25	1.25	0.00	0.00	0.00	0.00	0.00	0.00
<i>Plantago coronopus</i>	Plantain		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Samolus repens</i>	Creeping Brookweed		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Sarcocornia quinqueflora</i>	Beaded Glasswort		8.14	46.25	43.75	18.86	30.00	14.29	28.75	9.66	46.25	13.60	47.50	17.38
<i>Sarcocornia quinqueflora</i> (Dead)	Dead Beaded Glasswort		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Spinifex sericeus</i>	Hairy Spinifex grass		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Sporobolus virginicus</i>	Salt Couch		3.16	1.25	18.25	15.70	12.50	12.50	13.75	10.00	10.00	10.00	22.50	22.50
<i>Stenotaphrum secundatum</i>	Buffalo Grass		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Suaeda australis</i>	Seablite		0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Suaeda australis</i> (Dead)	Dead Seablite		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Tetragonia tetragonioides</i>	New Zealand Spinach		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified rush	unidentified rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified rush (dead)	dead unidentified rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified herb	unidentified herb		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified plant	unidentified plant		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

continued...

Appendix 2: continued

Species Name	Common Name	Treatment Transect	Transplanted Saltmarsh						Retained Saltmarsh 1			
			TR-8		TR-17		TR-18		R1-7		R1-14	
			Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Bare	bare ground		40.00	12.42	48.75	19.83	9.00	3.49	54.50	13.82	58.25	14.94
<i>Acacia sp.</i>	unidentified Wattle		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Aegiceras corniculatum</i>	River Mangrove		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Atriplex australasica</i>	Green Saltbush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Avicennia marina</i>	Grey Mangrove seedling		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Avicennia marina</i>	Grey Mangrove pneumatophores		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Carpobrotus sp.</i>	Pigface		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Hydrocotyle sp.</i>	Pennywort		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Isolepis nodosa</i>	Knobby Club-rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Juncus kraussii</i>	Sea Rush		21.25	18.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Plantago coronopus</i>	Plantain		0.00	0.00	0.00	0.00	0.00	0.00	1.25	1.25	0.00	0.00
<i>Samolus repens</i>	Creeping Brookweed		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Sarcocornia quinqueflora</i>	Beaded Glasswort		0.00	0.00	0.00	0.00	4.50	2.63	20.00	20.00	32.50	14.51
<i>Sarcocornia quinqueflora</i> (Dead)	Dead Beaded Glasswort		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Spinifex sericeus</i>	Hairy Spinifex grass		0.00	0.00	0.00	0.00	1.75	1.75	7.50	7.50	3.75	2.39
<i>Sporobolus virginicus</i>	Salt Couch		21.25	21.25	25.00	25.00	84.75	4.80	0.00	0.00	0.00	0.00
<i>Stenotaphrum secundatum</i>	Buffalo Grass		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Suaeda australis</i>	Seablite		17.50	10.31	25.00	14.86	0.00	0.00	11.75	3.84	5.50	4.86
<i>Suaeda australis</i> (Dead)	Dead Seablite		0.00	0.00	1.25	1.25	0.00	0.00	5.00	5.00	0.00	0.00
<i>Tetragonia tetragonioides</i>	New Zealand Spinach		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified rush	unidentified rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified rush (dead)	dead unidentified rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified herb	unidentified herb		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified plant	unidentified plant		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

continued...

Appendix 2: continued

Species Name	Common Name	Treatment Transect	Retained Saltmarsh 2				Altered Saltmarsh 2					
			R2-20		R2-22		A2-15		A2-16		A2-19	
			Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Bare	bare ground		13.75	6.88	16.25	6.25	62.50	10.10	27.00	1.78	38.00	13.41
<i>Acacia sp.</i>	unidentified Wattle		0.00	0.00	0.00	0.00	0.00	0.00	31.75	10.19	0.00	0.00
<i>Aegiceras corniculatum</i>	River Mangrove		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Atriplex australasica</i>	Green Saltbush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Avicennia marina</i>	Grey Mangrove seedling		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Avicennia marina</i>	Grey Mangrove pneumatophores		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Carpobrotus sp.</i>	Pigface		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Hydrocotyle sp.</i>	Pennywort		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Isolepis nodosa</i>	Knobby Club-rush		0.00	0.00	0.00	0.00	0.00	0.00	22.00	2.86	0.00	0.00
<i>Juncus kraussii</i>	Sea Rush		37.50	21.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Plantago coronopus</i>	Plantain		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Samolus repens</i>	Creeping Brookweed		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Sarcocornia quinqueflora</i>	Beaded Glasswort		26.25	16.75	28.25	19.57	0.00	0.00	0.00	0.00	8.25	5.68
<i>Sarcocornia quinqueflora</i> (Dead)	Dead Beaded Glasswort		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Spinifex sericeus</i>	Hairy Spinifex grass		0.00	0.00	1.25	1.25	0.00	0.00	11.75	5.22	0.00	0.00
<i>Sporobolus virginicus</i>	Salt Couch		22.50	14.36	23.00	22.34	0.00	0.00	7.50	7.50	23.75	14.77
<i>Stenotaphrum secundatum</i>	Buffalo Grass		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Suaeda australis</i>	Seablite		0.00	0.00	31.25	18.07	37.50	10.10	0.00	0.00	30.00	14.72
<i>Suaeda australis</i> (Dead)	Dead Seablite		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Tetragonia tetragonioides</i>	New Zealand Spinach		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified rush	unidentified rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified rush (dead)	dead unidentified rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified herb	unidentified herb		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified plant	unidentified plant		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

continued...

Appendix 2: continued

Species Name	Common Name	Treatment Transect	Reference Quibray Bay 1						Reference Quibray Bay 2					
			Q1-1		Q1-2		Q1-3		Q2-4		Q2-5		Q2-6	
			Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Bare	bare ground		15.00	8.66	17.00	7.84	20.50	17.18	13.75	4.73	11.25	9.66	3.00	2.38
<i>Acacia sp.</i>	unidentified Wattle		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Aegiceras corniculatum</i>	River Mangrove		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Atriplex australasica</i>	Green Saltbush		0.00	0.00	0.00	0.00	0.75	0.75	0.00	0.00	0.00	0.00	0.00	0.00
<i>Avicennia marina</i>	Grey Mangrove seedling		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Avicennia marina</i>	Grey Mangrove pneumatophores		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Carpobrotus sp.</i>	Pigface		0.00	0.00	0.00	0.00	5.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Hydrocotyle sp.</i>	Pennywort		0.00	0.00	1.25	1.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Isolepis nodosa</i>	Knobby Club-rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Juncus kraussii</i>	Sea Rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Plantago coronopus</i>	Plantain		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Samolus repens</i>	Creeping Brookweed		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Sarcocornia quinqueflora</i>	Beaded Glasswort		40.00	19.58	52.50	21.46	29.75	22.86	32.50	19.74	55.00	25.08	17.50	12.99
<i>Sarcocornia quinqueflora</i> (Dead)	Dead Beaded Glasswort		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Spinifex sericeus</i>	Hairy Spinifex grass		0.00	0.00	6.25	4.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Sporobolus virginicus</i>	Salt Couch		45.00	20.62	9.25	8.60	25.00	17.68	37.50	15.34	0.00	0.00	59.75	24.16
<i>Stenotaphrum secundatum</i>	Buffalo Grass		0.00	0.00	0.00	0.00	0.00	0.00	3.75	3.75	27.50	22.78	0.75	0.75
<i>Suaeda australis</i>	Seablite		0.00	0.00	13.75	13.75	19.00	19.00	6.25	4.73	5.00	5.00	19.00	18.67
<i>Suaeda australis</i> (Dead)	Dead Seablite		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Tetragonia tetragonioides</i>	New Zealand Spinach		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified rush	unidentified rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified rush (dead)	dead unidentified rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified herb	unidentified herb		0.00	0.00	0.00	0.00	0.00	0.00	6.25	6.25	0.00	0.00	0.00	0.00
unidentified plant	unidentified plant		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.25	1.25	0.00	0.00

continued...

Appendix 2: continued

Species Name	Common Name	Treatment Transect	Reference Woollooware Bay 1						Reference Woollooware Bay 2					
			W1-1		W1-2		W1-3		W2-1		W2-2		W2-3	
			Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Bare	bare ground		32.50	14.36	20.50	6.89	17.50	1.44	17.50	6.29	36.00	20.25	10.50	3.07
<i>Acacia sp.</i>	unidentified Wattle		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Aegiceras corniculatum</i>	River Mangrove		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.75	8.75	0.00	0.00
<i>Atriplex australasica</i>	Green Saltbush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Avicennia marina</i>	Grey Mangrove seedling		0.00	0.00	0.50	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Avicennia marina</i>	Grey Mangrove pneumatophores		0.00	0.00	6.25	6.25	0.00	0.00	0.00	0.00	7.75	4.84	0.00	0.00
<i>Carpobrotus sp.</i>	Pigface		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Hydrocotyle sp.</i>	Pennywort		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Isolepis nodosa</i>	Knobby Club-rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Juncus kraussii</i>	Sea Rush		0.00	0.00	0.00	0.00	0.00	0.00	1.25	1.25	0.00	0.00	0.00	0.00
<i>Plantago coronopus</i>	Plantain		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Samolus repens</i>	Creeping Brookweed		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Sarcocornia quinqueflora</i>	Beaded Glasswort		47.50	20.67	50.00	23.45	31.25	18.53	75.00	8.42	33.75	17.49	46.25	21.35
<i>Sarcocornia quinqueflora</i> (Dead)	Dead Beaded Glasswort		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.25	1.25	0.00	0.00
<i>Spinifex sericeus</i>	Hairy Spinifex grass		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Sporobolus virginicus</i>	Salt Couch		8.75	3.15	3.75	3.75	0.00	0.00	0.00	0.00	0.00	0.00	25.75	22.54
<i>Stenotaphrum secundatum</i>	Buffalo Grass		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Suaeda australis</i>	Seablite		11.25	11.25	19.00	18.67	51.25	19.83	6.25	6.25	12.50	12.50	17.50	15.88
<i>Suaeda australis</i> (Dead)	Dead Seablite		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Tetragonia tetragonioides</i>	New Zealand Spinach		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified rush	unidentified rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified rush (dead)	dead unidentified rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified herb	unidentified herb		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified plant	unidentified plant		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

continued...

Appendix 2: continued

Species Name	Common Name	Treatment Transect	Treated Reference Sans Souci						Treated Reference Salt Pan Creek					
			SS1-1		SS1-2		SS1-3		SPC1-1		SPC1-2		SPC1-3	
			Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Bare	bare ground		50.00	16.75	41.25	21.25	40.00	12.75	10.50	4.99	2.50	2.50	7.50	7.50
<i>Acacia sp.</i>	unidentified Wattle		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Aegiceras corniculatum</i>	River Mangrove		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Atriplex australasica</i>	Green Saltbush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Avicennia marina</i>	Grey Mangrove seedling		0.75	0.75	0.00	0.00	0.00	0.00	3.50	2.87	0.00	0.00	0.00	0.00
<i>Avicennia marina</i>	Grey Mangrove pneumatophores		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.25	1.25	5.00	5.00
<i>Carpobrotus sp.</i>	Pigface		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Hydrocotyle sp.</i>	Pennywort		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Isolepis nodosa</i>	Knobby Club-rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Juncus kraussii</i>	Sea Rush		1.25	1.25	0.00	0.00	16.25	14.63	14.75	11.77	15.50	11.08	1.25	1.25
<i>Plantago coronopus</i>	Plantain		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Samolus repens</i>	Creeping Brookweed		0.00	0.00	0.00	0.00	0.00	0.00	30.75	14.24	16.50	16.17	2.50	2.50
<i>Sarcocornia quinqueflora</i>	Beaded Glasswort		48.00	16.55	58.75	21.25	43.75	12.48	0.00	0.00	0.00	0.00	0.00	0.00
<i>Sarcocornia quinqueflora</i> (Dead)	Dead Beaded Glasswort		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Spinifex sericeus</i>	Hairy Spinifex grass		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Sporobolus virginicus</i>	Salt Couch		0.00	0.00	0.00	0.00	0.00	0.00	10.50	9.84	36.00	15.82	28.75	18.07
<i>Stenotaphrum secundatum</i>	Buffalo Grass		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Suaeda australis</i>	Seablite		0.00	0.00	0.00	0.00	0.00	0.00	20.00	8.90	17.00	6.70	21.25	14.20
<i>Suaeda australis</i> (Dead)	Dead Seablite		0.00	0.00	0.00	0.00	0.00	0.00	2.50	2.50	0.00	0.00	6.25	6.25
<i>Tetragonia tetragonioides</i>	New Zealand Spinach		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified rush	unidentified rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.00	11.90
unidentified rush (dead)	dead unidentified rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	5.00	12.50	12.50
unidentified herb	unidentified herb		0.00	0.00	0.00	0.00	0.00	0.00	7.50	5.95	6.25	4.73	0.00	0.00
unidentified plant	unidentified plant		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix 3: Abundance of individuals of each saltmarsh, mangrove and epifaunal invertebrate species recorded within four random quadrats (1m²) along the transect at each site from Penrhyn Estuary and Reference Sites (sampled 5 - 7 March 2012) and Treated Reference Sites (sampled 3 September 2012). Data are presented as means and standard errors for four quadrats.

Species Name	Common Name	Treatment Transect	New Saltmarsh 1											
			N1-1		N1-2		N1-3		N1-4		N1-5		N1-6	
			Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
<i>Acacia sp.</i>	unidentified Wattle		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Aegiceras corniculatum</i>	River Mangrove		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Atriplex australasica</i>	Green Saltbush		2.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Avicennia marina</i>	Grey Mangrove tree		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Avicennia marina</i>	Grey Mangrove seedling		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Avicennia marina</i>	Grey Mangrove pneumatophores		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Carpobrotus sp.</i>	Pigface		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Hydrocotyle sp.</i>	Pennywort		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Isolepis nodosa</i>	Knobby Club-rush		0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.25	0.00	0.00	0.00	0.00
<i>Juncus kraussii</i>	Sea Rush		0.00	0.00	0.00	0.00	0.00	0.00	1.50	1.50	0.00	0.00	0.00	0.00
<i>Plantago coronopus</i>	Plantain		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Samolus repens</i>	Creeping Brookweed		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Sarcocornia quinqueflora</i>	Beaded Glasswort		8.75	2.43	8.75	1.70	7.75	2.78	7.25	2.95	11.25	3.40	5.75	2.29
<i>Spinifex sericeus</i>	Hairy Spinifex grass		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Sporobolus virginicus</i>	Salt Couch		0.75	0.75	13.75	13.75	6.25	6.25	0.00	0.00	3.25	3.25	22.75	13.26
<i>Stenotaphrum secundatum</i>	Buffalo Grass		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Suaeda australis</i>	Seablite		0.25	0.25	0.00	0.00	1.00	1.00	0.25	0.25	0.00	0.00	0.50	0.29
<i>Suaeda australis</i> (Dead)	Dead Seablite		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Tetragonia tetragonioides</i>	New Zealand Spinach		0.50	0.50	0.25	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified rush	unidentified rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified rush (dead)	dead unidentified rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified herb	unidentified herb		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified plant	unidentified plant		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grapsidae crab	unidentified grapsid crab		0.00	0.00	0.00	0.00	0.00	0.00	0.75	0.48	0.25	0.25	0.00	0.00
crab hole	crab hole		4.25	4.25	1.50	1.50	2.00	2.00	1.25	1.25	0.00	0.00	2.50	2.50
Amphipoda	unidentified amphipod		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Onchidium damelli</i>	Air breathing sea slug		0.50	0.50	0.25	0.25	0.00	0.00	0.75	0.75	0.00	0.00	0.00	0.00
<i>Bembicium auratum</i>	Estuarine periwinkle		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Littorina scabra</i>	Rough periwinkle		0.00	0.00	0.50	0.50	0.00	0.00	0.00	0.00	0.00	0.00	4.00	4.00
<i>Ophicardelus ornatus</i>	Mangrove air-breather		1.25	1.25	0.00	0.00	0.00	0.00	0.25	0.25	0.00	0.00	0.00	0.00
<i>Salinator fragilis</i>	Fragile air-breather		2.25	2.25	3.50	3.50	0.00	0.00	6.75	6.75	0.75	0.75	1.75	1.75
<i>Calthalotia fragum</i>	Top shell		0.00	0.00	0.00	0.00	0.00	0.00	0.75	0.75	0.50	0.50	1.25	1.25
Batillariidae	unidentified whelk		0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.50	0.00	0.00	0.00	0.00
Mytilidae	unidentified mussel		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

continued...

Appendix 3: continued

Species Name	Common Name	Treatment Transect	New Saltmarsh 2											
			N2-9		N2-10		N2-11		N2-12		N2-13		N2-21	
			Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
<i>Acacia sp.</i>	unidentified Wattle		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Aegiceras corniculatum</i>	River Mangrove		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Atriplex australasica</i>	Green Saltbush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Avicennia marina</i>	Grey Mangrove tree		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Avicennia marina</i>	Grey Mangrove seedling		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Avicennia marina</i>	Grey Mangrove pneumatophores		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Carpobrotus sp.</i>	Pigface		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Hydrocotyle sp.</i>	Pennywort		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Isolepis nodosa</i>	Knobby Club-rush		0.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Juncus kraussii</i>	Sea Rush		0.00	0.00	0.00	0.00	0.25	0.25	0.00	0.00	0.00	0.00	0.00	0.00
<i>Plantago coronopus</i>	Plantain		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Samolus repens</i>	Creeping Brookweed		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Sarcocornia quinqueflora</i>	Beaded Glasswort		32.25	21.93	8.00	3.39	6.25	2.17	6.00	1.41	7.50	1.32	9.25	3.15
<i>Spinifex sericeus</i>	Hairy Spinifex grass		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Sporobolus virginicus</i>	Salt Couch		0.50	0.50	3.50	2.60	2.75	2.75	11.00	11.00	10.75	10.75	52.50	52.50
<i>Stenotaphrum secundatum</i>	Buffalo Grass		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Suaeda australis</i>	Seablite		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Suaeda australis</i> (Dead)	Dead Seablite		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Tetragonia tetragonioides</i>	New Zealand Spinach		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified rush	unidentified rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified rush (dead)	dead unidentified rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified herb	unidentified herb		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified plant	unidentified plant		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grapsidae crab	unidentified grapsid crab		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
crab hole	crab hole		2.25	1.65	2.00	2.00	2.25	2.25	18.25	9.47	0.25	0.25	16.25	9.87
Amphipoda	unidentified amphipod		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Onchidium damelli</i>	Air breathing sea slug		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.25
<i>Bembicium auratum</i>	Estuarine periwinkle		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Littorina scabra</i>	Rough periwinkle		0.75	0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Ophicardelus ornatus</i>	Mangrove air-breather		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Salinator fragilis</i>	Fragile air-breather		0.50	0.50	0.00	0.00	0.00	0.00	4.75	4.75	0.50	0.50	22.00	13.02
<i>Calthalotia fragum</i>	Top shell		0.50	0.50	0.00	0.00	0.00	0.00	0.75	0.48	0.00	0.00	0.00	0.00
Batillariidae	unidentified whelk		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mytilidae	unidentified mussel		0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.29	0.00	0.00	0.00	0.00

continued...

Appendix 3: continued

Species Name	Common Name	Treatment Transect	Transplanted Saltmarsh						Retained Saltmarsh 1			
			TR-8		TR-17		TR-18		R1-7		R1-14	
			Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
<i>Acacia sp.</i>	unidentified Wattle		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Aegiceras corniculatum</i>	River Mangrove		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Atriplex australasica</i>	Green Saltbush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Avicennia marina</i>	Grey Mangrove tree		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Avicennia marina</i>	Grey Mangrove seedling		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Avicennia marina</i>	Grey Mangrove pneumatophores		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Carpobrotus sp.</i>	Pigface		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Hydrocotyle sp.</i>	Pennywort		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Isolepis nodosa</i>	Knobby Club-rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Juncus kraussii</i>	Sea Rush		3.00	2.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Plantago coronopus</i>	Plantain		0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.50	0.00	0.00
<i>Samolus repens</i>	Creeping Brookweed		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Sarcocornia quinqueflora</i>	Beaded Glasswort		0.00	0.00	0.00	0.00	1.25	0.75	3.00	3.00	4.25	1.80
<i>Spinifex sericeus</i>	Hairy Spinifex grass		0.00	0.00	0.00	0.00	0.50	0.50	1.50	1.50	2.00	1.41
<i>Sporobolus virginicus</i>	Salt Couch		3.75	3.75	30.00	30.00	25.75	3.68	0.00	0.00	0.00	0.00
<i>Stenotaphrum secundatum</i>	Buffalo Grass		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Suaeda australis</i>	Seablite		1.50	0.87	1.00	0.41	0.00	0.00	4.00	1.08	1.00	0.71
<i>Suaeda australis</i> (Dead)	Dead Seablite		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Tetragonia tetragonioides</i>	New Zealand Spinach		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified rush	unidentified rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified rush (dead)	dead unidentified rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified herb	unidentified herb		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified plant	unidentified plant		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grapsidae crab	unidentified grapsid crab		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
crab hole	crab hole		8.50	4.73	7.25	4.57	1.50	1.19	6.50	2.22	0.00	0.00
Amphipoda	unidentified amphipod		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Onchidium damelli</i>	Air breathing sea slug		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Bembicium auratum</i>	Estuarine periwinkle		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Littorina scabra</i>	Rough periwinkle		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Ophicardelus ornatus</i>	Mangrove air-breather		0.75	0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Salinator fragilis</i>	Fragile air-breather		1.00	0.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Calthalotia fragum</i>	Top shell		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Batillariidae	unidentified whelk		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mytilidae	unidentified mussel		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

continued...

Appendix 3: continued

Species Name	Common Name	Treatment Transect	Retained Saltmarsh 2						Altered Saltmarsh 2					
			R2-20		R2-22		A2-15		A2-16		A2-19			
			Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE		
<i>Acacia sp.</i>	unidentified Wattle		0.00	0.00	0.00	0.00	0.00	0.00	1.25	0.25	0.00	0.00		
<i>Aegiceras corniculatum</i>	River Mangrove		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
<i>Atriplex australasica</i>	Green Saltbush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
<i>Avicennia marina</i>	Grey Mangrove tree		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
<i>Avicennia marina</i>	Grey Mangrove seedling		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
<i>Avicennia marina</i>	Grey Mangrove pneumatophores		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
<i>Carpobrotus sp.</i>	Pigface		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
<i>Hydrocotyle sp.</i>	Pennywort		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
<i>Isolepis nodosa</i>	Knobby Club-rush		0.00	0.00	0.00	0.00	0.00	0.00	7.25	0.85	0.00	0.00		
<i>Juncus kraussii</i>	Sea Rush		6.25	3.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
<i>Plantago coronopus</i>	Plantain		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
<i>Samolus repens</i>	Creeping Brookweed		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
<i>Sarcocornia quinqueflora</i>	Beaded Glasswort		9.00	5.93	11.75	9.56	0.00	0.00	0.00	0.00	0.75	0.25		
<i>Spinifex sericeus</i>	Hairy Spinifex grass		0.00	0.00	0.50	0.50	0.00	0.00	1.50	0.29	0.00	0.00		
<i>Sporobolus virginicus</i>	Salt Couch		13.75	9.44	6.50	6.17	0.00	0.00	2.00	2.00	11.75	7.33		
<i>Stenotaphrum secundatum</i>	Buffalo Grass		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
<i>Suaeda australis</i>	Seablite		0.00	0.00	3.25	1.89	3.50	1.55	0.00	0.00	2.50	1.55		
<i>Suaeda australis</i> (Dead)	Dead Seablite		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
<i>Tetragonia tetragonioides</i>	New Zealand Spinach		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
unidentified rush	unidentified rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
unidentified rush (dead)	dead unidentified rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
unidentified herb	unidentified herb		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
unidentified plant	unidentified plant		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grapsidae crab	unidentified grapsid crab		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
crab hole	crab hole		1.50	0.96	4.25	2.53	11.00	2.08	0.00	0.00	4.00	1.87		
Amphipoda	unidentified amphipod		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
<i>Onchidium damelli</i>	Air breathing sea slug		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
<i>Bembicium auratum</i>	Estuarine periwinkle		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
<i>Littorina scabra</i>	Rough periwinkle		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
<i>Ophicardelus ornatus</i>	Mangrove air-breather		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
<i>Salinator fragilis</i>	Fragile air-breather		0.00	0.00	0.25	0.25	0.50	0.50	0.00	0.00	0.25	0.25		
<i>Calthalotia fragum</i>	Top shell		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.75	0.48		
Batillariidae	unidentified whelk		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Mytilidae	unidentified mussel		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		

continued...

Appendix 3: continued

Species Name	Common Name	Treatment Transect	Reference Quibray Bay 1						Reference Quibray Bay 2					
			Q1-1		Q1-2		Q1-3		Q2-4		Q2-5		Q2-6	
			Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
<i>Acacia sp.</i>	unidentified Wattle		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Aegiceras corniculatum</i>	River Mangrove		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Atriplex australasica</i>	Green Saltbush		0.00	0.00	0.00	0.00	0.25	0.25	0.00	0.00	0.00	0.00	0.00	0.00
<i>Avicennia marina</i>	Grey Mangrove tree		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.25
<i>Avicennia marina</i>	Grey Mangrove seedling		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Avicennia marina</i>	Grey Mangrove pneumatophores		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Carpobrotus sp.</i>	Pigface		0.00	0.00	0.00	0.00	0.50	0.50	0.00	0.00	0.00	0.00	0.00	0.00
<i>Hydrocotyle sp.</i>	Pennywort		0.00	0.00	1.75	1.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Isolepis nodosa</i>	Knobby Club-rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Juncus kraussii</i>	Sea Rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Plantago coronopus</i>	Plantain		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Samolus repens</i>	Creeping Brookweed		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Sarcocornia quinqueflora</i>	Beaded Glasswort		15.75	6.45	7.25	3.33	4.25	2.72	6.25	3.66	1.27	0.00	3.50	3.18
<i>Spinifex sericeus</i>	Hairy Spinifex grass		0.00	0.00	0.50	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Sporobolus virginicus</i>	Salt Couch		18.75	7.65	4.25	3.61	6.25	4.48	19.25	6.70	1.68	0.00	15.75	5.45
<i>Stenotaphrum secundatum</i>	Buffalo Grass		0.00	0.00	0.00	0.00	0.00	0.00	2.25	2.25	4.59	0.00	0.25	0.25
<i>Suaeda australis</i>	Seablite		0.00	0.00	2.00	2.00	1.00	1.00	2.25	1.65	1.42	0.00	2.25	1.93
<i>Suaeda australis</i> (Dead)	Dead Seablite		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Tetragonia tetragonioides</i>	New Zealand Spinach		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified rush	unidentified rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified rush (dead)	dead unidentified rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified herb	unidentified herb		0.00	0.00	0.00	0.00	0.00	0.00	10.25	10.25	2.56	0.00	0.00	0.00
unidentified plant	unidentified plant		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grapsidae crab	unidentified grapsid crab		0.00	0.00	0.25	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
crab hole	crab hole		3.50	1.76	4.50	2.10	0.75	0.75	3.00	2.68	4.34	0.00	2.25	2.25
Amphipoda	unidentified amphipod		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.50	0.00	0.00	0.00
<i>Onchidium damelli</i>	Air breathing sea slug		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Bembicium auratum</i>	Estuarine periwinkle		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Littorina scabra</i>	Rough periwinkle		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Ophicardelus ornatus</i>	Mangrove air-breather		0.00	0.00	1.50	1.19	0.75	0.75	0.00	0.00	9.44	0.00	0.00	0.00
<i>Salinator fragilis</i>	Fragile air-breather		2.00	1.68	0.00	0.00	0.50	0.50	0.00	0.00	3.75	0.00	0.00	0.00
<i>Calthalotia fragum</i>	Top shell		1.25	0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.75	0.00	0.00	0.00
Batillariidae	unidentified whelk		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mytilidae	unidentified mussel		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

continued...

Appendix 3: continued

Species Name	Common Name	Treatment Transect	Reference Woollooware Bay 1						Reference Woollooware Bay 2					
			W1-1		W1-2		W1-3		W2-1		W2-2		W2-3	
			Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
<i>Acacia sp.</i>	unidentified Wattle		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Aegiceras corniculatum</i>	River Mangrove		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.50	1.50	0.00	0.00
<i>Atriplex australasica</i>	Green Saltbush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Avicennia marina</i>	Grey Mangrove tree		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Avicennia marina</i>	Grey Mangrove seedling		0.00	0.00	0.25	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Avicennia marina</i>	Grey Mangrove pneumatophores		35.50	35.50	19.50	18.17	1.75	0.75	2.00	2.00	34.25	29.46	0.00	0.00
<i>Carpobrotus sp.</i>	Pigface		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Hydrocotyle sp.</i>	Pennywort		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Isolepis nodosa</i>	Knobby Club-rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Juncus kraussii</i>	Sea Rush		0.00	0.00	0.00	0.00	0.00	0.00	1.25	1.25	0.00	0.00	0.00	0.00
<i>Plantago coronopus</i>	Plantain		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Samolus repens</i>	Creeping Brookweed		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Sarcocornia quinqueflora</i>	Beaded Glasswort		20.00	6.61	4.50	1.55	4.00	2.48	18.25	2.78	4.75	2.25	6.00	2.68
<i>Spinifex sericeus</i>	Hairy Spinifex grass		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Sporobolus virginicus</i>	Salt Couch		12.00	4.92	2.75	2.75	0.00	0.00	0.00	0.00	0.00	0.00	6.25	5.01
<i>Stenotaphrum secundatum</i>	Buffalo Grass		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Suaeda australis</i>	Seablite		3.50	3.50	1.25	0.95	3.50	1.32	0.75	0.75	1.00	1.00	1.75	1.44
<i>Suaeda australis</i> (Dead)	Dead Seablite		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Tetragonia tetragonioides</i>	New Zealand Spinach		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified rush	unidentified rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified rush (dead)	dead unidentified rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified herb	unidentified herb		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified plant	unidentified plant		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grapsidae crab	unidentified grapsid crab		0.75	0.48	1.75	0.85	0.00	0.00	1.50	1.50	0.25	0.25	0.00	0.00
crab hole	crab hole		10.25	2.39	39.75	16.94	4.50	1.04	7.25	3.61	21.50	6.51	1.50	1.19
Amphipoda	unidentified amphipod		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Onchidium damelli</i>	Air breathing sea slug		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Bembicium auratum</i>	Estuarine periwinkle		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Littorina scabra</i>	Rough periwinkle		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Ophicardelus ornatus</i>	Mangrove air-breather		3.50	1.26	16.00	8.38	0.75	0.48	15.25	11.60	3.25	2.36	0.00	0.00
<i>Salinator fragilis</i>	Fragile air-breather		1.25	0.95	2.50	2.50	0.50	0.50	1.75	1.44	0.00	0.00	0.50	0.29
<i>Calthalotia fragum</i>	Top shell		0.00	0.00	3.50	2.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Batillariidae	unidentified whelk		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mytilidae	unidentified mussel		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

continued...

Appendix 3: continued

Species Name	Common Name	Treatment Transect	Treated Reference Sans Souci						Treated Reference Salt Pan Creek					
			SS1-1		SS1-2		SS1-3		SPC1-1		SPC1-2		SPC1-3	
			Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
<i>Acacia sp.</i>	unidentified Wattle		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Aegiceras corniculatum</i>	River Mangrove		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Atriplex australasica</i>	Green Saltbush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Avicennia marina</i>	Grey Mangrove tree		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Avicennia marina</i>	Grey Mangrove seedling		0.50	0.29	0.00	0.00	0.00	0.00	0.50	0.29	0.00	0.00	0.00	0.00
<i>Avicennia marina</i>	Grey Mangrove pneumatophores		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.75	11.75	35.00	35.00
<i>Carpobrotus sp.</i>	Pigface		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Hydrocotyle sp.</i>	Pennywort		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Isolepis nodosa</i>	Knobby Club-rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Juncus kraussii</i>	Sea Rush		0.25	0.25	0.00	0.00	1.50	1.19	1.75	1.15	2.75	1.89	0.25	0.25
<i>Plantago coronopus</i>	Plantain		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Samolus repens</i>	Creeping Brookweed		0.00	0.00	0.00	0.00	0.00	0.00	12.00	5.10	3.25	2.93	1.75	1.75
<i>Sarcocornia quinqueflora</i>	Beaded Glasswort		15.75	4.77	16.50	6.40	11.75	4.31	0.00	0.00	0.00	0.00	0.00	0.00
<i>Spinifex sericeus</i>	Hairy Spinifex grass		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Sporobolus virginicus</i>	Salt Couch		0.00	0.00	0.00	0.00	0.00	0.00	3.00	2.38	9.00	3.89	8.75	5.91
<i>Stenotaphrum secundatum</i>	Buffalo Grass		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Suaeda australis</i>	Seablite		0.00	0.00	0.00	0.00	0.00	0.00	2.75	1.18	2.00	0.71	2.25	1.31
<i>Suaeda australis</i> (Dead)	Dead Seablite		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.25	1.25
<i>Tetragonia tetragonioides</i>	New Zealand Spinach		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified rush	unidentified rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.25	1.93
unidentified rush (dead)	dead unidentified rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.75	1.75	1.50	1.50
unidentified herb	unidentified herb		0.00	0.00	0.00	0.00	0.00	0.00	1.25	0.75	0.75	0.48	0.00	0.00
unidentified plant	unidentified plant		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grapsidae crab	unidentified grapsid crab		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
crab hole	crab hole		4.25	2.72	2.00	1.22	5.00	2.86	1.50	1.50	0.00	0.00	1.00	1.00
Amphipoda	unidentified amphipod		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Onchidium damelli</i>	Air breathing sea slug		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Bembicium auratum</i>	Estuarine periwinkle		3.75	3.42	1.00	1.00	2.25	2.25	0.00	0.00	0.00	0.00	0.00	0.00
<i>Littorina scabra</i>	Rough periwinkle		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Ophicardelus ornatus</i>	Mangrove air-breather		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Salinator fragilis</i>	Fragile air-breather		6.75	5.22	0.00	0.00	2.75	1.89	0.25	0.25	0.75	0.75	0.00	0.00
<i>Calthalotia fragum</i>	Top shell		0.25	0.25	0.50	0.50	0.25	0.25	0.00	0.00	0.00	0.00	0.00	0.00
Batillariidae	unidentified whelk		0.25	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mytilidae	unidentified mussel		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix 4: Height (cm) of the tallest plant species recorded within four random quadrats (1m²) along the transect at each site from Penrhyn Estuary and Reference Sites (sampled 5 - 7 March 2012) and Treated Reference Sites (sampled 3 September 2012). Data are presented as means and standard errors for four quadrats.

Species Name	Common Name	Treatment Transect	New Saltmarsh 1											
			N1-1		N1-2		N1-3		N1-4		N1-5		N1-6	
			Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
<i>Acacia sp.</i>	unidentified Wattle		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Aegiceras corniculatum</i>	River Mangrove		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Avicennia marina</i>	Grey Mangrove		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Isolepis nodosa</i>	Knobby Club-rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Juncus kraussii</i>	Sea Rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Sarcocornia quinqueflora</i>	Beaded Glasswort		14.75	5.92	19.00	6.62	15.25	5.09	27.25	0.25	17.75	6.33	9.00	5.45
<i>Spinifex sericeus</i>	Hairy Spinifex grass		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Sporobolus virginicus</i>	Salt Couch		0.00	0.00	10.75	10.75	7.75	7.75	0.00	0.00	7.75	7.75	11.25	6.87
<i>Suaeda australis</i>	Seablite		5.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified rush	unidentified rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified herb	unidentified herb		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified plant	unidentified plant		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

continued...

Species Name	Common Name	Treatment Transect	New Saltmarsh 2											
			N2-9		N2-10		N2-11		N2-12		N2-13		N2-21	
			Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
<i>Acacia sp.</i>	unidentified Wattle		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Aegiceras corniculatum</i>	River Mangrove		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Avicennia marina</i>	Grey Mangrove		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Isolepis nodosa</i>	Knobby Club-rush		0.00	0.00	0.00	0.00	11.75	11.75	0.00	0.00	0.00	0.00	0.00	0.00
<i>Juncus kraussii</i>	Sea Rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Sarcocornia quinqueflora</i>	Beaded Glasswort		23.50	1.55	14.25	8.25	14.50	8.41	14.00	5.49	21.00	7.15	18.50	6.56
<i>Spinifex sericeus</i>	Hairy Spinifex grass		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Sporobolus virginicus</i>	Salt Couch		0.00	0.00	14.50	8.41	7.00	7.00	9.50	9.50	8.75	8.75	4.50	4.50
<i>Suaeda australis</i>	Seablite		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified rush	unidentified rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified herb	unidentified herb		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified plant	unidentified plant		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

continued...

Appendix 4: continued

Species Name	Common Name	Treatment Transect	Transplanted Saltmarsh						Retained Saltmarsh 1			
			TR-8		TR-17		TR-18		R1-7		R1-14	
			Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
<i>Acacia sp.</i>	unidentified Wattle		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Aegiceras corniculatum</i>	River Mangrove		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Avicennia marina</i>	Grey Mangrove		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Isolepis nodosa</i>	Knobby Club-rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Juncus kraussii</i>	Sea Rush		45.25	26.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Sarcocornia quinqueflora</i>	Beaded Glasswort		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.25	8.25
<i>Spinifex sericeus</i>	Hairy Spinifex grass		0.00	0.00	0.00	0.00	0.00	0.00	12.50	12.50	13.75	7.96
<i>Sporobolus virginicus</i>	Salt Couch		0.00	0.00	11.25	11.25	38.00	4.53	5.00	5.00	0.00	0.00
<i>Suaeda australis</i>	Seablite		15.00	8.66	23.25	10.06	0.00	0.00	10.25	5.92	7.25	7.25
unidentified rush	unidentified rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified herb	unidentified herb		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified plant	unidentified plant		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

continued...

Species Name	Common Name	Treatment Transect	Retained Saltmarsh 2				Altered Saltmarsh 2					
			R2-20		R2-22		A2-15		A2-16		A2-19	
			Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
<i>Acacia sp.</i>	unidentified Wattle		0.00	0.00	0.00	0.00	0.00	0.00	41.25	27.26	0.00	0.00
<i>Aegiceras corniculatum</i>	River Mangrove		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Avicennia marina</i>	Grey Mangrove		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Isolepis nodosa</i>	Knobby Club-rush		0.00	0.00	0.00	0.00	0.00	0.00	28.75	17.37	0.00	0.00
<i>Juncus kraussii</i>	Sea Rush		53.75	31.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Sarcocornia quinqueflora</i>	Beaded Glasswort		0.00	0.00	4.25	4.25	0.00	0.00	0.00	0.00	5.25	5.25
<i>Spinifex sericeus</i>	Hairy Spinifex grass		10.50	6.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Sporobolus virginicus</i>	Salt Couch		0.00	0.00	7.00	7.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Suaeda australis</i>	Seablite		0.00	0.00	25.00	14.80	36.75	6.07	0.00	0.00	24.50	10.72
unidentified rush	unidentified rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified herb	unidentified herb		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified plant	unidentified plant		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

continued...

Appendix 4: continued

Species Name	Common Name	Treatment Transect	Reference Quibray Bay 1						Reference Quibray Bay 2					
			Q1-1		Q1-2		Q1-3		Q2-4		Q2-5		Q2-6	
			Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
<i>Acacia sp.</i>	unidentified Wattle		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Aegiceras corniculatum</i>	River Mangrove		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Avicennia marina</i>	Grey Mangrove		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Isolepis nodosa</i>	Knobby Club-rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Juncus kraussii</i>	Sea Rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Sarcocornia quinqueflora</i>	Beaded Glasswort		11.25	6.75	11.50	6.64	6.00	6.00	4.00	4.00	12.50	7.22	0.00	0.00
<i>Spinifex sericeus</i>	Hairy Spinifex grass		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Sporobolus virginicus</i>	Salt Couch		13.50	7.80	7.75	7.75	18.75	11.37	5.50	5.50	0.00	0.00	20.00	6.93
<i>Suaeda australis</i>	Seablite		0.00	0.00	8.00	8.00	10.75	10.75	7.25	7.25	5.50	5.50	10.75	10.75
unidentified rush	unidentified rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified herb	unidentified herb		0.00	0.00	0.00	0.00	0.00	0.00	4.25	4.25	0.00	0.00	0.00	0.00
unidentified plant	unidentified plant		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.75	8.75	0.00	0.00

continued...

Species Name	Common Name	Treatment Transect	Reference Woolooware Bay 1						Reference Woolooware Bay 2					
			W1-1		W1-2		W1-3		W2-1		W2-2		W2-3	
			Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
<i>Acacia sp.</i>	unidentified Wattle		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Aegiceras corniculatum</i>	River Mangrove		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.75	13.75	0.00	0.00
<i>Avicennia marina</i>	Grey Mangrove		0.00	0.00	11.25	11.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Isolepis nodosa</i>	Knobby Club-rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Juncus kraussii</i>	Sea Rush		0.00	0.00	0.00	0.00	0.00	0.00	23.50	23.50	0.00	0.00	0.00	0.00
<i>Sarcocornia quinqueflora</i>	Beaded Glasswort		4.75	4.75	7.50	4.33	5.00	5.00	8.25	4.87	7.50	4.79	5.50	5.50
<i>Spinifex sericeus</i>	Hairy Spinifex grass		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Sporobolus virginicus</i>	Salt Couch		9.25	5.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.25	8.81
<i>Suaeda australis</i>	Seablite		8.00	8.00	11.25	11.25	27.50	9.67	9.75	9.75	7.50	7.50	9.25	9.25
unidentified rush	unidentified rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified herb	unidentified herb		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified plant	unidentified plant		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

continued...

Appendix 4: continued

Species Name	Common Name	Treatment Transect	Treated Reference Sans Souci						Treated Reference Salt Pan Creek					
			SS1-1		SS1-2		SS1-3		SPC1-1		SPC1-2		SPC1-3	
			Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
<i>Acacia sp.</i>	unidentified Wattle		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Aegiceras corniculatum</i>	River Mangrove		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Avicennia marina</i>	Grey Mangrove		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Isolepis nodosa</i>	Knobby Club-rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Juncus kraussii</i>	Sea Rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Sarcocornia quinqueflora</i>	Beaded Glasswort		13.50	4.56	16.25	5.60	61.25	41.26	48.75	28.16	56.25	33.25	0.00	0.00
<i>Spinifex sericeus</i>	Hairy Spinifex grass		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Sporobolus virginicus</i>	Salt Couch		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Suaeda australis</i>	Seablite		20.00	20.00	0.00	0.00	0.00	0.00	22.25	12.85	22.25	12.93	13.75	13.75
unidentified rush	unidentified rush		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.00	24.88
unidentified herb	unidentified herb		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unidentified plant	unidentified plant		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

About Cardno

Cardno is a professional infrastructure and environmental services company, with expertise in the development and improvement of physical and social infrastructure for communities around the world. Cardno's team includes leading professionals who plan, design, manage and deliver sustainable projects and community programs. Cardno is an international company listed on the Australian Securities Exchange [ASX:CDD].

Contact

Cardno (NSW/ACT) Pty Ltd
Level 9, 203 Pacific Highway
St Leonards NSW 2065
Phone +61 2 9496 7700
Fax +61 2 9499 3902

Cardno WA Pty Ltd
2 Bagot Road Harvest Terrace
West Perth WA 6008
Phone +61 8 9273 3888
Fax +61 8 9486 8664

Cardno NT Pty Ltd
Level 6 93 Mitchell St
Darwin NT 0800
Phone +61 8 8942 8200
Fax +61 8 8942 8211

cardno@cardno.com
www.cardno.com

