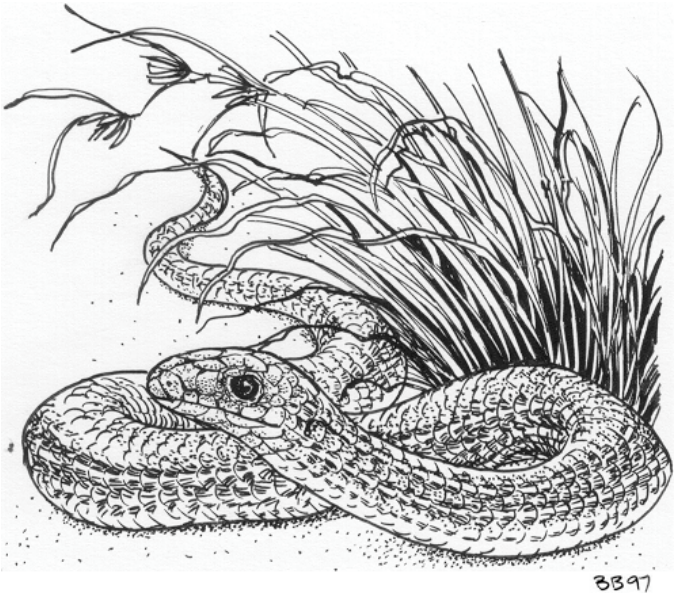
CRAIGIEBURN GRASSLAND

Interim Management Statement



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This Interim Management Statement was written by James Ross.

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'Effective vegetation management is management in a vacuum. So never get sucked in to doing nothing.'

- Ian Lunt 1992.

SUMMARY OF MANAGEMENT OBJECTIVES AND DIRECTIONS

INTERIM MANAGEMENT OBJECTIVES

- ***Maintain existing conservation values and biodiversity across the area.***
- ***Secure and maintain habitat for significant flora and fauna and vegetation communities.***
- ***Restore and enhance native vegetation communities.***
- ***Control short and long-term processes that will affect conservation values.***
- ***Facilitate scientific research and environmental monitoring.***
- ***Conserve features of archaeological, historical and cultural significance.***
- ***Allow for the future development of limited areas for public education and appreciation of grassland conservation.***
- ***Cooperate with local, State and interstate government authorities, the community and other interested organisations to assist with the management of the grassland.***

INTERIM MANAGEMENT DIRECTIONS

THREATENED SPECIES
Maintain habitat for rare or threatened flora and fauna and control or eliminate processes that threaten populations of these species.

BIOMASS REMOVAL
Maintain stock grazing as the primary tool for controlling biomass across the grassland in the short term. Grazing will be conducted under a licence with specific clauses to ensure that conservation objectives are met.

GRAZING EXCLUSION
Exclude stock from areas that support sensitive flora species and communities either on a permanent or seasonal basis.

TRIAL ALTERNATIVE MANAGEMENT REGIMES
Establish trials to investigate the potential benefits of alternative management regimes including restricted grazing and burning.

MONITORING
Develop effective monitoring programs for flora and fauna to assess overall management and to compare the outcomes of different management regimes.

PEST PLANTS AND ANIMALS
Control and where possible eliminate pest plants and animals especially where they pose an immediate threat to significant species or communities.

SPECIAL MANAGEMENT AREAS
Develop and implement specific management programs for those areas or communities with special issues or significance.

INFRASTRUCTURE
Erect signs to notify all persons of the status of the grassland. Provide and maintain adequate fencing and access tracks for the management and protection of the site.

VISITOR MANAGEMENT
Control and manage visitation to ensure that public access does not threaten conservation values.

HERITAGE PROTECTION
Identify and protect cultural and heritage values throughout the grassland.

EXISTING USES
Investigate the incorporation of public road reserves into the Reserve and ensure that all public authorities are aware of the conservation values and status of the grassland.

CONTENTS

1. INTRODUCTION

In 1996 the Victorian Government made a commitment to acquire the Craigieburn Grassland to be protected and managed as a Flora and Fauna Reserve under the *National Parks Act*.

The proposed purchase and inclusion of the Craigieburn Grassland in Victoria's reserve network will be a significant advance for grassland conservation at both a State and National level. It will be the largest protected area of native grassland communities in the Victorian Volcanic Plains Bioregion. The site supports a community of national significance, Western Basalt Plains Grassland, and provides habitat for several highly threatened species including Swollen Swamp Wallaby-Grass, Curly Sedge, Tough Scurf-pea, Striped Legless Lizard and Plains-wanderer.

Past experience with grassland management, together with the results of recent research, suggest that appropriate strategies should be developed and implemented for the long-term protection and management of conservation values.

A proposal to construct a Freeway in the vicinity of the grasslands is currently being investigated. Several route options traverse north-west across the north-east corner of the Grassland crossing Curly Sedge Creek south of a seasonal wetland (referred to in this document as 'Curly Sedge Swamp') (Map 1). For the purposes of this Interim Management Statement the area to be included within the formal Reserve is all the grassland south of that alignment and north of O'Herns Road (approximately 330ha). Pioneer will retain ownership of land in the northeastern corner of the grassland (approximately 95ha) containing a quarry area, pasture and some important conservation values. It is proposed that management of the conservation attributes of this area be conducted by agreement with the owners, consistent with the management arrangements outlined for the Craigieburn Grassland in this statement and recognizing Pioneer's continuing use of the land. The City of Whittlesea is commencing negotiations to purchase the area to the south of O'Herns Road. If purchased this area would be managed in accordance with the principles outlined in this Interim Management Statement.

2. PURPOSE OF THIS INTERIM MANAGEMENT STATEMENT

This Interim Management Statement will guide management of the Craigieburn Grassland in the short term following the purchase and dedication of the new protected area.

The key purposes of the Interim Management Statement are to:

a) Detail the context for management of the Craigieburn Grassland as a whole and the (interim) management arrangements necessary for maintaining the existing values of the property.

b) Develop a framework for establishing an appropriate ecological monitoring program to determine whether the key management objective of maintaining existing values is being achieved in the short term.

c) Summarise broad options for enhancing the conservation values of the property in the longer term.

d) Summarise research and monitoring programs required to determine the relative merits of alternative management programs for maintaining or enhancing these values.

3. DESCRIPTION

The Craigieburn Grassland is located east of the Merri Creek and mainly between O'Herns Road and Craigieburn Road East (Map 1). A further area of remnant vegetation, the O'Herns Road Grassland, is to the south of O'Herns Road. The majority of the site is open plain punctuated by stony ridges with the Merri Creek and its escarpment forming the western boundary. Curly Sedge Creek and an associated seasonal wetland (referred to in this statement as 'Curly Sedge Swamp') is a significant landscape and conservation feature of the northeastern and eastern sections of the grassland.

The landscape of the region is dominated by basalt flows of the 'newer volcanics' that date from the late Tertiary into the Pleistocene. The vast majority of soils in the area are derived from basalt. Differences presumably reflect different lava flow events and subsequent weathering and re-distribution, with drainage being a major contributing factor. The soils vary in their exposure of surface rock, depth, colouration, structure and tendency to crack and develop gilgai. Annual rainfall averages 600 mm at Craigieburn. Mean daily temperatures are probably similar to those recorded at Laverton, where the mean daily temperature is highest in February (26°C) and lowest in July (13°C). Mean minimum temperatures vary from 13.7°C to 4.5°C in February and July respectively (Frood 1992).

4. SUMMARY OF CONSERVATION VALUES

NATURE CONSERVATION

At the time of European settlement native grassland and grassy woodland communities were the dominant vegetation type across one-third of Victoria. Today it is estimated that less than 0.5% of the original extent remains, mostly as small scattered remnants (DCE 1992). All temperate lowland native grassland and grassy woodland communities are now threatened in Victoria. Native grasslands were once the major vegetation type on the Victorian Volcanic Plain covering thousands of square kilometres but have been reduced to just a few thousand hectares through agricultural and urban development. Only a tiny fraction of the former extent of the Western Basalt Plains Grassland community remains relatively intact (Stuwe, 1986; McDougall & Kirkpatrick 1994) and the community is poorly represented in conservation reserves (Frood 1989; Muir 1994). Cobra-Killuc Wildlife Reserve, Derrimut Grassland Reserve, Laverton North Grassland Reserve and Mortlake Common protect small remnants of Western Basalt Plains Grassland. These reserves are complemented by high-quality remnants in cemeteries and on road and rail reserves and by a few relatively large areas remaining on private land.

Western Basalt Plains Grassland is listed as a threatened community under Schedule 2 of the *Flora and Fauna Guarantee Act 1988 (FFG Act).* The community supports a large number of threatened plant and animal species including many that are also listed under the *FFG Act* in Victoria.

The Merri Creek extends from its headwaters in the Kilmore Gap to the confluence with the Yarra River at Dights Falls in Melbourne. Along its length the Creek and surrounding plains retain remnants of the original riparian, grassy woodland, wetland and plains grassland vegetation communities. The Merri Creek valley is at the eastern edge of the Victorian Volcanic Plain Bioregion. The Plenty valley and the foothills of the Central Victorian Uplands lie to the east, while to the north the Kilmore Gap leads through the Great Dividing Range to the Northern Inland Slopes and the Victorian Riverine Plains. The location of the Craigieburn Grassland close to the transition zones of these major biogeographic regions is strongly reflected in the diversity of flora and fauna recorded from the area.

The Craigieburn Grassland is regarded as being of National significance for both flora and fauna conservation (Peake *et al* 1996; Beardsell 1997). A major aspect contributing to this significance is its size and continuity. The Grassland includes intact volcanic stream and plain landscapes and a range of vegetation communities. This diversity of habitats supports the most diverse and significant native grassland fauna and flora assemblage on the eastern Victorian Volcanic Plains.

The Grassland, together with the Cooper Street Grassland to the south and the connecting link along the Merri Creek, has been placed on the Interim List of the Register of the National Estate.

The specific flora and fauna conservation values of the site are detailed in Peake *et al* (1996), Beardsell (1997) and Frood (1992) and in Appendices 1 & 2.

A total of 242 indigenous vascular plant taxa have been recorded for the site, including 3 taxa of National significance, 10 of State significance (including four of possible National significance) and 112 of regional significance. Craigieburn Grassland supports major Victorian populations of Swollen Swamp Wallaby-grass (*Amphibromus pithogastris*), Blown Grass (*Agrostis aemula* var. *setifolia*), Curly Sedge (*Carex tasmanica*), Mountain Psoralea (*Cullen microcephalum* (Hawkesdale)) and Tough Psoralea (*Cullen tenax*). Flora species of National and State significance that occur here (and many of those of Regional significance) are very poorly reserved or are unrepresented in conservation reserves in Victoria.

The Grassland supports large areas of relatively intact Western Basalt Plains Grassland, Stony Knoll Grassland and Grassy Wetland vegetation communities. These communities are all poorly or not represented in the conservation reserve system and are regarded as being amongst the most threatened vegetation communities in Victoria. A number of other vegetation communities are also present that are regarded as significant on a state or regional level including Riparian and Escarpment communities (Frood 1992; Peake *et al* 1996) (see Appendix 3).

The fauna recorded from the site is highly diverse and reflects the range and rarity of habitats available. Many species that are rare and threatened in Victoria or across the Victorian Volcanic Plain have been recorded from the Grassland. The native vertebrate fauna comprises 19 mammal species, 106 bird species, 10 amphibian species, 17 reptile species and 10 fish species. This includes 2 species of National Significance (Plains-wanderer and Striped Legless Lizard), 3 of State significance (Black Falcon, Red-chested Button-quail and Freshwater Blackfish) and 24 species of regional significance. Suitable habitat exists for several other fauna species of State or National significance including the Grassland Earless Dragon and further survey is required to determine the status of these species within the study area and the region. While, the invertebrate fauna is well studied compared to other grassland sites, the actual level of knowledge is poor. A preliminary invertebrate survey found that Craigieburn Grassland has the highest species diversity of any site sampled (134 native species) including 3 that are known to be of regional significance (Yen *et al*, 1993).

In addition to the specific values identified, the status of grassland communities in Victoria suggests that populations of grassland dependent species will continue to decline. Craigieburn Grassland is an important refuge for many species that may become threatened throughout their range in the future. Similarly, the Grassland provides significant habitat for the survival of many species on a regional basis and as potential habitat for the re-introduction of species that have become extinct or declined on the Victorian Volcanic Plain.

HERITAGE CONSERVATION

The valley of the Merri Creek contains a number of resources including abundant food, water, shelter and materials that would have attracted aboriginal people. The valley also provided a north-south route between the Great Dividing Range and the Yarra. The area to the north of Melbourne was one of the earliest regions to be settled by Europeans. Land along the Merri Creek near the present day Craigieburn was first surveyed in 1837 although land sales around this area were slow as the area was largely timberless and stony (Ellender 1997).

The Craigieburn Grasslands includes a number of sites and features that have significant heritage values including pre-European artefact scatters and scarred trees, and post-European settlements include the ruins of a farming complex, stone dwellings, a well, gardens, stone walls and fords (Hall 1989; Ellender 1997; Scarlett, *pers. comm.*). Several of these sites are regarded as being of very high significance (Ellender 1997). In addition to their inherent value, they are of considerable importance in interpreting the overall conservation values of the grassland.

5. MANAGEMENT OBJECTIVES

The objects of the *National Parks Act 1975* for areas of land included under Schedule 3 are: to make provision for the protection and preservation of indigenous flora and fauna and of features of scenic or archaeological, ecological, historic or other scientific interest; and, subject to the foregoing, make provision for public enjoyment, education and scientific studies and research.

The Craigieburn Grassland should be assigned to Category Ia of the IUCN list of National Parks and Protected Areas (ANCA 1996). Category Ia – Strict Nature Reserve: Protected area managed mainly for science – is defined as an, *"Area of land and/or sea possessing some outstanding or representative ecosystems, geological or physiographical features and/or species, available primarily for scientific research and/or environmental monitoring*".

The (interim) management objectives for the Craigieburn Grassland are derived from the objects of the *National Parks Act 1975* and the Application of IUCN Protected Area Management Categories.

- ***Maintain existing conservation values and biodiversity across the area.***
- ***Secure and maintain habitat for significant flora and fauna and vegetation communities.***
- ***Restore and enhance native vegetation communities.***
- ***Control short and long-term processes that will affect conservation values.***
- ***Facilitate scientific research and environmental monitoring.***
- ***Conserve features of archaeological, historical and cultural significance.***
- ***Allow for the future development of limited areas for public education and appreciation of grassland conservation.***
- ***Cooperate with local, State and interstate government authorities, the community and other interested organisations to assist with the management of the grassland.***

The maintenance of existing conservation values, control of processes that affect conservation values and the establishment of appropriate research and monitoring are of immediate concern. Hence these management objectives are of most relevance in the context of this Interim Management Statement.

Within the time frame of this Interim Management Statement the Management Objectives will be effected through implementing the Interim Management Directions identified throughout this document.

6. MANAGEMENT CONTEXT

HISTORICAL

European explorers first described the region surrounding the Craigieburn Grassland in 1824. Hume and Hovell climbed Mount Fraser near Beveridge and saw '…. plains and open forest … falling with gradual descent towards the south' (Hume and Hovell, 1825). They reported few trees amongst the grassland and deeply cracked dry ground. They also noted 'natives having fired the grass'. In subsequent years the plains and hills around Craigieburn were referred to as being generally sparsely timbered with abundant surface rock and destitute of water save for the Merri Creek. Trees were said to include She Oaks, Lightwood, Banksia and Gum. Although the land was surveyed in 1837, land sales in Craigieburn were still reported to be slow in 1887 despite the Merri Creek frontages and the rail line (Ellender 1997). The stony nature of the open grasslands would have been a major discouragement to agricultural development. The ruins of an old farming settlement near the Merri Creek within the grassland includes stockyards and pens and nearby a small area shows evidence of having been cleared of rocks and worked with a mould-board plough. It is likely that these inhabitants leased the area from land speculators. The pattern of relatively low-intensity stock grazing across the grassland that was established in the early years of settlement has been largely continued through to the present day.

STRATEGIES & PLANS

Numerous government policies and legislative instruments are of direct relevance to the management and protection of the grassland. These include the Victorian and Commonwealth Biodiversity Strategies (DNRE 1997; Commonwealth of Australia 1996), the National Reserve System Program, the *FFG Act* and the Draft Conservation Program for Native Grasslands and Grassy Woodlands in Victoria (DCE 1992). Action Statements have been developed by DNRE for the Striped Legless Lizard, Plains-wanderer, Grassland Earless Dragon and Western Basalt Plains Grassland Community. Action Statements that may also be of relevance have been prepared for the Eastern Barred Bandicoot, Sunshine Diuris, Brolga and Bush Stone-curlew.

RECENT RESEARCH

Many recent advances in our understanding of the effects of different management regimes on temperate grasslands have been obtained from regional surveys of sites with contrasting management histories (eg. Stuwe and Parsons 1977; Hadden 1995; Kirkpatrick and Gilfedder 1995; McIntyre *et al.* 1995; Prober and Thiele 1995; Lunt 1995, 1997).

Highly relevant studies on the management of Western Basalt Plains Grasslands have been recently conducted at Derrimut and Laverton North Grassland Reserves (Lunt and Morgan 1998). These studies investigated the changes in vegetation at the reserves following the replacement of stock grazing with intermittent burning. The control and management of invasive weed species in grasslands has also received considerable attention (Morgan 1989; Hocking, in prep; Phillips and Hocking 1996; Gardiner and Sindel, in prep).

Broad conclusions that may be drawn from this recent research are that:

- The type, frequency and consistency of management intervention, or lack of it, has a profound influence on the composition of grassland flora and fauna.
- Stands of Kangaroo Grass (*Themeda triandra*) in productive grasslands are not sustainable in the absence of biomass removal by burning, grazing, or slashing. Extensive mortality occurs if biomass removal is not conducted frequently.
- In reserves managed by burning (and presumably by slashing also), fire intervals of five years or more are likely to lead to substantial mortality of Kangaroo Grass.
- Maintaining a healthy sward of Kangaroo Grass (for example, by burning frequently) may prove a cost-effective way of minimising invasion by Chilean Needle-grass.
- Extended periods without fire (or other methods of biomass removal) promote substantial invasion by perennial exotic plants.
- Long-term fire exclusion had no adverse effect on exotic annual plants, which rapidly recovered after the area was eventually burnt.

CURRENT MANAGEMENT

The site is divided into four main areas (See Map 1). Fencing is post and wire and in places includes old stone fences as a base. Without added wire the existing stone fences found throughout the land are not adequate to control stock.

The current owners of the Craigieburn Grassland (north of O'Herns Road) utilise the area as a buffer for their quarrying operations to the north of Craigieburn Road East. The owners have leased the land for stock grazing to Peter Brewer since 1979. The area used for grazing is a total of 420ha in four paddocks. Approximately 1,500 merino wethers are stocked for wool production and 25 beef cattle graze in the north of the site (A1 and A2) (Peter Brewer, *pers. comm*.).

There are stock dams at the extreme north (A2) and in the centre of the grassland (C). Sheep are either brought into A2 initially for three years then moved to section B, or brought into section C where they remain. All wethers are retained for 4-5 years. Stock grazing is excluded from much of the Merri Creek riparian zones and the escarpment, and from land adjoining large bends of the Merri.

Supplementary feeding is occasionally provided for cattle. Superphosphate and introduced pasture seed has been applied in parts of section A1 during the current lessees occupation.

The current lessees have been responsible for weed management on the property. Effort has been made to control Serrated Tussock, Artichoke Thistle, Spiny Rush and other agricultural weeds across the grassland using herbicides and patch burning. Resources available for this work are limited and some assistance has been received from the Department of Natural Resources and Environment.

The area south of O'Herns Road is currently vacant land with no stock grazing present.

VEGETATION RESPONSE TO CURRENT MANAGEMENT

The existing high conservation values across the site could be taken as evidence that the current grazing management is relatively benign. However, several authors have suggested that stock grazing is detrimental to the maintenance of conservation values, either as a continuous management practise or in dry seasons (Moore, 1964; Lunt, 1991; Frood, 1992; Schulz and Webster, 1991; Beardsell 1997).

The condition of vegetation where stock have been excluded is noteworthy in this context. In general, stock exclusion for prolonged periods has allowed regeneration and growth of indigenous woody species, including Sheoke, Acacias, Grevillea, Sweet Bursaria and Tree Violet as well as weeds such Furze, Sweet Briar and Hawthorn. Where stock have been excluded from areas on deeper soils that would once have supported plains grassland communities (eg. south of O'Herns Road), rapid and almost complete domination of introduced pasture and shrub species including Chilean Needle Grass, Yorkshire Fog, Sweet Briar and Gorse has generally occurred. On the other hand, areas of Stony Knoll Grassland, Escarpment Shrubland, riverine areas and seasonal wetlands all appear to be in better condition in those areas where stock grazing is absent.

In the exceptionally dry summer of 1997/98, stock were removed from the central section (B) by the lessee to prevent damage to vegetation communities. In April 1998 this area had a healthy and vigorous cover of native grasses with some forbs on stony rises and floodplain grassland. The presence of threatened pea species (*Cullen microcephalum,* ?*Glycine latrobeana*) within the ungrazed floodplain grassland was of particular note. Grasslands on the Silt Plains were very sparse. In contrast, the area to the south (C) where stock had continued to graze had very low native grass cover (except for *Poa* tussocks) with considerable bare ground. It is clear that sheep in this area have grazed Chilean Needle-grass in preference to *Poa* tussocks.

7. THREATENED SPECIES CONSERVATION

The protection and enhancement of suitable habitat for threatened plant and animal species is an essential component of the overall conservation management of the grassland. In developing an overall management strategy for the site the following requirements should be considered.

Plains-wanderer

The Plains-wanderer is a ground dwelling bird that occurs in sparse native grassland. Key habitat is sparse low grass cover with an open tussock habitat and occasional dense clumps for nesting. Relatively large areas of habitat are required with a typical home range of 10 ha or more (Baker-Gabb 1995, 1998). Within the Craigieburn Grassland the most suitable habitat occurs in Plains Grasslands and seasonal wetland areas. The suitability of Stony Knoll Grassland as habitat is unknown and

hence the total area of available habitat within the site is unclear. The major threats to the Plains-wanderer and its habitat within the Craigieburn Grassland are fox predation, overgrazing in spring and summer (especially in drought years), lack of grazing allowing dense grass growth, and extensive fires that cause a reduction in suitable habitat.

Plains-wanderers are extremely cryptic and their actual population levels are difficult to determine. In recent years there have been a number of records in the Craigieburn-Whittlesea area including a breeding record in the north central section of the Craigieburn Grassland in open Plains Grassland dominated by Wallaby Grass (Beardsell 1997).

Striped Legless Lizard

The Striped Legless Lizard is a grassland specialist being only found in areas of native grassland and nearby exotic pasture. The known habitat for this species in southern Victoria is typically dominated by Kangaroo Grass with a cover of greater than 50% and a low cover of embedded rocks (Hadden 1995). Within Craigieburn Grassland the most suitable habitat occurs in Plains Grassland (including those dominated by either *Poa* or *Danthonia* species), Stony Knoll Grassland and Pasture. The major threats to the Striped Legless Lizard within Craigieburn Grassland are intensive grazing, extensive fires (either deliberate or wildfires), predation and illegal collection (Webster *et al* 1992).

Striped Legless Lizards have been recorded from several sites along the Merri Creek including two sites within Craigieburn Grassland (Peake, *et al* 1996). There has been little search effort for this species at Craigieburn and the distribution of records indicates that it may be found across most of the site.

Grassland Earless Dragon

The Grassland Earless Dragon is found in tussock grasslands dominated by Wallaby Grass, Spear Grass and occasionally Kangaroo Grass. In Victoria, recent sightings have occurred on rocky escarpment grasslands and woodlands with abundant surface rocks and moderate to sparse native grass cover. Craigieburn Grassland offers large areas of suitable habitat within Stony Knoll Grasslands and near the top of the Merri Creek escarpment. Major perceived threats are habitat loss and fragmentation, and degradation of remaining areas of habitat by changed fire regimes, changed grazing regimes, weed invasion, and predation by introduced animals (Brereton and Backhouse 1993).

This animal is extremely rare in Victoria. Five sightings were reported between 1988 and 1990: one from the upper reaches of Merri Creek, one from Holden Flora Reserve, and three from the Little River, west of Werribee. Intensive trapping surveys at these locations and other areas of suitable habitat (including Craigieburn) over the past three years have failed to locate the Grassland Earless Dragon (Robertson and Webster, *in prep.*). A reported sighting at the Craigieburn Grassland in 1990 (Beardsell 1997) requires further investigation.

Threatened Flora

Most of the significant flora species that are known to occur at Craigieburn are threatened throughout their range by habitat loss through agricultural and urban development, weed invasion and grazing by introduced species. Management of grazing pressure within Craigieburn Grassland including exclusion from sensitive areas and on a trial seasonal basis and the implementation of a sound weed management strategy will largely mitigate these threats. The maintenance of suitable water flows within Curly Sedge Creek is vital to the survival of populations of Curly Sedge and Narrow Plantain (*Plantago* aff *gaudichaudii* (lowland swamps)).

Specific management requirements for all threatened flora are described in Peake *et al* (1996).

INTERIM MANAGEMENT DIRECTION – THREATENED SPECIES

Maintain habitat for rare or threatened flora and fauna and control or eliminate processes that threaten populations of these species.

8. INTERIM MANAGEMENT ARRANGEMENTS

The following management arrangements are considered necessary to maintain the existing conservation values of the site in the short to medium term and to develop a framework for an ecological research and monitoring program aimed at determining whether key management objectives are being achieved.

OVERALL MANAGEMENT FRAMEWORK

> *'Adaptive management is a formal process for continually improving (resource) management policies and practices by learning from the outcomes of operational programs. Its most effective form – "active" adaptive management – is characterised by management programs that are designed to experimentally compare selected policies or practices by testing alternative hypotheses about the system being managed.'*
>
> (British Columbia Forest Service 1998).

The adoption of adaptive management principles in the management of the Craigieburn Grassland will emphasise that learning from management outcomes is a specific objective of conservation management. The following approach recommended by Lunt and Morgan (1998) will be adopted.

(1) Retain pre-existing management as the primary management tool, so that the impacts of alternative management regimes can be compared against the *status quo*;
(2) Consistent implementation of a small number of different management regimes in replicated areas within each community rather than instituting one regime across the entire reserve;
(3) Fully document all management activities within each treatment; and
(4) Establish monitoring regimes that will explicitly compare the outcomes of the different management regimes.

BIOMASS REMOVAL

In order to maintain suitable habitat for a range of flora and fauna species the density of standing grass vegetation must be controlled. Grazing by domestic stock should be retained as the primary means of achieving this aim. It is emphasised that in this context stock grazing is employed as a tool for achieving a specific management outcome rather than a commercial use. The maintenance of grazing is a conservative option to retain existing values in the short to medium term while investigating overall management practices.

It is highly desirable that a consistent and complementary stock grazing regime be developed for the grassland as a whole including those areas retained by Pioneer. Negotiations should be conducted with this company with the aim of a single coherent grazing management strategy that also recognizes Pioneer's continuing use of the land.

Stock grazing on the grassland should be conducted under a fixed term licence. The terms of the licence should include specific clauses relating to stocking rates, timing and areas of grazing, feeding, watering points, stock exclusion (including total removal of stock under drought conditions), infrastructure maintenance and pest plant and animal control. All stock numbers, type and movements must be recorded. The renewal of the licence should include a review of these factors based on outcomes of the previous licence period. Suggested terms of the licence are included in Appendix 4.

The maintenance of the existing paddock structure will allow for some degree of stock rotation and control. Additional fencing of sensitive areas is required. Further fencing will also need to be established to facilitate grazing and burning trials (see below). These should be removable or temporary where possible.

INTERIM MANAGEMENT DIRECTIONS – BIOMASS REMOVAL
Maintain stock grazing as the primary tool for controlling biomass across the grassland in the short term. Grazing will be conducted under a licence with specific clauses to ensure that conservation objectives are met.

The existing basic grazing regime should be modified to promote regeneration of grassland flora without compromising the need for biomass removal across the site in general.

- Stock grazing should be excluded from an additional 30 metre strip along the Merri Creek Escarpment.
- Stock grazing should be excluded during spring and summer from areas along Curly Sedge Creek that support significant *Cullen* and *Glycine* species
- With the agreement of Pioneer, sheep should be excluded from Curly Sedge Swamp during spring and summer and cattle should be excluded from the Swamp at all times.

- Stock grazing should be excluded where it is disturbing sites of heritage significance (see *Heritage* below)
- The current stocking rate (of approximately 3.5 dse per ha) should be reduced to approximately 2.5 dse per ha*. The total number of stock should be assessed with reference to areas that have been excluded from grazing.

Small mobs of Eastern Grey Kangaroos utilise the grassland for habitat. At present, kangaroos appear to make little contribution to the overall grazing pressure. Although it is not expected that the number of kangaroo will increase substantially in the short term, some effort should be made to monitor the population. Stock exclusion plots will generally not exclude kangaroos and some limited evidence of the extent of macropod grazing could be gained from observations within these trials.

INTERIM MANAGEMENT DIRECTION – GRAZING EXCLUSION
Exclude stock from areas that support sensitive flora species and communities either on a permanent or seasonal basis.

RESEARCH AND MONITORING

Maintaining the current year round grazing regime is a conservative option for the initial management of the grassland. The potential of other management regimes to maintain or improve biodiversity values should be investigated. It is proposed that trials be established to investigate the effects of:

- excluding grazing on a rotational basis.
- excluding grazing on a seasonal basis.
- using fire for biomass removal.
- excluding grazing from substantial areas of Stony Knoll Grassland.
- stock grazing as a means of controlling dense stands of Needle Grass (see *Pest Plants and Animals*).

Grazing exclosures in Plains Grassland will be relatively large (1 ha) and use removable/collapsible fencing. They will be replicated across each of the major tussock grass communities. Burning trials will be conducted as small plots within grazing exclosures. Some efficiency may be gained through linking fenced Stony Knoll areas with exclosure plots.

Management regimes that could be tested within these exclosures should be:

1. Exclude grazing for a full twelve months (May-April inclusive) for one year in three.
2. Exclude grazing from September-February inclusive every year.
3. Exclude grazing.
4. Normal grazing (control).
5. No burning.
6. Burn every one to three years within each grazing treatment.

INTERIM MANAGEMENT DIRECTION – TRIAL ALTERNATIVE MANAGEMENT REGIMES
Establish trials to investigate the potential benefits of alternative management regimes including restricted grazing and burning.

Vegetation Assessment

Vegetation monitoring will be directed at assessing the outcomes of different management regimes. Outcomes should be assessed after one year and three years with a final assessment after six years. Assessment methods will involve quadrat surveys, censuses of threatened species and vegetation structure. Some assessment should also be made of the relative populations of regionally significant species under various management regimes, including the status quo. Based on the assessment results, the effects of the different regimes can then be compared. Issues such as which regime promoted native diversity, minimised weed invasion, or promoted a particular threatened species, can then be addressed.

Areas from which stock have been excluded to promote vegetation regeneration or rare species conservation, such as sections of Curly Sedge Creek, Stony Knolls and the Merri Creek escarpment should also be assessed to ensure that the objectives of these treatments are being achieved and that possible deleterious effects including excessive grass cover and/or weed growth can be controlled.

In addition to specific monitoring within the various management treatments, a monitoring grid should be established across the grassland as a whole to provide basic information of site condition. This grid should be based on 1m² quadrats on a 100m grid

* Lower stocking rates of, say 1.5 dse per ha may also achieve the desired reduction in biomass with less impact on native vegetation.

and include year "0" photopoints to ensure that the site's "original" condition is recorded (Morgan and Rollason, 1996; Lunt and Morgan, 1998).

Based on recent surveys at Derrimut and Laverton North and an analysis of native grassland quadrats across southern Victoria, Lunt and Morgan (in prep.) suggest that Common Everlasting (*Chrysocephalum apiculatum*) and Scaly Buttons (*Leptorhynchos squamatus*) may be useful indicators of management effects at grassland reserves on the Victorian Volcanic Plains. Both species have been recorded at relatively low frequencies in the Craigieburn Grassland (1.2% and 2.4% of quadrats respectively by Frood (1992)). They are easily identified and would provide useful indicators of management effects on sparse species. The authors also suggest that test lines or plots of these species could be established within grassland areas in order to facilitate management assessments.

Fauna Monitoring

Information on the presence and distribution of fauna across the grassland has not been systematically collected. Accordingly, there is little basis for assessing the actual effect of various management strategies on fauna populations. Therefore until such information is gathered, habitat structure and condition should be monitored as an analogue for fauna monitoring. Key indicators should be amount of bare ground, vegetation height and cover, and weed invasion. This data should be interpreted in reference to the potential habitat values of the various vegetation communities and the desired habitat characteristics for fauna, especially rare and threatened species.

Although a reasonable body of data has been gathered on the fauna values of the grassland there are some notable gaps in our knowledge of some aspects of the fauna and, in particular, the distribution of rare and threatened species across the grassland. The following further studies would provide both general and specific information towards addressing these apparent gaps. Many of these programs and projects would be suitable as joint projects in conjunction with universities or other interested bodies. While the completion of these projects would almost certainly be beyond the timeframe of this Interim Statement, they are included in this section for simplicity of presentation.

- Rudimentary analysis of predator scats can provide some indication of the fauna present on the site. Scats should be collected on a regular basis.
- A program of pitfall trapping is required across all vegetation communities to provide general baseline information on the distribution and abundance of ground-dwelling reptiles and small mammals. Detailed information should be sought on Grassland Earless Dragon, Striped Legless Lizard and Fat-tailed Dunnart. The existing 'spider-burrow' traplines for the Grassland Earless Dragon should be supplemented by small conventional pitfall traps that could also target other species.
- A spotlight survey program of one to two weeks per annum for three years is required to determine the distribution, abundance and habitat preferences of the Plains-wanderer across the Grassland. This survey would also provide information on the Fat-tailed Dunnart.
- A systematic survey of the Merri Creek and Curly Sedge Creek is required to determine fish and crustacean fauna.
- Further survey programs should also be conducted for Bats and terrestrial macroinvertebrates.

INTERIM MANAGEMENT DIRECTION – MONITORING
Develop effective monitoring programs for flora and fauna to assess overall management and to compare the outcomes of different management regimes.

FIRE

The use of fire within Western Basalt Plains Grasslands has been well-documented (Parsons & Stuwe 1977: Lunt 1991; Lunt & Morgan 1998; Craigie and Stuwe 1992). The trials proposed above are based on existing knowledge from previously grazed sites and will provide information on the applicability of fire as a tool to meet management objectives.

Although fires from natural and human sources would have been a part of the ecology of this region for many thousands of years, they have been largely excluded from the grasslands since European settlement. No fires have been recorded in the Craigieburn Grassland since at least 1979 (Peter Brewer, *pers. comm*.) with the exception of two recent managed burns to control Serrated Tussock. Extensive or frequent fires are likely to have profound effects on habitat for grassland fauna including threatened species. Accordingly, wildfire should be excluded from and prevented from occurring within the grassland. The Merri Creek, Craigieburn Road East and the O'Herns Road reserve are all effective fire breaks and these combined with the proposed stock grazing regime to reduce biomass levels will be sufficient to reduce the risk of fire within the grassland. While caution must be exercised in the conduct of trial burns no further controls should be developed. Under no circumstance should ploughed or graded firebreaks be constructed within the grassland.

PEST PLANTS AND ANIMALS

All of the grassland suffers from weed invasion to some degree, largely as a result of previous land use. The presence of weed populations and the potential for further spread poses a major threat to conservation values. Urgent and immediate action is required.

Priorities for control are:

Species	**Priority Areas**
Spiny Rush (**Juncus acutus*)	Margins of Curly Sedge Creek and Curly Sedge Swamp.
Chilean Needle-grass (**Nassella neesiana*) Fine Needle-grass *(*N. hyalina)* Pale Needle-grass *(*N. leucotricha)*	Large infestations east of Curly Sedge Creek, on the O'Herns Road Reserve and within the O'Herns Road Grassland. Smaller scattered occurrences throughout, especially in low-lying areas.
Serrated Tussock *(*Nassella trichotoma*)	Significant infestations on Stony Knolls in central sections and scattered plants throughout especially along the top of the Merri Creek escarpment.
Sweet Briar (**Rosa rubiginosa)*	Throughout southern half of grassland and south of O'Herns Road.
African Box-thorn (**Lycium ferocissimum*)	Merri Creek escarpment and Stony Knolls.
Hawthorn (**Crataegus monogyna)*	Principally on Merri Creek escarpment and Stony Knolls.
Furze (**Ulex europeaus)*	Dense infestations along the Merri Creek escarpment and south of O'Herns Road. Scattered infestations on Stony Knolls.
Montpellier Broom (**Genista monspessulana*)	Scattered outbreaks south of O'Herns Road and along the Merri Creek escarpment.
Artichoke Thistle (**Cynara cardunculus*)	Large infestations south of O'Herns Road and occasional infestations throughout Plains Grassland and pasture areas.
Toowomba Canary-grass (**Phalaris aquatica*)	In wetter areas and in areas protected from grazing (eg. south of O'Herns Road and along the Merri Creek.

Control of invasive **Nassella* species has been the subject of extensive research in both conservation and agricultural spheres (Hocking *in prep*; Gardiner and Sindel *in prep*). Methods for control include burning, selective and non-selective herbicides, and the mulching with Kangaroo Grass hay (Phillips and Hocking 1996). Infested areas should be fenced to exclude stock before treatment. The use of intensive grazing by sheep may be of benefit in reducing infestations of Chilean, Fine and Pale Needle-grasses in conjunction with other techniques. This method should be trialed in areas south of O'Herns Road.

Additional weed control may be required where grazing is to be excluded along the Merri Creek escarpment and on Stony Knolls (with reference to any applicable trials that are being conducted).

Further weed spread can be limited by reducing soil disturbance due to stock grazing or vehicles, ensuring weeds are not introduced through stock and stock feed and managing boundary areas especially along the Merri Creek. Poorly maintained industrial land along the Creek is a major potential source of weed propagules.

A number of pest animal species occur within the grassland and surrounding areas. Rabbits and hares are both present in moderate numbers. Rabbits are most populous near the Merri Creek escarpment where suitable burrows can be formed. Hares are found throughout the grassland. Foxes are common within the grassland due to the availability of both food and den sites. They represent a significant threat to conservation values and immediate efforts should be made to control them. It is also likely that cats are a significant predator on wildlife throughout the grassland. Control programs for all these species would be made more effective if conducted in conjunction with neighbouring landholders and with the land management bodies responsible for the Merri Creek and surrounding land.

Control of pest plants and animals will be the responsibility of the manager. Suitably qualified personnel must conduct all pest plant and animal control.

INTERIM MANAGEMENT DIRECTION – PEST PLANTS AND ANIMALS
Control and where possible eliminate pest plants and animals especially where they pose an immediate threat to significant species or communities.

SPECIAL MANAGEMENT AREAS

Stony Knolls

The reduction of grazing pressure across the site and the exclusion of grazing from a substantial area of Stony Knolls will greatly assist in the regeneration of shrubs and forbs in this community. Where grazing has been absent for many years, Stony Knolls support a diverse assemblage of shrubs and small trees including Drooping Sheoke *(Allocasuarina verticillata*), Sweet Bursaria (*Bursaria spinosa*), Tree Violet (*Hymenanthera dentata*), Hedge Wattle (*Acacia paradoxa*) and Black Wattle (*Acacia mearnsii*). Historically these areas are also likely to have supported Tree Banksia (*Banksia marginata* (Tree Form)). The development of some Knolls with a moderate tree and shrub cover will have considerable benefits for both flora and fauna diversity across the site. On more degraded Knolls there will be insufficient seed source for natural regeneration and some supplementary planting will be necessary. Plant material for propagation should be obtained from within the grassland area including O'Herns Road Grassland (or from Clarkefield or Deep Creek in the case of Tree Banksia). While regeneration of a more diverse structure is seen as desirable, caution must be exercised to ensure that ground flora is not excluded from such Knolls by shading (see Ross 1995) and that suitable habitat for threatened fauna such as the Grassland Earless Dragon and the Striped Legless Lizard is not compromised.

O'Herns Road Swamp and Grassland

The O'Herns Road Grassland supports many excellent examples of Stony Knoll and escarpment vegetation communities and this togther with the O'Herns Road Swamp at the eastern boundary greatly increases the natural diversity of the Craigieburn Grasslands as a whole. However, large areas within this site are infested with weeds. Management of this area should include the removal of woody weeds and the trial re-introduction of sheep grazing into defined areas as a means of reducing the cover of Chilean Needle Grass and Toowomba Canary-grass. Restoration programs for both degraded Stony Knolls and Plains Grassland areas can then commence. The wetland must be protected from all stock grazing.

Curly Sedge Swamp

Curly Sedge Swamp is wholly within the area to be retained by Pioneer and all management actions and decisions will be the subject of an agreement between the company and the government. This large seasonal wetland is dry throughout the warmer months of the year and has been substantially degraded by stock grazing and weed invasion. It is likely that at some stage in the past, minor earthworks have altered the hydrology of the wetland by lowering the outlet to Curly Sedge Creek. If this is determined to be the case, then the potential for restoring the original hydrology of the wetland should be investigated. This would increase both the depth of the swamp and the length of time that it remains inundated and would offer suitable habitat for a number of flora and fauna species that may have formerly occurred here and would also eliminate a substantial exotic component of the flora. Raised water levels would eliminate the existing population of Curly Sedge within the Swamp. However, it is likely that suitable habitat for Curly Sedge would be present around the margins of the 'restored' swamp and that it would either colonise this zone naturally or could be planted.

It is proposed that initially all stock should be excluded from this wetland on a seasonal basis: grazing would be restricted to sheep and then only when the soil surface is dry. If the swamp is modified to increase the depth and period of inundation then all grazing should be excluded throughout the year. A spreading infestation of Spiny Rush occurs on the margins of the Swamp. Control of this species is a high priority. Restoration planting is required around the swamp margins.

Spoil dredged from the small dams north of Curly Sedge Swamp has been dumped along the northern margins of the Swamp and on adjacent rises. The issue of spoil removal and location of suitable sites for spoil dumping should be discussed with Pioneer and addressed within the proposed Land Management Agreement. Relocation of existing spoil from the Swamp to a more suitable location could also be addressed in this agreement. Expert advice should be sought on the management of water run-off into the Swamp from these dams and the quarry to the north to ensure that this water is of suitable quality and quantity.

Merri Creek

The Merri Creek is a significant feature of the Craigieburn Grassland and the riparian and escarpment vegetation is of high quality. The creek corridor forms an important habitat link and is especially important for ground mammals (Beardsell 1997). The Creek contains fast-flowing riffle sections of basalt cobbles and tessellated pavement, slow-flowing open water, reedy pools and a shallow gorge with columnar basalt cliffs, boulder screes and escarpments (Schulz and Webster 1991). Management of the Creek's values requires the implementation of effective controls over development on the western bank of the Creek, targeted weed control and revegetation programs, maintenance of and improvements to water quality and quantity, and the protection of corridor values along the Creek and its tributaries.

INTERIM MANAGEMENT DIRECTION – SPECIAL MANAGEMENT AREAS

Develop and implement specific management programs for those areas or communities with special issues or significance.

INFRASTRUCTURE

Existing fencing is adequate for controlling stock but is generally in poor repair and should be replaced as required. Additional fencing will be needed along the Merri Creek Escarpment and for grazing exclusions throughout the property. Those parts of sections A1 and A2 that support significant conservation values (see Map 1) should be protected from intensive grazing by newly introduced sheep. This will require either establishment of temporary fencing or relocation of existing fences.

Several poorly formed tracks exist within the grassland. These will be required for conservation management and for stock management. Existing tracks should be marked and where necessary hardened to prevent erosion. Reserve tracks should all be designated as "management vehicles only". No new tracks are required and all vehicles, with the exception of those required for fire or weed management tasks, should remain on the tracks at all times.

Signs notifying the public of the existence of the reserve should be erected at all four corners. The signs should inform the public that all plants and animals are protected within the reserve.

INTERIM MANAGEMENT DIRECTION – INFRASTRUCTURE
Erect signs to notify all persons of the status of the grassland. Provide and maintain adequate fencing and access tracks for the management and protection of the site.

VISITOR MANAGEMENT

Recreation

Public awareness of and interest in the reservation of the Craigieburn Grassland is likely to be significant. It can be expected that many groups and individuals will wish to visit the grassland especially in spring and early summer.

Major constraints on visitation are that:

- the site supports many rare and threatened species;
- domestic stock are present; and
- there are no visitor facilities within the grassland and limited information available.

The following procedures on visitor access should be adopted:

- Only passive recreation based on the conservation values of the grassland be permitted;
- The public should be encouraged to visit the site with organised groups;
- Publicity and information regarding the site must be consistent with the management objectives;
- No vehicles, including bicycles, should be allowed within the reserve except for management vehicles;
- No pets or horses should be allowed within the reserve with the exception of those used by the licensee for the purpose of managing stock; and
- All gates must remain locked.

In the first few years following its reservation it is unlikely that the level of visitation will conflict with the conservation management objectives for the grassland. However, the potential for damage or disturbance to the grassland community through uncontrolled access should be considered.

Plant and animal collection

There is some evidence that illegal reptile collection has been occurring in recent years north of O'Herns Road. Signs that inform the public of the status of the site along with regular surveillance should reduce the extent of illegal collecting. Without surveillance, the increased publicity for the Reserve may see this activity increase.

The Grassland, in particular the Merri Creek escarpment, are favoured areas for seed collection. All future collection of plant material must be conducted under permit and must be for legitimate conservation purposes only. This does not include cultivation for indigenous horticulture. The management of Craigieburn Grassland and other sites in the region will require considerable vegetation restoration in the future. Accordingly, rare plants within the grassland must only be collected for use within protected grasslands along the Merri Creek.

Hunting

Recreational hunting will not be permitted within the Craigieburn Grassland.

INTERIM MANAGEMENT DIRECTION – VISITOR MANAGEMENT
Control and manage visitation to ensure that public access does not threaten conservation values.

HERITAGE PROTECTION

All historic and cultural heritage sites within the Craigieburn Grassland should be identified and marked on relevant management maps. Specific guidelines for several sites have already been developed (Ellender 1997) and should be adhered to. These include preventing disturbance by stock and humans. The proposed grazing regime and exclusion of stock from the Merri Creek will largely achieve this objective. Known sites within the grassland have received relatively little study and considerably more information could be gained from these areas. It is also likely that as yet unidentified historic and cultural sites exist within the grassland area. Further advice on the identification, management and interpretation of historic and cultural sites within the grassland should be sought.

INTERIM MANAGEMENT DIRECTION – HERITAGE PROTECTION
Identify and protect cultural and heritage values throughout the grassland.

EXISTING USES

O'Herns Road is an unused road reserve along the southern boundary of the Craigieburn Grassland. The existing road reservation between the Merri Creek and the eastern boundary should be closed to public access and incorporated into the Reserve. The track through this area should however be maintained for use as a management access road, a firebreak and for access to the powerline easement and to the O'Herns Road Grassland.

An unused road reserve occurs on the eastern boundary of the grassland. The inclusion of this area within the Reserve would be desirable and should be investigated.

A powerline easement crosses from east to west just north of O'Herns Road. Power authorities must be informed of the status of the Craigieburn Grassland and an agreement reached concerning the conduct of maintenance operations and use of the powerline easement. Signs should be placed on all gates and pylons to notify relevant persons of the existence of this agreement.

INTERIM MANAGEMENT DIRECTION – EXISTING USES
Investigate incorporation of public road reserves into the Reserve and ensure that all public authorities are aware of the conservation values and status of the grassland.

9. FUTURE MANAGEMENT ISSUES

FREEWAY PROPOSAL

A new freeway proposal within this region may affect management of theGrassland within the short term. Management issues that should be considered regarding the construction of such a freeway either within or adjacent to the Grassland include:

- the maintenance of existing water flows and quality in both the Merri Creek and Curly Sedge Creek;
- retention of native vegetation;
- protection of the O'Herns Road Swamp;
- impacts on Curly Sedge Swamp and possible amelioration measures;
- stormwater management;
- rescue and (possible) relocation of significant fauna and flora;
- the safety of wildlife;
- prevention and management of soil disturbance, pollution and weed invasion;
- the use of local provenance indigenous flora in landscape works; and,
- the maintenance of habitat corridors.

The impact of a Freeway on management including grazing by introduced stock or burning should also be considered.

VEGETATION RESTORATION

The actual populations of forbs within the Craigieburn Grassland are extremely low in comparison to typical high-quality sites on road and rail reserves. There is a reasonable argument that rather than hope for long-term recovery in numbers, specific

action should be undertaken to replenish populations of typical grassland species reduced by over a century of stock grazing. Restoration should not only be confined to those areas that are relatively degraded. Indeed, restoration within an existing stable grassland matrix is likely to be simpler and more successful.

The objectives of such a program must be clearly determined and enunciated. These objectives may include the development of quite large areas with a forb composition typical of 'high quality' grassland sites. Such areas should become sustainable through appropriate broad-acre management rather than continual restocking. As such they can be used as indicators of management success as well as providing a seed source for the replenishment of grassland diversity. Such areas will also be highly attractive and of value for education and research.

Prior to European settlement it is likely that the Craigieburn Grassland included both open grassland and grassy woodland areas. Tree establishment was probably restricted to Stony Knolls, escarpments and lighter textured soils of the silt plains and rises (Frood 1992). Areas of silty soils would have supported a very open woodland of River Red-gum (*Eucalyptus camaldulensis*) and Swamp Gum (*Eucalyptus ovata*). River Red-gum would also have occurred sparsely along drainage lines and around seasonal wetlands such as Curly Sedge Swamp. Tree Banksia, Lightwood (*Acacia implexa*) and Sheoke would also have been components of woodlands on more elevated sites. The re-establishment of some trees within the grassland will have long-term benefits for fauna conservation. Regeneration around existing trees should be encouraged through fencing and weed control. Planting of woodland species should also be undertaken in areas where there are old tree stumps, where natural regeneration has failed and on the elevated sections at the northern end of the grassland.

RE INTRODUCTION OF THREATENED FLORA AND FAUNA

Re-introduction of threatened flora and fauna into secure areas is an acknowledged component of long-term conservation of native grassland and grassy woodland communities (Muir 1994: Lunt 1991; Backhouse and Crosthwaite 1996). However, the development of such programs requires careful planning and execution to ensure that the aims of re-introductions are likely to be successful and that the existing values of the recipient site are not compromised.

Craigieburn Grassland may provide suitable habitat for the conservation of several species that are not currently known to occur within the site. However, any proposal to re-introduce or introduce fauna or flora to Craigieburn Grassland must satisfy relevant policy and planning guidelines and be consistent with recovery and action plans developed for the species and for the Western Basalt Plains Community as a whole.

The following section outlines some species whose long-term conservation may benefit from (re-)introduction to secure sites. However, the suitability of Craigieburn Grassland as a recipient site for these species or the desirability of developing re-introduction programs at the grassland should not be assumed.

Fauna

It is likely that wetland fauna including Brolga and Magpie Geese would have been present in substantial numbers on seasonal wetlands on the grassy plains prior to European settlement. Curly Sedge Swamp could provide appropriate habitat for such species if the depth of water and period of inundation were increased.

The Eastern Barred Bandicoot was formerly widespread in grasslands and grassy woodlands of Victoria. It was recorded from the Craigieburn region as recently as the 1930's (Beardsell 1997). Habitat loss and cat and fox predation has pushed the species to the brink of extinction in Victoria. Re-introduction into secure habitat is an aim of the Action Statement for this species (Backhouse and Crosthwaite, 1996).

The Merri Creek valley supports large areas of apparently suitable habitat for the Grassland Earless Dragon. Recent surveys aimed at determining the presence of this species in the region have been unsuccessful. The Draft Recovery Plan for this species discusses protocols for the translocation of this species (Robertson and Cooper, *in prep.*)

Flora

Many species of grassland flora are regarded as highly threatened throughout Victoria or in grassland habitats. Often the only remaining populations occur on road and rail reserves, cemeteries and other insecure locations. Establishment of self-sustaining populations of all species within secure sites is a major objective for the conservation of the Western Basalt Plains Grassland Community (Muir 1994). Frood (1992) has made numerous suggestions for the re-introduction of threatened species into vegetation communities within Craigieburn Grassland including several species that are in urgent need of active conservation management. These include Sunshine Diuris (*Diuris fragrantissima*), Small Pepper-cress (*Lepidium hyssopifolium*) and Tree Banksia.

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APPENDIX 1: SIGNIFICANT FLORA

Significant vascular plant species recorded for Craigieburn Grasslands from Peake *et al* (1996).

NATIONAL SIGNIFICANCE

Amphibromus pithogastris	Swollen Swamp Wallaby-grass	Ke FFG
Carex tasmanica	Curly Sedge	Vv FFG
Dianella amoena	Mat Flax-lily	Ee

STATE SIGNIFICANCE

Agrostis aemula var. *setifolia*	Blown Grass	r
Amphibromus sp. aff. *nervosus*	Swamp Wallaby-grass	r
Austrostipa gibbosa	Spurred Spear-grass	r
Callitriche umbonata	Water Starwort	r
Comesperma polygaloides	Small Milkwort	v FFG
Cullen microcephalum s.l. (Hawkesdale)	Mountain Psoralea	r
Cullen tenax	Tough Psoralea	e FFG
Desmodium varians	Slender Tick-trefoil	r
Dianella sp. aff. *longifolia* (Volc. Plains)	Plains Flax-lily	d
Plantago aff. gaudichaudii	Swamp Plantain	v

nb Two plants that appear to be *Glycine latrobeana*, Clover Glycine (Vv, FFG), were located near Curly Sedge Creek in April 1998 by Tim Barlow, VNPA. This record requires further confirmation.

d = Taxa is depleted in Victoria (Guilan et al. 1990)
r = Taxa is rare in Victoria (Guilan et al. 1990)
v = Taxa is vulnerable in Victoria (Gullan et al. 1990)
e = Taxa is endangered in Victoria (Guilan et al. 1990)
K = Taxa is poorly known but suspected of being either endangered, vulnerable or rare in Australia (Briggs and Leigh 1988)
R = Taxa is rare in Australia (Briggs and Leigh 1988)
V = Taxa is vulnerable in Australia (Briggs and Leigh 1988)
E = Taxa is endangered in Australia (Briggs and Leigh 1988)

FFG = Taxa is listed under the Victorian *Flora and Fauna Guarantee Act 1988*.

REGIONAL SIGNIFICANCE

Adiantum aethiopicum	Common Maidenhair
Agrostis aemula var. aemula	Blown Grass
Agrostis avenacea var. perennis sp. agg.	Common Blown Grass (wetlands)
Agrostis sp. aff *adamsonii*	Blown-grass
Alismaplantago-aquatica	Broad-leaf Water Plantain
Allocasuarina verticillata	Drooping Sheoke
Aphelia pumilio	Dwarf Aphelia
Apium annuun	Annual Celery
Arthropodium milleflorum	Pale Vanilla-lily
Arthropodium minus	Small Vanilla-lily
Asperula aff. conferta	Woodruff
Asplenium labellifolium	Necklace Fern
Austrostipa curticoma	Short-crown Spear-grass
Austrostipa oligostachya	Fine-head Spear-grass
Austrostipa rudis	Veined Spear-grass
Austrostipa stuposa	Quizzical Spear-grass
Baumea arthrophylla	Fine Twig-sedge
Bothriochloa macra	Red-leg Grass
Buibine bulbosa	Yellow Bulbine-lily
Bursaria spinosa var. macrophylia	Sweet Bursaria
Bursaria spinosa var. spinosa	Sweet Bursaria
Calocephalus citreus	Lemon Beauty-heads
Calocephalus lacteus	Milky Beauty-heads
Carex incomitata	Hillside Sedge
Carex tereticaulis	Rush Sedge
Carpobrotus modestus	Inland Pigface
Centella cordifolia	Centelia
Centipeda cunninghamii	Common Sneezeweed
Cheilanthes sieberi ssp. sieberi	Narrow Rock Fern
Chrysocephalum apiculaturn s. 1.	Common Everlasting
Chrysocephalum semipapposum s. 1.	Clustered Everlasting
Convolvulus aff. erubescens	Bindweed
Convolvulus erubescens	Pink Bindweed
Convolvulus remotus	Grassy Bindweed
Correa glabra	Rock Correa
Crassula pedicellosa	Stalked Crassula
Crassula peduncularis	Purple Crassula
Cynoglossum suaveolens	Sweet Hound's-tongue
Danthonia auriculata	Lobed Wallaby-grass
Danthonia carphoides	Short Wallaby-grass
Dichelachne micrantha s. l.	Short-hair Plume-grass
Distichlis distichophylla	Australian Salt-grass
Drosera peltata ssp. peltata	Pale Sundew
Elatine gratioloides	Waterwort
Eleocharis aff. acuta	Spike-sedge
Enneapogon nigricans	Dark Bottlewashers
Eryngium ovinum	Blue Devil
Eryngium vesiculosum	Prickfoot
Eucalyptus ovata	Swamp Gum
Euchiton sphaericus	Annual Cudweed
Galium gaudichaudii	Rough Bedstraw
Galium migrans	Bedstraw
Geranium retrorsum	Grassland Cranesbill
Geranium sp.	Northern Cranesbill
Glyceria australis	Australian Sweet-grass
Glycine tabacina s.s.	Variable Glycine
Grevillea glabella (part G. rosmarinifolia s. L)	Smooth Grevillea
Gynatrix pulchella s.l.	Hemp Bush
Haloragis heterophylla	Varied Raspwort
Hemarthria uncinata var. uncinata	Mat Grass
Hydrocotyle laxiflora	Stinking Pennywort

Hydrocotyle sibthorpioides	Shining Pennywort
Hydrocotyle verticillata	Shield Pennywort
Hypoxis hygrometrica var. villosisepala	Golden Weather-glass
Isoetopsis graminifolia	Grass Cushion
Isolepis fluitans	Floating Club-sedge
Isolepis hookeriana	Grassy Club-sedge
Isolepis platycarpa	Flat-fruit Club-sedge
Isolepis victoriensis	Victorian Club-sedge
Isotoma fluviatilis ssp. australis	Swamp Isotome
Juncus filicaulis	Thread Rush
Juncus homalocaulis	Wiry Rush
Lepidium pseudotasmanicum	Shade Pepper-cress
Leptospermum lanigerum	Woolly Tea-tree
Lilaeopsis polyantha	Australian Lilaeopsis
Linum marginale	Native Flax
Lomandra micrantha	Small-flower Mat-rush
Mentha australis	River Mint
Mimulus repens	Creeping Monkey-flower
Muellerina eucalyptoides	Creeping Mistletoe
Myoporum viscosum	Sticky Boobialia
Myriophyllum ? saisugineum	Milfoil
Neopaxia australasica	White Purslane
Opercularia varia	Variable Stinkweed
Oxalis radicosa	Wood-sorrel
Panicum effusum	Hairy Panic
Parietaria debilis	Shade Pellitory
Pelargonium australe	Austral Stork's-bill
Pentapogon quadrifidus	Five-awned Spear-grass
Pimelea humilis	Common Rice-flower
Plantago aff. gaudichaudii (lowland swamps)	Narrow Plantain
Poa labillardieri (Basalt Plains form)	Blue Prickly Tussock-grass
Poa rodwayi	Velvet Tussock-grass
Poa sieberiana var. hirtella	Grey Tussock-grass
Poa sieberiana var. sieberiana	Grey Tussock-grass
Potamogeton pectinatus	FennelPondweed
Potamogeton tricarinatus	Floating Pondweed
Pratia irrigua	Salt Pratia
Ranunculus diminutus	Small River Buttercup
Rumex bidens	Mud Dock
Rumex dumosus	Wiry Dock
Schoenus nitens	Shiny Bog-sedge
Sebaea ovata	Yellow Sebaea
Selliera radicans	Shiny Swamp-mat
Stackhousia aff. monogyna (Western Plains)	Creamy Candies
Stellaria pungens	Prickly Starwort
Triptilodiscus pygmaeus	Common Sunray
Velleia paradoxa	Spur Velleia
Vittadinia cervicularis	Annual New Holland Daisy
Wahlenbergia comrnunis	Tufted Bluebell
Wahlenbergia luteola	Yellowish Bluebell
Wahlenbergia multicaulis	Many-stemmed Bluebell
Wahlenbergia stricta ssp. stricta	Tall Bluebell
Wurmbea dioica ssp. dioica	Common Early Nancy

APPENDIX 2: SIGNIFICANT FAUNA

Significant fauna recorded from or likely to occur at Craigieburn Grasslands from Peake *et al* (1996) and Beardsell (1997).

NATIONAL

Plains-wanderer	*Pedionomus torquatus*	Vulnerable. FFG
Striped Legless Lizard	*Delma impar*	Vulnerable. FFG

STATE

Black Falcon	*Falco subniger*	*Rare*
Red-chested Button-quail	*Turnix pyrrhothorax*	*Insufficiently Known*
Freshwater Blackfish	*Gadopsis marmoratus*	*Insufficiently Known*

REGIONAL

Fat-tailed Dunnart	*Sminthopsis crassicaudata*
Common Wombat	*Vombatus ursinus*
Black Wallaby	*Wallabia bicolor*
Brown Quail	*Coturnix ypsilophora*
Wedge-tailed Eagle	*Aquila audax*
Spotless Crake	*Porzana tabuensis*
Latham's Snipe	*Gallinago hardwickii*
Banded Lapwing	*Vanellus tricolor*
Little Lorikeet	*Glossopsitta pusilla*
Striated Fieldwren	*Calamanthus fuliginosus*
Spiny-checked Honeyeater	*Acanthagenys rufogularis*
Singing Honeyeater	*Lichenostomus virescens*
Singing Bushlark	*Taeniopygia guttata*
Brown Songlark	*Cinclorhamphus cruralis*
Plains Froglet	*Crinia parinsignifera*
Brown Toadlet	*Pseudophryne bibronii*
Eastern Snake-necked Turtle	*Chelodina longicollis*
Marbled Gecko	*Christinus marmoratus*
Southern Water Skink	*Eulamprus tympanum*
Red-bellied Black Snake	*Pseudechis porphyriacus*
Little Whip Snake	*Suta flagellum*
Common Galaxias	*Galaxias maculatus*
Flat-headed Gudgeon	*Philypnodon grandiceps*
Small Copper	*Lucia limbaria*
Checkered Swallowtail	*Papilio demoleus*
Freshwater Crayfish	*Engaeus quadrimanus*

OTHER NOTABLE SPECIES

Grassland Earless Dragon	*Tympanocryptis lineata pinguicolla*	Vulnerable in Australia. FFG. Unconfirmed sighting 1990. (Beardsell, 1997)
Spot-tailed Quoll	*Dasyurus maculatus*	Extinct in area, FFG.
Eastern Quoll	*Dasyurus viverrinus*	Extinct in area, FFG.
Bush Stone-curlew	*Buhinus grallarius*	Extinct in area, FFG.
Great Egret	*Ardea alba*	Restricted colonial breeding species in Victoria, FFG.
Nankeen Night Heron	*Nycticorax caledonicus*	Restricted colonial breeding species in Victoria
Pied Cormorant	*Phalocrocorax melanoleucos*	Restricted colonial breeding species in Victoria

APPENDIX 3: VEGETATION COMMUNITIES OF CRAIGIEBURN GRASSLAND

COMMUNITY NAME	**Plains Grassland (Western Basalt Plains Grassland)**
DOMINANT SPECIES	*Themeda triandra, Poa labillardieri, Danthonia spp., Austrostipa spp.*
ASSOCIATED SPECIES	Wide range of herbs including lilies, daisies, peas and orchids.
OVERSTOREY SPECIES	Occasional *Eucalyptus camaldulensis, E. ovata, Acacia mearnsii, A. melanoxylon*.
DISTRIBUTION AT CRAIGIEBURN	Widespread throughout the grassland. Limited distribution in northern part of grassland.
BOTANICAL SIGNIFICANCE	National, listed under the *Flora and Fauna Guarantee Act 1988*.
SIGNIFICANT FLORA	*Amphibromus pithogastris, Dianella amoena, Agrostis aemula var. setifolia, Amphibromus sp. aff. nervosus, Cullen microcephalum, Cullen tenax, Austrostipa gibbosa*
SIGNIFICANT FAUNA	Striped Legless Lizard, Plains-wanderer, Black Falcon, Red-chested Button-quail, ?Grassland Earless Dragon.

COMMUNITY NAME	**Pasture**
DOMINANT SPECIES	Pasture grasses and introduced herbs
ASSOCIATED SPECIES	Various introduced pasture species, eg. *Trifolium spp*.
OVERSTOREY SPECIES	Occasional *Eucalyptus camaldulensis, E. ovata, Acacia mearnsii.*
DISTRIBUTION AT CRAIGIEBURN	Widespread in northern part of grassland in A1 and A2.
BOTANICAL SIGNIFICANCE	Minimal
SIGNIFICANT FLORA	Nil
SIGNIFICANT FAUNA	?Striped Legless Lizard, ?Plains-wanderer, ?Black Falcon.

COMMUNITY NAME	**Stony Knoll Grassland**
DOMINANT SPECIES	*Themeda triandra, Danthonia spp., Austrostipa spp., Miroleana stipoides.*
ASSOCIATED SPECIES	Wide range of herbs including lilies, daisies, peas and orchids.
OVERSTOREY SPECIES	*Acacia mearnsii, A. paradoxa, Hymenanthera dentata, Allocasuarina verticillata*.
DISTRIBUTION AT CRAIGIEBURN	Widespread throughout the grassland (including south of O'Herns Road).
BOTANICAL SIGNIFICANCE	State
SIGNIFICANT FLORA	*Comesperma polygaloides, Desmodium varians*
SIGNIFICANT FAUNA	Striped Legless Lizard, Black Falcon, ?Plains-wanderer,?Grassland Earless Dragon.

COMMUNITY NAME	**Escarpment Shrubland**
DOMINANT SPECIES	*Allocasuarina verticillata, Acacia implexa, Hymenanthera dentata, Bursara spinosa*
ASSOCIATED SPECIES	Various shrubs, grasses, groundcovers and herbs.
OVERSTOREY SPECIES	*Allocasuarina verticillata, Acacia implexa.*
DISTRIBUTION AT CRAIGIEBURN	Present along Merri Creek and also along Curly Sedge Creek south of O'Herns Road.
BOTANICAL SIGNIFICANCE	State
SIGNIFICANT FLORA	*Dianella sp. aff. longifolia*
SIGNIFICANT FAUNA	Black Falcon, ?Grassland Earless Dragon.

COMMUNITY NAME	**Weedy Sward**
DOMINANT SPECIES	*Poa labillardieri, *Nassella neesiana.*
ASSOCIATED SPECIES	Various weeds, especially grasses and small herbs.
OVERSTOREY SPECIES	*Eucalyptus camaldulensis, Acacia mearnsii, A. melanoxylon*
DISTRIBUTION AT CRAIGIEBURN	Widespread south of O'Herns Road; scattered areas along Merri Creek escarpment and east of Curly Sedge Creek
BOTANICAL SIGNIFICANCE	Minimal
SIGNIFICANT FLORA	Nil
SIGNIFICANT FAUNA	?Striped Legless Lizard.

COMMUNITY NAME	**Riparian Scrub**
DOMINANT SPECIES	*Leptospermum lanigerum*
ASSOCIATED SPECIES	*Phragmites australis, Schoenoplectus validus, Bolboschoenus spp, Eleocharis acuta.*
OVERSTOREY SPECIES	*Eucalyptus camaldulensis*
DISTRIBUTION AT CRAIGIEBURN	Present along Merri Creek.
BOTANICAL SIGNIFICANCE	State
SIGNIFICANT FLORA	*Dianella sp. aff. longifolia*
SIGNIFICANT FAUNA	Black Falcon.

COMMUNITY NAME	**Grey Clay Drainage Line Complex**
DOMINANT SPECIES	*Schoenoplectus validus, Eleocharis acuta, Poa labillardieri*
ASSOCIATED SPECIES	Large variety of sedges, grasses and herbs.
OVERSTOREY SPECIES	Nil
DISTRIBUTION AT CRAIGIEBURN	Present along Curly Sedge Creek and in Curly Sedge Swamp.
BOTANICAL SIGNIFICANCE	State
SIGNIFICANT FLORA	*Carex tasmanica, Agrostis aemula var. setifolia, Plantago aff. gaudichaudii.*
SIGNIFICANT FAUNA	?Plains-wanderer and ?Red-Chested Button-quail in Curly Sedge Swamp when dry.

COMMUNITY NAME	**Grassy Wetland**
DOMINANT SPECIES	*Agrostis avenacea var. perennis, Amphibromus nervosus, Eleocharis acuta.*
ASSOCIATED SPECIES	Various sedges, grasses and herbs.
OVERSTOREY SPECIES	Nil
DISTRIBUTION AT CRAIGIEBURN	Restricted to the vicinity of O'Herns Road Swamp, including a small area north of O'Herns Road
BOTANICAL SIGNIFICANCE	State
SIGNIFICANT FLORA	*Amphibromus sp. aff. nervosus, Callitriche umbonata*
SIGNIFICANT FAUNA	Nil

COMMUNITY NAME	**Stony Knoll Wetland**
DOMINANT SPECIES	*Poa labillardieri, Danthonia duttoniana, Isolepis fluitans, Amphibromus nervosus, Eleocharis spp.*
ASSOCIATED SPECIES	Sedges, grasses and herbs. *Lobelia pratioides* is abundant.
OVERSTOREY SPECIES	Nil
DISTRIBUTION AT CRAIGIEBURN	Scattered and rare throughout the grassland at the base of Stony Knolls
BOTANICAL SIGNIFICANCE	State
SIGNIFICANT FLORA	*Agrostis aemula var. setifolia, Amphibromus sp. aff. nervosus.*
SIGNIFICANT FAUNA	Nil

APPENDIX 4: GRAZING MANAGEMENT

Grazing will be implemented under a licence agreement tied to this Interim Management Statement and terminating with the development of a full management plan for the grassland. The licence should include the following aspects.

1. *Stock* Stock will principally be sheep and be wethers of any breed. Cattle or horses will be allowed in Section A1 only.
2. *Quarantine* New stock should be newly shorn and be introduced into those parts of Sections A1 and A2 that are predominantly pasture and held there for at least one week prior to moving them to other areas of the grassland. Additional fencing will be required to ensure that those parts of A1 and A2 that support significant conservation values are protected from intensive grazing by newly introduced sheep.
3. *Stocking Rate* Stocking rates for all areas available for grazing (ie. excluding areas fenced for conservation or other purposes) shall not exceed 2.5 dse per hectare. The maximum stocking rate and total stock numbers shall be reviewed each year.
4. *Areas Available* Grazing will be allowed throughout the grassland except for those areas excluded for management or research purposes including the Merri Creek and environs, some Stony Knolls, grazing exclusion trials and seasonal exclusions from parts of Curly Sedge Creek, Curly Sedge Swamp and other sensitive areas. Grazing may be excluded from any area at the discretion of the manager for specific management purposes.
5. *Timing* Grazing will generally be maintained throughout the year, however this will be at the discretion of the manager. The manager may exclude stock from a part or all of the grassland during periods of abnormal climatic conditions or for specific management purposes.
6. *Records* Accurate records of stock numbers, types and movements (including between paddocks) will be kept by the licensee and made available to the manager on request and at the end of each licence period.
7. *Feed* Hay and other feed may be provided only in those parts of section A1 that are predominantly pasture. Source of hay to be determined in consultation with managers. Stock supplements must not be given except with the prior permission of the manager.
8. *Fertilisers and Pasture* There will be no fertiliser use or sowing of pasture seed on any part of the grassland.
9. *Cultivation* There will be no cultivation, tillage or other mechanical soil disturbance.
10. *Irrigation* There will be no irrigation development except to provide off-stream watering for stock.
11. *Vehicles* All normal vehicle movements shall be confined to existing tracks. Vehicles may leave tracks when engaged in fire management or weed control tasks but should aim to minimise soil disturbance at all times.
12. *Access* Vehicle access to the grassland is restricted to management vehicles only (including vehicles for the necessary management of stock). All access gates will be padlocked to prevent unauthorised entry).
13. *Infrastructure* Existing fencing, gates, dams, sheds and other facilities for the management of stock, will be maintained by the licensee. The licensee has access to the shearing shed and associated yards and equipment at all times and is responsible for the maintenance of same.
14. *Costs* All water, fuel, electricity, veterinary and other costs related to stock management will be borne by the licensee.
15. *Resource Use* The licensee must not remove or allow to be removed any hay, seeds, native animals, plants, wood, stone, soil or gravel from the grassland.
16. *Pest Plants and Animals* Control of pest plants and animals will be the responsibility of the manager.
17. *Fire* The licensee will not undertake any burning on the property nor allow any fire to burn unchecked. All fire precautions are the responsibility of the manager. The licensee recognises that fire as a technique for the management of the grassland will be under trial during the period of the licence.
18. *Research* The licensee recognises that the management of the grassland as a conservation reserve will require the establishment and maintenance of infrastructure and the conduct of surveys and trials. The licensee will cooperate with all reasonable requests in relation to such research including the provision of stock for assessing grazing impacts.
19. *Visitation* The licensee accepts that the reserve is public property and that visitation from the general public is allowed and to be expected.
20. *Liaison* The manager will designate a single contact person for the administration of the licence. The licensee will maintain regular contact with this person and will not take any new or unusual management action without first consulting with that person.
21. *Review* The licence will be reviewed on an annual basis including stock numbers and areas available for grazing. The licence as a whole will be reviewed in the development of a management plan for the grassland.