ebs ecology

Vegetation Survivorship Monitoring

Vegetation Survivorship Monitoring

4 JULY 2012

Version 2

Prepared by EBS Ecology for Department of Environment and Natural Resources

Document Control					
Revision No.	Date issued	Authors	Reviewed by	Date Reviewed	Revision type
1	18/06/2012	S. Lattanzio	D. Frazer	18/06/2012	Draft
2	04/07/2012	S. Lattanzio		04/07/2012	Final

Distribution of Copies			
Revision No.	Date issued	Media	Issued to
1	18/06/2012	Electronic	Katherine Goss, DENR
2	04/07/2012	Electronic	Katherine Goss, DENR

COPYRIGHT: Use or copying of this document in whole or in part (including photographs) without the written permission of EBS Ecology's client and EBS Ecology constitutes an infringement of copyright.

LIMITATION: This report has been prepared on behalf of and for the exclusive use of EBS Ecology's Client, and is subject to and issued in connection with the provisions of the agreement between EBS Ecology and its Client. EBS Ecology accepts no liability or responsibility whatsoever for or in respect of any use of or reliance upon this report by any third party.

CITATION: EBS Ecology (2012) *Vegetation Survivorship Monitoring.* Report to Department of Environment and Natural Resources. EBS Ecology, Adelaide.

Front cover photo: Lake Alexandrina at the Kindaruar site

EXECUTIVE SUMMARY

EBS Ecology was contracted by the Department of Environment and Natural Resources (DENR) Coorong, Lower Lakes and Murray Mouth (CLLMM) Program to undertake vegetation survivorship monitoring to provide quantitative information on percentage survival of selected revegetation sites planted in 2011. The survey was undertaken in May/June 2012.

The results of the survey presented in this report contribute to the vegetation monitoring aim of accurately understanding the survivorship rate of vegetation plantings established in 2011, and overall monitoring program success. The data has been examined by calculating the number of alive and dead plants surveyed over 133 quadrats at 20 different locations and providing a survivorship score.

The majority of the sites had a high survivorship score. A total of 15 sites had a survivorship score over 50%, of those; six sites had a survivorship score over 90%. A total of five sites had a very low survivorship score, these ranged from 30.65% to 2.82%.

It is evident that the tubestock planted in areas that are regularly inundated with water or have high water retention, such as the Samphire communities, had a higher death rate than those planted on higher ground. However, the areas surveyed on higher ground supported a higher abundance of weeds when compared to the Samphire communities.

There were several limitations when undertaking the vegetation survivorship monitoring, for example only one zone had plantings, when the information provided stated that the plantings were undertaken in two or more zones, also there were a lack of stakes or guards around individual plants which made it difficult to locate the tubestock for monitoring purposes.

Overall, the outcome of the vegetation survivorship monitoring was successful. Of the sites surveyed the majority of the plantings undertaken in 2011 had a high survivorship score.

Several key recommendations have been made in regards to follow up management work and improvements to future planting seasons, the key recommendations include:

- Replace tree guards that have collapsed on plants
- Use tree guards for all future plantings
- Undertake ongoing weed management at all planting sites
- Undertake fox and rabbit control on the islands
- Use an animal deterrent on tubestock in areas where high grazing has been observed
- Avoid planting in areas that are inundated with water for more than three months of the year at any one time
- Plant tubestock on higher ground where possible
- Record the GPS location of each planting location for all future plantings

Table of Contents

List of Tables

List of Figures

1 INTRODUCTION

EBS Ecology was contracted by the Department of Environment and Natural Resources (DENR) Coorong, Lower Lakes and Murray Mouth (CLLMM) Program to undertake vegetation survivorship monitoring to provide quantitative information on percentage survival of selected revegetation sites planted in 2011.

1.1 Objectives

The objectives of the project were to:

- Provide indicative data on the survivorship rate of the vegetation plantings at each site and overall
- Provide a basic photographic record of sites nine months after planting
- Provide an independent check against reported works completed
- Infer if any relationship trends can be seen when comparing survivorship to site characteristics or anecdotal observations that may explain the results (e.g. slope, soil, weeds)
- Provide recommendations on any follow up management works required and improvements to future planting seasons

2 BACKGROUND INFORMATION

In 2011, 510 000 plants were planted through the commercial program and 97 000 by the Ngarrindjeri community, covering a total area of 427 hectares. The survival assessment included assessing approximately 43 hectares and 60 000 plants across 20 sites around the CLLMM region. Sites surveyed are located in Figure 1.

The Coorong, Lower Lakes Program began in 2009 as part of the Commonwealth's Bioremediation and Revegetation Project. Works were undertaken as an emergency response to the prolonged drought.

Before water returned to the Lower Lakes system, mid-2010, the Bioremediation and Revegetation Project was designed to build community spirit and support for the broader program through involvement and capacity building of local community groups to have the skills, experience and equipment necessary to be involved in ongoing environmental care of the region.

The Project has now transitioned from emergency works to Habitat Restoration of the Coorong Lower Lakes region, and is now part of the Commonwealth's broader Murray Futures Initiative.

From July 2011, the Project is focused on building greater ecological resilience into the natural systems of the Lower Lakes and surrounding lands. To achieve this, the Project aims to help restore the ecological character of this Ramsar Site.

Survival monitoring of the annual planting season is a crucial component of the broader program to enable success to be tracked and inform continued delivery improvements. The methods used were originally developed for the community planting program working with the Goolwa to Wellington Local Action Planning Association (GLWAP).

Figure 1: Coorong and Lower Lakes Region Divided into Landscape units for regional planning and operations purposes. Sites monitored fall within units 3, 4, 13, 15, 16, 18, 22, 23, 27, 35, 36, 37, 41 and 47.

3 METHODS

3.1 Field Survey

A total of 20 sites were assessed as part of the vegetation survivorship monitoring project, with a total of 133 monitoring quadrats surveyed (Table 1). The field survey was undertaken from May 25th to June 7th 2012.

The method is based on conducting 30m x 30m quadrat survival counts. All individual plants within the quadrat are tallied into columns of alive or dead. Quadrats are conducted to assess 10% of plants in each zone to allow a reasonable indication of the total survival.

Planted areas are divided into one or more zones to signify differences in landform and soil types. Monitoring work was conducted within any set zones to allow a consistent approach and the ability to compare survival across and between zone types. This study has a maximum of two zones per site.

Two fifty metre tape measure were used to mark the length and width of the quadrat, plastic flagging pins were used to mark out the quadrat corners and a GPS was used to mark the centre point of each quadrat. The number of dead and alive planted species was counted systematically.

At sites where plants were not marked surveyors spent a minimum of 20 minutes per quadrat searching, but no more than 40 minutes. This was done to reduce the amount of variability in ability to locate plants.

Where dead species were present the identification may not be possible, these plants were marked as “dead unknown”. The identification of alive plants were identified to species level.

Table 1: Summary of Sites Monitored.

No.	Site Name	Landscape Unit	Hectares Planted	Monitoring Quadrats Undertaken
1	Currency Creek Island	3	2.93	1
2	Mud Islands	13	12.4	4
3	Reedy Island	13	17	6
4	Kindaruar	15	15.83	5
5	Kindaruar Farm	16	12.69	4
6	Boggy Lake	18	15.22	4
7	Tolderol	18	14.51	5
8	Low Point	22	1.93	1
9	Poltalloch	23	127.45	44
10	Warrengie	27	25	9
11	Yalkuri	35	5.1	2
12	Kartoo Road	36	19.15	7
13	Pelican Point	36	19.57	7
14	Pelican Point Road	36	10.17	4
15	Tauwitchere	36	33.43	10
16	Long Point	37	1.93	2
17	Jockwar Station	41	13.54	5

No.	Site Name	Landscape Unit	Hectares Planted	Monitoring Quadrats Undertaken
18	Wellington Lodge Swamp	41	8.03	3
19	Camp Coorong	47	11	4
20	Hack Point	47	56	6
		Total	**422.88**	**133**

3.1.1 Site Photographs

A photograph was taken at the centre of each quadrat surveyed. For each photo taken the GPS location, site code, compass bearing and approximate height was recorded. Each photo was taken with a general bearing towards water/wetland edge.

3.1.2 Anecdotal Observations

Anecdotal observations of each site as a whole were noted where applicable. Key aspects considered per site include evidence of pest animals, general health/vigour of plants and pest plant impacts. Depending on the site and observations made, example photographs were taken and included in the results and discussion section.

3.1.3 Survivorship Scoring

A survivorship score was undertaken for each quadrat surveyed and a total survivorship score was given for each site. The survivorship score was undertaken by adding the number of alive and dead plants recorded and dividing the number of alive plants with the total of all plants recorded which provided a percentage of alive plants, this was done for overstorey / midstorey species and understorey species separately. The total site survivorship score was undertaken for all species recorded by dividing the total number of alive plants by the total of all plants (dead and alive) recorded per site.

4 RESULTS / DISCUSSION

A total of 133 quadrats were surveyed in 20 different locations within the Coorong Lower Lakes and Murray Mouth area. Refer to Appendix 1 for the vegetation survivorship monitoring data.

The majority of the sites had a high survivorship score. A total of 15 sites had a survivorship score over 50%, of those six sites had a survivorship score over 90%. A total of five sites had a very low survivorship score, these ranged from 30.65% to 2.82% (Table 2).

It is evident that the tubestock planted in areas that are regularly inundated with water or have high water retention such as the Samphire communities, had a higher death rate than those planted on higher ground. The plants planted on higher ground had a higher survival rate possibly due to the opportunity to grow larger before dying. However, the areas on higher ground contained a high abundance of weeds when compared to the Samphire communities.

The ease of locating the sites and individual plants was difficult. When comparing the maps and information provided and the actual planting locations, there were several discrepancies and shortcomings such as:

- only one zone had plantings, when the information provided stated that the plantings were undertaken in two or more zones;
- for some of the sites it was difficult to determine where the actual planting locations were within the mapped areas. In some sites, for example Kindaruar Farm, one of the quadrats surveyed only had four individual plants identified and the majority of the area was not planted at all when there was meant to be 18,440 tubestock planted;
- lack of stakes or guards around the individual plants made it difficult to locate the tubestock for monitoring purposes; and
- some sites (i.e. Tauwitchere) had rip lines that may have been undertaken for the plantings but no plants were observed, consequently there was a high number of weeds present within the rip lines most likely due to disturbance of the soil.

Overall, the outcome of the vegetation survivorship monitoring was successful. Of the sites surveyed the majority of the plantings undertaken in 2011 had a high survivorship score. It is considered monitoring outcomes would be more successful if all planting locations were documented by a GPS location at installation stage and if each individual plant was supported by a tree guard, or as a minimum was staked. Further recommendations are provided in section 5.

The following sections describe each site that was surveyed as part of the vegetation survivorship monitoring.

Table 2. Summary of results

No.	Site Name	Landscape Unit	Hectares Planted	Monitoring Quadrats Undertaken	Overall Indicative Survival %
1	Currency Creek Island	3	2.93	1	97.87
2	Mud Islands	13	12.4	4	68.91
3	Reedy Island	13	17	6	83.67
4	Kindaruar	15	15.83	5	91.43
5	Kindaruar Farm	16	12.69	4	6.22
6	Boggy Lake	18	15.22	4	6.19
7	Tolderol	18	14.51	5	30.65
8	Low Point	22	1.93	1	88.73
9	Poltalloch	23	127.45	44	69.35
10	Warrengie	27	25	9	92.70
11	Yalkuri	35	5.1	2	93.75
12	Kartoo Road	36	19.15	7	77.28
13	Pelican Point	36	19.57	7	98.58
14	Pelican Point Road	36	10.17	4	90.08
15	Tauwitchere	36	33.43	10	78.36
16	Long Point	37	1.93	2	66.41
17	Jockwar Station	41	13.54	5	22.53
18	Wellington Lodge Swamp	41	8.03	3	2.82
19	Camp Coorong	47	11	4	85.95
20	Hack Point	47	56	6	84.18

4.1 Currency Creek Island

Table 3: Currency Creek Island Site Details

Site Code:	CCI	**Landscape Unit:**		3	**Revegetation Size (ha):**		3.8
Site Location:	Section 337, Hundred of Nangkita			**Planting Undertaken By:**		Rural Solutions	
Zone No:	2	**Zone description:**		Saline Swamp	**Zone Size (ha):**		3.8
Total No. Revegetation:	5568	**Overstorey:**	3520	**Understorey:**	2048	**No. of quadrats:**	1

Revegetation Map and Zones

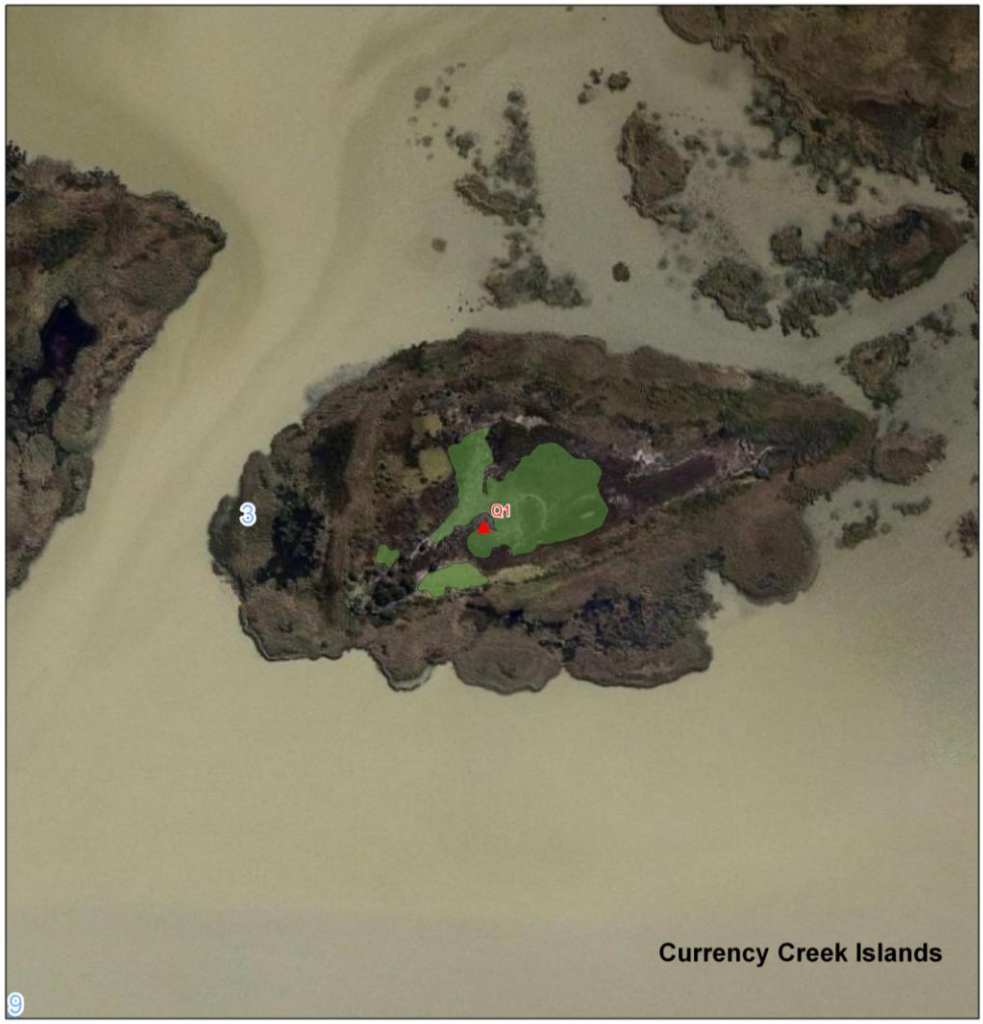
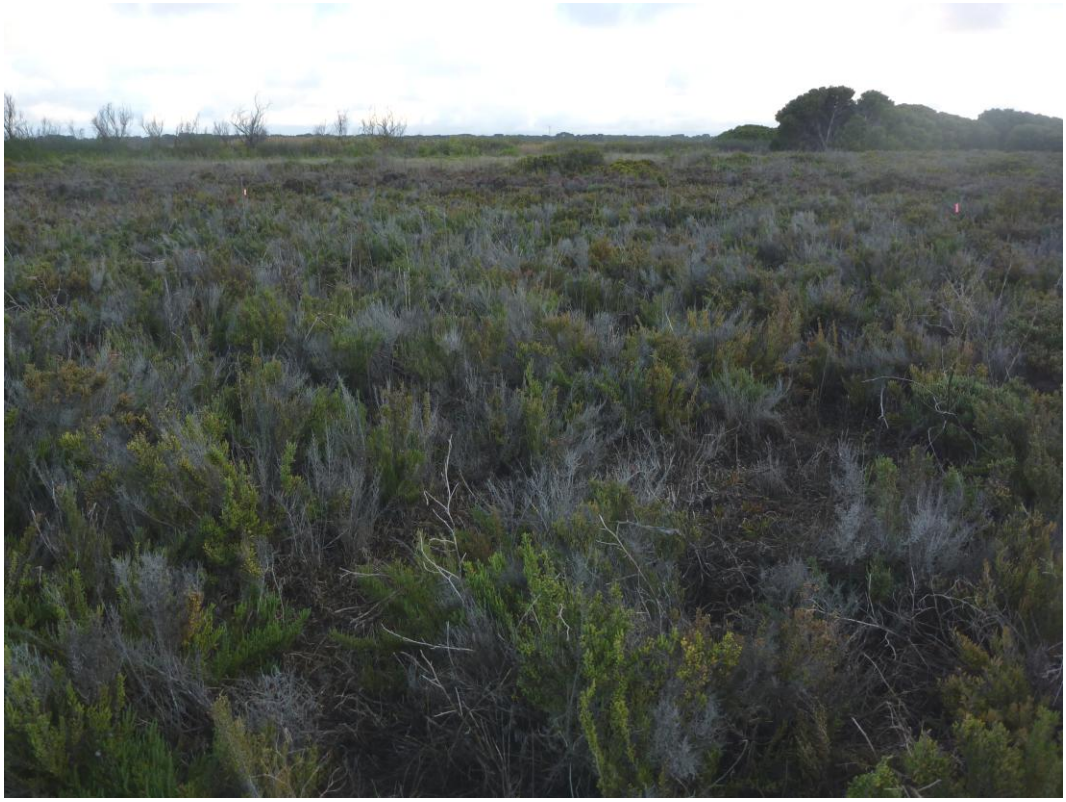


Table 4: Site photo and site description of Currency Creek Island

Site photo:



Quadrat:	CCIQ1	**Zone No:**	2	**Easting:**	303296	**Northing:**	6070214	**Bearing:**	200°

Site Description:

The vegetation at the Currency Creek Island consisted of dense Samphire and dead annuals and was in good condition with few weeds. The site had several larger trees within the revegetation zone and the surrounding area. The majority of the planted species within the quadrat was *Melaleuca halmaturorum*. Few *Juncus kraussii* was present in the understorey. The majority of the tubestock plantings were recorded as alive (Table 5). A fox was observed on Currency Creek Island as well as several fox scats containing Boxthorn and Samphire seeds.

Table 5. Currency Creek Island Survivorship Results

Site ID	**Zone**	**Date**	**Survivorship %**		
			Over and Midstorey	**Understorey**	**Total Per Quadrat**
CCIQ1	2	26/05/2012	-	50.00%	50.00%
CCIQ2	2	26/05/2012	98.50%	-	98.50%
Site Survivorship			**98.50%**	**50.00%**	**97.78%**

4.2 Mud Islands

Table 6: Mud Islands Site Details

Site Code:	MUDI	**Landscape Unit:**	13			**Revegetation Size (ha):**		7.2	
Site Location:	Section 59, Hundred of Baker			**Planting Undertaken By:**		Rural Solutions			
Zone No:	2	**Zone description:**	Saline Swamp			**Zone Size (ha):**		5.5	
Zone No:	3	**Zone description:**	Sand Dune			**Zone Size (ha):**		1.7	
Total No. Revegetation:		10,944	**Over/midstorey:**		6640	**Understorey:**	4304	**No. of quadrats:** 4	

Revegetation Map and Zones

Table 7: Site photo and description of Mud Islands

Site photo:

Quadrat:	MUDIQ1	**Zone No:**	3	**Easting:**	318704	**Northing:**	6062484	**Bearing:**	220°

Site Description:

Mud Island was a swampy/boggy area; low lying water was present within the majority of the quadrats surveyed. The Samphire was dense and was competing with the tubestock plantings by overcrowding them. Species that were planted on Mud Islands include *Melaleuca halmaturorum*, *Myoporum insular* and *Juncus kraussii.* The site had a moderate to high survival rate (Table 8). The vegetation on the islands is in good condition and few weeds were present; however there is not much tubestock planted within the mapped zones. There was evidence of pest animals and pest plant impacts on the islands; these include Fox scats, Rabbit warrens and Boxthorns. Some of the tubestock were pulled out of the ground which may have been caused by the Rabbits.

Fox scats

Rabbit warren and Boxthorn

Table 8. Mud Islands Survivorship Results

Site ID	Zone	Date	Survivorship %		
			Over and Midstorey	Understorey	Total per quadrat
MUDIQ1	3	26/05/2012	40.74%	-	40.74%
MUDIQ2	3	26/05/2012	58.06%	75.45%	71.63%
MUDIQ3	2	26/05/2012	100.00%	0.00%	62.50%
MUDIQ4	2	26/05/2012	90.91%	-	90.91%
Site Survivorship			**62.50%**	**73.45%**	**68.91%**

4.3 Reedy Island

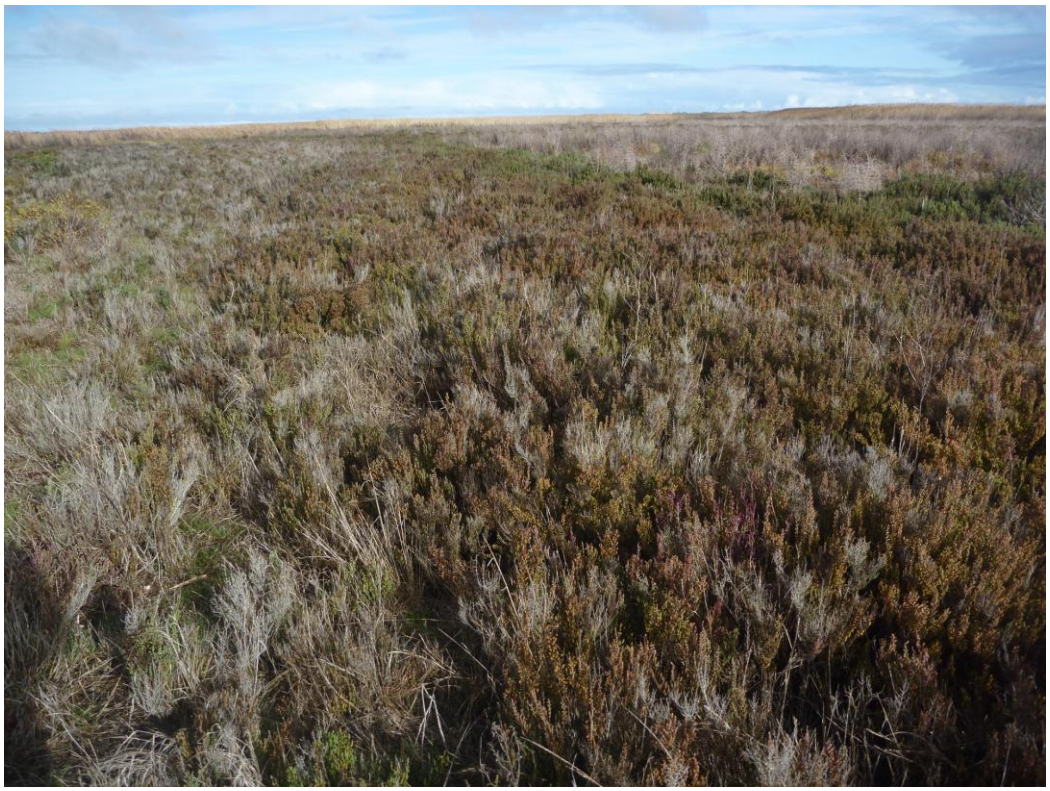
Table 9: Reedy Island Site Details

Site Code:	REED	**Landscape Unit:**	13	**Revegetation Size (ha):**	17		
Site Location:	Section 59, Hundred of Baker		**Planting Undertaken By:**		Rural Solutions		
Zone No:	2	**Zone description:**	Saline Swamp	**Zone Size (ha):**	11.7		
Zone No:	3	**Zone description:**	Sand Dune	**Zone Size (ha):**	5.3		
Total No. Revegetation:	20,000	**Over/midstorey:**	13,000	**Understorey:**	7000	**No. of quadrats:**	6

Revegetation Map and Zones

Table 10: Site photo and Site Description of Reedy Island

Site photo:



Quadrat:	REEDQ4	**Zone No:**	2	**Easting:**	319694	**Northing:**	6063593	**Bearing:**	150°

Site Description:

The native vegetation present within Reedy Island is healthy and in good condition. There is a large amount of water present at the site, with several of the plantings under water. Of the six quadrats surveyed, four different species were planted including *Melaleuca halmaturorum*, *Myoporum insular*, *Juncus kraussii* and *Ficinia nodosa*. The majority of the quadrats contained *Melaleuca halmaturorum*. Several of the Juncus plantings have been heavily grazed, possibly by Kangaroos. The majority of the plantings seemed to be located on a slope, there were not many within the Samphire. This site had a high survivorship score (Table 11). There was evidence of Boxthorn control that had been undertaken on the island; however there are a number of Boxthorns still present particularly on the sandy ridges.

Table 11. Reedy Island Survivorship Results

Site ID	Zone	Date	Survivorship %		
			Over and Midstorey	Understorey	Total per quadrat
REEDQ1	3	26/05/2012	93.75%	78.79%	83.67%
REEDQ2	2	26/05/2012	69.09%	-	69.09%
REEDQ3	2	26/05/2012	92.68%	-	92.68%
REEDQ4	2	26/05/2012	38.67%	50.00%	41.05%
REEDQ5	3	26/05/2012	66.67%	78.57%	76.47%
REEDQ6	3	26/05/2012	72.73%	-	72.73%
Site Survivorship			**93.75%**	**78.79%**	**83.67%**

4.4 Kindaruar

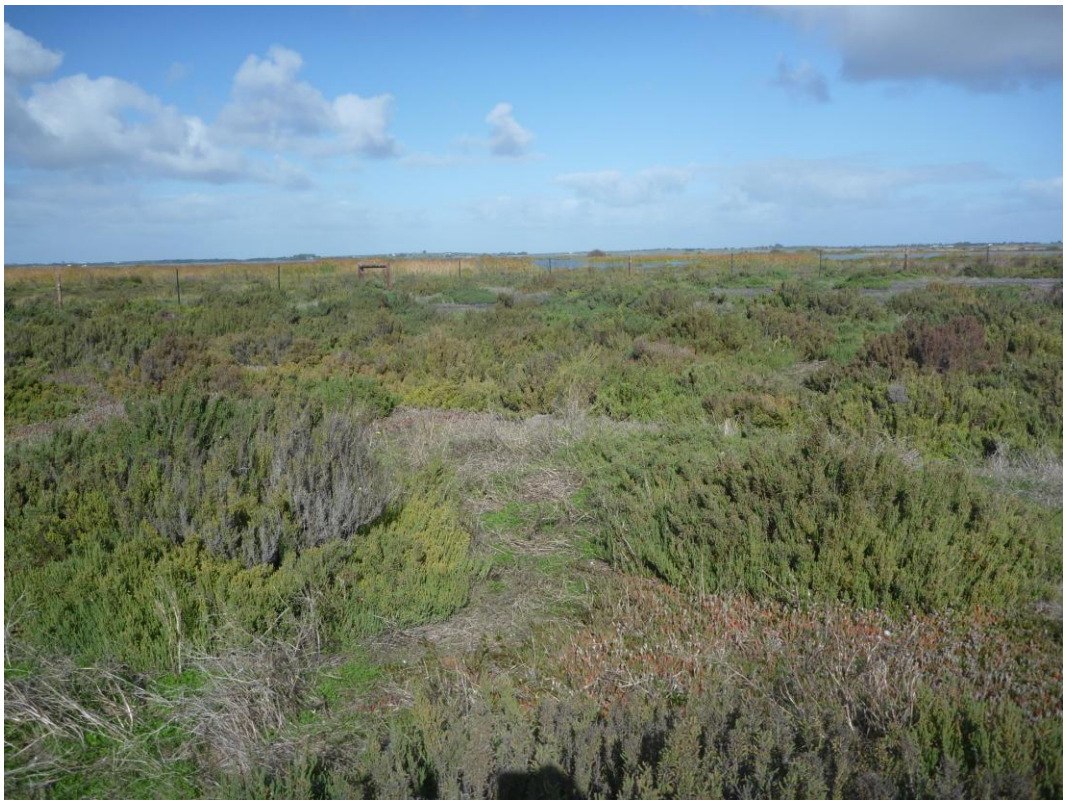
Table 12: Kindaruar Site Details

Site Code:	KIND	**Landscape Unit:**	15	**Revegetation Size (ha):**		15.7	
Site Location:	Section 20, Hundred of Alexandrina		**Planting Undertaken By:**			Rural Solutions	
Zone No:	2	**Zone description:**	Saline Swamp			**Zone Size:**	15.7
Total Number Revegetation:		40,470	**Understorey:**	40,470	**No. of quadrats:** 5		

Revegetation Map and Zones

Table 13: Site photo and Site Description of Kindaruar

Site photo:



Quadrat:	KINDQ4	**Zone No:**	2	**Easting:**	316163	**Northing:**	6074531	**Bearing:**	150°

Site Description:

Samphire, Couch and Pigface dominated this site; the native vegetation was in moderate to good condition. The Kindaruar site had a drainage channel running through it, and several of the tubestock within the quadrats were waterlogged. The majority of the tubestock at this site were dead within the lower ground (predominantly a heavy loam soil); plants on higher ground (sandy ridge) are growing well. Tubestock species include *Juncus kraussii* and *Ficinia nodosa*. The Kindaruar site had a high survivorship score (Table 14). Within the mapped area of zone 2 there were minimal planting locations. Some quadrats contained a high number of weed species such as Sow Thistle. A Fox was also observed at this site.

Sow Thistle (*Sonchus sp*.)

Waterlogged quadrat

Table 14. Kindaruar Survivorship Results

Site ID	Zone	Date	Survivorship %		
			Over and Midstorey	Understorey	Total per quadrat
KINDQ1	2	26/05/2012	-	69.70%	69.70%
KINDQ2	2	26/05/2012	-	91.43%	91.43%
KINDQ3	2	26/05/2012	-	35.80%	35.80%
KINDQ4	2	26/05/2012	-	75.36%	75.36%
KINDQ5	2	26/05/2012	-	34.85%	34.85%
Site Survivorship			**-**	**91.43%**	**91.43%**

4.5 Kindaruar Farm

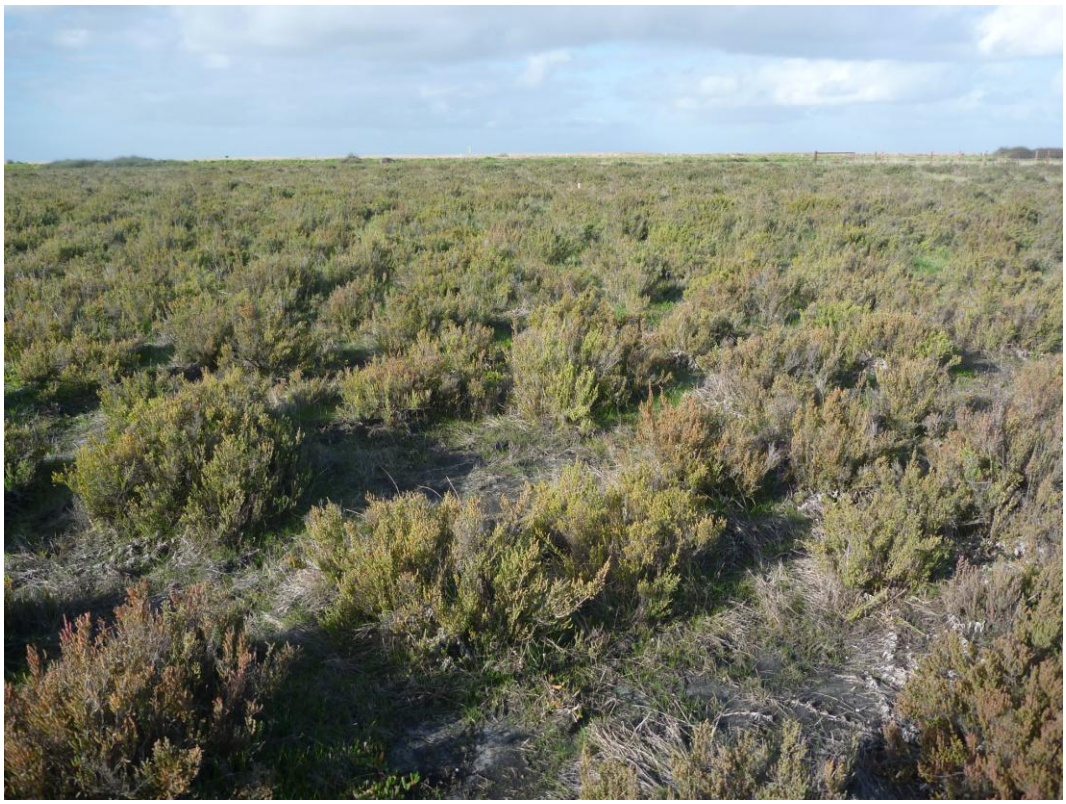
Table 15: Kindaruar FarmSite Details

Site Code:	KINDF	**Landscape Unit:**		16	**Revegetation Size (ha):**		7.5
Site Location:	Section 20, Hundred of Alexandrina			**Planting Undertaken By:**			Rural Solutions
Zone No:	2	**Zone description:**		Saline Scald	**Zone Size:**		7.5
Total No. Revegetation:	18,440	**Overstorey:**	18,440		**No. of quadrats:**	4	

Revegetation Map and Zones

Table 16: Site photo and Site Description of Kindaruar Farm site

Site photo:



Quadrat:	2	**Zone No:**	2	**Easting:**	314346	**Northing:**	6073715	**Bearing:**	90°

Site Description:

The Kindaruar Farm site mainly consisted of Samphire, exotic grasses and black sandy loam patches; the vegetation was in moderate condition. Old cow footprints were located throughout the site. *Melaleuca halmaturorum* was the only species planted at the Kindaruar Farm site; the seedlings that are alive are small, stunted and dying. Live *Melaleucas* were noted on the sandy rise on walking to the site. The survivorship score for the site was very low (Table 17). There were minimal planting locations within the mapped area.

Table 17. Kindaruar FarmSite Survivorship Results

Site ID	Zone	Date	Survivorship %		
			Over and Midstorey	Understorey	Total per quadrat
KINDFQ1	2	26/05/2012	75.00%	-	75.00%
KINDFQ2	2	26/05/2012	47.83%	-	47.83%
KINDFQ3	2	26/05/2012	0.00%	-	0.00%
KINDFQ4	2	26/05/2012	0.88%	-	0.88%
Site Survivorship			**6.22%**	**-**	**6.22%**

4.6 Stone Reserve (Boggy Lake)

Table 18: Stone Reserve Site Details

Site Code:	STONE	**Landscape Unit:**	18	**Revegetation Size (ha):**		18.95	
Site Location:	Section 68, Hundred of Brinkley			**Planting Undertaken By:**		Rural Solutions	
Zone No:	1	**Zone description:**	Fresh water lake edge		**Zone Size:**	1.25	
Zone No:	2	**Zone description:**	Saline Swamp		**Zone Size:**	16.9	
Zone No:	3	**Zone description:**	Low Sandy Rise		**Zone Size:**	0.8	
Total No. Revegetation:	29,408	**Overstorey:**	4320	**Understorey:**	25,088	**No. of quadrats:**	4

Revegetation Map and Zones

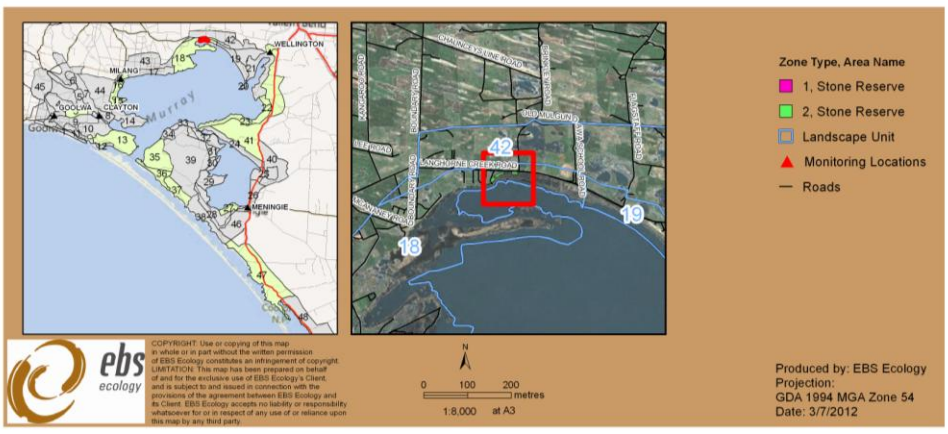
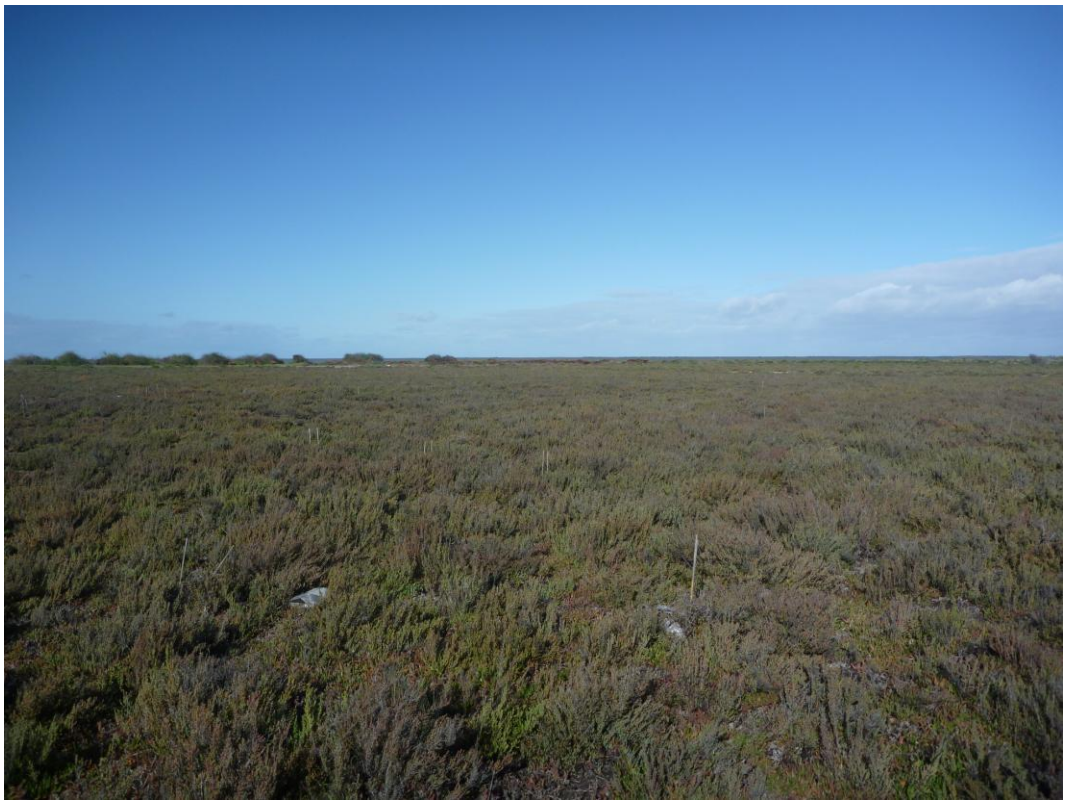


Table 19: Site photo and Site Description of Stone Reserve

Site photo:



Quadrat:	1	**Zone No:**	2	**Easting:**	335419	**Northing:**	6091093	**Bearing:**	180°

Site Description:

The Stone Reserve site was dominated by Samphire and Pigface. The site was located close to a depression which held water and contributed to soggy soil in the area. The majority of the planted tubestock at this site were dead. It was evident that the tubestock planted on higher ground appeared to have a higher survival rate or had the opportunity to grow larger before dying. The planted species within the quadrats surveyed consisted only of *Melaleuca halmaturorum.* The survivorship score for the site was very low (Table 20). The majority of the tree guards had either collapsed or fallen off. It was also noted that the tops of some plants were chewed off, possibly by stock or rabbits.

Dead *Melaleuca halmaturorum*

Dying *Melaleuca halmaturorum*

Table 20. Stone Reserve Survivorship Results

Site ID	Zone	Date	Survivorship %		
			Over and Midstorey	Understorey	Total per quadrat
STONEQ1	2	25/05/2012	9.38%	-	9.38%
STONEQ2	2	25/05/2012	11.11%	-	11.11%
STONEQ3	2	25/05/2012	0.00%	-	0.00%
STONEQ4	2	25/05/2012	2.94%	-	2.94%
Site Survivorship			**6.19%**	**-**	**6.19%**

4.7 Tolderol

Table 21: Tolderol Site Details

Site Code:	TOLD	**Landscape Unit:**	19	**Revegetation Size (ha):**		39.7		
Site Location:	Section 177, Hundred of Freeling Section 68, Hundred of Brinkley		**Planting Undertaken By:**			Rural Solutions		
Zone No:	2	**Zone description:**	Saline Swamp			**Zone Size:**	34	
Zone No:	4	**Zone description:**	Higher Ground			**Zone Size:**	5.7	
Total No. Revegetation:	37,656	**Overstorey:**	14,360	**Understorey:**	23,296	**No. of quadrats:** 5		

Revegetation Map and Zones

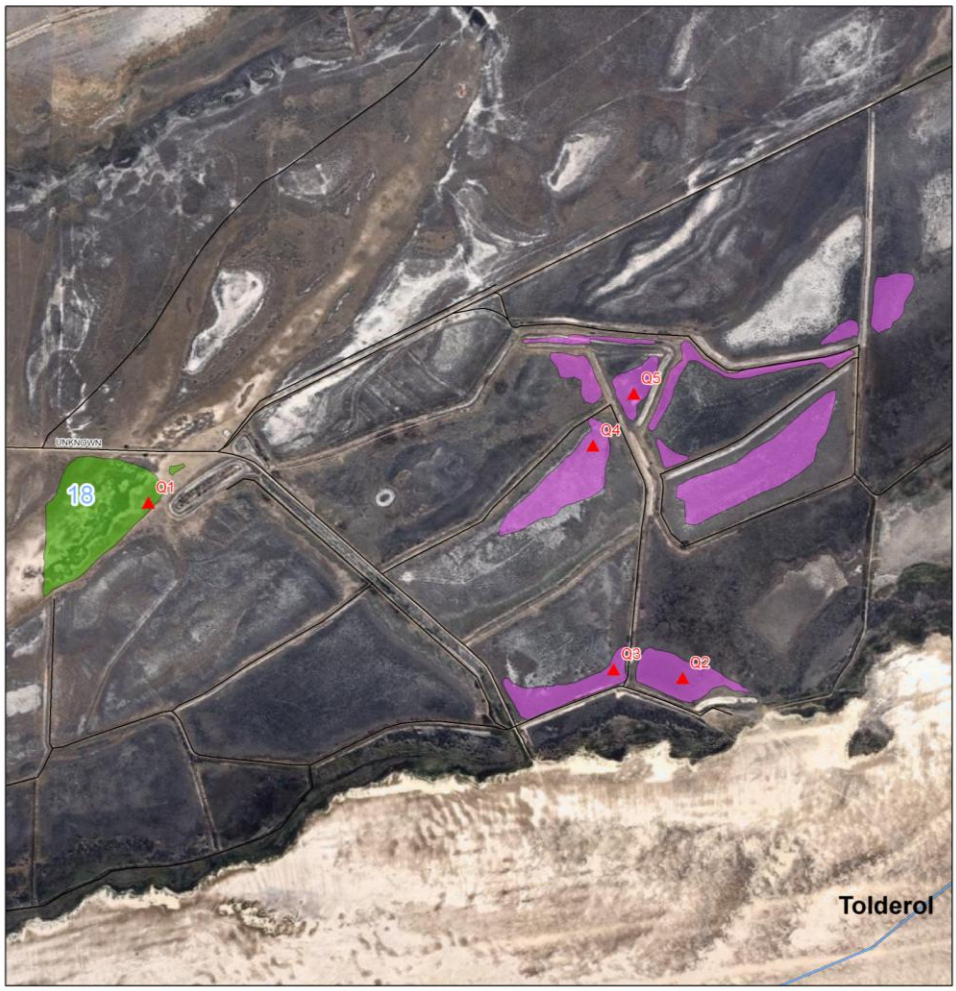
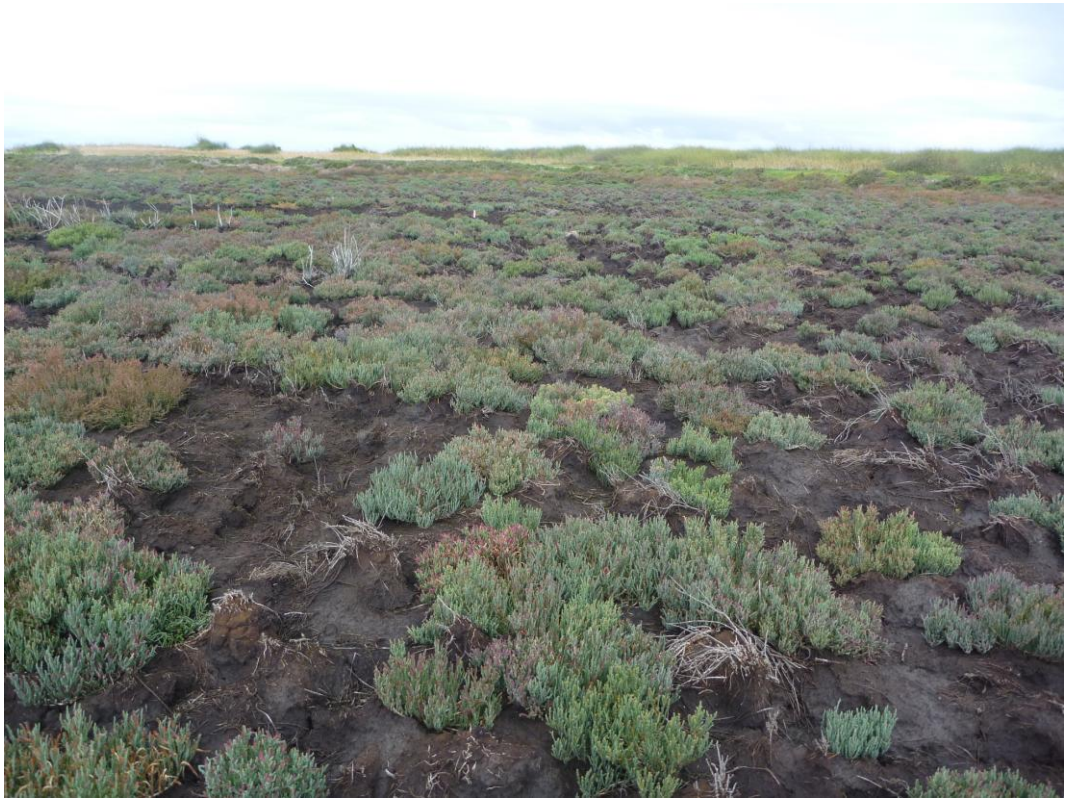


Table 22: Site photo and Site Description of Tolderol

Site photo:



Quadrat:	2	**Zone No:**	2	**Easting:**	331671	**Northing:**	6083835	**Bearing:**	140°

Site Description:

The Tolderol site contained vegetation in good condition with naturally regenerating native species such as Samphire and Emu Grass. The planted vegetation in Zone 4 contained well established *Ficinia nodosa* and some *Myoporum insular*. This zone was located within a depression. The vegetation within Zone 2 was dense and appeared undisturbed. Some of the plantings were under approximately 20cm of water. Frogs were observed and heard at the Tolderol site. Species planted include *Allocasuarina verticillata, Juncus kraussii, Melaleuca halmaturorum* and *Myoporum insulare.* The survivorship score for the site was low (Table 23). There was evidence of pest animals and pest plant impacts at the Tolderol site; these include Mouse holes, Boxthorn and Scotch Thistle. The Scotch Thistle was present on the boundary of the zone.

Table 23. Tolderol Survivorship Results

Site ID	Zone	Date	Survivorship %		
			Over and Midstorey	Understorey	Total per quadrat
TOLDQ1	2	25/05/2012	23.86%	-	23.86%
TOLDQ2	2	25/05/2012	40.00%	1.48%	7.50%
TOLDQ3	2	25/05/2012	100.00%	-	100.00%
TOLDQ4	2	25/05/2012	100.00%	-	100.00%
TOLDQ5	4	25/05/2012	100.00%	-	100.00%
Site Survivorship			**53.14%**	**1.48%**	**30.65%**

4.8 Low Point

Table 24: Low Point Site Details

Site Code:	LOWP	**Landscape Unit:**	22	**Revegetation Size (ha):**	2.1		
Site Location:	Section 237, Hundred of Malcolm			**Planting Undertaken By:**	Rural Solutions		
Zone No:	4	**Zone description:**	High Ground		**Zone Size:**	1.7	
Total No. Revegetation:	22,408	**Over/midstorey:**	3400	**Understorey:**	19,008	**No. of quadrats:**	1

Revegetation Map and Zones

Table 25: Site photo and Site Description of Low Point

Site photo:

Quadrat:	1	**Zone No:**	4	**Easting:**	351498	**Northing:**	6077169	**Bearing:**	270°

Site Description:

The revegetation undertaken at this site consisting of *Ficinia nodosa* and *Allocasuarina verticillata* has been successful, the plants are healthy and the majority of them were alive (Table 26). No midstorey or understorey species were located within this quadrat. Several of the cardboard tree guards have collapsed on the plants or have been blown over by the wind. There are also several guards with kikuyu growing through the top. The site appears to have had some weed control undertaken by slashing, possibly prior to the revegetation being undertaken. Horehound was observed throughout this site.

Table 26. Low Point Survivorship Results

Site ID	**Zone**	**Date**	**Survivorship %**		
			Over and Midstorey	**Understorey**	**Total per quadrat**
LOWPQ1	4	28/05/2012	68.11%	99.18%	88.73%
Site Survivorship			**68.11%**	**99.18%**	**88.73%**

4.9 Poltalloch

Table 27: Poltalloch Site Details

Site Code:	POLT	**Landscape Unit:**		23	**Revegetation Size (ha):**		179		
Site Location:	Section 237, Hundred of Malcolm			**Planting Undertaken By:**		Rural Solutions			
Zone No:	2	**Zone description:**	Saline Swamp		**Zone Size:**		165.9		
Zone No:	4	**Zone description:**	High Ground		**Zone Size:**		18.9		
Total No. Revegetation:	156,456	**Overstorey:**	151,400	**Understorey:**	5056	**No. of quadrats:** 44			

Revegetation Map and Zones

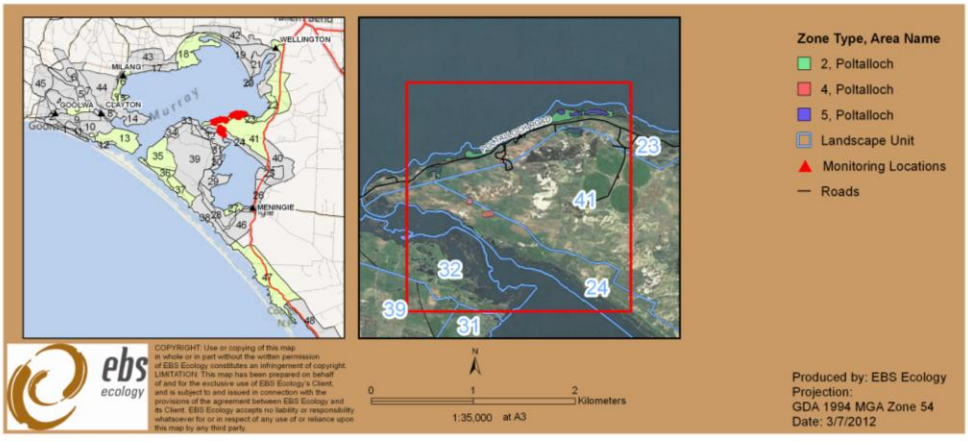


Table 28: Site photo and Site Description of Poltalloch

Site photo:

Quadrat:	40	**Zone No:**	2	**Easting:**	344311	**Northing:**	6071907	**Bearing:**	350°

Site photo:

Quadrat:	18	**Zone No:**	4	**Easting:**	340266	**Northing:**	6068351	**Bearing:**	180°

Site Description:

The Poltalloch site was the largest site surveyed of the vegetation survivorship monitoring project, a total of 44 quadrats were surveyed in two different zones. Zone 2 was a saline swamp and zone 4 was located on high ground. The site contained a moderate survivorship score (Table 29).

The majority of the quadrats surveyed were undertaken in zone 2 as it covered a larger area. The vegetation condition within Zone 2 varied, it consisted predominantly of Samphire and Emu Grass and black mud. Some of the quadrats were inundated with water. The only species recorded as being planted was *Melaleuca halmaturorum*. The condition of the planted vegetation varied from very healthy with no dead plants recorded to very poor, with the majority of the plants being stunted, dead or dying. There was evidence of kangaroos grazing on the planted *Melaleucas*, some were chewed to ground level and some were pulled out of the ground. Several kangaroos were observed across the Poltalloch site.

The vegetation within Zone 4 consisted of tussock grasses on sandy ridges. The only planted species located within this zone was *Allocasuarina verticillata*. The planted *Allocasuarinas* were in moderate to poor condition, some were stunted and dead or dying. Some tree guards have collapsed on the plants and some plants have been blown out of the ground. Previous plantings were observed, the trees were well established and at a height of approximately 2m to 3m.

There was evidence of pest animals and pest plant impacts at the Poltalloch site. A number of Rabbit scratchings, scats and warrens, as well as Fox scats, tracks and dens were observed. There were also areas that have been heavily compacted by cows. Several weeds were noted such as Boxthorns, Scotch Thistle, Horehound, Paddy Mellon and Pepper Tree.

Cow tracks in mud

Melaleuca halmaturorum tubestock pulled out and heavily grazed

Table 29. Poltalloch Survivorship Results

Site ID	Zone	Date	Survivorship %		
			Over and Midstorey	Understorey	Total per quadrat
POLLQ1	2	28/05/2012	25.00%	-	25.00%
POLLQ2	2	28/05/2012	27.27%	-	27.27%
POLLQ3	2	28/05/2012	30.00%	-	30.00%

Site ID	Zone	Date	Survivorship %		
			Over and Midstorey	Understorey	Total per quadrat
POLLQ4	2	28/05/2012	41.18%	-	41.18%
POLLQ5	2	28/05/2012	100.00%	-	100.00%
POLLQ6	2	28/05/2012	60.00%	-	60.00%
POLLQ7	2	28/05/2012	69.23%	-	69.23%
POLLQ8	2	29/05/2012	92.31%	-	92.31%
POLLQ9	2	29/05/2012	84.21%	-	84.21%
POLLQ10	2	29/05/2012	100.00%	-	100.00%
POLLQ11	2	29/05/2012	94.44%	-	94.44%
POLLQ12	2	29/05/2012	98.39%	-	98.39%
POLLQ13	4	29/05/2012	56.64%	-	56.64%
POLLQ14	4	29/05/2012	52.81%	-	52.81%
POLLQ15	4	29/05/2012	63.21%	-	63.21%
POLLQ16	4	29/05/2012	60.33%	-	60.33%
POLLQ17	4	29/05/2012	46.27%	-	46.27%
POLLQ18	4	29/05/2012	33.70%	-	33.70%
POLLQ19	4	29/05/2012	55.56%	-	55.56%
POLLQ20	4	29/05/2012	3.51%	-	3.51%
POLLQ21	4	29/05/2012	68.04%	-	68.04%
POLLQ22	4	29/05/2012	62.50%	-	62.50%
POLLQ23	2	29/05/2012	0.00%	-	0.00%
POLLQ24	2	29/05/2012	5.88%	-	5.88%
POLLQ25	2	29/05/2012	97.96%	-	97.96%
POLLQ26	2	29/05/2012	100.00%	-	100.00%
POLLQ27	2	30/05/2012	0.00%	-	0.00%
POLLQ28	2	30/05/2012	100.00%	-	100.00%
POLLQ29	2	30/05/2012	100.00%	-	100.00%
POLLQ30	2	30/05/2012	66.67%	-	66.67%
POLLQ31	2	30/05/2012	87.50%	-	87.50%
POLLQ32	2	30/05/2012	100.00%	-	100.00%
POLLQ33	2	30/05/2012	95.00%	-	95.00%
POLLQ34	2	30/05/2012	100.00%	-	100.00%
POLLQ35	2	30/05/2012	100.00%	-	100.00%
POLLQ36	2	30/05/2012	91.18%	-	91.18%
POLLQ37	2	30/05/2012	75.00%	-	75.00%
POLLQ38	2	30/05/2012	80.00%	-	80.00%
POLLQ39	2	30/05/2012	25.00%	-	25.00%
POLLQ40	2	30/05/2012	100.00%	-	100.00%
POLLQ41	2	30/05/2012	54.55%	-	54.55%
POLLQ42	2	30/05/2012	100.00%	-	100.00%
POLLQ43	2	30/05/2012	82.50%	-	82.50%
POLLQ44	2	30/05/2012	100.00%	-	100.00%
Site Survivorship			**69.35%**	**-**	**69.35%**

4.10 Warrengie

Table 30: Warrengie Site Details

Site Code:	WARR	**Landscape Unit:**		27	**Revegetation Size (ha):**	23			
Site Location:	Section 57, Hundred of Bonney		**Planting Undertaken By:**		Ngarrindjeri Community Group				
Zone No:	2	**Zone description:**	High Ground	**Zone Size:**	23				
Total No. Revegetation:	18,300	**Over/midstorey:**	16,800	**Understorey:**	1500	**No. of quadrats:** 9			

Revegetation Map and Zones

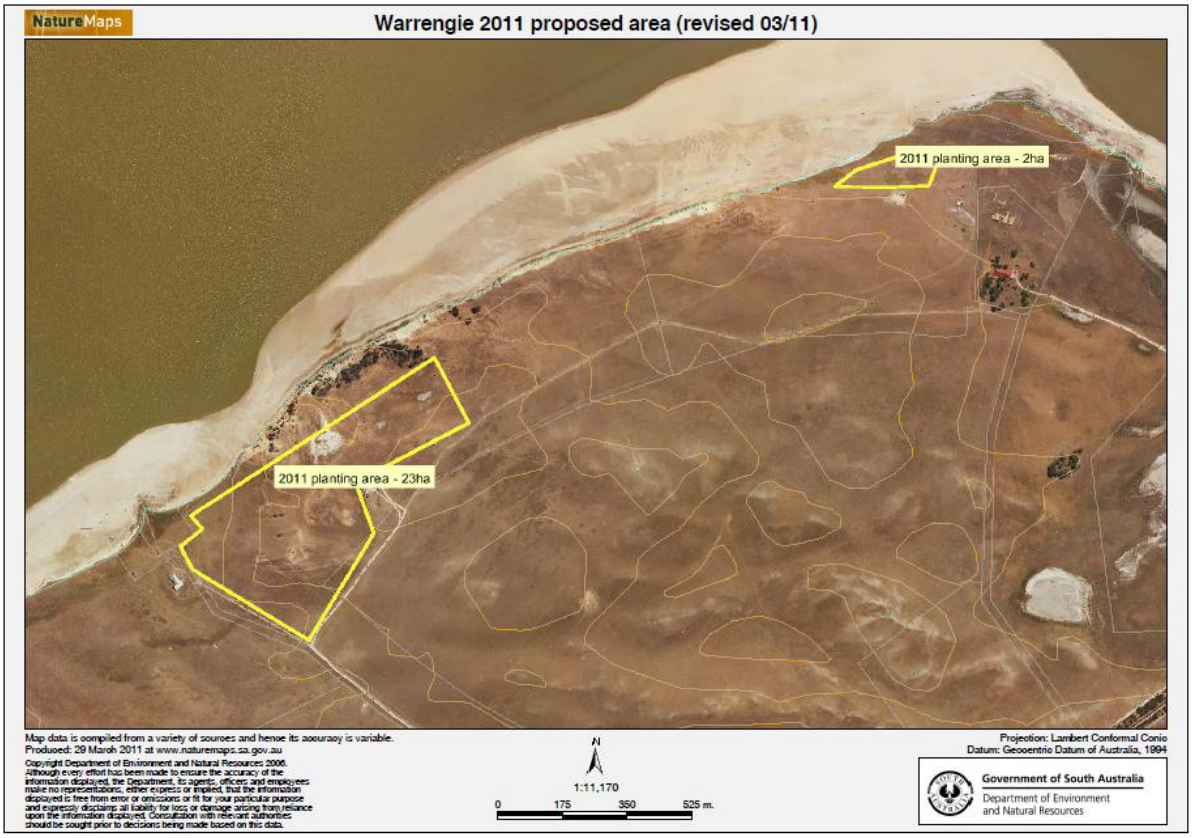


Table 31: Site photo and description of Warrengie

Site photo:

Quadrat:	8	**Zone No:**	2	**Easting:**	344421	**Northing:**	6048471	**Bearing:**	310°

Site Description:

The vegetation at the Warrengie site was in moderate condition, several weed species were present such as Flaxleaf Fleabane, Hare's Tail Grass, Cat's-ear and Couch/Kikuyu. The soil type within this site was a sandy loam. Several species were planted at the Warrengie site, some were unidentifiable to species level during the survey, the species planted include *Acacia pycnantha*, *Acacia sp*. *Allocasuarina verticillata*, *Bursaria spinosa* ssp., *Carpobrotus rossii*, *Eucalyptus diversifolia* ssp. *diversifolia, Ficinia nodosa*, *Melaleuca brevifolia, Melaleuca halmaturorum*, *Melaleuca lanceolata*, *Melaleuca sp,* and *Olearia axillaris*. The plantings were undertaken within rip lines within zone 2 only. The Warrengie site had a high survivorship score; this could be due to the high diversity of planted species (Table 32).

Table 32. Warrengie Survivorship Results

Site ID	Zone	Date	Survivorship %		
			Over and Midstorey	Understorey	Total per quadrat
WARRQ1	2	1/06/2012	97.56%	-	97.56%
WARRQ2	2	1/06/2012	96.30%	100.00%	96.43%
WARRQ3	2	1/06/2012	96.30%	95.51%	95.88%
WARRQ4	2	1/06/2012	96.30%	100.00%	97.56%
WARRQ5	2	1/06/2012	88.57%	-	88.57%
WARRQ6	2	1/06/2012	92.00%	-	92.00%
WARRQ7	2	1/06/2012	81.25%	-	81.25%
WARRQ8	2	1/06/2012	73.91%	-	73.91%
WARRQ9	2	1/06/2012	75.61%	-	75.61%
Site Survivorship			**88.97%**	**95.70%**	**92.70%**

4.11 Yalkuri

Table 33: Yalkuri Site Details

Site Code:	YALK	**Landscape Unit:**	35	**Revegetation Size (ha):**	6.3
Site Location:	Section 59, Hundred of Baker		**Planting Undertaken By:**		Rural Solutions
Zone No:	2	**Zone description:**	Saline Swamp	**Zone Size:**	6.1
Total No. Revegetation:	4500	**Overstorey:**	4500	**No. of quadrats:** 2	

Revegetation Map and Zones

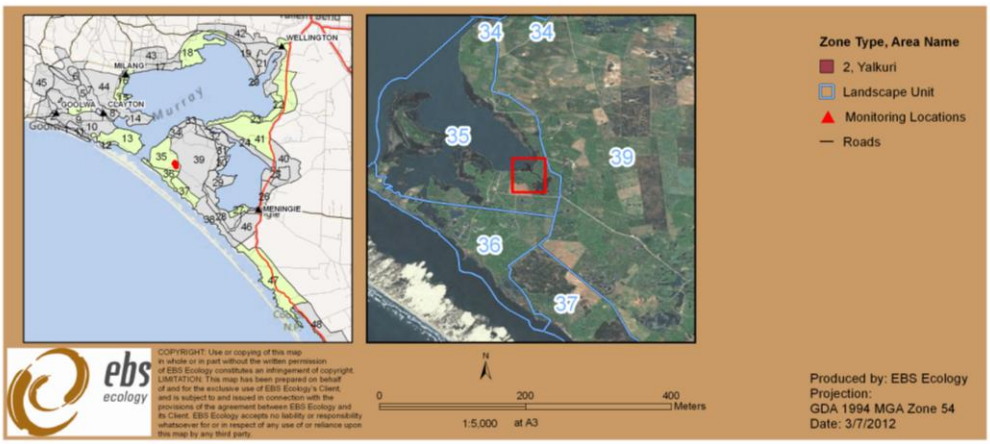
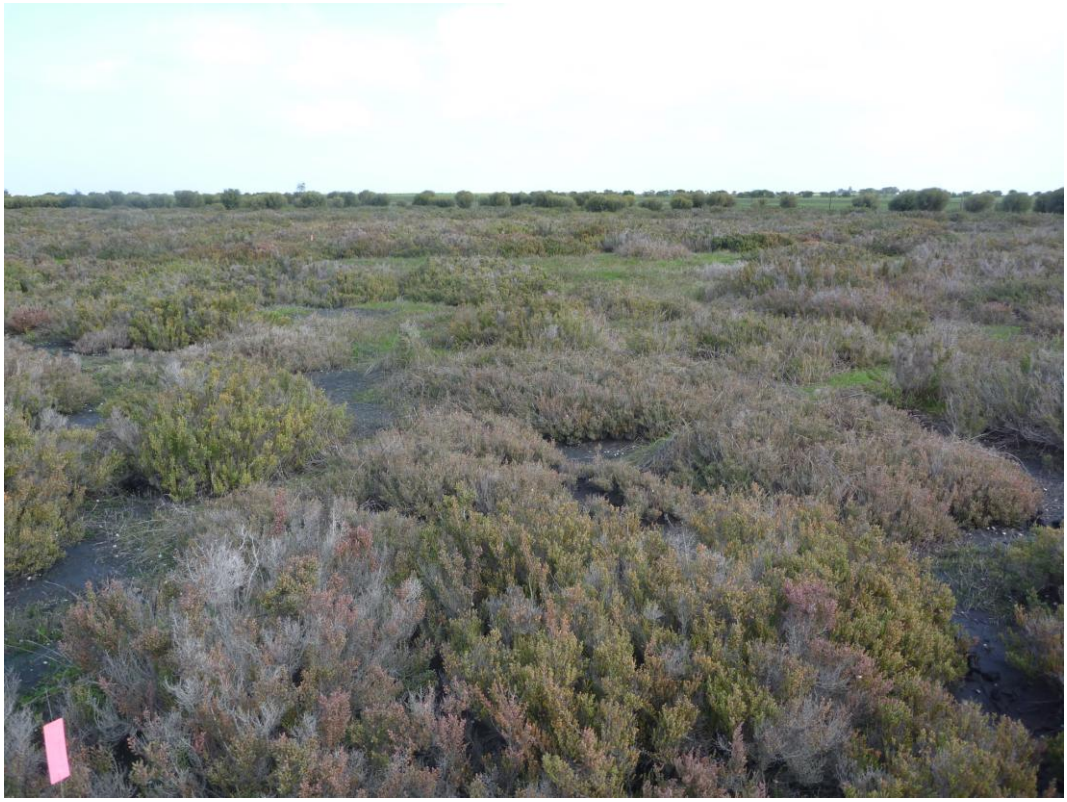


Table 34: Site photo and Site Description of Yalkuri

Site photo:



Quadrat:	1	**Zone No:**	2	**Easting:**	329070	**Northing:**	6058336	**Bearing:**	230°

Site Description:

The Yalkuri site supported vegetation in good condition. Samphire dominated the site, along with thick low grasses in black mud. The site was slightly boggy and surface water was present. The only planted species observed was *Melaleuca halmaturorum*; of the two quadrats surveyed all were alive and the site therefore had a high survivorship score (Table 35). The site was generally weed-free apart from emerging winter grasses such as Couch/Kikuyu and juvenile Boxthorns. Fox and Kangaroo tracks were noted.

Table 35. Yalkuri Survivorship Results

Site ID	Zone	Date	Survivorship %		
			Over and Midstorey	Understorey	Total per quadrat
YALKQ1	2	5/06/2012	90.00%	-	90.00%
YALKQ2	2	5/06/2012	100.00%	-	100.00%
Site Survivorship			**93.75%**	**-**	**93.75%**

4.12 Kartoo Road

Table 36: Kartoo Road Site Details

Site Code:	KART	**Landscape Unit:**	36	**Revegetation Size (ha):**		21.2	
Site Location:	Section 59, Hundred of Baker		**Planting Undertaken By:**	Rural Solutions			
Zone No:	2	**Zone description:**	Saline Swamp	**Zone Size:**		9.8	
Zone No:	4	**Zone description:**	High Ground	**Zone Size:**		6	
Total No. Revegetation:	52,371	**Over/midstorey:**	32,400	**Understorey:**	21,219	**No. of quadrats:**	7

Revegetation Map and Zones

Table 37: Site photo and Site Description of Kartoo Road

Site photo:

Quadrat:	3	**Zone No:**	4	**Easting:**	326418	**Northing:**	6055569	**Bearing:**	240°

Site Description:

The vegetation at the Kartoo Road site was in moderate condition. Natural regeneration *of Myoporum insular*, *Rhagodia sp*, *Frankenia sp*. and *Atriplex sp.* was observed. There were also numerous weeds present across the site such as Scabiosa, Black Nightshade, Horehound, Spurge, Bridal Creeper and Onion Weed. The planted species within the quadrats surveyed consisted of *Allocasuarina verticillata*, *Ficinia nodosa, Melaleuca halmaturorum* and *Myoporum insulare*. The majority of the plants were alive, the site contained a moderately high survivorship score (Table 38). Few cardboard tree guards were collapsed on top of plants. There was evidence of rabbit activity as observed from scratchings and a warren. Fox tracks were also observed. There was also evidence of heavy grazing on some of the planted vegetation, this may have been from Kangaroos as there were well worn Kangaroo tracks and several were also seen at the site. European snails were also present.

Rabbit scratchings

Table 38. Kartoo Road Survivorship Results

Site ID	Zone	Date	Survivorship %		
			Over and Midstorey	Understorey	Total per quadrat
KARRQ1	4	31/05/2012	83.85%	-	83.85%
KARRQ2	4	31/05/2012	71.64%	98.40%	90.38%
KARRQ3	4	31/05/2012	31.18%	74.19%	48.39%
KARRQ4	4	6/06/2012	75.81%	100.00%	91.98%
KARRQ5	2	6/06/2012	100%	-	100%
KARRQ6	2	6/06/2012	90.70%	-	90.70%
KARRQ7	2	6/06/2012	91.30%	-	91.30%
Site Survivorship			**72.24%**	**91.44%**	**77.28%**

4.13 Pelican Point

Table 39: Pelican Point Site Details

Site Code:	PELP	**Landscape Unit:**	**36**	**Revegetation Size (ha):**		10.1	
Site Location:	Section 59, Hundred of Baker		**Planting Undertaken By:**		Rural Solutions		
Zone No:	2	**Zone description:**	Saline Swamp		**Zone Size:**	10.1	
Total No. Revegetation:	19,272	**Over/midstorey:**	14,280	**Understorey:**	4992	**No. of quadrats:**	7

Revegetation Map and Zones

Table 40: Site photo and Site Description of Pelican Point

Site photo:

Quadrat:	5	**Zone No:**	2	**Easting:**	321440	**Northing:**	6059443	**Bearing:**	240°

Site Description:

The vegetation at the Pelican Point site was dominated by Samphire, Saltbush and Lignum, the soil ranged from a sandy loam to thick mud. The planted species within the quadrats surveyed consisted only of *Melaleuca halmaturorum.* Only two dead plants were observed out of all the quadrats surveyed, therefore the site had a very high survivorship score (Table 41). Although the site had a high survival rate, few plants were located within the quadrats. Quadrat 2 had the highest number of plants recorded with a total of 29. There was evidence of grazing on some of the *Melaleucas.* Some of the quadrats were inundated with water. There was evidence of pest animals and pest plant impacts at Pelican Point. A fox and a Hare were seen at the site. There was also high Couch grass cover observed.

Table 41. Pelican Point Survivorship Results

Site ID	Zone	Date	Survivorship %		
			Over and Midstorey	Understorey	Total per quadrat
PELPQ1	2	31/05/2012	100.00%	-	100.00%
PELPQ2	2	31/05/2012	96.67%	-	96.67%
PELPQ3	2	31/05/2012	96.43%	-	96.43%
PELPQ4	2	31/05/2012	100.00%	-	100.00%
PELPQ5	2	31/05/2012	100.00%	-	100.00%
PELPQ6	2	31/05/2012	100.00%	-	100.00%
PELPQ7	2	31/05/2012	100.00%	-	100.00%
Site Survivorship			**98.58%**	**-**	**98.58%**

4.14 Pelican Point Road

Table 42: Pelican Point Road Site Details

Site Code:	PELPR	**Landscape Unit:**	36	**Revegetation Size (ha):**	24		
Site Location:	Section 59, Hundred of Baker		**Planting Undertaken By:**		Rural Solutions		
Zone No:	3	**Zone description:**	Saline Swamp		**Zone Size:**	14.8	
Zone No:	3	**Zone description:**	Rising Ground		**Zone Size:**	4.4	
Zone No:	4	**Zone description:**	High Ground		**Zone Size:**	2.6	
Total No. Revegetation:	4040	**Overstorey:**	4040		**No. of quadrats:** 4		

Revegetation Map and Zones

Table 43: Site photo and Site Description of Pelican Point Road

Site photo:

Quadrat:	2	**Zone No:**	2	**Easting:**	324450	**Northing:**	6057011	**Bearing:**	240°

Site Description:

The vegetation at the Pelican Point Road site was in good condition. The site was dominated by Samphire, Saltbush and Emu-grass. The Samphire varied from thick swards to open areas throughout the site. The soil consisted of a sandy loam soil. The quadrats for this site were only undertaken in Zone 2. *Melaleuca halmaturorum* was the only species located within the quadrats; the majority of the plants were alive and the site has a high survivorship score (Table 44). There was evidence of pest animals and pest plant impacts at the Pelican Point Road site such as Bridal Creeper, a Hare was also observed at this site.

Table 44. Pelican Point Road Survivorship Results

Site ID	Zone	Date	Survivorship %		
			Over and Midstorey	Understorey	Total per quadrat
PELPRQ1	2	31/05/2012	83.93%	-	83.93%
PELPRQ2	2	31/05/2012	100.00%	-	100.00%
PELRPQ3	2	31/05/2012	100.00%	-	100.00%
PELRPQ4	2	31/05/2012	88.89%	-	88.89%
Site Survivorship			**90.08%**	**-**	**90.08%**

4.15 Tauwitchere

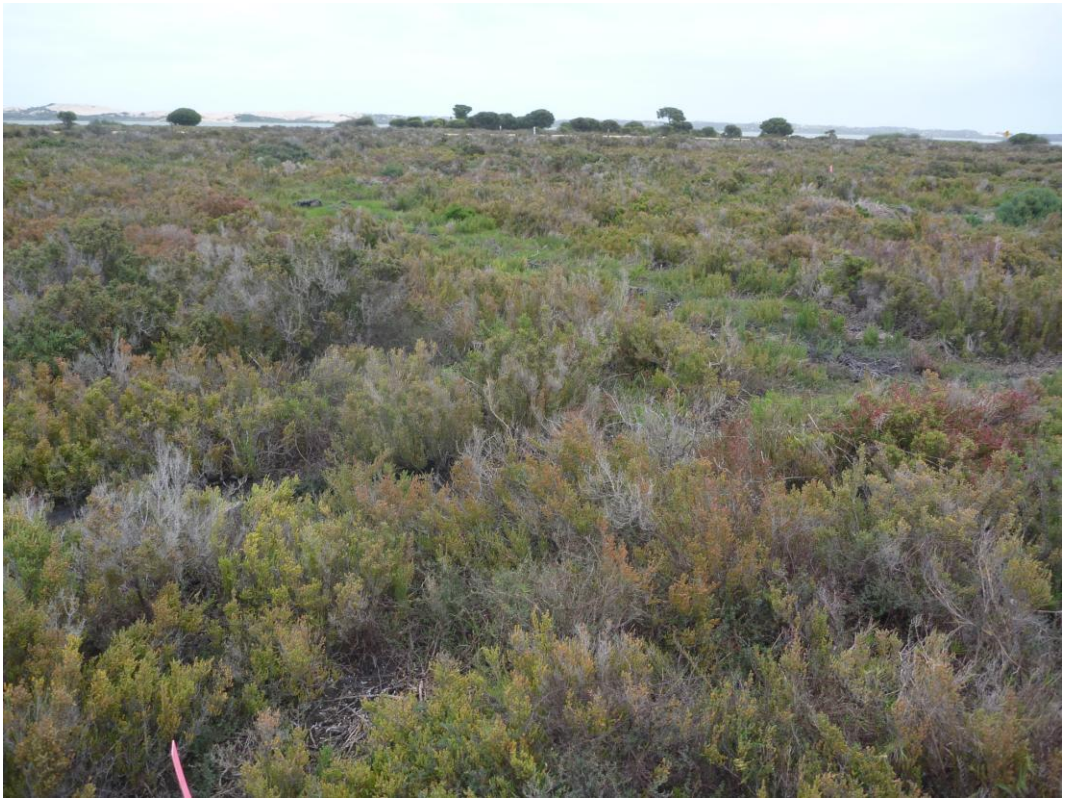
Table 45: Tauwitchere Site Details

Site Code:	TAUW	**Landscape Unit:**	36	**Revegetation Size (ha):**	40
Site Location:	Section 59, Hundred of Baker		**Planting Undertaken By:**	Rural Solutions	
Zone No:	2	**Zone description:**	Saline Swamp	**Zone Size:**	39.7
Total No. Revegetation:	25,960	**Overstorey:**	25,960	**No. of quadrats:**	10

Revegetation Map and Zones

Table 46: Site photo and Site Description of Tauwitchere

Site photo:



Quadrat:	6	**Zone No:**	2	**Easting:**	325415	**Northing:**	6056488	**Bearing:**	220°

Site Description:

The vegetation at Tauwitchere was in good condition, the site was dominated by Samphire and patches of Pigface. There were a low number of weeds observed; they were predominantly annual winter grasses such as Salt-water Couch. Paddy Mellon, Scotch Thistle, Boxthorn and Bridal Creeper were recorded across the site, but in low numbers. The site was quite wet and boggy and some quadrats surveyed were inundated with water. The plantings occurred in slashed strips between the Samphire. *Melaleuca halmaturorum* was the only species located within the quadrats; the majority of them were alive. The site had a moderately high survivorship score (Table 47). There were several rip lines throughout the site which may have occurred prior to the revegetation, no plantings were carried out within the rip lines. There was evidence of some grazing on the planted vegetation; this is most likely from Kangaroos as they were observed at the time of the survey. Fox tracks were also noted at the Tauwitchere site.

Table 47. Tauwitchere Survivorship Results

Site ID	Zone	Date	Survivorship %		
			Over and Midstorey	Understorey	Total per quadrat
TAUWQ1	2	5/06/2012	22.92%	-	22.92%
TAUWQ2	2	5/06/2012	74.29%	-	74.29%
TAUWQ3	2	5/06/2012	90.48%	-	90.48%
TAUWQ4	2	5/06/2012	0.00%	-	0.00%
TAUWQ5	2	5/06/2012	100.00%	-	100.00%
TAUWQ6	2	5/06/2012	94.34%	-	94.34%
TAUWQ7	2	5/06/2012	84.62%	-	84.62%
TAUWQ8	2	5/06/2012	100.00%	-	100.00%
TAUWQ9	2	6/06/2012	100.00%	-	100.00%
TAUWQ10	2	6/06/2012	79.78%	-	79.78%
Site Survivorship			**78.36%**	**-**	**78.36%**

4.16 Long Point

Table 48: Long Point Site Details

Site Code:	LONP	**Landscape Unit:**	37	**Revegetation Size (ha):**	4.6				
Site Location:	Section 59, Hundred of Baker			**Planting Undertaken By:**	Rural Solutions				
Zone No:	2	**Zone description:**	Saline Swamp			**Zone Size:**	0.5		
Zone No:	3	**Zone description:**	Low Rise			**Zone Size:**	0.8		
Zone No:	4	**Zone description:**	High Ground			**Zone Size:**	2.1		
Total No. Revegetation:	27,288	**Over/Midstorey:**	8280	**Understorey:**	19,008	**No. of quadrats:**	2		

Revegetation Map and Zones

Table 49: Site photo and Site Description of Long Point

Site photo:

Quadrat:	1	**Zone No:**	4	**Easting:**	334313	**Northing:**	6048804	**Bearing:**	210°

Site Description:

The vegetation at Long Point was in poor condition, there were numerous weeds present such as Bridal Creeper, Onion Weed, Scabiosa, Spurge and Scotch Thistle. Two planted species were observed within the quadrats, these include *Allocasuarina verticillata* and *Myoporum insular*. The site had a low to moderate survivorship score (Table 50). The two quadrats were undertaken within Zone 4. Several unknown dead species were also observed at this site. A number of the tree guards had collapsed on the plants. Rabbit scratchings were also detected.

Table 50. Long Point Survivorship Results

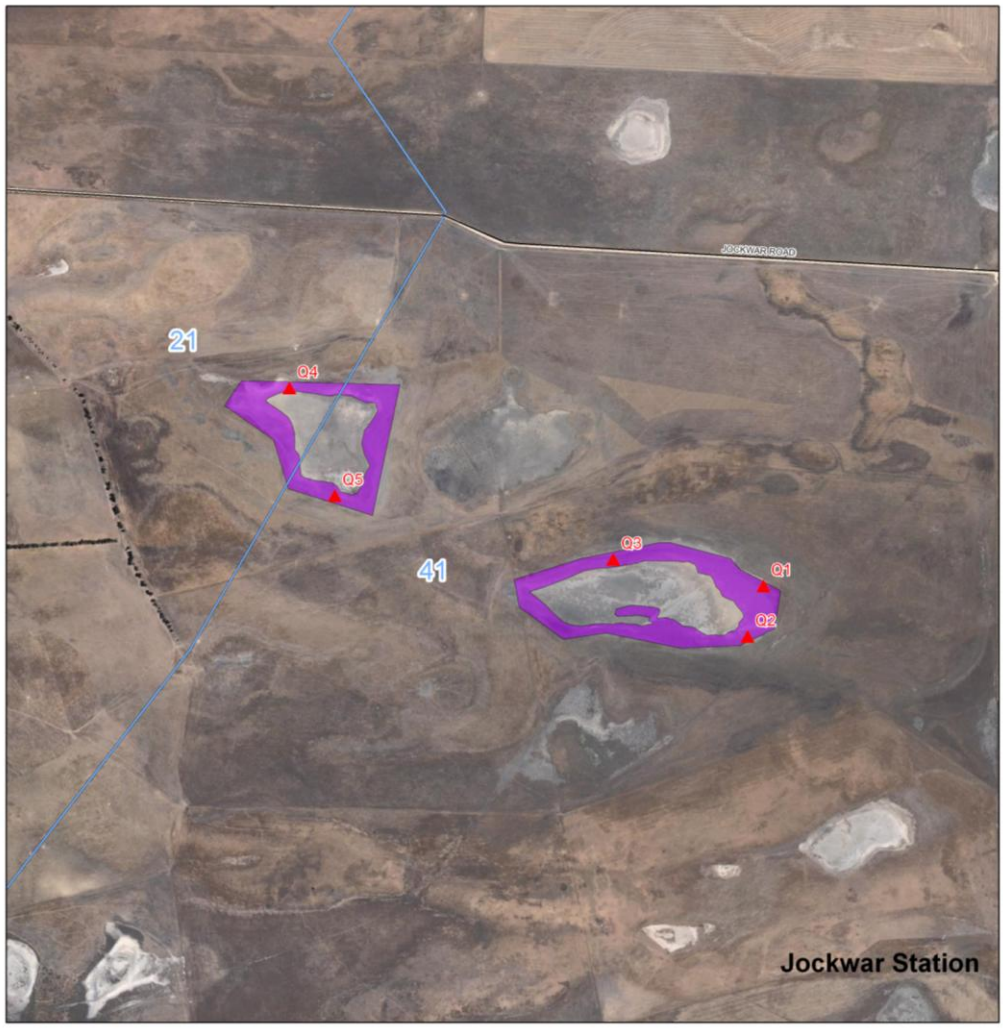
Site ID	Zone	Date	Survivorship %		
			Over and Midstorey	Understorey	Total per quadrat
LONPQ1	4	6/06/2012	55.13%	-	55.13%
LONPQ2	4	7/06/2012	84.00%	-	84.00%
Site Survivorship			**66.41%**	**-**	**66.41%**

4.17 Jockwar Station

Table 51: Jockwar Station Site Details

Site Code:	JOCKS	**Landscape Unit:**		41	**Revegetation Size (ha):**	14.3	
Site Location:	Section 445, Hundred of Seymour			**Planting Undertaken By:**		Rural Solutions	
Zone No:	2	**Zone description:**		Saline Swamp/Scald		**Zone Size:**	14.3
Total No. Revegetation:	16,920	**Overstorey:**		16,920		**No. of quadrats:**	5

Revegetation Map and Zones



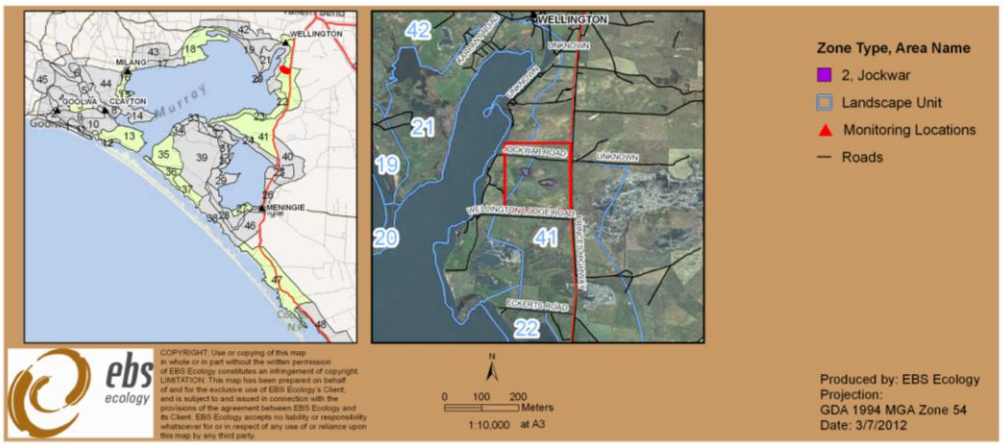
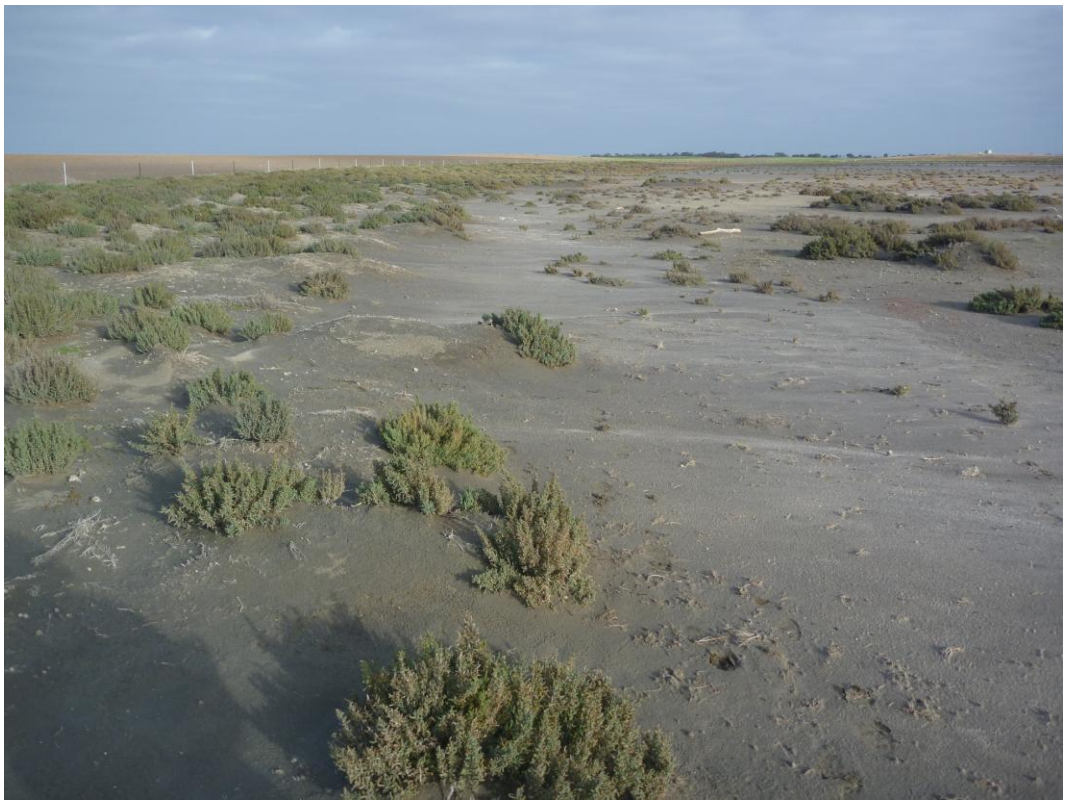


Table 52: Site photo and site description of Jockwar Station

Site photo:



Quadrat:	2	**Zone No:**	2	**Easting:**	353849	**Northing:**	6082061	**Bearing:**	260°

Site Description:

The vegetation at the Jockwar Station site was in good condition for the type of habitat that is present; the site is exposed with lots of bare ground. The soil type was a grey loamy mud/sand. There is scattered Samphire present across the site and some natural regeneration is also evident. *Melaleuca halmaturorum* was the only species located within the quadrats; the majority of them were dead. The Jockwar Station site had a low survivorship score (Table 53). Weeds were mainly restricted to the area surrounding the Samphire community, weeds include Wireweed, Rough Sow-thistle, Barley Grass, Mallow and winter annual grasses such as couch. A Fox was seen at this site.

Table 53. Jockwar Station Survivorship Results

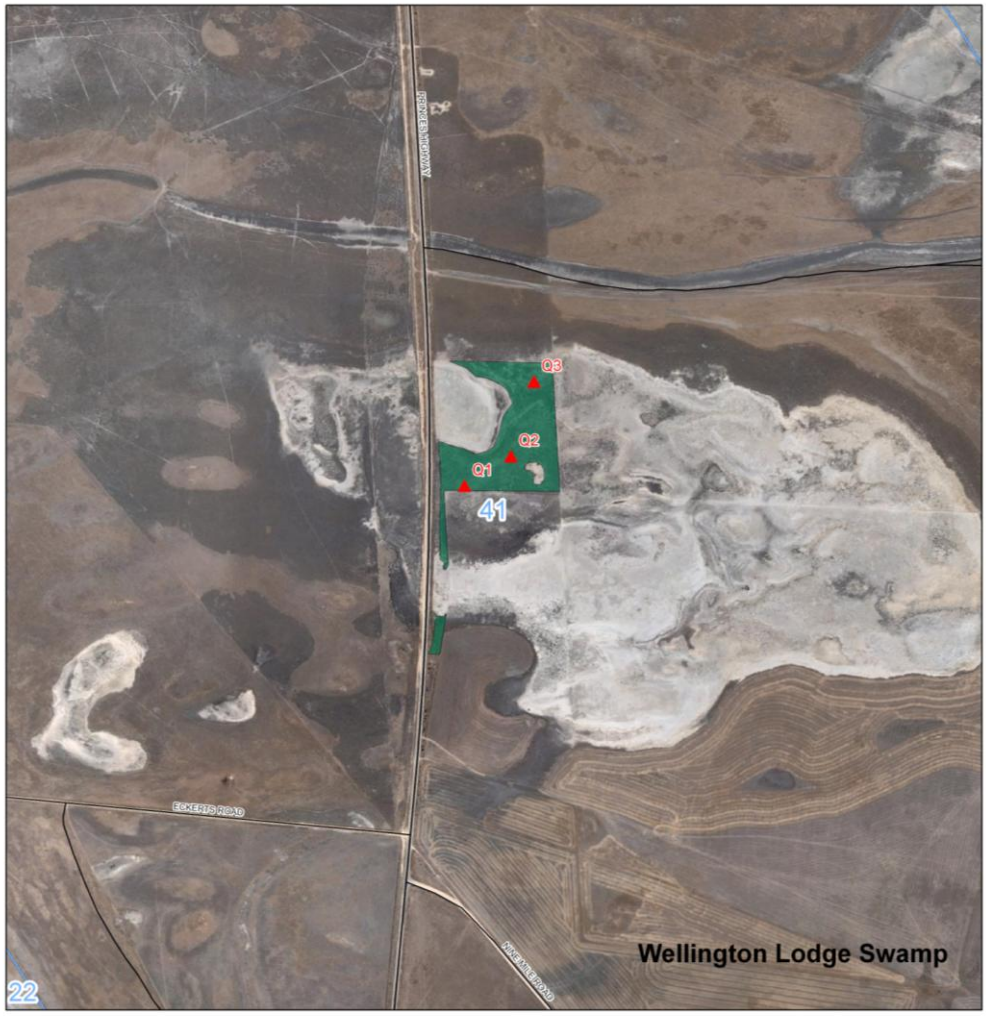
Site ID	Zone	Date	Survivorship %		
			Over and Midstorey	Understorey	Total
JOCKQ1	2	7/06/2012	7.02%	-	7.02%
JOCKQ2	2	7/06/2012	16.00%	-	16.00%
JOCKQ3	2	7/06/2012	5.48%	-	5.48%
JOCKQ4	2	7/06/2012	50.98%	-	50.98%
JOCKQ5	2	7/06/2012	17.07%	-	17.07%
Site Survivorship			**22.53%**	**-**	**22.53%**

4.18 Wellington Lodge Swamp

Table 54: Wellington Lodge Swamp Site Details

Site Code:	WLS	**Landscape Unit:**	41	**Revegetation Size (ha):**	8		
Site Location:	Section 237, Hundred of Malcolm		**Planting Undertaken By:**		Rural Solutions		
Zone No:	2	**Zone description:**	Saline Swamp		**Zone Size:**	8	
Total No. Revegetation:	10,040	**Overstorey:**	10,040	**No. of quadrats:** 3			

Revegetation Map and Zones



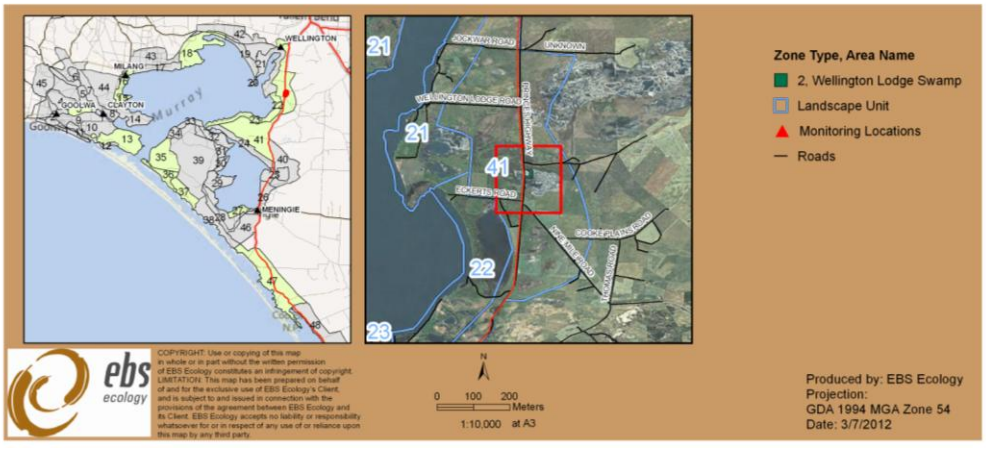
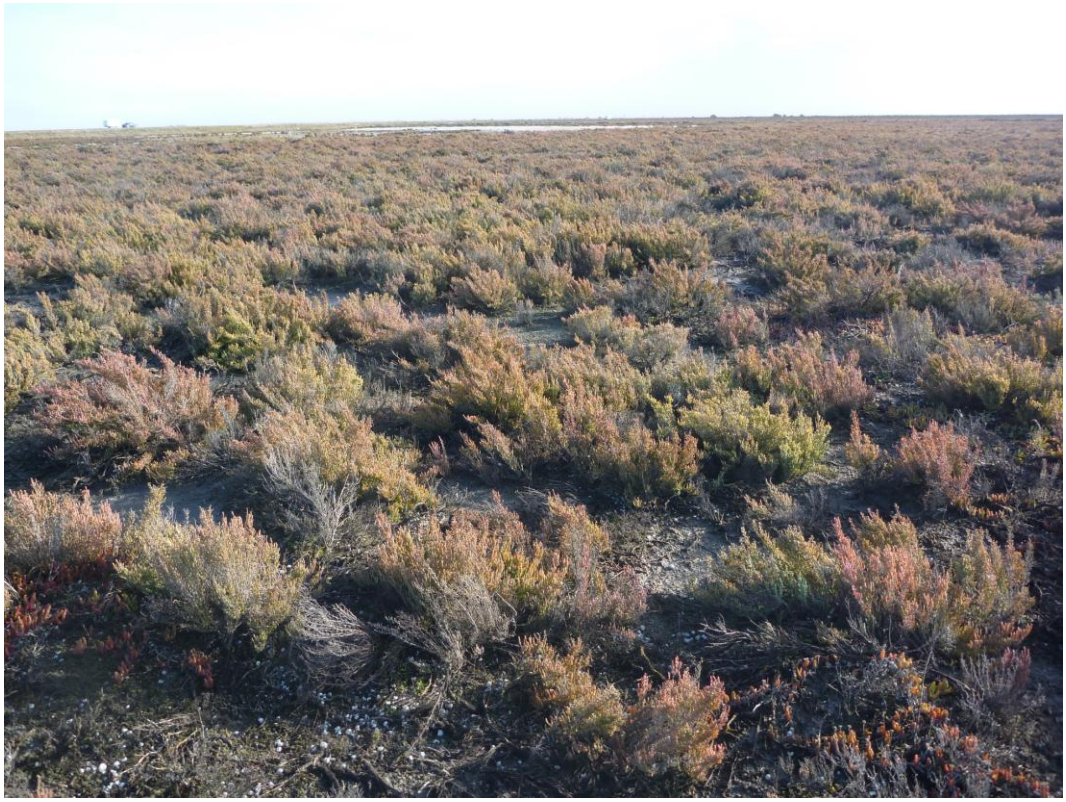


Table 55: Site photo and site description of Wellington Lodge Swamp

Site photo:



Quadrat:	2	**Zone No:**	2	**Easting:**	354973	**Northing:**	6077838	**Bearing:**	320°

Site Description:

The Wellington Lodge Swamp site consisted of a grey clay/mud soil, which was dominated by Samphire and Pigface. The vegetation at this site was in good condition and few weeds were present. *Melaleuca halmaturorum* was the only species planted at this site. The site had a very low survivorship score (Table 56). Of all the quadrats surveyed all but two of the tubestock were dead. It was noted that there were car tracks visible through one of the quadrats surveyed.

Dead *Melaleuca halmaturorum*

Table 56. Wellington Lodge Swamp Survivorship Results

Site ID	Zone	Date	Survivorship %		
			Over and Midstorey	Understorey	Total per quadrat
WLSQ1	2	28/05/2012	0.00%	-	0.00%
WLSQ2	2	28/05/2012	5.88%	-	5.88%
WLSQ3	2	28/05/2012	3.33%	-	3.33%
Site Survivorship			**2.82%**	**-**	**2.82%**

4.19 Camp Coorong

Table 57: Camp Coorong Site Details

Site Code:	CAMP	**Landscape Unit:**	47	**Revegetation Size (ha):**		10	
Site Location:	Section 57, Hundred of Bonney			**Planting Undertaken By:**		Ngarrindjeri Community Group	
Zone No:	2	**Zone description:**	High Ground			**Zone Size:**	10
Total No. Revegetation:	8300	**Over/Midstorey:**	7000	**Understorey:**	1300	**No. of quadrats:**	4

Revegetation Map and Zones

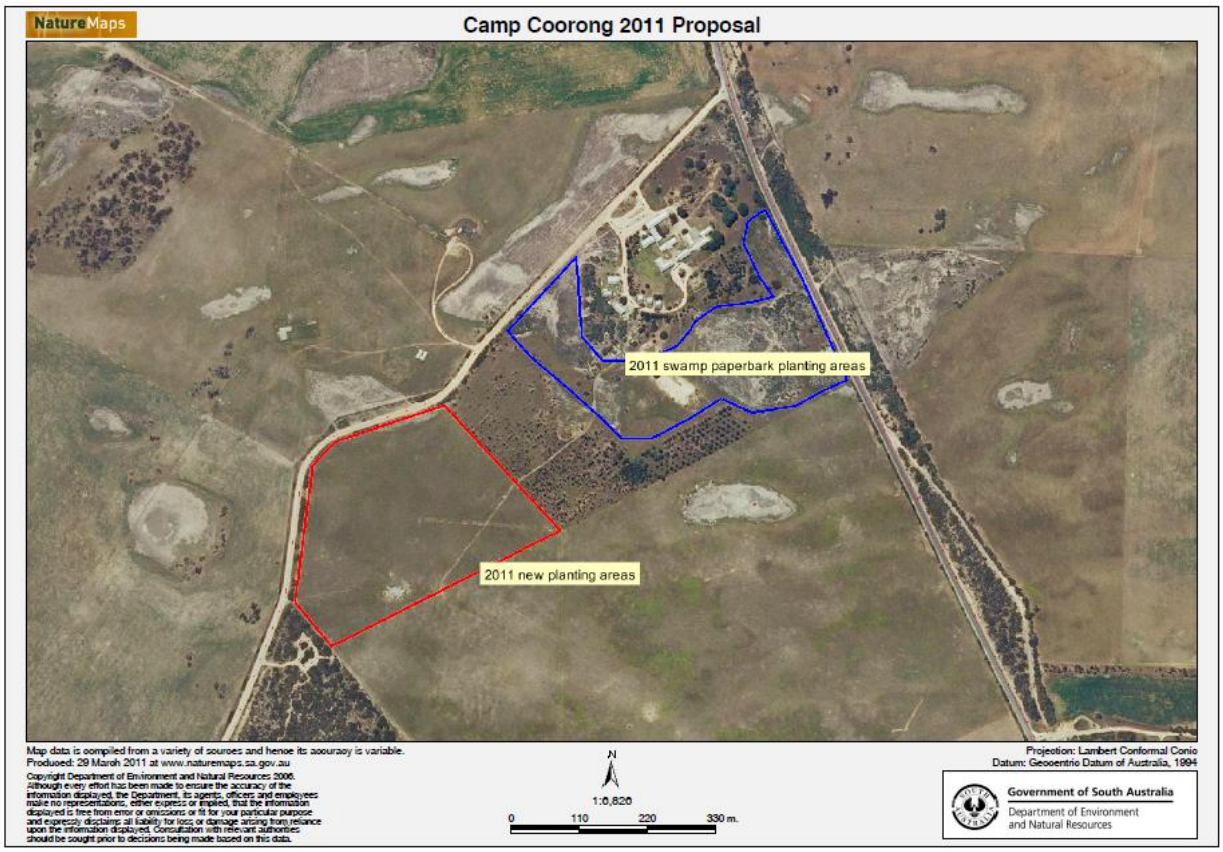


Table 58: Site photo and site description of Camp Coorong

Site photo:

Quadrat:	1	**Zone No:**	2	**Easting:**	348943	**Northing:**	6038783	**Bearing:**	260°

Site Description:

The vegetation in at the Camp Coorong site is in moderate to poor condition, there are a number of exotic species which dominate the site such as Scotch Thistle, Spurge, Yorkshire Fog, Canary-grass, Cocksfoot, Horehound and Scabiosa. Although the site in general has a high number of weeds, there is evidence that there has been ongoing weed control such as slashing between the rows of planted vegetation. The plantings within the quadrats include *Acacia sp*., *Allocasuarina verticillata*, *Bursaria spinosa* ssp., *Carpobrotus rossii*, *Dodonaea viscosa* ssp. *spatulata*, *Eucalyptus sp*., *Kunzea pomifera* and *Melaleuca sp*. The plantings occur in rows, with excellent tree guards and a high survivorship (Table 59). There is some evidence of grazing from Kangaroos and Rabbits. A Rabbit warren was also located on site.

Table 59. Camp Coorong Survivorship Results

Site ID	Zone	Date	Survivorship %		
			Over and Midstorey	Understorey	Total per quadrat
CAMPCQ1	2	4/06/2012	85.94%	100.00%	86.96%
CAMPCQ2	2	4/06/2012	84.40%	100.00%	84.62%
CAMPCQ3	2	4/06/2012	100.00%	100.00%	84.62%
CAMPCQ4	2	4/06/2012	74.13%	100.00%	75.82%
Site Survivorship			**85.10%**	**100.00%**	**85.95%**

4.20 Hack Point

Table 60: Hack Point Site Details

Site Code:	HACK	**Landscape Unit:**	47	**Revegetation Size (ha):**	20		
Site Location:	Section 57, Hundred of Bonney	**Planting Undertaken By:**	Ngarrindjeri Community Group				
Zone No:	2	**Zone description:**	High Ground	**Zone Size:**	20		
Total No. Revegetation:	12,730	**Over/Midstorey:**	11,480	**Understorey:**	1250	**No. of quadrats:**	6

Revegetation Map and Zones

Table 61: Site photo and site description of Hack Point

Site photo:

Quadrat:	5	**Zone No:**	2	**Easting:**	357354	**Northing:**	6026770	**Bearing:**	280°

Site Description:

The Hack Point site was situated along the edge of a salt lake. The soil was a sandy loam. The site contained a large number of weeds such as Scotch Thistle, Scabiosa, Onion Weed, Spurge, Salvation Jane, Plantain, Horehound and Boxthorn. Two species *Allocasuarina verticillata* and *Melaleuca sp*. were detected within the quadrats at Hack Point; the majority of the plants were alive and the site had a moderately high survivorship score (Table 62). Rabbit scratching and fox tracks were detected at this site.

Table 62. Hack Point Survivorship Results

Site ID	Zone	Date	Survivorship %		
			Over and Midstorey	Understorey	Total per quadrat
HACKPQ1	2	4/06/2012	90.91%	-	90.91%
HACKPQ2	2	4/06/2012	82.61%	-	82.61%
HACKPQ3	2	4/06/2012	96.67%	-	96.67%
HACKPQ4	2	4/06/2012	70.91%	-	70.91%
HACKPQ5	2	4/06/2012	78.95%	-	78.95%
HACKPQ6	2	4/06/2012	92.55%	-	92.55%
Site Survivorship			**84.18%**	**-**	**84.18%**

5 RECOMMENDATIONS

The following recommendations have been made in regards to any follow up management work and improvements to future planting seasons.

Tree Guards

- Replace and/or fix tree guards that have collapsed on plants or have blown away. Add additional stakes to tree guards to keep secure (up to three per guard);
- All plants should have core flute tree guards with a single stake where possible. If seedlings are to be planted with plastic bag guards, then a minimum of three stakes should be used to keep them secure;
- Monitor plant growth and remove tree guards after 18 months to two years, or when plants are suitably established. If biodegradable tree guards have been used then leave them in place; and
- If it is not possible to use tree guards, use a single stake for each tubestock planted for ease of location for future monitoring if required.

Weed management

- Undertake weed control prior to and post planting;
- Where possible slash and spray each individual planting location; and
- Undertake follow up weed control in all areas, in particular areas that have been ripped or have been highly disturbed or have high weed infestation prior to planting.

Pest animal management

- Make sure that each tubestock is guarded to avoid plants from being grazed;
- In areas where there are high numbers of grazing from rabbits, kangaroos and/or stock if possible use D-ter. D-ter is a highly effective and proven animal and bird repellent, fully registered for use against all animals and birds;
- Remove stock from all known planting locations, or fence off to avoid plants being trampled or eaten; and
- Undertake Fox and Rabbit control, in particular on the islands (Mud, Reedy and Currency Creek). If possible undertake Fox and Rabbit control when there is water surrounding the islands, using poison and/or ripping warrens and dens.

General

- Avoid areas that are inundated with water for more than three months of the year at any one time;
- Plant species that have a high water tolerance in the wet, boggy and muddy areas;
- Plant tubestock on higher ground where possible; and
- If future monitoring is required, record the location using a GPS of all planting locations as they are being planted.

6 APPENDICES

Appendix 1. Vegetation Survivorship Monitoring Data

No.	Locality	Landscape Unit	Site ID	Planting Zone	Scientific Name	Alive	Dead	Total
1	Currency Creek Island	3	CCIQ1	2	*Juncus kraussii*	1	1	2
					Melaleuca halmaturorum	131	2	133
2	Mud Island	13	MUDQ1	3	*Melaleuca halmaturorum*	11	16	27
			MUDQ2		*Ficinia nodosa*	83	27	110
					Melaleuca halmaturorum	18	13	31
			MUDQ3	2	*Ficinia nodosa*	0	3	3
					Melaleuca halmaturorum	5	0	5
					Myoporum insulare	6	0	6
			MUDQ4		*Melaleuca halmaturorum*	10	1	11
3	Reedy Island	13	REEDQ1	3	*Ficinia nodosa*	23	6	29
					Juncus kraussii	3	1	4
					Melaleuca halmaturorum	10	1	11
					Myoporum insulare	5	0	5
			REEDQ2	2	*Melaleuca halmaturorum*	38	17	55
			REEDQ3	3	*Melaleuca halmaturorum*	76	6	82
			REEDQ4	2	*Juncus kraussii*	10	10	20
					Melaleuca halmaturorum	29	46	75
			REEDQ5	3	*Juncus kraussii*	22	6	28
					Melaleuca halmaturorum	4	2	6
			REEDQ6		*Melaleuca halmaturorum*	16	6	22
4	Kindaruar	15	KINDQ1	2	*Juncus kraussii*	138	60	198
			KINDQ2		*Ficinia nodosa*	73	1	74
					Juncus kraussii	23	8	31
			KINDQ3		*Ficinia nodosa*	87	156	243
			KINDQ4		*Ficinia nodosa*	104	34	138
			KINDQ5		*Ficinia nodosa*	23	43	66
5	Kindaruar Farm	16	KINDFQ1	2	*Melaleuca halmaturorum*	3	1	4
			KINDFQ2		*Melaleuca halmaturorum*	11	12	23
			KINDFQ3		*Melaleuca halmaturorum*	0	100	100
			KINDFQ4		*Melaleuca halmaturorum*	1	113	114
6	Boggy Lake	18	STONEQ1	2	*Melaleuca halmaturorum*	3	29	32
			STONEQ2	2	*Melaleuca halmaturorum*	3	24	27
			STONEQ3	2	*Melaleuca halmaturorum*	0	20	20
			STONEQ4	2	*Melaleuca halmaturorum*	1	33	34
7	Tolderol	18	TOLDQ1	2	*Allocasuarina verticillata*	21	67	88
			TOLDQ2	2	*Melaleuca halmaturorum*	10	15	25
				2	*Juncus kraussii*	2	133	135
			TOLDQ3	2	*Melaleuca halmaturorum*	16	0	16
			TOLDQ4	2	*Melaleuca halmaturorum*	39	0	39
			TOLDQ5	2	*Melaleuca halmaturorum*	2	0	2
				4	*Myoporum insulare*	5		5
8	Low Point	22	LOWPQ1	4	*Allocasuarina verticillata*	126	59	185
				4	*Ficinia nodosa*	362	3	365
9	Poltalloch	23	POLLQ1	2	*Melaleuca halmaturorum*	4	12	16
			POLLQ2	2	*Melaleuca halmaturorum*	3	8	11
			POLLQ3	2	*Melaleuca halmaturorum*	6	14	20
			POLLQ4	2	*Melaleuca halmaturorum*	7	10	17
			POLLQ5	2	*Melaleuca halmaturorum*	30	0	30
			POLLQ6	2	*Melaleuca halmaturorum*	18	12	30
			POLLQ7	2	*Melaleuca halmaturorum*	9	4	13
			POLLQ8	2	*Melaleuca halmaturorum*	36	3	39
			POLLQ9	2	*Melaleuca halmaturorum*	16	3	19
			POLLQ10	2	*Melaleuca halmaturorum*	123	0	123

No.	Locality	Landscape Unit	Site ID	Planting Zone	Scientific Name	Alive	Dead	Total
			POLLQ11	2	*Melaleuca halmaturorum*	34	2	36
			POLLQ12	2	*Melaleuca halmaturorum*	61	1	62
			POLLQ13	4	*Allocasuarina verticillata*	81	62	143
			POLLQ14	4	*Allocasuarina verticillata*	47	42	89
			POLLQ15	4	*Allocasuarina verticillata*	67	39	106
			POLLQ16	4	*Allocasuarina verticillata*	73	48	121
			POLLQ17	4	*Allocasuarina verticillata*	31	36	67
			POLLQ18	4	*Allocasuarina verticillata*	31	61	92
			POLLQ19	4	*Allocasuarina verticillata*	50	40	90
			POLLQ20	4	*Allocasuarina verticillata*	2	55	57
			POLLQ21	4	*Allocasuarina verticillata*	66	31	97
			POLLQ22	4	*Allocasuarina verticillata*	20	12	32
			POLLQ23	2	*Melaleuca halmaturorum*	0	4	4
			POLLQ24	2	*Melaleuca halmaturorum*	1	16	17
			POLLQ25	2	*Melaleuca halmaturorum*	48	1	49
			POLLQ26	2	*Melaleuca halmaturorum*	23	0	23
			POLLQ27	2	*Melaleuca halmaturorum*	0	32	32
			POLLQ28	2	*Melaleuca halmaturorum*	27	0	27
			POLLQ29	2	*Melaleuca halmaturorum*	27	0	27
			POLLQ30	2	*Melaleuca halmaturorum*	4	2	6
			POLLQ31	2	*Myoporum insulare*	14	2	16
			POLLQ32	2	*Melaleuca halmaturorum*	32	0	32
			POLLQ33	2	*Melaleuca halmaturorum*	19	1	20
			POLLQ34	2	*Melaleuca halmaturorum*	40	0	40
			POLLQ35	2	*Melaleuca halmaturorum*	30	0	30
			POLLQ36	2	*Myoporum insulare*	31	3	34
			POLLQ37	2	*Melaleuca halmaturorum*	9	3	12
			POLLQ38	2	*Myoporum insulare*	20	5	25
			POLLQ39	2	*Melaleuca halmaturorum*	3	9	12
			POLLQ40	2	*Melaleuca halmaturorum*	52	0	52
			POLLQ41	2	*Melaleuca halmaturorum*	18	15	33
			POLLQ42	2	*Melaleuca halmaturorum*	83	0	83
			POLLQ43	2	*Melaleuca halmaturorum*	33	7	40
			POLLQ44	2	*Melaleuca halmaturorum*	17	0	17
10	Warrengie	27	WARRQ1	2	*Allocasuarina verticillata*	13	1	14
				2	*Melaleuca halmaturorum*	3	0	3
				2	*Acacia sp.*	12	0	12
				2	*Eucalyptus diversifolia*	7	0	7
				2	*Bursaria spinosa ssp.*	5	0	5
			WARRQ2	2	*Allocasuarina verticillata*	8	0	8
				2	*Ficinia nodosa*	1	0	1
				2	*Melaleuca halmaturorum*	7	0	7
				2	*Bursaria spinosa ssp.*	5	1	6
				2	*Acacia sp.*	1	0	1
				2	*Eucalyptus diversifolia*	5	0	5
			WARRQ3	2	*Allocasuarina verticillata*	11	0	11
				2	*Ficinia nodosa*	319	15	334
				2	*Melaleuca halmaturorum*	3		3
				2	UNKNOWN DEAD		1	1
				2	*Bursaria spinosa ssp.*	7	0	7
				2	*Eucalyptus diversifolia*	9	0	9
			WARRQ4	2	*Allocasuarina verticillata*	14	0	14
				2	*Melaleuca halmaturorum*	0	1	1
				2	*Bursaria spinosa ssp.*	3	0	3
				2	*Eucalyptus diversifolia*	5	0	5
				2	*Carpobrotus rossii*	14	0	14
				2	Olearia axillaris	1	0	1

No.	Locality	Landscape Unit	Site ID	Planting Zone	Scientific Name	Alive	Dead	Total
				2	*Acacia pycnantha*	3	0	3
			WARRQ5	2	*Allocasuarina verticillata*	8	1	9
				2	*Melaleuca halmaturorum*	7	0	7
				2	*Bursaria spinosa ssp.*	7	1	8
				2	UNKNOWN DEAD	0	1	1
				2	*Eucalyptus diversifolia*	6	2	8
				2	*Acacia sp.*	3	0	3
			WARRQ6	2	*Allocasuarina verticillata*	10	1	11
				2	*Melaleuca halmaturorum*	1	0	1
				2	*Acacia sp.*	6	1	7
				2	*Eucalyptus diversifolia*	3	0	3
				2	*Bursaria spinosa ssp.*	1	0	1
				2	*Melaleuca brevifolia*	2	0	2
			WARRQ7	2	*Allocasuarina verticillata*	6	0	6
				2	*Melaleuca halmaturorum*	1	0	1
				2	*Melaleuca lanceolata*	1	0	1
				2	*Acacia sp.*	10	1	11
				2	Melaleuca sp.	6	1	7
				2	*Melaleuca brevifolia*	2	4	6
			WARRQ8	2	*Allocasuarina verticillata*	1	0	1
				2	UNKNOWN DEAD	0	1	1
				2	*Acacia sp.*	10	0	10
				2	*Eucalyptus diversifolia*	5	5	10
				2	*Bursaria spinosa ssp.*	1	0	1
			WARRQ9	2	*Allocasuarina verticillata*	14	4	18
				2	*Eucalyptus diversifolia*	12	4	16
				2	*Acacia sp.*	5	2	7
11	Yalkuri	35	YALKQ1	2	*Melaleuca halmaturorum*	9	1	10
			YALKQ2	2	*Melaleuca halmaturorum*	6	0	6
12	Kartoo Road	36	KARRQ1	4	*Allocasuarina verticillata*	109	21	130
			KARRQ2	4	*Allocasuarina verticillata*	96	38	134
				4	*Ficinia nodosa*	308	5	313
			KARRQ3	4	*Allocasuarina verticillata*	29	64	93
				4	*Ficinia nodosa*	46	16	62
			KARRQ4	4	*Allocasuarina verticillata*	47	15	62
				4	*Ficinia nodosa*	125	0	125
			KARRQ5	2	*Melaleuca halmaturorum*	18	0	18
			KARRQ6	2	*Melaleuca halmaturorum*	39	4	43
			KARRQ7	2	*Melaleuca halmaturorum*	19	4	23
				2	*Myoporum insulare*	23	0	23
13	Pellican Point	36	PELPQ1	2	*Melaleuca halmaturorum*	24	0	24
			PELPQ2	2	*Melaleuca halmaturorum*	29	1	30
			PELPQ3	2	*Melaleuca halmaturorum*	27	1	28
			PELPQ4	2	*Melaleuca halmaturorum*	12	0	12
			PELPQ5	2	*Melaleuca halmaturorum*	5	0	5
			PELPQ6	2	*Melaleuca halmaturorum*	21	0	21
			PELPQ7	2	*Melaleuca halmaturorum*	21	0	21
14	Pellican Point Road	36	PELRQ1	2	*Melaleuca halmaturorum*	47	9	56
			PELRQ2	2	*Melaleuca halmaturorum*	9	0	9
			PELRQ3	2	*Melaleuca halmaturorum*	29	0	29
			PELRQ4	2	*Melaleuca halmaturorum*	24	3	27
15	Tauwitchere	36	TAUWQ1	2	*Melaleuca halmaturorum*	11	37	48
			TAUWQ2	2	*Melaleuca halmaturorum*	26	9	35
			TAUWQ3	2	*Melaleuca halmaturorum*	38	4	42
			TAUWQ4	2	*Melaleuca halmaturorum*	0	4	4
			TAUWQ5	2	*Melaleuca halmaturorum*	5	0	5
			TAUWQ6	2	*Melaleuca halmaturorum*	50	3	53

No.	Locality	Landscape Unit	Site ID	Planting Zone	Scientific Name	Alive	Dead	Total
			TAUWQ7	2	*Melaleuca halmaturorum*	22	4	26
			TAUWQ8	2	*Melaleuca halmaturorum*	28	0	28
			TAUWQ9	2	*Melaleuca halmaturorum*	35	0	35
			TAUWQ10	2	*Melaleuca halmaturorum*	71	18	89
16	Long Point	37	LONPQ1	4	*Allocasuarina verticillata*	74	30	104
				4	*Myoporum insulare*	12	0	12
				4	UNKNOWN DEAD	0	40	40
			LONPQ2	4	*Allocasuarina verticillata*	84	4	88
				4	UNKNOWN DEAD	0	12	12
17	Jockwar Station	41	JOCKQ1	2	*Melaleuca halmaturorum*	4	53	57
			JOCKQ2	2	*Melaleuca halmaturorum*	8	42	50
			JOCKQ3	2	*Melaleuca halmaturorum*	4	69	73
			JOCKQ4	2	*Melaleuca halmaturorum*	52	50	102
			JOCKQ5	2	*Melaleuca halmaturorum*	14	68	82
18	Wellington Lodge Swamp	41	WLSQ1	2	*Melaleuca halmaturorum*	0	24	24
			WLSQ2	2	*Melaleuca halmaturorum*	1	16	17
			WLSQ3	2	*Melaleuca halmaturorum*	1	29	30
19	Camp Coorong	47	CAMPCQ1	2	*Allocasuarina verticillata*	55	2	57
				2	*Melaleuca sp.*	24	2	26
				2	*Carpobrotus rossii*	9	0	9
				2	*Acacia sp.*	47	6	53
				2	*Bursaria spinosa ssp.*	37	3	40
				2	*Kunzea pomifera*	6	0	6
				2	*Eucalyptus sp.*	2	4	6
				2	UNKNOWN DEAD		10	10
			CAMPCQ2	2	*Allocasuarina verticillata*	38	3	41
				2	*Melaleuca sp.*	34	2	36
				2	*Dodonaea viscosa ssp. spatulata*	3	0	3
				2	*Carpobrotus rossii*	2	0	2
				2	*Eucalyptus sp.*	2	0	2
				2	*Bursaria spinosa ssp.*	24	0	24
				2	*Acacia sp.*	18	0	18
				2	UNKNOWN DEAD	0	17	17
			CAMPCQ3	2	*Allocasuarina verticillata*	22	0	22
				2	*Melaleuca sp.*	26	0	26
				2	*Carpobrotus rossii*	5	0	5
				2	*Kunzea pomifera*	3	0	3
				2	*Acacia sp.*	20	0	20
				2	*Eucalyptus sp.*	14	0	14
				2	*Bursaria spinosa ssp.*	19	0	19
			CAMPCQ4	2	*Allocasuarina verticillata*	39	13	52
				2	*Melaleuca sp.*	67	4	71
				2	UNKNOWN DEAD	0	20	20
				2	*Carpobrotus rossii*	10	0	10
20	Hack Point	47	HACKPQ1	2	*Allocasuarina verticillata*	20	2	22
			HACKPQ2	2	*Allocasuarina verticillata*	95	20	115
			HACKPQ3	2	*Allocasuarina verticillata*	29	1	30
			HACKPQ4	2	*Allocasuarina verticillata*	39	16	55
			HACKPQ5	2	*Allocasuarina verticillata*	60	16	76
			HACKPQ6	2	*Melaleuca sp.*	87	7	94

EBS Ecology
3/107 Hayward Avenue
Torrensville, SA 5031
www.ebsecology.com.au
t. 08 7127 5607
f. 08 8354 2403