VEGETATION MONITORING OF TOOLIBIN LAKE AND RESERVES

DEPARTMENT OF CONSERVATION & LAND MANAGEMENT

Prepared by:

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The wetland trees of Lake Toolibin and reserves continue to show a decline in numbers.

The *Melaleuca strobophylla* population has continued to decline over the last two years and relatively few mature healthy individuals remain on the lake floor. However there has been some recruitment of seedlings in areas within the lake but outside the original plots. In 2004 an additional plot was established to monitor a stand of 314 healthy seedlings.

The overall number of *Casuarina obesa* trees has declined in the last two years but the proportion of live trees that are healthy has increased. It appears that a significant portion of the stress recorded in the *C. obesa* trees monitored in 2002 had been induced by three successive years of below average rainfall and a significant portion of these trees have now died. This has resulted in a decline in overall *C. obesa* numbers. Following higher than average rainfall in 2003 some of the stressed trees have recovered resulting in an increase in the portion of healthy trees.

The three transects used for monitoring the *C. obesa* seedlings that germinated in 1998 on the west side of the lake around pump 9 were re-monitored in 2004. Whilst the height ranges within all the transects indicate that germination has continued after the initial recruitment in 1998, it appears that within the last years two transects have had no significant change in seedling numbers and one transect has had a small increase in seedlings. The lower soil salinity around pump 9 should favour seedling establishment however there is considerable variability within the area and high seedling densities are found in areas with electrical conductivities in the top 50 cm of soil in excess of 200 mS/m.

There has been an overall increase in the EM38 horizontal readings but this is probably not significant given that: the EM38 horizontal readings varied from the direct EC measurement by an average 20% in 2004; and that readings can be affected by soil moisture and temperature, and the accuracy when zeroing the EM38.

The terrestrial tree species of the Toolibin reserves have declined slightly in vigour since the last round of monitoring in 2002. Not all the declines in tree vigour are associated with salinity. One example of this is plot 30, which is not saline but lost virtually all mature trees in the period between 1998 and 2002 this may have resulted from a combination of drought stress leading to the death of mature trees and a lack of germination.

The understorey plant community on the lake bed and in other seasonally wet areas have shown a trend towards a greater abundance of *Atriplex semibaccata*, with individuals being recorded in subplots where they were not present two years ago in 13 of the 35 plots monitored. Such changes may reflect that it has been 8 years since the lake was last inundated rather than significant changes in salinity. An example being Plot 3.

In light of the 2004 monitoring programme, it is recommended that:

1. Mature trees be allocated into height classes rather than measure the heights of individual trees;
2. In addition to height ranges, the mean, mode or median height is also recorded for melaleuca stands and seedlings plots and transects;
3. The heights of seedlings are measured until they reach a nominal height (based on the depth to which the lake fills). When they reach this nominal height they are deemed to be 'mature' and then allocated to height classes;
4. The requirement for diameter at breast height to be frequently measured be reviewed;
5. A single estimate of the percentage cover of each overstorey species in each plot be made;
6. Previous raw data be made available to the data collectors to enable the consistent collection of data at individual plots;
7. The monitoring program be reviewed and long term trends only be measured from a date at which all data is being collected in a consistent manner;
8. Soil samples are only taken at 25 and 50 cm depths at the same plots they were collected in 2004 for validation of the EM38 horizontal readings; and
9. The population dynamics of *B. prionotes* be investigated and in particular the impediments to germination and recruitment of this species.

1.0 Introduction

Vegetation Monitoring of Toolibin Lake and Reserves

1.1 Background

The background for the project, as documented by Ogden and Froend (2002) is as follows:

> *The monitoring is an integral part of the Recovery Plan and has been conducted since 1977 when a baseline flora and vegetation survey was conducted for the Northern Arthur River Wetlands Rehabilitation Committee by Mattiske Consulting.*
>
> *The baseline work involved the establishment of 22 monitoring plots and the mapping of plant communities and their status and condition. Four additional plots were established in 1980 in the reserve to the north of the Lake, to record the impact of burning and clearing activities. Of these 26 plots, eleven are located on the lake bed, with the remainder located in the reserves to the north east of the lake. Reassessment of the plots was conducted in 1980, 1982, 1986 and 1992.*
>
> *In 1983, additional research plots were established by Dr Ray Froend, Edith Cowan University, to investigate the causes of lake bed tree mortality. Four plots were established in this study, one across the Northern Arthur River channel, two plots on the lake edge with similar elevational gradients and vegetation zonation but differing soil conditions, and a plot located on the lake bed with no elevational gradient.*
>
> *Five more vegetation plots were added in 1998, 2 in the Banksia prionotes woodland in the south east of the reserve and 3 on the lake bed. The lake bed plots were located in the west and south west areas of the lake to improve the coverage in these areas and to replace the plots lost during construction of the separator channel.*
>
> *The 1998 Vegetation Monitoring of Toolibin Lake and Reserves found a general decline in the health of both the aquatic and terrestrial vegetation in most of the 30 plots sampled. Some recovery of trees was noted in certain areas of the lake, particularly in the vicinity of pump 9 on the western side where significant numbers of seedlings were found. This improvement in both the tree health and soil salinity was likely to be in response to the effectiveness of the groundwater pump. The existing vegetation monitoring plots were not well located to monitor the effectiveness of the network of groundwater abstraction bores so in 2000, five additional plots were established on the lake bed in close vicinity to pumps 1, 2, 12, 13 and 15. Independent monitoring of the seedling recruitment around pump 9 was also undertaken in 2000 and these transects have now been formally marked and added to the Lake Toolibin vegetation monitoring plots. The system of monitoring plots now*

consists of 18 plots on the lake bed, 2 in the reserve to the east of the lake, 15 in the reserves to the north east and 3 seedling transects on the west side of the lake.

In the 1998 monitoring, all existing plots were upgraded to the standard of the Salinity Action Plan Wetland Vegetation Monitoring program and all new plots have been established using this methodology. Regular (every three years) monitoring of these plots using the Salinity Action Plan methods was a key recommendation of the 1998 report.

1.2 Objectives

As part of the Toolibin Lake Recovery Plan, The Department of Conservation and Land Management (CALM) oversees and implements the monitoring of lake and reserve vegetation composition and health. This report documents the results of the 2004 round of monitoring.

The following was undertaken for the 2004 vegetation monitoring of the Toolibin Lake and reserves:

1. Re-survey and reassess 34 monitoring plots in and around Lake Toolibin consistent with the methodology used by Froend *et al*. (1998);
2. Permanently mark and assess one *Melaleuca strobophylla* seedling plot within Lake Toolibin;
3. Record EM38 readings across all plots and validate against soil samples;
4. Present data and results in a similar format to Froend *et al*. (1998);
5. Discuss management options in light of the results of the vegetation monitoring.

2.0 Method

2.1 Overview of the Salinity Action Plan Methodology

The SAP Program methodology used in the 1998 reassessment involved the collection of a significant amount of additional data on biotic and abiotic factors. The methodology used was specifically designed to address change in wetland vegetation floristics, physiognomy, individual plant vigour and population vigour and dynamics in response to long-term changes in hydrology and salinity. An overview of the various components of the SAP methodology follows (how this methodology was applied to the Toolibin plots is discussed later):

1. Transect establishment

   The location of each transect determined using GPS and marked on maps for future reference. All location markers and tags are metal. Transects made up of contiguous 20 x 20 m quadrats running perpendicular to the shoreline into upland vegetation. Each of the 20 x 20 m quadrats divided into five 4 x 20 m quadrats. Photographs taken each monitoring year from two marked reference points. Site data such as, topographic position, slope, aspect, surface soil characteristics, litter and water depth recorded.

2. Floristic composition

   Within each 4 x 20 m subplot of each 20 x 20 m quadrat all overstorey species and large understorey species (>1.5 m) were identified. All trees tagged and given a unique reference number. Data for each overstorey subplot will be kept distinct to determine gradient transitions. Understorey 4 x 4 m subplots focus on species < 1.5 m. Presence of seedlings of tree and large shrub species recorded in overstorey sub-plots.

3. Density and foliage cover

   Density of understorey species was generally estimated for each subplot. Percentage foliage cover for each overstorey species was estimated for entire plots.

4. Physiognomy

   Height ranges for each vegetation strata measured within quadrats and subplots. Profile diagrams depicting vegetation structure constructed for each transect.

5. Tree vigour

   The vigour of each individual tree within overstorey subplots categorised using a subjective 3 factor system based on crown density, presence of dead branches and epicormic growth.

6. Population dynamics

Size class structure of key tree species determined by measuring height and diameter at breast height (DBH) of each individual in each 20 x 20 m quadrat. Seedling recruitment events recorded in the field when found.

7. Distribution of wetland plant communities, populations

   The different structural units of vegetation at each wetland mapped from aerial photography and ground truthing. At the transect scale, distribution of plant populations or community types is related to hydrology and salinity. The ground level (in relation to the deepest point in the lake) at each end of the 4 x 20 m overstorey subplots is measured using an auto level and staff. These relative levels are converted to mAHD if suitable benchmarks exist. The elevational gradient along each transect can then be compared to wetland water levels (information from other CALM and WRC SAP projects) and the water regime determined for different positions on the transect. Where available, historical wetland water levels will be related to vegetation distribution to identify past impacts and explain current distributions.

8. Physio-chemical parameters

   Transects are located adjacent to piezometers (if present) established as part of the Wetland Monitoring Project. Information on groundwater level and salinity is vital to correct interpretation of vegetation change. Surface soil salinities at each transect measured each monitoring year using an EM 38 and validated with limited soil sampling and direct measurement (EC of 1:5 soil:water extracts).

9. Database

   All data collected as part of the wetland vegetation monitoring project are databased using Microsoft Excel and presented to CALM in digital form.

2.2 Plot Establishment and Maintenance

Each plot was subdivided into subplots for measurement of understorey and overstorey vegetation. From the north-west corner of each plot, 4 x 20m subplots were marked out with measuring tapes running in a southerly direction for assessment of the overstorey. Understorey subplots were then established at the northern end of each overstorey subplot to provide a set of contiguous 4 x 4m understorey plots (Fig. 2.1).

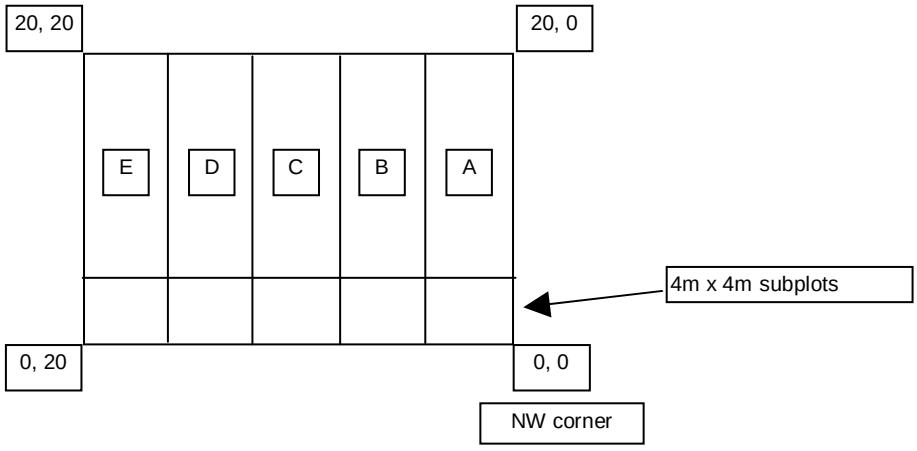


Figure 2.1: Plot Design

Where plot markers were missing, the original location was determined with tapes and an optical square and a new star picket installed. All tree tags were inspected and replaced where necessary. Some trees, which have increased in girth, significantly have either begun to enclose the head of the nail or push the tag off the nail. Attempts to remove the nails appeared to do more damage to the tree than simply leaving the nail. Most tags that had worn through from swinging on the nail were found and reattached or replaced with a new tag. The majority of the remaining tags were bent over the nail head to prevent this from occurring in the future.

More regular inspection of the trees within the monitoring plots may be necessary to prevent tags and nails damaging vigorously growing trees.

2.3 Overstorey

For each tree within each 4 x 20m subplot, the tag number, diameter at tag height and crown condition was recorded. Stem diameter was measured directly under the tag if nailed or at breast height if wired onto the tree. In the case of individual trees with multiple stems, all stems were measured at the same height as the position of the tag or at breast height.

Crown assessment was carried out using a subjective three-part scale where a score is recorded for crown density, dead branches and epicormic growth. Using diagrams for comparison, crown density is given a score out of nine, dead branches a score out of nine and epicormic growth a score out of five (Ladd, 1996) (Fig. 2.2). The higher the overall score, the better the condition of the tree. For the purpose of comparison with previous results, crown assessment values less than or equal to 11 were considered stressed and values greater than 11 considered healthy.

In dense stands of trees, stand height was measured with a clinometer and tape measure and presented as a height range for each species present. In open woodlands, height was directly measured for each tree. Number, species and height of seedlings was also measured within the 4 x 20m subplots.

2.4 Understorey

Within the 4 x 4m subplots, all perennial understorey plants were identified and percentage foliage cover determined by direct measurement (two foliage measurements at right angles) or percentage estimate. Height ranges for each species was also recorded.

2.5 Soil Salinity

EM38 measurements, which determines soil conductivity over 1-1.5m depths were taken at three points across each plot, every 4m along the transect. Adequate distance was always allowed when measuring near the fence posts or other metallic objects in the plots. EM38

data was validated against direct conductivity measurement of one soil sample taken at the north west corner of each plot. For plots 39 to 41, vertical and horizontal EM38 measurements were taken down the centre of the 5m wide transects every 5 metres from 0 to 100m. Salinity measurements are interpreted using the Agwest Soil Salinity Classes for Revegetation (Agwest, 2002) which provides a more accurate comparison for EM38 data than the modified Hunt and Gilkes (1992) scale used in the1998 report.

2.6 Reference Photographs

One photograph was taken from approximately 1m directly behind the tagged corner post looking diagonally across the plot. Digital copies of all photographs are included on the CD-ROM attached to this document.

2.7 Plot Locations

The GPS readings for plot locations were not found to be accurate. The GPS readings were retaken for each plot in 2004 (AGD Datum, MGA Projection) and used for placing plot locations on an aerial photo in this report to reduce time lost in relocating the plots in future years.

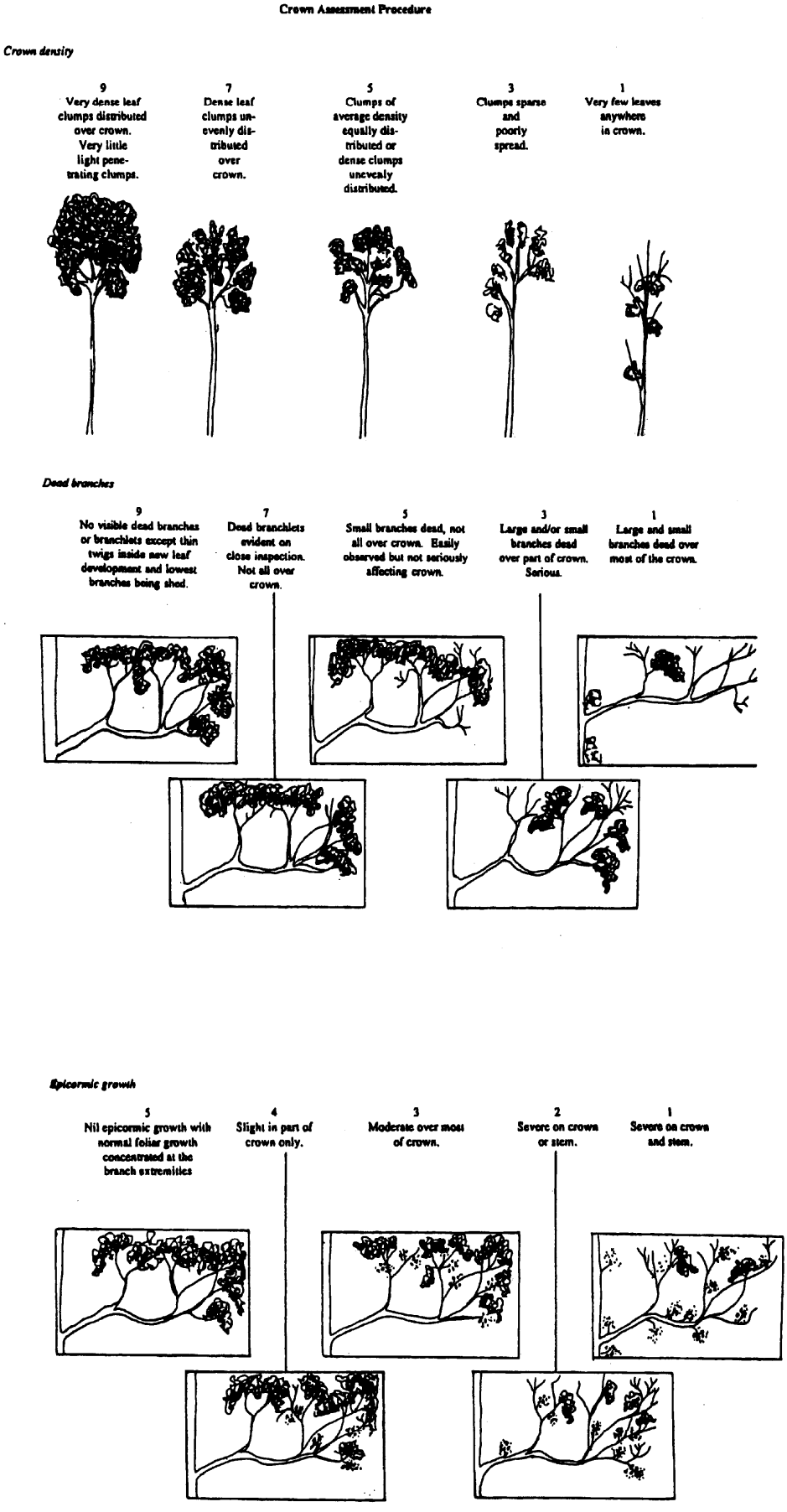


Figure 2.2: Crown Assessment Procedure Diagrams (Ladd, 1996)

3.0 Results

Vegetation Monitoring of Toolibin Lake and Reserves

The 35 plots that were monitored in 2004. Previously established plots that were not reassessed were Plots 1, 2, 14 and 31. Plots 1 and 2 were destroyed during the construction of the separator channel. Plot 14, near Dulbinning Lake, could not be located in 1998 or 2002 or 2004. Plot 31 could not be located in 2004.

Plots assessed in 2004 are shown in Map 1 and their co-ordinates (Datum GDA, Projection MGA) are listed in Table 3.1.

Table 3.1 Co-ordinates for Plots within Study Area

Plot	Northing	Easting
3	6357405	556083
4	6357442	556413
5	6357462	556423
6	6357575	557266
7	6357711	557496
8	6357664	557391
9	6357844	557519
10	6357950	557117
11	6358405	557036
12	6358562	557122
13	6358921	557643
15	6360835	559729
16	6360805	559788
17	6360778	560503
18	6360808	561068
19	6360800	561345
20	6360428	559060
21	6359773	561051
22	6360018	561128
23	6359500	558891
24	6359428	558858
25	6359808	558828
26	6358783	558882
27	6357284	556032
28	6356601	556189
29	6356584	556496
30	6356494	557422
32	6359030	557307
33	6357330	556116
34	6358111	556927
35	6356552	556796
36	6356958	557290
37	6357053	556887
38	6357859	556708
42	6357715	557540

The salinity status of the plots was based upon EM38 horizontal readings and the class boundaries shown in Table 3.2.

Table 3.2 Salinity Class Boundaries

	Measures and Units	
Classes	ECe (mS/m)	EM-38 hor (mS/m)
Non-saline	<200	<50
Slightly	200-400	50-100
Moderately	400-800	100-150
Very	800-1600	150-200
Extremely	>1600	>200

George, R & Short, R (2004)

The average EM38 horizontal reading for each plot and its salinity class is shown in Table 3.3, and the salinity classes are shown in Map 2.

Table 3.3 Salinity Classes of Plots

Plot	Average EM38 horizontal reading for Plot (mS/m)	Salinity Class
3	169	Very
4	315	Extremely
5	333	Extremely
6	199	Very
7	154	Very
8	185	Very
9	292	Extremely
10	294	Extremely
11	357	Extremely
12	48	Non-saline
13	12	Non-saline
15	185	Very
16	170	Very
17	196	Very
18	296	Extremely
19	448	Extremely
20	184	Very
21	820	Extremely
22	776	Extremely
23	238	Extremely
24	230	Extremely
25	190	Very
26	56	Slightly
27	92	Slightly
28	301	Extremely
29	412	Extremely
30	4	Non-saline
32 (RF1)	186	Very
33 (RF4)	205	Extremely

Plot	Average EM38 horizontal reading for Plot (mS/m)	Salinity Class
34	311	Extremely
35	360	Extremely
36	427	Extremely
37	374	Extremely
38	264	Extremely
42 (new seedling)	254	Extremely

Key results for each vegetation are presented for each plot below, including vegetation description, tree vigour trends, salinity trends and a reference photograph. Tree vigour categories are Healthy (H), Stressed (S) and Dead (D).

The data collected during the 2004 is included in the Appendices at the rear of this report:

- **Appendix 1** includes overstorey data for each plot. This includes species composition, DBH, height and crown health;
- **Appendix 2** is comprised of the vigour vs time tables for the dominant species of each plot. This data set includes information since 1977 (since 1983 for plots 32 and 33; since 1998 for plots 27 to 31 and since 2000 for plots 34 to 38) for all plots monitored;
- **Appendix 3** comprises the understorey data, including the density, % cover and height of perennial species.
- **Appendix 4** contains EM38 readings; and
- **Appendix 5** contains seedling number, seedling height and EM38 data for the three transects established in April 2000 to monitor the *C. obesa* recruitment on the west side of the lake around pump 9.

Plots 1 and 2

Destroyed during construction of separator channel.

Plot 3

Location E 556083; N 6357405
Western side of the lake bed, east of track and north of pump 9.

Vegetation Description:
Low woodland of *Casuarina obesa*. Understorey of *Halosarcia lepidosperma* and *Maireana brevifolia*

Salinity Class:
Very saline.

Condition in 2004 and Trend To-date:
Most of the *C. obesa* trees are dead. The overall condition of the remaining trees in the plot appears to have improved since 2002 (the first change since 1986), but this should be tempered with the fact that change is based on the assessment of a total of three trees.

Eleven *C. obesa* seedlings were recorded in this plot in 2002. Nine seedlings were recorded in 2004, eight of which would have been present in 2002 and one that germinated in 2003. However there appears to have been little growth in these seedlings since 2002 and all the seedlings have been grazed.

Conditions within the plot appear to have moved away from favouring *Halosarcia lepidosperma* towards favouring *Maireana brevifolia*. The number of *Halosarcia lepidosperma* in the subplots has decreased from 24 to 10 and thousands of *Maireana brevifolia* seedlings have germinated.

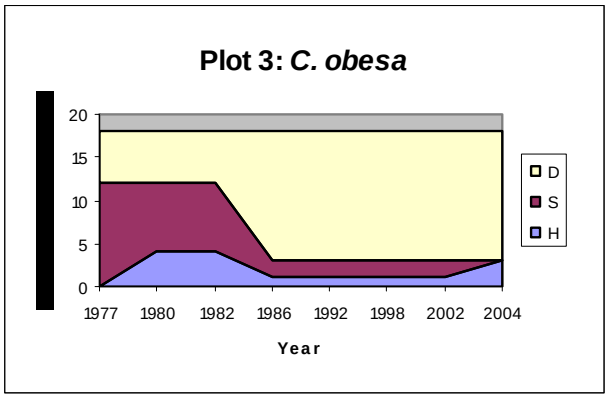


Figure 3.1: Trend in the vigour of the dominant species at Plot 3

Plate 1: Facing diagonally across Plot 3

Plot 4

Location: E 556413; N 6357442

Western side of the lake bed, north-east of pump 9.

Vegetation Description:

Woodland of *Casuarina obesa* and *Melaleuca strobophylla*. Understorey consists of *Halosarcia lepidosperma* and *Atriplex semibaccata*.

Salinity Class:

Extremely saline.

Condition in 2004 and Trend To-date:

As with most plots assessed, including the adjacent Plot 5, the proportion of live *C. obesa* that are healthy has risen and the overall number has fallen. The three *C. obesa* seedlings are present in this plot in 2002 were still present in 2004.

Whilst all *M. strobophylla* trees are now dead the number of seedlings within the subplots has increased from 15 to 24 between 2002 and 2004 which suggests salinities are within the tolerance range for germination and establishment.

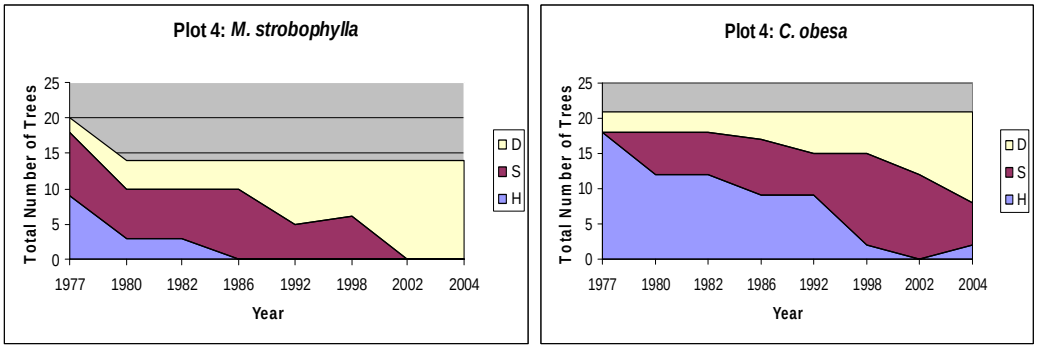


Figure 3.2: Trend in the vigour of the dominant species at Plot 4

Plate 2: Facing diagonally across Plot 4

Plot 5

Location: E 556423; N 6357462

Western side of the lake bed, adjacent to, and north of, Plot 4.

Vegetation Description:

Woodland of *Casuarina obesa – Melaleuca strobophylla*. Dense stand in parts (closed canopy). Large number of younger plants. Understorey of *Atriplex semibaccata* and *Halosarcia sp.*

Salinity Class:

Extremely saline.

Condition in 2004 and Trend To-date:

As with most plots assessed, including the adjacent Plot 4, the proportion of live *C. obesa* that are healthy rather than stressed has risen. There was also one seedling recorded in 2004.

The decline in the *M. strobophylla* that commenced more than a decade ago has continued since 2002. Of the 60 live trees surveyed in 1998, 20 were alive in 2002 and only 11 are alive (10 of which are stressed). At this rate there may be no mature *M. strobophylla* in the plot within several years. Despite this some recruitment of seedlings has occurred with 50 seedlings being recorded.

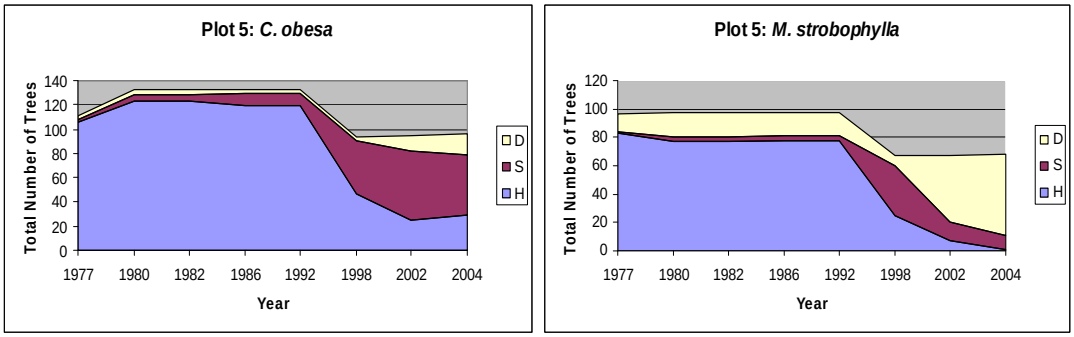


Figure 3.3: Trend in the vigour of the dominant species at Plot 5

Plate 3: Facing diagonally across Plot 5

Plot 6

Location: E 557266; N 6357575

Eastern edge of lake bed.

Vegetation Description:

Initially an open woodland of *Eucalyptus rudis*. Understorey of *Halosarcia lepidosperma* and *Atriplex semibaccata*.

Salinity Class:

Very saline.

Condition in 2004 and Trend To-date:

All trees are dead and have been since 1980.

The understorey shows little change since 2002, with the exception of *Wilsonia rotundifolia* which was not previously record for the plot now providing significant cover.

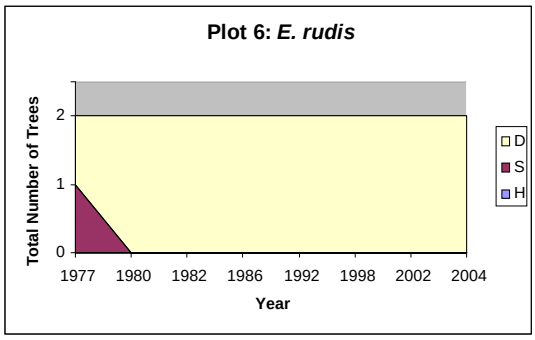


Figure 3.4: Trend in the vigour of the dominant species at Plot 6

Plate 4: Facing diagonally across Plot 6

Plot 7

Location: E 557496; N 6357711
Eastern edge of lake bed, to the east of Plot 6.

Vegetation Description:
Open woodland of *Casuarina obesa – Eucalyptus rudis*. Sparse understorey of *Halosarcia lepidosperma*, *Maireana brevifolia* and *Atriplex semibaccata.*

Salinity Class:
Very saline.

Condition in 2004 and Trend To-date:
All *E. rudis* are dead and have been since 1986.

The vigour of *C. obesa* declined significantly in 1986 and 1992 but increased in 1998, indicating a revival of the adults of this species. The condition of these trees has remained essentially unchanged since 1998.

The density of understorey species continues to increase and *Atriplex semibaccata* was recorded in a greater number of subplots in 2004.

The three *Eucalyptus* seedlings recorded in 2002 are still surviving in 2004.

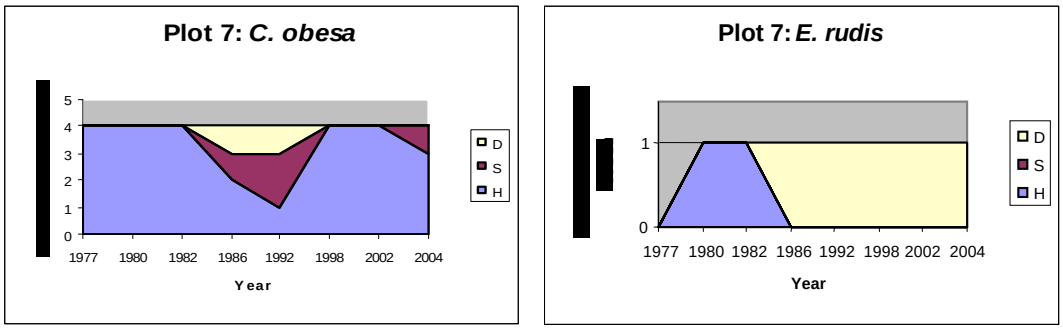


Figure 3.5: Trend in the vigour of the dominant species at Plot 7

Plate 5: Facing diagonally across Plot 7

Plot 8

Location: E 557391; N 6357664

Eastern edge of lake bed.

Vegetation Description:

Surrounded by an open woodland of *Casuarina obesa – Melaleuca strobophylla*. The plot itself has never contained any trees and has a sparse understorey of *Halosarcia lepidosperma.*

Salinity Class:

Very saline.

Condition in 2004 and Trend To-date:

No trees present. The understorey has remained essentially unchanged since 2002.

Plate 6: Facing diagonally across Plot 8

Plot 9

Location: E 557519; N 6357844
Eastern fringe of the lake bed.

Vegetation Description:
Woodland of *Casuarina obesa – Melaleuca strobophylla*. No understorey.

Salinity Class:
Extremely saline.

Condition in 2004 and Trend To-date:
The *M. strobophylla* population has been in poor condition since assessment began and all individuals were dead by 1998.

As with most plots assessed the proportion of live *C. obesa* that are healthy has risen and the overall number has fallen.

No recruitment was recorded in the plot.

There continues to be no understorey in the subplots.

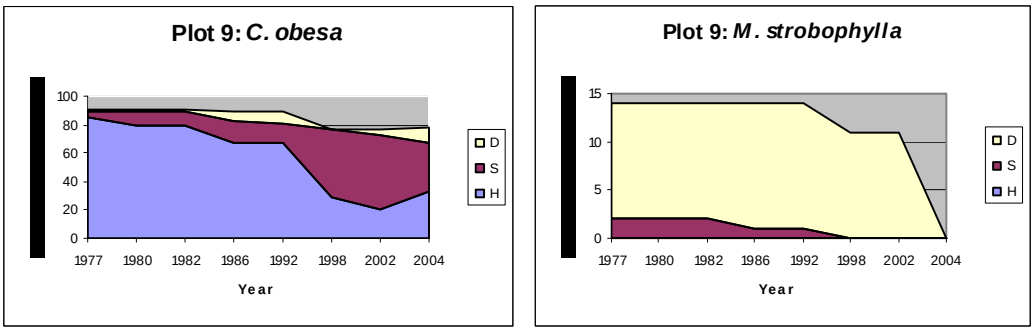


Figure 3.6: Trend in the vigour of the dominant species at Plot 9

Plate 7: Facing diagonally across Plot 9

Plot 10

Location: E 557117; N 6357950
Northern end of lake bed.

Vegetation Description:
Open woodland of *Casuarina obesa, Melaleuca strobophylla* and *Eucalyptus rudis*. Understorey of *Halosarcia lepidosperma* and *Atriplex semibaccata*.

Salinity Class:
Extremely saline.

Condition in 2004 and Trend To-date:
All *E. rudis* trees have been dead since 1980.

As with most plots assessed the proportion of live *C. obesa* that are healthy has risen and the overall number has fallen.

The decline of the *M. strobophylla* trees has continued with the death of one of the two trees since 2002. There only remains one stressed individual in 2004.

The understorey has not changed greatly but *Maireana brevifolia* and *Atriplex semibaccata* were recorded in more subplots in 2004 than 2002.

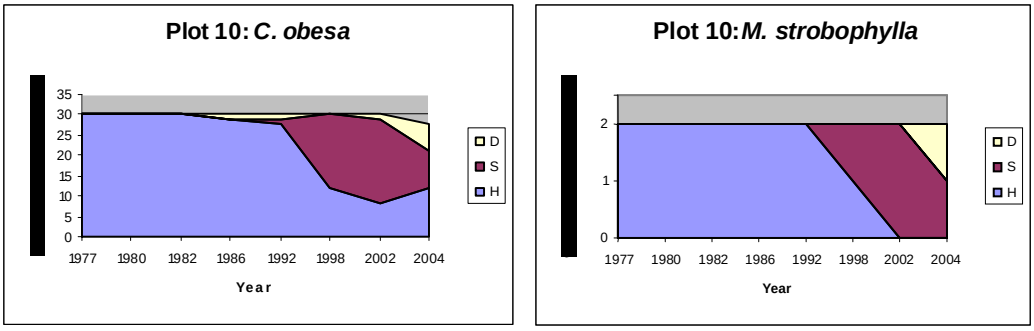


Figure 3.7: Trend in the vigour of the dominant species at Plot 10

Plate 8: Facing diagonally across Plot 10

Plot 11

Location: E 557036; N 6358405
Northern lake edge.

Vegetation Description:
Originally a woodland of *Eucalyptus rudis* with substorey of *Melaleuca strobophylla* and *Casuarina obesa*. Now an open woodland of *C. obesa* with a dense understorey of *Halosarcia lepidosperma* and *Halosarcia indica.*

Salinity Class:
Extremely saline.

Condition in 2004 and Trend To-date:
All *M. strobophylla* trees have been dead since 1992.

The condition of the *C. obesa* trees has remained stable since 1998.

The understorey has not changed greatly but *Atriplex semibaccata* was recorded in more subplots in 2004 than 2002.

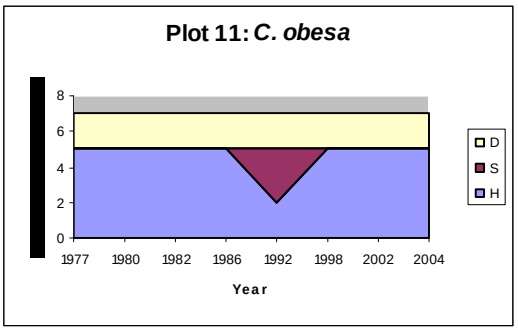


Figure 3.8: Trend in the vigour of the dominant species at Plot 11

Plate 9: Facing diagonally across Plot 11

Plot 12

Location: E 557122; N 6358562
On sandy soils to the north of the lake.

Vegetation Description:
Woodland of *Eucalyptus loxophleba* with a substorey of *Acacia acuminata* and *Allocasuarina huegeliana*. Understorey dominated by *Atriplex semibaccata* and *Stipa elegantissima.*

Salinity Class:
Non-saline.

Condition in 2002 and Trend To-date:
The levels of stress for both *E. loxophleba* and *A. acuminata* have decreased since 2002. This mimics the general pattern for *Casuarina obesa* across the majority of plots. This pattern, which has been observed in a number of species across a large number of sites, supports the theory that three years of below average rainfall resulted in increased stress being recorded in 2002 and these stress levels have subsequently fallen with above average rainfall in 2003.

No perennial species were present in the understorey plots however *Atriplex semibaccata* and *Austrostipa elegantissima* were scattered elsewhere in the 20 x 20m plot.

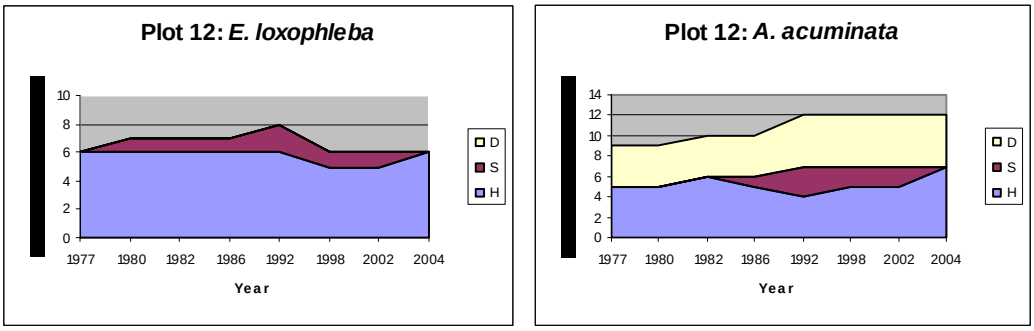


Figure 3.9: Trend in the vigour of the dominant species at Plot 12

Plate 10: Facing diagonally across Plot 12

Plot 13

Location: E 557643; N 6358921
North of the lake, roadside.

Vegetation Description:
Low open forest of *Allocasuarina huegeliana – Banksia prionotes*. *Banksia attenuata* also nearby on sandy soils. Diverse understorey dominated by *Jacksonia furcellata*.

Salinity Class:
Non-saline.

Condition in 2004 and Trend To-date:
The condition of the mature *A. huegeliana* population remains relatively unchanged and recruitment continues. The number of *A. huegeliana* seedlings increased from 4 to 8 individuals between 2002 and 2004. The range of heights for the seedlings recorded in 2002 has remained unchanged.

No significant change in the status of *B. prionotes* is evident with an individual changing from just within the healthy class range to just within the stressed class range.

Recruitment of *Jacksonia furcellata* continues with seedlings increasing from 5 to 12 individuals between 2002 and 2004.

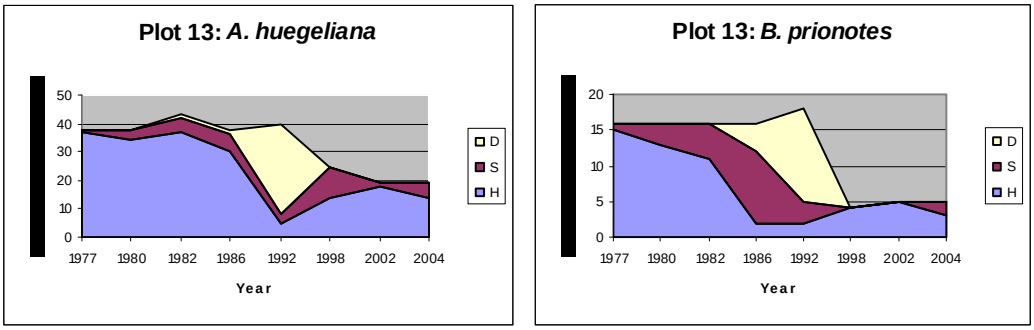


Figure 3.10: Trend in the vigour of the dominant species at Plot 13

Plate 11: Facing diagonally across Plot 13

Plot 15

Location: E 559729; N 6360835

On northern fence-line of Dulbinning Nature Reserve, south of dam in adjacent property.

Vegetation Description:

Open woodland of *Eucalyptus salmonophloia – Eucalyptus wandoo*. Understorey of *Gahnia ancistrophylla, Lomandra micrantha* and *Daviesia debilior.*

Salinity Class:

Very saline.

Condition in 2004 and Trend To-date:

The status of the overstorey has remained unchanged since 1996.

Whilst a decline in understorey species was noted in 2002 the understorey appears to have been stable since then. *Atriplex semibaccata* was observed in 1998 and 2004 but not 2002.

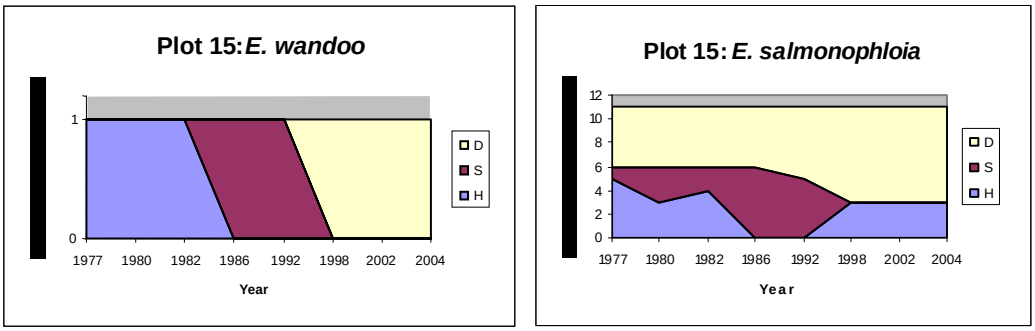


Figure 3.11: Trend in the vigour of the dominant species at Plot 15

Plate 12: Facing diagonally across Plot 15

Plot 16

Location: E 559788; N 6360805

Situated on the northern fringe of Dulbinning Nature Reserve; south of dam in adjacent property; just east of Plot 15.

Vegetation Description:

Open woodland of *Eucalyptus salmonophloia*. Understorey dominated by *Gahnia trifida* and *Lomandra micrantha.*

Salinity Class:

Very saline.

Condition in 2004 and Trend To-date:

E. salmonophloia vigour has remained stable since 1996.

A decline in understorey diversity was noted in 2002 (possibly due to poor rainfall) but this trend has reversed in the last two years. *Atriplex semibaccata* has established in all of the subplots since 2002 and two *Dianella* also established in one subplot.

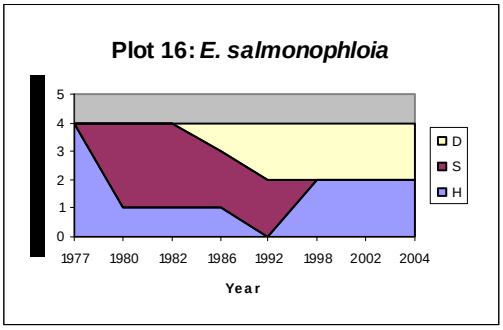


Figure 3.12: Trend in the vigour of the dominant species at Plot 16

Plate 13: Facing diagonally across Plot 16

Plot 17

Location: E 560503; N 6360778

Situated on the northern fringe of the Dulbinning Nature Reserve; south of the fence-line and east of Plots 15 and 16.

Vegetation Description:

Open woodland of *Eucalyptus salmonophloia*. Understorey dominated by *Melaleuca acuminata* and *Gahnia ancistrophylla*.

Salinity Class:

Very saline.

Condition in 2004 and Trend To-date:

All *E. salmonophloia* have been dead since 1998.

M. acuminata vigour remains high.

Understorey remains unchanged.

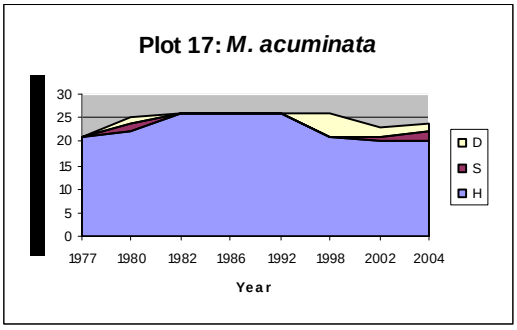


Figure 3.13: Trend in the vigour of the dominant species at Plot 17

Plate 14: Facing diagonally across Plot 17

Plot 18

Location: E 561068; N 6360808

Situated on the northern fringe of Dulbinning Nature Reserve; east of Plot 17.

Vegetation Description:

Initially an open woodland of *Eucalyptus salmonophloia*. Understorey dominated by *Melaleuca acuminata* and grasses.

Salinity Class:

Extremely saline.

Condition in 2004 and Trend To-date:

All *E. salmonophloia* and *E. loxophleba* have been dead since monitoring began.

Monitoring of *M. acuminata* commenced in 2002, as this is now the dominant overstorey species. The change in the number of melaleucas may reflect the number of individuals on the boundary of the plot that were counted, but recruitment is also occurring with 10 seedlings recorded in 2004. The overall vigour of *M. acuminata* has remained healthy and unchanged.

There were small (but possibly significant) increases in the number of subplots containing *Halosarcia indica* and *Atriplex semibaccata*.

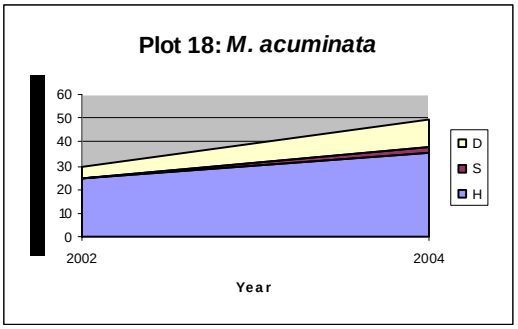


Figure 3.14: Trend in the vigour of the dominant species at Plot 18

Plate 15: Facing diagonally across Plot 18

Plot 19

Location: E 561345; N 6360800

Northern fringe of Dulbinning Nature Reserve on western edge of drain.

Vegetation Description:

Closed scrub of *Melaleuca lateriflora.* Very dense stand. Sparse understorey of *Atriplex semibaccata.*

Salinity Class:

Extremely saline.

Condition in 2004 and Trend To-date:

All *M. lateriflora* individuals surveyed were healthy. As with a number of overstorey species at a large number of sites it appears that stressed overstorey trees and shrubs have recovered from stress since 2002.

Significant changes have occurred in the understorey. Since 2002 the subplots have changed from being essentially bare to having *Atriplex semibaccata* being recorded in all subplots and *Halosarcia lepidosperma* being recorded in one. This trend was noted as having begun prior to 2002 at the site but was not reflected in the data for the subplots.

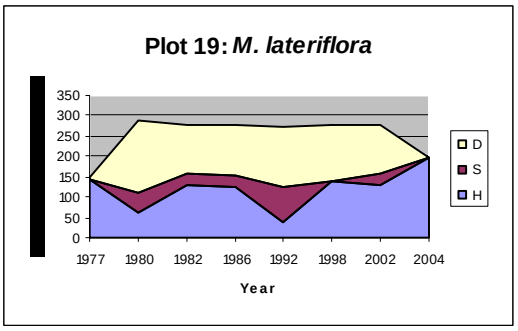


Figure 3.15: Trend in the vigour of the dominant species at Plot 19

Plate 16: Facing diagonally across Plot 19

Plot 20

Location: E 559060; N 6360428

Situated in Dulbinning Nature Reserve, near Oval Rd (between Chadwick's block and the reserve).

Vegetation Description:

Initially an open woodland of *Eucalyptus salmonophloia*. Understorey dominated by *Melaleuca acuminata* and grasses.

Salinity Class:

Very saline.

Condition in 2004 and Trend To-date:

All *E. salmonophloia* trees have been dead since 1998.

The one live *E. loxophleba* recorded in 1998 is now dead.

The *M. acuminata* understorey has remained relatively healthy and unchanged since 2002.

Atriplex semibaccata, which was present in 1998 but not in 2002 has become re-established in the subplots.

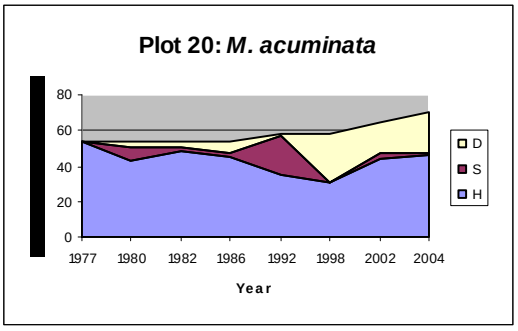


Figure 3.16: Trend in the vigour of the dominant species at Plot 20

Plate 17: Facing diagonally across Plot 20

Plot 21

Location: E 561051; N 6359773

Situated on the southern fringe of Dulbinning Nature Reserve, just north of dam on adjacent property.

Vegetation Description:

Initially a woodland of *Eucalyptus rudis, Casuarina obesa* and *Melaleuca strobophylla*. Understorey of *Melaleuca lateriflora*. Only *Halosarcia* species remain.

Salinity Class:

Extremely saline.

Condition in 2004 and Trend To-date:

All trees are dead and have been since monitoring began.

Understorey of samphires has been present since 1977.

Only *Halosarcia indica* was recorded in 2002. In 2004 both *Halosarcia indica* and *Halosarcia lepidosperma* were recorded. It is likely that this is a result of discrepancies in identification rather than a change in species present and the overall percentage cover does not appear to have significantly changed.

Plate 18: Facing diagonally across Plot 21

Plot 22

Location: E 561128; N 6360018

Located on the southern fringe of Dulbinning Nature Reserve, immediately west of dam in reserve (not the same dam as mentioned near Plot 21).

Vegetation Description:

Initially a woodland of *Eucalyptus rudis, Casuarina obesa* and *Melaleuca strobophylla*. Understorey of *Melaleuca lateriflora*. Only *Halosarcia indica* and *H. lepidosperma* remain.

Salinity Class:

Extremely saline.

Condition in 2002 and Trend To-date:

All trees are dead and have been since monitoring began.

Understorey of samphires has been present since 1977. There were thousands of germinants of *Halosarcia indica* in 2004.

Plate 19: Facing diagonally across Plot 22

Plot 23

Location: E 558891; N 6359500

On the Dulbinning Nature Reserve to the west of Oval Rd.

Vegetation Description:

Open woodland of *Eucalyptus salmonophloia, E. loxophleba*. Understorey of dense *Melaleuca acuminata* and *M. lateriflora*.

Salinity Class:

Extremely saline.

Condition in 2004 and Trend To-date:

The plot occurs within the bulldozed and burnt area of Dulbinning Nature Reserve. Monitoring began in 1980, after the disturbance.

Vigour of the *E. loxophleba* trees has declined since 1986 and this trend has continued over the last 2 years.

The increase in the number of *M. acuminata* appears to be a result of more diligent counting and the change in numbers should not be interpreted as a significant change in the number of individuals. The remainder of the understorey is also unchanged (i.e. the soil remains bare).

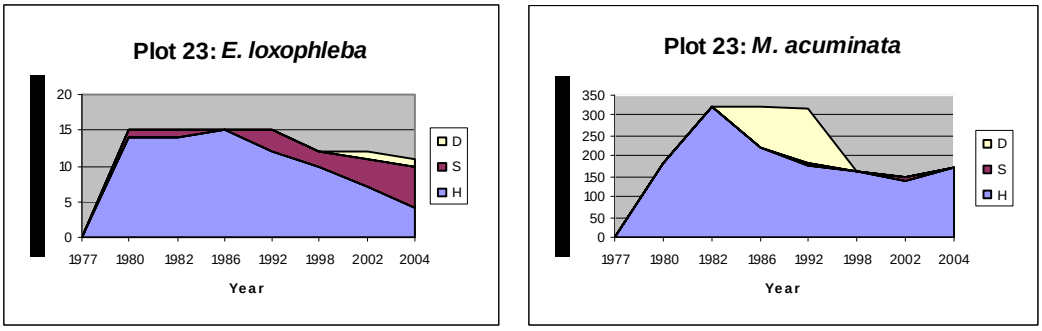


Figure 3.16: Trend in the vigour of the dominant species at Plot 23

Plate 20: Facing diagonally across Plot 23

Plot 24

Location: E 558858; N 6359428

Approximately 100m west of Oval Rd. In the regeneration area to the south of Plot 23.

Vegetation Description:

Initially open woodland of *Eucalyptus salmonophloia*. Now an open woodland of *E. loxophleba* and *E. wandoo*. Dense understorey of *Melaleuca acuminata* and *M. lateriflora*.

Salinity Class:

Extremely saline.

Condition in 2004 and Trend To-date:

The plot occurs within the bulldozed and burnt area of Dulbinning Nature Reserve. Monitoring began in 1980, after the disturbance. Very sparse trees of *E. loxophleba* and *E. wandoo* remain in the vicinity.

Based solely upon the data, there appears to have been a germination event of *Melaleuca acuminata* between 1986 and 1992 when the number of individuals increased from 2 to 33.

Vigour is reasonably high, with the apparent recovery of stressed *M. lateriflora* shrubs in 2004.

The understorey remains relatively unchanged.

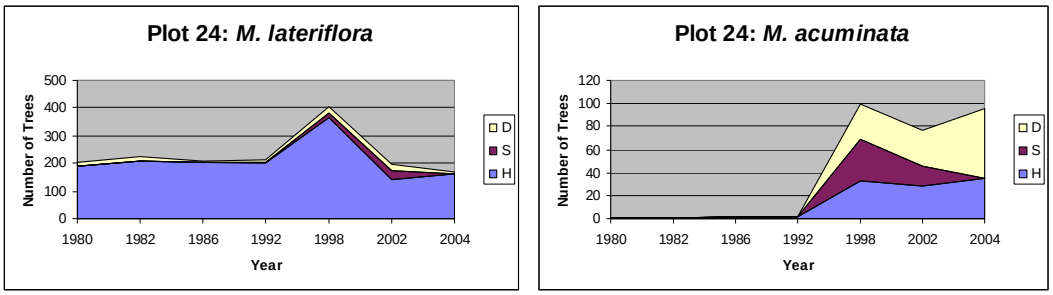


Figure 3.17: Trend in the vigour of the dominant species at Plot 24

Plate 21: Facing diagonally across Plot 24

Plot 25

Location: E 558828; N 6359808

On the Dulbinning Nature Reserve to the west of Oval Rd. Plot is approximately 150m south of northern boundary and 100m west of Oval Rd.

Vegetation Description:

Open woodland of *Eucalyptus wandoo* (as identified as *E. salmonophloia* in reports prior to 1998). Understorey of dense *Melaleuca acuminata*, grasses and small herbs

Salinity Class:

Very saline.

Condition in 2004 and Trend To-date:

The vigour of *E. wandoo* onsite remains relatively unchanged. Three of the seven *E. wandoo* seedlings recorded in 2002 were still surviving in 2004.

The understorey has remained relatively healthy and unchanged since 1992. The variation in the numbers of *M. acuminata* and *M. lateriflora* in 2002 appears to be an aberration in the data collection rather than a reflection of any changes in the vegetation.

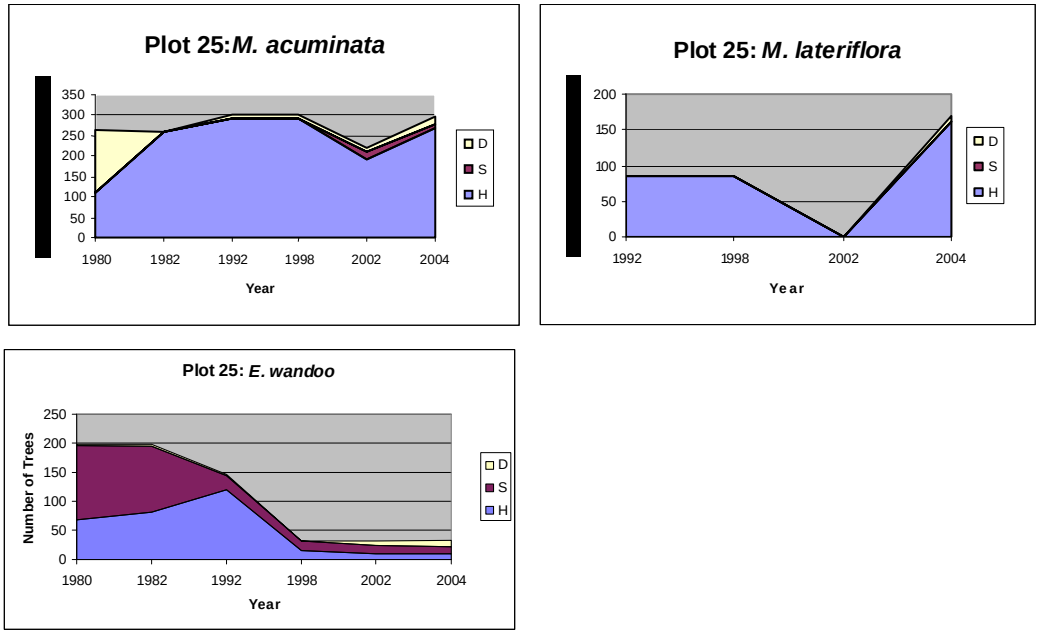


Figure 3.18: Trend in the vigour of the dominant species at Plot 25

Plate 22: Facing diagonally across Plot 25

Plot 26

Location: E 558882; N 6358783

To the west of Oval Rd. Located in the regeneration area to the south of Plots 23-25.

Vegetation Description:

Initially *Eucalyptus loxophleba* with *Acacia acuminata* and *Casuarina obesa* (identified as *Allocasuarina huegeliana* in previous reports) substorey. Now only *Acacia acuminata* and *Casuarina obesa* remain. No perennial understorey.

Salinity Class:

Slightly saline.

Condition in 2002 and Trend To-date:

Most of the *A. acuminata* remain healthy although two individuals have died since 2002.

The two *C. obesa* trees in the plot remain healthy.

There has been no change in the understorey as the soil remains bare.

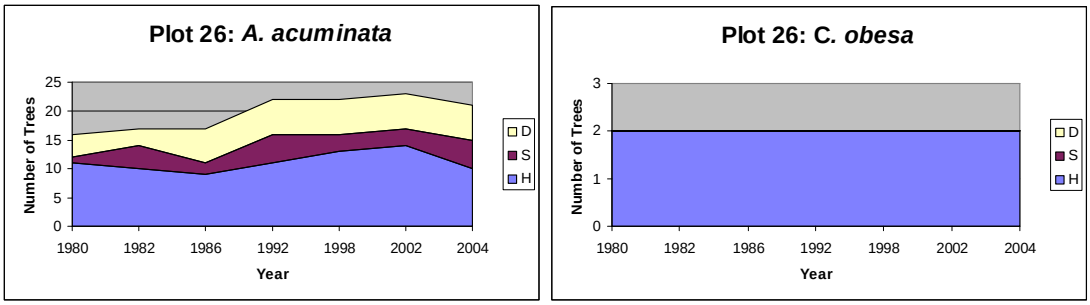


Figure 3.19: Trend in the vigour of the dominant species at Plot 26

Plate 23: Facing diagonally across Plot 26

Plot 27

Location: E 556032; N 6357284

Western edge of lake bed, just south of Plot 3. Plot established in 1998.

Vegetation Description:

Open woodland of *Casuarina obesa*.

Salinity Class:

Slightly saline.

Condition in 2004 and Trend To-date:

All the mature *C. obesa* trees are healthy and soil salinities are slight (mean EM38 horizontal 92 mS/m) in contrast to the higher salinity of nearby plots 33 and 3 (mean EM38 horizontal 205 mS/m and 169 mS/m respectively).

C. obesa seedling numbers have continued to increase (from 117 in 1998 to 891 in 2002 and then to 1069 in 2004). Seedlings were noted has having sustained significant levels of grazing in 2002 but were in good health. The seedlings remained in good health in 2004 and no significant grazing was noted.

The samphires present in the understorey in 1998 were absent in 2002 and 2004.

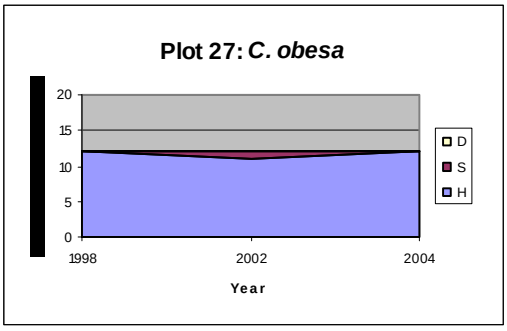


Figure 3.20: Trend in the vigour of the dominant species at Plot 27

Plate 24: Facing diagonally across Plot 27

Plot 28

Location: E 556189; N 6356601

Southern portion of lake bed, near abstraction bore 7. Plot established in 1998.

Vegetation Description:

Woodland of *Casuarina obesa*. Some *Melaleuca strobophylla*. Very sparse understorey of *Halosarcia lepidosperma* and *Maireana brevifolia*

Salinity Class:

Extremely saline.

Condition in 2004 and Trend To-date:

Whilst most plots have seen a decline in the total number of *C. obesa*, this is one of the few plots where the total number of stressed trees has remained constant and the number of healthy *C. obesa* has fallen. Since 2002, approximately 10% (7 out of 68) of the trees have died.

The one *M. strobophylla* tree has remained stressed. The one *M. strobophylla* seedling recorded in 2002 was still surviving in 2004, and had grown from 0.4 m to 1.1 m during this time.

The number of eucalypt seedlings has declined from 6 to 4 between 2002 and 2004.

The number of subplots in which *Halosarcia lepidosperma and Atriplex semibaccata* were recorded has increased since 2002.

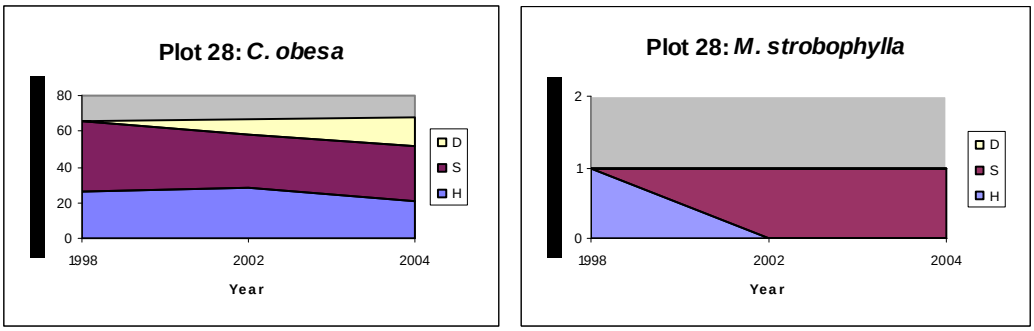


Figure 3.22: Trend in the vigour of the dominant species at Plot 28

Plate 25: Facing diagonally across Plot 28

Plot 29

Location: E 556496; N 6356584

Southern portion of lake bed, 300m east of Plot 28. Plot established in 1998.

Vegetation Description:

Open woodland of *Casuarina obesa*. Very sparse understorey of *Halosarcia lepidosperma*.

Salinity Class:

Extremely saline.

Condition in 2004 and Trend To-date:

The decline in *C. obesa* has continued since 1998 and there have been no healthy trees since 2002.

Halophytes (*Atriplex semibaccata and Halosarcia lepidosperma*) have established in the four previously bare subplots since 2002.

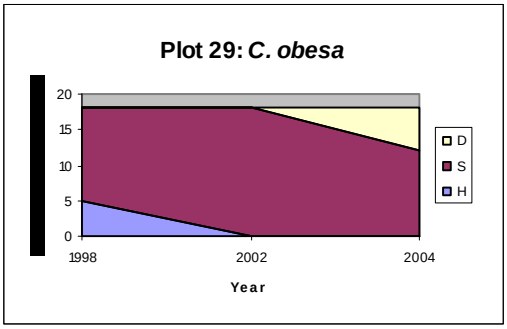


Figure 3.23: Trend in the vigour of the dominant species at Plot 29

Plate 26: Facing diagonally across Plot 29

Plot 30

Location: E 557422; N 6356494

On the deep sand dunes near the eastern fringe of the lake. Plot established in 1998.

Vegetation Description:

Woodland of *Banksia prionotes*. Understorey of grasses and small herbs.

Salinity Class:

Non-saline.

Condition in 2004 and Trend To-date:

Of the 36 *B. prionotes* surveyed in 1998, only two were alive in 2002 and one in 2004.

Of the three seedlings observed in 2002, one was dead, one was stressed and one was healthy in 2004. In 2004 the two live seedlings were judged to occur just outside the bounds of the plot.

The understorey appears largely unchanged and consisted predominately of exotic grasses. The predominant native species in the subplots was *Lomandra rupestris.*

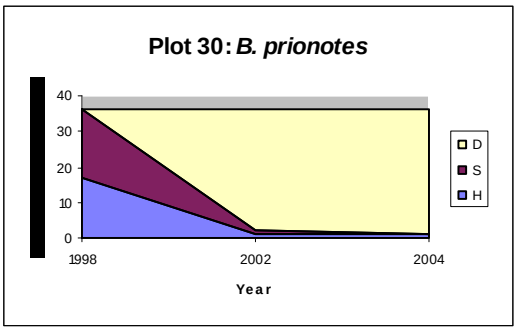


Figure 3.24: Trend in the vigour of the dominant species at Plot 30

Plate 27: Facing diagonally across Plot 30

Plot 32

Location: E 557307; N 6359030

Across the Northern Arthur River, 50m south of road. Plot runs across the river and extends approximately 30m east and 30m west from the river channel. Plot originally established in 1983.

Vegetation Description:

Woodland of *Eucalyptus loxophleba, Casuarina obesa* and *Melaleuca strobophylla*. Understorey of *Halosarcia indica* and *H. lepidosperma*.

Salinity Class:

Very saline. Soil salinities range from moderate (EM38 horizontal of 120 mS/m) at higher ground to extreme (EM38 horizontal of 208 mS/m) near or in the channel.

Condition in 2004 and Trend To-date:

The apparent improvement in the *C. obesa* population is in large part due to the inclusion of an additional 6 saplings in the dataset in 2004. Some of these appear as though they would have exceeded the 1.5 m minimum for inclusion in the dataset in 2002 as they ranged from 2.11 to 3.73 m in 2004. Sixteen trees had lost their tags by 2004 but using dbh and height data it is believed that the trees have been correctly retagged.

The cause of the decline in numbers of *E. loxophleba* is uncertain, there appears to be a discrepancy between the number of trees in the raw data and the summarized data for 2002.

The *M. strobophylla* population appears to have stabilised in the plot.

Understorey was estimated across the entire plot rather than recorded on a plot by plot basis rather than within subplots. There are large differences in the estimate cover of the *Halosarcia sp* between 2002 and 2004. This appears to be the result of a large overestimate in 2002 and does not reflect real changes onsite.

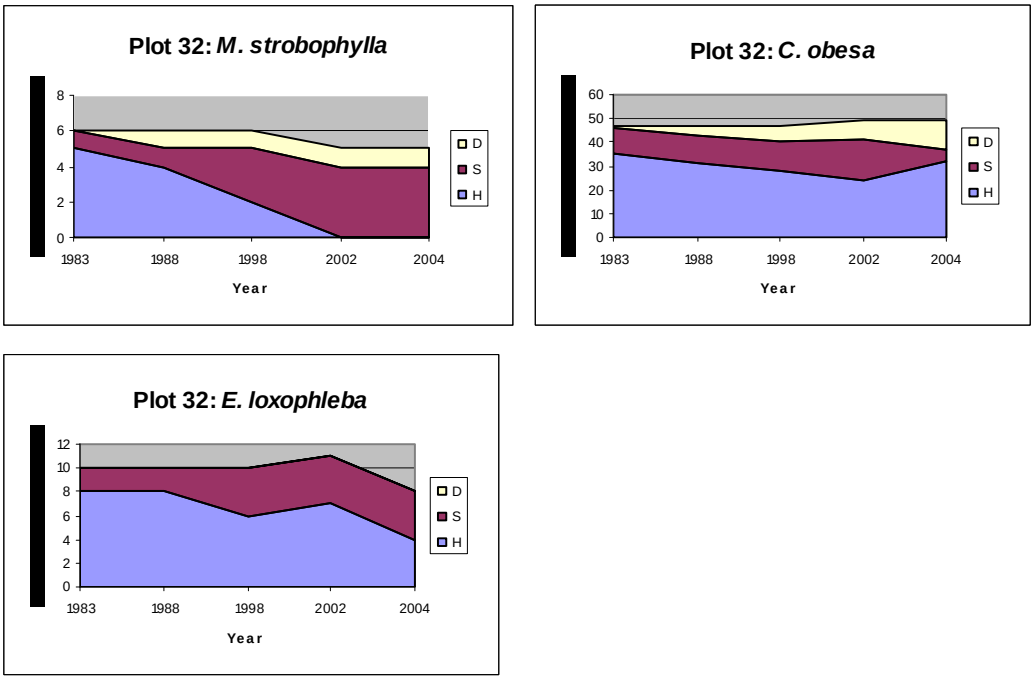


Figure 3.26: Trend in the vigour of the dominant species at Plot 32

Plate 29: Facing diagonally across Plot 32

Plot 33

Location: E 556116; N 6357330

South west corner of the lake bed. Plot originally established in 1983. Plot is 20 m x 40 m in size.

Vegetation Description:

Woodland of *Casuarina obesa*. Understorey of very sparse *Halosarcia lepidosperma* and small herbs.

Salinity Class:

Extremely saline.

Condition in 2004 and Trend To-date:

There has been an improvement in the *C. obesa* in the plot. This appears to be a real trend but the appears greater than it is due to the inclusion of a healthy 6.1 m tree that is within the plot but was not previously recorded.

No significant change is apparent in the understorey between 2002 and 2004.

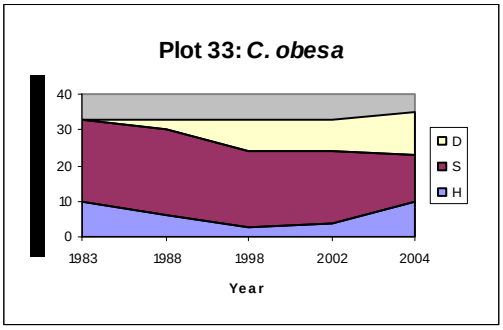


Figure 3.27: Trend in the vigour of the dominant species at Plot 33

Plate 30: Facing diagonally across Plot 33

Plot 34

Location: E 556927; N 6358111

Approx. 25m east of Pump 1. Plot established in 2000.

Vegetation Description:

Dense *C. obesa* and *M. strobophylla* stand on undulating gilgai mounds. Scattered *Halosarcia sp.* understorey.

Salinity Class:

Extremely saline.

Condition in 2004 and Trend To-date:

This plot is declining. A significant number of *C. obesa* have died in the last two years and of the 13 *M. strobophylla* trees alive in 2000, two were dead in 2002 and all were dead by 2004.

Halosarcia lepidosperma in depressions is relatively stable.

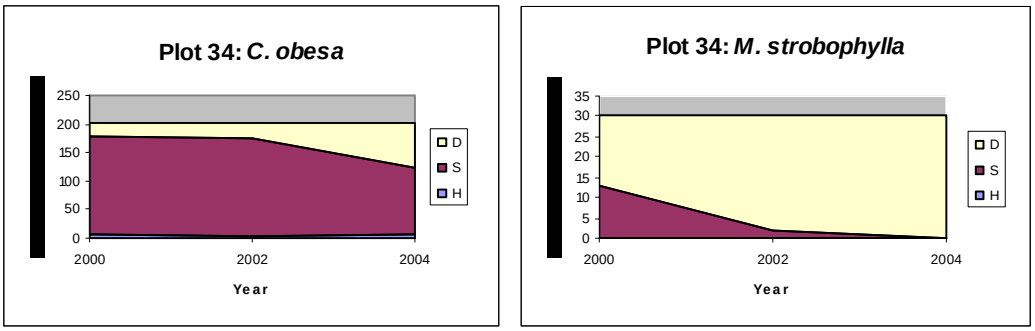


Figure 3.28: Trend in the vigour of the dominant species at Plot 34.

Plate 31: Facing diagonally across Plot 34

Plot 35

Location: E 556796; N 6356552

Approx. 50m south west of Pump 13. Plot established in 2000.

Vegetation Description:

Open woodland of *C. obesa*. Generally large trees occurring on flat ground. Occasional *Carpobrotus sp.,* otherwise no understorey present.

Salinity Class:

Extremely saline.

Condition in 2004 and Trend To-date:

The vigour of the *C. obesa* has improved and only one tree has died since 2002.

The understorey of *Carpobrotus* is significantly more abundant in 2004 than in 2002.

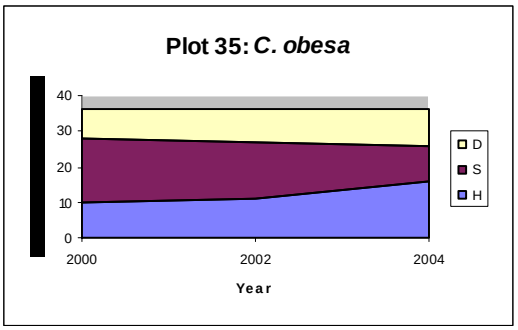


Figure 3.29: Trend in the vigour of the dominant species at Plot 35.

Plate 32: Facing diagonally across Plot 35

Plot 36

Location: E 557290; N 6356958

Approx. 80m west of Pump 15. Plot established in 2000.

Vegetation Description:

Woodland of *C. obesa* and *M. strobophylla*. Density of stems ranges from high on the raised gilgai mounds to low in and around depressions. Understorey consists of occasional *Halosarcia lepidosperma*

Salinity Class:

Extremely saline.

Condition in 2004 and Trend To-date:

This plot is declining. Whilst six *C. obesa* trees have improved in condition since 2002, 31 have died. Since 2002, 75% (15 of 20) of the *M. strobophylla* trees have died.

The abundance of both *Atriplex semibaccata* and *Halosarcia* species are increasing.

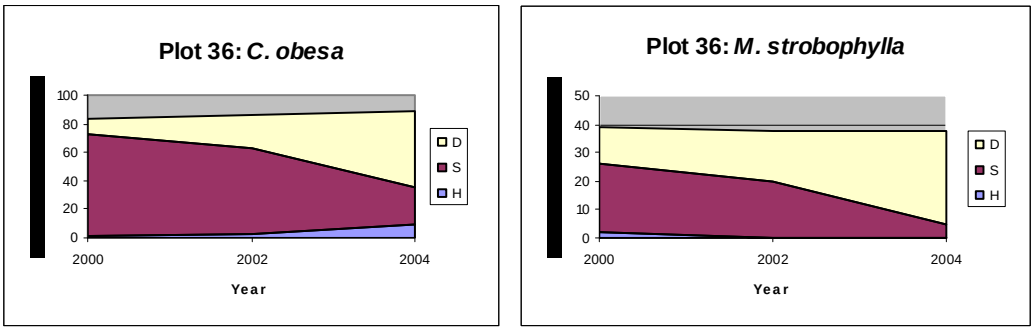


Figure 3.30: Trend in the vigour of the dominant species at Plot 36

Plate 33: Facing diagonally across Plot 36.

Plot 37

Location: E 556887; N 6357053

Approx. 50m south of Pump 12. Plot established in 2000.

Vegetation Description:

Plot samples one stand of *C. obesa* in an open woodland of *C. obesa*. The majority of trees to the south of Pump 12 are restricted to areas of higher elevation (ie. on gilgai mounds) with scattered *Halosarcia sp.* in the understorey.

Salinity Class:

Extremely saline.

Condition in 2004 and Trend To-date:

All *E. rudis* trees are dead and have been since 2000.

The majority of the *C. obesa* is stressed and 11 trees have died since 2002.

The abundance of both *Atriplex semibaccata* and *Halosarcia* species are increasing.

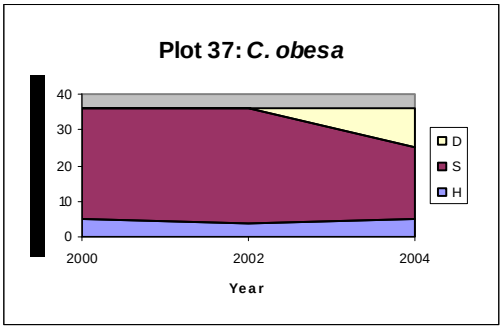


Figure 3.31: Trend in the vigour of the dominant species at Plot 37

Plate 34: Facing diagonally across Plot 37.

Plot 38

Location: E 556708; N 6357859

Approx. 50m west of Pump 2. Plot established in 2000.

Vegetation Description:

Open woodland of *C. obesa* with low open shrubland of *Halosarcia lepidosperma.*

Salinity Class:

Extremely saline.

Condition in 2004 and Trend To-date:

The number of healthy *C. obesa* has increased from 5 to 14 whilst only 2 trees have died since 2002.

The abundance of both *Atriplex semibaccata* has increased during the past two years.

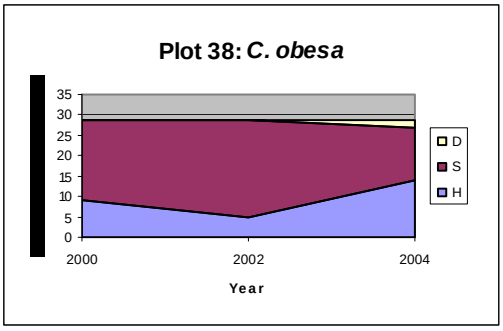


Figure 3.33: Trend in the vigour of the dominant species at Plot 38.

Plate 35: Facing diagonally across Plot 38.

Plot 39: Seedling Transect

Location: E 555988; N 6357325

Runs east-west, 60m north of pump 9. Plot established in 2000.

Salinity Class:

Moderately Saline

Description:

Transect runs at the northern end of the seedling recruitment area and samples a relatively low density of *C. obesa* seedlings in a generally open area. Seedling numbers doubled between 2000 and 2002. There is an increase the last two years from 121 to 136. This is likely to be a real increase as there is a significant number of seedlings less than 50 cm high and the seedlings are relatively sparse and easy to count accurately.

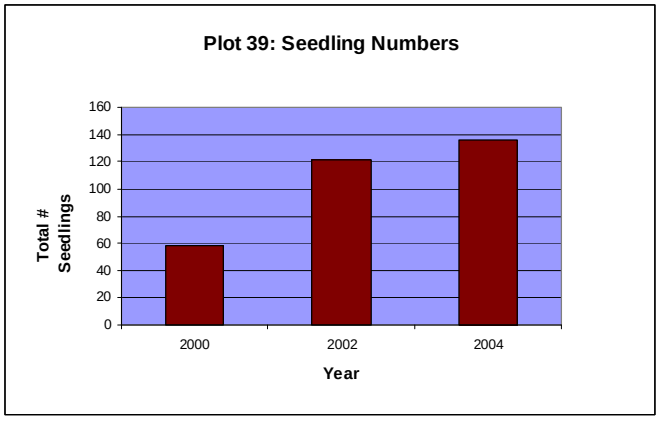


Figure 3.34: Seedling numbers at plot 39.

Plate 36: Seedling plot 39, facing east

Plot 40: Seedling Transect

Location: E 555982; N 6357283

Runs east-west, 20m north of pump 9. Plot established in 2000.

Salinity Class:

Moderately Saline

Description:

This transect passes through the stand of *C. obesa* trees just north of pump 9 and into the open area east of the pump. *C. obesa* seedling densities are low under the trees becoming higher in the open areas to the east and west.

Seedling numbers have increased from 517 in 2000 to 927 in 2002 and then to 1143 in 2004. The apparent increase in the last two years may be within the range of error in counting large numbers of very small seedlings.

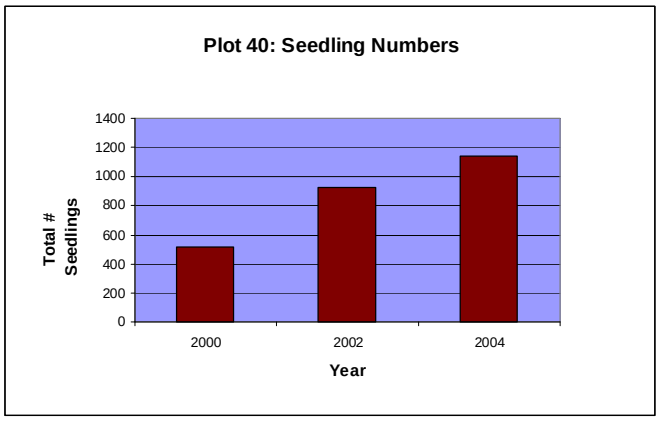


Figure 3.35: Seedling numbers at plot 40.

Plate 37: Seedling plot 40, facing east

Plot 41: Seedling Transect

Location: E 555978; N 6357242

Runs east-west, 20m south of pump 9. Plot established in 2000.

Salinity Class:

Moderately Saline

Description:

Very high densities of *C. obesa* seedlings with variable heights occur throughout much of this transect. Soil salinity varies from low to moderate at the eastern margin. Seedling numbers have increased from 1469 in 2000 to 2912 in 2002 and then declined to 2690 in 2004. The increase between 2000 and 2002 is likely to reflect an actual increase in seedling numbers but the decrease in the last two years is likely to be within the range of error in counting large numbers of very small seedlings.

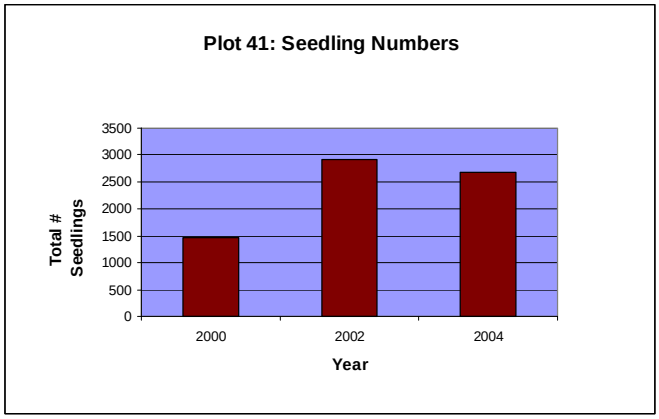


Figure 3.36: Seedling numbers at plot 41.

Plate 38: Seedling plot 41, facing east

Plot 42 Melaleuca seedling plot (established 2004)

Location: E 557540; N 6357715

Situated on the north-western edge of the lake bed, south of Plot 9 and just east of Plot 7.

Salinity Class:

Extremely saline

Description:

This plot was established in 2004 to monitor dense stand of *M strobophylla* seedlings. A total of 314 *M strobophylla* seedlings and 2 *C obesa* seedlings were present in this plot.

Plate 38: Seedling plot 42, photo taken from NW corner post

4.0 Discussion

4.1 Data Collection

4.1.1 Tree Height

Measuring tree heights required approximately 25% of the field time required for this project. In addition to being very time consuming, the level of error associated with measuring the height of mature trees appears to be greater than any real growth that occurs between years in which monitoring is undertaken.

Examining the differences in mature tree heights measured in 2002 with a clinometer and 2004 with a measuring pole (which is more precise) it appears that there are errors in height measurements of several metres (e.g. trees were observed to be several metres different 2004 than 2002). The crucial evidence of erroneous measurements are the trees that were measured as being several metres shorter than 2 years ago when there is no death at the top of the trees and no branches or parts of the trunk have fallen from the tree.

Therefore comparison of the heights of mature would provide little meaningful insight into growth rates. It is understood that tree heights were initially measured as part of an exercise to determine the age of the trees. Having obtained this initial data it is recommended that mature trees be allocated into height classes rather than measure the heights of individual trees.

In seedling plots and transects, and melaleuca stands only height ranges are recorded at present. This tends to result in only the extremes in growth being recorded. Whilst the lowest individual indicates whether germination is ongoing, the tallest individual does not necessarily provide useful information for management. It is recommended that in addition to height ranges, the mean, mode or median height is also recorded for melaleuca stands and seedlings plots and transects.

Measuring the growth rates of juvenile trees may still provide useful information for managing water levels within Lake Toolibin as the height of seedlings when the lake fills is probably critical to their survival. It would be reasonable to assume that seedlings totally submerged for a significant time would die. The heights of the seedlings are dependant upon growth rates and age. Therefore information regarding growth rates will be useful for manipulating water levels within the lake. It is recommended that the heights of seedlings are measured until they reach a nominal height (based on the depth to which the lake fills). When they reach this nominal height they are deemed to be ‘mature’ and then allocated to height classes.

4.1.2 Diameter at Breast Height

Measuring tree diameters required approximately 25% of the field time required for this project. In addition to being very time consuming, it is not clear whether this is going to be

analysed, and if so for what end. The requirement for this parameter to be regularly measured should be reviewed.

4.1.3 Vigour

Vigour Scale

The vigour scale is appropriate for the project, provided it is only used for analysis in terms of vigour classes (healthy, stressed and dead). The scale was designed specifically for eucalypts and is essentially subjective but it does seem to produce reasonably consistent vigour class assessments by different assessors. However the exact numerical value produced by different assessors using the condition scale is somewhat variable and therefore analysis should not be undertaken using these values.

One discrepancy noted between the use of this scale in 2002 and 2004 was that the lowest value used for each of the three measurements in 2002 was 0 but 1 was the lowest value used in 2004. This in no way affected the classes trees were assigned to but it would severely compromise any analysis of the numerical scores produced in those two years. For the sake of consistency in method for this project, the use of the scale should be clarified in the next brief for this long term monitoring program.

Vigour trends

The data from 2004 and 2002 appears to be directly comparable but assessing long term trends would be somewhat compromised by inconsistencies in data collection over time. This has largely resulted from changes in the position and the number of plots being measured and whether previously dead trees have continued to be included in the datasets for the plots.

Resolving inconsistencies within the dataset is outside the scope of this project and a project in its own right.

The analysis of trends provided below is based on the portion of the dataset that includes plots that have been measured up to 2004. Both percentages and number of trees are presented to provide an insight into some of the inconsistencies within the dataset.

4.1.4 Salinity

The validation of EM38 readings with the direct measurement of electrical conductivity of soil samples is mentioned in the report for the 2002 report, but the method is not elaborated upon, and neither the EC data nor a comparison of the EC and EM38 readings is presented.

In 2004, for each group of plots, soil samples at 25 cm (depth) intervals were collected up to a depth of 2 m where possible. These samples were analysed for EC and compared to the EM38 readings. These were not used to calibrate the EM38 readings as a minimum of 12 sites for each location or major soil type is required to generate the required linear regression required for calibration (Bennett *et. al*, 1995). Given that plots were located across a number of soil types it was not practical to auger 12 holes to a depth of 2 m for each soil type.

The comparisons of the direct measurements of EC with the EM38 readings is shown in Table 4.1.

Table 4.1 Comparison of EM38 readings and direct measurements of EC

Plot	EM38 - horizontal	EM38 - vertical	avg EC for 25cm & 50cm samples	avg EC all samples	depth (m)	EM38 - h as % of EC	EM38 - v as % of EC
4	336	413	314	407	2.00	107	102
6	221	303	278	367	1.00	80	82
11	298	412	211	324	1.25	142	127
12	26	50	2	1	1.25	1733	3571
13	13	25	1	1	1.00	2000	3125
15	161	199	144	140	1.50	112	142
17	223	295	114	164	1.25	196	179
18	348	370	292	272	1.00	119	136
19	440	556	281	346	1.00	157	161
20	185	256	209	216	1.25	88	119
21	753	666	743	652	1.00	101	102
22	923	820	534	487	1.00	173	168
23	243	282	274	269	1.00	89	105
25	248	252	137	168	1.25	181	150
26	46	88	4	46	1.50	1150	193
27	99	151	141	140	0.70	70	108
28	343	400	239	295	1.00	143	136
29	443	538	211	254	0.75	210	212
30	3.2	7.7	9	3	2.00	35	238
33 (RF4)	205	231	324	329	0.75	63	70
34	316	410	224	346	1.25	141	119
36	396	540	427	450	1.25	93	120
37	407	519	344	374	0.75	118	139
38	271	365	189	251	0.90	143	145
42	216	299	215	261	1.00	100	115
Average	287	338	234	263	1.00	121*	135*

* average excludes extreme values of 12, 13 & 26

The EM38 provided a reasonable indication of the salinity across the study area given the overall agreement between the EM38 readings and the direct EC measurements determined under laboratory conditions. There were large discrepancies at the three non-saline and slightly sites (plots 12, 13 and 26). These discrepancies are large as percentages but relatively small as actual qualities, and it should be noted that soil factors have a greater influence on EM38 readings were the salinity is low (Bennett *et. al*, 1995).

On average the EM38 slightly overestimated the EC levels. The overestimation appears to be greater between the vertical EM38 readings and the direct measurements. However the sample holes were on average only 1 m instead of the 2 m required for direct comparison. Therefore this discrepancy should not be interpreted as being precise.

The comparison of vertical and horizontal EM38 readings indicates whether salinity levels are greater at the surface or at depth. In 18 of the 26 sample sites the EM38 readings and the direct EC measures agree in terms of whether salinity is greater at depth or not. However once again the fact that the sample holes were on average only 1 m instead of the 2 m required for direct comparison required means that some caution should be exercised in assessing the level of agreement between the EM38 readings and the direct measurements.

The comparison of soil samples with the EM38 readings can be a useful exercise but the soil sampling regime should be reviewed given that:

- Obtaining soil samples in this project required 10% of the field time;
- The EM 38 can not be calibrated with soil samples unless a very large number of samples are taken;
- Obtaining soil samples disturbs the sites; and
- Whilst on average holes could only be hand augered to 1.0 m, samples need to be taken down to 2.0 m to compare to EM38 vertical readings.

It is recommended that samples at 25 and 50 cm depths are taken at the same plots they were collected in 2004 for validation of the EM38 horizontal readings. As vertical readings require comparison to samples up to 2 m below the surface and this can be practicably obtained with a hand auger it is not recommended that samples below 50 cm be collected.

4.1.5 Percentage Cover for Overstorey

In previous years the monitoring brief has stated that percentage cover for each overstorey species be estimated at 100 points across the 20 x 20 m plots (i.e. at 2 m intervals). No data for this was presented in the 2002 report and it was deemed in 2004 that this method was both very time consuming, and less accurate, than making a single estimate of the percentage cover of each overstorey species in each plot.

It is recommended that the monitoring brief be modified to reflect this change in method.

4.2 Vegetation Trends

4.2.1 Short Term Trends

The data from 2004 and 2002 appears to be directly comparable and this was in large part due to access to the raw 2002 data in the field when collecting the 2004 data. There are small inconsistencies in data collection between plots due to the fact that they were not all established at the same time. These inconsistencies include the orientation of the subplots and whether the percentage understorey cover is estimated across subplots or the entire plot. Access to the previous dataset provides the data collectors the opportunity to ensure data is collected within any individual plot is collected consistently over time. It is therefore recommended that in future monitoring, previous raw data be made available to the data collectors to ensure data at individual plots is collected consistently.

4.2.2 Long Term Trends

Assessing long term trends is somewhat compromised by inconsistencies in data collection over time. This has resulted from changes in the position and number of plots being measured and whether previously dead trees have continued to be included in the datasets for the plots.

An assessment of long term trends on the basis of a superficial examination of the data is fraught with difficulties and this is evident in Figures 4.4 to 4.8 which incorporate data for all plots still being measured in 2004.

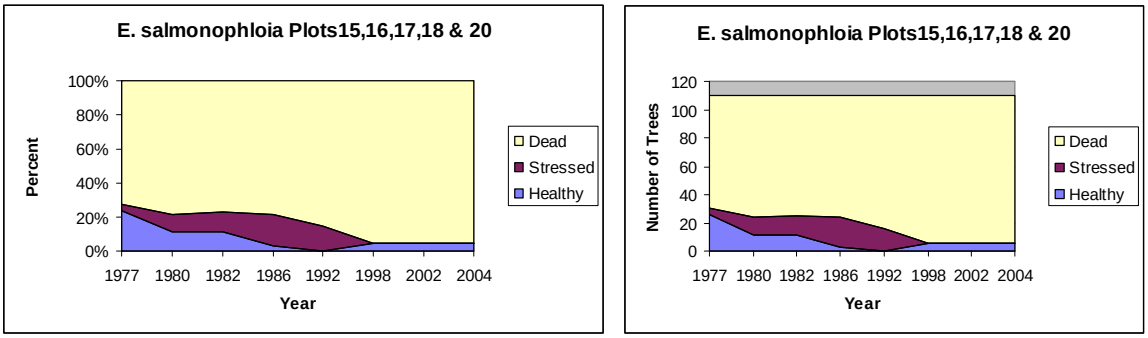


Figure 4.4: Trend in vigour for all* E. salmonophloia *trees within the study area

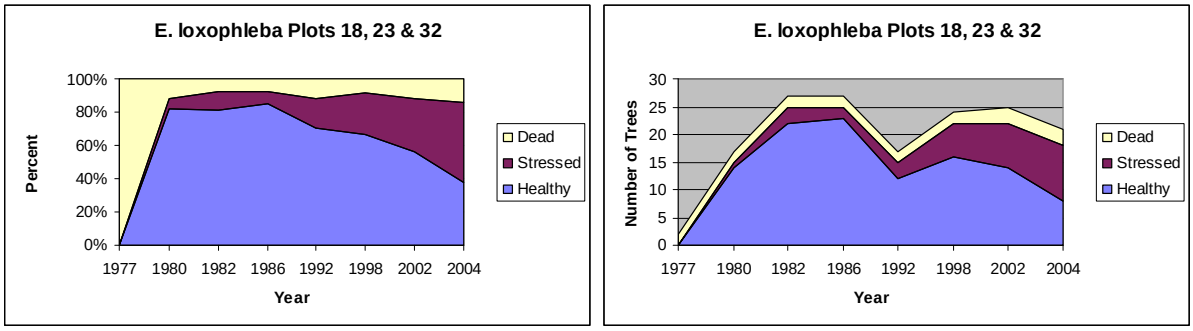


Figure 4.5: Trend in vigour for all* E. loxophleba *trees within the study area

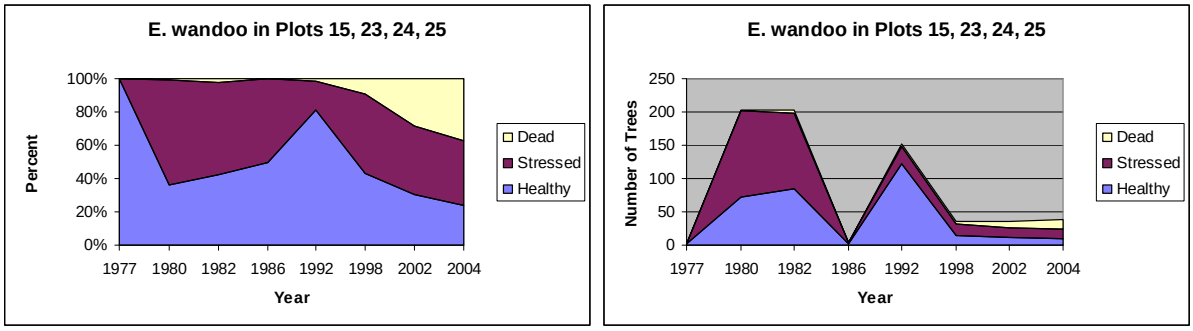


Figure 4.6: Trend in vigour for all* E. wandoo *trees within the study area

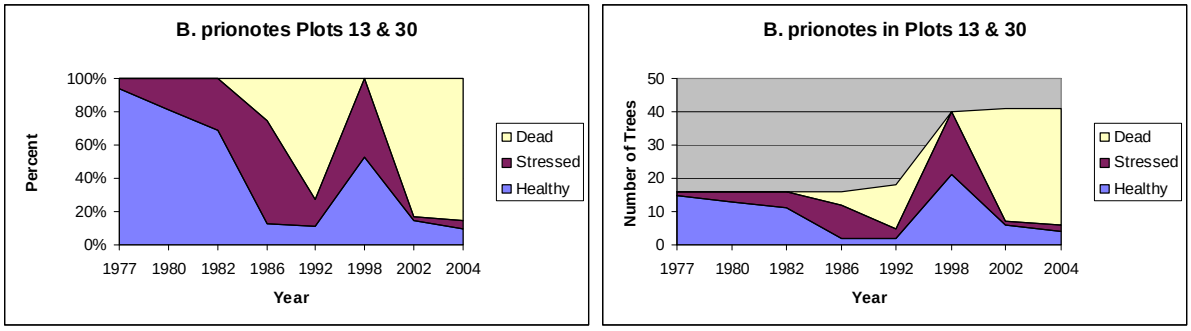


Figure 4.7: Trend in vigour for all* B. prionotes *trees within the study area

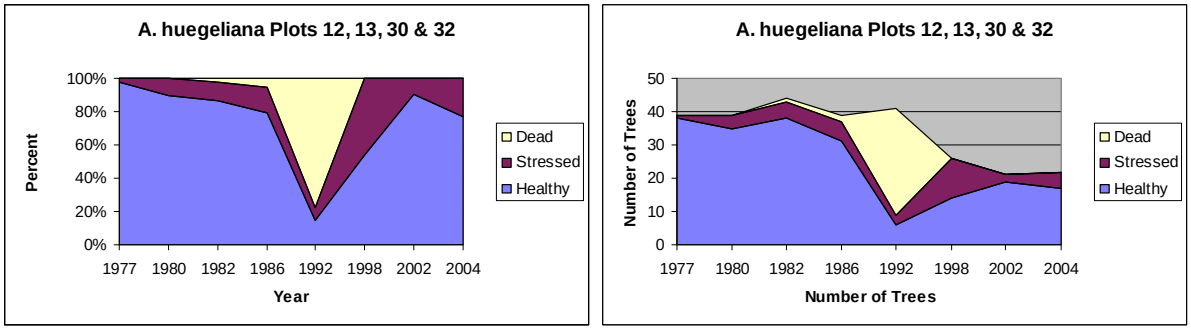


Figure 4.8: Trend in vigour for all* A. huegeliana *trees within the study area

Comparison of actual numbers within each vigour class over time is not legitimate if you start graphing from earliest date of monitoring and add in data from monitoring plots started later. If the *Melaleuca strobophylla* recorded in Plot 42 (which was established in 2004) was directly incorporated into the dataset used for determining trends of this species onsite, it would appear there has been a dramatic increase in the number and vigour of this species. This would be a false impression as the trees in Plot 42 were present more than two years, but they were not previously recorded.

Figures 4.5, 4.6, 4.7 & 4.8 imply that data from all plots stated begins from 1977, however in

- Figure 4.5 only Plot 18 was monitored in 1977, Plot 23 was first monitored in 1980 and Plot 32 first monitored in 1983;
- Figure 4.6 only Plot 15 was monitored in 1977 and Plots 23, 24 & 25 were first monitored in 1980;
- Figure 4.7 only Plot 13 was monitored in 1977 and Plot 30 first monitored in 1998; and
- Figure 4.8 Plots 12 & 13 were monitored in 1977, Plot 32 first monitored in 1983 and Plot 30 first monitored in 1998.

The intent of the monitoring program is to measure changes in vegetation over time, given the difficulties in using the existing dataset it is recommended that the monitoring program be reviewed and long term trends only be measured from a date at which all data is being collected in a consistent manner.

4.2.3 Wetland Vegetation

Casuarina Obesa

Within Lake Toolibin *Casuarina obesa* has fallen in overall numbers but the portion of live plants that are healthy has increased, as shown in Figure 4.1

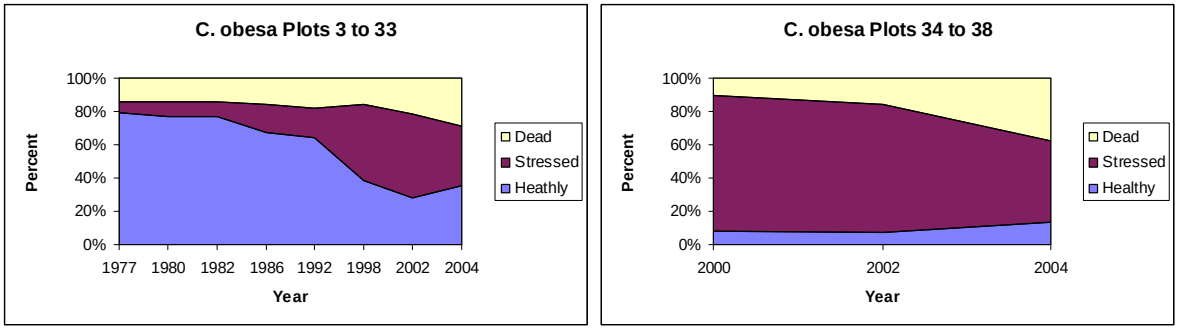


Figure 4.1: Trend in vigour for all* C. obesa *trees within the Lake Toolibin monitoring plots

This trend is likely to be the result of rainfall patterns shown in Figure 4.2.

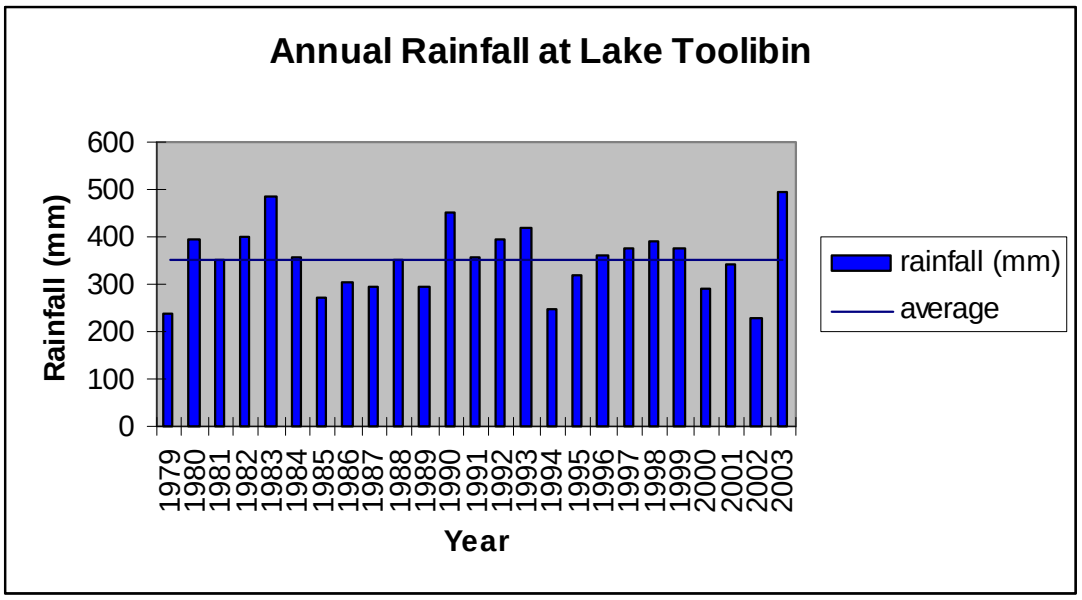


Figure 4.2: Annual Rainfall for Lake Toolibin 1979 - 2003

It is likely that a significant portion of the stress recorded in the *C. obesa* trees monitored in 2002 had been induced by three successive years of below average rain. It appears that a significant portion of these trees have now died, but also that following higher than average rainfall in 2003 some of the stressed trees have recovered. This trend appears to support investigations reported by Ogden and Froend (2002) at Toolibin Lake that showed both mature trees and seedlings of *C. obesa* and *M. strobophylla* are very dependent on rainfall to surface soils.

A significant germination and seedling establishment event was noted in 1998 in the area on the west side of the lake around pump 9. The area of seedling establishment extends from

approximately 100m south to 80m north of pump 9 and from the separator wall to 100m to the east.

In April 2000 a plot was established in this area (plot 27) to monitor the condition of the trees and encompassed 119 *C. obesa* seedlings. Three 100 x 5m belt transects were also established through this area and seedling numbers, height and soil salinity recorded in each 5m section.

In 2004 the seedlings in the transects varied in height from 0.05 to 6.0m, and the seedlings in Plot 27 varied from 0.05 m to 1.8 m. The variability in heights suggested germination has continued after the initial recruitment in 1998.

In Plot 27 *C. obesa* seedling numbers have continued to increase (from 117 in 1998 to 891 in 2002 and then to 1069 in 2004). The soil salinity at Plot 27 is slight (mean EM38 horizontal 92 mS/m) and samphires have not been present in the understorey since 1998. This contrasts greatly with the higher salinity levels of nearby plots 33 and 3 (mean EM38 horizontal 205 mS/m and 169 mS/m respectively).

In the three transects, seedling numbers have increased to 3960 in 2002 showing viable seed is continuing to be dispersed and conditions are favourable for germination and establishment.

The lower soil salinity around pump 9 should favour seedling establishment however there is considerable variability within the area. High seedling densities are found in areas with conductivities in excess of 200 mS/m.

Melaleuca strobophylla

The *Melaleuca strobophylla* population has declined almost continuously since 1977 and this trend has continued over the last two years. As shown in Figure 4.3, of the original 111 live trees assessed in 1977 only 29 remained in 2002 and 18 in 2004. Of the surviving trees in 2004 only two were healthy.

Figure 4.3: Trend in vigour for all M. strobophylla trees within the Lake Toolibin monitoring plots

This continued decline is not necessarily caused by continuing increases in salinity as most plots have not shown significant change in salinity status over the past two years, as shown in Table 4.2.

Table 4.2 Comparison of salinity status in 2002 and 2004 in Plots

Plot	Salinity Class in 2002	Salinity Class in 2004	Percentage Change in Em38 – horizontal readings
12	Non-saline	Non-saline	17
13	Non-saline	Non-saline	-25
30	Non-saline	Non-saline	-43
26	Slightly	Slightly	-11
27	Slightly	Slightly	15
3	Moderate	Very	27
8	Moderate	Very	31
16	Moderate	Very	22
25	Moderate	Very	29
6	Very	Very	23
7	Very	Very	-6
15	Very	Very	22
17	Very	Very	23
20	Very	Very	16
33	Very	Extremely	20
24	Very	Extremely	39
23	Very	Extremely	30
4	Extremely	Extremely	24
5	Extremely	Extremely	7
9	Extremely	Extremely	39
10	Extremely	Extremely	2
11	Extremely	Extremely	-5
18	Extremely	Extremely	0
19	Extremely	Extremely	23
28	Extremely	Extremely	-1
29	Extremely	Extremely	-13
32	Extremely	Very	-10
34	Extremely	Extremely	20
35	Extremely	Extremely	11
37	Extremely	Extremely	-11
38	Extremely	Extremely	-6
21	Extremely	Extremely	3
22	Extremely	Extremely	10
36	Extremely	Extremely	5
42	Not established	Extremely	NA
Average			10

There has been a slight overall increase in the EM38 horizontal readings but this is probably not significant given that: the EM38 horizontal readings varied from the direct EC measurement by an average 20% in 2004; and that readings can be affected by soil moisture and temperature, and the accuracy of the zeroing process for the EM38.

It is unclear from the data collected within this project whether the decline in *M. strobophylla* is related to continuing elevated salinity levels, water availability or other factors.

There has been some recruitment of seedlings in areas within the lake but outside the original plots. In 2004, plot 42 was established to monitor one of these stands. The stand of 314 seedlings was entirely contained within the 20 x 20 m plot (which equates to a density in the order of 0.8 plants/m^2). The vast majority of these individuals were healthy.

4.2.4 Understorey

The understorey plant community on the lake bed and in other seasonally wet areas have shown a trend towards a greater abundance of *Atriplex semibaccata*, with individuals being recorded in subplots where they were not present two years ago in 13 of the 35 plots monitored. Such changes may reflect that it has been 8 years since the lake was last inundated rather than significant changes in salinity. Changes at some sites are contrary to salinity being the driving force in changes in understorey.

At Plot 3 there appears that there may be a successional change from *Halosarcia lepidosperma* to *Maireana brevifolia* and whilst *Maireana brevifolia* is less salt tolerant than *Halosarcia lepidosperma* it does not appear that decreasing salinity is driving the change. Salinity within Plot 3 has increased from moderate to very saline between 2002 and 2004, with EM38 horizontal readings increasing from 133 mS/m to 169 mS/m. Having discounted differential grazing pressures it is most likely that changing water regimes is the crucial factor causing this change.

4.2.5 Terrestrial Vegetation

The terrestrial tree species of the Toolibin reserves have declined slightly in vigour since the last round of monitoring in 2002.

Not all the declines in tree vigour is associated with salinity. One plot (plot 30) is not saline but lost virtually all mature trees in the period between 1998 and 2002. Ogden & Froend (2002) noted that the decline may have been due to a combination of drought stress resulting in the death of mature trees and a lack of germination. Ogden & Froend (2002) recommended, given testing had failed to identify the presence of *Phytophthora sp.*, that the 'population dynamics of the *B. prionotes* should be examined as the recruitment requirements of the species is likely to be associated with more frequent disturbance (fire) intervals than what the woodlands currently experience.'

Whilst in 2004 there remain some healthy young stands of *Banksia prionotes* on the dunes fringing Lake Toolibin, the lack of recruitment of individuals to replace the dead overstorey was again observed at Plot 30. This may be in part due to competition to germinants of native species from exotic grasses within the Plot.

This in turn may have implications for vegetation within Lake Toolibin itself through an increase in recharge. The net recharge of groundwater in Banksia woodlands and other native vegetation is estimated to be 9% - >30% of average rainfall (Dodd & Heddle, 1989) but this could be expected to increase dramatically where shallow rooted annual weeds replace deep rooted perennials. In Banksia woodlands on the Swan Coastal Plain more than 70% of weeds are annual species such as grasses (Keighery, 1989).

Therefore the recommendation by Ogden and Froend (2002) that population dynamics of *B. prionotes* be investigated is made once again in 2004. These investigations should include a focus on impediments to germination.

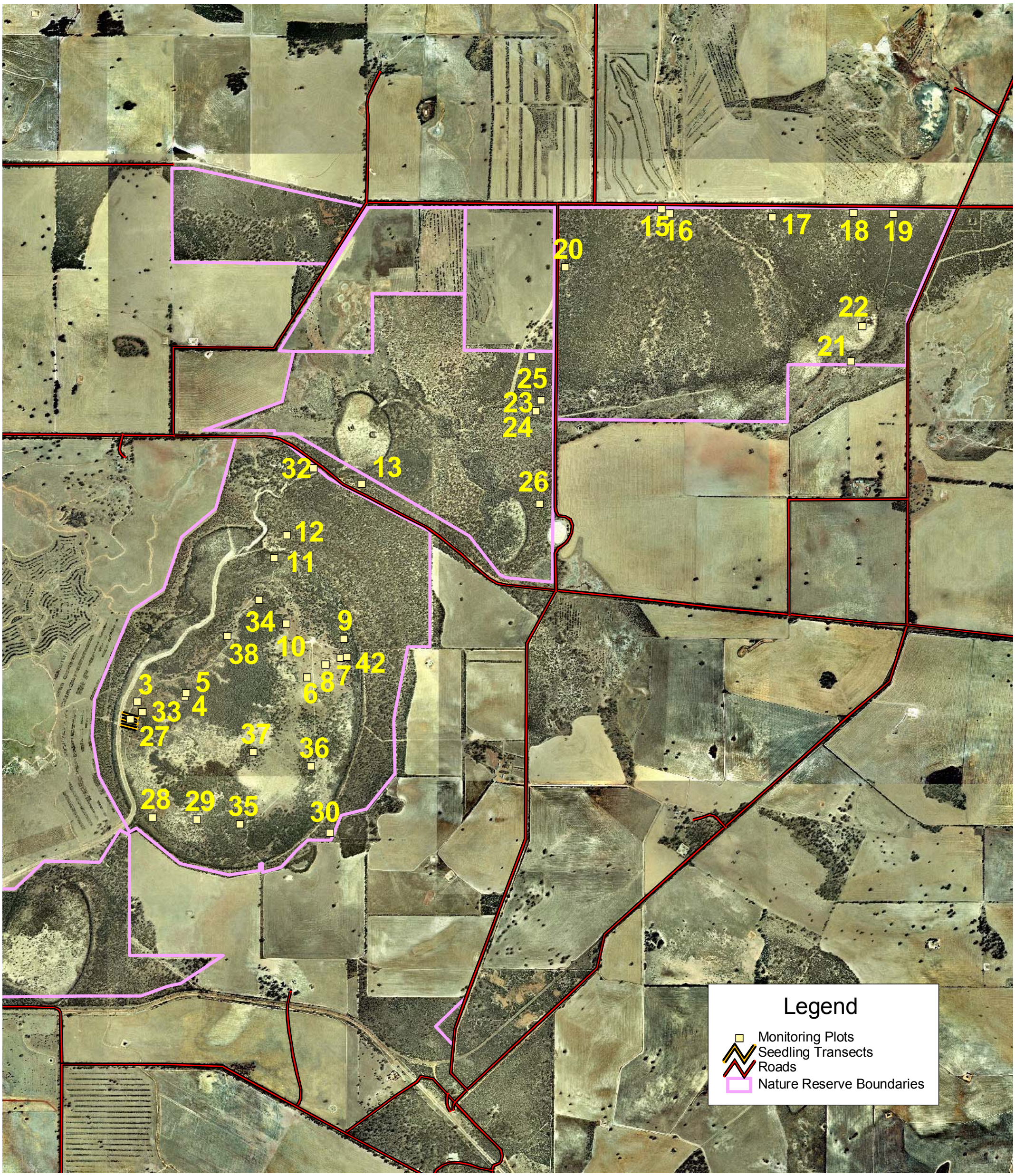
5.0 Recommendations

Vegetation Monitoring of Toolibin Lake and Reserves

It is recommended that:

1. Mature trees be allocated into height classes rather than measure the heights of individual trees;
2. In addition to height ranges, the mean, mode or median height is also recorded for melaleuca stands and seedlings plots and transects;
3. The heights of seedlings are measured until they reach a nominal height (based on the depth to which the lake fills). When they reach this nominal height they are deemed to be 'mature' and then allocated to height classes;
4. The requirement for diameter at breast height to be frequently measured be reviewed;
5. A single estimate of the percentage cover of each overstorey species in each plot be made;
6. Previous raw data be made available to the data collectors to enable the consistent collection of data at individual plots;
7. The monitoring program be reviewed and long term trends only be measured from a date at which all data is being collected in a consistent manner.
8. Soil samples are only taken at 25 and 50 cm depths at the same plots they were collected in 2004 for validation of the EM38 horizontal readings; and
9. The population dynamics of *B. prionotes* be investigated and in particular the impediments to germination and recruitment of this species.

6.0 Maps



ecoscape

Lake Toolibin Long Term Monitoring

Map 1

Location of Monitoring Plots

Nov 2004

500 0 500 1000 Meters

1 : 25000 @ A3

Legend

Salinity Classes

- Extremely Saline
- Non-saline
- Slightly Saline
- Very Saline
- Nature Reserve Boundaries

ecoscape

Lake Toolibin Long Term Monitoring

Map 2

Salinity Levels at Monitoring Plots

Nov 2004

500 0 500 1000 Meters

1 : 25000 @ A3

References

Vegetation Monitoring of Toolibin Lake and Reserves

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Appendix One: Overstorey Data

Vegetation Monitoring of Toolibin Lake and Reserves

Height and crown health were determined for live trees only.
Refer to methods section for transect design.
Refer to methods for crown health and DBH assessment.
Multiple DBH measurements represent multistemmed trees

Subplot refers to the section of the plot that trees were located; of relevance when locating trees and when a significant elevational gradient is present.

Missing Plots:
Plots 1 and 2 - Destroyed during construction of the separator channel
Plot 14 - Unable to locate

Plot 3 Tag No.	Subplot	*Species*	2004 DBH (cm) or #	2004 Ht (m)	2004 Crown Health
182	A	*C. obesa*	25.8	6.7	13
	A	*C. obesa*			
	B	*C. obesa*			
	B	*C. obesa*	2 seedlings	0.25 - 0.75	(grazed)
183	C	*C. obesa*	16.8	6.7	15
	C	*C. obesa*	5 seedlings	0.25 - 0.75	(grazed)
	C	*C. obesa*			
	C	*C. obesa*			
	C	*C. obesa*			
	C	*C. obesa*			
	C	*C. obesa*			
184	D	*C. obesa*	29.3	6.7	12
	D	*C. obesa*	1 seedling	0.25 - 0.75	(1 y.o. not grazed)
	D	*C. obesa*			
	D	*C. obesa*			
	D	*C. obesa*			
	D	*C. obesa*			
	D	*C. obesa*			
	E	*C. obesa*			
	E	*C. obesa*	1 Seedling	0.25 - 0.75	(grazed)
Plot : 4 Tag No.	**Subplot**	***Species***	**2004 DBH (cm) or #**	**2004 Ht (m)**	**2004 Crown Health**
	A	*C. obesa*	1 seedling		S (grazed)
	A	*M. strobophylla*	18 seedlings	0.1 - 0.8	18H
	B	*M. strobophylla*			
185	B	*C. obesa*	12.9	8	6
	B	*M. strobophylla*			
	B	*C. obesa*	2 seedlings	0.3 - 0.6	2H
	B	*M. strobophylla*	1 seedling	0.3	1H
187	B	*C. obesa*	12.2	4.3	3
188	C	*C. obesa*	18.9	12	6
189	C	*M. strobophylla*			
190	C	*M. strobophylla*			
191	C	*M. strobophylla*			

192	C	*C. obesa*			
193	C	*M. strobophylla*			
194	C	*C. obesa*	18.4	8	7
204	C	*M. strobophylla*			
195	C	*C. obesa*			
196	C	*M. strobophylla*			
197	C	*C. obesa*	15.7, 13.6	8.3	13
198	C	*C. obesa*			RD
199	C	*C. obesa*			
186	C	*C. obesa*	15.6	7	8
	C	*M. strobophylla*	3 seedlings	0.3 - 0.6	3H
	D	*C. obesa*			
200	D	*C. obesa*	15.2	10	3
	D	*M. strobophylla*			
201	D	*C. obesa*			RD
202	D	*C. obesa*			RD
203	D	*C. obesa*			D
	E	*C. obesa*			
205	E	*C. obesa*	9.3	6.6	14
206	E	*M. strobophylla*			
	E	*M. strobophylla*	2 seedlings	0.3 - 0.6	2H

Plot : 5 **Tag No.**	**Subplot**	***Species***	**2004 DBH (cm) or #**	**2004 Ht (m)**	**2004 Crown Health**
				Height Range for whole plot:	
207	A	*C. obesa*			
208	A	*C. obesa*		*C. obesa*:	
	A			*3.3 - 10*	
				M. strobophylla:	
209	A	*C. obesa*	10.1		3
210	A	*C. obesa*	21.8	3.6 - 4.7	7
211	A	*C. obesa*			
	A	*M. strobophylla*	10 seedlings	0.2 - 0.9	10H
212	B	*M. strobophylla*			D
213	B	*C. obesa*			RD
214	B	*C. obesa*	5.9, 8.0, 5.9		17
215	B	*C. obesa*	3.3		11
216	B	*C. obesa*	5.1, 5.4, 3.7, 3.2		14
217	B	*C. obesa*	5.2		15
218	B	*M. strobophylla*	7.5		13
219	B	*M. strobophylla*			
220	B	*C. obesa*	3.3, 4.5		13
221	B	*C. obesa*			
222	B	*C. obesa*			
223	B	*C. obesa*			
224	B	*C. obesa*	16.1		15
225	B	*C. obesa*	18.4, 17.3, 14.9		11
	B	*M. strobophylla*			
	B	*M. strobophylla*	5 seedlings	0.2 - 0.6	
	B	*C. obesa*	1 seedling	0.7	

226	C	*C. obesa*	5.2		10
227	C	*C. obesa*	7.5		10
228	C	*C. obesa*	4.4		10
229	C	*C. obesa*	7.8		13
230	C	*C. obesa*	4.6		13
231	C	*C. obesa*	6.2		7
232	C	*M. strobophylla*			D
233	C	*C. obesa*	4.3		7
234	C	*M. strobophylla*			D
235	C	*M. strobophylla*			D
236	C	*C. obesa*			D
237	C	*M. strobophylla*			
238	C	*C. obesa*	3.3		11
239	C	*C. obesa*	5.2		9
240	C	*M. strobophylla*			
241	C	*M. strobophylla*			
242	C	*C. obesa*	3.4		10
243	C	*C. obesa*	4.2		15
244	C	*M. strobophylla*			RD
245	C	*C. obesa*	8.5		13
246	C	*M. strobophylla*			
247	C	*M. strobophylla*			
248	C	*M. strobophylla*	7.8		9
249	C	*M. strobophylla*	5.5		9
250	C	*C. obesa*	6.5		14
251	C	*M. strobophylla*			RD
252	C	*C. obesa*	6.2		10
253	C	*C. obesa*	2.8		13
254	C	*M. strobophylla*	3.6		7
255	C	*C. obesa*	5.1		11
256	C	*C. obesa*	5.5		11
257	C	*C. obesa*	5.3		12
258	C	*M. strobophylla*	3.9		11
259	C	*M. strobophylla*			
	C	*M. strobophylla*	3 seedlings	0.6 - 0.9	3H
260	D	*C. obesa*	5, 5.5		12
261	D	*C. obesa*	4.2		8
262	D	*C. obesa*	3.1		11
263	D	*C. obesa*	4.8		11
264	D	*M. strobophylla*	4.8		9
265	D	*C. obesa*	7.9		12
266	D	*C. obesa*			
267	D	*C. obesa*	3		11
268	D	*C. obesa*	5.8		9
269	D	*C. obesa*	4.5		6
270	D	*C. obesa*	3.1		7
271	D	*C. obesa*	5		5
272	D	*C. obesa*	3.7		8
273	D	*C. obesa*			
274	D	*C. obesa*	4.5		8
275	D	*M. strobophylla*			RD
276	D	*C. obesa*	4.7		7
277	D	*M. strobophylla*	3.5		7
278	D	*M. strobophylla*			
279	D	*M. strobophylla*			
280	D	*M. strobophylla*			
281	D	*M. strobophylla*			

282	D	*M. strobophylla*			
283	D	*C. obesa*	2.5		7
284	D	*C. obesa*			RD
285	D	*C. obesa*	2.8		5
286	D	*C. obesa*			RD
287	D	*M. strobophylla*			
288	D	*M. strobophylla*			
289	D	*C. obesa*	4.7		12
290	D	*C. obesa*	5.2		13
291	D	*C. obesa*	5.5, 3.7, 6.1, 7.2, 5, 4.6, 4.7		14
292	D	*C. obesa*	3.7		14
293	D	*M. strobophylla*			
294	D	*M. strobophylla*			
295	D	*C. obesa*	4.4		6
296	D	*M. strobophylla*			
297	D	*M. strobophylla*			
298	D	*M. strobophylla*			
299	D	*M. strobophylla*			
300	D	*M. strobophylla*			
301	D	*M. strobophylla*			
302	D	*M. strobophylla*			
303	D	*M. strobophylla*			
304	D	*M. strobophylla*			
305	D	*C. obesa*	3.7		9
306	D	*C. obesa*	6		11
307	D	*C. obesa*	4.8		10
308	D	*M. strobophylla*			
309	D	*C. obesa*	7		13
310	D	*C. obesa*	5.2, 2.4		14
311	D	*M. strobophylla*			
312	D	*M. strobophylla*	5.8		9
313	D	*M. strobophylla*			D
314	D	*M. strobophylla*			
315	D	*C. obesa*	6.5		6
316	D	*M. strobophylla*			
317	D	*C. obesa*	4.9		9
318	D	*M. strobophylla*	3.8		11
319	D	*M. strobophylla*			
320	D	*C. obesa*	4.7		10
381	D	*C. obesa*			
321	D	*M. strobophylla*			RD
322	D	*C. obesa*	4		9
323	D	*C. obesa*	6.2		12
324	D	*C. obesa*	3.7, 5.7, 2.0		9
325	D	*M. strobophylla*			
	D	*M. strobophylla*			
326	D	*M. strobophylla*			
	D	*M. strobophylla*			
379	D	*M. strobophylla*	2.9		7
380	D	*M. strobophylla*			D
382	D	*M. strobophylla*			
383	E	*C. obesa*	7		11
	E	*M. strobophylla*			
384	E	*M. strobophylla*			
385	E	*C. obesa*	4.4		8
386	E	*M. strobophylla*			
387	E	*C. obesa*	4.8		15

388	E	*C. obesa*	3.7		12
389	E	*C. obesa*	5.1, 3.0		10
390	E	*C. obesa*	4.2		10
391	E	*C. obesa*	2.7, 6.5, 4.6, 4.6		12
	E	*C. obesa*			
392	E	*C. obesa*	4.2		10
393	E	*C. obesa*	4.3		5
394	E	*M. strobophylla*			
395	E	*C. obesa*	4.8		13
396	E	*C. obesa*	5		13
397	E	*C. obesa*	6		14
398	E	*C. obesa*	5.3		10
399	E	*M. strobophylla*	2.9		
	E	*M. strobophylla*			
	E	*M. strobophylla*			
326	E	*M. strobophylla*			
327	E	*C. obesa*	3.8		4
	E	*M. strobophylla*			
328	E	*C. obesa*	4.4, 4.3		12
329	E	*C. obesa*	5		6
330	E	*C. obesa*	9.2, 7.3, 6.3		8
331	E	*M. strobophylla*			
332	E	*C. obesa*	6.1, 4.6, 5.2		10
333	E	*M. strobophylla*			
334	E	*C. obesa*	9.1		12
	E	*C. obesa*			
	E	*C. obesa*			
336	E	*C. obesa*			RD
400		*C. obesa*	5.2		11
401			4.1		8

Plot : 6					**2004 Crown**
Tag No.	**Subplot**	***Species***	**2004 DBH (cm) or #**	**2004 Ht (m)**	**Health**
		no trees			
	A	*x*			
	B	*x*			
	C	*x*			
	D	*x*			
	E	*x*			

Plot : 7					**2004 Crown**
Tag No.	**Subplot**	***Species***	**2004 DBH (cm) or #**	**2004 Ht (m)**	**Health**
	A	*x*			
101	B	*C. obesa*	38.6, 23, 21.9	14	15
	C	*Eucalyptus sp.*	2 seedlings	0.94 - 1.74	H
	D	*Eucalyptus sp.*	1 seedling	0.76	H
102	E	*C. obesa*	11.6, 11.9, 16.1	10.5	15
103	E	*C. obesa*	65.9	16.5	11
104	E	*C. obesa*	43.6	8.25	13

Plot : 8					**2004 Crown**
Tag No.	**Subplot**	***Species***	**2004 DBH (cm) or #**	**2004 Ht (m)**	**Health**
		no trees			

	A	*x*				
	B	*x*				
	C	*x*				
	D	*x*				
	E	*x*				
Plot : 9						**2004 Crown**
Tag No.	**Subplot**	***Species***	**2004**	**DBH (cm) or #**	**2004 Ht (m)**	**Health**
105	A	*C. obesa*		10.9	4	13
	A	*M. strobophylla*				
106	A	*C.obesa*		16.1	13	12
107	A	*C.obesa*		10.2	8	14
	A					
108	A	*C.obesa*		11.8	9	15
109	A	*C.obesa*		6.6	7	13
	A	*M. strobophylla*				
110	A	*C.obesa*		17.2, 11.7, 9.0	11.5	14
	A	*M. strobophylla*				
111	A	*C.obesa*		15.4	9.5	15
112	A	*C.obesa*		14.8	12	15
113	A	*C.obesa*		17.6	11.5	11
114	B	*C.obesa*		19.3	12	11
115	C	*C.obesa*		14.3, 11.1	7.5	11
116	C	*C.obesa*		5	4.9	9
	C	*M. strobophylla*				
117	C	*C.obesa*		6.7	4.71	11
118	C	*C.obesa*		3.9	4.8	11
119	C	*C.obesa*		11.5		RD
	C	*M. strobophylla*				
120	C	*C.obesa*		14.6	2.8	8
121	C	*C.obesa*		6.7	2.7	9
	C	*M. strobophylla*				
122	C	*C.obesa*		14.2	10	13
123	C	*C.obesa*		18.8	10.5	11
124	C	*C.obesa*		6.7	8	13
125	C	*C.obesa*		12.8	7	13
126	C	*C.obesa*		11.8, 5.9, 3.7	7.4	13
	C	*M. strobophylla*				
127	D	*C.obesa*		11.3	8.5	11
128	D	*C.obesa*		14	7	13
129	D	*C.obesa*		12.3	10	15
130	D	*C.obesa*		3.2	4.7	9
131	D	*C.obesa*		8.3	8	15
132	D	*C.obesa*		15		RD
133	D	*C.obesa*				RD
134	D	*C.obesa*		13.2	11.5	15
135	D	*C.obesa*		5.8, 5.9	5.3	7
136	D	*C.obesa*		14.7	10	13
137	D	*C.obesa*		13.1, 10.8, 9.6	11	13
	D	*M. strobophylla*				
	D	*M. strobophylla*				
138	D	*C.obesa*		19.4	12	11
	D	*M. strobophylla*				
	D	*M. strobophylla*				
139	E	*C.obesa*		12.9	12	13
140	E	*C.obesa*		20.1	12	15

141	E	*C.obesa*	3.5	4.8	8
142	E	*C.obesa*	5.6, 5.5	5.6	9
143	E	*C.obesa*	6.9	6.7	11
144	E	*C.obesa*			
145	E	*C.obesa*	5	6.2	10
146	E	*C.obesa*	7.2	6.3	12
147	E	*C.obesa*	5.1	5	7
148	E	*C.obesa*	9.6	7.5	13
149	E	*C.obesa*	4.8	5.9	12
150	E	*C.obesa*	4.7, 4.5	5.4	10
151	E	*C.obesa*	5.3	5.7	9
152	E	*C.obesa*	6.4	5.6	9
153	E	*C.obesa*			D
154	E	*C.obesa*	12.6, 3.4, 3.3	7	13
155	E	*C.obesa*	6.1	7.6	10
156	E	*C.obesa*			
157	E	*C.obesa*			
158	E	*C.obesa*	13.2	10.5	15
159	E	*C.obesa*	4.9, 4.9	6.7	8
160	E	*C.obesa*	10	11	13
161	E	*C.obesa*	7.9		RD
162	E	*C.obesa*			RD
163	E	*C.obesa*	12	11	11
	E				
164	E	*C.obesa*			
165	E	*C.obesa*	11.6	11	15
166	E	*C.obesa*	15.2	9	15
167	E	*C.obesa*	7.1	4.7	7
168	E	*C.obesa*	10.4, 5.6	7.8	11
169	E	*C.obesa*	13, 9.2		RD
170	E	*C.obesa*	8.5	5.5	15
171	E	*C.obesa*	8.4	8.4	11
172	E	*C.obesa*	9.8, 8.3	5.2	7
173	E	*C.obesa*	3.7, 3.5, 1.7	6.1	7
174	E	*C.obesa*	4.1	4.3	13
175	E	*C.obesa*	5.6	5.8	11
176	E	*C.obesa*	9.8, 6.5	9	11
177	E	*C.obesa*	19.7	10.5	11
178	E	*C.obesa*	10.6	10	14
179	E	*C.obesa*	14	7.5	12
180	E	*C.obesa*	6.2	5.4	12
181	E	*C.obesa*	11.4	8.5	10
182	E	*C.obesa*	7	3.18	7

Plot : 10 **Tag No.**	**Subplot**	***Species***	**2004**	**DBH (cm) or #**	**2004 Ht (m)**	**2004 Crown Health**
	A	*x*				
	B	*x*				
	C	*x*				
60	D	*C. obesa*		16.7	10.5	11
61	D	*C. obesa*		8.9	10.5	7
62	D	*M. strobophylla*		8, 5.8, 14.1	5.5	7
63	D	*C. obesa*		10.6	11	7
64	D	*C. obesa*		6.2		D
65	D	*C. obesa*		13.3, 10.4	9.5	11
66	D	*C. obesa*		16.8	10.5	11

67	D	*C. obesa*	14.8	12.5	15
68	D	*C. obesa*	10.9	8.3	15
69	D	*C. obesa*	10.8	8.3	15
70	D	*C. obesa*	10	7.7	15
71	D	*C. obesa*	16.7	8	15
72	E	*C. obesa*	9.8	7.5	11
73	E	*C. obesa*	7.6	6.5	13
74	E	*C. obesa*			D
75	E	*C. obesa*			
76	E	*M. strobophylla*			RD
77	E	*C. obesa*			RD
78	E	*C. obesa*	7.2	7.9	13
79	E	*C. obesa*	14.3, 14.8, 11.8	13	11
80	E	*C. obesa*	16.2	10.5	15
81	E	*C. obesa*	12.8	4.53	7
82	E	*C. obesa*			D
83	E	*C. obesa*			RD
84	E	*C. obesa*			D
85	E	*C. obesa*	10.5, 3.6	12	13
86	E	*C. obesa*	12.8, 12.9	12	15
87	E	*C. obesa*	6.7	6	11
88	E	*C. obesa*	9.2	5.5	15
89	E	*C. obesa*			D
90	E	*C. obesa*	11.2	12	15
91	E	*C. obesa*	15.8	8.8	15

Plot : 11					**2004**
Tag No.	**Subplot**	***Species***	**2004 DBH (cm) or #**	**2004 Ht (m)**	**Crown Health**
350	A	*C. obesa*	16.2, 15.8, 15.1, 15.3	9.5	13
	A		10.8, 13.4, 9.9		
351	A	*C. obesa*	20.2	10.5	13
	A	*E. rudis*			
	B	*M. strobophylla*			
	B	*M. strobophylla*			
	B	*E. rudis*			
	B	*M. strobophylla*			
	B	*E. rudis*			
	C	*E. rudis*			
	C	*M. strobophylla*			
	C	*E. rudis*			
	C	*M. strobophylla*			
352	C	*C. obesa*	22.9	13	15
	C	*E. rudis*			
353	D	*C. obesa*	21	14.5	13
	D	*E. rudis*			
354	E	*C. obesa*	20	13	15
	E	*E. rudis*			

Plot : 12					**2004**
Tag No.	**Subplot**	***Species***	**2004 DBH (cm) or #**	**2004 Ht (m)**	**Crown Health**
	A				
335	B	*E. loxophleba*	28.9	13.8	15
337	C	*A. acuminata*	12.1, 11.4, 7.9	5.8	19
338	D	*E. loxophleba*	31.6, 9.8, 5, 3.0	7.4	13

339	D	*E. loxophleba*	18.4	8.4	13
340	D	*E. loxophleba*	41.6, 52.8	17.8	15
342	D	*E. loxophleba*	42.4	18.8	19
345	D	*A. acuminata*	16.6, 16.4	8.2	18
	D	*A. acuminata*	1 seedling	1.5	H
341	E	*A. acuminata*	12.5, 8.5	5.8	15
343	E	*E. loxophleba*	34.3, 30.5	13.8	15
344	E	*A. huegeliana*	10.9	6.9	13
346	E	*A. acuminata*	4.3	4.8	17
347	E	*A. acuminata*	7.9	6.1	15
348	E	*A. acuminata*	7.9	5.3	15
349	E	*A. acuminata*	9.5	5.6	15

Plot : 13					**2004**
Tag No.	**Subplot**	***Species***	**2004 DBH (cm) or #**	**2004 Ht (m)**	**Crown Health**
41	A	*B. prionotes*	4.8, 2.4, 4.7, 4.1, 3.3, 4.3	5.3	19
42	A	*A. huegeliana*	2.2, 1.8, 5.1	4.7	17
955	A	*A. huegeliana*	2.7	3.9	15
	A	*A. huegeliana*	4 seedlings	0.8 - 4.4	2H, 2D
43	B	*A. huegeliana*	3.3	4.5	17
44	B	*A. huegeliana*	3.2	4.5	17
45	B	*A. huegeliana*	4	4.6	15
46	B	*A. huegeliana*	2.5	3.8	13
47	B	*B. prionotes*	2.9, 9.3, 4, 3.3, 3.1, 4.4, 4.8	4.3	19
48	B	*A. huegeliana*	5.5	6.1	15
49	B	*A. huegeliana*	7.6	6.9	15
50	B	*A. huegeliana*	26.1	7.6	15
956	B	*A. huegeliana*	3.2	4	17
957	B	*A. huegeliana*	2.1	3.2	13
	B	*J. furcellata*	3 seedlings	1.9	1D, 1S, 1H
51	C	*B. prionotes*	10.2, 9.5, 10.5	7.2	11
52	C	*A. huegeliana*	18.4	5.2	11
53	C	*A. huegeliana*	25.4	9	11
54	C	*A. huegeliana*	3	4.7	11
958	C	*B. prionotes*	2.8, 1.7	3.5	11
55	D	*A. huegeliana*	3.4	4.3	11
56	D	*A. huegeliana*	7.5	5.5	15
959	D	*A. huegeliana*	2.3	4.2	13
	D	*J. furcellata*	2 seedlings	1.4 - 2.1	2H
	D	*A. huegeliana*	4 seedlings	0.8 - 2.8	15
57	E	*B. prionotes*	10.3, 11.4	7.5	13
58	E	*A. huegeliana*	34.8	11	11
59	E	*A. huegeliana*	3.7	4.9	7H, 1S
		J. furcellata	8 seedlings	0.6 - 2.4	3H

Plot : 15					**2004**
Tag No.	**Subplot**	***Species***	**2004 DBH (cm) or #**	**2004 Ht (m)**	**Crown Health**
	A	*x*			
1	B	*E. salmonophloia*	32.4, 29.2	17	18
2	B	*E. salmonophloia*	17.3, 13.1	11	12
3	C	*E. salmonophloia*	29.3, 34.2	15	15
	D	*x*			

	E	*x*				
Plot : 16						**2004 Crown**
Tag No.	**Subplot**	***Species***	**2004**	**DBH (cm) or #**	**2004 Ht (m)**	**Health**
	A	*x*				
	B	*x*				
4	C	*E. salmonophloia*		30.9, 20.3	18	12
5	C	*E. salmonophloia*		30.3, 51.6	21	12
	D	*x*				
	E	*x*				
Plot : 17						**2004 Crown**
Tag No.	**Subplot**	***Species***	**2004**	**DBH (cm) or #**	**2004 Ht (m)**	**Health**
	A	*M. acuminata*		2 individuals	2.6 - 2.8	2H
	B	*M. acuminata*		3 individuals	2.9 - 3.5	3H
	C	*M. acuminata*		5 individuals	2.9 - 4.3	4H, 1S
	D	*M. acuminata*		6 individuals	3.0 - 4.4	5H, 1S
	E	*M. acuminata*		6 individuals	1.3 - 3.8	6H
Plot : 18						**2004 Crown**
Tag No.	**Subplot**	***Species***	**2004**	**DBH (cm) or #**	**2004 Ht (m)**	**Health**
	A	*M. acuminata*		7 individuals	2.5 - 3.1	6H, 1D
	B	*M. acuminata*		8 individuals	2.3 - 2.7	5H, 3D
	C	*M. acuminata*		3 individuals	2.5 - 2.8	3H
	C	*M. acuminata*		5 individuals	0.7 - 1.2	4H, 1D
	D	*M. acuminata*		2 individuals	2 - 2.9	2H
	D	*M. acuminata*		5 individuals	0.5 - 0.7	4H, 1D
	E	*M. acuminata*		14 individuals (5 individuals on boundary)	1.8 - 3.4	11H, 3S
Plot : 19						**2004 Crown**
Tag No.	**Subplot**	***Species***	**2004**	**DBH (cm) or #**	**2004 Ht (m)**	**Health**
	A	*M. lateriflora*		36 individuals	2.0 - 3.5	36H
	B	*M. lateriflora*		39 individuals	(Ht range for	39H
	C	*M. lateriflora*		39 individuals	whole plot)	39H
	D	*M. lateriflora*		38 individuals		38H
	E	*M. lateriflora*		46 individuals		46H
Plot : 20						**2004 Crown**
Tag No.	**Subplot**	***Species***	**2004**	**DBH (cm) or #**	**2004 Ht (m)**	**Health**
	A	*M. acuminata*		13 individuals	2.7 - 3.9	12H, 1D
	B	*M. acuminata*		14 individuals	2.7 - 4.3	11H, 3D
	C	*M. acuminata*		12 individuals	2.7 - 3.6	10H, 1S, 1D
7	C	*E. loxophleba*				
	D	*M. acuminata*		8 individuals	2.8 - 3.5	8H
	E	*M. acuminata*		5 individuals	2.6 - 3.5	5H
Plot : 21						**2004 Crown**
Tag No.	**Subplot**	***Species***	**2004**	**DBH (cm) or #**	**2004 Ht (m)**	**Health**
		M. strobophylla		all dead		

		C. obesa	all dead			
Plot : 22						**2004 Crown**
Tag No.	**Subplot**	***Species***	**2004**	**DBH (cm) or #**	**2004 Ht (m)**	**Health**
		M. strobophylla	all dead			
		C. obesa	all dead			
		E. rudis	all dead			
Plot : 23						**2004 Crown**
Tag No.	**Subplot**	***Species***	**2004**	**DBH (cm) or #**	**2004 Ht (m)**	**Health**
	A	*M. acuminata*	86 individuals		1.1 - 2.4	86H
	A	*M. lateriflora*	2 individuals		2.8 - 3.0	2H
	B	*M. acuminata*	43 individuals		0.95 - 2.5	43H
	B	*M. lateriflora*	2 individuals		2.8 - 3.2	2H
	C	*M. acuminata*	23 individuals		1.6 - 2.6	23H
27	C	*E. loxophleba*	10.3, 10.8, 8.3		8.3	17
28	C	*E. loxophleba*	10, 10.1		8.8	13
29	C	*E. loxophleba*	7.4, 7.1, 6.1		6.8	13
	D	*M. acuminata*	14 individuals		1.2 - 2.5	14H
30	D	*E. loxophleba*				D
31	D	*E. salmonophloia*				
32	D	*E. loxophleba*	6.4, 4		6.7	9
33	D	*E. loxophleba*	5		4.4	9
	E	*M. acuminata*	7 individuals		1.7 - 2.2	7H
	E	*Hakea priessii*	1 individuals		1.2	H
34	E	*M. strobophylla*	5.9, 6.4, 2.9, 3.3, 7.0, 5.2, 4.8, 2.7		3.4	19
	E					
35	E	*E. loxophleba*	5, 6.5		5.6	6
36	E	*E. loxophleba*	6.6, 6.1		6.4	7
37	E	*E. loxophleba*	11.3, 10.7		7.5	9
38	E	*E. loxophleba*	7.8		7.2	9
39	E	*E. loxophleba*				
40	E	*E. loxophleba*	10		7.9	15
Plot : 24						**2004 Crown**
Tag No.	**Subplot**	***Species***	**2004**	**DBH (cm) or #**	**2004 Ht (m)**	**Health**
532	A	*E. wandoo*	3.7, 2.6, 2.6, 2.6		2.8	4
	A	*M. acuminata*	20 individuals		1.5 - 2.6	20H
	A	*M. lateriflora*	71 individuals		1.8 - 4.2	71H
	B	*M. acuminata*	31 individuals		1.1 - 2.5	7H, 24D
	B	*M. lateriflora*	25 individuals		1.7 - 3.0	25H
	C	*M. acuminata*	29 individuals		1.2 - 1.9	7H, 22D
	C	*M. lateriflora*	40 individuals		2.2 - 3.0	40H, 5D
	D	*M.acuminata*	15 individual		1.7	1H, 14D
	D	*M. lateriflora*	13 individuals		2.2 - 3.3	13H
	E	*M. acuminata*	0			
	E	*M. lateriflora*	16 individuals		1.2 - 3.6	13H, 3D
533	E	*E. loxophleba*	6.5, 9.8, 8, 6.6, 6, 4.2		4.6	15
Plot : 25						**2004 Crown**
Tag No.	**Subplot**	***Species***	**2004**	**DBH (cm) or #**	**2004 Ht (m)**	**Health**
534	A	*E. wandoo*	6.2, 7.3		5.3	14
535	A	*E. wandoo*	5.9, 5.2		5.3	17

536	A	*E. wandoo*			D
537	A	*E. wandoo*	5.5	1.4	3
538	A	*E. wandoo*	8.6	3.6	12
539	A	*E. wandoo*			
	A	*A. acuminata*	99 individuals	0.7 - 2.5	95H, 3S, 1D
540	B	*E. wandoo*	5.3, 5.8	4	7
541	B	*E. wandoo*			
542	B	*E. wandoo*			D
	B	*E. wandoo*	3 seedlings	0.5 - 1.2	3S
543	B	*E. wandoo*	2.8	2	13
545	B	*E. wandoo*	3	2.6	9
546	B	*E. wandoo*	2.1	1.8	13
547	B	*E. wandoo*	3.4	2.3	9
548	B	*E. wandoo*	5	3.2	5
	B	*A. acuminata*	63 individuals	0.4 - 2.4	59H, 4S
544	C	*E. wandoo*	4.8, 4.5	4.2	9
549	C	*E. wandoo*	4.4, 5.1	3.6	10
550	C	*E. wandoo*	2.8	3.2	6
	C	*E. wandoo*			
551	C	*E. wandoo*	5.3, 4.4, 4.7, 5.7	5.3	16
	C	*A. acuminata*	25 individuals	1.3 - 2.8	24H, 1D
552	D	*E. wandoo*	4.5, 9.0, 6.9	5.7	12
553	D	*E. wandoo*			
554	D	*E. wandoo*	3	2.9	4
	D	*E. wandoo*	1 seedling		D
555	D	*E. wandoo*	2.6	2.1	10
556	D	*E. wandoo*	2.9	2.2	11
557	D	*E. wandoo*	3	2.6	8
558	D	*E. wandoo*			D
	D	*A. acuminata*	64 individuals	0.7 - 2.7	58H, 6D
559	E	*E. wandoo*	4.4	3.7	12
560	E	*E. wandoo*	5.3, 5.5	5.5	13
561	E	*E. wandoo*			
562	E	*E. wandoo*	4.1	2.6	6
563	E	*E. wandoo*	3.0, 3.9	4.3	5
564	E	*E. wandoo*			
		A. acuminata	36 individuals	0.9 - 2.7	34H, 1S, 1D

Plot : 26 **Tag No.**	**Subplot**	***Species***	**2004 DBH (cm) or #**	**2004 Ht (m)**	**2004 Crown Health**
8	A	*A. acuminata*	3.9, 9.8, 8.5, 11.3, 2.9, 3.6	5.6	17
9	A	*A. acuminata*	3.7	3.7	11
10	A	*A. acuminata*	9.5, 4.6, 8.9, 4.7, 4.3, 6.3, 3.8, 5.3, 5.9, 4, 3.6, 7.7, 5.8, 6.9, 3.6, 3.8	5.2	17
11	A	*A. acuminata*	5.4, 3.5, 3.3	4.6	13
12	A	*A. acuminata*	11.3, 14.2	6.5	15
13	A	*A. acuminata*	4.1	3.8	13
14	A	*C. obesa*	10.4, 13.5, 14.1, 9.1, 8.5, 5.3, 3.1, 5.4, 4.1, 15.4, 10	10	22
15	B	*A. acuminata*		5.6	11
	B				
25	B	*A. acuminata*			
26	B	*A. acuminata*	6.2, 2.8	4.6	11

16	B	*A. acuminata*	10.5, 7.7, 7.6, 5, 12.6, 2.3, 12, 3.9, 2.4, 7, 6, 5.7, 7, 7, 9.8, 2.8, 3.3	6.1	17
17	B	*A. acuminata*	12.1, 5.5, 4.5	5.6	17
18	C	*A. acuminata*	3.6	3.2	15
19	C	*A. acuminata*	2.4, 3, 3.2, 2.9, 2.5, 2.4, 5.7, 3.9	3.8	15
20	D	*A. acuminata*	6.6, 5.9, 6.8	5.7	9
21	D	*A. acuminata*			
22	E	*A. acuminata*	6.4, 10.9, 6.8, 5.6, 5.8, 8.9, 11.2, 8.4	5.5	15
23	E	*C. obesa*	28.8	10	19
24	E	*A. acuminata*	10.9, 7.5, 3.6	5.7	11
Plot : 27					**2004 Crown**
Tag No.	**Subplot**	***Species***	**2004 DBH (cm) or #**	**2004 Ht (m)**	**Health**
355	A	*C. obesa*	27.3	10	21
	A	*C. obesa*	365 seedlings	0.1 - 1.7	H
356	B	*C. obesa*	13, 30.3	10	21
	B	*C. obesa*	276 seedlings	0.1 - 1.6	H
357	C	*C. obesa*	19.2	10	17
358	C	*C. obesa*	14.8, 11.3	7.1	13
359	C	*C. obesa*	16.3	8.5	17
360	C	*C. obesa*	10.8	7.1	15
361	C	*C. obesa*	11.6	9.5	15
362	C	*C. obesa*	10.5	7	13
	C	*C. obesa*	118 seedlings	0.2 - 1.4	H
363	D	*C. obesa*	17.2, 10.7	11	15
364	D	*C. obesa*	6.6, 7.6, 13.7, 4.1	8.1	17
	D	*C. obesa*	135 seedlings	0.05 - 1.6	H
365	E	*C. obesa*	19.6	13	17
366	E	*C. obesa*	14.2	7.5	15
	E	*C. obesa*	175 seedlings	0.05 - 1.8	H
Plot : 28					**2004 Crown**
Tag No.	**Subplot**	***Species***	**2004 DBH (cm) or #**	**2004 Ht (m)**	**Health**
367	A	*C. obesa*	18	9.5	9
368	A	*C. obesa*	23.9	13	7
369	A	*C. obesa*	5.9, 4.2, 5.8, 5.2	5.8	11
370	A	*C. obesa*	5.8, 3.3	5	7
371	A	*C. obesa*			D
372	A	*C. obesa*			
373	A	*C. obesa*	5.6	5.2	7
374	A	*C. obesa*	8.2	8.3	13
375	A	*C. obesa*	13	7.2	11
376	A	*C. obesa*	9.9	6.6	15
377	A	*C. obesa*	7.9	5.2	13
378	A	*C. obesa*	10.4	7.3	11
400	A	*C. obesa*	7.2	9	9
401	A	*C. obesa*	10.6	8.1	15
402	B	*C. obesa*			
403	B	*C. obesa*	7.3, 9.6	8.3	11
404	B	*C. obesa*	6.5	6.4	13
405	B	*C. obesa*			D
406	B	*C. obesa*	7.3	6.8	10
407	B	*C. obesa*	8.5	5.4	7

408	B	*C. obesa*	2.5, 2.5, 2.5	3.2	13
409	B	*C. obesa*	5, 4.1	5.5	6
410	B	*C. obesa*			D
411	B	*C. obesa*			RD
412	B	*M. strobophylla*	3.3, 4.2	2.8	11
413	B	*C. obesa*			
414	B	*C. obesa*			
415	B	*C. obesa*	8.6, 9.2	6.7	9
416	B	*C. obesa*	10.2, 4.8, 6.8	7.7	11
417	B	*C. obesa*	6.2	6.3	15
	B	*Eucalyptus sp.*	2 seedings	0.15 - 0.6	H
418	C	*C. obesa*	18.5	7.7	15
419	C	*C. obesa*	7.1	4.8	15
420	C	*C. obesa*	10.2	8.25	13
421	C	*C. obesa*	4.1	4.8	9
422	C	*C. obesa*	7.8	7.51	9
423	C	*C. obesa*	6.6	5.3	15
424	C	*C. obesa*	6.4	7.6	11
426	C	*C. obesa*	7.5	6.1	13
427	C	*C. obesa*	11.8	8.7	13
428	C	*C. obesa*			
	C	*M. strobophylla*	1 seedling	1.1	H
	C	*Eucalyptus sp.*	2 seedings	0.45 - 0.75	H
429	D	*C. obesa*	21.8	10	11
430	D	*C. obesa*	7.5, 6.8	6.2	15
431	D	*C. obesa*	7.8	5.8	15
432	D	*C. obesa*	6.8	6.2	11
433	D	*C. obesa*			
434	D	*C. obesa*	3.5	3.9	15
435	D	*C. obesa*	5.7	5.7	15
454	D	*C. obesa*	8.2	7.8	11
436	D	*C. obesa*	4.3	5.2	11
425	D	*C. obesa*	5	5.9	11
437	D	*C. obesa*	8.9	8.5	11
438	D	*C. obesa*	2.8	3.4	11
439	D	*C. obesa*	6.9	1.5	6
440	D	*C. obesa*	6.3	6.9	13
441	D	*C. obesa*			D
442	D	*C. obesa*			RD
443	D	*C. obesa*	4.3	4.6	11
455	D	*C. obesa*			RD
	D	*Eucalyptus sp.*	1 seedling	0.45	H
444	E	*C. obesa*	6.6	7	11
445	E	*C. obesa*	12.7	7.1	14
446	E	*C. obesa*	7.3	4.8	15
447	E	*C. obesa*			RD
448	E	*C. obesa*	9.5	7.9	9
449	E	*C. obesa*	4.9	4.1	13
450	E	*C. obesa*	5.3	5.2	11
451	E	*C. obesa*	5.5	6.2	9
452	E	*C. obesa*	4.9	5.5	11
453	E	*C. obesa*			

Plot : 29						**2004**
Tag No.	**Subplot**	***Species***	**2004**	**DBH (cm) or #**	**2004 Ht (m)**	**Crown Health**
456	A	*C. obesa*				D
457	A	*C. obesa*				RD

458	A	*C. obesa*	24.4, 18	10	7
459	B	*C. obesa*	27	10	11
460	B	*C. obesa*	13.5	7.5	9
461	B	*C. obesa*			RD
462	B	*C. obesa*			D
463	C	*C. obesa*	22.2	9	7
464	C	*C. obesa*	19.2, 27.6, 25.4	9.5	9
465	D	*C. obesa*			RD
466	D	*C. obesa*			RD
467	D	*C. obesa*	20	9	7
468	E	*C. obesa*	15	6.5	11
469	E	*C. obesa*	22.9	11	7
470	E	*C. obesa*	15.5	10	9
471	E	*C. obesa*	18.8	10	9
472	E	*C. obesa*	20.1	11.5	7
473	E	*C. obesa*	17.5	10	7

Plot : 30 **Tag No.**	**Subplot**	***Species***	**2004 DBH (cm) or #**	**2004 Ht (m)**	**2004 Crown Health**
474	A	*B. prionotes*			
475	A	*B. prionotes*			
476	A	*B. prionotes*			
477	A	*B. prionotes*			
	A	*B. prionotes*	1 seedling (2 more outside plot)		1H, 1S, 1D
478	B	*B. prionotes*			
479	B	*B. prionotes*			
480	B	*B. prionotes*		RD	
481	B	*B. prionotes*			
482	B	*B. prionotes*			
483	B	*B. prionotes*			
484	B	*B. prionotes*			
485	B	*B. prionotes*			
486	C	*B. prionotes*			
487	C	*B. prionotes*			
488	C	*B. prionotes*			
489	C	*B. prionotes*			
490	C	*B. prionotes*			
491	C	*B. prionotes*			
492	C	*B. prionotes*			
493	D	*B. prionotes*			
494	D	*B. prionotes*			
495	D	*B. prionotes*			
496	D	*B. prionotes*			
497	D	*B. prionotes*			
498	D	*B. prionotes*			
499	D	*B. prionotes*			
500	D	*B. prionotes*			
501	D	*B. prionotes*			
502	D	*B. prionotes*			
503	D	*B. prionotes*	4.8	4.15	15
508	D	*B. prionotes*			
509	D	*B. prionotes*			
504	E	*B. prionotes*			
505	E	*B. prionotes*			
506	E	*B. prionotes*			

507	E	*B. prionotes*				
510	E	*A. acuminata*				D
954	E	*A. huegeliana*		5.6	4.7	21
Plot : 31						**2004**
Tag No.	**Subplot**	***Species***	**2004**	**DBH (cm) or #**	**2004 Ht (m)**	**Crown Health**
511	A	*B. prionotes*				
512	A	*B. prionotes*				
513	A	*B. prionotes*				
	A	*J. furcellata*				
514	B	*B. prionotes*				
	B	*J. furcellata*				
	B	*J. furcellata*				
	B	*J.furcellata*				
515	B	*B. prionotes*				
516	B	*B. prionotes*				
517	B	*A. huegeliana*				
	B	*A. huegeliana*				
518	C	*A. huegeliana*				
519	C	*A. huegeliana*				
520	C	*B. prionotes*				
521	C	*B. prionotes*				
522	C	*B. prionotes*				
523	C	*B. prionotes*				
524	C	*B. prionotes*				
525	C	*B. prionotes*				
953	C	*A. huegeliana*				
	C	*J. furcellata*				
526	D	*B. prionotes*				
527	D	*A. huegeliana*				
528	D	*B. prionotes*				
529	D	*A. huegeliana*				
530	D	*B. prionotes*				
	D	*J. furcellata*				
	D	*J. furcellata*				
	E	*x*				
Plot : 32 (RF1)						**2004**
Tag No.	**Subplot**	***Species***	**2004**	**DBH (cm) or #**	**2004 Ht (m)**	**Crown Health**
1	west bank	*E. loxophleba*		15.5, 11.9	13.5	13
40	west bank	*C. obesa*				
42	west bank	*C. obesa*		18		
39	west bank	*C. obesa*				
36	west bank	*E. loxophleba*		30.4, 22.8	14	15
35	west bank	*C. obesa?*				
6	west bank	*C. obesa?*				
7	west bank	*C. obesa*		13.9	8.9	15
3	west	*C. obesa?*				

	bank west				
9	bank west	*C. obesa*	12.2	8.6	15
8	bank west	*C. obesa*	7.5		
10	bank west	*C. obesa*	9.3		
53	bank west	*C. obesa*	8.5		
55	bank west	*M. strobophylla*	3.9, 3.2	2.8	11
52	bank west	*C. obesa*	8.9	6.3	11
51	bank west	*C. obesa*	9.1	6.3	13
54	bank west	*C. obesa*	12.2	6.3	13
	bank west	*C. obesa*	4	4	19
50	bank west	*C. obesa*	9.1, 10.5	7.6	15
	bank west	*M. strobophylla*	3.4	3.1	11
46	bank west	*C. obesa*	7.5	5.7	13
47	bank west	*C. obesa*	6.5	6.2	13
48	bank west	*E. rudis?*			
12	bank west	*C. obesa*	13.3	8.5	15
22	bank west	*C. obesa*	25.4	10	15
30	bank west	*C. obesa*	25.3	10	15
24	bank west	*C. obesa*	21.2	10	15
66	bank west	*C. obesa*	16.4	9	15
70	bank west	*C. obesa*	14.7	10	11
133	bank west	*M. strobophylla*	3.2, 2.4, 1.9	2.7	11
69	bank west	*C. obesa*	9	7.1	17
68	bank west	*C. obesa*	10.1	7.1	17
64	bank west	*C. obesa*	9.8	6.6	17
59	bank west	*E. rudis?*			
58	bank west	*E. rudis?*			
62	bank west	*C. obesa?*			
5	bank west	*E. loxophleba*	31.2, 14.8, 25.3, 22.3, 26	15	13
63	bank west	*C. obesa?*			
134	bank east	*C. obesa*	3.5, 4.3	4.1	17
72	bank	*C. obesa*			RD

71	east bank	*C. obesa*	6.9	4.5	13
73	east bank	*C. obesa*	8.7	6	17
76	east bank	*C. obesa*			RD
81	east bank	*M. strobophylla*			
82	east bank	*M. strobophylla*	4.6	3.3	11
80	east bank	*C. obesa*	16.1		D
112	east bank	*C. obesa*	3.6	3.4	17
118	east bank	*C. obesa*	2.4	2.9	17
114	east bank	*C. obesa*	2.8	3.6	17
116	east bank	*C. obesa*	2	2.3	17
111	east bank	*C. obesa*	4.3	4.5	17
117	east bank	*C. obesa*	4.2, 1.8	3.5	17
115	east bank	*C. obesa*	3.6		D
113	east bank	*C. obesa*	3.4	4.4	17
83	east bank	*C. obesa*	14.9		
119	east bank	*C. obesa*	2.4	2.6	17
84	east bank	*C. obesa*	13.3, 8.3	6.2	15
85	east bank	*C. obesa*	22.8	8.5	13
89	east bank	*E. loxophelba*	13.6	11	11
88	east bank	*E. loxophelba*	16.6	9.5	9
87	east bank	*C. obesa*	20.4	6.9	15
97	east bank	*E. loxophelba*	17.8, 5.7	2.4	10
90	east bank	*C. obesa*	12.2, 10.1	5.6	19
91	east bank	*M. laterflora*	8.9, 8.4	4.6	15
92	east bank	*M. laterflora*	9.5, 10.2, 7.1	6.1	15
	east bank	*M. laterflora*			D
128	east bank	*M. laterflora*	3.2, 8.5, 5.5, 3.2	6.2	15
127	east bank	*M. laterflora*	7.5	2.3	21
107	east bank	*A. acuminata*	21.7	7.6	11
98	east bank	*E. loxophelba*	10.9, 9.9	6.7	17
100	east bank	*A. acuminata*	21.4	8.8	11
102	east	*A. acuminata?*	18, 10.7		

	bank east				
103	bank east	*E. loxophelba*	30.8	12	15
130	bank east	*A. huegeliana*	6.2	5.1	17
104	bank east	*E. loxophelba*	33.2	16.5	13
105	bank east	*A. acuminata*	23, 18.3	2.8	11
106	bank east	*E. loxophelba*	18.6, 13.9, 11	12	11
109	bank east	*E. loxophelba*	8.9, 47.6	11	13
108	bank east	*A. acuminata*			
129	bank east	*A. acuminata*	5.4	4.3	15
120	bank east	*C.obesa*	3.5	3.7	17
121	bank east	*C.obesa*	2.1	2.1	17
122	bank east	*C.obesa*	3.3	2.7	17
123	bank east	*C.obesa*	2.8	2.7	17
124	bank east	*C.obesa*	2.8	3.6	17
125	bank east	*C.obesa*	2		D
126	bank	*C.obesa*	2.1	3.1	17
110		*Hakea preissii*	8.7	2.5	14

Plot : 33 (RF4) Tag No.	**Subplot**	***Species***	**2004**	**DBH (cm) or #**	**2004 Ht (m)**	**2004 Crown Health**
200		*C. obesa*		17	4.2	9
		C. obesa				
		C. obesa				
		C. obesa				
202		*C. obesa*		15.6, 11	5.6	13
223		*C. obesa*				D
205		*C. obesa*		16.4	10	11
206		*C. obesa*		21	6.1	9
		C. obesa				
214		*C. obesa*				D
215		*C. obesa*		12.5	6	11
996?		*C. obesa*		12.2	7.3	13
257		*C. obesa*				
212		*C. obesa*		19.8, 16	7.9	9
232		*C. obesa*		16.9	4.3	9
259		*C. obesa*				
256		*C. obesa*		13.2	7.2	15
255		*C. obesa*		14.6	6.5	15
251		*C. obesa*		12.5	6.7	11
250		*C. obesa*		14.3, 12.8, 17.4	7.9	10
237		*C. obesa*		17.5	7.7	13
233		*C. obesa*		16	6.6	13
234		*C. obesa*		15.8, 16, 12.7	9	11

235		*C. obesa*		19.9, 16	11	11
239		*C. obesa*				
241		*C. obesa*		9.2	5	9
244		*C. obesa*				
245		*C. obesa*				D
246		*C. obesa*		13.5	5.3	13
247		*C. obesa*		21.2	8.3	11
248		*C. obesa*		13.5, 10.2	7	15
249		*C. obesa*		18.2, 13.2	6.8	13
219	fallen	*C. obesa*				
222	fallen	*C. obesa*		12.6	1.6	6
997		*C. obesa*		10.7	6.1	15
Plot 34						**2004**
Tag No.	**Subplot**	***Species***	**2004**	**DBH (cm) or #**	**2004 Ht (m)**	**Crown Health**
469	A	*C. obesa*			7 - 9.5	
470	A	*C. obesa*		9.5, 6.1		9
471	A	*C. obesa*				RD
472	A	*C. obesa*		8.7		6
473	A	*C. obesa*				RD
474	A	*C. obesa*				RD
475	A	*C. obesa*				RD
476	B	*C. obesa*		5.3, 7.9	7 - 12.0	5
477	B	*C. obesa*		4.7		5
478	B	*M. strobophylla*				D
479	B	*C. obesa*		10.4		9
480	B	*C. obesa*				RD
481	B	*C. obesa*				RD
482	B	*C. obesa*		5.2		5
483	B	*C. obesa*		4.6		7
484	B	*C. obesa*				RD
485	B	*C. obesa*		6.7, 3.7		6
486	B	*C. obesa*		12.8		11
487	B	*C. obesa*		4.3		6
488	B	*C. obesa*				D
489	B	*C. obesa*				D
490	B	*C. obesa*		8		6
491	B	*C. obesa*				D
492	B	*M. strobophylla*				D
493	B	*C. obesa*		5.4		7
494	B	*C. obesa*				D
495	B	*C. obesa*		8.8		13
496	B	*C. obesa*		7.7		6
497	B	*C. obesa*				RD
498	B	*C. obesa*		12		7
499	B	*C. obesa*				RD
500	B	*C. obesa*				
501	B	*C. obesa*		9.4		13
502	B	*C. obesa*				RD
503	B	*C. obesa*		15.9		7
504	B	*C. obesa*				D
505	B	*C. obesa*				RD
506	B	*C. obesa*		7.6		4
507	B	*C. obesa*		7.8		8
508	B	*C. obesa*		3.2		6
509	B	*C. obesa*		8.3		8

510	B	*C. obesa*	6.9		9
511	B	*C. obesa*	7, 7.3, 5.3		4
512	B	*C. obesa*			RD
513	B	*C. obesa*			D
514	B	*C. obesa*			RD
515	B	*C. obesa*			D
516	B	*C. obesa*			RD
517	B	*C. obesa*			D
	B	*C. obesa*			
	B	*M. strobophylla*			
518	C	*C. obesa*	6.9	4.0 - 13.0	9
519	C	*C. obesa*			RD
520	C	*C. obesa*			D
521	C	*C. obesa*	2.8, 3.4		7
522	C	*C. obesa*	5.3		6
523	C	*C. obesa*	3.4		5
524	C	*C. obesa*	7.1, 4.2		6
525	C	*C. obesa*	4, 8.5, 2.8		6
526	C	*C. obesa*			D
527	C	*C. obesa*	2.5		6
528	C	*C. obesa*			D
529	C	*C. obesa*	3.4		8
530	C	*C. obesa*	3.5		6
531	C	*C. obesa*	5.3		6
532	C	*C. obesa*	2.3		6
533	C	*C. obesa*	14.4		10
534	C	*C. obesa*	6.9		7
535	C	*C. obesa*	4		6
536	C	*C. obesa*	5.1		5
537	C	*M. strobophylla*			
538	C	*C. obesa*	2.2		7
539	C	*C. obesa*	4.5		7
540	C	*C. obesa*	5.7		13
541	C	*C. obesa*	3.3		11
542	C	*C. obesa*	7.3		5
543	C	*C. obesa*	6.2		7
544	C	*C. obesa*			RD
545	C	*C. obesa*			RD
546	C	*C. obesa*			RD
547	C	*C. obesa*	5.8		6
548	C	*C. obesa*	5.8		6
549	C	*C. obesa*			D
550	C	*C. obesa*			RD
551	C	*C. obesa*	7.2		6
552	C	*C. obesa*			RD
553	C	*C. obesa*	4.7		6
554	C	*C. obesa*			D
555	C	*C. obesa*			D
	C	*M. strobophylla*			
	C				
556	D	*M. strobophylla*		4.0 - 10.5	
557	D	*M. strobophylla*			
558	D	*M. strobophylla*			
559	D	*C. obesa*	8		11
560	D	*C. obesa*	4		11
561	D	*M. strobophylla*			
562	D	*C. obesa*	4.4		8

563	D	*C. obesa*	5.7		10
564	D	*C. obesa*			D
565	D	*C. obesa*	4.6		8
566	D	*C. obesa*	8.6		13
567	D	*C. obesa*	6.2		7
568	D	*C. obesa*	6.6		9
569	D	*C. obesa*	6.8		5
570	D	*C. obesa*	3.2		5
571	D	*C. obesa*	3.8		7
572	D	*C. obesa*	3.9		7
573	D	*C. obesa*	5.1		10
574	D	*C. obesa*	5		8
575	D	*C. obesa*	4.3		11
576	D	*C. obesa*	5.5		8
577	D	*C. obesa*	5.9		6
578	D	*C. obesa*	5.5		11
579	D	*M. strobophylla*			
580	D	*C. obesa*	6.1, 5.4		10
581	D	*C. obesa*	5.4		4
582	D	*M. strobophylla*			
583	D	*C. obesa*	5.9, 4.2		9
584	D	*C. obesa*	4.5		8
585	D	*C. obesa*			RD
586	D	*C. obesa*			
587	D	*C. obesa*	4		6
588	D	*C. obesa*	4.1		5
589	D	*C. obesa*	3.7		9
590	D	*C. obesa*	4		6
591	D	*C. obesa*	3.2		7
592	D	*C. obesa*	11		11
593	D	*C. obesa*	10.4		12
594	D	*C. obesa*			RD
595	D	*C. obesa*	6.2		5
596	D	*C. obesa*			RD
597	D	*C. obesa*			RD
598	D	*C. obesa*	6.5		6
599	D	*C. obesa*			RD
600	D	*C. obesa*			RD
601	D	*C. obesa*			RD
602	D	*C. obesa*	8.6		9
603	D	*C. obesa*			RD
604	D	*C. obesa*			RD
605	D	*C. obesa*	5.4		5
606	D	*C. obesa*	9.3		10
607	D	*M. strobophylla*			
	D	*M. strobophylla*			
	D	*C. obesa*			
608	E	*M. strobophylla*		4.0 - 8.5	
609	E	*C. obesa*	6.8		7
610	E	*C. obesa*	5		8
611	E	*C. obesa*			RD
612	E	*C. obesa*	1.6		6
613	E	*C. obesa*	7.3, 6.7		9
614	E	*C. obesa*	7.4		6
615	E	*C. obesa*	4.3		7
616	E	*C. obesa*	6.2		10
617	E	*C. obesa*	5.5		8

618	E	*C. obesa*	3.7		6
619	E	*C. obesa*			RD
620	E	*C. obesa*	3.7		10
621	E	*C. obesa*	4.1		7
622	E	*C. obesa*	4.8		8
623	E	*C. obesa*	4.1		9
624	E	*C. obesa*	4.1		11
625	E	*C. obesa*	5.8		6
626	E	*C. obesa*	2.9		6
627	E	*C. obesa*	4.9		11
628	E	*C. obesa*	4.2		10
629	E	*C. obesa*	5.8		10
630	E	*C. obesa*	5		10
631	E	*C. obesa*	4.5		12
632	E	*C. obesa*	3.8		8
633	E	*C. obesa*			RD
634	E	*C. obesa*	3.5		8
635	E	*C. obesa*	3.6		5
636	E	*C. obesa*	4.1		6
637	E	*C. obesa*	5.8		4
638	E	*C. obesa*	5.4		9
639	E	*M. strobophylla*			
640	E	*C. obesa*	4.6		7
641	E	*C. obesa*	2.8		6
642	E	*C. obesa*	7.7		14
643	E	*C. obesa*	4.1		10
644	E	*C. obesa*	4.1		8
645	E	*C. obesa*	3.5		8
646	E	*C. obesa*	6.6		12
647	E	*M. strobophylla*			
648	E	*C. obesa*	4.7		10
649	E	*C. obesa*	4		5
650	E	*C. obesa*			
651	E	*C. obesa*	3.4		7
652	E	*C. obesa*	4.5		5
653	E	*C. obesa*	3.2		5
654	E	*C. obesa*	4.2		5
655	E	*C. obesa*			RD
656	E	*C. obesa*			RD
657	E	*C. obesa*	9.9		6
658	E	*C. obesa*			RD
659	E	*C. obesa*	4.5		6

Plot 35 **Tag No.**	**Subplot**	***Species***	**2004**	**DBH (cm) or #**	**2004 Ht (m)**	**2004 Crown Health**
273	A	*C.obesa*		7.3	7	6
274	A	*C.obesa*		23.9	16	13
275	A	*C.obesa*		19.2, 13.1	11.5	11
276	A	*C.obesa*		16.6	7	13
	A	*C.obesa*				
277	B	*C.obesa*		25.4	15	15
278	B	*C.obesa*		29.4	16	15
279	B	*C.obesa*				
280	B	*C.obesa*		23	10	9
281	B	*C.obesa*		16.1	10	11

282	C	*C.obesa*	19.3	10	13
283	C	*C.obesa*	20.5	12.5	15
284	C	*C.obesa*	17.6	9.5	15
285	C	*C.obesa*	25.2, 18.7	16	13
286	C	*C.obesa*	18.4	12	15
299	C	*C.obesa*	10.1	8	9
	C	*C.obesa*			
287	D	*C.obesa*	32.9	14	15
288	D	*C.obesa*	27.3	14	11
289	D	*C.obesa*	17.6	14.5	13
290	D	*C.obesa*	20.2	7.5	11
291	D	*C.obesa*			
292	D	*C.obesa*	27.3	14.5	11
293	D	*C.obesa*	15.9	8	13
294	D	*C.obesa*	39.5	13	15
295	D	*C.obesa*	17.1	11.5	13
300	D	*C.obesa*	20.8	10	11
296	E	*C.obesa*	23	15	13
297	E	*C.obesa*	31.2	17	15
298	E	*C.obesa*	18.8	9.5	9
	E	*C.obesa*			

Plot 36 **Tag No.**	**Subplot**	***Species***	**2004**	**DBH (cm) or #**	**2004 Ht (m)**	**2004 Crown Health**
337	A	*M. strobophylla*				D
338	A	*C. obesa*				D
339	A	*C. obesa*				D
340	A	*C. obesa*				D
341	A	*M. strobophylla*				D
342	A	*M. strobophylla*				D
343	A	*M. strobophylla*				
344	A	*M. strobophylla*				
345	A	*C. obesa*				RD
	A	*M. strobophylla*				
346	B	*C.obesa*			7.7 - 8.5	D
347	B	*C.obesa*		12.3		10
348	B	*C.obesa*				D
349	B	*C.obesa*				D
350	B	*C.obesa*		13.2		11
351	C	*C. obesa*			4.3 - 7.3	
352	C	*C. obesa*				D
353	C	*M. strobophylla*				
354	C	*C. obesa*				
355	C	*M. strobophylla*		4.7		7
356	C	*C. obesa*				
357	C	*C. obesa*				
358	C	*C. obesa*				D
359	C	*C. obesa*				D
360	C	*C. obesa*				
361	C	*C. obesa*		6.5		6
362	C	*C. obesa*		7.6		9
363	C	*C. obesa*				D
364	C	*C. obesa*				

409	C	*C. obesa*	7.2		13
410	C	*M. strobophylla*			
365	C	*C. obesa*			D
366	C	*C. obesa*			D
367	C	*C. obesa*	4.6		7
368	C	*C. obesa*	7.2		9
369	C	*C. obesa*	6.2		5
370	C	*C. obesa*	5.4		7
371	C	*C. obesa*	5.2		7
372	C	*M. strobophylla*	4.5		7
373	C	*M. strobophylla*			D
374	C	*M. strobophylla*			D
375	C	*M. strobophylla*	5.9, 9.4		11
376	C	*C. obesa*	6.7		7
377	C	*C. obesa*			D
378	C	*C. obesa*			
379	C	*C. obesa*			D
380	C	*C. obesa*	8.8		9
381	C	*C. obesa*			
382	C	*M. strobophylla*			D
383	C	*C. obesa*	9.5, 6.5		7
384	C	*C. obesa*			D
385	C	*M. strobophylla*			
386	C	*M. strobophylla*			
387	C	*M. strobophylla*			
388	C	*C. obesa*			D
389	C	*C. obesa*			D
390	C	*M. strobophylla*	16.9		9
391	C	*C. obesa*			D
392	C	*C. obesa*	6.7		9
393	C	*C. obesa*	10.7, 6.9		9
394	C	*M. strobophylla*			
395	C	*C. obesa*	9.1		9
396	C	*M. strobophylla*	9.2		9
397	C	*C. obesa*	12.3		11
398	C	*C. obesa*			D
399	C	*C. obesa*			D
400	C	*C. obesa*	12.8		13
401	C	*C. obesa*	10, 9.4		15
	C	*C. obesa*			
	C	*M. strobophylla*			
402	D	*C. obesa*		2.9 - 9.0	
403	D	*M. strobophylla*			
404	D	*C. obesa*	6.1		7
406	D	*C. obesa*			
405	D	*C. obesa*	9.4		7
407	D	*C. obesa*			D
408	D	*C. obesa*	7.3		9
411	D	*C. obesa*			D
412	D	*M. strobophylla*			D
413	D	*C. obesa*			D
414	D	*C. obesa*			D
415	D	*C. obesa*	4.7		9
416	D	*C. obesa*			
417	D	*C. obesa*	10.5		9
418	D	*M. strobophylla*			D
419	D	*C. obesa*	7.2		7

420	D	*C. obesa*	7.1		12
421	D	*C. obesa*			D
422	D	*C. obesa*			D
423	D	*M. strobophylla*			D
424	D	*C. obesa*	11		13
425	D	*C. obesa*			D
426	D	*C. obesa*	12.9		13
427	D	*C. obesa*			D
428	D	*C. obesa*	10.7		11
	D	*C. obesa*			
	D	*M. strobophylla*			
429	E	*M. strobophylla*		7.2 - 8.5	D
430	E	*C. obesa*			RD
431	E	*M. strobophylla*			D
432	E	*M. strobophylla*			RD
433	E	*C. obesa*			D
434	E	*M. strobophylla*			D
435	E	*M. strobophylla*			RD
436	E	*C. obesa*	11		13
437	E	*C. obesa*			D
438	E	*C. obesa*	8, 7		13
439	E	*M. strobophylla*			RD
	E	*C. obesa*			
440	E	*C. obesa??*	3.1		7
441	E	*C. obesa??*	4.4		6
442	E	*C. obesa??*	3		7

Plot 37 **Tag No.**	**Subplot**	***Species***	**2004 DBH (cm) or #**	**2004 Ht (m)**	**2004 Crown Health**
301	A	*C. obesa*			RD
302	A	*C. obesa*			RD
303	A	*C. obesa*			RD
304	A	*C. obesa*	11.8	9	11
305	A	*C. obesa*			RD
306	A	*C. obesa*	13.6	8.5	15
307	A	*C. obesa*	9.3	8	7
308	A	*C. obesa*			D
309	A	*C. obesa*			RD
310	A	*C. obesa*	8.8	8	10
311	A	*C. obesa*	18	10.5	9
312	A	*C. obesa*	14.6	10	7
313	A	*C. obesa*	11.2	9	13
314	A	*C. obesa*	13.8	9	11
315	A	*C. obesa*	24.2	12.5	15
	A	*E. rudis*			
316	B	*C. obesa*	16.5, 13.8, 18.6, 8.8	10.5	15
317	C	*C. obesa*			D
318	C	*C. obesa*	11.5	9	7
319	C	*C. obesa*	17.6	9	7
320	C	*C. obesa*			RD
321	C	*C. obesa*	13.4	10	9
322	C	*C. obesa*	14.8, 10.4	10.5	11
323	C	*C. obesa*			D
324	C	*C. obesa*			RD
325	C	*C. obesa*	12.3	8	11
326	C	*C. obesa*	19.8	9	11
327	D	*C. obesa*	18.5	9	7

328	D	*C. obesa*	10.6, 6.1	9	11
329	D	*C. obesa*	8.9	9	11
330	D	*C. obesa*	13.5	10	9
331	D	*C. obesa*	10.2, 3.5	8	7
332	D	*C. obesa*			RD
333	D	*C. obesa*	13.5	9	8
334	D	*C. obesa*	18.4	12	11
	D	*E. rudis*			
335	E	*C. obesa*	18.8	4.5	5
336	E	*C. obesa*	18.9, 15.9	9	13

Plot 38 **Tag No.**	**Subplot**	***Species***	**2004**	**DBH (cm) or #**	**2004 Ht (m)**	**2004 Crown Health**
440	A	*C. obesa*		10.8	8.2	15
441	A	*C. obesa*		16.8	10.5	13
442	A	*C. obesa*		16.8	9.5	15
443	A	*C. obesa*		12.5	10	11
444	A	*C. obesa*		12	12	15
445	A	*C. obesa*		5.9	6.3	11
446	A	*C. obesa*		5.9	4.9	10
447	B	*C. obesa*		16	10	15
448	B	*C. obesa*		10.8, 7.7, 6.7	7.1	15
449	B	*C. obesa*		12.4	8.5	15
450	B	*C. obesa*		13.3	11.5	11
451	B	*C. obesa*		8.2	7.4	13
452	B	*C. obesa*		11.7	9	11
453	B	*C. obesa*		10.6	9	13
454	B	*C. obesa*		14.4, 8.5	11	9
455	C	*C. obesa*		10.9	9.5	15
456	C	*C. obesa*		11.2, 12.7	11	13
457	C	*C. obesa*		12.9	10	13
458	C	*C. obesa*		12.8	9.5	11
459	C	*C. obesa*		7.2	6	11
460	D	*C. obesa*		15.9, 22.2	7.9	19
461	D	*C. obesa*		8.2	7.1	11
462	D	*C. obesa*		18.2	6.1	11
463	D	*C. obesa*		12.8	6.3	7
464	D	*C. obesa*		16.9	5	7
465	D	*C. obesa*		12.5	10	13
466	D	*C. obesa*				RD
467	E	*C. obesa*				RD
468	E	*C. obesa*		8.5, 9.6	8.5	11

Appendix Two: Vigour Trends

Vegetation Monitoring of Toolibin Lake and Reserves

Plot 1	C. obesa			M. strobophylla								
	H	S	D	H	S	D	H	S	D	H	S	D
1977			27			7						
1980			27			7						
1982			27			7						
1986			27			7						
1992			27			7						
1998	Not sampled											
2004	Not sampled											

Plot 2	C. obesa			E.rudis			A. huegeliana					
	H	S	D	H	S	D	H	S	D	H	S	D
1977	11			1		1	3		2			
1980	10	1	1		1	1	1	2	2			
1982	10	1	1		1	1	1	2	2			
1986	8	2	2			2	1	1	3			
1992	8	2	2			2	1		4			
1998	Not sampled											
2004	Not sampled											

Plot 3	C. obesa											
	H	S	D	H	S	D	H	S	D	H	S	D
1977		12	6									
1980	4	8	6									
1982	4	8	6									
1986	1	2	15									
1992	1	2	15									
1998	1	2	15									
2002	1	2	15									
2004	3	0	15									

Plot 4	C. obesa			M. strobophylla								
	H	S	D	H	S	D	H	S	D	H	S	D
1977	18		3	9	9	2						
1980	12	6	3	3	7	4						
1982	12	6	3	3	7	4						
1986	9	8	4		10	4						
1992	9	6	6		5	9						
1998	2	13	6		6	8						
2002	0	12	9			14						
2004	2	6	13			14						

Plot 5	C. obesa			M. strobophylla								
	H	S	D	H	S	D	H	S	D	H	S	D
1977	106	2	3	83	1	12						
1980	123	6	4	77	3	17						
1982	123	6	4	77	3	17						
1986	119	11	3	78	3	16						
1992	119	11	3	78	3	16						
1998	47	43	3	25	35	7						
2002	25	57	12	7	13	47						
2004	29	50	17	1	10	57						

Plot 6	E. rudis											
	H	S	D	H	S	D	H	S	D	H	S	D
1977		1	1									
1980			2									
1982			2									
1986			2									
1992			2									
1998			2									
2002			2									
2004			2									

Plot 7	C. obesa			E. rudis								
	H	S	D	H	S	D	H	S	D	H	S	D
1977	4											
1980	4			1								
1982	4			1								
1986	2	1	1			1						
1992	1	2	1			1						
1998	4					1						
2002	4					1						
2004	3	1				1						

Plot 8												
	H	S	D	H	S	D	H	S	D	H	S	D
1977	no trees on this plot											
1980												
1982												
1986												
1992												
1998												
2002												
2004												

Plot 9	C. obesa			M. strobophylla								
	H	S	D	H	S	D	H	S	D	H	S	D
1977	85	4	2		2	12						

1980	80	9	2		2	12						
1982	80	9	2		2	12						
1986	67	15	7		1	13						
1992	67	14	8		1	13						
1998	29	48				11						
2002	21	52	4			11						
2004	33	34	11									

Plot 10	**C. obesa**			**M. strobophylla**			**E. rudis**					
	H	**S**	**D**	**H**	**S**	**D**	**H**	**S**	**D**	**H**	**S**	**D**
1977	30			2				1	1			
1980	30			2					2			
1982	30			2					2			
1986	29		1	2					2			
1992	28	1	1	2					2			
1998	12	18		1	1				2			
2002	8	21	1		2							
2004	12	9	7	0	1	1						

Plot 11	**C. obesa**			**M. strobophylla**			**E. rudis**					
	H	**S**	**D**	**H**	**S**	**D**	**H**	**S**	**D**	**H**	**S**	**D**
1977	5		2	6		1		1	14			
1980	5		2		6	1		1	14			
1982	5		2		5	2		1	14			
1986	5		2		1	6			15			
1992	2	3	2			7			15			
1998	5		2			7			15			
2002	5		2			7			15			
2004	5		2			7						

Plot 12	**E. loxophleba**			**A. acuminata**			**A. huegeliana**					
	H	**S**	**D**	**H**	**S**	**D**	**H**	**S**	**D**	**H**	**S**	**D**
1977	6			5		4	1					
1980	6	1		5		4	1					
1982	6	1		6		4	1					
1986	6	1		5	1	4	1					
1992	6	2		4	3	5	1					
1998	5	1		5	2	5		1				
2002	5	1		5	2	5		1				
2004	6			7		5	1					

Plot 13	**A. huegeliana**			**B. prionotes**								
	H	**S**	**D**	**H**	**S**	**D**	**H**	**S**	**D**	**H**	**S**	**D**
1977	37	1		15	1							
1980	34	4		13	3							
1982	37	5	1	11	5							
1986	30	6	2	2	10	4						
1992	5	3	32	2	3	13						
1998	14	11		4								
2002	18	1		5								
2004	14	5		3	2							

Plot 14	C. obesa			M. strobophylla								
	H	S	D	H	S	D	H	S	D	H	S	D
1977	11	4	7	1								
1980	3	12	8	1								
1982	3	12	7	1								
1986	2	12	7	1								
1992	3	10	9	1								
1998	Not sampled											
2002	Not sampled											
2004	Not sampled											

Plot 15	E. wandoo			E. salmonophloia								
	H	S	D	H	S	D	H	S	D	H	S	D
1977	1			5	1	5						
1980	1			3	3	5						
1982	1			4	2	5						
1986		1			6	5						
1992		1			5	6						
1998			1	3		8						
2002			1	3		8						
2004			1	3		8						

Plot 16	E. salmonophloia											
	H	S	D	H	S	D	H	S	D	H	S	D
1977	4											
1980	1	3										
1982	1	3										
1986	1	2	1									
1992		2	2									
1998	2		2									
2002	2		2									
2004	2		2									

Plot 17	E. salmonophloia			M. acuminata								
	H	S	D	H	S	D	H	S	D	H	S	D
1977	4	2	3	21								
1980		5	4	22	2	1						
1982	1	4	4	26								
1986		4	5	26								
1992		2	7	26								
1998			9	21		5						
2002			9	20	1	2						
2004			9	20	2	2						

Plot 18	E. loxophleba			E. salmonophloia			M. acuminata					
	H	S	D	H	S	D	H	S	D	H	S	D
1977			2			22						

1980			2			22					
1982			2			22					
1986			2			22					
1992			2			22					
1998			2			22					
2002			2			22	25		5		
2004			2				35	3	11		

Plot 19	**M. lateriflora**			**M. acuminata**								
	H	**S**	**D**	**H**	**S**	**D**	**H**	**S**	**D**	**H**	**S**	**D**
1977	143		6									
1980	62	46	179									
1982	131	25	120									
1986	124	30	122									
1992	40	86	148									
1998	140		136	1								
2002	131	28	118									
2004	198											

Plot 20	**E. salmonophloia**			**M. acuminata**								
	H	**S**	**D**	**H**	**S**	**D**	**H**	**S**	**D**	**H**	**S**	**D**
1977	13	1	50	54								
1980	8	1	55	43	7	4						
1982	6	4	54	48	2	4						
1986	2	9	53	45	2	7						
1992		7	57	35	22	1						
1998			64	31		27						
2002			64	44	3	18						
2004				46	1	23						

Plot 21	**C. obesa**			**M. strobophylla**			**E. rudis**			**M. lateriflora**		
	H	**S**	**D**	**H**	**S**	**D**	**H**	**S**	**D**	**H**	**S**	**D**
1977			24			8			8			2
1980			24			8			8			2
1982			24			8			8			2
1986			24			8			8			2
1992			24			8			8			2
1998			24			8			8			
2002			24			8			8			
2004	all dead											

Plot 22	**C. obesa**			**M. strobophylla**								
	H	**S**	**D**	**H**	**S**	**D**	**H**	**S**	**D**	**H**	**S**	**D**
1977			4		1	5						
1980			4			6						
1982		1	3			6						
1986			4			6						
1992			4			6						
1998			4			6						
2002			4			6						
2004	all dead											

Plot 23	E. loxophleba			E. wandoo			M. lateriflora			M. acuminata		
	H	S	D	H	S	D	H	S	D	H	S	D
1977												
1980	14	1		3			6			180		
1982	14	1		3			9			319		
1986	15			2	1		9			221	1	97
1992	12	3		2	1		10			179	1	136
1998	10	2		1		2	6			161	2	
2002	7	4	1			3	6			139	9	2
2004	4	6	1			3	4			173		2

Plot 24	M. lateriflora			M. acuminata			E. wandoo			E. loxophleba		
	H	S	D	H	S	D	H	S	D	H	S	D
1977												
1980	188		16	1								
1982	209		16	1								
1986	204		5	2								
1992	202	1	9	2								
1998	367	13	24	33	36	30						
2002	141	31	25	28	17	32	1			1		
2004	162		8	35		60		1		1		

Plot 25	E. wandoo			E. sp			M. lateriflora			M. acuminata		
	H	S	D	H	S	D	H	S	D	H	S	D
1977												
1980	69	128	2	69	128	2				109		153
1982	82	113	4	82	113	4				261		
1992	121	24	2				86			293		10
1998	14	17					86			293		10
2002	10	15	6							192	19	10
2004	9	14	10				162		8	270	8	19

Plot 26	A. acuminata			C. obesa								
	H	S	D	H	S	D	H	S	D	H	S	D
1977												
1980	11	1	4	2								
1982	10	4	3	2								
1986	9	2	6	2								
1992	11	5	6	2								
1998	13	3	6	2								
2002	14	3	6	2								
2004	10	5	6	2								

Plot 27	C. obesa											
	H	S	D	H	S	D	H	S	D	H	S	D
1977												
1980												
1982												
1986												
1992												

1998	12											
2002	11	1										
2004	12											

Plot 28	**C. obesa**			**M. strobophylla**								
	H	S	D	H	S	D	H	S	D	H	S	D
1977												
1980												
1982												
1986												
1992												
1998	26	40		1								
2002	28	30	9		1							
2004	21	31	16		1							

Plot 29	**C. obesa**											
	H	S	D	H	S	D	H	S	D	H	S	D
1977												
1980												
1982												
1986												
1992												
1998	5	13										
2002		18										
2004		12	6									

Plot 30	**B. prionotes**			**A. acuminata**			**A. huegeliana**					
	H	S	D	H	S	D	H	S	D	H	S	D
1977												
1980												
1982												
1986												
1992												
1998	17	19		1								
2002	1	1	34		1		1					
2004	1		35			1	1					

Plot 31	**B. prionotes**			**A. huegeliana**			**J. furcellata**					
	H	S	D	H	S	D	H	S	D	H	S	D
1977												
1980												
1982												
1986												
1992												
1998	10	4	1	4		1	4					
2002	5	7	3	5		1	8	4	3			
2004	Not sampled											

Plot 32	**C. obesa**			**M. strobophylla**			**E. loxophleba**			**E. rudis**		
	H	S	D	H	S	D	H	S	D	H	S	D

1983	35	11	1	5	1		8	2				3
1988	31	12	4	4	1	1	8	2				3
1998	28	12	7	2	3	1	6	4				3
2002	24	17	8		4	1	7	4				3
2004	32	5	12		4	1	4	4				3

Plot 33	**C. obesa**											
	H	S	D	H	S	D	H	S	D	H	S	D
1983	10	23										
1988	6	24	3									
1998	3	21	9									
2002	4	20	9									
2004	10	13	12									

Plot 34	**C. obesa**			**M. strobophylla**								
	H	S	D	H	S	D	H	S	D	H	S	D
2000	6	173	22		13	17						
2002	5	169	27		2	28						
2004	8	116	77			30						

Plot 35	**C. obesa**											
	H	S	D	H	S	D	H	S	D	H	S	D
2000	10	18	8									
2002	11	16	9									
2004	16	10	10									

Plot 36	**C. obesa**			**M. strobophylla**								
	H	S	D	H	S	D	H	S	D	H	S	D
2000	2	71	11	2	24	13						
2002	3	60	23		20	18						
2004	9	26	54		5	33						

Plot 37	**C. obesa**			**E. rudis**								
	H	S	D	H	S	D	H	S	D	H	S	D
2000	5	31				2						
2002	4	32				2						
2004	5	20	11			2						

Plot 38	**C. obesa**											
	H	S	D	H	S	D	H	S	D	H	S	D
2000	9	20										
2002	5	24										
2004	14	13	2									

Appendix Three: Understorey Data

Vegetation Monitoring of Toolibin Lake and Reserves

	Species	2004 Number	2004 % Cover	2004 Ht (m)	Comments
Plot 3					
A	***Halosarcia lepidosperma***	4	1	0.45	
	Maireana brevifolia	130	3	0.2	mostly germinants
B	***Halosarcia lepidosperma***	1	1	0.3	
	Maireana brevifolia	227	7	0.25	mostly germinants
C	***Halosarcia lepidosperma***	1	2	0.3	
	Maireana brevifolia	500+	8	0.4	
D	***Halosarcia lepidosperma***	1	1	0.3	
	Maireana brevifolia	500+	10	0.45	mostly germinants
E	***Halosarcia lepidosperma***	3	1	0.4	
	Maireana brevifolia	500+	15	0.3	mostly germinants
	Casuarina obesa	2	1	0.3	seedlings
Plot 4					
A	***Atriplex semibaccata***	2	5	0.2	
	Halosarcia lepidosperma	4	30	0.4	
B	***Halosarcia lepidosperma***	1	25	0.3	
	Atriplex semibaccata	1	40	0.1	
C	***Halosarcia lepidosperma***	6	5	0.3	
	Atriplex semibaccata	2	5	0.1	
D	***Halosarcia lepidosperma***	1	5	0.3	
E	***Halosarcia lepidosperma***	1	5	0.4	
	Atriplex semibaccata	2	5	0.1	
Plot 5					
A	***Atriplex semibaccata***	11	20	0.1	
	Halosarcia lepidosperma	2	10	0.5	
B	***Halosarcia lepidosperma***	2	5	0.4	
	Atriplex semibaccata	4	10	0.1	
C	***Atriplex semibaccata***	3	5	0.1	
	Halosarcia lepidosperma	1	10	0.6	
	Halosarcia indica	0	0	-	
D	***Halosarcia lepidosperma***	4	15	0.5	
	Atriplex semibaccata	1	1	0.1	
E	***Halosarcia lepidosperma***	3	5	0.4	
	Atriplex semibaccata	5	5	0.2	
	Maireana brevifolia	1	5	0.1	
Plot 6					
A	***Atriplex semibaccata***	1	1	0.1	
	Wilsonia rotundifolia		10	0.1	
	Halosarcia lepidosperma	0	0	-	
B	***Maireana brevifolia***	1	1	0.5	
	Wilsonia rotundifolia		10	0.1	
C	***Atriplex semibaccata***	2	1	0.1	

	Halosarcia lepidosperma	2	1	0.3	
	Wilsonia rotundifolia		10	0.1	
D	***Atriplex semibaccata***	5	1	0.1	
	Halosarcia lepidosperma	1	1	0.5	
	Wilsonia rotundifolia		10	0.1	
E	***Atriplex semibaccata***	6	1	0.1	
	Wilsonia rotundifolia		10	0.1	
	Maireana brevifolia	1	1	0.15	
Plot 7					
A	***Maireana brevifolia***	8	1	0.3	
	Atriplex semibaccata	2	1	0.1	
	Wilsonia rotundifolia	0	25	0.05	
B	***Halosarcia lepidosperma***	0	0	-	
	Maireana brevifolia	3	1	0.3	
	Wilsonia rotundifolia	1	1	0.05	
	Atriplex semibaccata	16	1	0.1	
C	***Wilsonia rotundifolia***	0	0	-	
	Atriplex semibaccata	8	1	0.1	
	Maireana brevifolia	8	1	0.1	
D	***Halosarcia lepidosperma***	2	5	0.3	
	Maireana brevifolia	150	5	0.1 - 0.5	
	Wilsonia rotundifolia	0	15	0.05	
	Atriplex semibaccata	3	1	0.1	
E	***Halosarcia lepidosperma***	6	5	0.4	
	Maireana brevifolia	12	1	0.2	
	Atriplex semibaccata	4	1	0.05	
	Wilsonia rotundifolia	0	1	0.05	
Plot 8					
A	***Casuarina obesa***	1	1	0.3	grazed seedling
	Maireana brevifolia	5	1	0.3	
	Wilsonia rotundifolia		10	0.05	
B	***Wilsonia rotundifolia***		10	0.05	
C	***Halosarcia lepidosperma***	1	1	0.4	
	Wilsonia rotundifolia		10	0.05	
D	***Wilsonia rotundifolia***		10	0.05	
E	***Wilsonia rotundifolia***		10	0.05	
Plot 9					
A	***x***		-	-	
B	***x***		-	-	
C	***x***		-	-	
D	***x***		-	-	
E	***x***		-	-	
Plot 10					
A	***Halosarcia lepidosperma***	4	15	5	
	Atriplex semibaccata	24	5	15	
	Maireana brevifolia	120	5	0.05	
	Wilsonia rotundifolia	0	20	0.05	
B	***Halosarcia lepidosperma***	4	5	0.4	
	Maireana brevifolia	48	2	0.05	
	Atriplex semibaccata	31	15	0.15	

	Wilsonia rotundifolia	0	1	0.05	
C	***Halosarcia pergranulata***	3	20	0.5	
	Atriplex semibaccata	30	20	0.2	
	Wilsonia rotundifolia	0	1	0.05	
D	***Halosarcia lepidosperma***	15	20	0.5	
	Atriplex semibaccata	7	5	0.2	
	Wilsonia rotundifolia	0	1	0.05	
E	***Halosarcia lepidosperma***	3	5	0.5	
	Wilsonia rotundifolia	0	1	0.05	
	Atriplex semibaccata	21	5	0.2	
Plot 11					
A	***Halosarcia lepidosperma***	18	30	0.4	
	Atriplex semibaccata	3	5	0.2	
	Halosarcia indica	2	5	0.4	
B	***Halosarcia lepidosperma***	15	25	0.3	
	Atriplex semibaccata	1	1	0.2	
	Halosarcia indica	5	40	0.4	
C	***Halosarcia lepidosperma***	3	40	0.4	
	Halosarcia indica	3	5	0.4	
D	***Halosarcia lepidosperma***	7	20	0.5	
	Atriplex semibaccata	4	1	0.2	
	Halosarcia indica	0	0	0.3	
E	***Halosarcia lepidosperma***	10	30	0.4	
	Halosarcia indica	1	1	0.3	
Plot 12					
A	***x***		-	-	
B	***x***		-	-	
C	***x***		-	-	
D	***x***		-	-	
E	***x***		-	-	
Plot 13					
A	***x***				
B	***Jacksonia furcellata***	1	1	1.4	
	Lepidobolus preissianus	12	5	0.2	
C	***Melaleuca seriata***	1	1	0.35	
	Lepidobolus preissianus		10	0.3	
D	***Austrostipa elegantissima***		1	0.3	
	Lepidobolus preissianus		1	0.2	
E	***Lepidobolus preissianus***		20	0.2	
	Austrostipa elegantissima		1	0.3	
	Jacksonia furcellata	1	1		seedling
	Neurachne alopecuroidea		1	0.05	
Plot 15					
A	***Austrostipa elegantissima***		1	0.3	
	Atriplex semibaccata	2	1	0.2	
	Daviesia debilior	2	1	0.3	
	Lomandra micrantha	7	1	0.3	
	Gahnia ancistrophylla	3	1	0.15	

B	***Gahnia ancistrophylla***	9	15	0.3	
	Daviesia debilior	1	1	0.3	
	Austrostipa elegantissima		1	0.3	
	Lomandra micrantha	1	1	0.2	
C	***Gahnia ancistrophylla***	5	5	0.3	
	Austrostipa elegantissima		1	0.4	
	Lomandra micrantha	2	1	0.2	
	Daviesia debilior	6	1	0.2	
D	***Daviesia debilior***	18	15	0.2	
	Atriplex semibaccata	1	1	0.2	
	Austrostipa elegantissima		1	0.3	
	Comesperma virgatum	1	1	0.15	
	Gahnia ancistrophylla	0	1	0.1	
E	***Austrostipa elegantissima***		1	0.05	
	Atriplex semibaccata	4	1	0.2	
	Daviesia debilior	6	5	0.3	
	Lomandra micrantha	6	1	0.3	
Plot 16					
A	***Gahnia trifida***	2	10	1	
	Lomandra micrantha	12	5	0.2	
	Dianella revoluta. divaricata		2	1	0.3
	Atriplex semibaccata	1	1	0.2	
	Austrostipa sp.		1	0.3	
B	***Gahnia trifida***	2	5	0.7	
	Lomandra micrantha	9	1	0.2	
	Dodonaea viscosa	1	1	0.5	
	Austrostipa sp.		1	0.2	
C	***Gahnia trifida***	1	10	0.6	
	Lomandra micrantha	21	10	0.2	
	Dianella revoluta. divaricata	2	1	0.5	
	Austrostipa elegantissima		1	0.5	
	Neurachne alopecuroidea		1	0.2	
	Atriplex semibaccata	1	1	0.2	
D	***Lomandra micrantha***	5	1	0.3	
	Danthonia caespitosa	1	1	0.4	
	Atriplex semibaccata	4	1	0.2	
E	***Gahnia ancistrophylla***		1	0.3	
	Lomandra micrantha	3	1	0.2	
	Danthonia caespitosa	13	1	0.2	
	Atriplex semibaccata	4	1	0.2	
Plot 17					
A	***Gahnia ancistrophylla***	6	1	0.4	
B	***Gahnia ancistrophylla***	8	2	0.3	
	Lomandra micrantha	1	1	0.15	
C	***Gahnia ancistrophylla***	2	1	0.3	
D	***Atriplex semibaccata***	1	1	0.2	

E	***x***		0	-	
Plot 18					
A	***Atriplex semibaccata***	6	1	0.05	
B	***Atriplex semibaccata***	0	0	-	
	Halosarcia indica	2	1	0.2	
C	***Atriplex semibaccata***	6	1	0.1	
	Halosarcia indica	1	1	0.1	
D	***Gahnia trifida***	1	1	0.4	
	Melaleuca acuminata		0	-	
	Atriplex semibaccata	3	1	0.1	
	Halosarcia indica	1	1	0.1	
E	***Atriplex semibaccata***			0.1	
Plot 19					
A	***Atriplex semibaccata***	2	1	0.05	
	Halosarcia indica	1	1	0.1	
B	***Atriplex semibaccata***	2	1	0.05	
	Halosarcia indica	1	1	0.2	
C	***Atriplex semibaccata***	2	1	0.05	
	Halosarcia indica	2	1	0.2	
D	***Atriplex semibaccata***	2	1	0.1	
E	***Atriplex semibaccata***	3	1	0.05	
Plot 20					
A	***Gahnia trifida***	13	10	0.4	
	Austrostipa elegantissima		1	0.3	
	Atriplex semibaccata	5	1	0.2	
	Dianella revoluta. divaricata		2	1	0.3
B	***Austrostipa elegantissima***		1	0.3	
	Atriplex semibaccata	1	1	0.2	
C	***Austrostipa elegantissima***		1	0.4	
D	***Austrostipa elegantissima***		1	0.4	
E	***Austrostipa elegantissima***		1	0.5	
	Atriplex semibaccata	1	1	0.2	
Plot 21					
A	***Halosarcia lepidosperma***	65	25	0.2	
	Halosarcia indica	77	1	0.2	
B	***Halosarcia lepidosperma***	30	2	0.2	
	Halosarcia indica		1	0.1	
C	***Halosarcia lepidosperma***	22	5	0.2	
	Halosarcia indica		1	0.1	
D	***Halosarcia lepidosperma***	10	2	0.2	
	Halosarcia indica		25	0.1	
E	***Halosarcia lepidosperma***	25	2	0.2	
	Halosarcia indica		1	0.2	
Plot 22					
A	***Halosarcia indica***	77	1	0.3	

	Halosarcia indica		1	0.2	
B	***Halosarcia indica***		1	0.2	
C	***Halosarcia indica***		1	0.2	
D	***Halosarcia indica***	1000+	25	0.2	mostly germinants
E	***Halosarcia indica***	1000+	1	0.2	mostly germinants
Plot 23					
A	***x***				
B	***x***				
C	***x***				
D	***x***				
E	***x***				
Plot 24					
A	***Dianella revoluta. divaricata***	1	1	0.4	
	Gahnia trifida	1	1	0.3	
	Melaleuca acuminata			1.4	
B	***Melaleuca acuminata***			1.4	
C	***x***				
D	***x***				
E	***x***				
Plot 25					
A	***Neurachne alopecuroidea***		1	0.2	
B	***Neurachne alopecuroidea***		1	0.2	
C	***Neurachne alopecuroidea***		1	0.2	
	Chorizandra enodis		1	0.15	
D	***Danthonia caespitosa***		1	0.1	
	Neurachne alopecuroidea		1	0.2	
	Cryptandra sp	2	1	0.3	
E	***Lepidosperma tenue***		1	0.3	
	Ptilotus manglesii		1	0.1	
	Neurachne alopecuroidea		1	0.05	
	Cryptandra sp	2	1	0.3	
Plot 26					
A	***x***				
B	***x***				
C	***x***				
D	***x***				
E	***x***				
Plot 27					
A	***x***				
B	***x***				
C	***x***				
D	***x***				
E	***x***				
Plot 28					

A	***Maireana brevifolia***	2	1	0.15	
	Halosarcia lepidosperma	1	1	0.5	
	Atriplex semibaccata	2	1	0.1	
B	***Halosarcia lepidosperma***	5	15	0.5	
	Maireana brevifolia	10	1	0.2	
	Atriplex semibaccata	50	5	0.1	
	Halosarcia indica	1	1	0.4	
C	***Halosarcia lepidosperma***	0		-	
	Atriplex semibaccata	1	1	0.1	
	Maireana brevifolia	20	2	0.7	
D	***Halosarcia lepidosperma***	6	5	1	
	Maireana brevifolia	30	5	0.5	
	Atriplex semibaccata	1	1	0.05	
E	***Halosarcia lepidosperma***	2	5	0.5	
	Maireana brevifolia	15	5	0.5	
	Atriplex semibaccata	2	1	0.1	
Plot 29					
A	***Maireana brevifolia***	1	1	0.2	
B	***Halosarcia lepidosperma***	2	1	0.4	
C	***Halosarcia lepidosperma***	5	5	0.4	
D	***Halosarcia lepidosperma***	2	1	0.4	
	Atriplex semibaccata	2	1	0.1	
E	***Atriplex semibaccata***	2	1	0.1	
	Halosarcia lepidosperma	1	1	0.1	
Plot 30					
A	***x***				mainly exotic grasses
B	***Lomandra rupestris***	1	1	0.5	plus stipas
C	***Lomandra rupestris***	4	5	0.5	
D	***Lomandra rupestris***	2	1	0.5	
E	***Lomandra rupestris***	3	5	0.5	
	Stipa compressa	0	0	0.1	
Plot 31					
A	***Lomandra rupestris***				
	Neurachne alopecuroidea				
	Austrostipa elegantissima				
B	***Lomandra rupestris***				
	Neurachne alopecuroidea				
	Dianella revoluta. divaricata				
C	***Dianella revoluta. divaricata***				
	Lepidobolus preissiana				
	Neurachne alopecuroidea				
D	***Lomandra rupestris***				
	Neurachne alopecuroidea				
	Austrostipa elegantissima				
E	***Lomandra rupestris***				
	Neurachne				

	alopecuroidea				
Plot 32 (RF1)					
Whole Plot	***Halosarcia indica***		10	0.3	
	Halosarcia lepidosperma		20	0.2 - 0.4	
	Dianella revoluta. divaricata			1	
	Hakea preissii		1	0.4	
	Gahnia trifida		1	0.3	
	Lomandra micrantha		1	0.25	
Plot 33 (RF4)					
Whole Plot	***Halosarcia lepidosperma***		3	0.3	
	Maireana brevifolia		10	0.4	
Plot 34					
A	***Halosarcia lepidosperma***	4	20	0.3	
B	***Halosarcia lepidosperma***	13	40	0.3 - 0.4	
C	***Halosarcia lepidosperma***	12	30	0.3 - 0.5	
	Halosarcia indica	1	1	0.3	
D	***Halosarcia lepidosperma***	21	30	0.3 - 0.6	
	Atriplex semibaccata	2	1	0.2	
E	***Halosarcia lepidosperma***	27	30	0.3 - 0.7	
Plot 35					
A	***x***				
B	***Carpobrotus sp.***	3	5	0.1	
	Halosarcia lepidosperma	1	1	0.1	
C	***Carpobrotus sp.***	7	20	0.05	
	Atriplex semibaccata	1	1	0.05	
D	***Carpobrotus sp.***	2	1	0.05	
	Atriplex semibaccata	1	1	0.05	
E	***Carpobrotus sp.***	4	5	0.05	
	Halosarcia lepidosperma	1	1	0.3	
Plot 36					
A	***Halosarcia lepidosperma***	5	40	0.2 - 0.4	
	Atriplex semibaccata	16	10	0.2	
B	***Halosarcia lepidosperma***	12	40	0.3	
	Halosarcia pergranulata	1	5	0.3	
C	***Halosarcia lepidosperma***	7	15	0.3	
	Halosarcia pergranulata	1	0	-	
D	***Halosarcia lepidosperma***	12	10	0.3	
	Atriplex semibaccata	1	1	0.1	
E	***Halosarcia lepidosperma***	8	10	0.3	
	Halosarcia pergranulata	8	1	0.2	
	Carpobrotus sp.	1	1	0.05	
	Atriplex semibaccata	1	1	0.05	

Plot 37					
A	***Halosarcia lepidosperma***	1	1	0.3	
	Halosarcia pergranulata	4	20	0.2	
	Atriplex semibaccata	1	1	0.2	
B	***Halosarcia lepidosperma***	7	5	0.2	
	Halosarcia pergranulata	5	5	0.3	
	Atriplex semibaccata	1	1	0.15	
C	***Halosarcia lepidosperma***	11	20	0.4	
	Halosarcia pergranulata	3	1	0.3	
	Atriplex semibaccata	2	1	0.2	
D	***Halosarcia lepidosperma***	22	5	0.2	
	Atriplex semibaccata	4	1	0.1	
E	***Halosarcia lepidosperma***			-	
	Halosarcia pergranulata	5	5	0.5	
	Atriplex semibaccata	8	1	0.1	
Plot 38					
A	***Halosarcia lepidosperma***	1	1	0.3	
	Atriplex semibaccata	1	1	0.1	
B	***Halosarcia lepidosperma***	3	1	0.3	
	Atriplex semibaccata	6	1	0.1	
C	***Halosarcia lepidosperma***	1	1	0.2	
	Atriplex semibaccata	7	1	0.1	
D	***Halosarcia lepidosperma***	9	20	0.5	
	Atriplex semibaccata	4	10	0.2	
E	***Halosarcia lepidosperma***	7	10	0.3	
	Atriplex semibaccata	9	20	0.1	

Appendix Four: Salinity Data

Vegetation Monitoring of Toolibin Lake and Reserves

Plots highlighted in yellow were assessed after rain (~27mm fell 5 days prior)

Plot 3 - 2004

EM38	Distance Across (m)					
	0		10		20	
Distance (m)	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal
0	203	170	177	138	145	104
4	178	197	182	140	167	133
8	211	164	197	142	218	192
12	280	184	161	106	185	157
16	259	223	189	159	190	137
20	303	251	307	279	214	170

Plot 4 - 2004

EM38	Distance Across (m)					
	0		10		20	
Distance (m)	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal
0	380	288	413	336	321	310
4	379	334	395	339	388	258
8	383	256	343	290	387	281
12	448	382	377	310	450	365
16	434	340	427	380	410	281
20	360	230	448	352	398	345

Plot 5 - 2004

EM38	Distance Across (m)					
	0		10		20	
Distance (m)	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal
0	360	230	448	352	398	345
4	406	266	425	418	452	311
8	384	248	461	326	475	424
12	435	379	397	334	389	343
16	476	320	465	354	407	225
20	458	343	428	331	453	436

Plot 6 - 2004

EM38	Distance Across (m)					
	0		10		20	
Distance (m)	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal
0	291	214	303	221	300	192
4	297	203	293	195	193	130
8	264	207	242	201	215	182
12	245	194	309	232	298	196
16	271	194	286	198	307	200
20	303	213	262	164	289	241

Plot 7 - 2004

EM38	Distance Across (m)					
	0		10		20	
Distance (m)	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal
0	194	135	337	252	388	271
4	169	105	311	213	384	175
8	205	130	260	177	220	157
12	215	145	214	140	214	149
16	200	132	161	98	240	174
20	220	140	143	90	129	83

Plot 8 - 2004

EM38	Distance Across (m)					
	0		10		20	
Distance (m)	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal
0	340	218	261	205	275	202
4	312	195	244	172	248	164
8	317	197	251	181	230	148
12	297	169	272	174	214	143
16	289	183	283	188	235	166
20	287	208	315	228	245	190

Plot 9 - 2004

EM38	Distance Across (m)					
	0		10		20	
Distance (m)	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal
0	382	240	382	264	399	303
4	422	304	425	339	367	254
8	431	284	439	320	409	316
12	402	321	386	297	403	285
16	395	327	383	273	398	316
20	394	296	370	271	352	249

Plot 10 - 2004

EM38	Distance Across (m)					
	0		10		20	
Distance (m)	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal
0	345	285	338	303	434	279
4	353	250	333	224	442	288
8	371	323	403	274	470	345
12	434	308	430	288	470	327
16	379	277	407	316	473	322
20	374	299	385	275	510	313

Plot 11 - 2004

EM38	Distance Across (m)					
	0		10		20	
Distance (m)	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal
0	416	326	412	298	410	275
4	505	373	457	349	390	299
8	438	440	480	351	423	331
12	479	361	481	360	469	342
16	490	385	499	373	486	352

20	474	347	528	398	528	465

Plot 12 - 2004

EM38	Distance Across (m)					
	0		10		20	
Distance (m)	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal
0	107	59	96	52	64	33
4	127	73	95	51	50	26
8	120	66	101	54	49	26
12	125	71	102	54	46	21
16	120	57	106	58	42	20
20	122	64	98	53	43	23

Plot 13 - 2004

EM38	Distance Across (m)					
	0		10		20	
Distance (m)	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal
0	29	13	25	13	27	13
4	29	13	26	12	26	7
8	29	12	26	11	26	13
12	30	13	26	11	26	12
16	31	13	25	11	26	11
20	35	12	26	12	27	12

Plot 15 - 2004

EM38	Distance Across (m)					
	0		10		20	
Distance (m)	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal
0	224	200	199	161	237	217
4	202	175	199	148	240	189
8	227	188	185	144	243	195
12	234	193	200	130	250	200
16	259	209	221	203	248	194
20	226	202	225	176	245	213

Plot 16 - 2004

EM38	Distance Across (m)					
	0		10		20	
Distance (m)	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal
0	188	150	198	172	215	177
4	210	175	187	143	241	207
8	200	131	178	130	218	180
12	198	152	222	155	210	119
16	207	180	213	186	239	209
20	221	199	205	158	224	233

Plot 17 - 2004

EM38	Distance Across (m)					
	0		10		20	
Distance (m)	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal
0	220	150	295	223	247	176
4	192	173	282	189	273	237
8	237	190	238	221	224	194

12	274	187	254	185	216	152
16	306	263	262	192	262	228
20	297	222	245	172	206	171

Plot 18 - 2004

EM38	Distance Across (m)					
	0		10		20	
Distance (m)	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal
0	282	216	370	348	386	379
4	288	225	333	292	411	357
8	316	290	340	297	387	371
12	316	243	335	299	394	390
16	293	227	313	261	375	302
20	288	225	318	255	362	356

Plot 19 - 2004

EM38	Distance Across (m)					
	0		10		20	
Distance (m)	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal
0	549	460	556	440	620	525
4	552	460	647	508	532	400
8	600	475	560	467	573	508
12	550	448	592	465	581	466
16	546	520	517	468	500	388
20	522	403	357	270	405	385

Plot 20 - 2004

EM38	Distance Across (m)					
	0		10		20	
Distance (m)	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal
0	243	219	256	185	217	183
4	242	219	217	156	228	168
8	238	198	221	186	214	162
12	229	183	200	161	227	164
16	256	215	199	136	221	171
20	258	208	220	156	231	237

Plot 21 - 2004

EM38	Distance Across (m)					
	0		10		20	
Distance (m)	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal
0	473	603	666	753	597	740
4	487	660	628	682	639	738
8	550	724	522	682	760	784
12	616	728	562	720	770	928
16	770	752	933	1062	826	983
20	881	1176	837	908	1046	1132

Plot 22 - 2004

EM38	Distance Across (m)					
	0		10		20	
Distance (m)	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal
0	889	1078	820	923	692	784

4	841	937	736	766	651	736
8	752	811	586	630	683	772
12	682	670	648	650	652	679
16	673	705	675	739	618	636
20	708	730	766	792	782	930

Plot 23 - 2004

EM38	Distance Across (m)					
	0		10		20	
Distance (m)	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal
0	347	285	282	243	290	215
4	356	317	345	265	292	258
8	363	319	280	247	273	226
12	320	284	264	224	252	213
16	272	244	242	201	249	173
20	301	247	251	178	201	146

Plot 24 - 2004

EM38	Distance Across (m)					
	0		10		20	
Distance (m)	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal
0	288	211	294	220	292	234
4	289	222	302	239	282	193
8	306	260	325	285	305	243
12	301	231	324	259	317	267
16	287	222	339	255	290	201
20	222	135	290	252	271	216

Plot 25 - 2004

EM38	Distance Across (m)					
	0		10		20	
Distance (m)	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal
0	223	173	252	248	250	234
4	225	167	242	172	246	183
8	224	160	216	201	203	222
12	224	163	213	212	237	195
16	248	166	232	171	247	183
20	213	188	224	160	226	214

Plot 26 - 2004

EM38	Distance Across (m)					
	0		10		20	
Distance (m)	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal
0	88	48	88	46	75	39
4	93	51	94	51	75	41
8	86	54	105	57	82	46
12	96	52	112	67	94	53
16	114	65	114	64	105	59
20	120	69	122	73	107	65

Plot 27 - 2004

EM38	Distance Across (m)		
	0	10	20

Distance (m)	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal
0	119	78	151	99	126	87
4	138	93	137	93	150	103
8	99	63	134	92	161	113
12	110	79	137	86	164	112
16	112	71	140	89	170	115
20	114	78	129	82	163	118

Plot 28 - 2004

EM38	Distance Across (m)					
	0		10		20	
Distance (m)	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal
0	369	287	400	343	418	320
4	358	269	419	333	360	317
8	351	250	385	343	462	358
12	328	250	391	314	447	332
16	306	259	355	305	406	299
20	304	225	396	302	385	318

Plot 29 - 2004

EM38	Distance Across (m)					
	0		10		20	
Distance (m)	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal
0	452	357	538	443	489	397
4	483	365	503	392	488	418
8	489	408	460	378	544	419
12	481	381	491	396	516	430
16	491	440	485	435	508	431
20	514	422	504	435	522	464

Plot 30 - 2004

EM38	Distance Across (m)					
	0		10		20	
Distance (m)	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal
0	9.4	4.3	7.7	3.2	5.7	2.5
4	10.1	4.3	9.9	3.3	6.6	2
8	10.8	4.1	8.9	2.5	7.5	2.9
12	11.3	1.4	10.4	4.6	8.6	1.5
16	13.9	5.2	11.5	7	10	4
20	14.9	7	14.9	5.2	12	6.1

Plot 32 (RF1) - 2004

EM38	Distance Across (m)					
	0		10		20	
Distance (m)	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal
0	153	88	84	45	60	29
4	176	102	135	78	108	59
8	207	130	216	130	156	86
12	274	161	240	155	242	153
16	321	207	436	302	258	159
20	434	331	519	452	410	295
24	582	425	471	365	462	440
28	422	314	333	292	425	387

33	412	346	343	276	324	207
37	466	392	453	439	473	384
41	277	193	338	277	298	206
45	215	144	243	176	228	178
49	157	101	199	140	157	104
53	129	80	149	98	114	69
57	96	54	102	58	95	54
61	85	44	89	50	92	52
65	56	90	82	44	86	48

Plot 33 (RF4) - 2004

EM38	Distance Across (m)					
	0		10		20	
Distance (m)	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal
0	258	211	231	205	264	180
4	253	201	272	190	261	235
8	283	203	271	210	216	171
12	285	219	270	211	205	150
16	308	219	310	242	268	204
20	289	232	304	220	272	232
24	262	200	285	253	277	204
28	251	169	295	245	256	216
32	246	170	293	208	275	225
36	241	168	255	182	298	226
40	238	165	267	206	267	183

Plot 34 - 2004

EM38	Distance Across (m)					
	0		10		20	
Distance (m)	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal
0	412	337	410	316	367	217
4	381	262	440	350	343	223
8	423	343	518	326	397	315
12	413	354	440	294	358	298
16	422	335	389	258	420	351
20	409	359	408	313	391	344

Plot 35 - 2004

EM38	Distance Across (m)					
	0		10		20	
Distance (m)	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal
0	425	368	386	373	409	365
4	449	375	412	365	403	351
8	461	396	423	371	365	325
12	411	369	404	338	390	282
16	405	356	388	376	391	353
20	432	373	426	390	440	348

Plot 36 - 2004

EM38	Distance Across (m)					
	0		10		20	
Distance (m)	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal
0	539	402	540	396	428	373

4	475	427	459	473	385	363
8	453	429	482	483	485	411
12	577	398	497	435	502	381
16	526	498	469	446	484	422
20	485	432	624	490	465	426

Plot 37 - 2004

EM38	Distance Across (m)					
	0		10		20	
Distance (m)	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal
0	457	420	519	407	470	317
4	538	421	576	390	412	273
8	562	485	433	375	412	344
12	479	372	403	387	417	338
16	476	482	436	372	402	355
20	473	393	419	364	393	264

Plot 38 - 2004

EM38	Distance Across (m)					
	0		10		20	
Distance (m)	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal
0	333	222	365	271	416	307
4	357	236	385	270	438	319
8	328	243	397	285	433	337
12	342	216	344	242	369	247
16	372	268	323	221	331	251
20	329	277	390	271	338	263

Plot T42 (new seedling plot) - 2004

EM38	Distance Across (m)					
	0		10		20	
Distance (m)	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal
0	374	296	299	216	267	174
4	364	285	351	242	307	211
8	338	245	336	238	308	228
12	368	297	340	241	327	234
16	366	247	380	305	372	254
20	332	275	392	316	401	265

Appendix Five: Seedling Data

Vegetation Monitoring of Toolibin Lake and Reserves

Plot 39	2004			
Distance (m)	Seedling #	Height (M)	EM38 (V)	EM38 (H)
0-5	2	1.7--2.0	213	149
5-10	6	0.3-4.0	189	137
10-15	18	0.7-3.5	151	105
15-20	17	0.3-4.0	114	77
20-25	16	0.6-3.5	110	73
25-30	9	0.15-3.0	127	84
30-35	2	0.4-0.8	192	183
35-40	18	1.0-2.3	156	284
40-45	28	0.15-2.5	148	99
45-50	6	0.15-1.3	138	92
50-55	0		179	116
55-60	0		203	148
60-65	1	0.15	159	121
65-70	0		124	80
70-75	1	0.8	114	96
75-80	2	0.3-0.6	135	91
80-85	7	0.2-1.8	130	104
85-90	2	0.2	136	95
90-95	0		161	115
95-100	1	0.3	215	158

Plot 40	2004			
Distance (m)	Seedling #	Height (M)	EM38 (V)	EM38 (H)
0-5	50	0.8-3.0	172	116
5-10	89	0.3-5.0	152	103
10-15	188	0.05-6.0	232	178
15-20	59	0.05-2.1	191	227
20-25	25	0.05-1.7	123	81
25-30	119	0.05-1.8	129	92
30-35	37	0.05-1.1	172	127
35-40	16	0.05-0.3	182	126
40-45	16	0.05-0.4	191	139
45-50	12	0.05-0.2	173	121
50-55	21	0.05-0.4	144	102
55-60	3	0.05-0.2	183	165
60-65	104	0.05-2.5	106	69
65-70	98	0.05-3.3	92	63
70-75	58	0.04-4.0	86	61
75-80	79	0.05-4.0	88	64
80-85	59	0.05-2.5	93	67
85-90	47	0.3-2.2	114	85
90-95	34	0.1-1.8	127	92
95-100	29	0.5-2.1	131	90

Plot 41	2004			
Distance (m)	**Seedling #**	**Height (M)**	**EM38 (V)**	**EM38 (H)**
0-5	7	1.0-2.5	163	127
5-10	14	0.2-5.5	158	114
10-15	31	0.2-4.5	187	172
15-20	32	0.6-4.5	137	98
20-25	39	0.5-3.5	158	108
25-30	78	0.4-4.0	144	115
30-35	73	0.3-3.0	158	116
35-40	102	0.4-2.5	132	94
40-45	209	0.2-2.3	124	91
45-50	117	0.2-2.5	148	118
50-55	176	0.1-2.0	154	103
55-60	288	0.3-2.0	166	111
60-65	406	0.2-1.7	203	134
65-70	424	0.1-1.6	243	170
70-75	297	0.1-0.8	254	176
75-80	236	0.2-1.1	294	209
80-85	98	0.1-1.4	282	188
85-90	40	0.2-0.6	298	220
90-95	14	0.3-1.2	322	248
95-100	9	0.1-1.2	308	202

Plot 42		**Vigour**	**Ht Range(m)**
subplot			
A	*C obesa*	1H (grazed)	0.45
	M strobophylla	52H	0.8-3.1
B	*C obesa*	1H	0.35
	M strobophylla	33H	0.55-3.1
C	*C obesa*	0	
	M strobophylla	16H	1.8-3.2
D	*C obesa*	0	
	M strobophylla	120H, 2S	0.9-3.3
E	*C obesa*	0	
	M strobophylla	89H, 2D	0.5-2.6
Total # live seedlings			
C obesa		**2**	
M strobophylla		314	