FINAL REPORT

VEGETATION SURVIVORSHIP MONITORING

Department of Environment, Water and Natural Resources (DEWNR)

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Vegetation Survivorship Monitoring

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Executive Summary

The Department of Environment, Water and Natural Resources (DEWNR) Coorong, Lower Lakes and Murray Mouth (CLLMM) Program is delivering a five year restoration project in the CLLMM region. As an emergency response to prolonged drought, bioremediation and revegetation activities were initiated in 2009. In 2012, 648,000 plants were planted as part of the CLLMM Vegetation Project covering an area of 406 hectares.

To assess the restoration activities in the CLLMM region, survival assessment of a sub-sample of the plantings is required to enable success to be tracked and inform continued delivery improvements.

COOE monitored 56 sites across the Coorong and Lower Lakes regions to estimate survivorship and assess plant health. The monitoring program also provides an independent check against reported works completed.

A transect method was used to estimate survivorship. Along a 50m length and 1m either side of the tape, plants were identified and listed as either alive or dead and a health score assigned to alive plants. Planted areas were divided into one or more zones to signify differences in landform and soil types. Sampling units were located within each zone to allow comparison of survival across and between zone types.

Across all the sites monitored 62% (22,018 individuals) of the plants identified were recorded as alive with 38% recorded as dead (13,320 individuals). The majority of the sites scored a survivorship of between 60-80%. Plant health was overall good with 36 sites having healthy plants.

Survivorship across the sites was affected by common issues including high levels of grazing, inefficient planting, lack of tree guards at some sites, insufficient pre and post-planting site management and off-target herbicide spraying. The highest contributing factor that could be observed to plant deaths was from pest impacts. The most likely grazers on the seedlings included rabbits and kangaroos, based on scat observations at the sites.

A large proportion (81 species) of the 121 species identified recorded over 80% survivorship. Some of the most notable species within this category included *Acacia spp.*, *Eucalyptus spp.*, *Allocasuarina spp.*, *Enchylaena tomentosa* and sedges. Fourteen species recorded very low survivorship (<20%) and included *Puccinellia stricta*, *Lasiopetalum baueri*, *Enneapogon nigricans* and mostly unknown species.

Several recommendations are provided to assist in the survivorship of future plantings. The primary recommendations include the use of tree guards, pest and weed control, possible use of strategic fencing and ongoing monitoring for new plants.

Acknowledgements

COOE would like to acknowledge the Department of Environment, Water and Natural Resources for support and comments on the draft final report.

COOE would like to acknowledge all participating landowners and the Hindmarsh Island Landcare group for access to private land for site visits and monitoring.

Acknowledgments to GWLAP for assistance with site access and providing species identification resources of the 2012 plantings.

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1 Introduction

The Department of Environment, Water and Natural Resources (DEWNR) Coorong, Lower Lakes and Murray Mouth (CLLMM) Program is delivering a five year restoration project in the CLLMM region. As an emergency response to prolonged drought, bioremediation and revegetation activities were initiated in 2009. In 2012, 648,000 plants were planted as part of the CLLMM Vegetation Project covering an area of 406 hectares.

To assess the restoration activities in the CLLMM region, survival assessment of a sub-sample of the plantings is required to enable success to be tracked and inform continued delivery improvements.

1.1 Objectives

The specific objectives of the project are to:

- Estimate survivorship of the planting at 56 revegetation sites
- Compare the survivorship of plant species surveyed across all sites
- Provide an indication of the plant health of the surviving species
- Provide an independent check against reported works completed.
- Provide recommendations on any follow up management works required and improvements to future planting seasons.

2 Methods

2.1 Study Sites

The 2013 vegetation survivorship monitoring included a total of 56 sites. Sites can be grouped into three regions with 19Hindmarsh Island sites (Figure 1), 12Currency Creek, Finniss and Point Sturt sites (Figure 2) and 25 Lakes Alexandrina and Albert and Coorong sites (Figure 3).

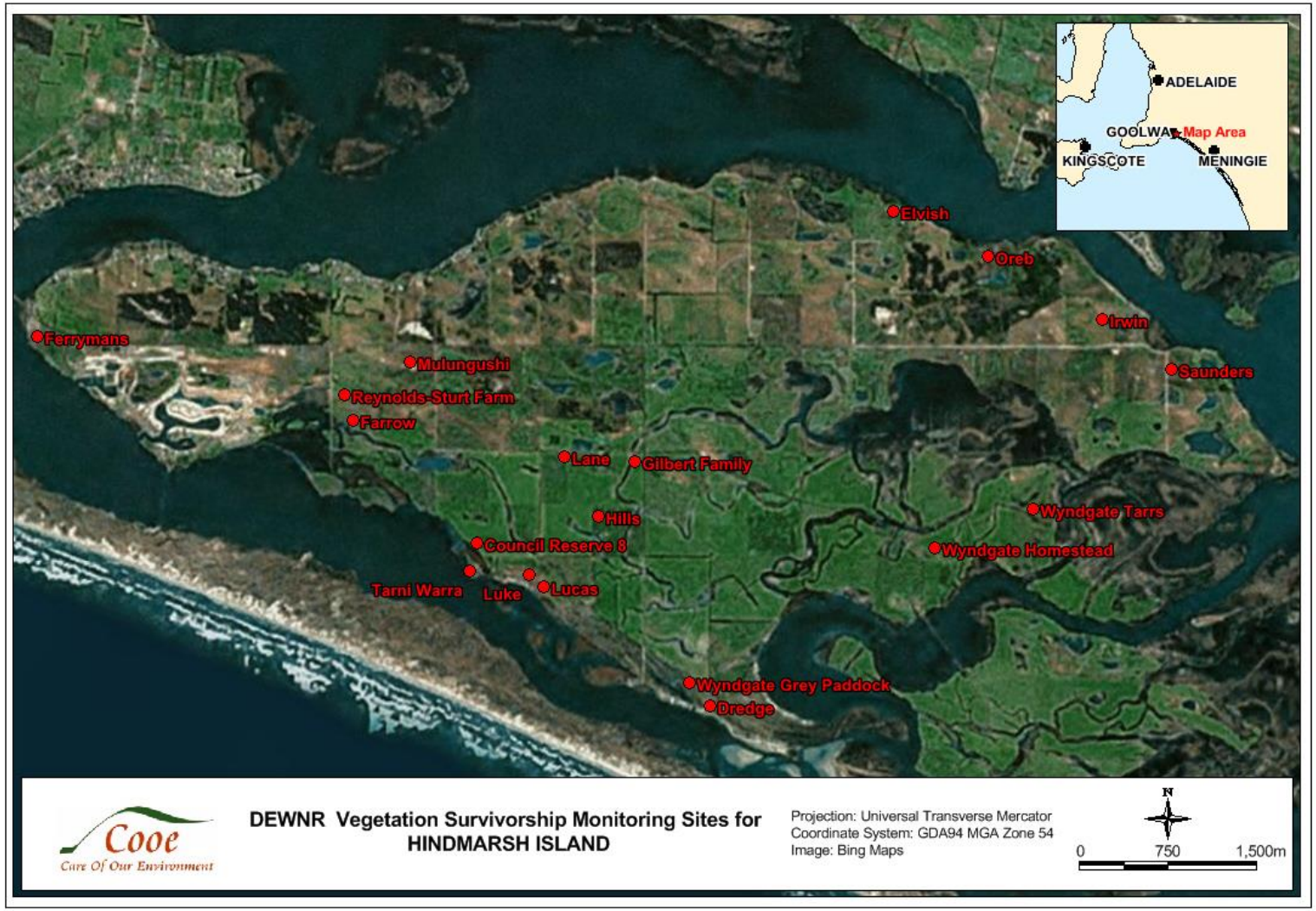


Figure 1 **Site locations on Hindmarsh Island.**

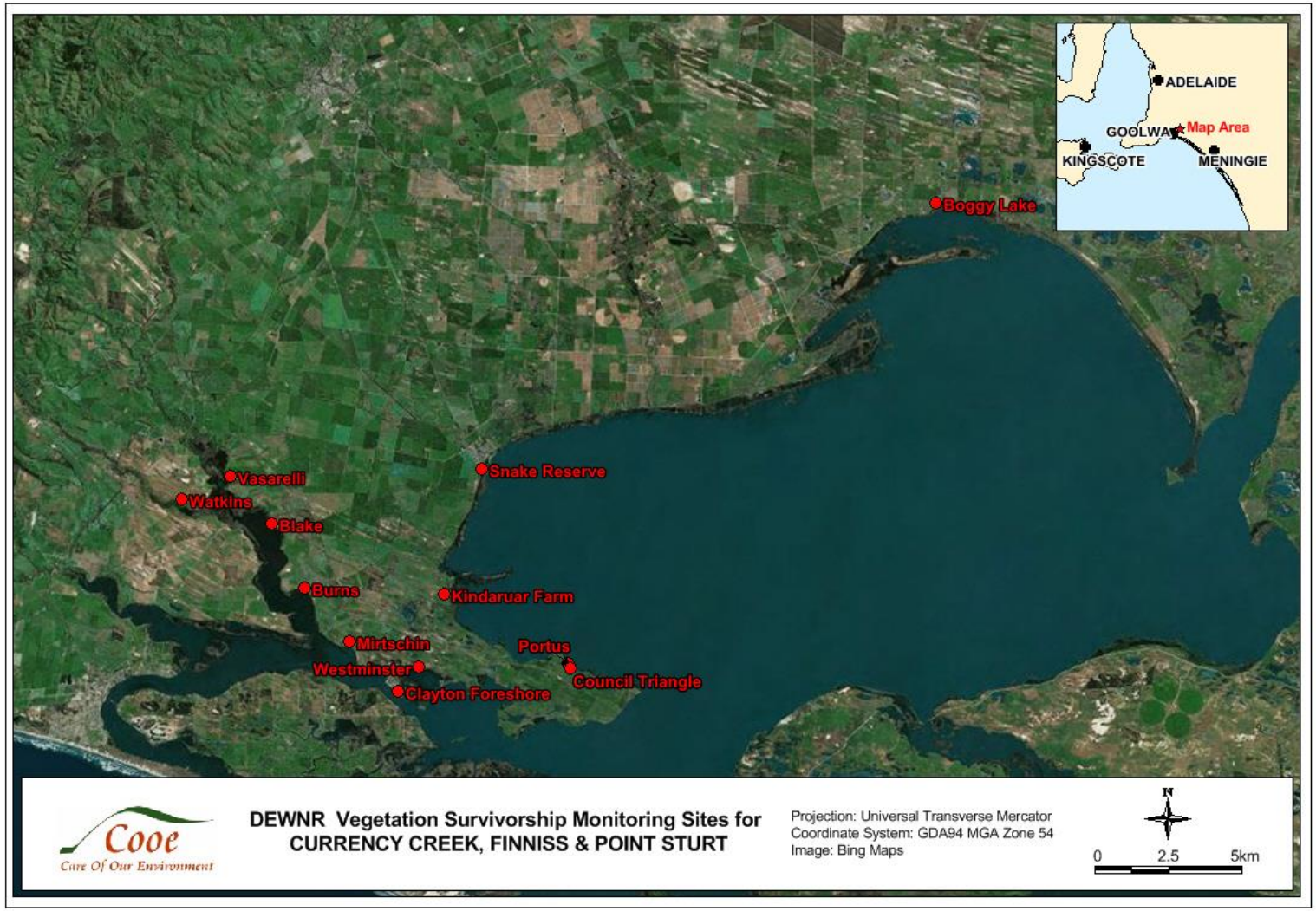


Figure 2 **Site locations for the Currency Creek, Finniss and Point Sturt regions.**

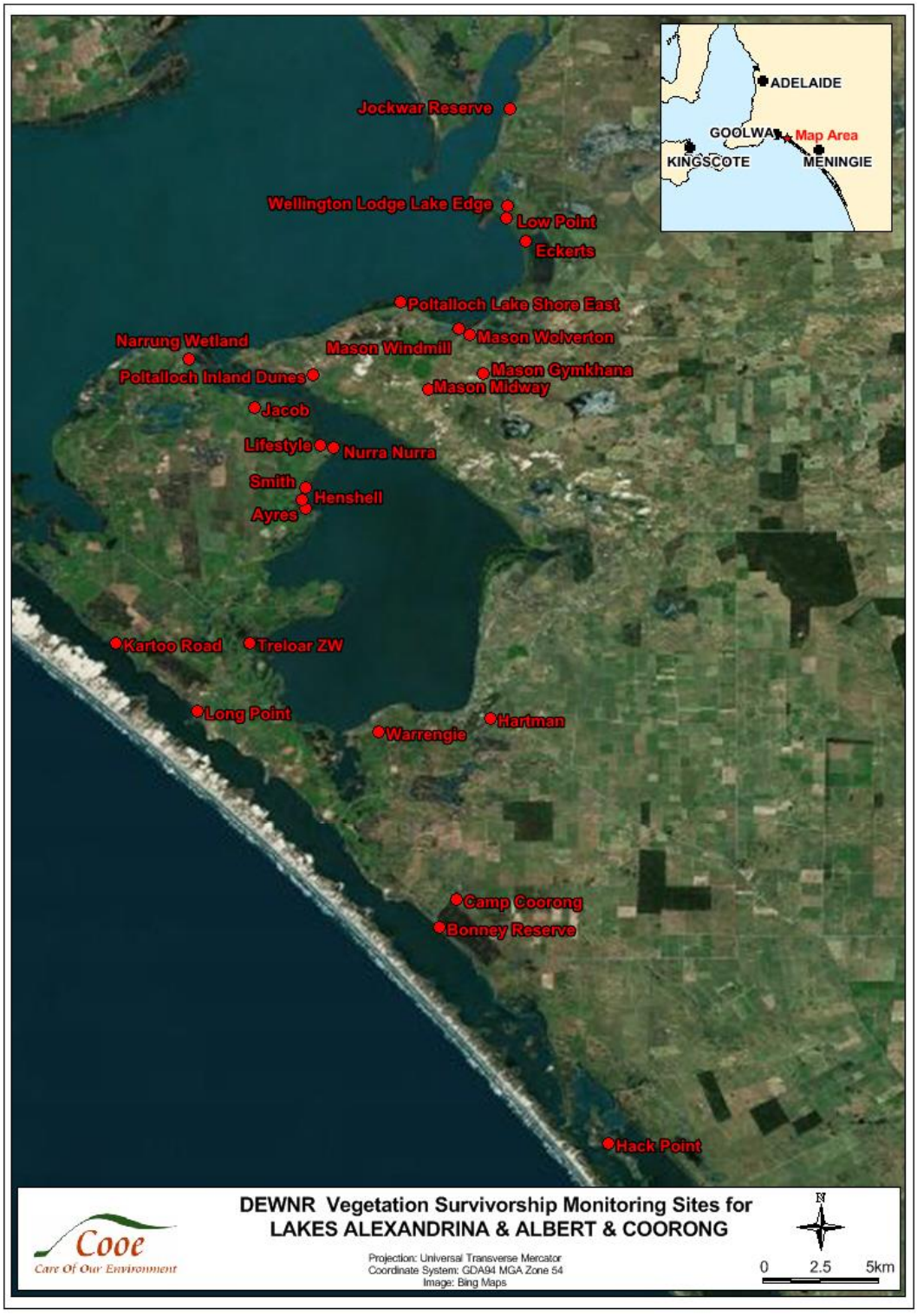


Figure 3 Location of sites for the Lakes Alexandrina and Albert and Coorong regions.

2.2 Vegetation Survival

The 2013 plant survivorship was calculated using a transect method with starting points randomly generated to reduce site selection biases. Data collection involved surveyors identifying plants to species level and listing if the plants were alive or dead. A small number of juvenile plants were not possible to ID to species level and were identified by genus (i.e. *Acacia sp.* 1). Similarly, some grass species lacked distinguishing characteristics for identification hence were identified as Sedge sp. Where it was not possible to identify dead plants, "unknown species" was marked. Where a stake was present but no plant visible this was also marked as "unknown species".

GPS waypoints, randomly allocated for each zone within each site, was used as the starting point of a transect. If the waypoint ended up in a location where no plantings were found within a 50m radius or within the wrong zone, a new location was allocated where possible. At the waypoint, an assessment of the site was undertaken to identify the most appropriate direction to run the transect allowing sufficient space, within the same zone, to lay a 50m transect without crossing another transect. The basic sampling unit included two 1 x 50m transects (which equated to one transect). All individual plants one metre to the left and right of the transect were tallied into columns of alive or dead.

Planted areas were divided into one or more zones to signify differences in landform and soil types. Sampling units were located within each zone to allow comparison of survival across and between zone types. Across the monitoring region, 10 zones, which describe the landscape and soil types present have been identified (Table 1) most of which were located across the sites monitored.

Table 1 Summary of zones identified within the region

Zone	Zone Description
1	Lake / Lagoon edge
2	Saline Swamp
3	Saline Edge
4	Rising Ground
5	Slope/Embankment
6	Cliff
7	Cliff Top
8	Sandhill
9	Other Inland
10	Coastal

For each site, a photograph showing the general habitat was taken including GPS location of the photograph. In addition, any anecdotal observations which may assist in describing the survivorship of the planting were noted.

2.3 Plant Health

To further facilitate defining the resilience of the species planted a plant health scoring system was implemented. A score of between one and four was determined for each live plant identified. A description of each score is provided in Table 2.

Table 2 Plant Health Scoring

Health	Score	Description
Good	1	No symptoms of disease / other effects on growth and vitality.
Slightly Affected	2	Some symptoms of being affected but signs of growth still evident.
Severely Affected	3	Symptoms that substantially affect the tree's growth and vitality. Limited signs of growth evident.
Dying	4	Damage that is or will lead to death or the tree has fallen. Minimal signs of growth.

2.4 Data Analysis

Data analyses included:

- The total number of plants that were alive, as a percentage, for each site and zone.
- An overall survivorship percentage across all sites and zones.
- The average plant health for each site and zone.
- The survivorship percentage for each plant species (surveyed) across all sites and zones.

3 Results

3.1 Overall Results

A total of 56 sites were surveyed to assess vegetation survivorship from 2012 plantings. Across all the sites monitored a total of 62% (22,018 individuals) of the plants identified were recorded as alive with 38% recorded as dead (13,320 individuals) (Table 3). The majority of the sites scored a survivorship of between 60-80% (Table 4). Two sites scored 0-20% survivorship which included Mason Gymkhana and Mason Wolverton.

Plant health was overall good with 36 sites having healthy plants (Table 5). Only one site, Bonney Reserve, recorded an average plant health of four where plants that were severely affected by grazing with the majority of the plants showing minimal signs of growth. Grazing may have been from rabbits and kangaroos, as rabbit scats and burrows and kangaroo scats were observed at some sites.

At sites where plants showed symptoms of being slightly affected, several factors were identified and included grazing and signs of water or heat stress (browned leaves). The two sites (Long Point and Mason Gymkhana) where plant health was severely affected (average plant health 3) was mainly due to heavy grazing.

Survivorship across the sites was affected by common issues including:

- High levels of grazing (e.g. Bonney Reserve, ACL-Triangle, and Hack Point).
- Inefficient planting (e.g. Camp Coorong and Hartman).
- Lack of tree guards at some sites (e.g. Mason Midway and Bonney Reserve).
- Insufficient pre and post-planting site management (e.g. PoltallochInland Dune, Clayton Foreshore, Gilbert Family and Wyndgate Homestead).
- Off-target herbicide spraying (e.g. Burns, Eckert and Mirtschin).
- Cattle trampling (e.g. Boggy Lake, ACL-Triangle, Kartoo Road, Low Point, Warrengie, Watkins and Wellington Lodge Lake Edge).

Further details of survivorship issues at each site are provided in Section 3.3.

Photographs of some of the planting issues are included in Appendix A.

Several zones which were identified as being planted did not contain any plants or signs of being planted. These zones have been identified in Section 3.3. Additionally, where some transects had to be relocated they would have overlapped with a previous transect therefore the transect was not included.

Table 3 Overall vegetation survivorship across all sites

Site	Number of transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
ACL-Triangle	13	367	38%	602	62%	969	19	2
Ayres	5	171	90%	18	10%	189	4	1
Blake Community	12	413	63%	239	37%	652	34	1
Boggy Lake	30	915	67%	452	33%	1367	13	1
Bonney Reserve	22	223	76%	72	24%	295	1	4
Burns	5	248	32%	518	68%	766	10	1
Camp Coorong	28	589	80%	146	20%	735	24	1
Clayton Foreshore	21	1407	66%	710	34%	2117	29	2
Council Reserve 8	8	118	91%	12	9%	130	13	1
Dredge	1	21	88%	3	13%	24	3	2
Eckert	30	1024	56%	810	44%	1834	10	2
Elvish	9	92	63%	53	37%	145	14	1
Farrow	2	69	75%	23	25%	92	13	1
Ferrymans	9	155	83%	32	17%	187	20	1
Gilbert Family	3	26	50%	26	50%	52	9	1
Hack Point	70	2056	74%	709	26%	2765	21	1
Hartman	25	388	89%	47	11%	435	20	1
Henshell	1	102	70%	44	30%	146	4	1
Hill	3	13	43%	17	57%	30	3	1
Irwin	4	123	62%	74	38%	197	2	2

Site	Number of transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Jacob	23	642	68%	299	32%	941	37	1
Jockwar	5	123	35%	230	65%	353	19	2
Kartoo Road	129	3824	61%	2494	39%	6318	34	2
Kindaruar Farm	18	195	28%	507	72%	702	11	2
Lane	5	117	95%	6	5%	123	20	1
Lifestyle	9	243	80%	59	20%	302	33	1
Long Point	3	34	60%	23	40%	57	4	3
Low Point	11	183	54%	156	46%	339	18	1
Lucas	14	155	95%	8	5%	163	19	1
Lukes	6	31	70%	13	30%	44	13	2
Mason Gymkhana	9	12	4%	255	96%	267	8	3
Mason Midway	20	87	22%	309	78%	396	10	2
Mason Windmill	13	140	57%	106	43%	246	6	2
Mason Wolverton	5	5	5%	96	95%	101	10	1
Mirtschin	7	359	80%	91	20%	450	20	1
Mulungushi	27	288	74%	103	26%	391	21	1
Narrung Wetland	3	219	77%	64	23%	283	16	2
Nurra Nurra	2	130	83%	27	17%	157	7	1
Oreb	2	74	99%	1	1%	75	12	1
Poltalloch Inland Dune	36	446	38%	733	62%	1179	24	2
Poltalloch Lake Shore	6	2181	69%	973	31%	3154	2	1
Portus	5	509	62%	309	38%	818	12	1
Reynolds-Sturt Farm	4	87	78%	25	22%	112	15	1
Saunders	9	46	23%	156	77%	202	10	1
Smith	6	429	72%	171	29%	600	9	1
Snake Reserve	5	313	55%	251	45%	564	25	1
Tarni Warra	6	17	52%	16	48%	33	3	1
Treloar	6	297	51%	286	49%	583	12	1
Vasarelli	7	156	45%	192	55%	348	29	2
Warrengie	20	225	84%	43	16%	268	16	1
Watkins	24	309	74%	109	26%	418	30	1
Wellington Lodge Lake Edge	42	564	73%	210	27%	774	5	2
Westminster	22	712	76%	230	24%	942	20	2
Wyndgate Grey Paddock	13	139	90%	16	10%	155	26	1
Wyndgate Homestead	3	51	50%	50	40%	101	17	2
WyndgateTarrs	9	156	62%	96	38%	252	18	1
Total-Summary Across All Sites	**835**	**22,018**	**62%**	**13,320**	**38%**	**35,338**	**121**	**1**

Table 4 Summary of number of sites for each category of overall survivorship

Overall survivorship (%)	Number of Sites
0-20	2
20-40	7
40-60	10
60-80	23
80-100	14

Table 5 Summary of plant health across all sites monitored

Health	Score	Number of Sites
Good	1	36
Slightly Affected	2	17
Severely Affected	3	2
Dying	4	1

3.2 Survivorship of each species

The survivorship of each species identified was calculated across all sites monitored (Table 7). A large proportion (81 species) of the 121 species identified recorded over 80% survivorship (Table 8). Some of the most notable species within this category included *Acacia spp.*, *Eucalyptus spp.*, *Allocasuarina spp.*, *Enchylaena tomentose* and sedges. *Allocasuarina verticillata* was the most common species at 42 sites.

Fourteen species recorded very low survivorship (<20%) and included *Puccinellia stricta*, *Lasiopetalum baueri*, *Enneapogon nigricans* as well as many unknown species.

Of all the species planted 74 were in good condition and 40 were slightly affected (Table 9). Plants which were slightly affected showed some signs of grazing and either heat or water stress, growth was still evident in this class of plant health. Only one species, *Acacia leiophylla* showed sign of being severely affected, of which only two individuals were found. Severely affected plants showed minimal signs of growth with high impacts from grazing and heat or water stress (evident by browned leaves).

The overall survivorship for each species for each zone monitored across the region is summarised in Table 10. The 'other inland' zone obtained the highest survivorship across the nine zones monitored, with 72% survivorship (5073 individual plants). The 'saline swamp' zone obtained the lowest survivorship, with 52% (615 individuals). The survivorship of each species within each zone in which it was identified is summarised in Table 11.

Table 6 Summary of number of species for each category of overall survivorship

Overall Survivorship (%)	Number of Species
0-20	10
20-40	7
40-60	7
60-80	18
80-100	79

Table 7 Plant survivorship for each species identified

*indicates an introduced species

Species	Number of Sites	Alive	Alive %	Dead	Dead %	Total Plants	Average Plant Health
Acacia calamifolia	3	20	80%	5	20%	25	1
Acacia cupularis	12	71	92%	6	8%	77	2
Acacia dodonaeifolia	2	1	50%	1	50%	2	1
Acacia leiophylla	1	2	100%	0	0%	2	3
Acacia ligulata	3	1	33%	2	67%	3	2
Acacia longifolia var. sophorae	27	354	78%	100	22%	454	1
Acacia microcarpa	1	4	67%	2	33%	6	1
Acacia myrtifolia	3	8	100%	0	0%	8	2
Acacia paradoxa	12	79	76%	25	24%	104	1
Acacia pycnantha	25	222	62%	136	38%	358	1
Acacia retinodes	1	2	100%	0	0%	2	2
*Acacia saligna**	1	1	100%	0	0%	1	2
Acacia sp. 1	18	27	27%	73	73%	100	2
Acacia sp. 2	1	8	100%	0	0%	8	1
Acacia sp. 3	1	1	100%	0	0%	1	1
Acacia spinescens	10	55	98%	1	2%	56	1
Acacia wilhelmiana	1	0	0%	2	100%	2	—
Adriana quadripartita	6	23	96%	1	4%	24	1
Allocasuarinapusilla	1	2	100%	0	0%	2	2
Allocasuarina sp.	1	10	100%	0	0%	10	2
Allocasuarina verticillata	42	2254	84%	416	16%	2670	2
Atriplex paludosa	16	1552	94%	100	6%	1652	1
Atriplex semibaccata	15	418	85%	74	15%	492	1
Atriplex sp.	6	15	83%	3	17%	18	2
Austrodanthonia caespitosa	8	457	91%	47	9%	504	2
Austrodanthonia sp.	2	389	72%	150	28%	539	2
Austrostipa elegantissima	5	175	89%	22	11%	197	1
Austrostipa eremophila	1	3	100%	0	0%	3	1
Austrostipa flavescens	2	118	94%	8	6%	126	1
*Austrostipa sp.*1	6	177	77%	53	23%	230	2

Species	Number of Sites	Alive	Alive %	Dead	Dead %	Total Plants	Average Plant Health
Austrostipasp. 2	2	145	64%	80	36%	225	2
Banksia ornata	3	9	75%	3	25%	12	1
Billardiera cymosa	13	77	95%	4	5%	81	1
Billardiera scandens	2	2	100%	0	0%	2	1
Bursaria spinosa	25	142	89%	17	11%	159	1
Callistemon rugulosus	3	12	52%	11	48%	23	2
Callitris gracilis	18	142	85%	25	15%	167	1
Callitris sp.	1	0	0%	3	100%	3	—
Calytrix tetragona	4	15	68%	7	32%	22	2
Carpobrotus rossii	8	68	91%	7	9%	75	1
Clematis microphylla	8	34	100%	0	0%	34	1
Correa reflexa	1	2	67%	1	33%	3	2
Cyperus gymnocaulos	4	435	56%	335	44%	770	2
Dianella brevicaulis	6	77	97%	2	3%	79	2
Dianella revoluta	9	166	90%	18	10%	184	1
Dianella sp.	1	0	0%	1	100%	1	—
Disphyma crassifolium	8	582	84%	109	16%	691	2
Dodonaea viscosa ssp. spatulata	31	525	81%	127	19%	652	1
Duma florulenta	9	61	95%	3	5%	64	1
Duma horrida	1	3	100%	0	0	3	1
Einadia nutans	4	10	100%	0	0%	10	1
Enchylaena tomentosa	17	1308	96%	51	4%	1359	1
Enneapogon nigricans	1	0	0%	22	100%	22	—
Eucalyptus camaldulensis	2	3	100%	0	0%	3	1
Eucalyptus diversifolia	22	320	94%	19	6%	339	1
Eucalyptus fasciculosa	5	34	89%	4	11%	38	1
Eucalyptus incrassata	10	389	95%	21	5%	410	1
Eucalyptus leptophylla	4	18	95%	1	5%	19	1
Eucalyptus odorata	2	3	100%	0	0	3	1
Eucalyptus porosa	14	43	91%	4	9%	47	2
Eucalyptus sp.	26	150	59%	106	41%	256	1
Eutaxia microphylla	1	1	20%	4	80%	5	1
Ficinia nodosa	22	1578	76%	507	24%	2085	2
Gahnia filum	6	46	98%	1	2%	47	1
Grass sp.	13	257	41%	366	59%	623	2
Hakea mitchellii	15	82	89%	10	11%	92	1
Hakea sp.	1	6	100%	0	0%	6	1
Juncus kraussii	5	221	94%	14	6%	235	1
Juncussp.	3	179	82%	40	18%	219	1
Kennedia prostrata	7	54	96%	2	4%	56	1
Kunzea pomifera	17	68	68%	32	32%	100	1

Species	Number of Sites	Alive	Alive %	Dead	Dead %	Total Plants	Average Plant Health
Lasiopetalum baueri	3	3	18%	14	82%	17	2
Lawrencia squamata	1	5	100%	0	0%	5	2
Leptospermum myrsinoides	2	12	92%	1	8%	13	1
Leucophyta brownii	8	46	98%	1	2%	47	1
Leucopogon parviflorus	5	20	27%	54	73%	74	1
Leucopogon sp.	1	1	100%	0	0%	1	1
Lomandra effusa	1	5	29%	12	71%	17	2
Lomandra leucocephala	2	7	100%	0	0%	7	1
Lomandra micrantha	1	2	100%	0	0%	2	2
Lotus australis	1	0	0%	1	100%	1	—
Lycium australe	1	2	100%	0	0%	2	1
Maireana brevifolia	5	29	100%	0	0%	29	1
Maireana oppositifolia	3	72	88%	10	12%	82	1
Maireana sp.	1	1	100%	0	0%	1	1
Melaleuca brevifolia	1	6	27%	16	73%	22	1
Melaleuca halmaturorum	28	1192	77%	349	23%	1541	1
Melaleuca lanceolata	26	476	82%	105	18%	581	1
Melaleuca sp.	13	27	39%	43	61%	70	2
Melaleuca uncinata	2	28	82%	6	18%	34	2
Muehlenbeckia gunnii	3	3	100%	0	0	3	1
Myoporum insulare	23	211	91%	21	9%	232	1
Myoporum parvifolium	2	9	100%	0	0%	9	2
Nitraria billardierei	4	13	59%	9	41%	22	2
Olearia axillaris	16	83	98%	2	2%	85	1
Olearia ramulosa	5	39	95%	2	5%	41	1
Pelargonium australe	8	99	76%	31	24%	130	1
Pittosporum angustifolium	2	6	100%	0	0%	6	2
Platylobium obtusangulum	1	3	75%	1	25%	4	2
Poa labillardieri	6	545	78%	152	22%	697	2
Poa poiformis var. poiformis	11	2066	53%	1829	47%	3895	2
Poa sp.	1	24	96%	1	4%	25	2
Puccinellia stricta	2	67	18%	313	82%	380	2
Pultenaea tenuifolia	1	3	100%	0	0%	3	1
Rhagodia candolleana	22	480	99%	6	1%	486	1
Samolus repens	1	6	100%	0	0%	6	1
Samphire sp.	1	4	100%	0	0%	4	1
Sedge sp. 1	13	2440	87%	378	13%	2818	1
Sedge sp. 2	1	1	100%	0	0%	1	1
Senecio pinnatifolius	2	12	75%	4	25%	16	1
Senecio sp.	1	0	0%	3	100%	3	—
Tecticornia arbuscula	2	57	100%	0	0%	57	1
Tetragonia implexicoma	4	9	100%	0	0%	9	1

Species	Number of Sites	Alive	Alive %	Dead	Dead %	Total Plants	Average Plant Health
Themeda triandra	1	44	96%	2	4%	46	1
Thomasia petalocalyx	2	8	89%	1	11%	9	1
Threlkeldia diffusa	1	2	100%	0	0%	2	2
Unknown species	56	19	0.3%	6271	99.7%	6740	1
Velleia arguta	1	7	100%	0	0%	7	1
Vittadinia australasica	7	81	70%	34	30%	115	1
Wahlenbergia sp.	1	0	0%	13	100%	13	—
Xanthorrhoea semiplana	7	27	90%	3	10%	30	2

Table 8 Summary of number of species for each category of overall survivorship

Overall survivorship (%)	Number of Species
0-20	10
20-40	7
40-60	7
60-80	18
80-100	79

Table 9 Overall plant health of species identified

Health	Score	Number of Species	% of total population
Good	1	74	61%
Slightly Affected	2	39	33%
Severely Affected	3	1	1%
Dying*	4	7	6%

*This only includes dead species which were able to be identified as opposed to the majority of dead plants which were classed as "unknown species".

Table 10 Overall summary of plant survivorship per zone.

Zone	Alive	Alive %	Dead	Dead %	Total Counted	Average Species health
1 - Lake/lagoon edge	866	63%	512	37%	1378	2
2 - Saline swamp	615	52%	566	48%	1181	2
3 - Saline edge	4500	64%	2504	36%	7004	1
4 - Rising ground	1213	55%	976	45%	2189	1
5 - Slope/embankment	3405	64%	1950	36%	5355	1
7 - Cliff top	683	70%	299	30%	982	2
8 - Sandhill	2486	55%	2043	45%	4529	2
9 - Other inland	5073	72%	2015	28%	7088	1
10 - Coastal	3131	58%	2299	42%	5430	2

Table 11 Plant survivorship within each zone for each species identified.

Species	Zone	Alive	Alive %	Dead	Dead %	Total Counted	Average Species health
Acacia calamifolia	3	1	50%	1	50%	2	1
	8	11	79%	3	21%	14	1
	9	8	89%	1	11%	9	1
Acacia cupularis	1	7	100%	0	0%	7	1
	2	1	100%	0	0%	1	1
	8	23	79%	6	21%	29	1
	9	18	100%	0	0%	18	1
	10	22	100%	0	0%	22	2
Acacia dodonaeifolia	8	0	0%	1	100%	1	—
	9	1	50%	1	50%	2	1
Acacia leiophylla	10	2	100%	0	0%	2	3
Acacia ligulata	1	1	100%	0	0%	1	2
	8	0	0%	1	100%	1	—
	9	0	0%	1	100%	1	—
Acacia longifolia var. sophorae	1	14	70%	6	30%	20	1
	3	13	81%	3	19%	16	2
	4	1	50%	1	50%	2	1
	5	1	100%	0	0%	1	1
	8	80	90%	8	10%	88	1
	9	104	65%	56	35%	160	1
	10	140	84%	26	16%	166	1
	?(Saunders)	1	100%	0	0%	1	1
Acacia microcarpa	8	4	67%	2	33%	6	1
Acacia myrtifolia	1	2	100%	0	0%	2	2

Species	Zone	Alive	Alive %	Dead	Dead %	Total Counted	Average Species health
	3	1	100%	0	0%	1	2
	8	5	100%	0	0%	5	2
Acacia paradoxa	3	1	100%	0	0%	1	2
	4	2	100%	0	0%	2	2
	5	1	100%	0	0%	1	1
	8	11	79%	3	21%	14	2
	9	55	76%	17	24%	72	1
	?(Saunders)	9	64%	5	36%	14	1
Acacia pycnantha	1	4	67%	2	33%	6	1
	3	5	56%	4	44%	9	1
	4	1	50%	1	50%	2	3
	5	0	0%	1	100%	1	—
	7	1	100%	0	0%	1	1
	8	17	55%	14	45%	31	1
	9	186	63%	111	37%	297	1
	10	8	73%	3	27%	11	2
Acacia retinodes	10	2	100%	0	0%	2	2
*Acacia saligna**	3	1	100%	0	0%	1	2
Acacia sp. 1	3	2	67%	1	33%	3	1
	4	1	33%	2	67%	3	3
	8	13	30%	31	70%	44	3
	9	7	50%	7	50%	14	1
	10	1	3%	30	97%	31	1
	?(Saunders)	3	60%	2	40%	5	2
Acacia sp. 2	8	8	100%	0	0%	8	1
Acacia sp. 3	8	1	100%	0	0%	1	1
Acacia spinescens	3	14	93%	1	7%	15	1
	4	2	100%	0	0%	2	1
	8	26	100%	0	0%	26	1
	9	13	100%	0	0%	13	1
Acacia wilhelmiana	8	0	0%	2	100%	2	—
Adriana quadripartita	3	6	100%	0	0%	6	2
	4	3	100%	0	0%	3	1
	7	5	100%	0	0%	5	2
	8	2	67%	1	33%	3	2
	9	7	100%	0	0%	7	1
Allocasuarina pusilla	8	2	100%	0	0%	2	2
Allocasuarina sp.	8	10	100%	0	0%	10	2
Allocasuarina verticillata	1	272	79%	71	21%	343	3
	2	24	100%	0	0%	24	1
	3	37	74%	13	26%	50	2
	4	19	95%	1	5%	20	1

Species	Zone	Alive	Alive %	Dead	Dead %	Total Counted	Average Species health
	5	3	33%	6	67%	9	2
	7	1	100%	0	0%	1	3
	8	252	70%	106	30%	358	2
	9	1577	89%	204	11%	1781	2
	10	66	83%	14	18%	80	2
	?(Saunders)	3	75%	1	25%	4	1
Atriplex paludosa	2	80	84%	15	16%	95	2
	3	866	93%	67	7%	933	1
	4	382	96%	18	5%	400	1
	5	85	100%	0	0%	85	1
	8	45	100%	0	0%	45	1
	9	16	100%	0	0%	16	2
	10	78	100%	0	0%	78	1
Atriplex semibaccata	2	83	72%	32	28%	115	2
	3	206	88%	27	12%	233	1
	4	6	86%	1	14%	7	2
	5	45	100%	0	0%	45	2
	7	8	62%	5	38%	13	2
	8	26	76%	8	24%	34	2
	9	28	100%	0	0%	28	1
	10	16	94%	1	6%	17	2
Atriplex sp.	2	1	100%	0	0%	1	3
	3	8	80%	2	20%	10	1
	5	2	67%	1	33%	3	3
	9	4	100%	0	0%	4	1
Austrodanthonia caespitosa	1	70	100%	0	0%	70	2
	3	42	84%	8	16%	50	2
	4	11	100%	0	0%	11	1
	8	183	92%	16	8%	199	2
	9	40	66%	21	34%	61	2
	10	111	98%	2	2%	113	2
Austrodanthonia sp.	1	18	95%	1	5%	19	2
	5	196	65%	105	35%	301	2
	7	174	80%	44	20%	218	2
	9	1	100%	0	0%	1	1
Austrostipa elegantissima	4	18	100%	0	0%	18	2
	7	15	79%	4	21%	19	1
	8	135	88%	18	12%	153	1
	9	7	100%	0	0%	7	2
Austrostipa eremophila	9	3	100%	0	0%	3	1
Austrostipa flavescens	4	10	100%	0	0%	10	1
	8	72	90%	8	10%	80	2

Species	Zone	Alive	Alive %	Dead	Dead %	Total Counted	Average Species health
	9	36	100%	0	0%	36	1
*Austrostipa sp.*1	1	6	40%	9	60%	15	2
	3	3	100%	0	0%	3	2
	4	36	57%	27	43%	63	2
	5	23	77%	7	23%	30	2
	7	41	82%	9	18%	50	2
	8	36	100%	0	0%	36	2
	9	30	100%	0	0%	30	2
	10	2	67%	1	33%	3	3
Austrostipa sp. 2	5	69	55%	56	45%	125	2
	7	75	76%	24	24%	99	2
	9	1	100%	0	0%	1	1
Banksia ornata	4	0	0%	1	100%	1	—
	8	5	71%	2	29%	7	1
	9	4	100%	0	0%	4	1
Billardiera cymosa	4	4	80%	1	20%	5	1
	5	1	100%	0	0%	1	2
	8	9	90%	1	10%	10	1
	9	21	100%	0	0%	21	1
	10	42	95%	2	5%	44	1
Billardiera scandens	8	1	100%	0	0%	1	1
	9	1	100%	0	0%	1	1
Bursaria spinosa	1	2	100%	0	0%	2	1
	3	9	75%	3	25%	12	2
	4	2	50%	2	50%	4	3
	5	1	33%	2	67%	3	2
	7	1	100%	0	0%	1	1
	8	38	95%	2	5%	40	1
	9	86	92%	7	8%	93	1
	?(Saunders)	3	75%	1	25%	4	1
Callistemon rugulosus	4	5	63%	3	38%	8	2
	5	5	50%	5	50%	10	2
	8	2	100%	0	0%	2	2
	9	0	0%	3	100%	3	—
Callitris gracilis	8	22	56%	17	44%	39	1
	9	117	94%	8	6%	125	1
	?(Saunders)	3	100%	0	0%	3	1
Callitris sp.	8	0	0%	3	100%	3	—
Calytrix tetragona	4	2	40%	3	60%	5	1
	5	0	0%	4	100%	4	—
	8	4	100%	0	0%	4	3
	9	9	100%	0	0%	9	1

Species	Zone	Alive	Alive %	Dead	Dead %	Total Counted	Average Species health
Carpobrotus rossii	3	52	91%	5	9%	57	1
	8	2	100%	0	0%	2	1
	9	5	71%	2	29%	7	1
	10	9	100%	0	0%	9	1
Clematis microphylla	3	3	100%	0	0%	3	1
	4	1	100%	0	0%	1	1
	5	1	100%	0	0%	1	1
	8	10	100%	0	0%	10	2
	9	19	100%	0	0%	19	1
Correa reflexa	4	2	67%	1	33%	3	2
Cyperus gymnocaulos	1	35	63%	21	38%	56	2
	3	84	69%	38	31%	122	2
	5	120	71%	49	29%	169	2
	8	1	100%	0	0%	1	3
	9	195	46%	227	54%	422	2
Dianella brevicaulis	3	25	100%	0	0%	25	1
	4	10	100%	0	0%	10	1
	5	1	100%	0	0%	1	1
	8	36	95%	2	5%	38	2
	9	5	100%	0	0%	5	2
Dianella revoluta	1	18	90%	2	10%	20	2
	3	24	100%	0	0%	24	1
	4	12	55%	10	45%	22	2
	5	17	77%	5	23%	22	2
	7	40	100%	0	0%	40	1
	8	27	96%	1	4%	28	1
	9	28	100%	0	0%	28	1
Dianella sp.	9	0	0%	1	100%	1	—
Disphyma crassifolium	2	7	100%	0	0%	7	1
	3	559	84%	105	16%	664	2
	4	16	80%	4	20%	20	1
Dodonaea viscosa ssp. spatulata	1	9	100%	0	0%	9	1
	2	0	0%	1	100%	1	—
	3	13	93%	1	7%	14	1
	5	8	42%	11	58%	19	2
	7	3	100%	0	0%	3	1
	8	78	57%	59	43%	137	1
	9	294	86%	48	14%	342	1
	10	120	94%	7	6%	127	1
Duma florulenta	3	43	98%	1	2%	44	1
	4	3	100%	0	0%	3	1
	5	2	50%	2	50%	4	2

Species	Zone	Alive	Alive %	Dead	Dead %	Total Counted	Average Species health
	8	10	100%	0	0%	10	1
	9	3	100%	0	0%	3	2
Duma horrida	3	3	100%	0	0%	3	1
Einadia nutans	3	5	100%	0	0%	5	1
	5	4	100%	0	0%	4	1
	7	1	100%	0	0%	1	1
Enchylaena tomentosa	1	2	100%	0	0%	2	1
	2	35	100%	0	0%	35	2
	3	455	97%	12	3%	467	1
	4	132	99%	2	1%	134	1
	5	330	100%	1	0%	331	1
	7	14	100%	0	0%	14	2
	8	166	97%	5	3%	171	1
	9	134	81%	31	19%	165	1
	10	40	100%	0	0%	40	1
Enneapogon nigricans	3	0	0%	22	100%	22	—
Eucalyptus camaldulensis	3	2	100%	0	0%	2	1
	5	1	100%	0	0%	1	1
Eucalyptus diversifolia	1	28	100%	0	0%	28	1
	2	2	100%	0	0%	2	2
	3	1	100%	0	0%	1	1
	8	9	100%	0	0%	9	2
	9	229	95%	13	5%	242	1
	10	51	89%	6	11%	57	1
Eucalyptus fasciculosa	1	1	100%	0	0%	1	3
	3	1	100%	0	0%	1	1
	8	8	100%	0	0%	8	2
	9	15	94%	1	6%	16	1
	?(Saunders)	9	75%	3	25%	12	1
Eucalyptus incrassata	1	12	100%	0	0%	12	1
	3	1	100%	0	0%	1	1
	9	376	95%	21	5%	397	1
Eucalyptus leptophylla	3	1	100%	0	0%	1	1
	8	2	100%	0	0%	2	1
	9	15	94%	1	6%	16	1
Eucalyptus odorata	4	2	100%	0	0%	2	2
	8	1	100%	0	0%	1	1
Eucalyptus porosa	1	4	100%	0	0%	4	1
	4	1	100%	0	0%	1	2
	8	26	93%	2	7%	28	2
	9	12	86%	2	14%	14	1
Eucalyptus sp.	1	1	50%	1	50%	2	1

Species	Zone	Alive	Alive %	Dead	Dead %	Total Counted	Average Species health
	8	10	30%	23	70%	33	2
	9	125	68%	60	32%	185	1
	10	3	33%	6	67%	9	1
	?(Saunders)	11	41%	16	59%	27	2
Eutaxia microphylla	4	1	20%	4	80%	5	1
Ficinia nodosa	1	187	80%	47	20%	234	1
	2	100	88%	14	12%	114	2
	3	252	94%	15	6%	267	1
	4	326	57%	241	43%	567	2
	5	36	41%	51	59%	87	1
	7	39	53%	34	47%	73	2
	8	159	62%	96	38%	255	2
	9	175	95%	9	5%	184	1
	10	304	100%	0	0%	304	3
Gahnia filum	1	1	100%	0	0%	1	1
	3	7	88%	1	13%	8	1
	4	18	100%	0	0%	18	1
	5	14	100%	0	0%	14	1
	8	2	100%	0	0%	2	1
	9	4	100%	0	0%	4	2
Grass sp.	1	4	3%	139	97%	143	1
	2	0	0%	100	100%	100	—
	3	53	56%	42	44%	95	1
	4	0	0%	18	100%	18	—
	5	10	83%	2	17%	12	2
	7	0	0%	3	100%	3	—
	8	140	76%	44	24%	184	2
	9	50	74%	18	26%	68	1
Hakea mitchellii	1	6	100%	0	0%	6	1
	8	4	80%	1	20%	5	1
	9	72	89%	9	11%	81	1
Hakea sp.	9	6	100%	0	0%	6	1
Juncus kraussii	1	17	100%	0	0%	17	1
	3	204	94%	14	6%	218	1
Juncus sp.	3	81	90%	9	10%	90	1
	5	94	78%	26	22%	120	1
	8	4	44%	5	56%	9	2
Kennedia prostrata	3	8	100%	0	0%	8	1
	4	1	33%	2	67%	3	2
	8	27	100%	0	0%	27	1
	9	7	100%	0	0%	7	1
	10	11	100%	0	0%	11	1

Species	Zone	Alive	Alive %	Dead	Dead %	Total Counted	Average Species health
Kunzea pomifera	1	1	100%	0	0%	1	1
	2	2	67%	1	33%	3	1
	3	8	100%	0	0%	8	1
	5	2	33%	4	67%	6	2
	7	1	50%	1	50%	2	1
	8	28	85%	5	15%	33	2
	9	26	67%	13	33%	39	1
	10	0	0%	8	100%	8	—
Lasiopetalum baueri	5	0	0%	2	100%	2	—
	8	1	100%	0	0%	1	1
	9	2	14%	12	86%	14	2
Lawrencia squamata	3	5	100%	0	0%	5	2
Leptospermum myrsinoides	8	8	89%	1	11%	9	1
	9	4	100%	0	0%	4	1
Leucophyta brownii	3	2	100%	0	0%	2	1
	9	35	97%	1	3%	36	1
	10	9	100%	0	0%	9	1
Leucopogon sp.	9	1	100%	0	0%	1	1
Leucopogon parviflorus	2	0	0%	1	100%	1	—
	8	0	0%	9	100%	9	—
	9	5	100%	0	0%	5	1
	10	15	25%	44	75%	59	1
Leucopogon sp.	9	1	100%	0	0%	1	1
Lomandra effusa	8	5	29%	12	71%	17	2
Lomandra leucocephala	3	3	100%	0	0%	3	1
	4	1	100%	0	0%	1	1
	8	1	100%	0	0%	1	1
	9	2	100%	0	0%	2	2
Lomandra micrantha	8	2	100%	0	0%	2	2
Lotus australis	10	0	0%	1	100%	1	—
Lycium australe	9	2	100%	0	0%	2	1
Maireana brevifolia	1	1	100%	0	0%	1	1
	3	10	100%	0	0%	10	1
	5	2	100%	0	0%	2	1
	8	16	100%	0	0%	16	1
Maireana oppositifolia	2	21	100%	0	0%	21	1
	3	49	83%	10	17%	59	1
	4	2	100%	0	0%	2	2
Maireana sp.	9	1	100%	0	0%	1	1
Melaleuca brevifolia	3	1	7%	13	93%	14	3
	5	5	63%	3	38%	8	1
Melaleuca halmaturorum	1	8	89%	1	11%	9	1

Species	Zone	Alive	Alive %	Dead	Dead %	Total Counted	Average Species health
	2	227	75%	77	25%	304	1
	3	716	75%	236	25%	952	1
	4	67	99%	1	1%	68	1
	5	33	100%	0	0%	33	1
	8	33	73%	12	27%	45	1
	9	95	85%	17	15%	112	1
	10	13	72%	5	28%	18	1
Melaleuca lanceolata	1	5	56%	4	44%	9	1
	2	8	100%	0	0%	8	2
	3	168	85%	30	15%	198	1
	4	18	67%	9	33%	27	1
	5	1	17%	5	83%	6	1
	8	83	92%	7	8%	90	1
	9	154	77%	45	23%	199	1
	10	39	89%	5	11%	44	1
Melaleuca sp.	2	0	0%	1	100%	1	—
	3	11	48%	12	52%	23	2
	4	0	0%	1	100%	1	—
	5	0	0%	2	100%	2	—
	8	14	58%	10	42%	24	1
	9	2	12%	15	88%	17	1
	10	0	0%	2	100%	2	—
Melaleuca uncinata	7	1	100%	0	0%	1	2
	8	27	82%	6	18%	33	2
Muehlenbeckia gunnii	1	1	100%	0	0%	1	1
	4	1	100%	0	0%	1	1
	8	1	100%	0	0%	1	1
Myoporum insulare	1	9	100%	0	0%	9	1
	2	4	80%	1	20%	5	1
	3	45	80%	11	20%	56	2
	4	21	91%	2	9%	23	1
	5	0	0%	3	100%	3	—
	8	1	100%	0	0%	1	1
	9	85	99%	1	1%	86	1
	10	46	94%	3	6%	49	1
Myoporum parvifolium	9	9	100%	0	0%	9	2
Nitraria billardierei	2	3	75%	1	25%	4	3
	3	7	47%	8	53%	15	2
	5	3	100%	0	0%	3	2
Olearia axillaris	1	10	100%	0	0%	10	1
	2	2	100%	0	0%	2	1
	3	6	100%	0	0%	6	2

Species	Zone	Alive	Alive %	Dead	Dead %	Total Counted	Average Species health
	4	4	100%	0	0%	4	2
	8	10	91%	1	9%	11	1
	9	45	98%	1	2%	46	1
	10	3	100%	0	0%	3	1
	?(Saunders)	3	100%	0	0%	3	1
Olearia ramulosa	3	1	100%	0	0%	1	1
	4	5	100%	0	0%	5	1
	7	0	0%	1	100%	1	—
	8	5	100%	0	0%	5	1
	9	28	97%	1	3%	29	1
Pelargonium australe	3	2	100%	0	0%	2	3
	4	5	100%	0	0%	5	1
	5	2	100%	0	0%	2	2
	8	7	88%	1	13%	8	2
	9	34	89%	4	11%	38	1
	10	49	65%	26	35%	75	1
Pittosporum angustifolium	7	4	100%	0	0%	4	2
	8	2	100%	0	0%	2	2
Platylobium obtusangulum	8	3	75%	1	25%	4	2
Poa labillardieri	1	7	100%	0	0%	7	1
	3	86	100%	0	0%	86	1
	7	251	67%	125	33%	376	2
	8	175	87%	27	13%	202	2
	9	6	100%	0	0%	6	1
	10	20	100%	0	0%	20	1
Poa poiformis var. poiformis	2	3	100%	0	0%	3	2
	3	112	35%	210	65%	322	2
	4	14	88%	2	13%	16	1
	8	31	100%	0	0%	31	1
	9	19	100%	0	0%	19	1
	10	1887	54%	1617	46%	3504	2
Poa sp.	9	24	96%	1	4%	25	2
Puccinellia stricta	2	0	0%	274	100%	274	—
	5	67	63%	39	37%	106	2
Pultenaea tenuifolia	9	3	100%	0	0%	3	1
Rhagodia candolleana	1	14	93%	1	7%	15	1
	3	88	100%	0	0%	88	1
	4	36	100%	0	0%	36	1
	5	13	100%	0	0%	13	2
	7	8	100%	0	0%	8	1
	8	100	96%	4	4%	104	1
	9	220	100%	1	0%	221	1

Species	Zone	Alive	Alive %	Dead	Dead %	Total Counted	Average Species health
	?(Saunders)	1	100%	0	0%	1	1
Samolus repens	3	6	100%	0	0%	6	1
Samphire sp.	3	4	100%	0	0%	4	1
Sedge sp. 1	1	89	53%	80	47%	169	1
	3	67	71%	28	29%	95	2
	4	0	0%	1	100%	1	—
	5	2200	95%	108	5%	2308	1
	7	0	0%	1	100%	1	—
	8	42	28%	106	72%	148	2
	9	23	45%	28	55%	51	1
	10	19	42%	26	58%	45	2
Sedge sp. 2	10	1	100%	0	0%	1	1
Senecio pinnatifolius	3	1	50%	1	50%	2	1
	8	11	79%	3	21%	14	1
Senecio sp.	7	0	0%	3	100%	3	—
Tecticornia arbuscula	9	57	100%	0	0%	57	1
Tetragonia implexicoma	3	2	100%	0	0%	2	1
	4	5	100%	0	0%	5	1
	10	2	100%	0	0%	2	2
Themeda triandra	8	44	96%	2	4%	46	1
Thomasia petalocalyx	8	8	89%	1	11%	9	1
Threlkeldia diffusa	5	2	100%	0	0%	2	2
Unknown species	1	0	0%	127	100%	127	—
	2	12	20%	48	80%	60	1
	3	1	0%	1549	100%	1550	1
	4	0	0%	617	100%	617	—
	5	0	0%	1437	100%	1437	—
	7	0	0%	43	100%	43	—
	8	2	0%	1310	100%	1312	4
	9	4	0%	996	100%	1000	2
	10	0	0%	466	100%	466	—
	?(Saunders)	0	0%	128	100%	128	—
Velleia arguta	9	7	100%	0	0%	7	1
Vittadinia australasica	3	7	88%	1	13%	8	1
	4	4	100%	0	0%	4	2
	5	5	28%	13	72%	18	2
	7	0	0%	2	100%	2	—
	8	46	72%	18	28%	64	1
	9	19	100%	0	0%	19	1
Wahlenbergia sp.	8	0	0%	13	100%	13	—
Xanthorrhoea semiplana	8	15	83%	3	17%	18	2
	9	12	100%	0	0%	12	1

3.3 Plant Survivorship per Site and Zone

The following section summarises the vegetation survivorship for each site monitored. A photograph showing the overall condition of the site is provided including site observations that may provide some explanation to the survivorship results obtained.

The number and percentage of alive and dead plants is displayed within each site and across each zone. The number of species identified does not include the dead "unknown species". The site ID is indicated in brackets next to the site name.

ACL – TRIANGLE (19)

The site has been severely impacted by grazing resulting in poor survivorship.

Evidence of cattle, rabbits (spotted during field survey) and kangaroos.

Many tree guards and stakes had been knocked over by cattle. The majority of seedlings within these guards have not survived.

A large number of plants were not guarded at this site, in most cases no tree guard resulted in no survival.

Waypoint 3 (Poly 2056) had no 2012 plantings as it was located within a samphire wetland; hence no data was recorded for this transect.

Zones monitored: Lake/lagoon edge (Zone 1), Saline edge (Zone 3), Rising ground (Zone 4), Slope/embankment (Zone 5).

Site	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
ACL-Triangle	13	367	38%	602	62%	969	19	2

Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
1	2057	1	70	57%	53	43%	123	2	1
3	2056	3	114	43%	152	57%	266	8	2
4	2058	4	60	17%	292	83%	352	11	2
5	2055, 2059	5	123	54%	105	46%	228	10	1

AYRES (146)

The site was in good condition with evidence of weed management assisting with the overall survivorship of plants.

Not much evidence of grazing.

Some plants may have suffered from lack of water or heat stress.

Zones monitored: Saline swamp (zone 2) and Saline edge (zone 3).

Site	Number of transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Ayres	5	171	90%	18	10%	189	4	1

Zone	Poly_ID	Number of transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
2	2139	3	121	95%	7	5%	128	4	1
3	2140	2	50	82%	11	18%	61	3	2

BLAKE COMMUNITY (25)

The site had a good survivorship of the woody species planted in 2012.

The site was covered in weeds (predominately grass species), with no weed control evident.

Weeds were recorded growing through many of the tree guards and out competing the native grasses and sedges.

Zones monitored: Saline edge (Zone 3), Rising ground (Zone 4) and Other inland (Zone 9).

Site	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Blake Community	12	413	63%	239	37%	652	34	1

Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
3	2067	1	75	83%	15	17%	90	6	1
4	2065	1	53	91%	5	9%	58	8	1
9	2066, 2068	10	285	57%	219	43%	504	34	1

BOGGY LAKE (26)

Grazing impacts were evident at Boggy Lake, especially from rabbits.

Evidence of recent cattle presence.

Soils varied from solid limestone on high ground, to sand patches and black clay samphire flats.

Moderate survival rates on most transects.

Zones monitored: Saline edge (Zone 3), Slope/embankment (Zone 5) and Other inland (Zone 9).

Site	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Boggy Lake	30	915	67%	452	33%	1367	13	1

Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
3	1946, 1947, 1948, 1949	8	380	76%	123	24%	503	3	1
5	1950	7	353	65%	187	35%	540	3	1
9	1951	15	182	56%	142	44%	324	11	1

BONNEY RESERVE (214)

Overall, the site and plants were in very poor condition.

Lots of weeds were present throughout the site.

The lack of tree guards resulted in high grazing pressure on the plants, possibly from rabbits and kangaroos. Rabbit burrows were present at the site.

The majority of the plants had little evidence of growth.

There was evidence that some of the seedlings were pulled from the ground from grazing activity.

Zone monitored: Lake/lagoon edge (Zone 1).

Site	Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Bonney Reserve	1	2148	22	223	76%	72	24%	295	1	4

BURNS (30)

Electric fence around 2012 planting site.

Minimal grazing impacts.

More than half the 2012 planting were planted without guards (predominantly *Ficinia nodosa* seedlings). The plants without guards had a very poor survival rate and may be affected by off-target herbicide spraying (not protected from drift by the guards) as weed control appears to have been undertaken at this site. This was particularly evident in an area where one guarded sedge was in good condition, while surrounding, non-guarded sedges had died.

Zones monitored: Lake/lagoon edge (Zone 1), Slope/embankment (Zone 5), Sandhill (Zone 8).

Site	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Burns	5	248	32%	518	68%	766	10	1

Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
1	2071, 2072	2	220	44%	280	56%	500	6	1
5	2070	1	11	7%	155	93%	166	3	2
8	2069	2	17	17%	83	83%	100	4	2

CAMP COORONG (33)

Evidence of grazing from rabbits and kangaroos.

Some seedlings were not well planted or not planted deep enough with the roots exposed.

Pest infestations, from unknown insects and mealybugs, were evident on some plants.

The tree guards were very deteriorated and collapsed on the plants.

Large proportions of *Acacia pycnantha* were dead or dying.

Zone monitored: Other Inland (Zone 9)

Site	Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Camp Coorong	9	2150	30	589	80%	146	20%	735	24	1
	9	2149	No plantings	–	–	–	–	–	–	–

COUNCIL RESERVE 8

Very good survivorship and plant health at this site.

Minimal grazing evident.

The area was cleared of weeds around plantings prior to planting. Very good conditions.

The samphire flat area was planted in 2012 with samphire and grass species in between established plants.

Zone monitored: Other inland (Zone 9).

Site	Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Council Reserve 8	9	2020, 2021, 2022, 2023	8	118	91%	12	9%	130	13	1

DREDGE (193)

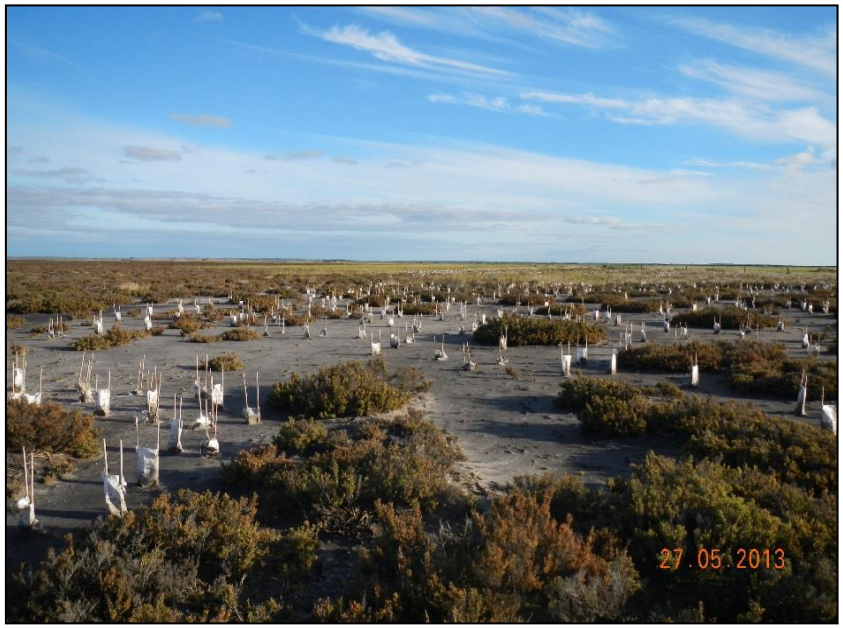
Very small area on Hindmarsh Island.

Establishment of 2012 plantings has been successful, in particular the *Atriplex* species.

Zone monitored: other inland (Zone 9).

Site	Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Dredge	9	2025	1	21	88%	3	13%	24	3	2
	9	2024	2013 plantings	–	–	–	–	–	–	–

ECKERT (149)



A 56% survival rate was recorded for the 2012 plantings at the Eckert site.

There was evidence of rabbits including the sighting of two large hares during the field study.

Evidence of grazing particularly on *Melaleuca* and *Atriplex* species.

Weed species (particularly grasses) were invasive at various areas and had out competed natives in a number of transects.

Herbicide spraying was undertaken during time of monitoring with chemical seen on the biodegradable guards. This may have contributed to the fatalities in established species.

Some plants were not planted deep enough and may have resulted in fatalities.

Zone monitored: Saline edge (Zone 3).

Site	Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Eckert	3	2144	30	1024	56%	810	44%	1834	10	2

ELVISH

The area was covered with exotic grass species, no weed control appears to have been implemented.

Relatively low survival rate at a number of transects which may be contributed to lack of water over summer and/or competition with weed species.

The plantings were located in two patches north and south of the property. No plantings were observed at two waypoints located between the northern and southern patches.

Zone monitored: Other inland (Zone 9).

Site	Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Elvish	9	2026	9	92	63%	53	37%	145	14	1

FARROW (194)

2012 plantings have established well at this site with good diversity.

No evidence of grazing pressures.

Weeds were present, however they do not appear to be having a detrimental effect on the plantings.

Zone monitored: Other inland (Zone 9).

Site	Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Farrow	9	2027	2	69	75%	23	25%	92	13	1

FERRYMANS (195)

Excellent plant establishment and species diversity at the Ferrymans site.

Appropriate weed control has been conducted which may have contributed to the high survival rate.

Hares where observed during the site visit, however all 2012 plantings were tree guarded (using the plastic guards) so no detrimental grazing effects were observed.

Zone monitored: Other inland (Zone 9).

Site	Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Ferrymans	9	2028	9	155	83%	32	17%	187	20	1

GILBERT FAMILY (135)

50% survivorship recorded at the Gilbert Family site and maybe the result of weed species growing through the tree guards and out-competing the native seedlings.

Weed control is highly recommended at this site.

Zone monitored: Other inland (Zone 9)

Site	Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Gilbert Family	9	2029	3	26	50%	26	50%	52	9	1

HACK POINT (51)

Overall plantings throughout the site suffered from high grazing pressure.

Pest infestations were evident on some plants. Possible from rabbits and kangaroos as evident from scats around the site.

Plants may be suffering from a lack of water or heat stress.

Several zones did not have any plantings as indicated from the management plans. Within some other zones the extent of plantings was less than indicated.

Poly 1973b is located between Poly 1973 and 1974, both of which were not planted. The plantings in Poly 1973b appeared to be from 2012.

Zones monitored: Other inland (Zone 9) and Saline edge (Zone 3).

Site	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Hack Point	70	2056	74%	709	26%	2765	21	1

Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
3	1977	5	107	89%	13	11%	120	2	1
9	1970, 1971, 1973b, 1976	65	1949	74%	696	26%	2645	21	1
3	1978	No plantings	–	–	–	–	–	–	–
9	1972, 1973, 1974, 1975	No plantings	–	–	–	–	–	–	–

HARTMAN (152)

The overall condition of the surviving plants was good.

Several plants were not planted deep enough and signs of heat or water stress were evident, as evident from browning off of the leaves.

Some of the tree guards were closed at the top preventing sunlight.

Zones monitored: Lake/lagoon edge (Zone 1) and Saline swamp (Zone 2).

Site	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Hartman	25	388	89%	47	11%	435	20	1

Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
1	1992	16	143	92%	12	8%	155	18	1
2	1991	9	245	88%	35	13%	280	7	1

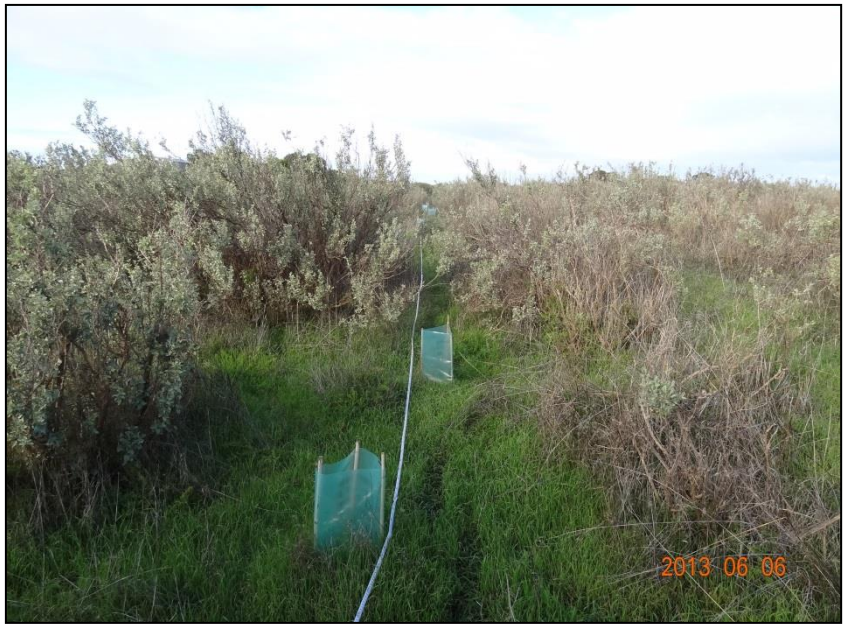
HENSHELL (56)

Survivorship at this site could be increased by not planting too close to water logged areas.

The majority of the dead plants were in the water logged area.

Zone monitored: Slope/embankment (Zone 5).

Site	Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Henshell	5	2130	1	102	70%	44	30%	146	4	1



HILLS (197)

The 2012 plantings have been planted between large established saltbush plants.

The site is densely covered with exotic grass species.

The low survivorship of the 2012 native seedlings may be attributed to competition with both weed species and established salt bush.

No grazing was evident at this site.

Zone monitored: Other inland (Zone 9).

Site	Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Hills	9	2036	3	13	43%	17	57%	30	3	1

IRWIN (199)

Only two species were planted at Irwin and included *Allocasuarina verticillata* and *Callitris gracilis.*

The majority of the dead plants were *Allocasuarina verticillata*. It appeared that many plants had established then died off which may be a result of the dry 2012/2013 summer.

The plants which were alive were of fair health, possibly due to heat and water stress.

Competition with exotic grass species was evident (grass growing in guards and smothering seedlings).

Zone monitored: Other inland (Zone 9).

Site	Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Irwin	9	2037	4	123	62%	74	38%	197	2	2

JACOB (218)

The overall condition across this site was good with many of the surviving plants doing well.

Evidence of grazing was noted across the site.

Zones monitored: Saline edge (Zone 3) and Sandhill (Zone 8)

Site	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Jacob	23	642	68%	299	32%	941	37	1

Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
3	2132, 2133	6	192	57%	145	43%	337	21	1
8	2134, 2135	17	450	75%	154	25%	604	31	1
3	2131	No plantings	–	–	–	–	–	–	–

JOCKWAR RESERVE (153)

Poor survivorship at Jockwar Reserve.

The site is densely covered with weed species (grasses) which may have outcompeted many of the native seedlings.

Moderate grazing by rabbits was evident and many of the tree guards had deteriorated.

Zones monitored: Rising ground (Zone 4), Slope/embankment (Zone 5), Other inland (Zone 9).

Site	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Jockwar	5	123	35%	230	65%	353	19	2

Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
4	1958	1	48	44%	62	56%	110	1	2
5	1849	1	15	30%	35	70%	50	11	2
9	1848, 1993	3	60	31%	133	69%	193	17	2

KARTOO ROAD (63)

Many zone showed high evidence of grazing and many tree guards had deteriorated and collapse onto the plants which may have contributed to the poor plant condition.

The plants planted in sandy soils on the lake edge had very poor survivorship.

There were signs that cattle had walked through the plantings along the roadside zones, which was unfenced.

Evidence of motorbike tracks and of cars running over some areas was noted.

The sites needs more weed management in some areas.

Many plants showed signs of heat or water stress.

Zones monitored: Saline Swamp (Zone2), Saline Edge (Zone 3), Rising Ground (Zone 4), and Coastal (Zone 10).

Site	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Kartoo Road	130	3824	61%	2494	39%	6318	34	2

KARTOO ROAD

Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
2	1857, 1861	4	46	79%	12	21%	58	9	2
3	1858, 1864, 1865, 1876,	7	173	81%	41	19%	214	8	1
4	1866, 1867, 1868, 1869	22	508	75%	165	25%	673	8	1
10	1836, 1837, 1859, 1860, 1870, 1871, 1872, 1873, 1874, 1877, 1886, 1887, 1888, 1889, 1890, 1891,	96	3097	58%	2276	42%	5373	34	2
2	1862, 1963, 1875	No plantings	–	–	–	–	–	–	–

KINDARUAR FARM (66)

The poor survival rate at Kindaruar Farm was associated with the high number of dead *Puccinellia stricta* recorded. It may be possible that this species is dormant rather than dead (the species is known to go dormant throughout the summer months). These grasses also had seed heads from last season which could result in future germination

Although 30 transects were required throughout area 1847, located on samphire flat area, the majority was unplanted with only one transect recording plants.

Species planted on samphire flat margins produced poor results, the rising ground around the margins was much better.

Areas along the edge of area 1843 were very weedy.

Zones monitored: Saline swamp (Zone 2) and Saline edge (Zone 3).

Site	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Kindaruar Farm	18	195	28%	507	72%	702	11	2

Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
2	1844, 1845, 1846, 1847	8	63	13%	406	87%	469	7	2
3	1843	10	132	57%	101	43%	233	7	2

LANE (200)

Great survivorship and plant health of the 2012 plantings.

No random waypoints were provided for this site therefore transects were chosen during the field survey.

Transects 1- 3 were located in an area consisting of only 2012 low density plantings with *Myoporum insulare* and *Carpobrotus rossii the* only species recorded along the transects.

Transects 4 and 5 were located in an area of infill plantings with very high species diversity and density.

Weeds had been managed well at this site and no signs of grazing was evident.

Zone monitored: Other inland (Zone 9).

Site	Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Lane	9	2038	5	117	95%	6	5%	123	21	1

LIFESTYLES (157)

Overall plants were doing well at this site. Survivorship was assisted by extra guards (wire fencing) placed around some plants.

Evidence of rabbits.

Signs of weed management throughout the site.

Zone monitored: Saline Edge (Zone 3).

Site	Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Lifestyles	3	2136, 2137	9	243	80%	59	20%	302	32	1

LONG POINT (71)

The site was in very poor condition and appeared to be heavily affected by grazing animals, especially rabbits.

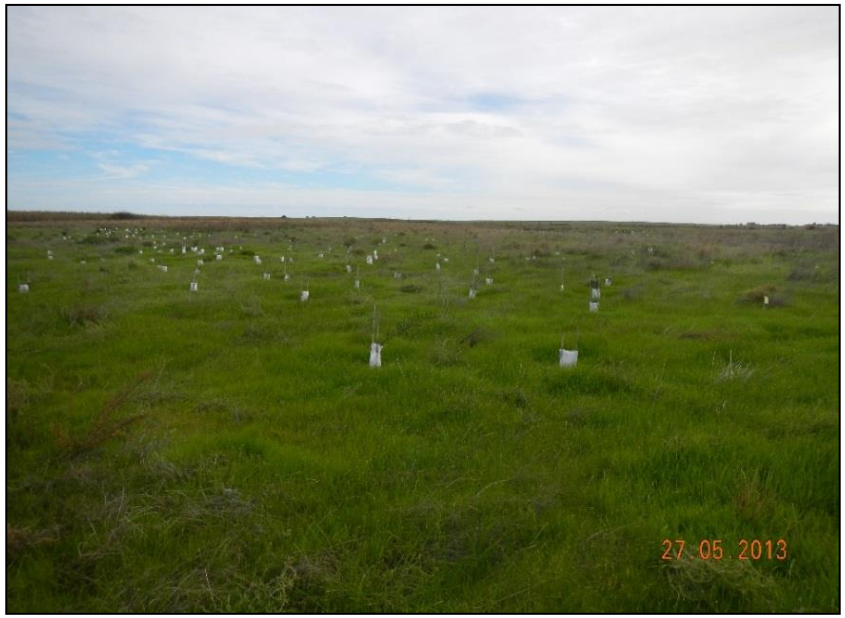
Most of the tree guards were flat to the ground or missing.

Soil condition also appeared poor.

Zone monitored: Coastal (Zone 10).

Site	Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Long Point	10	1957	3	34	60%	23	40%	57	4	3

LOW POINT (73)



Relatively poor survival rate at this site.

Evidence of cattle throughout the site with a number of guards and stakes knocked over.

Many of the dead plants(unknown species) appear to be out competed by weeds as the guards were overgrown by introduced species.

Zones monitored: Saline edge (Zone 3), Rising ground (Zone 4), Sandhill (Zone 8), Other inland (Zone 9).

Site	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Low Point	11	183	54%	156	46%	339	18	1

Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
3	1856	1	7	54%	6	46%	13	3	1
4	1850, 1851	3	49	43%	65	57%	114	6	2
8	1852	3	56	65%	30	35%	86	11	1
9	1853, 1854, 1855	4	71	56%	55	44%	126	14	1

LUCAS (201)

Great survivorship, plant health and diversity recorded at this site.

The 2012 plantings where in filled between older plants with predominately she-oaks.

2013 seedlings had already been planted at this site.

The older and younger plants not included in the transect data.

Zone monitored: Other inland (Zone 9).

Site	Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Lucas	9	2039, 2040, 2041	14	155	95%	8	5%	163	19	1

LUKES (202)

High proportion of weeds in the area monitored.

A fire had burned through much of the area, many plants were scorched, some dead, others regrowing from the base (e.g. She-oaks).

The plant guards were burnt, scorched by heat or had holes burnt in them.

High numbers of white snails seen although hard to identify how many were alive. The snails were present on the guards and the plants, further observations would be required to determine if they are impacting on plant health.

Zone monitored: Other inland (Zone 9).

Site	Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Lukes	9	2042	6	31	70%	13	30%	44	11	2

MASON GYMKHANA (160)

Extremely poor vegetation survivorship at this site. Signs of heavy grazing impacts by kangaroos and rabbits may provide some explanation to the survivorship.

The site has very sandy soils which may provide some evidence for the poor survivorship.

There was evidence of plants completely 'dug' from the ground by grazing fauna.

Plant health of the surviving plants was poor (average plant health of three).

Apart from grazing, seedlings may have struggled with competition for water with established sedges dominating the area (seedlings planted close to established sedges).

Zones monitored: Rising ground (Zone 4) and Sandhill (Zone 8).

Site	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Mason Gymkhana	9	12	4%	255	96%	267	8	3

Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
4	1840	2	0	0%	13	100%	13	1	—
8	1839	7	12	5%	242	95%	254	7	3
9	1838	No plantings	—	—	—	—	—	—	—

MASON MIDWAY (160)

Poor vegetation survivorship results at Mason Midway.

Evidence of intense rabbit and kangaroo grazing, with guards and stakes completely knocked over in many instances.

More than half the plants were planted without tree guards, no guard may have resulted in no or dead plants.

Biodegradable guards were used at this site with many already deteriorating. Appears grazing animals may have eaten/broken through a number of them.

Some seedlings were very small which indicates the timing of planting may be an issue (maybe planted too late in winter and not survived the summer drought).

Zone monitored: Sandhill (Zone 8).

Site	Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Mason Midway	8	1841	20	87	22%	309	78%	396	11	2

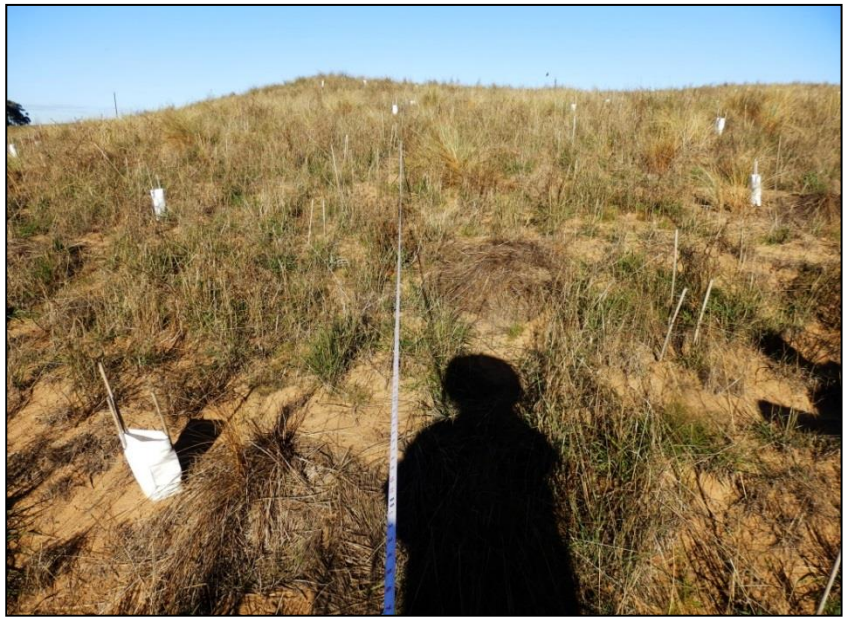
MASON WINDMILL (160)

A large area of Poly 1956 had not been planted, however the native establishment was very good so additional planting needs are questioned as existing plants of such density typically out complete new plants.

Occasional transects on rising ground (away from established plants) produced fair results. The site is characterised with clay soils and open samphire vegetation.

Zone monitored: Saline swamp (Zone 2).

Site	Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Mason Windmill	2	1955, 1956	13	140	57%	106	43%	246	6	2



MASON WOLVERTON (160)

Extremely poor survival rate (5%).

The very long hot summer appears to have impacted severity on this site because of the elevated height susceptible to wind.

The site has very sandy soils which may provide some evidence for the poor survivorship.

No guards resulted in no survival.

Zone monitored: Sandhill (Zone 8).

Site	Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Mason Wolverton	8	1842	5	5	5%	96	95%	101	9	1

MIRTSCHIN (164)

Good plant establishment at this site.

Spray drift as a result of herbicide spraying around the plants appears to be a common cause of death, particularly throughout Poly 2078. Pink dye marks were observed on and near the plants.

Many of the native grass species have been out competed by exotic weed species (growing up through the tree guards).

Poly 2074 and 2075, which are both basins, have not been planted, however it appears the sedges have been planted in Poly 2078 instead (area surrounding the basins).

Zones monitored: Lake/lagoon edge (Zone 1), Sandhill (Zone 8) and Other inland (Zone 9).

Site	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Mirtschin	7	359	80%	91	20%	450	20	1

Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
1	2081	1	10	32%	21	68%	31	5	2
8	2076, 2077, 2078, 2082	4	316	84%	62	16%	378	17	1
9	2079, 2080	2	33	80%	8	20%	41	5	1
1	2074, 2075	No plantings	—	—	—	—	—	—	—

MULUNGUSHI (203)

Poly 2043 and 2045 were areas of low density infill planting resulting in low total plant numbers.

Older infill plantings were also evident throughout these were hard to distinguish between the 2012 plantings, hence all plants (with stakes or guards) were included in the data.

These Poly had reasonably low survival rates (in comparison to the other three Poly), and may possibly be a result of competition with both older established native species and the dense weeds species present (predominately grasses).

Poly 2047-2049 were all 2012 plantings with plants establishing well. Although these Poly were covered with exotic grass species, weed control appeared to be conducted prior to planting.

Zone monitored: Other inland (Zone 9).

Site	Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Mulungushi	9	2043, 2045, 2047, 2048, 2049	27	288	74%	103	26%	391	22	1

NARRUNG WETLAND (85)

Survivorship could be increased through on-going weed management.

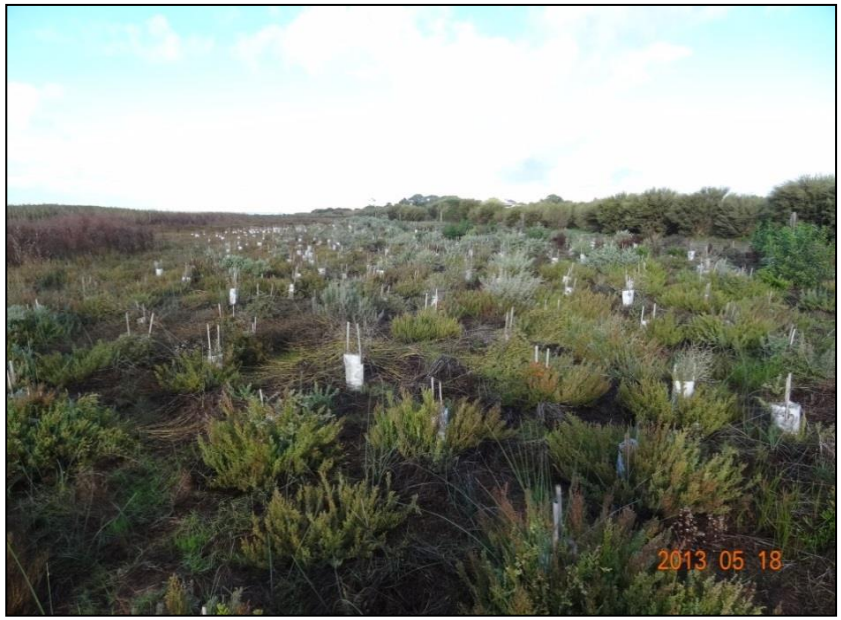
Most of the dead plants included grass species.

Zones monitored: Rising Ground (Zone 4) and Sandhill (Zone 8).

Site	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Narrung Wetland	3	219	77%	64	23%	283	15	2

Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
4	2147	1	28	61%	18	39%	46	5	1
8	2145, 2146	2	191	81%	46	19%	237	12	2

NURRA-NURRA (165)



Overall plants were doing well with many growing out of their tree guards.

Plantings further away from the water logged areas were doing well.

Plants closer to the water's edge were suffering. Plant choice in these areas needs to be considered.

Evidence of weed control throughout the site.

Zone monitored: Saline edge (Zone 3).

Site	Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Nurra-Nurra	3	2138	2	130	83%	27	17%	157	7	1

OREB (205)

Poly 2054 and 2053 had not been planted, hence no data is available for these Poly.

Poly 2052 was planted in 2011 and in-filled in 2012, however, differentiating between the years proved difficult, therefore all plants were included in the transect data

Plants had established extremely well in this area with a good diversity of species

Zone monitored: Other inland (Zone 9).

Site	Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Oreb	9	2052	2	74	99%	1	1%	75	12	1

POLTALLOCH INLAND DUNES (16)

Plants within this site were not doing well and the majority recorded as dead, especially in Poly 1953.

Evidence that weed spraying had occurred too close to the plants, evident by the dye marks on or near the plants.

Plants within the open sand swales were severely affected by the conditions. Strong winds would not assist in plants establishing and several seedlings were exposed due to sand drift. This area may need a different management approach to stabilise the swales.

Plants in Poly 1954 were doing better and may be protected by the thick grassy weeds between planting rows.

Evidence of rabbits.

Zone monitored: Sandhill (Zone 8).

Site	Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Poltalloch Inland Dune	8	1953, 1954	36	446	38%	733	62%	1179	23	2

POLTALLOCH LAKESHORE EAST (16)

2012 plants have been planted in very dense sedge patches throughout Poly 1960.

The sedges with tree guards are much healthier than those without and observed to have a higher survival rate than unguarded plants.

In some areas the sedges appeared to be covered in rust. The effect on the plants is unknown and would require further investigation.

The sedges were small and not seeding, hence they were unable to be ID but appear to be a mixture of *Juncus kraussii* and *Ficinia nodosa*

The site was densely covered in a large number of weed species

Zone monitored: Slope/embankment (Zone 5).

Site	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Poltalloch Lakeshore East	6	2181	69%	973	31%	3154	2	1

Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
5	1960	6	2181	69%	973	31%	3154	2	1
5	1959	No Plantings	–	–	–	–	–	–	–

PORTUS (168)

An electric fence has kept cattle out of this site and the difference in survivorship and plant health is visibly noticeable when compared to adjacent site ACL Triangle (heavy cattle grazing impact).

Evidence of kangaroos at the Portus site however, they do not appear to be detrimental to the plantings, as all are guarded.

At the edge of the lake (Poly 2061), it appears herbicide spraying of large woody weeds has killed a large number of sedges (top photo).

The plantings in Poly 2060 are doing extremely well (bottom photo).

Zones monitored: Saline edge (Zone 3) and Rising ground (Zone 4)

Site	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Portus	5	509	62%	309	38%	818	12	1

Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
3	2060	2	149	85%	26	15%	175	5	1
4	2061, 2062, 2063	3	360	56%	283	44%	643	11	2

REYNOLDS-STURT FARM (207)

Plant survivorship and condition where good across this site.

Although covered with exotic grass species, native seedlings have established well at this site.

No grazing impacts were observed (site was surrounded by an electric fence).

Zone monitored: Other inland (Zone 9).

Site	Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Reynolds-Sturt Farm	9	2058	4	87	78%	25	22%	112	15	1

SAUNDERS

The Saunders site consisted of older native plantings in-filled in 2011 and 2012.

At a numbers of transects it was difficult to differentiate between 2011 and 2012 plants. In these cases, all plants (with stakes or guards) were included in the transect data.

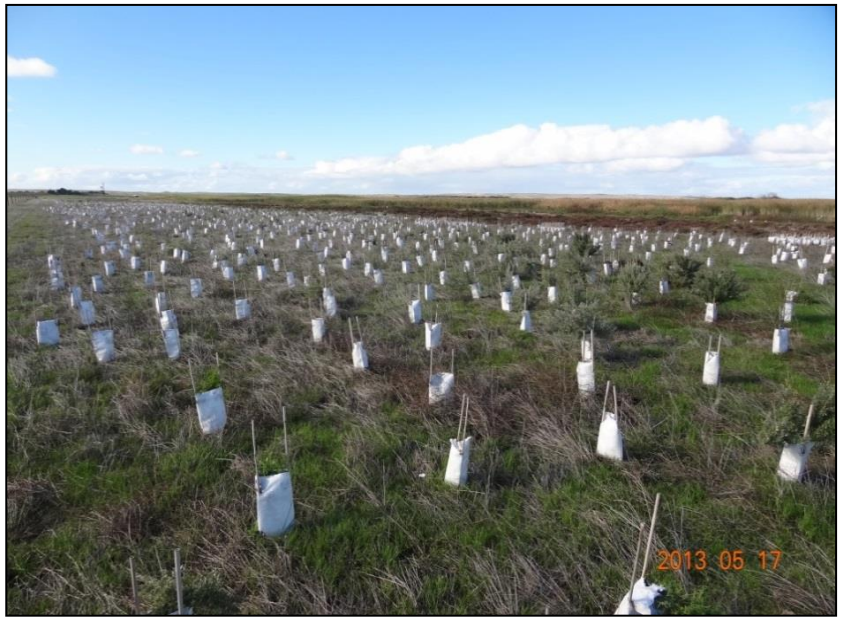
No waypoints were provided for the site, thus transect locations were chosen during the field study.

Kangaroos were evident throughout the site and a very dense covering of weed species (no evidence of weed control in these areas).

Survival rate was extremely low (23%) at this site. This may be attributed to competition with weed species.

The hot dry summer may have impacted on this site as many of the plantings were located on an exposed embankment.

Site	Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Saunders	9	?	9	46	23%	156	77%	202	10	1



SMITH (170)

Plant survivorship and condition were good across the site.

Minimal evidence of grazing.

Weed management across the site has assisted in the overall survivorship of the plants.

Zone monitored: Saline Edge (Zone 3).

Site	Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Smith	3	2141, 2142	6	429	72%	171	29%	600	9	1

SNAKE RESERVE (171)

Although only 50% survival rate, the site was densely planted in 2012, and subsequently the surviving plants are still providing an adequate cover.

Zones monitored: Saline edge (Zone 3) and Rising ground (Zone 4).

Site	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Snake Reserve	5	313	55%	251	45%	564	25	1

Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
3	2102	4	264	54%	224	46%	488	22	1
4	2101	1	49	64%	27	36%	76	8	1

TARNI WARRA (211)

The 2012 plantings at Tarni Warra were in-filled at low densities established native species.

In summary, a 50% survival rate was observed, however, this was a result of the dead unknown species recorded in the samphire flats.

In many instances, where bamboo stakes were present, plants were not observed as they were smothered by existing samphire.

Site	Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Tarni Warra	9	2059	6	17	52%	16	48%	33	3	1

TRELOAR ZW (15)

Plant survivorship may have been affected by inefficient weed spraying. Spray drift was observed very close to some plants.

Survivorship of grasses were very patchy with some areas doing very well and others not.

Zone monitored: Saline Edge (Zone 3).

Site	Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Treloar ZW	3	2143	6	297	51%	286	49%	583	12	1

VASARELLI (118)

A number of transects had very poor survival rates and may be due to the cover of wireweed and fresh annual grasses out competing the 2012 plants.

Herbicide had been used recently as a halo around some guards with surviving plants within.

A surprising number of survivors were on very steep riverbank (many *Enchylaena tomentosa*).

The samphire patch (Poly 2090) was poor as seems to be the case whenever these areas are planted.

Zones monitored: Saline edge (Zone 3), Rising ground (Zone 4), Slope/embankment (Zone 5), Other inland (Zone 9).

Site	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Vasarelli	7	156	45%	192	55%	348	28	2

Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
3	2090	1	9	21%	33	79%	42	3	2
4	2088, 2092	2	58	56%	46	44%	104	17	2
5	2086, 2089, 2091	3	57	35%	104	65%	161	17	2
9	2087	1	32	78%	9	22%	41	7	2

WARRENGIE (119)

Several zones did not have any evidence of plantings.

Most of the dead plants were broadleaf species.

Evidence of grazing from rabbits and kangaroos.

Cattle accessed some areas which may have affected plant survivorship.

Zones monitored: Lake/lagoon edge (Zone 1) and Other inland (Zone 9).

Site	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Warrengie	20	225	84%	43	16%	268	15	1

Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
1	1980, 1982	9	39	80%	10	20%	49	7	1
9	1983	11	186	85%	33	15%	219	13	1
1	1981	No plantings	–	–	–	–	–	–	–
9	1984, 1985, 1986, 1987, 1988, 1989, 1990	No plantings	–	–	–	–	–	–	–

WATKINS (120)

Good survivorship of 2012 plantings at the Watkins site.

Many zones at this site contained old plantings and 2013 plantings, only the 2012 plantings were recorded at most transects.

Cattle evident at site, some plants appear to be uprooted by grazing.

Flat weed (*Hypochaeris radicata*) found in nearly all guards and throughout the site.

Zone monitored: Sandhill (Zone 8).

Site	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Watkins	24	309	74%	109	26%	418	30	1

Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
8	2098, 2099, 2100, 2103, 2104, 2124	24	309	74%	109	26%	418	30	1
8	2126, 2128	Pre-2012 and 2013 plantings no data	—	—	—	—	—	—	—

WELLINGTON LODGE LAKE EDGE (13)

Evidence of both grazing by hares and cattle presence.

Only light grazing impacts observed.

Some areas guards have blown away, or been removed, however has not impacted plant.

Zone monitored: Saline edge (Zone 3).

Site	Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Wellington Lodge Lake Edge	3	1961, 1962, 1963, 1965, 1965, 1966, 1967, 1968, 1969	42	564	73%	210	27%	774	5	2

WESTMINSTER (145)

Site predominately planted with native grasses, each species planted together in clumps across the site.

Poly 2094 comprised of 2012 infill planting between older plantings.

Light grazing was evident.

Evidence of echidna burrows.

Zones monitored: Saline edge (Zone 3) and Sandhill (Zone 8)

Site	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Westminster	22	712	76%	230	24%	942	20	2

Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
3	2093	4	115	69%	51	31%	166	8	1
8	2094, 2095, 2096, 2097	18	597	77%	179	23%	776	17	2

WYNDGATE GREY PADDOCK (124)

High survivorship of the 2012 infill plantings was recorded at this site (90%).

Conical snails were very active and present on the tree guards and plants. The effect on the plants would require further investigation.

She-oak was the dominant species planted and surviving well.

Zones monitored: Saline edge (Zone 3) and Other inland (Zone 9).

Site	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Wyndgate Grey Paddock	13	139	90%	16	10%	155	25	1

Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
3	2033	3	25	100%	0	0	25	8	
9	2035	10	114	88%	16	12%	130	21	

WYNDGATE HOMESTEAD (213)

Fair results considering the competition with annual weed grasses.

Weed control will be beneficial at this site.

Zone monitored: Other inland (Zone 9).

Site	Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
Wyndgate Homestead	9	2063, 2064	3	51	50%	50	50%	101	18	2

WYNDGATE TARRS (212)

Fair survival rates at this site.

Exotic weed species were observed growing through the guards may have out-competed the native seedlings. However, the weeds may have established after the plant had died.

No grazing evident.

Some areas looked to have been planted with 2013 plants already.

Zones monitored: Saline edge (Zone 3) and Other inland (Zone 9).

Site	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
WyndgateTarrs	9	156	62%	96	38%	252	17	1

Zone	Poly_ID	Number of Transects	Alive (Total Plants)	Alive %	Dead (Total Plants)	Dead %	Total Plants (Alive and Dead)	Total Number of Species	Average Plant health
3	2057	1	21	100%	0	0%	21	1	1
9	2056	8	135	58%	96	42%	231	17	1

4 Discussion and Recommendations

The overall vegetation survivorship for the 2012 plantings was 62%. A total of 121 species were identified across all 56 sites monitored of which 61% were in good condition and 33% were slightly affected. Only 1% of the species identified were severely affected. Survivorship of *Acacia spp.*, *Eucalyptus spp.*, *Allocasuarina spp.*, *Enchylaena tomentose* and sedges was excellent with greater than 80 % survivorship across all sites. The survivorship of *Puccinellia stricta*, *Lasiopetalum baueri*, *Enneapogon nigricans* and many unknown species was very poor with <20 % survivorship across all sites.

The following observations were noted which may provide some explanation for the survivorship obtained:

- Plants with no tree guards were highly affected by grazing either from hares, rabbits or kangaroos. Evidence of cattle through some sites was also observed.
- Some plants were inefficiently planted (e.g. not planted below ground level). These sites included Camp Coorong and Hartman.
- Weed spraying was too close to plantings at some sites.
- Some weeds were out-competing some plantings.
- Some areas within some sites were not suitable for plantings (e.g. sand swales and water logged zones). Sites included Poltalloch Inland Dune, Henshell, Kindaruar Farm and Nurra-Nurra.
- Samphire flats, where planted, produced poor results; much natural regeneration of samphire was observed in stranded litter zones. Trying to introduce other plants (e.g. *Melaleuca halmaturorum*) into these low samphire areas appears futile.
- Introduction of cattle to an area with new plantings proved detrimental to the survival rate.

To improve the survivorship of future plantings the following recommendations are suggested:

- Pre-planting management could include strategies such as fencing, pest and weed control.
- Additionally, soil testing at some sites could assist in planning where some species could be planted.
- Pest control, especially for rabbits, needs to be ongoing as this was the major contribution to plant deaths.
- Tree guards proved to be vital in the survivorship of plants and should be included in all future plantings.
- The type of tree guard needs to be considered. Biodegradable tree guards were affected by grazing and observed to collapse onto the seedlings.
- Livestock need to be kept off planted areas either through strategic fencing of some areas or providing information to landowners regarding keeping livestock off the planted areas. Cattle were evident at Boggy Lake, ACL-Triangle, Kartoo Road, Low Point, Warrengie, Watkins and Wellington Lodge Lake Edge.

- Plants suffered through either water or heat stress. Recognising that watering is labour intensive and costly, however watering at some locations during times of low rainfall could be considered for new seedlings.
- A weed spraying and control management plan needs to be initiated. Many plants suffered or died as a result of inefficient spraying and other weed control activities.
- Some sites could benefit from planting an initial round of colonising species to stabilise the soil and landscape. Further plantings can include infill ground cover species to aid surface stabilisation. This would be especially beneficial at the very sandy sites including Poltalloch Inland Dunes and Mason Wolverton.
- The benefits of direct seeding should be considered for large open sites which have minimal vegetation cover.
- Ongoing monitoring after plantings have occurred to check on condition of tree guards and pest activity could improve long-term survivorship. Additional site management activities could be implemented if the plants are not doing well.

5 Conclusion

Across all of the sites surveyed, the surviving plants are overall growing well and in a healthy condition. Survivorship across all sites was 62%. Several observations were noted which accounted for the deaths of the 2012 plantings. The highest contributing factor that could be observed that may be contributed to plant deaths was from pest impacts, especially grazers such as rabbits and kangaroos. There were many empty tree guards and stakes where the cause of the plant death could not be accounted.

Several recommendations are provided to assist in the survivorship of future plantings. The primary recommendations include the use of tree guards, pest and weed control, possible use of strategic fencing and ongoing monitoring for new plants.

APPENDICES

Appendix A Photographs of plant condition and survivorship issues

Plate 1 Results of no tree guards and grazing pressure on *Allocasuarinaverticillata* at Bonney Reserve.

Plate 2 Ineffective planting at Camp Coorong.

Plate 3Ineffective planting at Camp Coorong.

Plate 4Extra tree guards to provide protection from grazing at Lifestyles

Plate 5 Exotic grass species out competing natives at Blake Community

Plate 6 Dye from herbicide spraying on biodegradable guards at Eckert

Plate 7Spray drift at Mirtschin