



SHIRE OF LILLYDALE

MAY MOON RESERVE
VEGETATION AND MANAGEMENT REPORT

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March 1984

For Special Projects &
Recreation Department

Report on the Vegetation and Management of the
May Moon Memorial Reserve, Shire of Lillydale

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Report on the Vegetation and Management
of the May Moon Memorial Reserve
Shire of Lillydale

1. Introduction

Following an agreement made in October 1983 with the Lillydale Shire Council per Miss Sonia Shaw, the vegetation of the May Moon Memorial Reserve (MMR) was investigated to:

- (i) Determine and describe its indigenous and introduced vegetation.
- (ii) Ascertain the significance and state of preservation of the vegetation.
- (iii) Formulate plans to ameliorate environmental degradation.
- (iv) Determine management plans for the area.

This report documents these findings and makes relevant recommendations and proposals to maintain the MMR as a permanent biological reserve.

2. Methods

The reserve was inspected on the 7th October, 1983. Field work was carried out on 27th November, 1983, and a further inspection was made in January, 1984, when weed removal was supervised over several days.

Data was collected from nine quadrats each measuring 10x10m. All plant species in quadrats were recorded and assigned cover abundance value on the Braun-Blanquet scale (Table 1). Quadrats were placed throughout the one hectare reserve and sited to encompass as much variation in the vegetation as possible, including good quality and extensively weed invaded samples.

The site was traversed repeatedly during the course of the main survey. All indigenous and exotic species not found in quadrats were recorded and general notes were made on the vegetation degradation processes and other notes of biological or management interest. Some observations on user activity were made during the survey. Sources of contamination by weed seeds from outside the reserve were identified.

3. Vegetation of the Reserve

(i) Description of the vegetation

The natural vegetation of the reserve is tall open-forest dominated by Eucalyptus obliqua (Messmate), with occasional E.cypellocarpa (Mountain Grey Gum) and rather rare E.radiata (Narrow leaf Peppermint). This is the climax forest typical for the region on similar soils and with a high rainfall.

A structurally diverse woody understorey of trees and shrubs is found over a dense primarily herbaceous field layer. The upper part of this woody stratum is dominated by Acacia melanoxylon (Blackwood) which is often dense enough to suppress other woody species. Other smaller trees include Acacia dealbata (Silver Wattle), Prostanthera lasianthos (Victorian Christmas Bush), Olearia argophylla (Musk Daisy Bush), and Pomaderris aspera (Hazel Pomaderris) but these are rare. Major weedy tree species are conspicuous, though mature specimens are not necessarily abundant. The most frequent is Pittosporum undulatum (Sweet Pittosporum); others include Crataegus monogyna (Hawthorn), Ilex aquifolium (Holly) and Coprosma robusta (Coprosma).

The dense to sparse layer of medium to tall shrubs is dominated by the native Coprosma quadrifida (Prickly Currant-bush). Cassinia aculeata (Common Cassinia), Kunzea ericoides (NE corner only), Acacia verticillata (Prickly Moses) and Helichrysum dendroideum (Tree Everlasting). The vine Clematis aristata (Clematis) is common, ascending trees to a considerable height.

Introduced shrubs include the important weed species Cotoneaster pannosus and C.glaucophyllus (Cotoneaster), Teline monspeliulana (Montpellier Broom), Cytisus scoparius (English Broom), Erica lusitanica (Spanish Heath), Cytisus proliferus (Tree Lucerne), Rubus procerus and R.laciniatus (Blackberries). These are replacing or vying with native species and are all very invasive.

The field layer is almost entirely herbaceous being dominated by the grasses Poa ensiformis (Tussock-grass), P.tenera (Slender Tussock-grass), Tetrarrhena juncea (Forest Wire-grass) and by Pteridium esculentum (Bracken). Abundant though structurally less significant, are Viola hederacea (Ivy-leafed Violet), Geranium potentilloides (Stork's-bill), Veronica calycina (Hairy Speedwell), Hydrocotyle hirta (Hairy Pennywort), Gonocarpus tetragynus (Common Raspwort), Acaena anserinifolia (Bidgee-Widgee) and Dichondra repens (Kidney Weed). Several orchid species, Chiloglottis gunnii (Common Bird Orchid) and Pterostylis scabrida (Mountain Greenhood) are frequent.

Where soil disturbance has occurred, or clearing, trampling or removal of vegetation, particularly adjacent to the tennis court and pavilion, the native plant community is very degraded and excessively weed invaded. A suite of woody species, especially Rubus and Teline and exotic grasses and herbaceous dicots - Dactylis glomerata (Coxfoot), Holcus lanatus (Yorkshire Fog), Agrostis capillaris (Bentgrass), Hypochoeris radicata (Flat Weed) and Ranunculus repens (Buttercup) have replaced and will tend to permanently exclude native species.

(ii) Floristics

The data from the quadrats (Appendix 2) describes the vegetation according to its structure (cover abundance - Table 1) and floristics. Floristic statistics and quadrat data are summarized in Table 2 and 3 respectively.

In all, 121 species were recorded from the quadrats. This represents 72.8% of the 166 plant species recorded in the reserve in an area including the cutting and reserve along Mt. Dandenong Tourist Road and bounded on the west by the two sets of tennis courts. Of this figure 104 species (62.0%) were exotic, indicating extensive vegetation degradation. This figure however is typical for urban vegetation remnants.

The weed flora is discussed in Section 4.

(iii) Significance of Vegetation

The vegetation was assessed for significance according to :

- (a) the plant community and
- (b) individual species.

(a) Plant Community

Vegetation of the reserve is quite uniform being a typical sample of a climax community which is widespread in the region (Gullan et al. 1980). It has no special significance at the community level though because of the density of the eucalypt and wattle overstorey it is surprisingly weed free in a least degraded central section, even though weeds are highly significant on the perimeter.

(b) Plant Species

No rare, unusual or otherwise significant plant species was recorded in the area. This is not surprising in view of the typically species-poor forest vegetation of the region. It is unlikely that many plant species have become extinct in the reserve, but this situation will change: species now

represented by populations of one or few individuals will inevitably become extinct in the absence of natural fire regimes or the increasingly serious weed invasions.

4. Degradation Processes

The biological values of the reserve have already been seriously reduced and in the long term, will be almost wholly sacrificed unless a management plan is formulated and enacted. Several independent or associated factors are responsible for the degradation:

(i) User related factors

(ii) Fire regimes

(iii) Weed Invasions

(i) User Related Factors

The reserve is partly unfenced and essentially undelineated, thus the area is used for recreation by people on foot and horseback. The area contains a network of foot tracks and a large proportion of the site is trampled from time to time. This destroys native vegetation, especially regeneration, or upsets flowering and fruiting of the ground flora, e.g. orchids.

People and horses, among other animals, are doubtless a major agent for the dispersal of weed seeds from the periphery or the adjoining recreation areas in to the reserve. The soil and litter disturbance associated with foot and animal traffic also creates sites for weed seedling establishment. Horses are known to be a significant weed dispersal agent by ingestion of seeds and their subsequent deposition in faeces.

(ii) Fire Regimes

Australian vegetation has a long history of evolution with fire as a major environmental factor. Almost all native plants have morphological or behavioural adaptations to survive fires or regenerate following fires. The cyclic fire-induced renewal of vegetation is a well known phenomenon and most vegetation in Victoria is a fire climax vegetation (see McMahon (1984) for discussion of the role of fire in plant communities).

In the absence of fire, the structure and floristics of the vegetation usually change. Structurally, the vegetation tends to be simplified by the senescence and death of fire regeneration shrubs (especially the peas and wattles), the species richness of the vegetation lowers as fire regenerating species are lost to the community.

All native indigenous plant species in the reserve can be grouped as:

- (a) Post-fire root-stock regenerators, in which case post-fire regeneration is from underground root stocks or other storage organs; or
- (b) Regeneration is from seed, directly or indirectly induced to germinate by fire.

Recognising that there is danger of the biological values in the area deteriorating in the long term absence of fire, the formulation of a fire management plan is necessary. There is, however, a conflict between the optimum (i.e. natural) time to burn, the frequency of burning and the necessity to manage vegetation to prevent uncontrolled potentially dangerous or unwanted fires, especially near residential areas.

The general practice is of course to implement cool fuel-reduction burns in the spring or autumn, but evidence suggests that these are likely to be detrimental to the flora and fauna. This may be particularly so in wetter forests such as the present site. This extremely important question needs further study in respect to the May Moon Memorial Reserve and elsewhere in the Shire.

It is evident that the site has not been burnt for some years. If it were burnt again, we would expect some changes in the vegetation:

- (a) Species richness. Indigenous species would probably increase as regeneration took place from soil-stored seed (species only present on a site as seeds). In addition, some species may appear from seed that was blown in (post-fire colonisers).
- (b) Some rare fire-sensitive species may be lost from the site because regeneration from off-site seed sources (et soil-stored seed) is no longer possible because of the isolation, fragmentation or diminished species richness of surrounding vegetation.
- (c) Weed invasion would be stimulated, especially those species with soil-stored seed e.g. the Grooms teline, and cytissus. We would expect a spectacular post fire colonisation by these species and perhaps by exotic grasses.
- (d) The density of the understorey vegetation would probably rise considerably (concomitant with species richness). In the years following fire, both density and species richness of the understorey would be expected to diminish, though at an unknown rate.

The present density of the understorey shrub layer beneath the dense overstorey of eucalyptus and wattles is relatively low, particularly towards the centre of the reserve. At the margins where light penetration is at a maximum, the understorey is denser.

The implications of these comments on vegetation response to fire are that burning would be a stimulus to growth thus fuel availability may increase, enhancing the probability of uncontrollable fire in the reserve, whether accidentally or deliberately lit.

- (iii) Pending further study of the problems of fire management, an interim (small) experimental burn could be implemented to ascertain the effects of fire and provide data on which to base a fire management plan. Along with weed control, this is by far the most important management aspect of the reserve.

(iv) Weed Invasions

The greatest threat to the natural vegetation of the reserve is that of weed invasions. In the long term, weeds would all but eliminate most native species from the site. Each vegetation stratum from the field layer to the canopy is liable to be overtaken by one or more weed species. See Carr (1984) for a discussion of the problem of weed invasions in native vegetation. The weeds fall into two broad categories:

- (a) Environmental weeds.
- (b) Non-environmental weeds.

Non-environmental weeds (including many declared noxious weeds in Victoria) are those which invade as a result of disturbance to the natural vegetation cover or following soil disturbance. Such weeds are largely confined to the margin of the reserve, along walking tracks or around the barbecue pavilion. These are not considered as serious as environmental weeds, in any case their control is impractical.

Environmental weeds, by contrast, are usually capable of invasion without direct disturbance to vegetation or soil. In the case of the reserve, they germinate on the forest floor and are competitive enough, especially in regard to shade tolerance, to reach maturity alongside native species. They will eventually eliminate native species by suppression of adults or by preventing their regeneration from seed.

Most native (indigenous) species in this forest vegetation, regenerate from seed following fires, as outlined above. This contrasts strongly with the establishment of the shade tolerant environmental weeds. Some 32 species of weeds are considered serious, necessitating control (Appendix 1), most are environmental weeds.

Of the 104 weed species (exotic plants) recorded in the reserve (Appendix 1), 42 (40.7%) originated directly from adjoining or nearby gardens or from trees and shrubs planted around the recreation reserve. The majority of these garden escapees are dispersed by birds, especially introduced blackbirds, which ingest the fruits and void the seed in the reserve.

Parent plants of many of the reserve's weeds can be seen in gardens across the road, e.g. Cotoneaster, Pittosporum. It makes sense to destroy these sources of weed infestation, but of course this raises problems. Much weed invasion could be eliminated if the source of infestation was destroyed. The landowners may be amenable to a diplomatic approach and compensated with a new and harmless plant if their weedy species were removed. The adjoining native gardens contains Pittosporum which should certainly be removed.

5. Management and Environmental Amelioration

(i) User Related Questions

The reserve should be used exclusively for passive enjoyment of the environment and its flora and fauna. Recreation is amply catered for by the adjoining public land. To this end, the reserve should be clearly demarcated from the surrounding area and signposted. The sign should spell out the intended use of the reserve and convey something of the biological value of the area.

Demarcation should be by a fence of some kind, though what kind is open to discussion. Pine log barriers are aesthetically less than desirable and perhaps a single undressed hardwood post and rail fence is all that is required to prevent free access to the reserve from the barbecue pavilion. There should be only two openings into the reserve from this area.

As large an area as possible should be enclosed by the perimeter fence (i.e. on the western or pavilion side). This is to maximise the reserve area to perimeter length ratio. The reserve should then be extended west as far as the row of pine trees and to include the eucalypt stand on the west side of the pavilion. All the surrounding degraded and trampled area not required for paths etc., should be replanted with native tussock grass (Poa gensiformis) and other species - see below.

The perimeter fence along Mt. Dandenong Scenic Road has been damaged in places, and points of access have been made, presumably by children. Tracks radiate from these points. This fence should be repaired and such traffic strongly discouraged.

(ii) Weed Control

Methods of control for individual weed species are given in Appendix 1. These are outlined below. It is stressed that we do not always know the best method of control and some experiments may be needed to find the most effective means.

A balance has to be struck between the least environmentally harmful method (-that which disturbs soil at an absolute minimum) and the most economic method.

(a) Physical Removal - Pulling

Fortunately the soil is friable and many weeds can be hand pulled - a simple and easy solution. If the weeds do not contain seeds or propagules, they should be left in situ or placed on bare areas where they will form a mulch and discourage traffic along paths that should be closed.

(b) Ringbarking or Felling

Some of the woody species can be ringbarked and left standing or felled. Ideally, felled trees should be chipped and the material used for the treatment of bare areas mentioned above.

(c) Cutting with Herbicide Treatment of Stumps

Some woody species will resprout if cut, so that the stump needs to be treated with poison as described in discussion with Graeme Tonkin.

(d) Digging and Removal

Some species, such as the bulbous Agapanthus or Narcissus (jonquils), which set little seed or increase by division only, should be dug up in their entirety and removed from the reserve.

(e) Herbicide

Some species, such as the blackberry, must be poisoned, though this must be done with great care because of dangers to the operator and because native species, which may be quite rare, must not be killed. Pultenaea scabra (Rough Bush-pea) is an example of a rare species - very few are present and they often grow amongst blackberries. G. Tonkin (in conversation) suggests that the herbicide Garlon 480 is the most appropriate for woody species. Herbaceous species can be eliminated with less specific herbicide.

(iii) Tracks in the Reserve

The area is extensively tracked, resulting in considerable deterioration through soil compaction, vegetation trampling, facilitation of weed invasion and soil erosion. Most tracks should be closed and obscured or obstructed by cut vegetation - weeds without seeds that have been removed from the site or branches cut for the purpose. All bare soil on these tracks should be covered by chipped plant material to protect soil and discourage invasion by exotic grasses etc. It may be desirable or necessary to plant these tracks with clumps of tussock grass (Poa ensiformis) to achieve a rapid cover of vegetation.

All tracks that are left open should be similarly covered with chipped plant material and all mineral soil covered to prevent erosion and to improve the appearance of the area. This will also discourage the establishment of some weed species.

It is necessary to decide which tracks are to be closed by an inspection held between June and December. The large colonies of the summer-dormant common Bird-orchid (Chiloglottis gunnii) which are to be protected by closing some tracks, will be visible (above ground) during this period. At the moment, some of the tracks go right through these orchid colonies.

(iv) Species Enrichment Plantings and Revegetation

Extensive weed invasion has occurred in sites at the margin of the reserve where soil disturbance has taken place and on areas which were formerly made bare by user pressure, or where extensive trampling has occurred - around the pavilion etc.

When the major weeds have been removed from these sites, they should be replanted with indigenous species which are either nursery-grown or are collected as divisions etc., from the area. If this treatment is not effective, regeneration of most native species will not occur because the sites are too densely vegetated with exotic species. If the right native species can be established, they should provide competitive and eventually eliminate many exotic species.

Apart from the history of disturbance of such sites, the reason they have been so weed invaded is that light intensity is highest at the margin of the forest. A canopy of native trees and shrubs would render these areas much less open to colonisation by light demanding exotic species.

It may also be desirable to propagate some of the rarer plants from the reserve to augment their diminished populations or to introduce species judged likely to have occurred on the site. This is termed "species enrichment planting" but it needs to be done with caution to ensure that only the right species are introduced. These are species that could be found as members of similar plant communities in nearby areas. I view this as a long term goal, certainly not one of high priority.

Species considered suitable for revegetation on the margins of the reserve are indicated in Appendix 1 where their method of propagation is given. It is stressed that material for propagation should be obtained from the site to ensure that foreign genetic material is not introduced and that as many individual plants as practical will be sampled for seed and cuttings to ensure genetic diversity in the plant crop. The rationale for these practices is discussed by Robin (1984), Carr and Robin (1984) and by Fripp (1984).

The timing of planting of nursery grown stock is probably best in autumn. Divisions (grasses etc.) should be direct planted in autumn following rains, just after growth has commenced, but before the onset of winter cold and cessation of growth.

6. Recommendations

The following recommendations are made:

(i) Policy

A formal policy should be made to maintain the May Moon Memorial Reserve in perpetuity for its biological (flora, fauna and landscape) values.

(ii) Management Plans

A management plan should be formulated to maintain the area embracing:

- (a) Public access and use - passive use only. All recreational activities should be discouraged or actively controlled.
- (b) Weed control needs to be an ongoing concern of the highest priority and effected where required. The weed situation should be monitored at least every six months.

(iii) Involvement by Conservation Groups or Individuals

The interest and assistance of a local conservation group should be enlisted to stimulate community involvement in conservation issues and to implement, where possible, management works at the reserve. The interest of local residents should ensure speedy feedback when management problems arise. They would also act to some extent as policing agents to ensure proper use of the area. Valuable lessons in reserve management could be learned which would be of much wider application. A sensible attitude towards fire and its role in resource management should be fostered.

(iv) Publicity

A small brochure outlining flora and fauna and ecology of the reserve would be a valuable educational exercise and publicity aid to ensure development of sound user attitudes.

(v) Weed Control

There is a very strong case in favour of discouraging or legislating against the use in horticulture of environmental weeds in the Shire. At least an education programme should be mounted. The greatest threat posed to the reserve, apart of the ubiquitous blackberry, is from weeds disbursed by birds etc., from adjoining gardens. Dumping of garden rubbish has also played a significant role in weed establishment. The removal of a small number of species from the nursery trade and from gardens would be an absolutely trivial price to pay. The alternative is the ultimate destruction of at least 90% of the natural vegetation of the reserve over the next several decades. This destruction is to a large extent reversible. Without this, the environmental and economic costs in the long term will be astronomical. It would be easy to demonstrate that the single most valuable natural resource in the Shire is indigenous vegetation - an asset beyond valuation.

The problems of management policy and practices appropriate for the May Moon Memorial Reserve have far wide implications in the Shire of Lillydale. It is essential to actively manage the vegetation of any kind, especially in respect to weed invasions and fire.

(vi) Fire Management

Fire is a rather more vexatious issue than weeds, since the need to institute fire control measures and vegetation management often conflicts with the desirable fire frequency, intensity and timing appropriate to maintain natural plant communities. All indigenous plant communities in the Shire, except swamp vegetation, ultimately require fire to effect natural regeneration and maintain species richness and structural diversity. There is an urgent need to develop a fire control policy simultaneously with the vegetation management policy

but divorced from the emotional response and political motivations characteristic of present times. The issues must be resolved by the fire control authority, landowners and fire ecologists together.

The following recommendations are made in respect to fire management.

Fire frequency

The minimum frequency should be between 12-15 years but this aspect needs further study based on data collected by monitoring quadrats (see below).

Intensity

The intensity is very hard to control beyond a safe point but the aims should be to burn the understorey at a moderate intensity without burning the crowns of the eucalypts.

Timing

The burn should be as late in spring as possible when most of the orchids and summer dormant species have matured their tubers etc. or have died down. This timing gives the native perennial plants such as grasses and other post-fire root resprouters a chance to grow over early summer or beyond so that when the autumn rains arrive the germinating weeds will be competing with already established regrowth or native species. An autumn fire would stimulate a simultaneous germination of native and exotic species in competition that may seriously disadvantage native species.

The following points need to be borne in mind when implementing burns:

- no disturbance of soil
- no vehicular traffic across native vegetation or access made for vehicles
- if fire breaks are made they should be slashed.

The reserve is probably too small to partition and burn in separate parts. When burning is contemplated the details should be decided by the fire authority in consultation with an ecologist who is present when the burn takes place.

Monitoring the effects of burning is mandatory. Several permanent quadrats (10 x 10m - +5 in number) should be placed in the reserve and monitored before and after burning and over the subsequent years. The optimum fire management regime can only be devised with this data.

7. Acknowledgements

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Table 1

The Braun-Blanquet Cover Abundance Scale *

Cover 75 - 100%	5
Cover 50 - 75%	4
Cover 25 - 50%	3
Cover 5 - 25%	2
Very scattered, cover small, to 5%	1
Isolated, few plants only, cover small	+

* Vertically projected cover values of plant species or vegetation strata.

Table 2

Statistics from Quadrat Data Collected at
May Moon Memorial Reserve
(9 Quadrats each 10 x 10m)

Total species recorded in quadrats	121 (72.8% of total species recorded)
Total exotic species recorded in quadrats	58 (47.9% of species recorded in quadrats; 56.3% of total exotic species recorded)
Number of species per quadrat - range	35 - 62
- average	44

Table 3

Floristic Statistics for May Moon Memorial Reserve

Total species recorded	166
Total native species	62 (37.3%)
Total exotic species	104 (62.0%)
Total exotic species of direct garden origin	42 (40.7% of total exotic species)
Number of serious or potentially serious weed species	32 (31.0% of total weed species)

Appendix 1 : Plant Species Recorded for the May Moon Memorial Reserve
November 1983 - January 1984.

Key to Appendix 1

1. Botanical name is based on the most recent listing of the Victorian Flora by Forbes et.al. (1984). The nomenclatural authorities used in that list apply; authorities for additional species not listed for Victoria but naturalised in the reserve mostly follow Flora Europaea (1964-1980).
2. Common names are generally those used by Willis (1970,1972).
3. Life Form: A - annual herb; B - biennial herb; C - bulbous, cormous or tuberous perennial herb; Ph - perennial herb; R - stem - root climber; S - shrub; St - small tree; T - tall tree; Ts - tall shrub; V - vine.
4. Weed status: The weeds in the reserve are ranked in the scale of 1-5 in order of increasing seriousness as a threat to the native vegetation.
 1. Of little consequence and confined to well-lit or disturbed sites and/or control impossible.
 2. Not serious, usually rare species unlikely to be invasive but with visual impact.
 3. Serious or potentially so in marginal or disturbed sites; control desirable.
 4. Serious or potentially so in the long term; species with a slow colonising ability or growth rate because of shaded conditions.
 5. Extremely serious, mostly woody species liable to eventually eliminate all native vegetation.
- (N) Declared noxious in Victoria.
5. Origin: The weed species that colonise from nearby gardens or from plants cultivated on the recreation reserve or garden-escape populations are indicated thus +.
6. Weed control method: 1 - hand pulling of plants; 2 - ringbarking or felling; 3 - cutting with herbicide treatment of stump; 4 - digging and removal of whole plant; 5 - herbicide.
7. Method of propagation or establishment for revegetation: D - clumps are divided on site and tillers or divisions planted directly back; S - propagation by seed; C - propagation by cuttings; (D) - divisions of clumps are established in the nursery before planting out. Species considered particularly suitable for revegetation are indicated by an underlining of the symbol.

Plant Species Recorded for the May Moon Memorial Reserve
November 1983 - January 1984

1	2	3	4	5	6	7
Botanical Name	Common Name	Life Form	Weed Status	Origin	Weed control method	Propagation or revegetation method
<u>FERNS</u>						
Adiantaceae						
<u>Adiantum aethiopicum</u>	Common Maidenhair Fern	Ph				(D)
Dennstaedtiaceae						
<u>Pteridium esculentum</u>	Common Bracken	Ph				D
<u>CONIFERS</u>						
Cupressaceae						
* <u>Cupressus</u> sp.	Cypress	St	2	+		1,2
Pinaceae						
* <u>Pinus radiata</u>	Monterey Pine	T	4	+		1,2
<u>MONOCOTYLEDONS</u>						
Amaryllidaceae						
* <u>Agapanthus orientalis</u>	Agapanthus	G	4	+		4
* <u>Narcissus</u> sp.	Jonquil	G	2	+		4
Cyperaceae						
<u>Carex breviculmis</u>	Sedge	Ph				(D),S
* <u>Cyperus eragrostis</u>	Drain Flat - sedge	Ph	1			
<u>Lepidosperma elatius</u>	Tall Sword - sedge	Ph				(D),S

1	2	3	4	5	6	7
Botanical Name	Common Name	Life Form	Weed Status	Origin	Weed control method	Propagation or revegetation method
Iridaceae						
* <u>Crocasmia x crocosmiflora</u>	Montbretia	G	4			
* <u>Romulea rosea</u>	Onion-grass	G	1	+	4,5	
Juncaceae						
* <u>Juncus bufonius</u>	Toad Rush	A	1			
<u>Luzula meridionalis</u> var. <u>densiflora</u>	Wood Rush	Ph				S(D)
Liliaceae						
<u>Dianella revoluta</u>	Black-anther, Flax-lily	PH				<u>D,S</u>
<u>D. tasmanica</u>	Tasmar Flax-lily	Ph				<u>D,S</u>
* <u>Muscari botryoides</u>	Grape Hyacinth	G	2	+	4	
Orchidaceae						
<u>Chiloglottis gunnii</u>	Common Bird-orchid	G				D
<u>Dipodium punctatum</u>	Hyacinth Orchid	G				
<u>Gastrodia sesamoides</u>	Potato Orchid	G				
<u>Pterostylis decurra</u>	Greenhood	G				
<u>P. longifolia</u>	Tall Greenhood	G				D
<u>P. pedunculata</u>	Maroonhood	G				D
<u>P. scabrata</u>	Mountain Greenhood	G				D
Poaceae						
* <u>Agrostis capillaris</u>	Bent Grass	Ph	1			
* <u>Anthoxanthum odoratum</u>	Sweet Vernal Grass	Ph	1			
* <u>Avena fatua</u>	Wild Oat	A	1			
* <u>Briza maxima</u>	Quaking Grass	A	1			
* <u>Bromus catharticus</u>	Prairie Grass	A	1			
* <u>B. diandrus</u>	Great Brome	A	1			
* <u>Cynosurus echinatus</u>	Rough Dog's-tail	A	1			
* <u>Dactylis glomerata</u>	Cocksfoot	A	1			
<u>Danthonia racemosa</u>	Wallaby Grass	Ph	1			D

Botanical Name	Common Name	3 Life Form	4 Weed Status	5 Origin	6 Weed control method	7 Propagation or revegetation method
Poaceae (continued)						
<u>*Ehrharta erecta</u>	Panic Veldt-grass	Ph	1			
<u>*Holcus lanatus</u>	Yorkshire Fog	Ph	1		4,5	
<u>Microlaena stipoides</u>	Weeping Grass	Ph				
<u>*Poa annua</u>	Winter Grass	A	1			D
<u>P. ensiformis</u>	Tussock-grass	Ph				D
<u>P. tenera</u>	Slender Tussock-grass	Ph				D
<u>Tetrarrhena juncea</u>	Forest Wire-grass	Ph				D
<u>*Vulpia myuros</u>	Rat's tail Rescue	A	1			D
Xanthorrhoeaceae						
<u>Lomandra filiformis</u>	Wattle Mat-rush	Ph				S
<u>L. longifolia</u>	Spiny-headed Mat-rush	Ph				S
DICOTYLEDONS						
Aceraceae						
<u>*Acer pseudoplatanus</u>	Sycamore	T	5	+	1,2,3	
Apiaceae						
<u>Hydrocotyle hirta</u>	Hairy Pennywort	Ph				D,C
<u>H. laxiflora</u>	Stinking Pennywort	Ph				D,C
Apocynaceae						
<u>*Vinca major</u>	Periwinkle	Ph	5	+	5	
Aquifoliaceae						
<u>*Ilex aquifolium</u>	Holly	St	5	+	1,4	
Araliaceae						
<u>*Hedera helix</u>	Ivy	R	5	+	1,5	
<u>Polyscias sambuncifolius</u>	Elderberry Parax	St				S,C

Botanical Name	Common Name	Life Form	Weed Status	Origin	Weed control method	Propagation or revegetation method
Asteraceae						
<u>Bedfordia arborescens</u>	Blanket-leaf	St				S
* <u>Bellis perennis</u>	English Daisy	Ph	1	+		S, C
<u>Cassinia aculeata</u>	Common Cassinia	Ts				
* <u>Cirsium arvense</u>	Perennial Thistle	Ph	3(N)		5	
* <u>C. vulgare</u>	Spear Thistle	B	1(N)		1	
* <u>Crepis capillaris</u>	Smooth Hawksbeard	B	1			
<u>Gnaphalium sphaericum</u>	Cudweed	A-B				
<u>Helichrysum dendroideum</u>	Tree Everlasting	St				S
* <u>Hypochoeris radicata</u>	Flat-weed	Ph	1			S, C
<u>Lagenifera stipitata</u>	Common Bottle-daisy	Ph				
* <u>Chrysanthemum leucanthemum</u>	Ox-eye Daisy	Ph	2(N)		5	S, (D)
<u>Olearia argophylla</u>	Musk Daisy-bush	St				S, C
<u>O. lirata</u>	Snowy Daisy-bush	Ts				S, C
<u>Senecio glomeratus</u>	Groundsel	Ph				S
<u>S. hispidulus</u>	Rough Fireweed	Ph				S
<u>S. linearifolius</u>	Groundsel	Ph				S
<u>S. minimus</u>	Groundsel	B				S
<u>S. quadridentatus</u>	Cotton Fireweed	Ph				S
<u>Sigesbeckia orientalis</u>	Indian Weed	Ph				S
* <u>Sonchus oleraceus</u>	Sow Thistle	A	1			S
* <u>Taraxacum officinale</u> spp.agg.	Dandelion	Ph	1			
* <u>Tragopogon porrifolius</u>	Salsify	B	1			
Berberidaceae						
<u>Berberis darwinii</u>	Berberis	S	2	+	1	
Bignoniaceae						
* <u>Pandorea pandorana</u>	Wonga Vine	V				S, C
Boraginaceae						
* <u>Myosotis sylvatica</u>	Forget-me-not	Ph	2	+	1	

Botanical Name	Common Name	Life Form	Weed Status	Origin	Weed control method	Propagation or revegetation method
Campanulaceae <u>Wahlenbergia quadrifida</u>	Slender Bluebell	Ph				<u>(D), S</u>
Caprifoliaceae *Leycesteria formosa *Viburnum sp. *V. tinus	Himalayan Honeysuckle Viburnum Viburnum	S S S	4-5 2 4	+ + +	4 1,4 1,4	
Caryophyllaceae *Cerastium glomeratum	Mouse-ear Chickweed	A	1			
Convolvulaceae <u>Dichondra repens</u>	Kidney Weed	Ph				<u>D</u>
Cornaceae *Cornus capitata	Dogwood	St	4	+	1,4	
Ericaceae *Arbutus unedo *Erica lusitanica	Irish Strawberry Tree Spanish Heath	St S	2 4	+ +	1 1	
Euphorbiaceae <u>Poranthera microphylla</u>	Small Poranthera	A				S
Fabaceae *Cytisus proliferus *C. scoparius Glycine clandestina *Lotus corniculatus Pultenaea scabra *Teline monspessulana *Trifolium dubium *T. glomeratum	Tree Lucerne English Broom Twining Glycine Birds-foot Treetail Rough Bush-pea Montpellier Broom Suckling Clover Clustered Clover	St S V Ph S S A A	5 5(N) 1 5(N) 1 1	+ +	1, 3 1 - 1	<u>S, C</u> <u>S, C</u>

Botanical Name	Common Name	Life Form	Weed Status	Origin	Weed control method	Propagation or revegetation method
Fabaceae (continued)						
* <u>T. repens</u>	White Clover	Ph	1			
* <u>T. sp.</u>	Clover	A	1			
* <u>Vicia sativa</u>	Common Vetch	A	1			
Fagaceae						
* <u>Castanea sativa</u>	Chestnut	T	2	+	1,4	
* <u>Quercus robur</u>	English Oak	T	2	+	1,4	
Gentianaceae						
* <u>Centaurium erythraea</u>	Common Centaury	B	1			
Geraniaceae						
* <u>Geranium dissectum</u>	Cut-leaf Crane's-bill	Ph	1			
<u>G. potentilloides</u>	Crane's-bill	Ph				S
<u>G. solanderi</u>	Austral Crane's-bill	Ph				S
Goodeniaceae						
<u>Goodenia ovata</u>	Hop Goodenia	S				S,C
Haloragaceae						
<u>Gonocarpus tetragynus</u>	Common Raspwort	Ph				S,C
Hypericaceae						
* <u>Hypericum androsaemum</u>	Tutsan	S	5 (N)	+	4	
Juglandaceae						
* <u>Juglans sp.</u>	Walnut	T	2	+	1	
Lamiaceae						
* <u>Mentha pulegium</u>	Pennyroyal	Ph	1			
<u>M. laxiflora</u>	Forest Mint	Ph				(D), C, S.
<u>Prostanthera lasianthos</u>	Victorian Christmas-bush	St				C, S
<u>Prunella vulgaris</u>	Self-heal	Ph				C, S

	Form	Status	+	control method	or revegetation method
<u>Lauraceae</u>					
<u>*Laurus nobilis</u>	St	4	+	1,4	
<u>Linaceae</u>					
<u>Linum marginale</u>	Ph				S
<u>Lobeliaceae</u>					
<u>Lobelia gibbosa</u>	A				S
<u>Mimosaceae</u>					
<u>Acacia dealbata</u>	St				S
<u>A. melanoxylon</u>	St-T				S
<u>A. verticillata</u>	Ts				S
<u>Myrtaceae</u>					
<u>Eucalyptus cypellocarpa</u>	T				S
<u>E. obliqua</u>	T				S
<u>E. radiata</u>	T				S
<u>Kunzea ericoides</u>	Ts				C, S
<u>Oleaceae</u>					
<u>*Ligustrum vulgare</u>	S	4	+	1,4	
<u>Oxalidaceae</u>					
<u>Oxalis corniculatus sens. lat.</u>	Ph				S, C
<u>*O. incarnata</u>	G	3		5	
<u>*O. pescaprae</u>	G	2-3(N)		5	
<u>Pittosporaceae</u>					
<u>Billardiera scandens</u>	V				S, C
<u>*Pittosporum crassifolium</u>	St	2	+	1,2	
<u>*P. engenioides</u>	St	2	+	1,2	
<u>*P. undulatum</u>	St	5	+	1,2	

Botanical Name	Common Name	Life Form	Weed Status	Origin	Weed control method	Propagation or revegetation method
Plantaginaceae						
<i>Plantago debilis</i>	Shade Plantain	Ph	1			S
* <i>P. lanceolata</i>	Ribwort Plantain	Ph				
* <i>P. major</i>	Greater Plantain	Ph	1			
Polygonaceae						
* <i>Rumex acetosella</i>	Sheep Sorrel	Ph	1			
* <i>R. conglomeratus</i>	Clustered Dock	B	1			
Ranunculaceae						
<i>Clematis aristata</i>	Clematis	V				S,C
<i>Ranunculus plebeius</i>	Forest Buttercup	Ph				S
* <i>R. repens</i>	Creeping Buttercup	Ph	1			
Rhamnaceae						
<i>Pomaderris aspera</i>	Hazel Pomaderris	St				S,C
Rosaceae						
<i>Acaena anserinifolia</i>	Bidgee-widgee Burr	Ph				S,C
* <i>Aronia</i> sp.	Aronia	St	2	+	1,4	
* <i>Cotoneaster glaucophyllus</i>	Cotoneaster	Ts	5	+	1,4	
* <i>C. horizontalis</i>	Cotoneaster	S	5	+	1,4	
* <i>C. pannosa</i>	Cotoneaster	Ts	5	+	1,4	
* <i>C. hybrid</i>	Cotoneaster	S	5	+	1,4	
* <i>Crataegus monogyna</i>	Hawthorn	St	5(N)	+	1,3,4	
* <i>Malus x domestica</i>	Apple	St	2	+	1,4	
* <i>Prunus cerasifera</i>	Cherry Plum	St	5	+	1,3,4	
* <i>P. laurocerasus</i>	Cherry Laurel	St	5	+	1,3,4	
* <i>Pyracantha</i> sp.	Pyracantha	Ts	5	+	1,3,4	
* <i>Rubus idaeus</i>	Raspberry	S	2		5	
* <i>R. laciniatus</i>	Cut-leaf Blackberry	S	5(N)		5	
<i>R. parvifolius</i>	Native Raspberry	S				S,C
* <i>R. procerus</i>	Blackberry	S	5(N)		5	

Common Name	Form	weed Status	Origin	Weed control method	Propagation or revegetation method
<u>Rubiaceae</u>					
<u>Asperula scoparia</u>	Ph				S (D)
<u>Coprosma quadrifida</u>	Ts				<u>S,C</u>
* <u>C. repens</u>	Ts	4	+	1,4	
* <u>C. robusta</u>	St	5	+	1,4	
* <u>C. robusta x C. quadrifida</u>	Ts			1	
* <u>Galium aparine</u>	A	1			
<u>C. propinquum</u>	Ph				S,C
<u>Santalaceae</u>					
<u>Exocarpos cupressiformis</u>	St				<u>S,C</u>
<u>Stackhouseaceae</u>					
<u>Stackhouseia monogyna</u>	Ph				S
<u>Scrophulariaceae</u>					
<u>Veronica calycina</u>	Ph				S,C
<u>Thymelaeaceae</u>					
<u>Pimelea axiflora</u>	Ts				<u>C,S</u>
<u>Tremandraceae</u>					
<u>Tetratheca ciliata</u>	S				<u>C</u>
<u>Violaceae</u>					
* <u>Viola canina</u>	Ph	3	+		
<u>V. hederacea</u>	Ph			4	
* <u>V. odorata</u>	Ph	5	+		(D), <u>S</u>

Appendix 2

Quadrat Data from the May Moon Memorial Reserve

Species	Quadrat Number								
	' 1	' 2	' 3	' 4	' 5	' 6	' 7	' 8	' 9
<u>Eucalyptus obliqua</u>	5	5	5	5	5	3	3	5	5
<u>Poa ensiformis</u>	5	3	4	3	4	3	2	2	3
<u>Pteridium esculentum</u>	2	1	1	1	1	1	1	1	1
<u>Kunzea ericoides</u>	4								
<u>Acacia melanoxylon</u>	3	4	1	2	3	4	2	1	3
<u>Rubus parvifolius</u>	1	1	1	1	1				1
* <u>Teline monspessulana</u>	1		1	2	1	2	3	3	1
<u>Acacia verticillata</u>	1	1	1	1	1	1			
* <u>Vinca major</u>	3						1	1	
* <u>Coprosma robusta</u>	1	1	1	1	1	+	1		1
* <u>Sonchus oleraceus</u>	1					1	1	1	
* <u>Hedera helix</u>	1	2	+	1	2	1	1	+	1
* <u>Prunus cerasifera</u>	1		1	+			+		
<u>Tetrarrhena juncea</u>	2		1	3	2	3	3	3	3
* <u>Rubus laciniatus</u>	1		1	1		1			
<u>Lagenifera stipitata</u>	1	1		1	1	1		1	1
* <u>Rubus procerus</u>	1		1			1	2	1	1
<u>Dianella tasmanica</u>	1							+	1
<u>Senecio sp.</u>	1								1
<u>Geranium potentilloides</u>	1	1	1	1	1		1	1	1
<u>Gonocarpus tetragypus</u>	1	1	1	1	1		1		
<u>Billardiera scandens</u>	+		1					+	
<u>Poa tenera</u>	1	2	1	1	1	1	1	1	2
<u>Pimelea axiflora</u>	1								
* <u>Cotoneaster glaucophyllus</u>	+						1		
<u>Hydrocotyle hirta</u>	1	1		1	1	1		1	1
<u>Pandorea pandorana</u>	+				1				
<u>Oxalis corniculatus</u> sens.lat.	+	1	1	1		+	1	+	1
<u>Ranunculus plebeius</u>	+		1	1				+	
<u>Microlaena stipoides</u>	1			1		1	1		
* <u>Dactylis glomerata</u>	1	1	1	1		1	1	1	
* <u>Hypochoeris radicata</u>	1	1	1	1		1	1		1

Species	Quadrat Number								
	' 1	' 2	' 3	' 4	' 5	' 6	' 7	' 8	' 9
<u>*Pittosporum undulatum</u>	1	1	1	1	1	1	1	1	2
<u>Acaena anserinifolia</u>	1		1	1		1	1		1
<u>Viola hederacea</u>	1	1	1	1	1		1	1	1
<u>Wahlenbergia quadrifida</u>	+							+	
<u>*Taraxacum officinale</u> spp. agg.	+						1		
<u>*Holcus lanatus</u>	1						1	+	
<u>*Vicia sativa</u>	+				1		1	1	1
<u>Dichondra repens</u>	1			2					
<u>*Coprosma repens</u>	+								
<u>Clematis aristata</u>		1	1	1	2	1		1	1
<u>Chiloglottis gunnii</u>		1	1	2	1				
<u>Olearia argophylla</u>		2			+				
<u>Pterostylis scrabrida</u>		1	1	1	1	1	1	1	
<u>Pterostylis longifolia</u>		+			+			+	
<u>Veronica calycina</u>		1	1	1	1	1	1		1
<u>Polyscias sambucifolius</u>		1							
<u>*Ilex aquifolium</u>		1	2	1	1	1	1	1	+
<u>Eucalyptus radiata</u>		1		3		1	1		
<u>Coprosma quadrifida</u>		+	1			1			
<u>Tetratheca ciliata</u>		1	1			1			
<u>Galium</u> sp.		1		1	1	1			1
<u>Senecio minimus</u>		+	+	1	+	+			
<u>*Ligustrum vulgare</u>		+							
<u>*Juglans</u> sp.		+							
<u>*Acer pseudoplatanus</u>		+	1						
<u>*Plantago lanceolata</u>		1	1	1		1	1		
<u>*Erica lusitanica</u>			1						
<u>*Berberis darwinii</u>			1						
<u>*Briza maxima</u>			1				1		
<u>*Crataegus monogyna</u>			1				2	+	
<u>Poranthera microphylla</u>			1						
<u>*Prunus laurocerasus</u>			1						+
<u>*Cotoneaster pannosus</u>			1				1		
<u>Eucalyptus cypellocarpa</u>			1	1	+	5	3		
<u>*Cornus capitatus</u>			1		+		+		
<u>Carex breviculmis</u>			1	1		1	+	+	

Species	Quadrat Number								
	'1	'2	'3	'4	'5	'6	'7	'8	'9
<u>*Pinus radiata</u>			1		+	+		+	I
<u>*Quercus robur</u>			+				1		
<u>Danthoria penicillata</u>			1						
<u>*Malus x domestica</u>			1						
<u>Cassinia aculeata</u>			1	+		1		1	
<u>Helichrysum dendroideum</u>			1	1	+			+	
<u>*Cotoneaster horizontalis x pannosus</u>			+			+			+
<u>*Centaurium erythraea</u>			1	1					
<u>*Anthoxanthum odoratum</u>			+						
<u>Dianella revoluta</u>				1					
<u>Luzula meridopnal var. densiflora</u>				1					
<u>Glycine clandestina</u>				1			1		
<u>Stackhousia monogyna</u>				1	1	1			I
<u>Lepidosperma elatius</u>				1			1	+	
<u>Prunella vulgaris</u>				1		1	1		
<u>*Crepis capillaris</u>				1					
<u>Senecio glomeratus</u>				+			1	1	
<u>Linum marginale</u>				1					
<u>*Myosotis sylvatica</u>				+				+	+
<u>*Trifolium repens</u>				1		+	1		
<u>*Agapanthus orientalis</u>				1				+	+
<u>Pterostylis pedunculata</u>					+				
<u>Lomandra longifolia</u>					+				
<u>*Pittosporum eugenoides</u>							+		
<u>Goodenia ovata</u>							1		1
<u>*Bromus catharticus</u>							+		
<u>*Cirsium vulgare</u>							+	1	
<u>*Cytisus proliferus</u>								3	
<u>*Galium aparine</u>								1	
<u>Sigesbeckia orientalis</u>								1	1
<u>*Lotus corniculatus</u>								1	
<u>*Agrostis capillaris</u>								2	
<u>*Geranium dissectum</u>								1	
<u>*Anagallis arvensis</u>								1	1
<u>Plantago debilis</u>								1	1
<u>*Scilla sp.</u>								1	

Species	Quadrat Number								
	' 1	' 2	' 3	' 4	' 5	' 6	' 7	' 8	' 9
<u>*Vulpia myuros</u>							1		
<u>*Trifolium sp.</u>							1		
<u>*Trifolium glomeratum</u>							1		
<u>*Rumex conglomeratus</u>							1		
<u>*Poa annua</u>							1		
<u>*Juncus bufonius</u>							1		
<u>*Cynosurus echinatus</u>							1		
<u>*Hypericum androsaemum</u>							1		
<u>Hydrocotyle laxiflora</u>							1		
<u>Acacia dealbata</u>							2		
<u>Gastrodia sesamoides</u>									+
<u>Senecio quadridentatus</u>									1
<u>Prostanthera lasianthos</u>									1
<u>Asperula scoparia</u>									+
<u>Exocarpos cypressiformis</u>									1
<u>*Sarothamnus scoparius</u>									1
<u>*Cupressus sp.</u>									+