Department of Sustainability and Environment

# Action Statement

Flora and Fauna Guarantee Act 1988 No. 182

## Central Gippsland Plains Grassland
## Forest Red Gum Grassy Woodland
## Northern Plains Grassland
## South Gippsland Plains Grassland
## Western (Basalt) Plains Grassland

### Preamble

This Action Statement addresses five lowland grassland or grassy woodland communities, each of which is listed as threatened under the **Flora and Fauna Guarantee Act 1988**. The preparation of Action Statements is a requirement of the Act.

It includes a general discussion of the communities, their broad description and distribution, conservation status, and issues related to their management. It proposes major conservation objectives and approaches that are applicable to all five communities.

This Action Statement also includes, as an appendix, sections that focus specifically on each listed community, providing more detail on their description, distribution, ecology and specific threats, and outlines management actions taken to date.

This Action Statement has not attempted to identify specific actions for every site. The geographic range of the five communities, the variety of land tenures and numbers of stakeholders would make this an enormous task.

The intended management actions are divided into two groups – Statewide Actions and Local Actions.

The Statewide Actions are primarily of a policy or strategic nature, and it will largely be the responsibility of the Department of Sustainability and Environment (DSE), Department of Primary Industries (DPI) and other state and local government agencies and authorities to carry out these actions.

The Local Actions also consist of general actions, in some cases accompanied by more specific actions that relate to each of the five communities. Although the communities occur in different parts of Victoria, the local management requirements are common to all. These actions are largely the responsibility of land managers, local planning authorities and regional staff of DSE and DPI.

The Local Actions include the development of brief 'Site Management Statements' for all known sites, with the cooperation of the landholder or land manager. This process will identify the details of site-by-site management, responsibilities for management and resourcing needs.

Victoria The Place To Be

## Lowland grasslands and grassy woodlands – a special case

Temperate grasslands are one of the world's major ecosystems, occurring widely on all continents except Antarctica. They occur in mild climates, are generally fertile and easy to exploit and as such have been replaced faster than most other ecosystems. The native grassland communities of the North American prairies, South American pampas, European chalk grasslands, Asian steppes and south-eastern Australian plains are threatened worldwide (IFFA 1992).

There are compelling reasons why our approach to conserving lowland grasslands and grassy woodlands should be different from those for other ecological communities.

- Lowland grasslands and grassy woodlands are more severely depleted than any other ecological communities in Victoria;
- Despite a few recent acquisitions, lowland grasslands and grassy woodlands are extremely poorly reserved;
- Few remnants of lowland grasslands and grassy woodlands occur on public land and where they do, the parcels of land tend to be small and/or linear (e.g. road and rail reserves), they are used for purposes other than conservation and in some cases are managed by committees or agencies with little conservation management expertise;
- Remnants of lowland grasslands and grassy woodlands on private land are mostly larger than those on public land and generally non-linear, but are also likely to be more degraded;
- Remnants of lowland grasslands and grassy woodlands are often modified by past management and many are in a degraded condition;
- Because of their small size, remnants of lowland grasslands and grassy woodlands may not provide habitat for the full range of species which formerly occurred in them. The small size and isolation of remnants can also lead to small, isolated populations of plants and animals with limited genetic diversity, in turn leading to reduced ability to reproduce and adapt to changing conditions, and in the longer term, vulnerability to extinction;
- Over the past 15-20 years, in spite of increasing knowledge and concern about lowland grasslands and grassy woodlands, the rate of loss and degradation has continued if not accelerated, largely as a result of urban development, changed agricultural practices on private land, increasing mechanisation, including larger agricultural and earth-moving machinery, infrastructure maintenance and development on public land, and ongoing fragmentation and degradation, and
- Grasslands are often perceived as uninteresting and unattractive, as 'vacant' land, because of their lack of trees. Their conservation importance, and legally protected status as native vegetation are often ignored.

For these reasons, it would be reasonable to adopt an approach to conservation based on protecting and enhancing all remnants, regardless of tenure, condition or current use. However, given the cost of the active management required to maintain or enhance the biodiversity values and condition of remnants, it is necessary to focus on significant[1] remnants (i.e. those that have high species diversity, are in good condition, or that support rare sub-communities or populations of rare or threatened species. However, consistent with Victoria's Biodiversity Strategy the Native Vegetation Management Framework and Regional Native Vegetation Plans, the target for conserving lowland grasslands and grassy woodlands in Victoria will be to achieve a net gain in area and condition.

The degree to which the five listed communities have been fragmented means that the biodiversity values of each community cannot be captured and protected in a single reserve. To address this problem, concepts such as Conservation Management Networks (CMNs) will be proposed. A Conservation Management Network is a network of community remnants comprising priority sites on all land tenures, managed wholly or in part for conservation purposes, and encompassing formal conservation reserves, unreserved public land subject to conservation management agreement, and private land, preferably protected under some form of voluntary management agreement and/or covenant. Without the latter, private land components cannot realistically be included in any sense as a meaningful conservation reserve.

## Description and distribution

The grasslands and grassy woodlands addressed in this Action Statement once occurred over most of the lowland plains of Victoria in low-medium rainfall areas, on varying types of soil fertility. Small, fragmented remnants of these communities occur across the plains, on paddocks of privately owned farmland that have remained unploughed, unfertilised and only lightly grazed; and on mostly ungrazed public land with a history of burning for

[1] i.e. those that have high species diversity, are in good condition, or that support rare sub-communities or populations of rare or threatened species. Refer to the Native Vegetation Management Framework for assessment of significance of native grasslands and the appropriate outcomes (Table 1, p. 27).).

fuel reduction e.g. 'town commons', cemeteries, roadsides and rail reserves (Lunt 1991).

With the exception of the Forest Red Gum Grassy Woodland community, trees are absent or sparse or occur as isolated copses of woodland. This is due to a combination of soil type (e.g. cracking clays), rainfall and past management history. Plants flower in spring and early summer, early in the north, later in the south. Variation in seasonal climatic conditions, most notably rainfall and temperature, also influences flowering. Flora species are mostly perennials with few annuals.

Some existing grassland remnants, particularly on the Gippsland Plains and the eastern part of the Northern Plains, may have lost their original woodland overstorey as a result of changed management practices following European settlement. These grasslands are sometimes referred to as 'secondary' or 'derived' grasslands. This does not reduce their value for conservation. Little is known of their management history in pre-European times, and the degree to which tree cover fluctuated in response to management events. It is possible that what we now call "grasslands" consisted of a mosaic of open grassland, sparse tree cover and denser woodland, that varied with time. All grasslands and grassy woodlands are highly threatened and contain many threatened species, some of which occur on only a single site or handful of sites. All remnants of these communities must be protected and managed to conserve the values that exist within them today, regardless of past history.

More information on the description and distribution of these communities is provided in Table 1 on Page 19.

## Conservation status

### Current status

Each community has been listed under the Victorian **Flora and Fauna Guarantee Act 1988**.

Natural Temperate Grassland ecological communities in south-eastern Australia are being considered for listing under the Commonwealth **Environment Protection and Biodiversity Conservation Act 1999**. These grassland communities will be considered in a staged approach, on the basis of their conservation need and the availability of information. The 'Western (Basalt) Plains Natural Temperate Grasslands' community is presently under consideration for listing and public comments were sought until 30 June 2003.

The listed grasslands and grassy woodlands occupy plains habitats on reasonably fertile soils that have been cleared over large parts of their range for agricultural production. Once a third of Victoria was covered by these grasslands and grassy woodlands (DCE 1992), but today, grasslands of the Western Basalt Plains have declined to about 0.15% of their original distribution. Those of the Northern Plains have declined to about 0.5%, and those of the Central Gippsland Plains Grasslands and South Gippsland Plains Grassland to much less than 1%. Forest Red Gum Grassy Woodland has declined to between 2% and 4%. Remnants of these communities are distributed so widely across the State and are subject to such a variety of land uses that they are also subject to a very wide range of threatening processes, including ongoing clearing, habitat destruction and fragmentation, weed invasion and inappropriate management.

The Scientific Advisory Committee requires certain criteria to be satisfied for a community to be eligible for listing:

*2.1 the community is in a demonstrable state of decline which is likely to result in extinction;*

*2.2 the community is significantly prone to future threats which are likely to result in extinction*

*2.2.1 the community is very rare in terms of the total area it covers or it has a very restricted distribution or it has been recorded from only a few localities.*

In its final recommendations for listing, the Scientific Advisory Committee determined that the nominations for communities satisfied at least one of these criteria.

Western (Basalt) Plains Grassland Community
criteria 2.1 and 2.2 (SAC 1991)

Northern Plains Grassland Community
criteria 2.1 and 2.2 (SAC 1992).

Central Gippsland Plains Grassland Community
criteria 2.2 and 2.2.1 (SAC 1993a)

Forest Red Gum Grassy Woodland Community
criteria 2.2 and 2.2.1.(SAC 1993b

South Gippsland Plains Grassland
criteria 2.2 and 2.2.1 (SAC 1994).

## Ecology

All these communities require regular biomass reduction, through fire, suitable managed grazing, or some other form of natural perturbation to maintain the structure and species diversity of a grassland or grassy woodland. In the absence of suitable disturbance, the dominant perennial tussock grasses tend to out-compete and suppress the less competitive smaller forbs. In the grassland communities south of the Divide, 5-10 years without disturbance results in loss of many herb species and senescence and death of Kangaroo Grass tussocks (Lunt & Morgan 1999). Open spaces are then colonised, by native species

in an intact grassy ecosystem, but more often by opportunistic weed species. North of the Divide, lower rainfalls generally mean reduced fertility, and biomass reduction may not be so frequently required.

In pre-European times, disturbance resulted from grazing by macropods, digging and scratching by smaller macropods and bandicoots, digging for food plants by aboriginal people, and fires lit by aborigines or caused by lightning strikes. These disturbances created open spaces among the tussocks, providing habitat for fauna and small flowering herbs. Soil types and patterns of fire and grazing disturbance would have created mosaics within the grassy ecosystem, ranging from sparse woodlands through to herblands, open grassland, closed tussock grassland and ephemeral wetlands and drainage lines. Today, biomass reduction is maintained by burning, slashing or grazing by introduced stock. However timing, intensity and type of biomass reduction is not evidence-based and is generally inadequate, resulting in a general decline in species richness. Disturbances such as overgrazing, cultivation, irrigation or development will quickly result in the replacement of much of the indigenous flora with exotic species from which recovery is either very slow or non-existent.

The general approach of grassy ecosystem managers is a conservative one. If a good quality remnant of a community has survived under a certain management regime, e.g. frequent fuel reduction burning, or light grazing by stock, then it is best to continue that regime with only minor modifications, although changes may be made after suitable trials and monitoring. 'Locking up' a native grassy ecosystem remnant and removing appropriate disturbance will quickly result in the loss of conservation values.

## Past Management History

### Prior to 1970

- Moormurng woodland, near Bairnsdale, declared a Forest Reserve in 1958
- Several authors publish reports of the vegetation of the Western Basalt Plains, noting the impacts of European land use changes and decline in native flora and fauna (Patton 1930; Sutton 1916; Willis 1964)

### 1970s

- Stuwe & Parsons (1977) publish a study on the floristics and management of Western Plains grasslands. In the same year A.H. Arnold researches the effects of grazing natural ecosystems.
- La Trobe University staff and students carry out further detailed studies on the native grasslands of the western plains, focusing on areas on the western edge of Melbourne, and emphasising the rarity of these grasslands. Detailed submission to Western Region Commission.
- Incremental losses continue due to land use change (e.g. railway realignments, development of public land -RMIT develops part of Laverton North grassland).
- Moormurng's status changed to Flora and Fauna Reserve in 1977.

### 1980s

- Laverton North Grassland Reserve (40ha) is created as a temporary reserve for "preservation of native grasslands" and Derrimut Grasslands Reserve (150 ha) is permanently reserved. These are the only reserves in Victoria specifically created and managed for conservation of native grassland.
- Conley & Dennis (1984) publish The Western Plains - A Natural and Social History which includes documented changes to and decline of native flora and fauna of the Western Plains grasslands.
- Stuwe (1986) publishes an assessment of the conservation status of native grasslands on the Western Plains, stating that about 0.16% remains of their original distribution.
- CFL undertakes a survey of the relic vegetation of all Victorian railway reserves in 1985. In 1989 CFL and VLine sign a licence agreement for implementation of a Railway Reserve Vegetation Management Plan, requiring CFL to pay an annual fee to carry out management works on significant rail reserves. This agreement is not fully implemented and is dissolved in the early 1990s.
- From the mid 1980s through to the 1990s railways managers replaced regular burning as a fuel control method with the use of herbicides and ploughed firebreaks, thus destroying perhaps 50% of the high quality grassland remnants on rail reserves.

### 1990s

- The then Department of Conservation and Environment publishes a report on remnant native grasslands and grassy woodlands of the Melbourne area (DCE (1990) with management recommendations.
- Western (Basalt) Plains Grassland community is listed as a threatened community under the Flora and Fauna Guarantee Act in 1991, followed by Northern Plains Grassland Community in 1992, Central Gippsland Plains Grassland and Forest Red Gum Grassy Woodland in 1993 and South Gippsland Plains Grassland in 1994. The FFG Action Statement

for Western Basalt) Plains Grassland was released in 1995 (Muir 1995).

- Draft Conservation Program for Native Grasslands and Grassy Woodlands in Victoria published by Department of Conservation and Environment in 1992.
- !n 1992 the Australian National Parks and Wildlife Service published the national Recovery Plan for Western Basalt Plains Grassland (Muir 1992). The following year AN&WPS provided two years of half-time funding for five Grassland Planning and Extension positions, to cover the Northern Plains, Western Plains, Melbourne and Gippsland regions.
- Sheep and cattle grazing became less profitable, prompting a move towards more intensive agricultural practices e.g. pasture improvement, new crops, raised-bed cropping, laser grading, pig farming. Native grasslands that had persisted under low level grazing regimes were cleared and destroyed.
- Public Authority Management Agreements were entered into for several cemeteries containing grassland and grassy woodland remnants.
- Moormurng declared a Flora and Fauna Reserve in 1993 and grazing ceased.
- Between 1995 and 1998 the then Australian Nature Conservation Agency (ANCA) provided $160,000 p.a. for three years to fund grassy ecosystem conservation, management and research. Funds were allocated on the recommendations of the multi-disciplinary Grassy Ecosystem Reference Group (Craigie & Ross 1995) and Research Advisory Group (Wellington 1996). ANCA also funded a project investigating the Economic Benefits of Native Grasslands, for which farmers on the Basalt Plain and Riverine Plain were interviewed (Crosthwaite (1997).
- Management guidelines for the relatively unknown Northern Plains Grasslands are developed (Diez & Foreman 1996).
- Surveys and identification of roadsides with high conservation values were undertaken for most local government areas. Many roadsides were signposted, but many signs later stolen or destroyed. Roadside management plans were developed but not all implemented.
- Victoria's Biodiversity Strategy was released (Crown [State of Victoria] 1997), identifying the highly endangered status of lowland grasslands and grassy woodlands and recommending no further loss of native vegetation.
- Numerous extension materials (brochures, posters, management kits) on grasslands and their management were produced by the then Department of Conservation, Forests and Lands, Land for Wildlife, Trust for Nature, WWF and VNPA.

**Late 1990s - early 2000s**

- A conference at Victoria University was held on the management of native grasslands and proceedings published (Craigie & Hocking 1999)
- A conference in Clare, SA was held on balancing conservation and production on native grasslands and pastures, and proceedings published (Barlow & Thorburn 2000).
- Several private land sites were purchased for conservation (e.g. Terrick Terrick, Craigieburn), public land reserves were gazetted as grassland conservation reserves, conservation covenants and management agreements were entered into on private land and Public Authority Management Agreements begun with some local governments.
- From 1999-2001, the Federal Government established a devolved grants program to fund grassy ecosystem conservation and management projects. The WWF/NHT Grassy Ecosystem Grants Program disbursed $500,000 p.a over three years, a significant proportion going to Victoria.
- NHT funding was sought and received for many projects involving conservation and management of grasslands and grassy woodlands
- Nature conservation on private land became a focus of research, extension and policy at state and national level (this had been evolving since at least the late 1970s).
- Under the Ecologically Sustainable Agriculture Initiative of the then Department of Natural Resources and Environment (NRE), now Departments of Primary Industries and of Sustainability and Environment, a project was established to specifically investigate the management requirements of native grasslands on the Basalt Plain and Riverine Plain (Dorrough et al. 2002, Dorrough & Carter in press, ESAI booklet (State of Victoria 2002)). This ongoing project has also surveyed producers and extension officers in these areas to determine appropriate extension approaches.
- An environmental management system has been trialed on cropping properties in the Barwon basin, some of which have native grasslands (Western Ecological Consultants 2002). Related projects included biodiversity assessments on the properties (Newton & Hastings 2003) and mapping the potential for raised bed cropping against biodiversity assets across south-west Victoria (MacEwan 2003). Further EMS work on properties with native grasslands is being led by the North-Central Catchment Management Authority. Best

Management Practice Guidelines were tested with producers across south-west Victoria, many of whom manage native grasslands (McFarlane & Trewick 2002); an extension program has recently finished.

- Native grasslands in the context of farm businesses are a focus for research in a project under the national Land, Water and Wool program (Moll et al. 2003); this extends earlier research investigating opportunities to improve conservation of native grasslands by taking a whole-farm perspective (Crosthwaite & Malcolm 2000).
- Extension materials about biodiversity, including native grasslands, was produced (much of it incorporated in the Living Systems Resource Kit (Straker & Platt 2002)). The national Sustainable Grazing Systems project has incorporated the most recent research and management recommendations into extension materials received by all meat producers in Victoria, namely the special issue of Prograzier and Tips and Tools on biodiversity.
- BushTender, a market-like policy tool, is being trialed in several regions of Victoria, including parts of the Gippsland Plain bioregion containing the Forest Red Gum Grassy Woodland vegetation community. The approach pays landholders to provide habitat services that improve the quality and quantity of native vegetation on their land beyond current obligations. Landholders establish their own price for the services they are prepared to offer and successful bids are those that offer the best biodiversity value for money. Landholders may choose from a range of shorter and longer-term agreements including permanent protection options.
- The Victorian government undertook a program of strategic identification, assessment and voluntary purchasing of key sites for conservation, often with financial assistance from the Commonwealth Government as part of the National Reserve System Program (Fitzsimons & Ashe 2003).

Despite the many positive actions that are listed above, threatening processes have continued to operate and the conservation status of the listed grasslands and grassy woodland has not improved. The rate of loss has proceeded, particularly in areas subject to subdivision around Melbourne, where it has greatly increased since the 1970s. Economic pressures within the agricultural sector have led to changes in agricultural practices that have accelerated losses on private land.

## Decline and Threats

The following major threats apply across all land tenures and uses:

### Clearing and habitat destruction

Clearing and habitat destruction is associated with urbanisation (intensive residential, industrial, infrastructure development), rural and farming infrastructure and development, installation and management of public utilities, herbicide use, dumping of material, inappropriate fire prevention works, ploughing, cropping, and overgrazing by introduced and native herbivores.

Fragmentation of grasslands into small isolated remnants within largely agricultural and urbanised landscapes, and the associated site degradation arising from it, may now represent the greatest threat to the long-term conservation of these communities.

### Pest plants and animals

Even very small remnants of native grasslands will generally maintain their integrity if properly managed. However soil disturbance, including overgrazing, fertilising, stock movements, machinery movements, promote the growth of more fast growing exotic weeds, including otherwise desirable pasture species. Once significant invasion has occurred, immediate control is necessary or the grassland will eventually become degraded and destroyed. Pest animals such as foxes and rabbits can cause considerable damage to flora and fauna.

### Biomass management

In the absence of suitable burning or grazing, dominant grass species will generally out-compete and smother smaller flowering herbs, and in turn senesce and become smothered themselves. In such cases species diversity will decline, fauna habitat will be lost and the grassland will eventually degraded beyond repair.

### Legal and planning protection

The native flora and fauna of these listed communities are legally protected, but this is not widely understood. Poor understanding of, and compliance with, legislation and planning controls allows deliberate and accidental removal to continue.

### Loss of key component species

These can include species of flora, vertebrate fauna and invertebrates, with roles as pollinators, providing nutrient recycling, creating suitable vegetation disturbance and other essential elements of structural habitat. There has been an almost complete loss of mammalian fauna on the plains south of the Divide, with a number of

species becoming extinct or endangered at a statewide or regional level (Seebeck 1984).

### Land uses and tenures

Grasslands and grassy woodlands occur on a wide variety of public land reservations and on private land. They are poorly represented in the conservation reserve system. Land tenures and uses are summarised in Table 2 on Page 20

### Stakeholders and interest groups

- Department of Sustainability and Environment
- Department of Primary Industries
- Parks Victoria
- Department of Infrastructure
- Department of State and Regional Development
- Traditional (Aboriginal) owners
- Utilities providers (power, gas, telecommunications)
- Commonwealth agencies, especially Department of Defence and Environment Australia
- Local government authorities
- Victorian Catchment Management Council and Catchment Management Authorities
- Victorian Farmers Federation
- Landholders
- Business (developers, manufacturers, transport operators, construction companies, environmental consultants, planning and engineering consultants)
- Trust for Nature
- Country Fire Authority
- Melbourne Fire Brigade
- National conservation groups (e.g. World Wide Fund for Nature)
- State-wide conservation groups (e.g. Victorian National Parks Association)
- Local community and conservation groups, Field Naturalists
- Educational institutions

### Policy framework

There are a number of policy and legislative mechanisms that identify actions and processes and provide guidance for decision-making. Some of the most important are described below.

### Flora and Fauna Guarantee Act 1988

This Action Statement forms a part of the implementation of the **Flora and Fauna Guarantee Act 1988**. Among the objectives of the FFG Act is "…to conserve communities of flora and fauna."

The communities that are the subject of this Action Statement are listed as threatened under the Act. As a result of listing, the flora of these communities is protected flora under sections 46-51 of the FFG Act, and must not be taken without authorisation wherever they occur on public land, including reserves, parks, roadsides, rail reserves and cemeteries.

### Victoria's Biodiversity Strategy

Victoria's Biodiversity Strategy states that the goals for biodiversity management are to ensure that within Victoria:

- there is a reversal, across the entire landscape, of the long-term decline in the extent and quality of native vegetation, leading to a net gain with the first target being no net loss by the year 2000;
- the ecological processes and the biodiversity dependent upon terrestrial, freshwater and marine environments are maintained and, where necessary, restored; the present diversity of species and ecological communities and their viability is maintained or improved across each bioregion;
- there is no further preventable decline in the viability of any rare species or of any rare ecological community;
- there is an increase in the viability of threatened species and in the extent and quality of threatened ecological communities.

### Victoria's Native Vegetation Management – A Framework for Action

The Framework's primary goal for native vegetation management in Victoria is to achieve:

"A reversal, across the entire landscape, of the long-term decline in the extent and quality of native vegetation, leading to a Net Gain."

'Net Gain' is where, over a specified area and period of time, losses of native vegetation and habitat, as measured by a combined quality-quantity measure (habitat-hectare), are reduced, minimised and more than offset by commensurate gains.

The Framework provides a basis for determining the conservation significance of areas of native vegetation, and the habitat hectares approach provides a method for assessing the condition/quality of native vegetation. The Framework prioritises rare vegetation types such as grasslands.

## Planning Framework

### Statutory Planning

The **Planning and Environment Act 1987** sets the legal framework for planning in Victoria. The Act allows for the creation of municipal planning

schemes by a responsible authority, which is usually a local council. The planning scheme provides the responsible authority with the means to make decisions on land use and development.

The Victoria Planning Provisions (VPP) are best considered as a statewide reference document or template from which planning schemes are sourced and constructed. It is a statutory device to ensure the consistent provisions for various matters are maintained across Victoria. The VPP includes the State Planning Policy Framework (SPPF) that provides responsible authorities with the State policy outcomes and the relevant policy documents that should be referred to and implemented in decision making, where relevant. The **Flora and Fauna Guarantee Act 1988** and *Victoria's Biodiversity Strategy* are referenced in this way. The forthcoming update of the VPP, due in July 2003, will include *Victoria's Native Vegetation Management - A Framework for Action* within the SPPF . The SPPF also suggests that responsible authorities should take into account any regional catchment strategies or regional vegetation plans in decision making.

A municipal planning scheme is constructed by taking the VPP as the basic template and inserting the local vision and policy framework (the Municipal Strategic Statement and local policies), selecting the zones and overlays needed to implement these and writing the appropriate local provisions to support the zones and overlays (the schedules).

## Regional Planning

### Regional Catchment Strategies

The **Catchment and Land Protection Act 1994** requires that Regional Catchment Strategies be prepared and periodically revised by the Catchment Management Authorities. The Regional Catchment Strategy must:

- assess the land and water resources of the catchments in the region and how they are used;
- assess the nature, causes, extent and severity of land degradation of the catchments in the region and identify areas for priority attention;
- identify objectives for the quality of the land and water resources of the catchments in the region;
- set a program of measures to promote improved use of land and water resources and to treat land degradation;
- state the action necessary to implement the strategy and who should take it;
- specify procedures for monitoring the implementation of the strategy, achieving the land and water resource quality objectives and assessing the effectiveness of the program.

The Catchment Management Authorities have included consideration of biodiversity assets and threats within the scope of their Regional Catchment Strategies.

### Regional Vegetation Plans

Each Catchment Management Authority has commenced preparation of a Regional Vegetation Plan. The Regional Vegetation Plans contain information on the extent and condition of native vegetation within each catchment and identify rare, depleted or threatened vegetation types. The Regional Vegetation Plans are consistent with "Victoria's Native Vegetation Management – A Framework for Action".

### Biodiversity Action Planning

Biodiversity Action Planning is a structured approach to identifying priorities and mapping significant areas for native biodiversity conservation at the landscape and bioregional scales. This will assist Regional Catchment Strategies, local government, public and private landowners and land managers to deal with the complexity of Victoria's native biodiversity and strategically direct their efforts. It supports the notion of a "net gain" in vegetation quality and quantity.

## Major Conservation Objectives and Strategic Approaches

### Conservation Reserves

Context

The listed grasslands and grassy woodland are gravely under-represented in the conservation reserve system. With the exception of a few bushland and game reserves that incidentally contained native grasslands, there were no reserves set aside specifically for grassland conservation until the early 1980s. This situation has improved slightly over the last twenty years with the purchase and reservation of several blocks of private land, especially on the Western and Northern Plains, but there are still threatened grassland and woodland species and sub-communities that are completely unprotected.

Long-term goal

A major long-term conservation goal is to establish a comprehensive, adequate and representative reserve system for these communities and to ensure that they are managed to recover and retain their biodiversity values.

Objectives of this Action Statement

There are three key objectives of this Action Statement which, if met, would contribute substantially to achieving this goal:

1. To protect all significant remnants of the five listed communities currently within the conservation reserve system
2. To enhance and restore priority degraded remnants of the five listed communities currently within the conservation reserve system
3. to incorporate into the reserve system additional significant remnants of the five listed communities to achieve a comprehensive, adequate and representative system

Strategic approaches

In pursuit of these objectives, this Action Statement adopts the following strategic approaches:

- preparation and implementation of site management statements which will specify the active management required to maintain, enhance and/or restore the biodiversity values of the site.
- application of adaptive management approaches to refine management and restoration techniques
- regular monitoring of sites and constituent biodiversity values
- voluntary acquisition of significant remnants from private or corporate landholders;
- transfer to the Crown of significant remnants as a result of planning decisions (e.g. open space contributions);
- transfer to the Crown of land formerly used for other purposes (eg. Defence Department land);
- changes to use of existing Crown land (eg. Victorian Environment Assessment Council recommendations).

**Other public land (including publicly-owned freehold)**

Context

Remnants occur on public land used for purposes other than nature conservation, including rail reserves, roadsides, cemeteries, and on land reserved for purposes other than conservation. These sites retain high quality grassland and woodland remnants as a result of accidentally benign management, such as burning or light sporadic grazing.

Long-term goal

The long-term goal for remnants occurring on other public land is to work with the relevant management agencies to ensure that the values of the remnants are recognised, that responsibilities for biodiversity conservation are accepted within the organisational culture, and the remnants are managed to maintain and enhance their conservation values. This goal is to be achieved without unduly constraining the existing land use.

Objective of this Action Statement

The objective of this Action Statement for remnants occurring on other public land, is to protect and enhance all significant remnants of the five listed communities.

Strategic approaches

This will be achieved by pursing the following strategic approaches:

- survey, mapping, documentation and fencing (if appropriate) of all significant remnants
- preparation of management guidelines and protocols to ensure that conservation objectives are met and legal compliance is achieved
- preparation and implementation of site management statements which will specify the active management required to maintain and enhance the biodiversity values of the site
- regular monitoring of biodiversity values

## Private agricultural land

Context

Remnants of the grasslands and grassy woodland occur on private land throughout Victoria. Only a small proportion of these remnants have been identified and assessed. Based on those that are known, the remnants are of variable size and condition, and have a range of management histories.

Some are quite degraded and would be difficult to restore. In some cases, these might continue to provide habitat for threatened fauna species, or continue to support populations of threatened plants. In other cases, the remnants may be so degraded that the investment required to restore and manage them may outweigh the benefits to be gained.

Other remnants will be in much better condition, retaining most if not all of their biodiversity values. Areas of agricultural land that have not been cropped or undergone intensive pasture improvement can support high quality remnants, especially on the Northern and Western Plains. If the grasslands and grassy woodland are to be

conserved on private land, the cooperation and involvement of the farmer is essential.

Landholders have commented that many farmers are struggling with the complexities and fluctuations of international markets for wool and grain, and are faced with financial pressures to implement different farming systems. Adding to this complexity has, at times, been the conflicting messages to farmers from government agencies, on the one hand encouraging land use changes without considering the impact on biodiversity, while on the other hand advocating conservation without addressing farmers' financial viability.

Ultimately, the best long-term arrangement for conservation of grasslands on private agricultural land is for farmers to derive sufficient income from their properties to allow them to work co-operatively with Government agencies and community groups to conserve the relatively small area of significant remnants.

Long-term goal

The long term goal for private land remnants is to maintain and enhance as many of the significant remnants as possible, without necessarily acquiring them. It is important to note that, due to the relatively poor representation of the grasslands and grassy woodland in conservation reserves or other public land, the long-term conservation of these communities relies heavily on retaining remnants on private agricultural land.

Objectives of this Action Statement

**For private agricultural land, the objectives of this Action Statement are:**

1. To protect and enhance significant remnants of the listed grasslands and grassy woodland on private land, and
2. To recognise and address the economic and social issues confronting farmers and farming communities in managing native grasslands and grassy woodlands.

Strategic approaches

- These objectives will be achieved by consistently applying the Victorian Planning Provisions and Victorian Government policies relating to native vegetation, in particular 'Victoria's Native Vegetation Management – A Framework for Action'. It is intended that these controls be used to conserve the most endangered communities, such as the listed grasslands and grassy woodland.
- A key element of Government policy is the goal of 'Net Gain'. However, in some cases landholders have already managed and improved for conservation, and it would be very difficult to obtain net gain at a future point in time, by either improving existing remnants or purchasing others. The 'Net Gain' concept recognises vegetation management and enhancement works previously undertaken by landholders, as these are automatically built into the way 'Net Gain' is structured. Vegetation that is of higher quality is potentially more valuable as a conservation 'offset' as it is eligible for a higher potential gain with less effort. Vegetation remnants of higher conservation significance are also more valuable, particularly as offsets for permitted clearing in lower conservation significance patches.
- The regulatory approach will be complemented by the continuing development and use of voluntary conservation programs, including Land for Wildlife, conservation covenants and incentives programs such as BushTender. Farmers with significant remnants would be encouraged to undertake whole farm planning, including options for continuing to derive income from the remnants. In many cases, maintaining existing management regimes will be the preferred option.
- Some areas of very high quality grasslands or grassy woodland on private land may be identified for voluntary land purchase or exchange. In general terms, such grasslands remain because they have been managed in such a way as to retain native biodiversity, generally by light grazing. If purchased for inclusion in the conservation reserve system, management would tend to copy that of the previous owner, at least in the short term, and the advice of the previous manager would be sought. In some cases the landholder could continue to graze the reserve under a license agreement, and stocking rates and timing varied to reflect conservation targets for threatened flora and fauna.
- DSE will also focus on improving the information about remnant grasslands and grassy woodlands on private agricultural land, by undertaking survey and mapping of all significant remnants, subject to owners' agreement.
- Finally, the Victorian Government, through DPI and DSE, will engage landholders and farm advisers in developing solutions to grassland and grassy woodland conservation and management within the farm business context.

## Private land on urban fringes

Context

Grasslands and grassy woodlands on the urban fringes are generally old grazing properties that are no longer farmed. Many of these areas are on

the northern and western fringes of Melbourne, but they also occur to the south-east of Melbourne, near Geelong and around other provincial cities and towns.

As cities and towns grow, demand for industrial, commercial and residential land results in pressure to re-zone and subdivide these properties. Such developments can generate large financial windfalls for the owners.

Long-term goal

The long-term goal for remnants on private land on the urban fringe is to ensure that all significant remnants of grasslands and grassy woodlands are securely protected and managed for their biodiversity values and that, where appropriate, restoration and enhancement of degraded remnants is undertaken to improve the viability of the remnants.

Objectives of this Action Statement

The objectives of this Action Statement for grasslands and grassy woodlands remnants on private land on the urban fringe are:

1. to prevent further loss of significant remnants of grasslands and grassy woodlands.
2. to improve our knowledge of the type, distribution, condition and biodiversity values of remnants and
3. to improve our understanding of the management practices required to maintain, enhance and restore the biodiversity values

Strategic approaches

- Where new industrial, commercial and residential developments are proposed, DSE will pursue, in co-operation with local government authorities and developers, sophisticated planning outcomes which meet fully the requirements of the Victorian Planning Provisions and Victorian Government policies relating to native vegetation, in particular 'Victoria's Native Vegetation Management – A Framework for Action'. Such planning outcomes will include mechanisms to provide permanent protection to retained remnants, such as conservation covenants and s173 agreements, and ongoing provision for active management and monitoring of the retained remnants.
- DSE will also pursue, in co-operation with local government authorities and developers, planning controls on the use of the remainder of the area being developed to ensure that future use is not incompatible with the long-term conservation requirements of the retained remnants.
- DSE will assist prospective developers in understanding the information requirements and approval processes as they relate to biodiversity, land and water management.

## Intended Management Actions

*The intended management actions listed below will be further elaborated in DSE's Actions for Biodiversity Conservation database. Detailed information about the actions and locations, including priorities, is held in this system and will be provided annually to land managers. This system identifies responsibilities for implementation, timelines and progress of implementation.*

Site Management Statements will be prepared in conjunction with landholders and managers (see Local Action L4) to identify management aims, actions, responsibilities, timing and resourcing. These will give clear future directions, and identify opportunities for advice, assistance and incentives.

## Statewide Actions

### Developing the policy and institutional framework

S1 Develop a policy statement in regard to the conservation of lowland grasslands and grassy woodlands consistent with Growing Victoria Together, Victoria's Biodiversity Strategy and Victoria's Native Vegetation Management: A Framework for Action.

*Responsibility:* *DSE/DPI*

### Information and identification

S2 Compile and maintain information on all grassland and grassy woodland remnants, including assessment of their biological assets, conservation significance, levels of risk and priorities for action.

*Responsibility:* *DSE*

S3 Develop a research and monitoring program to maintain, enhance and restore the condition of lowland grasslands and grassy woodlands, including research and development into management techniques for native grasslands within farming systems.

*Responsibility:* *DSE/DPI*

### Integrating production and conservation

S4 Identify the institutional, organisational and on-farm barriers to the conservation and retention of grasslands and grassy woodland and their component species on private land.

*Responsibility:* *DSE/DPI*

S5 Identify a range of ecologically sustainable farm management operations that can provide for the retention of native grasslands and grassy woodlands within a viable farm business.

*Responsibility: DSE/DPI*

S6 Identify the strategic options open to private landholders to allow them to retain grassland and grassy woodland communities and species on land subject to development plans eg offset arrangements.

*Responsibility: DSE/DPI*

S7 Provide landholders with the latest information about on-site management requirements, and encourage preparation of site management statements, incorporating adaptive management principles that facilitate landholder input and feedback into management decisions.

*Responsibility: DSE, DPI, CMAs*

S9 Include information on appropriate management techniques and standards for native pastures and native grasslands into relevant agricultural and land management programs and into guidelines such as EMS, whole farm or property management planning, best management practice and codes of practice.

*Responsibility: DSE, DPI*

**Planning and regulation**

S10 Publicise and enforce the provisions of the **Flora and Fauna Guarantee Act 1988** and the native vegetation controls in planning schemes in regard to lowland grassland and grassy woodlands, including providing encouragement and support to landholders, land managers and local planning authorities to achieve improved compliance.

*Responsibility: DSE, local governments*

S11 Ensure that landholders and local planning authorities are aware of the range of activities that may disturb, damage or destroy native grassland, such as rock removal, ploughing, fertilising, draining and laser-grading.

*Responsibility: DSE*

S12 Analyse and assess the impact and trends of planning approvals on endangered vegetation classes on private land and determine the outcomes for 'net gain', using information contained in the DSE/DPI case management tracking system.

*Responsibility: DSE*

**Moving towards appropriate management**

S13 Discourage the use of inappropriate techniques for fuel reduction and weed management in lowland grassland and grassy woodlands.

*Responsibility: DSE, DPI, CFA , local government authorities*

S14 Encourage ecological burning as a management tool on appropriate sites, especially those with a history of burning, in partnership with CFA management and brigades.

*Responsibility: DSE, DPI, CFA , local government authorities*

S15 Promote ecologically sustainable weed control practices, such as cell grazing and burning, with emphasis on minimising soil disturbance, reducing soil nutrient levels and replacing weeds with suitable native species.

*Responsibility: DSE, DPI, CFA , local government authorities*

S16 Endeavour to resolve impediments to ecological burning and pest plant and animal control activities in significant sites on rail and other linear reserves. Issues include public safety, occupational health and safety and public liability.

*Responsibility: DSE, DPI, Vicroads, local government authorities, rail managers*

S17 Develop Environmental Standards and Procedures for works and maintenance operations on Crown land and incorporate them into contracts where appropriate.

*Responsibility: DSE, DPI, DoI, VicTrack, VicRoads*

**Reserve system development**

S18 Further develop Comprehensive, Adequate and Representative reserve system design models and apply to lowland grasslands and grassy woodlands at a bioregional level to identify key gaps.

*Responsibility: DSE*

S19 Pursue the voluntary acquisition of significant sites in private ownership. Where appropriate, equivalent public land may be exchanged for private land supporting significant grassland and grassy woodland remnants.

*Responsibility: DSE, DPI*

S20 Encourage non-government organisations (e.g. Trust for Nature, Australian Bush Heritage Fund), philanthropic trusts and other organisations to sponsor conservation management activity, including land purchase.

*Responsibility: DSE*

S21 Undertake permanent reservation for conservation purposes of significant remnants on public land.

*Responsibility: DSE (Parks, Flora and Fauna Division, Regions)*

#### Engaging with the community

S22 Explore improved options to incorporate grassland and grassy woodland biodiversity values into farm extension programs and activity , especially through commercial farmer cropping groups at the subregional level. Extension programs to engage include:

- DPI wool, meat and grains as well as national equivalents sponsored by Australian Wool Innovations, Meat & Livestock Australia and the Grains Research and Development Corporation, and Land & Water Australia, FarmBiz
- farmer-led programs eg. Bestwool 2010, Southern Farming Systems, Birchip Cropping Group,
- Landcare,
- Conservation programs such as Land for Wildlife and those run by Trust for Nature and Greening Australia.

*Responsibility: DSE, DPI*

S23 Prepare informational material on the conservation significance of native grasslands and grassy woodlands and their practical, ecological and financial values, for distribution by local government planning offices and officers to private landholders contemplating development applications.

*Responsibility: DSE, DPI, Catchment Management Authorities, local government authorities*

## Local Actions

#### Planning

L1 Incorporate targets and actions to protect, enhance and restore lowland grassland and grassy woodlands into Regional Catchment Strategies and subordinate strategies, including Regional Vegetation Plans .

*Responsibility: Catchment Management Authorities*

L2 Provide information (including maps and supporting data) and advice to assist local government authorities to conserve lowland grassland and grassy woodlands through the implementation of native vegetation controls and application of local planning schemes.

*Responsibility: DSE Regions*

L3 Ensure that all relevant municipal planning schemes include the objective of conserving and restoring native grasslands and grassy woodlands, and achieve this objective through the optimal use of environmental zones, environmental overlays, local policy and non-statutory programs (see Biodiversity Planning Practice Note (DOI 2002)).

*Responsibility: DSE, local government authorities*

L4 Develop bioregional Conservation Management Networks for lowland grasslands and grassy woodlands.

*Responsibility: DSE Regions*

#### Agreements and incentives

L5 Negotiate management agreements, in their various forms, as a means of increasing certainty about conservation outcomes, especially for sites of high and very high conservation significance. On private land these agreements will include covenants, Land for Wildlife voluntary agreements, and agreements reached via planning schemes or incentives schemes such as BushTender. On public land these will include Public Authority Management Agreements under the FFG Act.

*Responsibility: DSE Regions*

L6 Continue to implement mechanisms and programs to facilitate voluntary conservation action on private land (including whole farm planning, conservation covenants, management agreements and financial incentives such as rate reductions, tax incentives and payments of services through approaches such as BushTender) and seek to ensure that native grasslands and grassy woodlands are given high priority in funding programs such as the Natural Heritage Trust and the National Action Plan for Water Quality and Salinity.

*Responsibility: DSE Regions, Catchment Management Authorities, Trust for Nature, local government authorities*

#### Community involvement

L7 Promote and support participation by community groups, landholders and managers and education institutions in management, research and monitoring of lowland grasslands and grassy woodlands. Assist such groups to obtain funding for suitable projects.

*Responsibility: DSE Regions*

#### Science-based decisions and management

L8 Conduct targeted flora and fauna survey mapping and site documentation to fill key information gaps.

*Responsibility: DSE Regions*

L9 Develop and implement management trials (adaptive experimental management) at priority sites.

*Responsibility: DSE Regions, land managers*

**On-ground management responsibility and action**

L10 Clarify responsibilities for various site management actions with managers and lessees of Crown land, including road and rail managers, and formalise (where necessary) in agreements (eg. Public Authority Management Agreements)

*Responsibility: DSE Regions*

L11 Prepare, implement and review Site Management Statements for all priority sites in each listed community, in consultation with landholders and land managers, to maintain or improve existing biodiversity, including provision for biomass management, weed control, signposting and fencing, adaptive management methodology and baseline and ongoing monitoring, by 2008.

*Responsibility: DSE Regions*

L12 Undertake urgent management at priority sites prior to preparation of Site Management Statements, including actions specified below.

*Responsibility: land managers*

**Central Gippsland Plains Grassland**

- Continue ecological burning at Munro, Marriage Lane , Hillside Lindenow South, Fernbank rail reserves, Briagolong cemetery and Golden Beach.
- Undertake weed control for African love-grass and St John's Wort, and tree and shrub removal (e.g. burgan, casuarinas, eucalypts, black wattles) from significant sites that suffered a cessation of burning from 1980 – 1990, especially Munro and The Knob.
- Undertake a Rabbit control program on Briagolong cemetery, and rail reserves from Munro to Lindenow South
- Repair and maintain fences at all fenced sites to prevent accidental damage

**Forest Red Gum Grassy Woodland**

- Prepare and implement a management plan for The Knob Recreation Reserve, Moormung and Providence Ponds Flora and Fauna Reserves.
- Undertake control of priority weeds such as Sweet Vernal Grass, Yorkshire Fog, Phalaris and Bridal creeper, at Moormurng Flora and Fauna Reserve, Providence Ponds FFR, Stratford Highway Park, The Knob Recreation Reserve, The Billabong FFR

**Plains Grassland (South Gippsland)**

- Undertake control of introduced pasture grasses (Phalaris, Paspalum, Yorkshire Fog and Sweet Vernal Grass), Blue Periwinkle, Watsonia and native shrubs such as Swamp Paperbark and Prickly Teatree at all sites

**Northern Plains Grassland**

- Undertake ecological burning of priority rail and road reserves e.g. Hunter, Mitiamo-Pyramid Hill, Glenrowan, Boorhaman rail reserves; Mitiamo, Lalbert-Kerang, Bael Bael-Quambatook, Suttie, Adamthwaite, and Tungamah roads.
- Undertake control of priority weeds such as African Box-thorn, Bathurst Burr, Wheel Cactus, Horehound, Paterson's Curse, Annual Rye-grass, Wild Oats at Terrick Terrick National Park. Undertake weed control at Hunter Flora Reserve and Thunder Swamp (Spear thistles, Paterson's Curse and Artichoke thistles).
- Phase out commercial wildflower harvesting from grassland remnants on roadsides.
- Undertake appropriate grazing management at Terrick Terrick National Park and Terrick Terrick East, incorporating ecological research findings.

**Western (Basalt) Plains Grassland**

- Undertake ecological burning at Yalla- y-poora Recreation Reserve, priority roadsides e.g. Chatsworth, Dundonnell, Woorndoo, Carngham - Streatham, Chepstowe-Mt Emu; priority cemeteries e.g. Truganina and Bannockburn; and priority rail reserves e.g. Bannockburn, Middle Creek, Dobie, Wingeel, Little River and Manor
- Undertake control of priority weeds such as Phalaris, African Love-grass, Furze, Nassella spp. and Paterson's Curse at key sites - Yalla- y-poora Recreation Reserve, Middle Creek and Werribee-Geelong rail reserves, Ballarat-Skipton Rail Trail.
- Discourage weed control practices that involve broadscale herbicide application, especially on paddocks containing remnant native grasslands and minor Serrated tussock infestations.
- Control access along railway reserves in rapidly urbanising areas to stop destruction of sites by 4WD and trail bikes, rubbish dumpers etc.
- Phase out commercial wildflower harvesting from grassland remnants on roadsides.

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**Table 1: Description and distribution of the listed communities**

| Community | General distribution and landscape | Characteristic species |
|---|---|---|
| Central Gippsland Plains Grassland | On the poorly drained, heavy alluvial clays of the lowland plains of central Gippsland, Seaspray west to Westernport, and on parts of the Mornington Peninsula. Rainfall ranges from 570 – 650mm, generally <600mm. | Open - closed tussock grasslands, mostly dominated by Kangaroo Grass. Between grass tussocks there is a variety of perennial herbs, including rice-flowers, daisies, lilies, sedges and orchids. |
| Forest Red Gum Grassy Woodland | On the poorly drained, heavy alluvial clays of the lowland plains of central Gippsland, from Traralgon east to Lakes Entrance. Rainfall ranges from 570 – 650mm, generally <600mm. | The community is dominated by Forest Red Gum over a grassy understorey that is similar to that of Central Gippsland Plains Grassland, but without the dominance of Kangaroo Grass. |
| South Gippsland Plains Grassland | On the South Gippsland coastal plain between Seaspray and Welshpool and the head of Westernport Bay, on grey, often seasonally waterlogged soils. | The community ranges from closed tussock grassland dominated by Kangaroo Grass or Mat Grass with perennial herbs to seasonal wetlands dominated by Tussock Grass, sedges and herbs of wet or saline habitats. |
| Northern Plains Grassland | Across the Northern Plain, primarily on alluvial sediments. Rainfall ranges from 375 - 460 mm in the west to 550mm in the east, on average <430mm. | The community ranges from open to closed tussock grassland dominated by Wallaby-grasses, Spear-grasses and Spider Grass, with some herblands or occasionally low chenopod shrubland. |
| Western (Basalt) Plains Grassland | On the heavy, basalt derived soils of the Victorian Volcanic Plain, ranging from Melbourne west to Hamilton. Rainfall ranges from 400mm in the east to 700mm in the west. | The community is generally dominated by Kangaroo Grass, with other native grasses such as Wallaby, Tussock and Spear grasses. Between grass tussocks there is a variety of perennial herbs, particularly daisies. Only a few scattered trees and shrubs occur. |

For more detail, refer to the appendices for each of the individual communities.

### Table 2: Land uses and tenures

Grasslands and grassy woodlands are poorly represented in the reserve system. Land tenures and uses include:

| Land Use | Management |
|---|---|
| Public land reserved for conservation | |
| Conservation reserves, including National Parks, State Parks, Flora and Fauna Reserves, Bushland Reserves, some public open space | Parks Victoria, Committees of Management, Trust for Nature, local government |
| Other public land | |
| Transport – roads | VicRoads, local government |
| Transport - railways | VicTrack, private rail operators. maintenance contractors |
| Transport - airports | airport managers |
| Licensed unused roads | DSE |
| Utilities corridors – energy, telecommunications, pipelines | Telstra, Optus, AGL etc |
| RailTrails | Committees of Management |
| Commonwealth land (communications, munitions) | Dept of Defence, Environment Australia |
| Other Crown land reserves e.g. water reserves, public purposes reserves, State Game Reserves, water frontages, race tracks, tips, Recreation reserves & Town Commons | Local government, committees of management, DSE |
| State forests | DSE |
| Cemeteries | Local government, cemetery trusts, Dept of Community Services |
| Travelling Stock Routes | local government |
| Private land | |
| Production farms, hobby farms, private conservation reserves, quarries, industrial sites | Private landholders, lessees, Trust for Nature |

**Appendix: Further information on each community**

# Central Gippsland Plains Grassland

## Description and Distribution

Central Gippsland Plains Grassland and Forest Red Gum Grassy Woodland occur together on the lowland plains of central Gippsland, in the Gippsland Plain Bioregion, in an area between Seaspray and Welshpool and the head of Westernport Bay, bounded to the north by the Great Dividing Range and in the south by the Gippsland Lakes and Holey Plains sand hills. Despite its name, Central Gippsland Plains Grassland is not restricted to central Gippsland. Remnants have been recorded in West Gippsland and the Mornington Peninsula (Muir pers. comm., Cook *pers. comm.*), and there is a single patch of *Themeda triandra - Austrodanthonia laevis* grassland on French Island in Westernport Bay (Oates & Taranto 2001). The flat to undulating plains are derived from Upper Pleistocene alluvium of poorly drained, heavy clays. The average annual rainfall is less than 650mm and elevation is relatively low at 20-40m above sea level. The Gippsland RFA Biodiversity Assessment Report (Commonwealth of Australia 2000a) equates the community to EVC 132-01 Plains Grassland.

The open treeless grasslands of the Central Gippsland Plains once covered about 600km$^2$ (Lunt in McDougall and Kirkpatrick 1994) at the time of European settlement, but are now believed to be extinct. The grassy vegetation of the plains has been severely modified by nearly 200 years of agriculture and development, and its original condition is not known in precise detail. Composition and structure of the original grasslands and open grassy woodlands was maintained by grazing and aboriginal burning. Cessation of burning led to a decrease in grassiness and increase in shrub and tree cover. Following European settlement, burning in grassy woodlands greatly decreased and woodland remnants were grazed by stock. Small remnants such as railways and cemeteries were excluded from grazing but were repeatedly burned, as often as every 2-3 years. So over the last 150 years, grassland and woodland remnants have been altered from ecosystems subject to burning and grazing interactions, to either solely grazed or solely burned ecosystems.

Lunt (1997a) has proposed that these remnants now form two distinct communities - Forest Red Gum Grassy Woodland and Central Gippsland Plains Grassland - formed by different land use histories. The present grassland community of the Gippsland Plains consists of small remnants derived from the original grassy woodlands.

Forest Red Gum Grassy Woodland and Central Gippsland Plains Grassland have many species in common, but because of this ecological segregation they now contain different threatened species and have different management requirements.

The present areas of open, herb-rich grasslands occur almost exclusively on small areas of public land that have had a history of frequent burning for fuel reduction. These are small fragmented patches on the Melbourne-Bairnsdale rail line, disused Heyfield-Maffra line, and in a few local cemeteries and roadsides – comprising at most 60 hectares.

This burning regime has created an open, treeless community with a suite of tall flowering herbs. It includes species that are tolerant of frequent burning but intolerant of grazing (e.g. orchids). The community is dominated by Kangaroo Grass (*Themeda triandra*) with Wallaby Grasses (mostly *Austrodanthonia laevis and Notodanthonia semiannularis)* and Tussock-grass *(Poa labillardierei)* and includes a number of native herbs, mostly perennials. Common species include Common Everlasting (*Chrysocephalum apiculatum*), Short-stem Sedge (*Carex breviculmis*), Five-awned Spear-grass (*Pentapogon quadrifidus*), Blue Grass-lily (*Caesia calliantha*), Golden Weather-glass (*Hypoxis hygrometrica ),* Pale Sundew (*Drosera peltata ssp. peltata*), Milkmaids (*Burchardia umbellata*), Common Rice-flower (*Pimelea humilis*), Yellow Rush-lily (*Tricoryne elatior*), Common Bog-sedge (*Schoenus apogon*), Chocolate Lily (*Arthropodium strictum).* Threatened species include Purple Diuris (*Diuris punctata*) and Gaping Leek-orchid *(Prasophyllum correctum).*

Although dominated by *Themeda*, and containing many species common to the grasslands further to the west of Victoria, the flora of the Central Gippsland Plains Grassland has distinct differences from that of the Western (Basalt) Plains Grasslands, and from that of the heavy soils of the South Gippsland grasslands. Species that are common in the Central Gippsland Plains Grasslands, but are rare or absent in the Western (Basalt) Plains Grasslands, include Purple Diuris, Golden Weather-glass and Noah's Ark (*Poa clelandii*). Species that are common in the Western (Basalt) Plains Grasslands, but do not occur in the otherwise floristically similar Central Gippsland Plains Grasslands, include Lemon Beauty-heads, Prickly Woodruff (*Asperula scoparia*), Pink Bindweed and

Blue Devil. The uncommon but still widely distributed *Swainsona* and *Ptilotus* species that occur in other Victorian grasslands are also absent.

There are few if any fauna species characteristic of this community remaining. Some relatively common and non-specialised may remain, but no grassland specialists. Invertebrate fauna are so far unsurveyed.

## Key sites:

Rail reserves at Clyde, Dawson, Munro, Marriage Lane, Hillside and Toongabbie South

Mornington tourist rail line

Cemeteries at Briagolong and Maffra

West Sale aerodrome

Fulham road reserve.

## Reservation status:

Mostly unreserved

## Links to other Action Statements

*Prasophyllum correctum* Gaping Leek-orchid (No. 57)

## Threats

- Weed invasion, by African love-grass, St John's Wort, exotic pasture species and cemetery garden waste. Chilean Needle-grass has been recorded in the area and has the potential to be a major weed. On long-unburnt sites, invasion by native shrubs such as Burgan (*Kunzea ericoides*), melaleucas, acacias and casuarinas require management.
- Lack of burning for biomass management
- Overgrazing by stock and pest animals, especially on disused rail lines and roadsides
- Broadscale and incremental damage caused by railway maintenance works and road upgrades and maintenance works
- Destruction for cemetery use, by digging graves and "tidying up".
- Tree planting in naturally treeless areas
- Increasing groundwater salinity

## Previous Management Action

### Policy and strategic planning

- Action Statement prepared for *Prasophyllum correctum*, Gaping Leek-orchid (No. 57),
- Brief management statements prepared for known rail and road sites in the early 1990s
- Management plan developed for the Traralgon Reservoir Conservation Reserve by the Friends group
- FFG Action Statement completed for Maroon Leek-orchid *Prasophyllum* sp. aff. *frenchii* 2 (formerly *Prasophyllum frenchii*)

### Reserve system development

- Establishment of the Perry River Protected Area Network (later expanded into the Gippsland Plains Conservation Management Network)
- Dawson, Toongabbie and Bumberrah rail reserves established as RailTrails under Committees of Management

### Site management

- Burning, weed control, fencing and signposting undertaken at high quality rail reserves and cemeteries
- Rabbit control undertaken at Munro and Lindenow South
- Weed control along rail reserve sites.
- WWF/NHT grassy ecosystem grants was awarded in 2000 for 'Best Practice Grassland Management Project' undertaken by Wellington Shire, for management and PAMAs at several sites including the West Sale Aerodrome

### Incentives for conservation on private land

- WWF/NHT grassy ecosystem grants was awarded in 2000 for Grassland Conservers (Trust for Nature)

### Community Involvement

- Programs of springtime walks, talks and tours carried out through the last decade, by Trust for Nature and NRE staff
- NRE liaised with landholders to inform them of management activities on adjacent sites
- Interpretation boards erected at the Munro, Fulham and Dawson grasslands
- Grassland Interpretation Board erected at West Sale Aerodrome Terminal Building, as part of Wellington Shire's 'Grassy Ecosystem Grants Project'
- WWF/NHT grassy ecosystem grants were awarded in 2001 for Grassland Conservers Part 2 – Trust for Nature

### Knowledge and Information

- Surveys of sites and development of management recommendations for sites on the Traralgon-Bairnsdale rail lines during the 1990s, funded by grants and the then Department of Conservation and Environment
- Trust for Nature undertook a survey of grassland sites on private land, on invitation from interested landowners in 1997

- Known grassland sites were entered onto the Grasslands Register and later the NRE Biosites database
- Surveys were undertaken to identify and map grassland remnants on rail reserves of active lines from Warragul to Bairnsdale, in 2001
- Ecological Assessment completed for West Sale Aerodrome
- Gaping Leek-orchid monitoring program at Munro and Lindenow
- Grassland community monitoring quadrats at 10 key sites to the east of the bioregion
- Purple Diuris monitoring occurring at key sites

# Forest Red Gum Grassy Woodland

## Description and Distribution

The community occurs on the Gippsland Plain Bioregion, stretching east from near Bairnsdale and west to Welshpool and the head of Westernport Bay, bounded to the north by the Great Dividing Range and in the south by the Gippsland Lakes and Holey Plains sand hillsand localised remnants on Raymond Island (Commonwealth of Australia 2000). Elevation ranges from approximately 5-80 m above sea level and average annual rainfall is 500-700 mm.

The community is estimated to have once covered about 1200km$^2$ prior to European settlement (Lunt 1994) , but 99.5% of the original Gippsland plains woodlands has been converted to farmland and few remnants of the original flora now survive. This original distribution can be seen from large numbers of old Forest Red Gum (*Eucalyptus tereticornis* subsp. *mediana)* trees and stumps dotted across the plains, but most are surrounded by an understorey of exotic grasses and other weeds. Perhaps 900 ha of partially intact grassy woodland remains, in a few reserves, on roadsides and on blocks of private land with a past history of light grazing. The Gippsland RFA Biodiversity Assessment Report (Commonwealth of Australia 2000a) equates the community to EVC 55-03 Plains Grassy Woodland.

The community presently consists of woodland with a scattered mosaic of smaller open grassy areas. However the composition if this community has undoubtedly been altered since European settlement. Composition and structure of the original grassy ecosystems was maintained by grazing and aboriginal burning. Halting of burning led to a decrease in grass and an increase in shrub and tree cover. Following European settlement, burning in grassy woodlands greatly decreased and woodland remnants were grazed by stock. Small remnants such as railways and cemeteries were excluded from grazing but were repeatedly burned, changing them from an open grassy woodland to a treeless grassland. Lunt (1997b) has proposed that these remnants now form two distinct communities - Forest Red Gum Grassy Woodland and Central Gippsland Plains Grassland - due to different land use histories. Division of these communities is problematical due to the small size of remnant areas. Some open grassland areas occur within the woodlands, and some of the Central Gippsland Grassland Community has undergone some shrub and tree invasion. These two communities have many understorey species in common, but because of this ecological segregation they now contain different threatened species and have different management requirements.

Since European settlement most of the Forest Red Gums in Moormurng Flora and Fauna Reserve had been felled for railway sleepers, farming timber and cobbles for Melbourne streets. Most of the timber stands are about 130 years old. Adjacent roadside vegetation which has never been grazed contains about 30 more understorey species than exist in Moormurng.

Forest Red Gum Grassy Woodland occurs on Lower Pleistocene gravels, sands, silts and clays with minor Tertiary alluvium. (Commonwealth of Australia 2000). It is dominated by Forest Red Gum (*Eucalyptus teretecornis* subsp. *mediana*) over a grassy understorey that is similar to that of Central Gippsland Plains Grassland, but without the dominance of Kangaroo Grass. Co-dominant trees are Red Box (*E. polyanthemos*), and scattered smaller trees of Lightwood (*Acacia implexa*). There are occasional patches of Black Sheoke (*Allocasuarina littoralis*). Dominant understorey grasses include Weeping Grass (*Microlaena stipoides*), Wallaby Grasses (*Austrodanthonia racemosa* and *Notodanthonia geniculata*) and Spear Grass (*Austrostipa* spp., commonly *A. rudis*). Dominant herbs include Kidney Weed (*Dichondra repens*), Stinking Pennywort (*Hydrocotyle laxiflora*), Small St John's Wort (*Hypericum gramineum*), Chocolate Lily (*Arthropodium strictum*), Common Bog-sedge (*Schoenus apogon*), Short-stem Sedge (*Carex breviculmis),* Cranberry Heath (*Astroloma humifusum),* Creeping Bossiaea *(Bossiaea prostrata),* Yellow Rush-lily (*Tricoryne elatior),* Thatch Saw-sedge *(Gahnia radula),* Star Cudweed *(Euchiton involucratus*), Small Poranthera (*Poranthera microphylla*).

Threatened species include Bushy Hedgehog-grass (*Echinopogon caespitosus*), Dwarf Milkwort (*Polygala japonica*), Southern Spider-orchid (*Caladenia australis*), Slender Tick-trefoil (*Desmodium varians*) and Paddock Love-grass (*Eragrostis leptostachya*).

## Key sites

Moormurng Flora and Fauna Reserve

Providence Ponds Flora and Fauna Reserve

Stratford Highway Park

The Knob Recreation Reserve

Briagolong Forest Red Gum Reserve,

Blond Bay Wildlife Reserve

Gippsland Plains Conservation Management Network

The Billabong Flora and Fauna Reserve

Swallow Lagoon Nature Conservation Reserve

Billabong, Bush Family, and Frair Trust for Nature Reserves

Yeerung Bushland Reserve

## Reservation status:

650-700ha occurs in reserves, but not all are managed primarily for nature conservation.

## Links to other Action Statements:

Dwarf Kerrawang (*Rulingia prostrata*)

## Threats

- Lack of burning in areas with a history of occasional burning
- Weed invasion by Bridal Creeper and exotic pasture species such as Sweet Vernal Grass, Yorkshire Fog and Phalaris
- Invasion by Sweet Pittosporum, caused by changed fire regimes
- Stock overgrazing
- Forest Red Gum insect-mediated dieback
- Firebreak ploughing on roadsides
- Road works
- Firewood collection
- Increasing overgrowth of shrub and tree vegetation
- Fragmentation
- Increased dairy production, potato production, tree clearing for more efficient pivot and linear irrigation systems
- Inconsistent application of exemptions on clearing controls for landholders

## Previous Management Action

### Reservation

- Purchase of Swallow Lagoon for reservation as a Nature Conservation Reserve. A number of other properties have been purchased by the government through Trust for Nature.

### Strategic planning

- Ongoing review of MSSs for all municipalities

### Protection and management

- Trust for Nature has entered into conservation covenants for 12 sites
- WWF/NHT grassy ecosystem grants awarded in 2000 for Grassland Conservers (Trust for Nature)
- WWF/NHT grassy ecosystem grants awarded in 2001 for Grassland Conservers Part 2 – Trust for Nature
- Ecological burns have been undertaken at the Moormurng Flora and Fauna Reserve and on significant roadsides
- Bridal Creeper control has been undertaken at Moormurng and on Bumberrah Rd
- The Perry River Protected Area Network (later the Gippsland Plains CMN)was established in 2001 and a Ranger appointed
- The CMN Ranger has carried out trials on thinning and understorey planting
- Revegetation work has been undertaken on the Gippsland Plains, focussing primarily on trees and shrubs, as part of the through the Red Gum Plains Recovery Project and Gippsland Plains Recovery Project, as a means to reduce fragmentation
- The BushTender project entered into management agreements to secure several areas of Plains Grassy Woodland - 30 ha were secured through 6 year management agreements; 2 ha through 6 year management plus 10 year protection agreements and 25 ha through 6 year management agreement plus conservation covenant.
- Briagolong Forest Red Gum Reserve is zoned as a Special Protection Zone and is managed for conservation.

### Community education and extension

- Programs of springtime walks, talks and tours carried out through the last decade, by Trust for Nature and NRE staff
- *On the plains*, a quarterly newsletter of the Gippsland Plains Conservation Management Network has been produced.

### Inventory and survey

- EVC mapping of Gippsland vegetation communities has been undertaken
- Forest Red Gum dieback has been mapped on the eastern part of the Gippsland plains

### Biological research and monitoring

- Research on floristic structure of understorey conducted by Ian Lunt in mid 1990s
- 24 remnants on private and public land surveyed by NRE staff as contribution to the Red Gum Plains Recovery Project, an NHT funded program

# Northern Plains Grassland

## Description and Distribution

Northern Plains Grassland Community occurs throughout the areas of the Northern Plain (Shepparton Formation) which are not subject to seasonal inundation or associated with prior stream channels. It infrequently occurs in the southern regions of the Northern Plain because particle size distribution results in better drained soils in the south which tend to support grassy woodlands. The community occurs on quaternary alluvial sediments. Soils are calcareous clay loams, or clays on wetter sites.

Today this vegetation extends to the west from the Patho/Mitiamo Plains over the Loddon River at Serpentine on the Powlett Plains. It is also found to the north, west of Kerang in the Bael Bael area associated with the Avoca River. To the east this community extends to Echuca, into NSW at Moama and east of the Campaspe River as far as Kyabram and Corop - although this region has not been extensively searched for remnants (McDougall and Kirkpatrick 1994). Grasslands of the higher rainfall areas (up to 550 mm) occur on the far eastern edge of the Riverine Plain around Wangaratta, Chiltern and areas immediately adjacent to the Warby Ranges. The soils of this region are also generally of a lighter texture and the average particle size distribution decreases further north and west (Macumber 1991).

In the lower rainfall parts of the Riverina plains, the present Northern Plains Grassland Community consists of a plains herbland of no particular dominance, or an open to closed tussock grassland dominated by Wallaby-grasses (*Austrodanthonia setacea* and *A. caespitosa*), Spear-grasses (*Austrostipa scabra* and *A. gibbosa*) and Spider Grass (*Enteropogon acicularis*).This dominance tends to be the result of past grazing and disturbance events. Prior to intensive livestock grazing and cultivation, there would probably have been a greater abundance of annual and perennial herbs, shrubs and C4 grasses (Moore 1953, Williams 1955, 1969). It occasionally occurs as an open (grassy) shrubland dominated by a variety of species. A range of perennial herbs occupy the inter-tussock spaces. Total indigenous vascular flora richness is greater than 10 species per 100 $m^2$, although the most species-rich areas generally exceed 20 and occasionally 30 species/100 $m^2$.

Widespread perennial herbs include Variable Sida (*Sida corrugata*), Grassland Wood-sorrel (*Oxalis perennans*), Wingless Blue-bush (*Maireana enchylaeniodes*), Bulbine Lily (*Bulbine bulbosa*), Scaly Buttons (*Leptorhynchos squamatus*), Paper Sunray (*Rhodanthe corymbiflora*), Vanilla lilies (*Arthropodium* spp.), Common Everlasting (*Chrysocephalum apiculatum*), Pale Beauty-heads (*Calocephalus sonderi*) and Lambs-tails (*Ptilotus exaltatus*). Perennial herbs that are characteristic of the community include Red Swainson Pea (*Swainsona plagiotropis*), Pink Bindweed (*Convolvulus erubescens*), Rough Burr-daisy (*Calotis scabiosifolia*), Broad-leaf Early Nancy (*Wurmbea latifolia*), Narrow-leaf Plantain (*Plantago guadichaudii*) and Billy Buttons (*Pycnosorus globosus*). In addition there are several characteristic Bluebushes – Slender Bluebush (*Maireana pentagona*), Bottle Bluebush (*M. excavata*), Dwarf Bluebush (*M. humillima*) and Common Bluebush (*M. decalvans*). The only other common chenopod in this grassland vegetation is Creeping Saltbush (*Atriplex semibaccata*). Others would have been abundant prior to extensive cultivation and grazing e.g. Rohrlach's Bluebush (*M. rohrlachii*) and Leafless Bluebush (*M. aphylla*).

The other important groups of native species in Northern Plains Grassland Community are the diminutive annuals and woody shrubs. The most common annuals are Small-flowered Goodenia (*Goodenia pusilliflora*), Hairy Stylewort (*Levenhookia dubia*), Grass cushion (*Isoetopsis graminifolia*), Common Sunray (*Triptilodiscus pygmaeus*), and Woolly Mantle (*Eriochlamys behrii*). Although many shrub species have been recorded in grassland vegetation throughout the region, most are rare, with only Woolly Buttons (*Leiocarpa panaetioides*) and Common Bluebush regularly persisting in infrequently grazed remnants.

Exotic species, particularly annual grasses and herbs, are always present in some abundance. Exotic herbs more diverse and frequent, although grasses can often have a high cover at any particular site. The common species include Smooth Cat's-ear (**Hypochoeris glabra*), Cape Weed (**Arctotheca calendula*), Onion Weeds (**Romulea minutiflora* and **R. rosea*), Clovers (**Trifolium* spp.), Centaury (**Centaurium tenuiflorum*) and annual grasses such as Annual Rye-grass (**Lolium rigidum*), Wild Oats (**Avena fatua*) and Soft Brome (**Bromus hordeaceus*).

As on all other grassland communities, past management history influences occurrence of different species. Where there has been little grazing (usually along roadsides and rail reserves)

annual species are scarce, seasonal perennial herbs dominate and a number of often significant shrubs persist. Where grazing has been frequent, a slightly different flora persists where dominance is shared between the grasses, seasonal perennial and annual herbs.

In the grazed and drier (<375 mm annual rainfall) parts of the Northern Plains there is generally species-poor grassland vegetation supporting a range of characteristic species - Hard-head Daisy (*Brachyscome lineariloba*), Stiff Cup-flower (*Pogonolepis muelleriana*), Narrow-leaf Sida (*Sida trichopoda*), Yakka Grass (*Sporobolus caroli*) and Nitre Bush (*Nitraria billardierei*). This vegetation possibly represents a northern grassland form that was formerly dominated by a range of shrubs (especially chenopods) which has been severely depleted by irrigation and associated groundwater salinisation.

In damper areas, in association with gilgai or local depressions where water regularly pools during the growing season, another form of Northern Plains Grassland Community persists. This vegetation is characterised by the presence of hydrophilic grass species (e.g. Rigid Panic (*Whalleya proluta,* some *Austrostipa* spp.), semi-aquatic herbs such as Woolly Heads (*Myriocephalus rhizocephalus*) and a number of other plants typically found in wetter environments.

The eastern higher rainfall grasslands have many species in common with the drier western sub-communities, but tends to be dominated more by a variety of native perennial grasses. Common species include Blown grass (*Lachnagrostis filifolia*), Swamp Wallaby-grasses (*Amphibromus nervosus* and *A. macrorhinus*), Rigid Panic (*Homopholis proluta*), Windmill grass (*Chloris truncata*), Red-leg Grass (*Bothriochloa macra*), Wallaby-grasses and some scattered areas of Kangaroo Grass. There tend to be fewer chenopods, fewer native annual species, and more perennial weeds such as Fog grasses (**Holcus setosus* and **H. lanatus*), Paspalum (**Paspalum dilatatum*), Canary grasses (**Phalaris aquatica* and **P. paradoxa*) and Nut-grass (**Gastridium phleoides*). There are also some of the common species of Grassy Woodlands throughout the Riverine Plain such as Bulbine Lily (*Bulbine bulbosa*), Wattle Mat-rush (*Lomandra filiformis*), Bindweeds (*Convolvulus angustissimus* and *C. wimmerensis*), Yellowish Blue-bell (*Wahlenbergia luteola*) and Scaly Buttons (*Leptorhynchos squamatos*).

A number of state and nationally rare or threatened flora and fauna have been recorded from grasslands of the Northern Plains. Nationally significant species include Fragrant Leek Orchid (*Prasophyllum suaveolens*), Turnip Bassia (*Sclerolaena napiformis*), Chariot Wheels (*Maireana cheelii*), Red Swainson-pea (*Swainsona plagiotropis*), Murray Swainson-pea (*S. murrayana*), Spiny Rice-flower (*Pimelea spinescens* subsp. *spinescnes*), Striped Legless Lizard (*Delma impar*), Plains wanderer (*Pedionomus torquatus*), Hooded Scaly-foot (*Pygopus nigriceps*) and Sun Moth (*Synemon* sp. aff. *selene*).

## Key sites

Terrick Terrick National Park

Yassom Swamp Flora and Fauna Reserve

Kinyapanial Grassland

Naringaningalook Grassland

Glasson's grasslands

Echuca aerodrome

Terrick Terrick East

Korrak Korrak Grassland Reserve

Pine Grove and Roslynmead Grasslands

Balmattum Nature Conservation Bushland Reserve

Rail reserves e.g. Hunter, Mitiamo-Pyramid Hill, Glenrowan, Boorhaman

Roadsides e.g. Mitiamo, Lalbert-Kerang, Bael Bael-Quambatook, Suttie (Quambatook), Adamthwaite (Budgerum), Three Chain (Tungamah), Tandara

Old Mysia School

Numurkah Rifle Range

several private land sites

## Threats

Over the last 170 years, intensive irrigated and dryland agriculture and domestic stock grazing has destroyed an estimated 99.75% of the habitat of the Northern Plains Grassland Community, and significantly altered the remainder (Maher & Baker-Gabb 1993, Foreman 1995) Most of the grassland remnants are found as small, isolated patches wherever disturbance has been minimal, along railway lines, roadsides, on miscellaneous crown land and on private farmland. The largest and most important remnants are found on private land and are still threatened by destruction resulting from agricultural changes.

Threats include:

- further clearing for agriculture and cropping
- weed invasion – African Box-thorn, Bathurst Burr, Wheel Cactus, Horehound, Paterson's Curse, Annual Rye-grass, Wild Oats, in wetter areas, Phalaris & Paspalum
- overgrazing and undergrazing

- road and rail maintenance works
- cultivation, slashing and inappropriate burning for fire breaks
- tree planting within native grassland remnants, especially on roadsides
- trampling of sites at inappropriate times of the year
- salinity may be a future problem

## Previous management action

### Strategic planning

- A strategic plan for nature conservation was developed for the Northern Plain (Foreman 1996b) for a five year period commencing in 1996/97.
- Roadside management plans developed by many Shires e.g. Gannawarra, Buloke, Moira
- Action Statements outlining conservation management actions for the following Northern Plains grassland species have been completed and are in implementation phase: *Delma impar* (Striped Legless Lizard No. 17), *Falco hypoleucos* (Grey Falcon No. 83), *Pedionomus torquatus* (Plains-wanderer No. 66), *Synemon plana* (Golden Sun Moth No. 106), *Pygopus nigriceps* (Hooded Scaly-foot No. 108).

### Reservation

- Yassom Swamp Flora and Fauna Reserve and Patho Flora and Fauna Reserve have been formally reserved via the Land Conservation Council's public land use review process.
- The Davies property purchased and added to the Terrick Terrick State Park, to form the Terrick Terrick National Park.
- Purchase by Trust for Nature of the Kinyapanial, Naringaningalook and Glasson's grasslands
- 214 ha of private land purchased by NRE in 2000 to create the new Terrick Terrick East Grassland Conservation Reserve
- Korrak Korrak Grassland Reserve (246 ha) purchased in 2002 by Trust for Nature as part of the National Reserve System, with assistance from NHT and the RE Ross Trust.
- Purchase of Roslynmead, adjoining Patho and a section north of Patho
- Patho Flora and Fauna Reserve added to Roslynmead Nature Conservation Reserve
- Purchase of 89.4 ha Kotta grasslands, between Mitiamo and Echuca
- Purchase and reservation of Balmattum Nature Conservation Reserve
- Purchase and reservation of 121 ha of grassland near Warnup on the Patho Plains

### Protection and management

- Conservation management guidelines for remnant grasslands throughout the Riverina of NSW and Victoria developed (Diez and Foreman 1996).
- Patho Flora Reserve fenced in 1992,
- Over last ten years, selected rail and road reserves sign posted, fenced and burnt to protect populations of significant species and high quality examples of the vegetation community, e.g Hunter, Glenrowan
- improved management regimes of several key grassland remnants on private ongoing
- WWF/NHT grassy ecosystem grants 2001: Victorian Riverine Plains Protected Area Network Project
- Management plan completed and implemented for Wangaratta Common

### Community education and extension

- WWF/NHT grassy ecosystem grants 2000: Grassland Conservers (Trust for Nature)
- WWF/NHT grassy ecosystem grants 2001: Grassland Conservers Part 2 – Trust for Nature

### Inventory and survey

- Maher & Baker-Gabb (1993) undertook surveys for Plains-wanderers in northern Victoria which have helped to identify a number of very important grassland remnants in the region.
- Surveys of grassland remnants and establishment of management trials through La Trobe University and the then Department of Conservation and Natural Resources (Foreman 1995, 1996b)
- Survey conducted by Paul Foreman (MSc thesis, La Trobe University) identified significant grassland remnants across the Northern Plain (including Pine Grove (near Mitiamo) and Kinypanial) and information stored on NRE's *Flora Information System* (FIS).
- Vegetation surveys in the Shires of Loddon, Gannawarra and Buloke identified additional significant grassland remnants particularly on roadsides and on private property (Foreman & Westerway 1994, Foreman & Garner 1996, Foreman and Bailey 1996). A key privately owned site at Budgerum (North of Quambatook) was identified and described.
- World Wide Fund for Nature Conservation survey for Red Swainson-pea and associated grassland habitat (McDougall *et. al.* 1991, McDougall and Kirkpatrick 1994)
- National Estate Grants Program sponsored survey for Plains-wanderers and suitable habitat on private property across Northern Victoria (Maher and Baker-Gabb 1993)

- All known Northern Plains sites were placed on the Grasslands Register, an Access database developed by VNPA and administered by DSE.
- Surveys of private land throughout the Northern Plain were undertaken to identify additional significant remnants to be targeted for land acquisition or other conservation management activities.
- Surveys and identification of significant grassland remnants on rail reserves within the Riverina, in 1999, 2000 and 2001
- In 1997 and 1999 systematic monitoring of recorded *Swainsona* populations was carried out. All data has been entered into the VROTPop database (DSE)

#### Economic issues

- A La Trobe University project to document the economic benefits of native grasslands on farms across south-eastern Australia was undertaken. Land and Water Resources, Research and Development Corporation (LWRRDC) provided additional funding for a further study through Melbourne University expanding on this project (Jim Crosthwaite *pers comm.*).
- projects were undertaken to explore the use of incentives and other financial instruments for achieving nature conservation goals in private and leasehold land (Crosthwaite 1997)

#### Biological research and monitoring

- Research into the general ecology of Northern Plains Grassland Community with particular emphasis on conservation management was initiated in 1993 by La Trobe University and documented as an MSc thesis (Foreman 1996). Experimental plots continue to be monitored.
- A report on sustainability of Plains-wanderers in the Terrick Terrick area was produced (Baker-Gabb 1993)
- Research was undertaken into management techniques at Terrick Terrick NP to enhance biodiversity outcomes
- A PhD has commenced at Charles Sturt University, conducting research into management techniques at Terrick Terrick National Park
- BSc thesis undertaken, analysing vegetation data collected from Terrick Terrick National Park between 1992 and 1999
- Review of grazing in Terrick Terrick National Park commissioned by Parks Victoria
- Parks Victoria commissioned a preliminary assessment of vegetation in Terrick Terrick National Park

# South Gippsland Plains Grassland

## Description and Distribution

Despite its name, the South Gippsland Plains Grassland is not restricted to South Gippsland. It occurs in the Gippsland Plain Bioregion, on flats in the Yarram region to the east of Wilsons Promontory. The community begins to appear near Giffard, where Forest Red Gum starts to be replaced by Swamp Gum (*Eucalyptus ovata)* and Black Sheoak (*Allocasuarina littoralis*) . It probably did not occur on the Yanakie Isthmus, but then re-appears near Cranbourne and around Westernport. However its distribution to the west is unclear because remnants are so small and surveys closer to Melbourne have been somewhat ad hoc. A previous occurrence of the community at Jack Smith Lake is thought to be extinct. Most of the former range of this community has been heavily utilised for agriculture and converted to introduced pastures. The best estimate for the remaining total area of relatively intact remnants is less than 15 ha, (Frood pers. comm.) with perhaps 10 ha of other degraded remnants. no more than 0.1% of the original distribution remains (Cook pers. comm.).

The Gippsland RFA Biodiversity Assessment Report (Commonwealth of Australia 2000a) equates the community to EVC 132-05 Plains Grassland.

Although there are few remnants in existence, the original vegetation structure is likely to have been an open-woodland which included areas of very sparsely treed tussock-grassland, and shrubby zones associated with drainage lines . It would have covered an ecological range from *Themeda*-dominated vegetation on non-saline plains to ecotonal *Poa labillardieri* dominated vegetation on brackish near-coastal sites.

The present structure of the community ranges from closed tussock grassland to open woodland. Frood (pers. comm.) identifies the following character species for the community - Common Blown-grass (*Lachnagrostis filifolia*), Smooth Wallaby-grass (*Austrodanthonia laevis*), Heath Wallaby-grass (*Notodanthonia semiannularis*), Mat Grass (*Hemarthria uncinata*), Finger Rush (*Juncus subsecundus*), Common Bog Sedge (*Schoenus apogon*), Common Tussock-grass (*Poa labillardieri*) and Blown Grass (*Lachnagrostis aemula*). Other common species include Milkmaids (*Burchardia umbellata*), Wiry Buttons (*Leptorhynchos tenuifolius*), Spiny-headed Mat-lily (*Lomandra longifolia*), Shady Wood-sorrel (*Oxalis exilis*), Five-awned Spear-grass (*Pentapogon quadrifidus*), Varied Raspwort (*Haloragis heterophylla*), Bidgee-widgee (*Aceana novae-zelandiae*), Reed Bent-grass (*Deyeuxia quadriseta*) and Yellow Rush-lily (*Tricoryne elatior*). Other occasional occurrences as Bulbine-lily (*Bulbine bulbosa),* Scaly Buttons *Leptorhynchos squamatus,* Creeping Bossiaea (*Bossiaea prostrata)* and Common Rice-flower (*Pimelia humilis)* (Commonwealth of Australia 2000).

There is some variation in the community reflecting variation in soil type, soil moisture and salinity. In drier variants or those of lighter soil types which may still be seasonally waterlogged, the vegetation is dominated by a dense sward of Kangaroo Grass (*Themeda triandra*) in association with Mat Grass. Common Tussock-grass is typically only a minor component of the sward in these sites. A range of Wallaby Grasses, forbs, geophytes and Spear Grasses are also present.. Wetter sites dominated either by Common Tussock Grass or Kangaroo Grass include species shared with seasonal wetlands, such as *Eleocharis* spp., Soft Twig-sedge (*Baumera rubiginosa*), Poison Lobelia (*Lobelia pratioides*), Floating Club-sedge (*Isolepis fluitans*) and Prickfoot (*Eryngium vesiculosum*).

In damper areas where Common Tussock-grass is conspicuous in the vegetation, most of the additional character species for the drier site/lighter soils vegetation, including Kangaroo Grass, are sparse to absent. The suite of associated herbaceous species varies between non-saline and brackish sites. The non-saline flora has marked similarities to plains grassland sub-communities from heavy black volcanic soils around Merri Creek, north of Melbourne eg. including species such as Common Woodruff (*Asperula conferta*), Brown-back Wallaby-grass (*Austrodanthonia duttoniana*), Blown-grass (*Lachnagrostis punicea* subsp. *punicea*), Milky Beauty-heads (*Calochephalus lacteus*), Slender Speedwell (*Veronica gracilis*) and in more brackish sites Australian Salt-grass (*Distichlis distichophylla*). More saline sites can include saltmarsh species such as Sea Rush (*Juncus krausii*) and Round-leaf Wilsonia (*Wilsonia rotundifolia*).

Threatened species include Maroon Leek-orchid (*Prasophyllum frenchii*) and Matted Flax-lily (*Dianella amoena*). The nationally endangered Southern Brown Bandicoot (*Isoodon obesulus*

*obesulus*) has been recorded utilising plains grassland habitat along the Clyde-Tooradin rail line.

No known remnants occur on private land. Five small sites are known. The largest remnants are approximately 10ha and 5 ha in size. Remnants also occur on the South Gippsland rail line between Clyde and Tooradin (Cook & Yugovic in press).

## Key sites

Alberton cemetery - 8 ha

Darriman Bushland Reserve

Small corner on Parkside Aerodrome

Stringybark Lane - 0.5 ha

Greens Road Swamp

## Reservation status:

Mostly unreserved

## Threats

- Weed invasion, particularly from introduced pasture species (Phalaris, Paspalum, Yorkshire Fog and Sweet Vernal Grass. Inadequate biomass control has also led to invasion by native shrubs such as Swamp Paperbark and Prickly Teatree.
- Overgrazing
- Inappropriate fuel management and fire prevention techniques, such as slashing, mowing and ploughing
- Inappropriate road maintenance (Stringybark Lane)
- Fertiliser residues in drifting soils

## Previous Management Action

### Strategic planning

- A Public Authority Management Agreement (PAMA) was entered into between NRE and the Cemetery Trust in July 1993 to manage Alberton Cemetery.
- An updated draft PAMA for Alberton Cemetery, and a draft PAMA between Wellington Shire Council and DSE has been produced for Parkside Aerodrome as part of Wellington Shire's 'Grassy Ecosystem Grants Project'

### Protection and management

- WWF/NHT grassy ecosystem grants 2000:
  - protection of Plains Grasslands (Greens Road Swamp Dandenong)
  - Grassland Conservers (Trust for Nature)
- WWF/NHT grassy ecosystem grants 2001 - Grassland Conservers Part 2 – Trust for Nature

### Site management and protection

- Weed control (mostly gorse and periwinkle), rabbit control and ecological burns have been undertaken in Alberton Cemetery
- Darriman Bushland Reserve near Giffard received ecological burning and weed control by Parks Victoria

### Inventory and survey

- Surveys and identification of significant grassland remnants on rail reserves of active lines from Warragul to Bairnsdale, and the Cranbourne – Leongatha line, were carried out in spring 2001.

# Western (Basalt) Plains Grassland

## Distribution and Description

Remnants of the Western (Basalt) Plains Grassland Community occur in the Victorian Volcanic Plain Bioregion, within a 23,000 km$^2$ area of flat to undulating basalt plains. This area is bounded by the Plenty River (Melbourne) to the east, Hamilton to the west, Beaufort to the north and Colac to the south. Soils are mostly heavy grey or red cracking clays with occasional exposed layers of ironstone 'buckshot' and scattered rocky outcrops. Wetland areas have black cracking clays and may be sub-saline.

The community is predominantly open treeless grassland, usually dominated by Kangaroo Grass (*Themeda triandra*) in the drier areas, with Wallaby Grasses (*Austrodanthonia* spp.) and Spear Grasses (*Austrostipa* spp.),. and Tussock Grasses (*Poa* spp.) in areas of higher moisture regimes.. Woody plants are generally absent, although there are occasional scattered trees and shrubs, in areas of ephemeral swamps, drainage lines, and deep river-cut escarpments. The natural lack of tree cover on the western plains is thought to be caused in part by the heavy basaltic soils that are poorly drained, becoming water-logged in winter or extremely dry and hard in summer (Stuwe 1986, Barlow & Ross 2002) and by frequent fires prior to European settlement (Lunt 1991).

The West RFA Biodiversity Assessment Report (Commonwealth of Australia 2000b) equates the community to EVC 132 Plains Grassland.

The community is structurally composed of tussock grasses, with a variety of perennial herbs, particularly composites, occupying the inter-tussock spaces. Species that occur throughout the whole community include Blue Devil (*Eryngium ovinum*), Sheep's Burr (*Acaena echinata*), Scaly Buttons (*Leptorhynchos squamatus*), Pink Bindweed (*Convolvulus angustissimus*) and Common Bog-rush (*Schoenus apogon*). In areas of higher rainfall to the west of the plains frequently occurring species include Common Onion Orchid (*Microtis unifolia*) and Pale Sundew (*Drosera peltata*). Lower rainfall species include Common Everlasting (*Chrysocephalum apiculatum*) and Lemon Beauty-heads (*Calocephalus citreus*). All these species are perennials. Seedling recruitment is generally a rare event as most native species form small or transient soil seed banks. Vegetative regeneration is the primary means by which all species recover from fire and other disturbances.

Species that are common in the Western (Basalt) Plains Grasslands, but do not occur in the otherwise floristically similar Central Gippsland Plains Grasslands, include Lemon Beauty-heads, Prickly Woodruff (*Asperula scoparia*), Pink Bindweed and Blue Devil.

Ephemeral swamps, dominated by Swamp Wallaby-grass (*Amphibromus nervosus*), and Cane Grass (*Eragrostis infecunda*), sometimes sedges in the wetter areas, once occurred widely as mosaics among the plains grassland to the west of the bioregion. Many of these grassy swamps have been drained, weed invaded or more recently, converted to agriculture.

The community supports a rich diversity of reptile species, particularly skinks and snakes. Birds of prey are prominent, and there are a number of ground-dwelling birds and wetland birds such as Brolgas. There are very few small native mammal species (SAC 1991, Seebeck 1984, Emison *et al.* 1975). Many of the vertebrate fauna species that rely on this vegetation are now severely depleted. The invertebrate fauna is poorly known, but surveys have indicated a large number of species of beetles, ants and grasshoppers (Yen *et al.* 1994, 1995, 1996)

Threatened flora species include Button Wrinklewort (*Rutidosis leptorrhynchoides*), Large-fruit Groundsel (*Senecio macrocarpus*,), Spiny Rice-flower (*Pimelea spinescens*), Sunshine Diuris (*Diuris fragrantissima*), Small Golden Moths (*Diuris basaltica*), Basalt Greenhood (*Pterostylis basaltica*), Basalt Podolepis (*Podolepis* sp. 1), Small Milkwort (*Comesperma polygaloides*), Clover Glycine (*Glycine latrobeana*), Swollen Swamp Wallaby-grass (*Amphibromus pithogastrus*), Tough Scurf-pea (*Cullen tenax*) and Adamson's Blown-grass (*Lachnagrostis adamsonii*). Threatened grassland fauna include Striped Legless Lizard (*Delma impar*), Grassland Earless Dragon (*Tympanocryptis pinguicolla*), Eastern Barred Bandicoot (*Perameles gunnii*), Fat-tailed Dunnart (*Sminthopsis crassicaudata*) and Plains-wanderer (*Pedionomus torquatus*).

There are very few intact remnants of Western (Basalt) Plains Grassland, as any soil disturbance has favoured the ingress of introduced species (Stuwe 1986). The decline of some native plants is not only caused by the influx of introduced plants, but also to competition from dominant native grasses. Kangaroo Grass can form a dense sward which suppresses the germination and growth of forbs (Stuwe & Parsons 1977). Before European settlement, frequent fires and grazing by native herbivores reduced the biomass of grasses and so maintained species richness (Stuwe 1986).

In the absence of soil disturbance, native grasslands are relatively resistant to weed invasion. Research has suggested (Hocking 2001) that an intact native grassland will bind much of the available soil nutrients within the above and below-ground parts of the plants. Once plants are destroyed and rot, nutrients are released and fast colonising, mostly exotic species quickly move in to take advantage of the open spaces and increase in nutrients. Therefore it has been suggested that, although an intact grassland may contain weed seed and a few young plants of weeds such as Serrated Tussock, these weeds will remain small and sub-dominant. However the practice of broadscale herbicide spraying on these sites, in an effort to control the Serrated Tussock, can destroy the very values that are keeping the Serrated Tussock in check.

## Key sites

Craigieburn Grassland Reserve and Merri Creek Grasslands

Derrimut Grassland Reserve, Laverton North Grassland Reserve

West Point Business Park (former Laverton RAAF)

Hamilton Community Parklands

Cressy Flora Reserve, Mt Mercer Nature Conservation Reserve

Mortlake Common Flora Reserve, Skipton Common, Rokewood Common

Blacks Creek

Ridge Paddock (added to Cobra Killuc Wildlife Reserve)

Cairnlea Grasslands and associated grasslands along Kororoit Creek

Roadsides e.g. Chatsworth, Dundonnell, Woorndoo, Mt Mercer, Glenthompson-Wickliffe, Wickliffe-Ararat, Poorneit, McCorkells

Cemeteries e.g. Rokewood, Truganina, Bannockburn, Dowling Forest

Rail reserves e.g. Bannockburn, Middle Creek, Wingeel, Little River, Manor

Private land sites

### Links to other Action Statements

*Perameles gunnii* Eastern Barred Bandicoot (No. 4)

*Delma impar* (Striped Legless Lizard No. 17)

*Rutidosis leptorrhynchoides* (Button Wrinklewort No. 28)

*Psoralea parva* (Small Psoralea No. 31, now *Cullen parvum*)

*Tympanocryptis lineata lineata* (Southern Lined Earless Dragon No. 35 now *T. pinguicolla*, Grassland Earless Dragon)

*Diuris fragrantissima* (Sunshine Diuris No. 50)

*Senecio macrocarpus* (Large-fruit Groundsel No. 68)

*Carex tasmanica* (Curly Sedge No. 88)

*Comesperma polygaloides* (Small Milkwort No. 96)

*Synemon plana* (Golden Sun Moth No. 106)

*Amphibromus pithogastrus* (Plump Swamp Wallaby-grass No. 109)

*Lepidium aschersonii* (Spiny Pepper-cress No. 111).

## Threats

In 1802 the volcanic plains of Victoria's west were covered with deep, fertile soil, rolling grassland and open grassy woodland. Europeans brought in exotic plants and animals, notably large mobs of sheep, which began to intensely graze and trample the plains. The first warnings came in the no more than twenty years after European settlement, with losses of vegetation cover, reduction in palatable species and increased compaction of soil. Native grasses were heavily grazed and palatable herbs were targeted by stock.

In 1862, there were reports that .... "*Kangaroo Grass, the most succulent of the Australian Herbage will soon be exterminated* . . ." (Lloyd 1862, cited in Conley 1984). Further warnings followed, until Sutton (1916) was obliged to record that the plains had *"been put so thoroughly to pastoral and agricultural uses that hardly any part remains in the virgin state"*.

The plains were grazed beyond their carrying capacity, including increasing stocking rates during drought. Some native grasslands persisted for over 100 years under low stocking regimes (Stuwe 1986), but in the 1920s Subterranean Clover and superphosphate application began, and in the 1940s and early 1950s the practice of pasture improvement based on superphosphate and introduced clover and grasses became widespread. This period coincided with the Soldier Settlement program and a considerable increase in stocking rates from 1 to 3-4 sheep per acre. All of these factors combined to dramatically reduce the distribution and numbers of native grassland species. Changes to fire regimes and the cycle of biomass removal also altered vegetation patterns and fauna habitats.

It is estimated that there was once about 800,000 to 1,000,000 ha of open plains grassland on the Victorian Volcanic Plain (NRE 1997). Barlow & Ross (2002) suggest that perhaps 5,000-6,000 ha remains across the whole of the Victorian Volcanic Plain. Of this, they consider that less than 1,000 ha

(0.1%) consists of high quality, species rich, relatively weed-free grasslands, and the remainder is degraded or simplified native grassland, or disclimax grassy woodland communities. Remnants occur on large blocks of lightly grazed, unploughed, unfertilised private land, and on small blocks of public land such as roadsides, rail reserves and cemeteries.

The invasion of introduced grasses and other herbs has significantly altered the community, replacing a suite of largely perennial species with a high proportion of exotic annuals (Stuwe 1986). The floristic composition of Western (Basalt) Plains Grassland is now as much a product of management history as variation in topography and soils (Stuwe & Parsons 1977).

Threats currently operating include:

- Inadequate biomass removal - in less than ten years without appropriate biomass removal a *Themeda* dominated grassland can be become almost completely degraded
- Weed invasion by exotic perennial grasses, such as *Nassella* spp. (e.g. Chilean Needle-grass, Serrated Tussock, Texas Needle-grass, Cane Needle-grass), Phalaris, African Love-grass, Wild Oats and Gorse
- Poor weed control practices, including inappropriate application and over-use of herbicides, poor identification of target species, removal of rocks and *Poa* tussocks under the guise of Serrated Tussock control, and broadscale herbicide application without follow-up replacement by weed-resistant native species
- Broadscale application of herbicides on paddocks that contain remnant native grasslands and scattered weed species such as Serrated Tussock. In such cases the entire paddock is destroyed under the guide of weed control, leaving an open field for greater weed colonisation.
- Infrastructure installation and management
- Road works including plant and vehicles driving and parking on roadsides, dumping of spoil
- Further clearing for agriculture and cropping, and pasture improvements using fertilisers and exotic species
- Clearing for olive groves and vineyards, leading to off site impacts eg. fertilisers, hydrology changes, invasion of native remnants by wild olives
- Overgrazing and trampling by stock
- Illegal grazing ("long paddock", stock traffic) and cropping of rural roadside remnants
- Intensive agricultural practices such as raised bed cropping, causing high nutrient water run-off, and winter wheats that can be sown in wetter, southern districts.
- Conflicting advice given to landholders by conservation and agricultural productivity experts
- Inability to carry out ecological burns, especially in grassland remnants close to and within urban areas, as these are often adjacent to new developments, which constrain ongoing management.
- Lack of recruitment in the wild of a wide range of native forb species.
- Tree planting for shelter belts, landscaping, and amenity planting, especially on roadsides
- Rock removal, for landscape use or as a precursor to cultivation, (thus removing habitat for flora and fauna.
- Pine and blue gum plantations, associated with cultivation & drainage of freshwater marshes and meadows (particularly in the recent dry years), shading of grassland vegetation, altered water tables and pine wildlings (via wind-blown seeds) invading grasslands.

## Previous Management Action

### Reservation

- New reserves were created at Mortlake, Cressy, Blacks Creek, Craigieburn Grassland Reserve, Banchory Grove, and the Angliss estates at Laverton and Deer Park
- Ridge Paddock added to Cobra Killuc Wildlife Reserve
- West Point Business Park (formerly Laverton RAAF base) and Burns Road (formerly Slough Estate) were sold and parts managed as grassland reserves under agreement with the private landholder
- Purchase and reservation of 400 ha of grasslands on two properties, at Mt Mercer and Boonderoo

### Strategic planning

- Along the Hamilton Highway between Cressy and Darlington, a strategic management plan has been developed for protection and management, including ecological burning of native grasslands in conjunction with NRE, CFA, VicRoads, Colac and Corangamite Shires
- Native grasslands on roadsides within the Shires of Golden Plains, Southern Grampians and Moyne have been included in planning schemes
- Municipal Strategic Statements (MSSs) are being reviewed between 2001 and 2003
- A draft environmental study was completed for the Shire of Golden Plains
- The Shire of Moorabool developed a Roadside Management Plan, a Roadside Tour Guide and is in the process of developing a an

Environmental Strategy which will incorporate information and actions for grassland management.

**Protection and management**

- A Public Authority Management Agreement was signed for Truganina cemetery
- Burning and weed control has been undertaken at Derrimut and Laverton North Grassland Reserves, Cooper Street, Central Creek and West Point Business Park
- Exclusion plots at Craigieburn Grassland Reserve were fenced and received trial burns and weed control
- Phalaris control is being undertaken at Bookaar Lake Reserve, via a Botanic Guardians grant
- WWF/NHT grassy ecosystem grants were awarded in 2000 for:
  - Grassland Conservers (Trust for Nature)
  - Conservation of Grassy Ecosystem Roadsides in Moorabool Shire
  - Protection of National Estate Listed Grasslands in SW Victoria
  - Bush's Paddock: Implementing & Demonstrating Best Practice Management
  - Protection of remnant native grassland at Truganina Cemetery
- WWF/NHT grassy ecosystem grants were awarded in 2001 for:
  - Protection of High Conservation Value Native Grassy Ecosystems within Melton Shire
  - Protection of Basalt Plains Grasslands in Western Victoria
  - Protection of native grasslands within Golden Plains Shire
  - Grassland Conservers Part 2 – Trust for Nature

**Community education and extension**

- Since the early 1990s, walks, talks and tours were undertaken in spring by NRE Flora and Fauna staff, VNPA, Trust for Nature, Friends groups etc.
- Posters, brochures and management guidelines were prepared by NRE, Merri Creek Management Committee and Trust for Nature
- Handbooks were published by Society for Growing Australian plants, VNPA, Trust for Nature

**Inventory and survey**

- Surveys and identification of significant grassland remnants on rail reserves within the Victorian Volcanic Plain were undertaken in 1999, 2000 and 2001.
- More than 30 native grassland remnants in the northern and western suburbs of Melbourne were surveyed by the Australian Research Centre for Urban Ecology (ARCUE)
- Surveys of *Nassella* spp. on the Hamilton Hwy between Cressy and Inverleigh began in 2000 and are ongoing. The City of Hume has mapped *Nassella neesiana* along roadsides as part of a management plan
- Roadsides assessment work was undertaken by Corangamite, Colac Otway, Moorabool and Surf Coast Shires
- Shires of Golden Plains, Southern Grampians, Moorabool, Melton and Moyne have begun or completed biodiversity mapping
- Biodiversity mapping for Glenelg Shire is being updated and revised
- Several Shires e.g. Melton, Hume, have completed reviews of indigenous vegetation sites on private and public land

**Biological research and monitoring**

- During the 1990s NHT funded projects for the re-introduction and re-establishment *Cullen parvum, Comesperma polygaloides* and *Glycine latrobeana* at secure sites. Propagation and seed orchard establishment was undertaken for *Rutidosis leptorrhynchoides* and *Discaria pubescens*
- Victoria University has undertaken research on weed management and restoration techniques e.g. Hammond & Hocking 1998a, 1998b; Henderson 1999, Hocking 2001, Phillips 1999, Wijesuriya & Hocking 1999. A PhD is nearing completion on Striped Legless Lizards and a MSc on recruitment of native forbs.
- LaTrobe Univedrsity has undertaken research into ecological processes within different grassland remnants e.g. Morgan 1996, 1997, 1998a, b, c, d, 1999; Morgan & Lunt 1999.