ESTABLISHMENT OF VEGETATION MONITORING PROGRAMME
McCARLEY'S SWAMP

Prepared By : E.M. Mattiske & Associates

Prepared For : Department of Conservation and Land Management

February 1987

TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF TABLES

LIST OF TABLES (Continued)

LIST OF FIGURES:

1. SUMMARY

A vegetation monitoring programme was established at McCarley's Swamp, south of the township of Capel, in January 1987.

Discussions held with the local landowners indicated that recent water levels in McCarley's Swamp were generally higher than in the past. The actual cause of this increase in water levels may be related to a variety of factors, including the overflow from the adjacent mining areas. The increase in water levels, particularly in the summer months also appears to have had an influence on the condition of the stands of Melaleuca rhaphiophylla. From observations of the landowners and a review of available aerial photographs it is evident that there has been a deterioration in the health of the trees in the last few years. It has been proposed that the lowering of the water table by 0.5 metres above the natural fall in the summer months may improve the vigour of the Paperbarks and discourage the birds from resting on the trees in the wetlands during the summer period. Monitoring of the vegetation and birds in the next few years should indicate if this adopted management approach is the preferred option for the maintenance of these wetland communities and bird populations.

In view of the recent pumping of the water from the wetlands, the large numbers of birds utilizing the wetland and the degree of stress evident in some of the plant communities, it is recommended that regular monitoring of the water levels, water quality and vegetation monitoring plots is undertaken by the Department of Conservation and Land Management. Initially this monitoring should be carried out on an annual basis for a period of three years, and then on a three yearly basis, until the side-effects of the nearby mining are minimized by the establishment of the proposed planting of seedlings east of the wetland.

In addition to the proposed planting of seedlings by the mining company (Associated Minerals Consolidated Limited - AMC), positive management options for the fringing vegetation should be discussed with the private land-owners. These might include limited prescribed burning of the older stands of Melaleuca hamulosa and Melaleuca lateritia on the eastern edges of the wetlands.

2. BACKGROUND

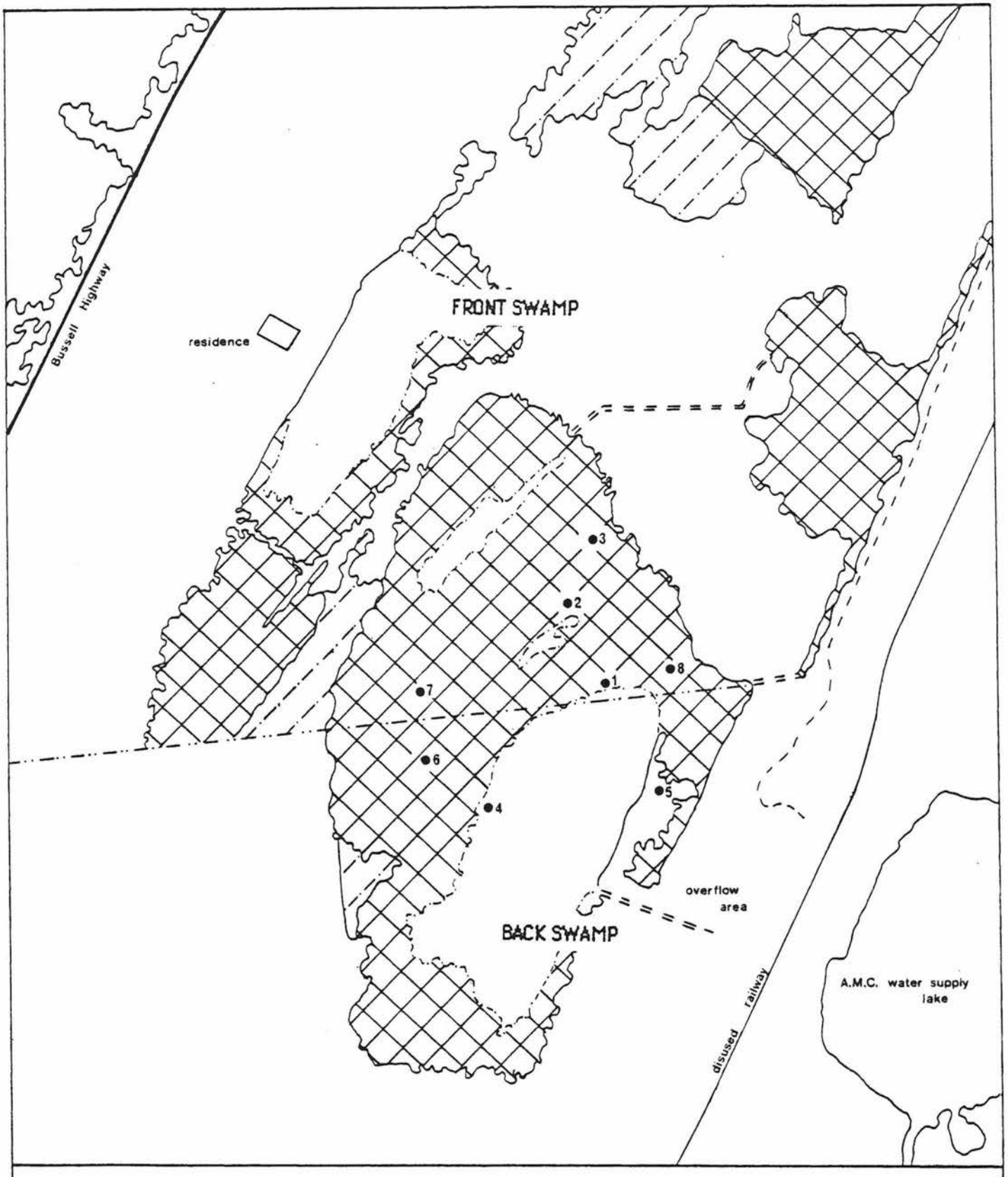
E.M. Mattiske & Associates was commissioned by the Department of Conservation and Land Management to establish a vegetation monitoring programme in the wetlands, known locally as McCarley's Swamp (named after a former landowner), located south of the township of Capel.

McCarley's Swamp overlaps the boundaries of the two properties owned respectively by Mr N. Bentley and Miss E. Higgins.

McCarley's Swamp has been influenced by man's activties for some 60 years (pers. comm., E. Higgins). The "front swamp" near the house on Higgins property is reported to have held water longer than the "back swamp". Earlier landowners cleared the wetlands for grazing and the cultivation of potatoes. Prior to 1966, only two small pockets of McCarley's Swamp were cleared of Paperbarks (and burnt) to allow for the cultivation of the potatoes in the late summer months. During the period 1966-1972, more extensive areas were cleared and cultivated for potatoes. To assist, pumping was carried out to reduce the water levels during the summer months. Since 1972, the swamps have been too wet to contemplate cultivation (and in some years grazing of the adjacent paddocks).

This pattern suggests that these swamps were seasonally inundated, and depending on the seasonal rainfall, pumping was necessary to enable crops of potatoes to be grown and dug before the winter rains commenced in April-May.

Miss E. Higgins also referred to the increased water levels in the paddocks since mining commenced near McCarley's Swamp. This is despite the series of below average annual rainfall years since the mid 1960's, Table 1. In fact, only five years in this recent period exceeded the average annual rainfall of 846 mm.



LEGEND

- vegetated
- partially vegetated
- cleared land
- ●5 vegetation plot location [approximate]
- open water [Jan '87]
- drain
- central fence line

NORTH

scale 1:6,140

Figure 1: LOCATION OF VEGETATION MONITORING PLOTS AT McCARLEY SWAMP

TABLE 1: SUMMARY OF ANNUAL RAINFALL RECORDINGS FOR CAPEL, 1965-1985

Year	Annual Rainfall (mm)	Year	Annual Rainfall (mm)
1965	* 1030	1975	686
1966	741	1976	755
1967	* 886	1977	619
1968	770	1978	686
1969	551	1979	672
1970	* 860	1980	742
1971	764	1981	689
1972	674	1982	641
1973	N.A.	1983	* 892
1974	* 896	1984	706
		1985	728

Note: Capel Average Annual Rainfall 1914-1986 = 846 mm
* = Annual Rainfall exceeds Average Annual Rainfall
N.A. = Not Available

Therefore, the increased water levels must relate to factors associated with clearing (mining, forestry and agriculture), thus decreased evapo-transpiration, and to changes in water flows from the adjacent mining operations. This was also addressed in the Groundwater Resource Consultant's Report (1986), as follows:

> "The Ludlow wetland in the dry summer months is presently supported by seepage from the upper part of the water table aquifer, in the few metres of sand which may overlie the clay and organic ferruginous caprock north of the mined area; by overland flow from the AMC lake directly southeast of the wetland; and by vertically upward leaking of water from the aquifer beneath the wetland."

In addition to these effects of mining, there has been increasing activities of forestry and agriculture in the region since the early days of settlement. For example, Mr N. Bentley indicated that forestry activities commenced in the mid-1950's along the railway line near the swamp. Clearing of the forests east of the railway line occurred in the 1960's.

To counteract these increased water levels, the mining company (Associated Minerals Consolidated Limited) arranged for pumping of the wetlands during the summer months of 1986-1987. Pumping was intended to lower the water table by an additional 0.5 metres (Groundwater Resource Consultants, 1986), above the "natural" fall due to evaporation and loss during summer months. This pumping had commenced in January 1987, prior to the establishment of the vegetation monitoring programme.

The plant communities on the wetlands are dominated by dense stands of Paperbark (mainly Melaleuca rhaphiophylla, and to a lesser extent Melaleuca lateritia and Melaleuca hamulosa). Currently there is substantial stress evident in the native plant communities. This report reviews the status of the native flora and vegetation in the wetlands and the nesting activties in selected areas of the swamp.

2.1 Available Resources

Preliminary information gathered includes:

- Notes following discussion with landowners, Miss E. Higgins and Mr N. Bentley.
- Discussions with Department of Conservation and Land Management Officers.
- Laboratory Results for Water Samples - Government Chemical Laboratories.
- Preliminary Report by Groundwater Resource Consultants (1986).
- Aerial Photographs -
    - Black and White air-photos (March, 1982) at approximately 1:10,000 scale, covering the Capel wetlands and the Associated Minerals Consolidated Limited water supply lakes.
    - Coloured air-photos (January, 1983) at approximately 1:10,396 scale, covering Capel wetlands and the Associated Minerals Consolidated Limited water supply lakes.

- Coloured air-photos (January, 1983) at approximately 1:8,015 scale, covering the Capel wetlands and the Associated Minerals Consolidated Limited water supply lakes.

- Coloured air-photos (December, 1986) at approximately 1:6,140 scale, covering the Capel wetlands and portion of the Associated Minerals Consolidated Limited water supply lakes.

- Coloured air-photos (January, 1986) at approximately 1:1,6140 scale, covering the Capel wetlands and portion of the Associated Minerals Consolidated Limited water supply lakes.

3. OBJECTIVES

The following objectives were defined with Departmental officers, after discussions on time and costs.

- To collect and identify flora as required to summarize the plant communities,

- To provide a series of plant community descriptions,

- To establish a few monitoring sites within the swamp, including tagging individual stems which will be recorded by measuring diameters at breast height (d.b.h.), observing condition of individual stems, observing epicormic shoots, recording the number and type (where possible) of bird nests of each stem,

- To install a staff gauge for monitoring of change in water level along the fenceline on the central part of the swamp,

- To nominate possible causes of stress, which may be apparent in the vegetation,

- To prepare two copies of the report summarizing findings.

4. METHODS

A general reconnaissance of the area was undertaken in December, 1986 with Mr Peter Lambert (Wildlife Officer - Busselton, Department of Conservation and Land Management). Discussions were held with the landowners Miss E. Higgins and Mr N. Bentley. This led to a delineation of options for vegetation studies in the McCarley's Swamp. Discussions were then held with Dr F. Batini of the Protection Branch of the Department of Conservation and Land Management.

Within the time and cost limitations it was decided to place an emphasis on the establishment of a series of plots which could be re-assessed at regular intervals in the near future. These plots were established and recorded in the period January 12th - 14th, 1987. The staff gauge was installed at the end of January 1987 by local wildlife officers.

Field studies included the following:

- Collection of plant specimens from the wetlands and adjacent areas east of the wetlands (particularly near the overflow areas from the mining operations).

- Establishment of 8 monitoring plots (plots were 20m x 20m; except in two cases where the tree density and time allowed, reduced the plot size to 10m x 10m) in a variety of plant communities within the wetlands. Corners of the plots were determined by compass and tape. Factors affecting selection of plots included:
  - the floristic and structural composition,
  - the age of the plant communities,
  - the condition of plant communities and
  - the degree of inundation.

- The plots were labelled with survey tape (pink and blue in south-eastern corner and blue in other four corners). Where possible local features (e.g. fence-line through centre of wetland) were used for reference points.

- All species present in the plot were recorded. Specimens were collected as required for taxonomic verification. Plant specimens were dried, fumigated and checked against current collections in the Western Australian Herbarium.

. As the majority of plots were lacking an understorey, due to inundation, the study placed a greater emphasis on the overstorey. However where understorey species did occur (e.g. often in the forks of trees, above the current water levels) then detailed recordings were taken. In plot 5, on the edge of the large area of open water, percentage foliage covers were recorded for the understorey species.

. All trees and shrubs were labelled with aluminium tags using the following code:

Code: 3/10 (Plot 3/Tree Number 10)

. All trees and shrubs were then recorded as follows:

Diameter at Breast Height for each stem (cm)

Condition of Each Stem using the following code:

H	=	Healthy
Sl.St	=	Slightly Stressed
St	=	Stressed
V.St	=	Very Stressed
Rd	=	Recently Dead
D	=	Dead
Fd	=	Fallen Dead
Adv	=	Adventitious Shoots
E	-	Epicormic Shoots
<BH	=	Below Breast Height

All results were summarized by stem, tree, shrub, species and plot for interpretation.

5. RESULTS

The area near Capel receives the majority of its rainfall in winter months, Table 2. Consequently it is expected that any replenishment of the water table would occur in these months. Further, there appears to be evidence that McCarley's Swamp was seasonally dry in the late summer months. Observations in other wetlands indicate that the dominant Paperbark Melaleuca rhaphiophylla can tolerate inundation for some length of time, however it is unclear from current knowledge whether longer-term inundation leads to irreversible damage of the trees. This proposed monitoring programme may assist in defining tolerance levels.

TABLE 2 : SUMMARY OF RAINFALL AND EVAPORATION DATA - CAPEL

(Extracted from Groundwater Resources Consultants Report, 1986)

Month	Average Rainfall (mm)	Pan Evaporation (mm)
January	10	200
February	13	165
March	25	135
April	48	80
May	122	65
June	188	55
July	166	50
August	115	55
September	72	68
October	50	100
November	25	130
December	12	190

5.1 Flora

A total of 22 families, 42 genera and 53 vascular plant species were recorded in the botanical studies at McCarley's Swamp, Appendix A.

Dominant families were Cyperaceae (8 species - 7 native and 1 introduced), Poaceae (8 species - all introduced), Myrtaceae (6 species - all native) and Asteraceae (5 species - 1 native and 4 introduced), Appendix A.

Several of the Paperbarks form extensive stands on the wetlands. Foremost amongst these is Melaleuca rhaphiophylla, which would provide the largest plant cover in the wetland area.

5.2 Vegetation

The vegetation communities are dominated by Paperbarks and Sedges. This is reflected in the results in Appendix B and Table 3.

Plot 1 : Low open-forest of Melaleuca rhaphiophylla with occasional understorey of Melaleuca hamulosa, Melaleuca lateritia and Astartea aff. fascicularis. Other understorey species generally lacking. The plot was inundated by approximately 50 cm of water in December, 1986, although at the time of monitoring in Jaunary 1987, this was reduced to localized pockets of water.

This plot supported a mixed age stand of Paperbarks and occurred on a small rise near the main open area in the south-eastern corner of McCarley's Swamp (just north of the boundary fence between the two properties owned by Bentley and Higgins).

Plot 2: Low open-forest of Melaleuca rhaphiophylla, with a general lack of understorey species (except for the occasional plant growing from the forks of trees, above the water-line). The plot was inundated by approximately 80 to 100 cm of water in January 1987.

This plot supported a mature stand of Paperbarks and is located to the north of Plot 1 (on the property of Higgins).

TABLE 3 : SUMMARY OF SPECIES IN VEGETATION MONITORING PLOTS

Species	Plot No. 1	2	3	4	5	6	7	8
Melaleuca rhaphiophylla	++	++	++	++	-	++	++	+
Melaleuca hamulosa	+	-	++	-	+	+	-	++
Melaleuca lateritia	+	+	++	-	+	++	-	-
Astartea aff. fascicularis	+	+	-	+	-	-	+	-
Cassytha racemosa	+	-	+	-	-	+	+	-
Alternanthera nodiflora	-	+	-	+	+	+	-	+
Cotula coronopifolia	-	+	-	+	+	-	+	++
*Chenopodium ?macrospermum	-	+	-	-	+	+	-	+
*Lythrum hyssopifolia	-	+	-	-	++	-	-	-
*Solanum nigrum	-	+	-	-	-	-	+	-
Epilobium billardierianum ssp. cinereum	-	+	-	-	-	-	+	-
*Zantedeschia aethiopica	-	+	-	-	-	-	-	-
Eucalyptus rudis	-	-	-	-	+	-	-	-
*Phalaris aquatica	-	-	-	-	++	-	-	-
*Polypogon monospeliensis	-	-	-	-	++	-	-	-
*Lotus suaveolens	-	-	-	-	++	+	-	-
*Hordeum leporinum	-	-	-	-	++	-	-	-
Bolboschoenus caldwellii	-	-	-	-	+	-	-	-
*Rumex crispus	-	-	-	-	+	-	-	-
Juncus pallidus	-	-	-	-	+	-	-	-
*Trifolium repens	-	-	-	-	+	-	-	-
*Isolepis prolifer	-	-	-	-	+	-	-	-
Lobelia alata	-	-	-	-	+	-	-	-
*Sonchus oleraceus	-	-	-	-	+	-	-	-
*Centaurium ?erythraea	-	-	-	-	+	-	-	-
*Juncus articulatus	-	-	-	-	+	-	-	-
*Dittrichia graveolens	-	-	-	-	-	+	+	-

Note: ++ = Dominant Species
+ = Associated Species
- = Absent
* = Introduced Species

Plot 3: Variable plot ranging from an open-scrub to tall shrubland of mixed Paperbarks (Melaleuca hamulosa - Melaleuca rhaphiophylla - Melaleuca lateritia). The plot had been previously inundated, although in January 1987, there were only remnant pools of water left.

This plot supported a mixed stand of Paperbarks, with a larger proportion of M. hamulosa and M. lateritia, and occurred in the north-eastern section of the wetlands (on the property of Higgins).

Plot 4: Variable plot ranging from an open-woodland of Melaleuca rhaphiophylla, to open water devoid of vascular plant species to a fringing low open-woodland of Melaleuca rhaphiophylla. This plot extends from the open area of water in the south-eastern section of McCarley's Swamp to the embankment to the west of the area of open water (on the property of Bentley). The depth of water present in January 1987 was therefore variable (ranging from 1 metre in the lake to pools on the fringes of the lake).

Plot 5: Open-woodland of Eucalyptus rudis with an occasional shrub of Paperbarks and Wattles. This plot occurs on the embankment east of the open water area in the south-eastern section of McCarley's Swamp, and at the time of monitoring in January 1987 was relatively dry, although the area had previously been boggy (as evident from the presence of cow hoof imprints in the clay soils).

The ground is covered by a variety of Sedges and introduced plant species (particularly Grasses, Legumes and Daisies).

Plot 6: Low woodland of Melaleuca rhaphiophylla with occasional Melaleuca hamulosa and Melaleuca lateritia. This plot occurs in a lower lying area on the south-western section of McCarley's Swamp (on the property of Bentley). At the time of monitoring in January 1987, the plot was covered with pools of water up to a depth of 30 cm.

In December this area was substantially wetter, with water levels in the vicinity of 80 to 100cm. The presence of large numbers of small dead shrubs of Melaleuca lateritia suggests that in the past this plot has been drier for longer periods of time.

The mixture of Paperbarks on this plot is relatively young in comparison to the older stands in Plots 1, 2 and 7. This may relate to clearing or burning activities by previous owners, although it appears that the growth is greater than 20 years old (see comments on clearing and burning in the 1960's, Chapter 2).

Plot 7: Open-woodland of Melaleuca rhaphiophylla, with a general lack of understorey species (except for the occasional plant growing from the forks of trees, above the water-line, including Astartea aff. fascicularis). The plot was inundated by approximately 80 to 100 cm of water in January 1987.

This plot supported a mature stand of Paperbarks and is located in inundated areas (on the property of Higgins).

Plot 8: Open-scrub of Melaleuca hamulosa with herbaceous ground cover. This plot was covered by 5 to 10 cm of water at the time of the monitoring in January 1987. It occurs on the eastern side of the wetland, just north of the fence-line separating the two properties (on the property of Higgins). This plot supported a mature stand of Melaleuca hamulosa, which is even aged (possibly due to a previous fire some 20 to 25 years ago). Some of the plants both within and beyond the plot are degenerating from age (senescent), and management options should be addressed at maintaining a healthy plant community.

In summary, the main plant communities on the wetlands at McCarley's Swamp are:

- The stands of Melaleuca rhaphiophylla, which vary in height, age and density (Plots 2, 4 and 7). Plot 4 forms an extreme of this community as it includes large areas of open water. Plots 2 and 7 are similar, although they differ slightly in the associated species, both support mature stands of the Paperbark (Melaleuca rhaphiophylla) and were significantly inundated at the time of the first monitoring in January, 1987.

- The mixed stands of Paperbarks; Melaleuca rhaphiophylla and varying proportions of Melaleuca hamulosa and Melaleuca lateritia (e.g. Melaleuca hamulosa is dominant in Plot 3, while Melaleuca lateritia is dominant in Plots 3 and 6). The latter variation reflects the different degrees of recent inundation. For example, the large numbers of dead Melaleuca lateritia in Plot 6 suggests that this plot has been drier in the past and only able to support small shrubs (less than 2 metres) of this species.

- The open-scrub of Melaleuca hamulosa forms a fringing plant community that extends around the wetlands on the lower slopes (Plot 8 and in part Plot 3). In some ways Plot 3, forms an transitional community as it overlaps the almost pure stands of Melaleuca hamulosa and the more open mixed stands of Melaleuca rhaphiophylla. As this area on the edges of the wetlands is of interest, the plot was located to cover the variation (e.g. if the wetland becomes drier or wetter, then this area should respond through a possible shift in plant distributions and vigour). Associated species are summarized in Table 3. In addition, a range of species were recorded for this community and include the following:

  Pimelea ciliata, Baumea juncea, Chorizandra enodis, Viminaria juncea, Juncus holoschoenus and Isolepis cernua.

- The last of the plots (Plot 5), supports a open-woodland of Eucalyptus rudis with a variable understorey. The range of species recorded in this community can be extended beyond those summarized in Table 3, to include the following opportunistically collected species:

  Melaleuca rhaphiophylla, Juncus krausii, Viminaria juncea, Acacia saligna and the introduced species - Typha orientalis and Rumex pulcher.

- The remaining plant species were collected from the low open-woodland of Paperbarks and Banksia littoralis to the east of McCarley's Swamp, near the overflow channels from the adjacent mining operations. Associated species include:

  Acacia pulchella var. glaberrima, Viminaria juncea, Pimelea ciliata, Juncus kraussii, Juncus holoschoenus, Astartea aff. fascicularis, Goodenia filiformis, Acacia saligna, Baumea arthrophylla, Leptocarpus coangustatus and a range of introduced species including Eragrostis curvula, Juncus articulatus, Pseudognaphalium luteo-album and Paspalum dilatatum.

5.3 **Plot Data**

The vegetation data collected in the plots is summarized in the following text by plant species, condition of plant species and diameter size classes for each plant species. The locations of the tagged trees and shrubs in each plot are summarized in Appendix B (note Plots 6 and 8 are 10m x 10m, the other plots are 20m x 20m). The results for each species in each plot are summarized in Appendices C and D. The findings on the damage to the trees and shrubs by birds are summarized in Appendix E. In addition, the findings on bird nesting activities are summarized in Appendix F.

5.3.1 Condition of Stems

The condition of the plant species varied a great deal between the vegetation plots and through the wetlands. The results are summarized by individual tree or shrub in Appendix C and by plot in the following text and tables, see Tables 4A, 4B, 4C and 4D.

The results reflect the dominance of the three Paperbarks in the wetlands, Melaleuca rhaphiophylla, Melaleuca hamulosa and Melaleuca lateritia.

Eucalyptus rudis was restricted to the fringing woodlands near the area of open water in the south-eastern section of McCarley's Swamp. All stems were stressed, although the cause appeared to relate to insect damage.

Melaleuca hamulosa occurred on a range of sites, although its dominance in Plot 8 is obvious from a comparison of the number of shrubs (particularly as Plot 8 was on a reduced area of 10m x 10m). The high percentage of dead stems (46.6%) is of concern.

Melaleuca lateritia occurred in a range of plots, although it was most vigorous in the plots on the fringes of the wetter areas (namely Plots 3 and 5). The high number of dead shrubs and stems in Plot 6 (including the 210 dead stems below breast height) resulted in a low percentage of living stems (10.9%) for this species. This result appears to reflect the inability of this species to tolerate inundation. The appearance of healthier shrubs on the fringes of the wetlands supports this concept of inundation causing death. In addition, the dead shrubs in the wetlands support the concept that the lower lying areas have been drier in the past.

Melaleuca rhaphiophylla occurred in the majority of the plots (with the exception of Plots 5 and 8). In all cases the presence of significant numbers of dead and stressed stems requires attention. Although a total of 59.3% of the stems were living, many of these were stressed (47.3% were stressed or very stressed), see Table 4D.

TABLE 4A : Summary of Condition of Eucalyptus rudis Stems in the Monitoring Plots at McCarley's Swamp

Plot No.	No. Trees	No. Stems	Condition of Stems					
			H	Sl.St	St	V.St	Rd	D
1	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-
5	1	4	-	-	4	-	-	-
6	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-
Total	1	4	-	-	4	-	-	-
% of Total Stems		100			100			

TABLE 4B : Summary of Condition of Melaleuca hamulosa Stems in the Monitoring Plots at McCarley's Swamp

Plot No.	No. Shrubs	No. Stems	Condition of Stems					
			H	Sl.St	St	V.St	Rd	D
1	1	1	-	-	-	-	-	1
2	-	-	-	-	-	-	-	-
3	5	9	-	-	1	3	4	1
4	-	-	-	-	-	-	-	-
5	2	57	57	-	-	-	-	-
6	6	6	-	-	-	-	2	4
7	-	-	-	-	-	-	-	-
8	55	120	26	-	16	-	4	74
Total	69	193	83	-	17	3	10	80
% of Total Stems		100	43.0	-	8.8	1.6	5.2	41.4

TABLE 4C : Summary of Condition of Melaleuca lateritia Stems in the Monitoring Plots at McCarley's Swamp

Plot No.	No. Shrubs	No. Stems	Condition of Stems H	Sl.St	St	V.St	Rd	D	Below Breast Height
1	9	11	-	1	-	1	2	7	-
2	1	1	-	-	-	-	-	1	-
3	42	73	22	-	14	-	1	6	30
4	-	-	-	-	-	-	-	-	-
5	1	6	6	-	-	-	-	-	-
6	322	322	-	-	-	1	-	141	180
7	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-
Total	375	413	28	1	14	2	3	155	210
% of Total Stems		99.9	6.8	0.2	3.4	0.5	0.7	37.5	50.8

TABLE 4D : Summary of Condition of Melaleuca rhaphiophylla Stems in the Monitoring Plots at McCarley's Swamp

Plot No.	No. Trees	No. Stems	Condition of Stems H	Sl.St	St	V.St	Rd	D
1	21	60	20	6	17	7	2	8
2	32	188	-	1	24	46	36	81
3	59	176	28	34	67	12	8	27
4	15	175	10	11	65	44	12	33
5	-	-	-	-	-	-	-	-
6	37	113	3	-	26	22	36	26
7	45	216	-	-	45	64	18	89
8	1	1	1	-	-	-	-	-
Total	210	929	62	52	244	195	112	264
% of Total Stems		100	6.7	5.6	26.3	21	12	28.4

The cause of this stress appears to be variable, but may relate to a variety of factors (age, period of inundation, bird damage - to be addressed later in this chapter). Although it is still too early to provide distinct causes of the deterioration in condition, it is obvious from the aerial photos that the degree of stress has increased since 1983 and that it is concentrated in the wetter areas of McCarley's Swamp. This may relate to the increased periods of inundation in the lower lying areas, or possibly an indirect aspect like the greater utilization of these wetter areas by the bird populations for nesting (with the resulting direct and indirect effects).

To assess the effects of inundation the depth of water at the time of monitoring in January 1987 is compared with the percantage of healthy, stressed and dead stems in the respective plots, Table 5.

TABLE 5: Comparison of Water Levels in January 1987 with Percentage of Varying Stem Conditions for Melaleuca rhaphiophylla

Plot No.	Depth of Water January 1987 (cm.)	Percentage of Stems		
		Healthy	Stressed	Dead
5	-	-	-	-
8	5 - 10	100	-	-
1	10 - 20	33	50	17
3	10 - 20	16	64	20
6	10 - 30	3	42	55
4	10 -100	6	69	25
2	80 -100	0	38	62
7	80 -100	0	50	50

The depth of inundation appears to have affected the condition of the Melaleuca rhaphiophylla. The higher percenatge of dead stems in Plots 2, 6 and 7, which were all subjected to deeper water reflects this likely correlation. As these plots are lower lying, the findings may also reflect the length of inundation (which would be higher in these same areas). On the other hand, as mentioned earlier

the plots on the fringes of the main water body may illustrate the most change (e.g. Plot 3); particularly if these areas have not been subject to inundation for substantial periods before. The percentage of stressed stems in Plot 3 may indicate a deterioration in the fringe communities. Further monitoring may refine the causes of stress and deaths in these trees.

Another aspect that may explain some of the deterioration in plant communities is the changes in water quality. The results from the Government Chemical Laboratories provide a basis for future assessment of water quality, and the effects on the native vegetation.

Further monitoring should clarify some of these relationships.

5.3.2 Diameter Size Classes

The age of the trees and shrubs varied a great deal between the vegetation plots and through the wetlands. The results are summarized by individual tree or shrub in Appendix D and by plot in the following text and tables, see Tables 6A, 6B, 6C and 6D.

Eucalyptus rudis - all stems are relatively large and stressed. As mentioned earlier the cause appears to relate to insect damage.

Melaleuca hamulosa - most smaller stems are relatively healthy, and stress appears to be restricted mainly to the larger stems.

Melaleuca lateritia - most stems are relatively small, largely as a result of the small size of most shrubs.

Melaleuca rhaphiophylla - the healthy stems are restricted to the smaller stems (less than 15 cm), while the stressed stems occur in the all size classes (including a significant proportion in the diameter classes less than 15 cm).

TABLE 6A : Summary of Stem Condition of Eucalyptus rudis in Diameter Size Classes

Diameter at Breast Height Size Classes (cm)	Condition of Living Stems			
	H	Sl.St	St	V.St
0- 5	-	-	-	-
6-10	-	-	-	-
11-15	-	-	1	-
16-20	-	-	1	-
21-25	-	-	2	-
Total	-	-	4	-

TABLE 6B : Summary of Stem Condition of Melaleuca hamulosa in Diameter Size Classes

Diameter at Breast Height Size Classes (cm)	Condition of Living Stems			
	H	Sl.St	St	V.St
<1	-	-	-	-
1- 2	57	-	1	-
3- 4	5	-	-	-
5- 6	10	-	3	1
7- 8	4	-	4	1
9-10	5	-	5	1
11-12	2	-	1	-
13-14	-	-	3	-
Total	83	-	17	3

TABLE 6C : Summary of Stem Condition of Melaleuca lateritia in Diameter Size Classes

Diameter at Breast Height Size Classes (cm)	Condition of Living Stems			
	H	Sl.St	St	V.St
< 1	12	-	8	-
1 - 2	14	1	5	1
3 - 4	2	-	1	1
Total	28	1	14	2

TABLE 6D : Summary of Stem Condition of Melaleuca rhaphiophylla in Diameter Size Classes

Diameter at Breast Height Size Classes (cm)	Condition of Living Stems			
	H	Sl.St	St	V.St
0- 5	42	14	79	23
6-10	14	3	54	69
11-15	6	16	32	35
16-20	-	10	43	29
21-25	-	4	23	22
26-30	-	4	6	7
31-35	-	-	3	7
36-40	-	1	1	1
41-45	-	-	1	1
46-50	-	-	2	1
Total	62	52	244	195

The results in part reflect the differences in the shrubs and trees, however there does appear to be a slight trend in Melaleuca hamulosa and Melaleuca rhaphiophylla, where stress is more evident in the larger (and older) stems.

5.3.3 Review of Bird Damage to Stems

The direct effect of the birds resting and nesting on the upper stems and branches is evident from results summarized in Appendix E.

Findings indicate that the direct effects of the birds are most obvious on the upper stems, where apparent wing damage has resulted in the loss of leaves (defoliation) and broken upper branches and twigs. The degree of bird activity in the south-western section of McCarley's Swamp is evident from the concentration of damaged trees in Plot 6.

5.4 **Nesting Activity**

The nesting activities are summarized in Appendix F. All findings were checked in the field by Mr P. Lambert (Department of Conservation and Land Management).

There was a higher concentration of nests in the stands of Paperbarks on the wetlands (see results for Plots 1, 2, 3, 4, 6 and 7. The Ibis was present in significant numbers, with 39 low nests, 71 high nests and 40 old, fallen or incomplete nests (largely from previous nesting periods).

Other significant findings included the degree of nesting by the Egrets, Spoonbills and Herons, which was largely in the northern section of McCarley's Swamp.

The importance of healthy vegetation to the bird species may be clarified as monitoring of the Swamp continues.

6.0 DISCUSSION

The vegetation monitoring programme was established in January 1987. The intensity of the plant collecting and sampling was restricted by the season (less annual species) and time available for field studies. Therefore it may be necessary to expand the study as more resources become available, as follows:

- Expand the plant collections (including non-vascular plant species).
- Map the plant communities for the study area.
- Increase the number of vegetation monitoring plots.
- Include some "Control" monitoring plots, located beyond the local influence of mining operations.

Observations from this first monitoring period indicate that McCarley's Swamp is dominated by a few plant species and plant communities, although the plant communities differ substantially in their age, vigour, structure and floristics. The sampling approach adopted in plot selection attempted to cover this variation.

Possible causes for changes in the plant communities present in McCarley's Swamp include the following:

- Increased water levels (may explain the stress and deaths in Melaleuca lateritia and Melaleuca rhaphiophylla).
- Increased periods of inundation (may explain the stress and deaths in Melaleuca lateritia and Melaleuca rhaphiophylla).
- Altered water quality levels (increased sampling at regular intervals may clarify these relationships, particularly if nearby "Control" areas are also sampled for water quality).
- Bird damage (defoliation and broken upper branches).
- Insect damage (largely on the Flooded Gums - Eucalyptus rudis).
- Lack of factors which may be a pre-requisite for seasonal growth and sustained healthy growth.

On the current findings it is difficult to ascertain the relative significance of these possible causes, although some relationships have been discussed in the previous sections of the report. If monitoring is maintained on a regular basis, it should assist in assessing the management option adopted to return McCarley's Swamp to a seasonally inundated wetland.

Recommendations for monitoring include the following:

- Regular inspections by Wildlife Officers to assess bird activities and the condition of the plant communities. These inspections should be carried out at monthly intervals to follow seasonal water levels, to collect water samples from both the centre of the Swamp and near the inflow channels and to monitor bird activities.

- Yearly monitoring of the vegetation plots should be undertaken by the Department of Conservation and Land Management. If possible, the option of expanding the programme into nearby "Control" wetlands should be reviewed and incorporated into the programme.

7.0 REFERENCES

Blackall, W.E. and Grieve, B.J. (1974). "How to Know Western Australian Wildflowers. Parts I, II, III". University of Western Australia Press, Perth.

Blackall, W.E. and Grieve, B.J. (1980). "How to Know Western Australian Wildflowers. Part IIIA," University of Western Australia Press, Perth.

Blackall, W.E. and Grieve, B.J. (1981). "How to Know Western Australian Wildflowers. Part IIIB." University of Western Australia Press, Perth.

Blackall, W.E. and Grieve, B.J. (1982) "How to Know Western Australian Wildflowers. Part IV." University of Western Australia Press, Perth.

Green J.W. (1985). "Census of the Vascular Plants of Western Australia". 2nd Edition, Western Australian Herbarium Department of Agriculture, Perth.

Groundwater Resource Consultants (1986). Preliminary Report - "Control of Water Level in Ludlow Wetlands Capel - Western Australia". Unpublished report prepared for Associated Minerals Consolidated Limited, Nedlands, Western Australia.

Government Chemical Laboratories (1986). Letter to Executive Director of the Department of Conservation and Land Management on results of testing of Water Samples from Busselton.

8.0 ACKNOWLEDGEMENTS

The author wishes to thank the following organizations and individuals:

Department of Conservation and Land Management
Dr F. Batini
Mr P. Lambert

Property Owners
Miss E. Higgins
Mr N. Bentley

Groundwater Resource Consultants
Mr P. Whincup

In Field Studies:
Miss D. K. Maher
Mr P. Lambert
Miss C. Dymond

In Report Preparation:
Miss D. K. Maher
Miss C.D.M. Keating
Mrs J. Barrett

APPENDIX A : FLORA LIST - McCARLEY'S SWAMP

APPENDIX A : FLORA LIST - McCARLEY'S SWAMP

FAMILY		GENERA	SPECIES
TYPHACEAE	*	Typha	orientalis
POACEAE	*	Briza	maxima
	*	Briza	minor
	*	Cynodon	dactylon
	*	Eragrostis	curvula
	*	Hordeum	leporinum
	*	Paspalum	dilatatum
	*	Phalaris	aquatica
	*	Polypogon	monospeliensis
CYPERACEAE		Baumea	arthrophylla
		Baumea	juncea
		Bolboschoenus	caldwellii
		Chorizandra	enodis
		Cyperus	polystachyos
		Gahnia	trifida
		Isolepis	cernua
	*	Isolepis	prolifer
ARACEAE	*	Zantedeschia	aethiopica
RESTIONACEAE		Leptocarpus	coangustatus
JUNCACEAE	*	Juncus	articulatus
		Juncus	holoschoenus
		Juncus	kraussii
		Juncus	pallidus
PROTEACEAE		Banksia	littoralis
		Hakea	varia
POLYGONACEAE	*	Rumex	crispus
	*	Rumex	pulcher
CHENOPODIACEAE	*	Chenopodium	? macrospermum
AMARANTHACEAE		Alternanthera	nodiflora

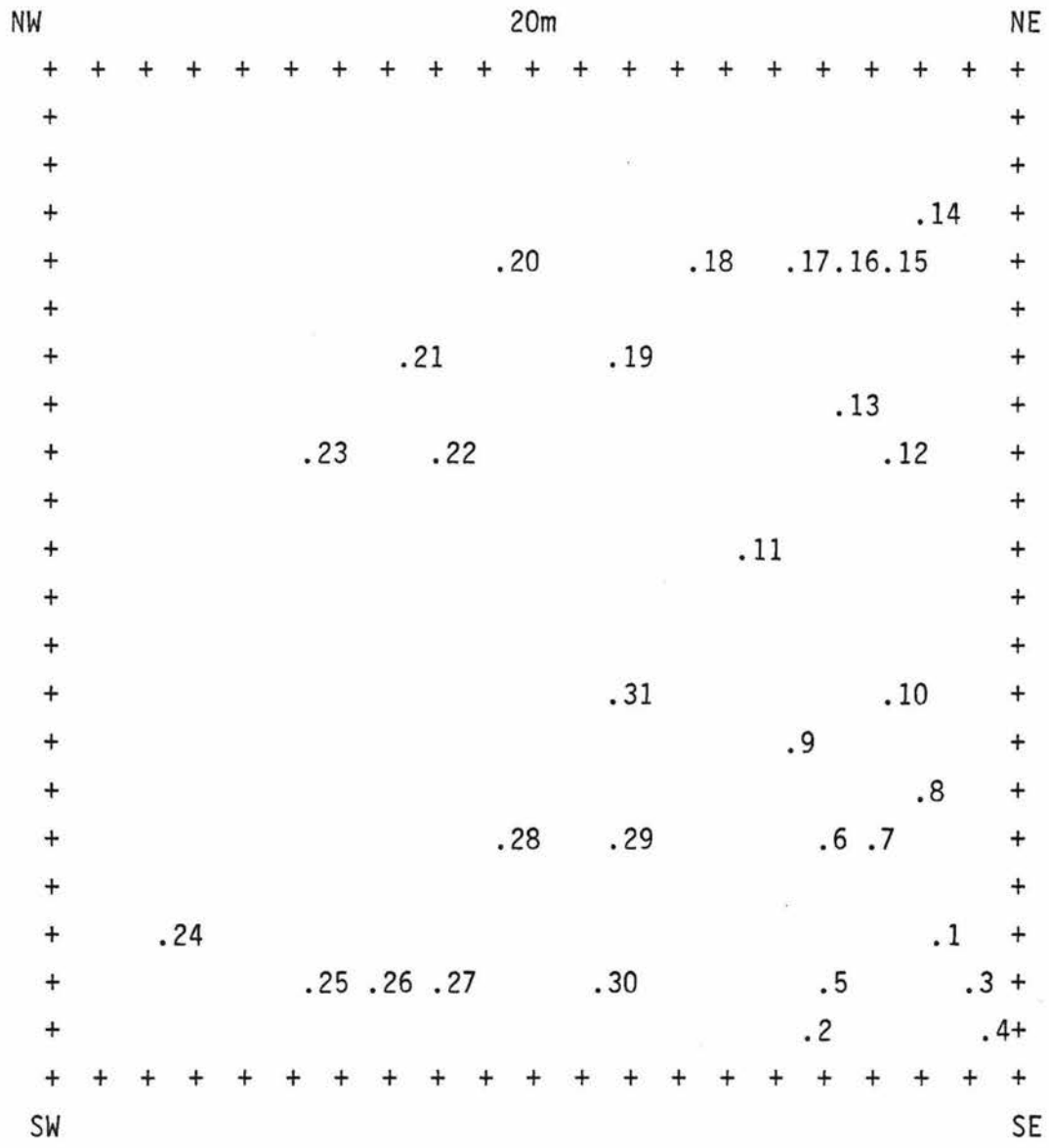
APPENDIX A : FLORA LIST - McCARLEY'S SWAMP (Cont.)

FAMILY	GENERA	SPECIES
LAURACEAE	Cassytha	racemosa
MIMOSACEAE	Acacia	pulchella var. galberrima
	Acacia	saligna
PAPILIONACEAE	* Lotus	suaveolens
	* Trifolium	repens
	Viminaria	juncea
THYMELIACEAE	Pimelea	ciliata
LYTHRACEAE	* Lythrum	hyssopifolia
MYRTACEAE	Astartea	aff. fascicularis
	Eucalyptus	rudis
	Melaleuca	hamulosa
	Melaleuca	lateritia
	Melaleuca	rhaphiophylla
	Melaleuca	teretifolia
ONAGRACEAE	Epilobium	billardierianum ssp. cinereum
GENTIANACEAE	* Centaurium	? erythraea
SOLANACEAE	* Solanum	nigrum
LOBELIACEAE	Lobelia	alata
GOODENIACEAE	Goodenia	filiformis
ASTERACEAE	Cotula	coronopifolia
	* Dittrichia	graveolens
	* Hypochoeris	radicata
	* Pseudognaphalium	luteo-album
	* Sonchus	oleraceus

APPENDIX B : LOCATION OF TAGGED PLANTS IN VEGETATION PLOTS

APPENDIX B: LOCATION OF TAGGED PLANTS IN VEGETATION PLOTS

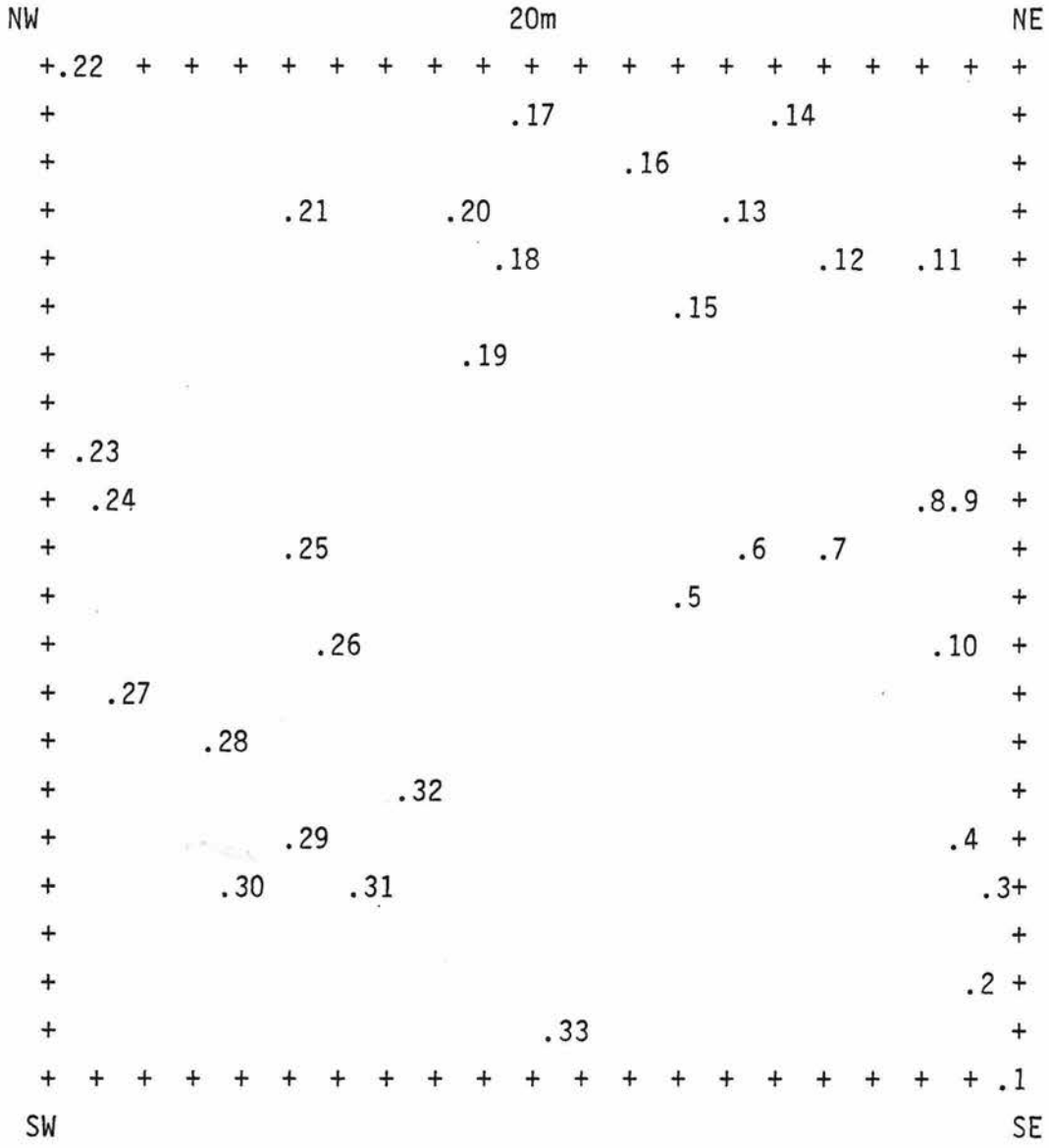
Plot No: 1 (Location of plants is approximate).



Note: Plot 1 is located some 18m north of central fenceline dividing two properties; and some 60 metres west of eastern edge of open water.

APPENDIX B: LOCATION OF TAGGED PLANTS IN VEGETATION PLOTS

Plot No: 2 (Location of plants is approximate).



Note: Plot 2 is located some 100m north of Plot 1.

APPENDIX B: LOCATION OF TAGGED PLANTS IN VEGETATION PLOTS

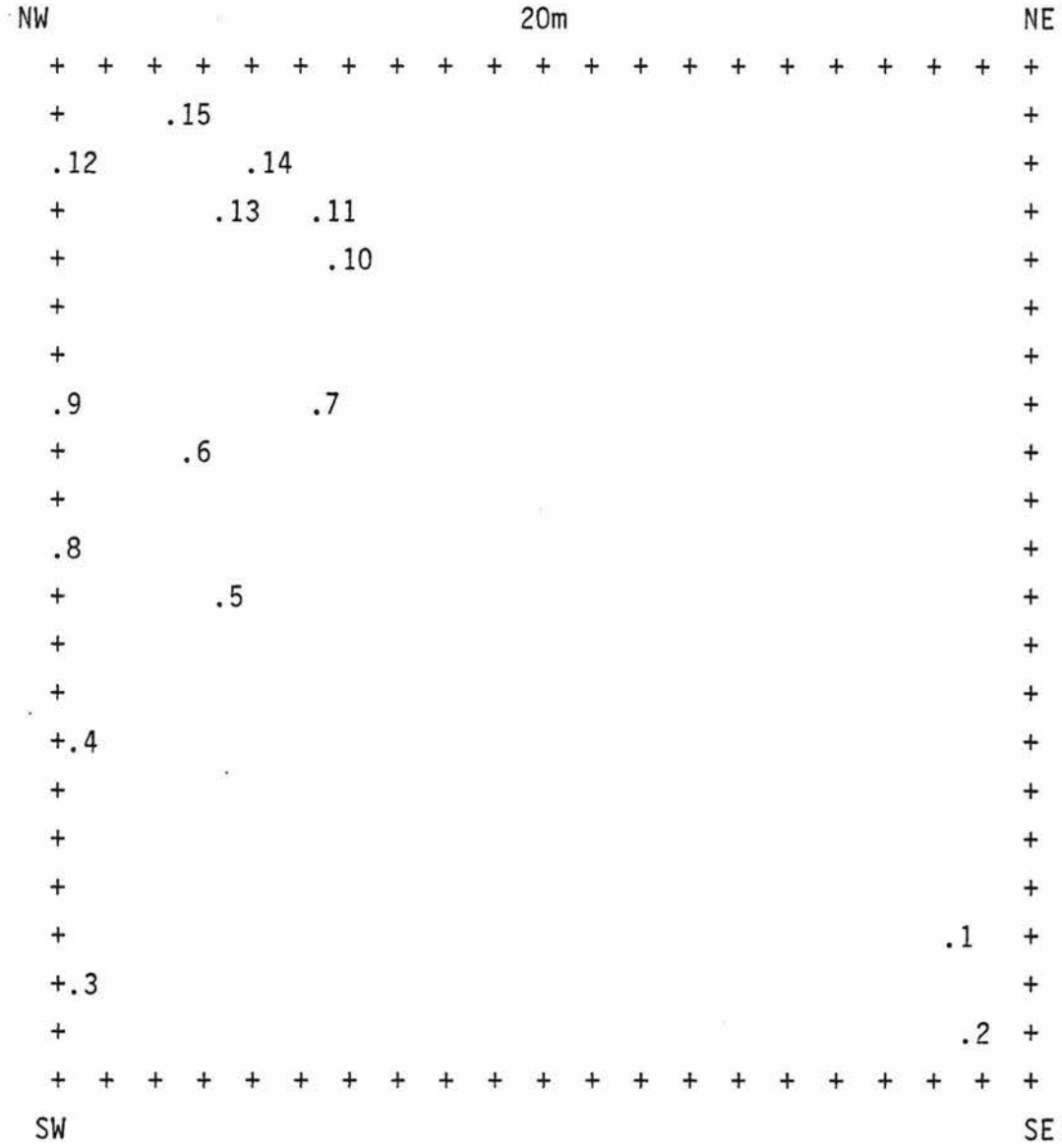
Plot No: 3 (Location of plants is approximate).

```
NW                                     20m                                    NE
  +  +  +  +  +  +  +  +  +  +  +  +  +  +  +  +  +  +  +  +  +
  +                                    .36       23:24.22.16                  +
  +                                                .18.17                     +
  +                         .35                      .20 .21                  +
  +                      .33   .34       .25           .19                    +
  +   .38                        .32                       .15                +
  +.37                     .30 .31                          .14               +
  +     .39             .29 .27          .26                      .13   11 +
  +                                            68. .67  .65  .12  .10 +
  +                                                  .66             .9  +
  +                                   .28                      .7       .8 +
  +       .40                                    .69 .70                      +
  +                                                  .71  .72  .6   +
  +         .41           .42           .64       .75 74..73                  +
  +                                      .63.62                    .77 .5   +
  +                    .43           61..60   98..97   .76            .4
  +                       .44               102.101..100 79..78 .85 .3
  +                  .45                 59.103..104.99   .80.81.83  +
  +                                         .108               .86.82.84+
  +       .47  .48-53.54        .56.58.57.107.105 88.89..87.    .2
  + .46                  .55                      .106  95..96 90..91 +
  +  +  +  +  +  +  +  +  +  +  +  + .109+  + .110. .93 + .92.1
 SW                                                         94             SE
```

Note: Plot 3 is located some 100m north of Plot 2 and then some 30m east, on edge of wetland.

APPENDIX B: LOCATION OF TAGGED PLANTS IN VEGETATION PLOTS

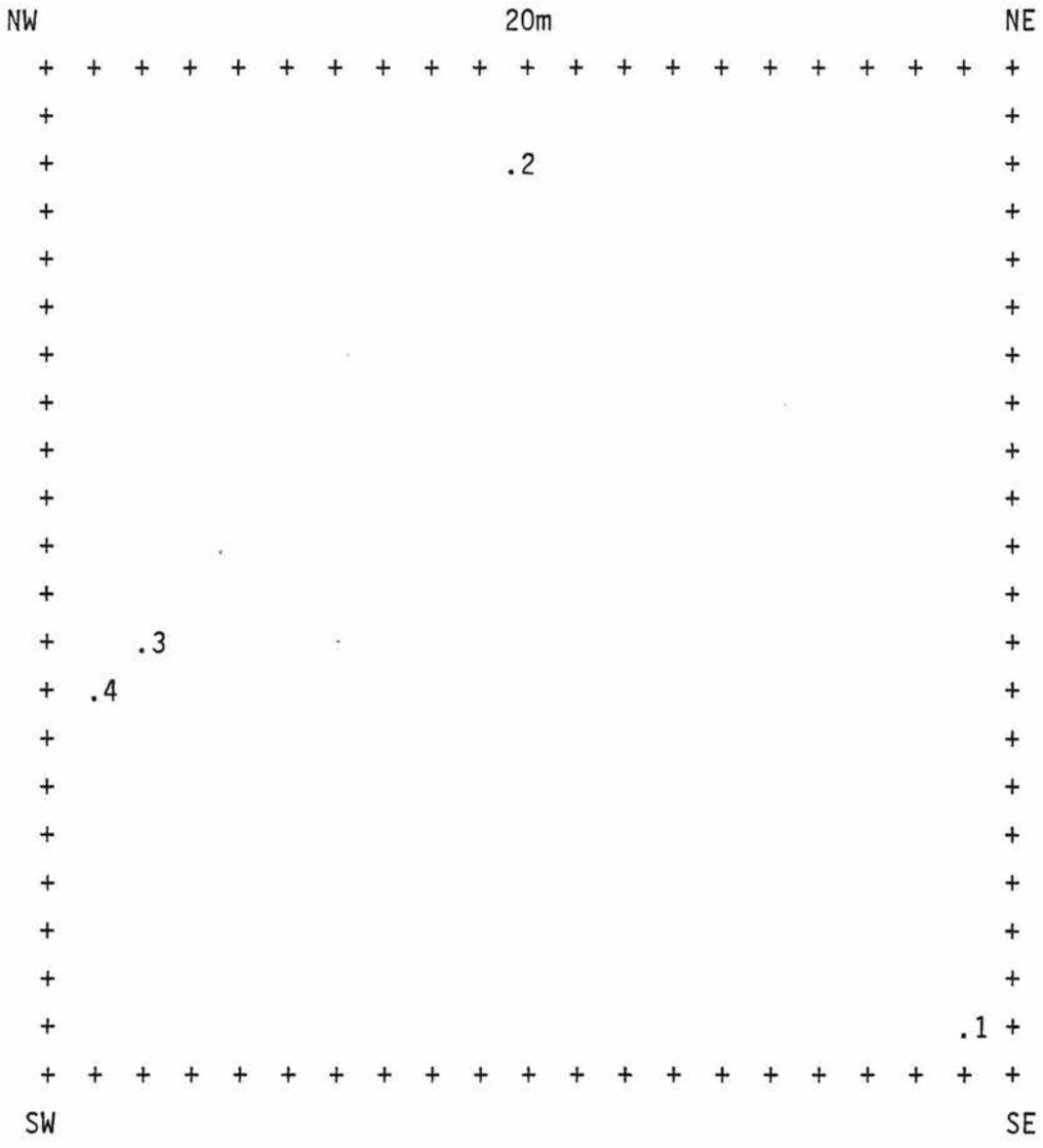
Plot No: 4 (Location of plants is approximate).



Note: Plot 4 is located in open water in south-eastern section of McCarley's Swamp, note trees 1 and 2 in open water at the time of monitoring in January 1987.

APPENDIX B: LOCATION OF TAGGED PLANTS IN VEGETATION PLOTS

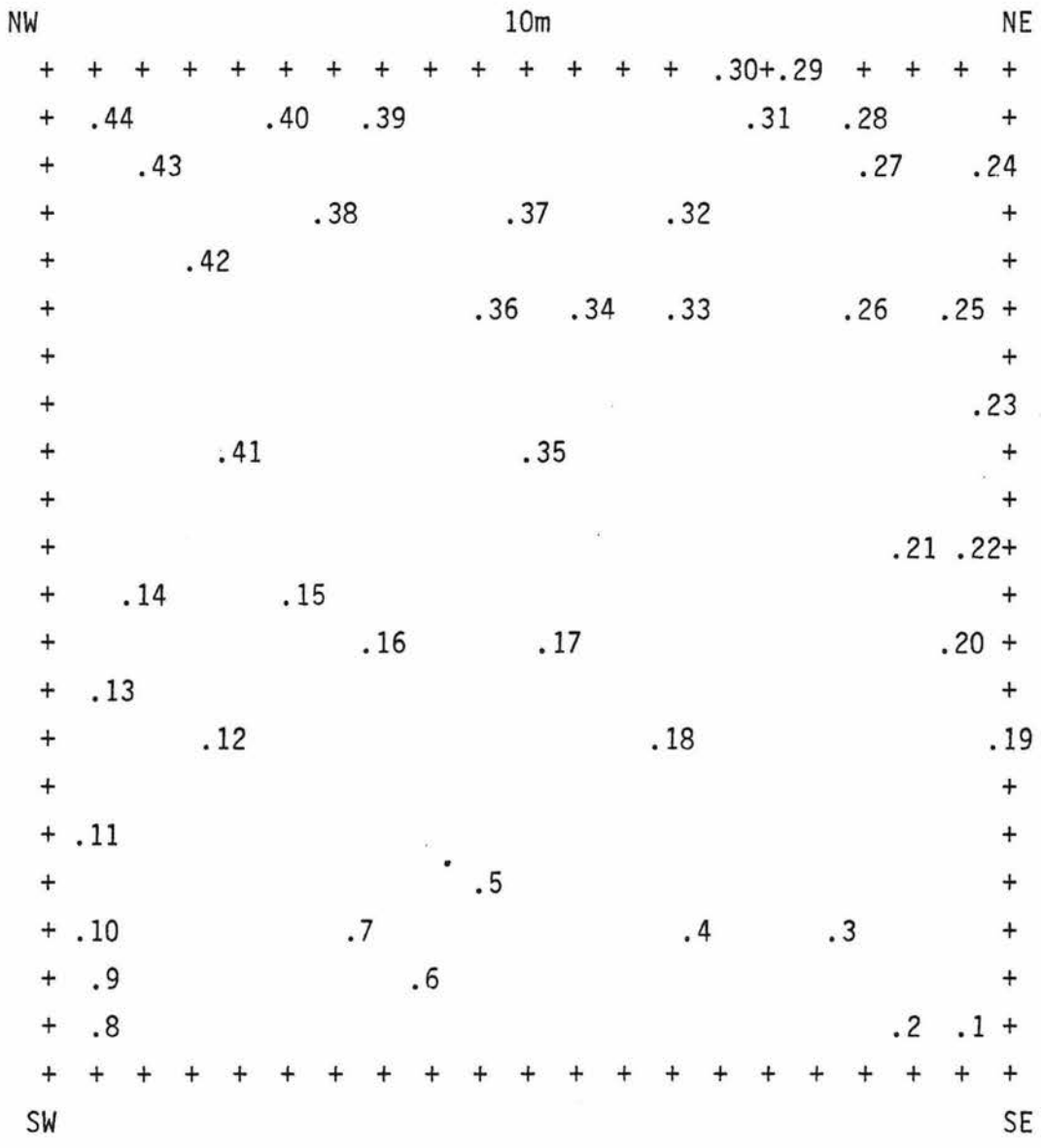
Plot No: 5 (Location of plants is approximate).



Note: Plot 5 is located on the eastern edge of the open water in the south-eastern section of McCarley's Swamp.

APPENDIX B: LOCATION OF TAGGED PLANTS IN VEGETATION PLOTS

Plot No: 6 (Location of plants is approximate).



Note: Plot 6 is located in the south-western section of McCarley's Swamp. The plot is also subdivided into sections (see coding) for data presented in Appendix C.

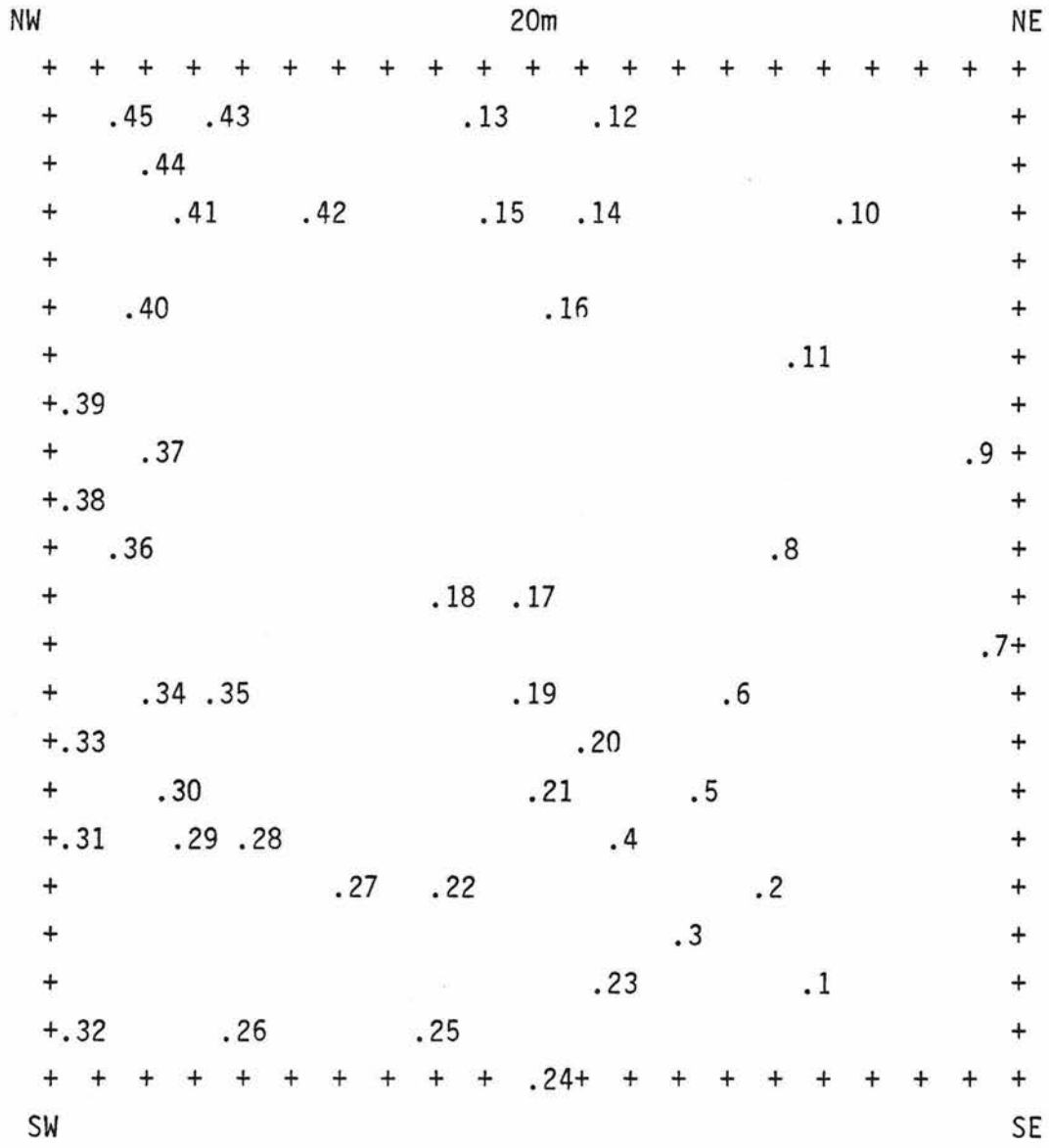
(NW) (NE)

5E 4E 3E 2E 1E
5D 4D 3D 2D 1D
5C 4C 3C 2C 1C
5B 4B 3B 2B 1B
5A 4A 3A 2A 1A

(SW) (SE)

APPENDIX B: LOCATION OF TAGGED PLANTS IN VEGETATION PLOTS

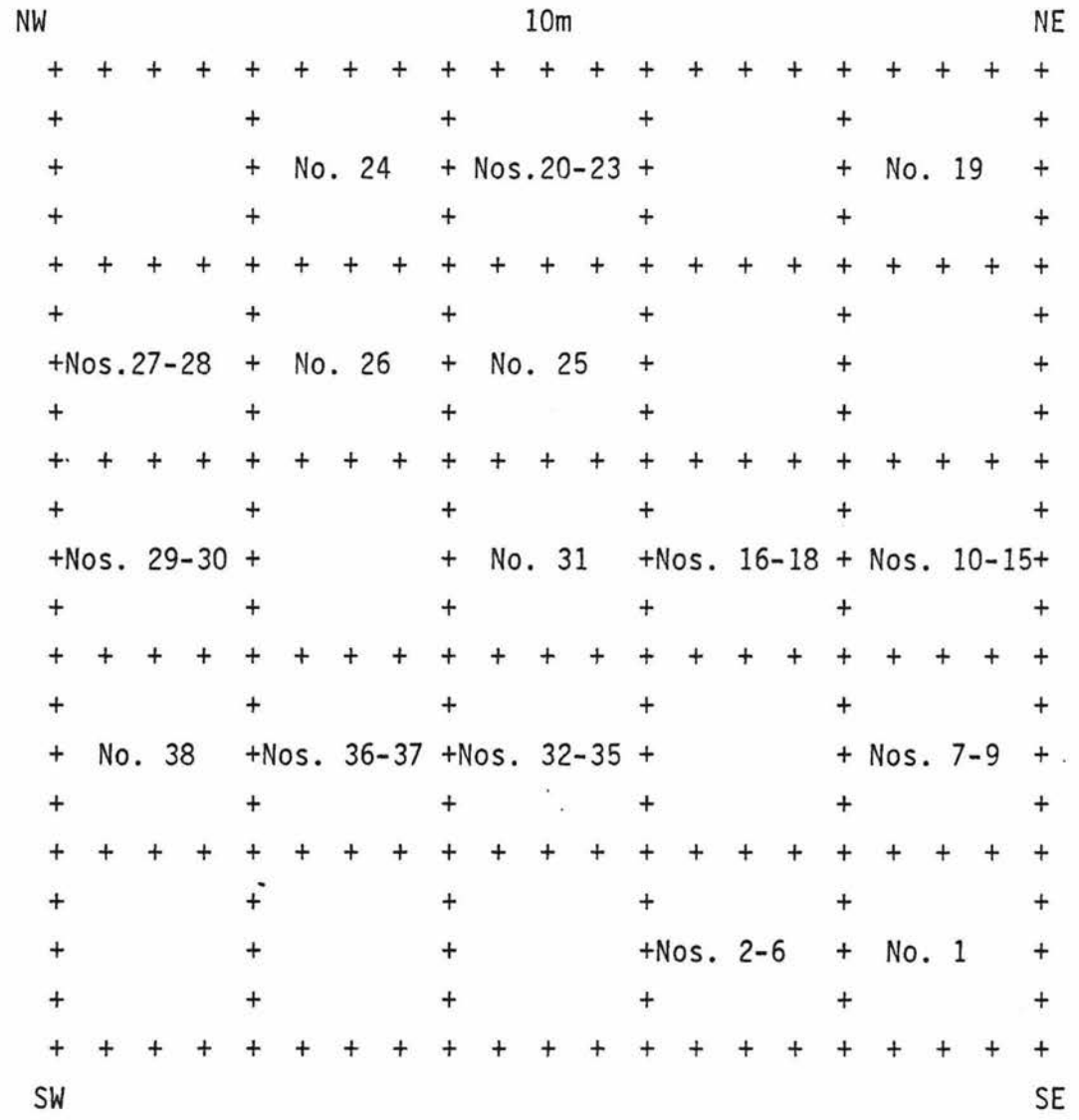
Plot No: 7 (Location of plants is approximate).



Note: Plot 7 is located north of the boundary fenceline in the north-western section of McCarley's Swamp.

APPENDIX B: LOCATION OF TAGGED PLANTS IN VEGETATION PLOTS

Plot No: 8 (Location of plants is approximate).



Note: Plot 8 is located on the eastern edge of the wetland in the north-eastern section of McCarley's Swamp, just north of the boundary fenceline. The plot is also subdivided into sections (see coding) for data presented in Appendix C.

(NW) (NE)

5E 4E 3E 2E 1E
5D 4D 3D 2D 1D
5C 4C 3C 2C 1C
5B 4B 3B 2B 1B
5A 4A 3A 2A 1A

(SW) (SE)

APPENDIX C : SUMMARY OF PLOT DATA

H	=	Healthy
Sl.St	=	Slightly Stressed
St	=	Stressed
V.St	=	Very Stressed
Rd	=	Recently Dead
D	=	Dead
Fd	=	Fallen Dead
Adv	=	Adventitious Shoots
E	-	Epicormic Shoots
<BH	=	Below Breast Height

APPENDIX C1 : SUMMARY OF PLOT DATA - EUCALYPTUS RUDIS

PLOT NO. 5.

Tree No.	No.of Stems	Condition of Stems								Regrowth Status	
		H	Sl.St	St	V.St	Rd	D	Fd	<BH	Adv	E
5/1	4	-	-	4	-	-	-	-	-	-	-
Total	4	-	-	4	-	-	-	-	-	-	-

APPENDIX C2 : SUMMARY OF PLOT DATA - MELALEUCA HAMULOSA

PLOT NO. 1.

Shrub No.	No.of Stems	Condition of Stems								Regrowth Status	
		H	Sl.St	St	V.St	Rd	D	Fd	<BH	Adv	E
1/18	1	-	-	-	-	-	1	-	-	-	-
Total	1	-	-	-	-	-	1	-	-	-	-

PLOT NO. 3.

Shrub No.	No.of Stems	Condition of Stems								Regrowth Status	
		H	Sl.St	St	V.St	Rd	D	Fd	<BH	Adv	E
3/ 1	1	-	-	-	-	-	1	-	-	-	-
3/ 8	3	-	-	-	3	-	-	-	-	-	-
3/ 9	3	-	-	-	-	3	-	-	-	-	-
3/10	1	-	-	-	-	1	-	-	-	-	-
3/11	1	-	-	1	-	-	-	-	-	-	-
Total	9	-	-	1	3	4	1	-	-	-	-

APPENDIX C2 : SUMMARY OF PLOT DATA - MELALEUCA HAMULOSA (Continued)

PLOT NO. 5.

Shrub No.	No.of Stems	Condition of Stems								Regrowth Status	
		H	Sl.St	St	V.St	Rd	D	Fd	<BH	Adv	E
5/ 2	32	32	-	-	-	-	-	-	-	-	-
5/ 3	25	25	-	-	-	-	-	-	-	-	-
Total	57	57	-	-	-	-	-	-	-	-	-

PLOT NO. 6.

Shrub No.	No.of Stems	Condition of Stems								Regrowth Status	
		H	Sl.St	St	V.St	Rd	D	Fd	<BH	Adv	E
6/10	1	-	-	-	-	-	1	-	-	-	-
6/29	1	-	-	-	-	-	1	-	-	-	-
6/33	1	-	-	-	-	-	1	-	-	-	-
6/35	1	-	-	-	-	1	-	-	-	-	-
6/36	1	-	-	-	-	1	-	-	-	-	-
6/42	1	-	-	-	-	-	1	-	-	-	-
Total	6	-	-	-	-	2	4	-	-	-	-

APPENDIX C2 : SUMMARY OF PLOT DATA - MELALEUCA HAMULOSA (Continued)

PLOT NO. 8.

Shrub No.	No.of Stems	Condition of Stems								Regrowth Status	
		H	Sl.St	St	V.St	Rd	D	Fd	<BH	Adv	E
Quadrat 8A1											
8/ 1	2	2	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	4	1	-	-	-	-
Quadrat 8A2											
8/ 2	1	1	-	-	-	-	-	-	-	-	-
8/ 3	1	1	-	-	-	-	-	-	-	-	-
8/ 4	1	1	-	-	-	-	-	-	-	-	-
8/ 5	1	1	-	-	-	-	-	-	-	-	-
8/ 6	1	1	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	4	-	-	-	-
Quadrat 8B1											
8/ 7	1	1	-	-	-	-	-	-	-	-	-
8/ 8	1	1	-	-	-	-	-	-	-	-	-
8/ 9	1	1	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	5	-	-	-	-
Quadrat 8B2											
	5	-	-	-	-	-	5	-	-	-	-
Quadrat 8B3											
8/32	2	-	-	2	-	-	-	-	-	-	-
8/33	1	1	-	-	-	-	-	-	-	-	-
8/34	1	1	-	-	-	-	-	-	-	-	-
8/35	1	1	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	4	-	-	-
Quadrat 8B4											
8/36	1	-	-	1	-	-	-	-	-	-	-
8/37	2	-	-	1	-	-	-	1	-	-	-
Quadrat 8B5											
8/38	1	-	-	1	-	-	-	-	-	-	-
Quadrat 8C1											
8/10	1	1	-	-	-	-	-	-	-	-	-
8/11	1	1	-	-	-	-	-	-	-	-	-
8/12	1	1	-	-	-	-	-	-	-	-	-
8/13	1	1	-	-	-	-	-	-	-	-	-
8/14	1	1	-	-	-	-	-	-	-	-	-
8/15	1	1	-	-	-	-	-	-	-	-	-
	1	-	-	-	-	-	1	-	-	-	-
Quadrat 8C2											
8/16	1	1	-	-	-	-	-	-	-	-	-
8/17	1	1	-	-	-	-	-	-	-	-	-
8/18	1	1	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	2	-	-	-	-

APPENDIX C2 : SUMMARY OF PLOT DATA - MELALEUCA HAMULOSA (Continued)

PLOT NO. 8. (Continued)

Shrub No.	No.of Stems	Condition of Stems								Regrowth Status	
		H	Sl.St	St	V.St	Rd	D	Fd	<BH	Adv	E
Quadrat 8C3											
8/31	2	2	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	3	2	-	-	-
Quadrat 8C4											
	10	-	-	-	-	-	10	-	-	-	-
Quadrat 8C5											
8/29	1	1	-	-	-	-	-	-	-	-	-
8/36	1	-	-	1	-	-	-	-	-	-	-
	1	-	-	-	-	-	1	-	-	-	-
Quadrat 8D1											
	2	-	-	-	-	-	2	-	-	-	-
Quadrat 8D3											
8/25	1	-	-	1	-	-	-	-	-	-	-
	1	-	-	-	-	-	1	-	-	-	-
Quadrat 8D4											
8/26	1	-	-	1	-	-	-	-	-	-	-
	7	-	-	-	-	-	7	-	-	-	-
Quadrat 8D5											
8/27	1	-	-	1	-	-	-	-	-	-	-
8/28	1	-	-	1	-	-	-	-	-	-	-
	12	-	-	-	-	-	12	-	-	-	-
Quadrat 8E1											
8/19	1	-	-	1	-	-	-	-	-	-	-
	1	-	-	-	-	-	1	-	-	-	-
Quadrat 8E3											
8/20	1	-	-	1	-	-	-	-	-	-	-
8/21	1	-	-	1	-	-	-	-	-	-	-
8/22	3	-	-	3	-	-	-	-	-	-	-
	7	-	-	-	-	-	7	-	-	-	-
Quadrat 8E4											
8/24	1	1	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	3	-	-	-	-
Quadrat 8E5											
	2	-	-	-	-	-	2	-	-	-	-
	120	26	-	16	-	4	67	7	-	-	-

APPENDIX C3 : SUMMARY OF PLOT DATA - MELALEUCA LATERITIA

PLOT NO. 1.

Shrub No.	No.of Stems	Condition of Stems								Regrowth Status	
		H	Sl.St	St	V.St	Rd	D	Fd	<BH	Adv	E
1/ 3	1	-	-	-	-	-	1	-	-	-	-
1/ 4	1	-	-	-	-	-	1	-	-	-	-
1/ 5	3	-	-	-	-	-	3	-	-	-	-
1/ 6	1	-	-	-	-	-	1	-	-	-	-
1/ 7	1	-	-	-	-	1	-	-	-	-	-
1/ 9	1	-	-	-	1	-	-	-	-	-	1
1/24	1	-	-	-	-	-	1	-	-	-	-
1/25	1	-	1	-	-	-	-	-	-	-	-
1/31	1	-	-	-	-	1	-	-	-	-	-
Total	11	-	1	-	1	2	7	-	-	-	1

PLOT NO. 2.

Shrub No.	No.of Stems	Condition of Stems								Regrowth Status	
		H	Sl.St	St	V.St	Rd	D	Fd	<BH	Adv	E
2/25	1	-	-	-	-	-	1	-	-	-	-
Total	1	-	-	-	-	-	1	-	-	-	-

APPENDIX C3 : SUMMARY OF PLOT DATA - MELALEUCA LATERITIA (Continued)

PLOT NO. 3.

Shrub No.	No.of Stems	Condition of Stems								Regrowth Status	
		H	Sl.St	St	V.St	Rd	D	Fd	<BH	Adv	E
3/16	3	3	-	-	-	-	-	-	-	-	-
3/17	2	2	-	-	-	-	-	-	-	-	-
3/18	7	6	-	-	-	-	1	-	-	-	-
3/19	3	3	-	-	-	-	-	-	-	-	-
3/20	3	3	-	-	-	-	-	-	-	-	-
3/21	1	1	-	-	-	-	-	-	-	-	-
3/22	1	1	-	-	-	-	-	-	-	-	-
3/24	2	-	-	2	-	-	-	-	-	-	-
3/28	3	-	-	-	-	-	-	-	3	-	-
3/29	5	-	-	4	-	-	-	-	1	-	-
3/30	3	-	-	2	-	1	-	-	-	-	-
3/31	1	-	-	-	-	-	-	-	1	-	-
3/32	1	-	-	-	-	-	-	-	1	-	-
3/33	2	1	-	-	-	-	1	-	-	-	-
3/34	1	1	-	-	-	-	-	-	-	-	-
3/35	1	-	-	-	-	-	-	-	1	-	-
3/37	1	-	-	-	-	-	-	-	1	-	-
3/40	1	-	-	-	-	-	-	-	1	-	-
3/44	1	-	-	-	-	-	-	-	1	-	-
3/45	1	-	-	-	-	-	-	-	1	-	-
3/47	1	-	-	-	-	-	1	-	-	-	-
3/48-3/53	6	-	-	-	-	-	-	-	6	-	-
3/54	1	-	-	-	-	-	1	-	-	-	-
3/55	1	-	-	-	-	-	1	-	-	-	-
3/56	2	-	-	2	-	-	-	-	-	-	-
3/58	1	-	-	-	-	-	1	-	-	-	-
3/57	3	-	-	3	-	-	-	-	-	-	-
3/60	1	-	-	1	-	-	-	-	-	-	-
3/61	1	-	-	-	-	-	-	-	1	-	-
3/62	1	-	-	-	-	-	-	-	1	-	-
3/63	1	-	-	-	-	-	-	-	1	-	-
3/69	1	-	-	-	-	-	-	-	1	-	-
3/82	1	-	-	-	-	-	-	-	1	-	-
3/83	1	-	-	-	-	-	-	-	1	-	-
3/84	1	-	-	-	-	-	-	-	1	-	-

APPENDIX C3 : SUMMARY OF PLOT DATA - MELALEUCA LATERITIA (Continued)

PLOT NO. 3. (Continued)

Shrub No.	No.of Stems	Condition of Stems								Regrowth Status	
		H	Sl.St	St	V.St	Rd	D	Fd	<BH	Adv	E
3/89	1	1	-	-	-	-	-	-	-	-	-
3/93	1	-	-	-	-	-	-	-	1	-	-
3/95	1	-	-	-	-	-	-	-	1	-	-
3/96	1	-	-	-	-	-	-	-	1	-	-
3/104	1	-	-	-	-	-	-	-	1	-	-
3/106	1	-	-	-	-	-	-	-	1	-	-
3/107	1	-	-	-	-	-	-	-	1	-	-
	73	22	-	14	-	1	6	-	30	-	-

PLOT NO. 5.

Shrub No.	No.of Stems	Condition of Stems								Regrowth Status	
		H	Sl.St	St	V.St	Rd	D	Fd	<BH	Adv	E
5/4	6	6	-	-	-	-	-	-	-	-	-
Total	6	6	-	-	-	-	-	-	-	-	-

APPENDIX C3 : SUMMARY OF PLOT DATA - MELALEUCA LATERITIA (Continued)

PLOT NO. 6.

Shrub No.	No.of Stems	Condition of Stems								Regrowth Status	
		H	Sl.St	St	V.St	Rd	D	Fd	<BH	Adv	E
6/18 Quadrat	1	-	-	-	1	-	-	-	-	-	1
6E5	7	-	-	-	-	-	5	-	2	-	-
6E4	10	-	-	-	-	-	4	-	6	-	-
6E3	21	-	-	-	-	-	10	-	11	-	-
6E2	18	-	-	-	-	-	10	-	8	-	-
6E1	11	-	-	-	-	-	8	-	3	-	-
6D5	16	-	-	-	-	-	10	-	6	-	-
6D4	14	-	-	-	-	-	8	-	6	-	-
6D3	7	-	-	-	-	-	4	-	3	-	-
6D2	23	-	-	-	-	-	7	-	16	-	-
6D1	17	-	-	-	-	-	9	-	8	-	-
6C5	12	-	-	-	-	-	6	-	6	-	-
6C4	10	-	-	-	-	-	4	-	6	-	-
6C3	9	-	-	-	-	-	6	-	3	-	-
6C2	23	-	-	-	-	-	12	-	11	-	-
6C1	10	-	-	-	-	-	5	-	5	-	-
6B5	15	-	-	-	-	-	1	-	14	-	-
6B4	10	-	-	-	-	-	4	-	6	-	-
6B3	16	-	-	-	-	-	2	-	14	-	-
6B2	26	-	-	-	-	-	7	-	19	-	-
6B1	9	-	-	-	-	-	1	-	8	-	-
6A5	11	-	-	-	-	-	5	-	6	-	-
6A4	9	-	-	-	-	-	4	-	5	-	-
6A3	2	-	-	-	-	-	2	-	-	-	-
6A2	8	-	-	-	-	-	3	-	5	-	-
6A1	7	-	-	-	-	-	4	-	3	-	-
Total	322	-	-	-	1	-	141	-	180	-	1

APPENDIX C4 : SUMMARY OF PLOT DATA - MELALEUCA RHAPHIOPHYLLA

PLOT NO. 1.

Tree No.	No.of Stems	Condition of Stems								Regrowth Status	
		H	Sl.St	St	V.St	Rd	D	Fd	<BH	Adv	E
1/ 1	3	-	-	1	-	-	-	2	-	-	1
1/ 2	11	1	-	4	2	-	-	3	1	2	4
1/ 8	2	-	-	-	-	-	2	-	-	-	-
1/10	7	1	3	3	-	-	-	-	-	-	5
1/11	6	-	-	5	-	-	-	1	-	-	5
1/12	1	1	-	-	-	-	-	-	-	-	1
1/13	1	1	-	-	-	-	-	-	-	-	1
1/14	1	1	-	-	-	-	-	-	-	-	-
1/15	4	4	-	-	-	-	-	-	-	-	-
1/16	1	1	-	-	-	-	-	-	-	-	-
1/17	2	2	-	-	-	-	-	-	-	2	-
1/19	3	3	-	-	-	-	-	-	-	-	-
1/20	5	1	1	2	-	-	-	1	-	1	3
1/21	2	1	1	-	-	-	-	-	-	2	1
1/22	3	3	-	-	-	-	-	-	-	1	1
1/23	1	-	1	-	-	-	-	-	-	-	-
1/26	2	-	-	2	-	-	-	-	-	-	-
1/27	1	-	-	-	1	-	-	-	-	1	1
1/28	2	-	-	-	2	-	-	-	-	-	-
1/29	1	-	-	-	1	-	-	-	-	1	1
1/30	1	-	-	-	1	-	-	-	-	-	1
Total	60	20	6	17	7	-	2	7	1	10	25

APPENDIX C4: SUMMARY OF PLOT DATA - MELALEUCA RHAPHIOPHYLLA (Continued)

PLOT NO. 2.

Tree No.	No.of Stems	Condition of Stems								Regrowth Status	
		H	Sl.St	St	V.St	Rd	D	Fd	<BH	Adv	E
2/ 1	1	-	-	-	-	-	-	1	-	-	-
2/ 2	1	-	-	-	-	-	-	1	-	-	-
2/ 3	7	-	-	-	2	-	4	1	-	-	-
2/ 4	6	-	-	1	2	-	1	1	1	2	-
2/ 5	3	-	-	-	-	-	3	-	-	1	-
2/ 6	10	-	-	-	1	-	1	8	-	-	1
2/ 7	7	-	-	-	1	-	1	5	-	7	-
2/ 8	5	-	-	-	-	-	-	5	-	-	-
2/ 9	1	-	-	-	-	-	-	1	-	-	-
2/10	7	-	-	-	2	-	1	4	-	2	2
2/11	4	-	-	-	2	-	-	2	-	-	2
2/12	6	-	-	-	3	-	2	1	-	-	1
2/13	3	-	-	-	2	-	-	1	-	-	1
2/14	17	-	-	-	9	-	3	5	-	-	10
2/15	4	-	-	-	1	-	-	3	-	4	1
2/16	3	-	-	-	2	-	-	-	1	-	2
2/17	7	-	-	-	3	-	-	4	-	1	4
2/18	1	-	-	-	-	-	-	1	-	-	-
2/19	1	-	-	-	-	-	-	1	-	-	-
2/20	1	-	-	-	-	-	-	1	-	-	-
2/21	12	-	-	1	5	-	1	4	1	-	5
2/22	14	-	1	-	4	-	2	5	2	1	3
2/23	7	-	-	3	-	-	-	4	-	-	1
2/24	2	-	-	-	-	-	1	1	-	1	1
2/26	6	-	-	-	-	-	1	4	1	1	-
2/27	6	-	-	5	-	-	-	1	-	-	5
2/28	15	-	-	-	4	-	4	6	1	8	2
2/29	7	-	-	3	2	-	-	2	-	2	2
2/30	5	-	-	5	-	-	-	-	-	3	4
2/31	3	-	-	1	-	-	2	-	-	1	1
2/32	9	-	-	5	1	-	2	-	1	-	6
2/33	7	-	-	-	-	-	7	-	-	-	-
Total	188	-	1	24	46	-	36	73	8	34	54

APPENDIX C4: SUMMARY OF PLOT DATA - MELALEUCA RHAPHIOPHYLLA (Continued)

PLOT NO. 3.

Tree No.	No.of Stems	Condition of Stems								Regrowth Status	
		H	Sl.St	St	V.St	Rd	D	Fd	<BH	Adv	E
3/ 2	1	1	-	-	-	-	-	-	-	3	-
3/ 3	3	2	1	-	-	-	-	-	-	-	-
3/ 4	2	-	2	-	-	-	-	-	-	-	-
3/ 5	1	-	1	-	-	-	-	-	-	-	-
3/ 6	1	-	-	1	-	-	-	-	-	-	-
3/ 7	1	-	1	-	-	-	-	-	-	-	-
3/12	1	1	-	-	-	-	-	-	-	-	-
3/13	2	1	-	1	-	-	-	-	-	-	-
3/14	9	1	8	-	-	-	-	-	-	-	-
3/15	5	5	-	-	-	-	-	-	-	-	-
3/23	20	5	-	14	-	-	-	-	1	-	4
3/25	3	-	3	-	-	-	-	-	-	-	-
3/26	8	4	-	2	1	-	-	1	-	-	4
3/27	4	-	2	-	-	-	-	1	1	-	-
3/36	9	2	3	1	-	-	-	3	-	-	-
3/38	9	2	-	7	-	-	-	-	-	-	-
3/39	9	-	-	6	-	-	2	-	1	-	1
3/41	1	-	-	-	1	-	-	-	-	-	-
3/42	10	1	-	5	1	-	-	3	-	2	4
3/43	8	-	-	4	1	-	3	-	-	-	4
3/46	1	-	-	-	1	-	-	-	-	-	1
3/59	1	-	-	-	-	-	1	-	-	-	-
3/64	1	-	-	1	-	-	-	-	-	-	1
3/65	3	-	-	1	-	-	1	-	1	-	-
3/66	3	-	3	-	-	-	-	-	-	-	1
3/67	3	-	-	2	-	-	-	1	-	-	-
3/68	1	-	-	1	-	-	-	-	-	-	-
3/70	3	-	2	-	1	-	-	-	-	-	-
3/71	1	-	-	1	-	-	-	-	-	-	1
3/72	1	-	-	1	-	-	-	-	-	-	-
3/73	1	-	-	-	-	-	-	1	-	-	-
3/74	1	-	-	-	-	-	-	1	-	-	-
3/75	2	-	-	-	2	-	-	-	-	-	1
3/76	1	-	-	1	-	-	-	-	-	-	1
3/77	3	-	-	-	3	-	-	-	-	-	3

APPENDIX C4: SUMMARY OF PLOT DATA - MELALEUCA RHAPHIOPHYLLA (Continued)

PLOT NO. 3. (Continued)

Tree No.	No.of Stems	Condition of Stems								Regrowth Status	
		H	Sl.St	St	V.St	Rd	D	Fd	<BH	Adv	E
3/78	1	-	-	1	-	-	-	-	-	-	1
3/79	1	-	-	1	-	-	-	-	-	-	-
3/80	1	-	-	-	-	-	-	1	-	-	-
3/81	1	-	-	1	-	-	-	-	-	-	-
3/85	1	1	-	-	-	-	-	-	-	-	-
3/86	1	-	-	1	-	-	-	-	-	-	1
3/87	2	1	-	-	-	-	1	-	-	-	-
3/88	1	-	-	1	-	-	-	-	-	-	-
3/90	1	-	-	-	1	-	-	-	-	-	1
3/91	1	-	-	-	-	-	-	1	-	-	-
3/92	2	-	-	2	-	-	-	-	-	-	-
3/94	1	1	-	-	-	-	-	-	-	-	-
3/97	2	-	1	-	-	-	-	1	-	-	-
3/98	1	-	-	1	-	-	-	-	-	-	1
3/99	1	-	1	-	-	-	-	-	-	-	-
3/100	1	-	-	-	-	-	-	1	-	-	-
3/101	2	-	-	-	-	-	-	2	-	-	-
3/102	5	-	1	1	-	-	-	3	-	2	-
3/103	6	-	-	5	-	-	-	1	-	-	1
3/105	3	-	-	1	-	-	-	2	-	-	-
3/108	5	-	5	-	-	-	-	-	-	-	-
3/109	1	-	-	1	-	-	-	-	-	-	-
3/110	2	-	-	2	-	-	-	-	-	-	-
Total	176	28	34	67	12	-	8	23	4	7	31

APPENDIX C4: SUMMARY OF PLOT DATA - MELALEUCA RHAPHIOPHYLLA (Continued)

PLOT NO. 4.

Tree No.	No.of Stems	Condition of Stems								Regrowth Status	
		H	Sl.St	St	V.St	Rd	D	Fd	<BH	Adv	E
4/ 1	17	-	-	-	12	-	2	3	-	-	12
4/ 2	25	3	-	6	5	-	8	3	-	-	17
4/ 3	24	-	-	-	17	-	1	6	-	-	1
4/ 4	23	2	-	11	8	-	-	2	-	-	13
4/ 5	9	-	-	8	-	-	-	1	-	-	2
4/ 6	10	-	-	10	-	-	-	-	-	-	9
4/ 7	9	-	4	5	-	-	-	-	-	-	3
4/ 8	21	-	-	13	-	-	1	7	-	1	7
4/ 9	7	-	-	4	-	-	-	3	-	-	-
4/10	5	1	-	3	-	-	-	1	-	-	-
4/11	3	2	-	-	-	-	-	1	-	-	1
4/12	4	-	3	-	1	-	-	-	-	-	2
4/13	4	-	2	1	-	-	-	1	-	-	1
4/14	8	2	2	-	1	-	-	3	-	-	-
4/15	6	-	-	4	-	-	-	2	-	-	-
Total	175	10	11	65	44	-	12	33	-	1	68

APPENDIX C4: SUMMARY OF PLOT DATA - MELALEUCA RHAPHIOPHYLLA (Continued)

PLOT NO. 6.

Tree No.	No.of Stems	Condition of Stems								Regrowth Status	
		H	Sl.St	St	V.St	Rd	D	Fd	<BH	Adv	E
6/ 1	4	-	-	3	1	-	-	-	-	-	-
6/ 2	1	-	-	-	-	-	1	-	-	-	-
6/ 3	1	-	-	-	1	-	-	-	-	-	-
6/ 4	3	-	-	2	1	-	-	-	-	-	1
6/ 5	1	-	-	1	-	-	-	-	-	-	1
6/ 6	3	-	-	-	-	-	2	1	-	-	
6/ 7	2	-	-	-	-	-	2	-	-	2	-
6/ 8	8	-	-	1	3	-	4	-	-	-	-
6/ 9	1	-	-	-	-	-	1	-	-	-	-
6/11	2	1	-	1	-	-	-	-	-	-	2
6/12	1	-	-	-	-	-	1	-	-	-	-
6/13	1	-	-	-	-	-	1	-	-	-	-
6/14	6	-	-	-	-	-	3	2	1	-	1
6/15	2	-	-	-	-	-	1	1	-	-	-
6/16	8	-	-	1	-	-	5	2	-	-	1
6/17	1	-	-	-	1	-	-	-	-	-	1
6/19	3	-	-	2	-	-	-	1	-	-	2
6/20	1	-	-	1	-	-	-	-	-	-	1
6/21	1	-	-	1	-	-	-	-	-	-	-
6/22	9	-	-	2	1	-	6	-	-	-	3
6/23	1	-	-	-	-	-	1	-	-	-	-
6/24	1	-	-	-	-	-	1	-	-	-	-
6/25	10	-	-	3	4	-	-	3	-	-	6
6/26	6	-	-	-	-	-	3	3	-	-	-
6/27	3	1	-	1	-	-	-	1	-	-	1
6/28	1	-	-	-	-	-	-	1	-	-	-
6/30	1	-	-	1	-	-	-	-	-	-	1
6/31	1	-	-	-	-	-	-	1	-	-	-
6/32	1	-	-	-	-	-	1	-	-	-	-
6/34	1	-	-	-	-	-	-	1	-	-	-
6/37	1	-	-	-	-	-	-	1	-	-	-
6/38	1	-	-	-	1	-	-	-	-	1	1
6/39	9	-	-	-	6	-	1	2	-	-	5
6/40	1	-	-	-	-	-	-	1	-	-	-
6/41	1	-	-	-	1	-	-	-	-	-	1
6/43	14	1	-	6	1	-	2	4	-	-	8
6/44	1	-	-	-	1	-	-	-	-	-	1
Total	113	3	-	28	22	-	36	25	1	3	37

APPENDIX C4: SUMMARY OF PLOT DATA - MELALEUCA RHAPHIOPHYLLA (Continued)

PLOT NO. 7.

Tree No.	No.of Stems	Condition of Stems								Regrowth Status	
		H	Sl.St	St	V.St	Rd	D	Fd	<BH	Adv	E
7/ 1	7	-	-	4	2	-	-	1	-	-	6
7/ 2	2	-	-	-	-	-	-	1	1	-	-
7/ 3	3	-	-	2	-	-	1	-	-	-	1
7/ 4	2	-	-	-	1	-	1	-	-	1	1
7/ 5	11	-	-	4	3	-	2	2	-	1	7
7/ 6	4	-	-	1	1	-	-	-	2	-	2
7/ 7	14	-	-	8	-	-	-	6	-	-	-
7/ 8	6	-	-	1	2	-	1	2	-	-	2
7/ 9	4	-	-	1	1	-	-	1	1	-	1
7/10	6	-	-	2	3	-	-	1	-	1	5
7/11	7	-	-	-	4	-	-	1	2	1	2
7/12	9	-	-	1	3	-	3	2	-	-	3
7/13	7	-	-	3	2	-	-	2	-	2	4
7/14	6	-	-	4	-	-	-	2	-	2	3
7/15	5	-	-	2	-	-	2	1	-	-	1
7/16	7	-	-	1	-	-	1	5	-	-	1
7/17	5	-	-	3	-	-	-	2	-	-	3
7/18	1	-	-	-	-	-	-	1	-	-	-
7/19	1	-	-	-	-	-	-	1	-	-	-
7/20	4	-	-	2	-	-	1	1	-	-	-
7/21	5	-	-	1	3	-	-	1	-	2	3
7/22	5	-	-	-	4	-	-	1	-	-	-
7/23	1	-	-	-	1	-	-	-	-	-	1
7/24	11	-	-	-	4	-	-	7	-	-	4
7/25	6	-	-	-	1	-	-	5	-	-	1
7/26	3	-	-	-	-	-	-	3	-	-	-
7/27	1	-	-	-	1	-	-	-	-	-	1
7/28	1	-	-	-	1	-	-	-	-	-	1
7/29	3	-	-	-	3	-	-	-	-	-	1
7/30	5	-	-	-	2	-	-	3	-	-	1
7/31	3	-	-	1	1	-	-	1	-	-	1
7/32	3	-	-	-	1	-	-	2	-	-	1
7/33	4	-	-	1	1	-	-	2	-	1	-
7/34	1	-	-	-	1	-	-	-	-	-	1
7/35	10	-	-	-	4	-	-	6	-	2	4
7/36	2	-	-	-	2	-	-	-	-	-	2

APPENDIX C4: SUMMARY OF PLOT DATA - MELALEUCA RHAPHIOPHYLLA (Continued)

PLOT NO. 7. (Continued)

Tree No.	No.of Stems	Condition of Stems								Regrowth Status	
		H	Sl.St	St	V.St	Rd	D	Fd	<BH	Adv	E
7/37	3	-	-	-	2	-	-	1	-	-	2
7/38	3	-	-	-	-	-	-	3	-	-	-
7/39	1	-	-	-	-	-	-	1	-	-	-
7/40	1	-	-	-	-	-	-	1	-	-	-
7/41	6	-	-	-	4	-	-	2	-	-	4
7/42	7	-	-	-	3	-	-	3	1	-	3
7/43	10	-	-	3	2	-	4	1	-	1	3
7/44	5	-	-	-	1	-	2	2	-	1	2
7/45	3	-	-	-	-	-	-	3	-	-	-
	214	-	-	45	64	-	18	80	7	15	77

PLOT NO. 8.

Tree No.	No.of Stems	Condition of Stems								Status	
		H	Sl.St	St	V.St	Rd	D	Fd	<BH	Adv	E
8/23	1	1	-	-	-	-	-	-	-	-	-
Total	1	1	-	-	-	-	-	-	-	-	-

APPENDIX D1. SUMMARY OF PLOT DATA BY DIAMETER CLASS - EUCALYPTUS RUDIS

PLOT NO. 5.

Diameter at Breast Height Size Classes (cm)	Condition of Living Stems			
	H	Sl.St	St	V.St
0- 5	-	-	-	-
6-10	-	-	-	-
11-15	-	-	1	-
16-20	-	-	1	-
21-25	-	-	2	-
Total	-	-	4	-

APPENDIX D2: SUMMARY OF PLOT DATA BY DIAMETER CLASS - MELALEUCA HAMULOSA

PLOT NO. 3.

Diameter at Breast Height Size Classes (cm)	Condition of Living Stems			
	H	Sl.St	St	V.St
<1	-	-	-	-
1- 2	-	-	1	-
3- 4	-	-	-	-
5- 6	-	-	-	1
7- 8	-	-	-	1
9-10	-	-	-	1
11-12	-	-	-	-
13-14	-	-	-	-
Total	-	-	1	3

PLOT NO. 5.

Diameter at Breast Height Size Classes (cm)	Condition of Living Stems			
	H	Sl.St	St	V.St
<1	-	-	-	-
1- 2	57	-	-	-
3- 4	-	-	-	-
5- 6	-	-	-	-
7- 8	-	-	-	-
9-10	-	-	-	-
Total	57	-	-	-

APPENDIX D2: SUMMARY OF PLOT DATA BY DIAMETER CLASS - MELALEUCA HAMULOSA

PLOT NO. 8.

Diameter at Breast Height Size Classes (cm)	Condition of Living Stems			
	H	Sl.St	St	V.St
<1	-	-	-	-
1- 2	-	-	-	-
3- 4	5	-	-	-
5- 6	10	-	3	-
7- 8	4	-	4	-
9-10	5	-	5	-
11-12	2	-	1	-
13-14	-	-	3	-
Total	26	-	16	-

APPENDIX D3: SUMMARY OF PLOT DATA BY DIAMETER CLASS - MELALEUCA LATERITIA

PLOT NO. 1.

Diameter at Breast Height Size Classes (cm)	Condition of Living Stems			
	H	Sl.St	St	V.St
0- 2	-	1	-	-
3- 4	-	-	-	1
5- 6	-	-	-	-
7- 8	-	-	-	-
9-10	-	-	-	-
Total	-	1	-	1

PLOT NO. 3.

Diameter at Breast Height Size Classes (cm)	Condition of Living Stems			
	H	Sl.St	St	V.St
0- 2	20	-	13	-
3- 4	2	-	1	1
5- 6	-	-	-	-
7- 8	-	-	-	-
9-10	-	-	-	-
Total	22	-	14	1

APPENDIX D3: SUMMARY OF PLOT DATA BY DIAMETER CLASS - MELALEUCA LATERITIA

PLOT NO. 5.

Diameter at Breast Height Size Classes (cm)	Condition of Living Stems			
	H	Sl.St	St	V.St
<1	4	-	-	-
1- 2	2	-	-	-
3- 4	-	-	-	-
Total	6	-	-	-

PLOT NO. 6.

Diameter at Breast Height Size Classes (cm)	Condition of Living Stems			
	H	Sl.St	St	V.St
<1	-	-	-	-
1- 2	-	-	-	1
Total	-	-	-	1

APPENDIX D4: SUMMARY OF PLOT DATA BY DIAMETER CLASS - MELALEUCA RHAPHIOPHYLLA

PLOT NO. 1

Diameter at Breast Height Size Classes (cm)	Condition of Living Stems			
	H	Sl.St	St	V.St
0- 5	17	-	5	-
6-10	2	-	2	1
11-15	1	1	3	-
16-20	-	4	2	4
21-25	-	-	3	1
26-30	-	1	-	-
31-35	-	-	-	1
36-40	-	-	-	-
41-45	-	-	-	-
46-50	-	-	2	-
Total	20	6	17	7

PLOT NO. 2

Diameter at Breast Height Size Classes (cm)	Condition of Living Stems			
	H	Sl.St	St	V.St
0- 5	-	-	1	-
6-10	-	-	-	19
11-15	-	1	3	8
16-20	-	-	7	5
21-25	-	-	7	5
26-30	-	-	3	3
31-35	-	-	3	5
36-40	-	-	-	-
41-45	-	-	-	1
46-50	-	-	-	-
Total	-	1	24	46

APPENDIX D4: SUMMARY OF PLOT DATA BY DIAMETER CLASS - MELALEUCA RHAPHIOPHYLLA

PLOT NO. 3

Diameter at Breast Height Size Classes (cm)	Condition of Living Stems			
	H	Sl.St	St	V.St
0- 5	18	10	19	1
6-10	7	2	21	6
11-15	3	9	15	3
16-20	-	5	10	1
21-25	-	4	1	1
26-30	-	3	1	-
31-35	-	-	-	-
36-40	-	1	-	-
41-45	-	-	-	-
46-50	-	-	-	-
Total	28	34	67	12

PLOT NO. 4

Diameter at Breast Height Size Classes (cm)	Condition of Living Stems			
	H	Sl.St	St	V.St
0- 5	5	4	43	16
6-10	3	1	14	18
11-15	2	5	3	5
16-20	-	1	2	1
21-25	-	-	-	1
26-30	-	-	1	-
31-35	-	-	-	1
36-40	-	-	1	1
41-45	-	-	1	-
46-50	-	-	-	1
Total	10	11	65	44

APPENDIX D4: SUMMARY OF PLOT DATA BY DIAMETER CLASS - MELALEUCA RHAPHIOPHYLLA

PLOT NO. 6.

Diameter at Breast Height Size Classes (cm)	Condition of Living Stems			
	H	Sl.St	St	V.St
0- 5	2	-	11	6
6-10	1	-	13	15
11-15	-	-	2	1
Total	3	-	26	22

PLOT NO. 7

Diameter at Breast Height Size Classes (cm)	Condition of Living Stems			
	H	Sl.St	St	V.St
0- 5	-	-	-	-
6-10	-	-	4	10
11-15	-	-	6	18
16-20	-	-	22	18
21-25	-	-	12	14
26-30	-	-	1	4
Total	-	-	45	64

PLOT NO. 6.

Diameter at Breast Height Size Classes (cm)	Condition of Living Stems			
	H	Sl.St	St	V.St
0- 5	-	-	-	-
6-10	1	-	-	-
11-15	-	-	-	-
Total	1	-	-	-

APPENDIX E: SUMMARY OF BIRD DAMAGE TO STEMS

Summary of Results for Each Tree damaged by Birds

Species	Plot No.	Tree No.	No. of Stems Damaged
Melaleuca rhaphiophylla	4	14	2
" "	4	15	2
		Subtotal	4
Melaleuca rhaphiophylla	6	1	4
" "	6	3	1
" "	6	4	1
" "	6	6	2
" "	6	7	2
" "	6	8	6
" "	6	13	1
" "	6	14	2
" "	6	15	1
" "	6	16	4
" "	6	26	1
" "	6	39	1
		Subtotal	26
Melaleuca rhaphiophylla	7	6	1
		Subtotal	1
		TOTAL	31

APPENDIX E: SUMMARY OF BIRD DAMAGE TO STEMS

Summary of Results for Each Plot reflecting Damage by Birds

Plot No.	Total No. Trees	Total No. Stems	No. Stems Damaged	% Stems Damaged
4	2	113	4	4
6	12	214	26	12
7	1	175	1	1

Note: Most of bird damage appears to relate to the birds that use the higher stems and branches for resting and nesting, i.e. the Ibis, Heron and Egret.

APPENDIX F: SUMMARY OF NESTING ACTIVITIES AT McCARLEY'S SWAMP

	Plot No. 1				2				3				4				6				7			
	Nests			Dead	Nests			Dead	Nests			Dead	Nests			Dead	Nests			Dead	Nests			Dead
BirdSpecies	Low	High	Old	Birds	Low	High	Old	Birds	Low	High	Old	Birds	Low	High	Old	Birds	Low	High	Old	Birds	Low	High	Old	Birds
Ibis	16	-	-	13	3	6	19	1	-	37	7	-	3	5	2	1	7	5	11	3	10	18	1	1
Duck	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
Coot	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	1	-	-	-
Egret	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	13	2	-
Spoonbill	-	1	-	-	-	2+1?		-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heron	-	-	-	-	-	1+1?		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16	1	-	13	4	9+2?	19	1	-	39	7	-	3	5	2	1	11	5	11	3	12	31	3	1

TOTALS:

Ibis Nests Low 39
" High 71
" Old 40
Dead Birds 19

Egret Nests Low 1
" High 13
" Old 2

Duck Nests Low 1

Coot Nests Low 5

Heron Nests High 1+1?

Spoonbill Nests High 5 +1?

NOTE: Old = Fallen (in case of Ibis only), Incomplete or old nests (not recently used).