

Grasslands and Grassy Woodlands of the VVP Landholders Guide



Part of the Corangamite CMA's
Victorian Volcanic Plain
Recovery Program

How to use this guide

This guide has been developed to assist landholders in identifying grasslands and grassy woodlands on the Victorian Volcanic Plain, to make decisions on how to improve biodiversity values on their own land, as well as the broader landscape.

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It is hoped that this guide, combined with local knowledge, can be used to support landholders and the wider community, to protect and improve the unique flora and fauna of our volcanic plains grasslands and grassy woodlands.

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Woodland trees provide essential habitat



Bluebells
Wahlenbergia spp.



Laughing Kookaburra
Image: Craig Morley



Corangamite Region



Introduction

Victoria's native wildflower grasslands and grassy woodlands originally extended across huge areas of the State and are today exceedingly rare. Temperate grasslands and grassy woodlands are now highly fragmented within the Victorian Volcanic Plain with less than five per cent of the original extent remaining. Less than one percent are thought to be intact and of high diversity.

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Many remnant patches are small in size and continue to face pressures from weeds, feral animals and human activities, causing a decline in biodiversity along with the ability to maintain ecosystem function.

The magnitude of decline in these communities has been recognised as a critical biodiversity issue at both state and national levels. These grassy communities are listed as threatened under the *Victorian Flora and Fauna Guarantee Act (1988)* and the *Commonwealth Environment Protection and Biodiversity Conservation Act (1999)*.

For future generations to enjoy and for the continued survival of many threatened flora and fauna species, it is crucial to engage with community and landholders to raise awareness and understanding of these unique ecosystems.



Nationally threatened ecological community

Grassland vegetation communities of the Victorian Volcanic Plain

Vegetation types, or classes, are given a formal classification by the Department of Environment, Land, Water and Planning (DELWP) and termed Ecological Vegetation Classes (EVCs). These classes are used for classifying vegetation types in Victoria and are described through a combination of floristics, life forms and ecological characteristics that occur across a biogeographic range.

A summary table below provides information on the grassland and grassy woodland EVCs that occur within the Victorian Volcanic Plain Bioregion.

Ecological Vegetation Class (EVC)	Description	Indicator Species	
		Canopy	Understorey
55_61 Plains Grassy Woodland	An open, Eucalypt woodland with trees up to 15m tall (8 to a hectare) and an understorey dominated by grasses or grass-like herbs, with a few interspersed shrubs. These grasslands occur in low elevations on poorly drained, fertile volcanic soils, often flat to gently undulating terrain. Annual rainfall is generally 500-700mm.	River Red Gum (<i>Eucalyptus camaldulensis</i>) Occasional large shrubs of Golden Wattle (<i>Acacia pycnantha</i>) and Hedge Wattle (<i>Acacia paradoxa</i>).	A variety of Tussock forming perennial grasses including Spear Grass (<i>Auistrostipa species</i>), Wallaby Grass (<i>Rytidosperma species</i>), Kangaroo Grass (<i>Themeda triandra</i>), Common Wheatgrass (<i>Elymus scaber var. scaber</i>) and Weeping Grass (<i>Microlaena stipoides var. stipoides</i>). Small forbs of Common Rice-flower (<i>Pimelea humilis</i>), Cranberry-heath (<i>Astroloma humifusum</i>), Creeping Bossiaea (<i>Bossiaea prostrata</i>), Sheep's Burr (<i>Acaena echinata</i>) and inconspicuous herbs of Grassland Wood-sorrel (<i>Oxalis perennans</i>), Common Raspwort (<i>Gonocarpus tetragynus</i>), Kidney-weed (<i>Dichondra repens</i>) and Stinking Pennywort (<i>Hydrocotyle laxiflora</i>).

Ecological Vegetation Class (EVC)	Description	Indicator Species	
		Canopy	Understorey
55_63 Higher rainfall Plains Grassy Woodlands	An open, Eucalypt woodland, with tall trees up to 15m, or an Acacia/Sheoak woodland to 10m tall. The understorey is a rich diversity of grass and herbaceous species with few, sparse shrubs. Occurs on poorly drained, fertile soils on flat or gently undulating plains at low elevations, with rainfall more than 700mm per annum.		
132_63 Heavier soils Plains Grassland	Occasional trees or shrubs persist within this plant community, plants are generally less than 1m tall, including grass-like species (grasses, sedges and rushes) and other non-woody upright herbs. Occurs on fertile basalt soils prone to cracking in dry periods and being seasonally waterlogged in wet periods. Occurs in areas receiving at least 500mm annual rainfall.		<p>A mix of grass species including Kneed Spear Grass (<i>Austrostipa bigeniculata</i>), Plume Grass (<i>Dichelachne crinita</i>), Common Wallaby-grass (<i>Rytidosperma caespitosum</i>) and Weeping Grass (<i>Elymus scaber</i> var. <i>scaber</i>).</p> <p>Colourful forbes of Lemon Beauty-heads (<i>Calocephalus citreus</i>), Scaly Buttons (<i>Leptorhynchus squamatus</i>), Blue Devil (<i>Eryngium ovinum</i>), Pink Bindweed (<i>Convolvulus erubescens</i>), Slender Sun-orchid (<i>Thelymitra pauciflora</i>) and Common Rice-flower (<i>Pimelea humilis</i>), with less notable herbs of Wiry Dock (<i>Rumex dumosus</i>), Sheep's Burr (<i>Acaena echinata</i>), Smooth Solenogyne (<i>Solenogyne dominii</i>) and Common Onion Orchid (<i>Microtis unifolia</i>).</p>

Grassland vegetation communities of the Victorian Volcanic Plain cont.

Ecological Vegetation Class (EVC)	Description	Indicator Species	
		Canopy	Understory
132_62 Lighter-soils Plains Grassland	No trees are present, with all plants less than 1m tall, mainly graminoid (grass, sedge, rush or similar) and herb (non-woody) life forms. May have originally contained scattered woody plants. Occurs in areas receiving at least 500mm annual rainfall.		
132_63 Low-rainfall Plains Grassland	Trees are absent with plants mostly less than 1m tall, mainly graminoid (grass, sedge, rush or similar) and herb (non-woody) life forms. Occurs on cracking basalt soils prone to seasonal waterlogging. Occurs in areas receiving less than 500mm annual rainfall.		A mix of Spear grasses including Kneed Spear-grass (<i>Austrostipa bigeniculata</i>), Rough Spear-grass (<i>Austrostipa scabra</i>) and Knotty Spear-grass (<i>Austrostipa nodosa</i>) along with a ground layer of erect and prostrate herbs of Curved Rice-flower (<i>Pimelea curviflora</i>), Berry Saltbush (<i>Atriplex semmibaccata</i>), Feather-heads (<i>Ptilotus macrocephalus</i>), Sheep's Burr (<i>Acaena echinata</i>), Narrow Plantain (<i>Plantago gaudichaudii</i>), Wingless Bluebush (<i>Maireana enchylaenoides</i>), Lemon Beauty-heads (<i>Calocephalus citreus</i>), Smooth Solenogyne (<i>Solenogyne dominii</i>), Grassland Wood Sorrel (<i>Oxalis perennans</i>), Cut-leaf Goodenia (<i>Goodenia pinnatifida</i>), Pointed Centrolepis (<i>Centrolepis aristata</i>) and Pink Bindweed (<i>Convolvulus erubescens</i>).

Ecological Vegetation Class (EVC)	Description	Indicator Species	
		Canopy	Understorey
803 Plains Grassland	Woodland with trees up to 15m tall and an understorey of grasses or sedges. The large spaces between the tussocks potentially support a range of annual or geophytic (perennial with underground bulb or tuber) herbs adapted to low summer rainfall, with low overall biomass. Occurs mostly on low terrain, with fertile soils, sometimes seasonally waterlogged, mostly silty, and loamy or clay topsoils, with heavy subsoils, largely derived from former Quaternary swamp deposits. Occurs in areas receiving more than 600mm rainfall per annum.		
68 Creekline Grassy Woodland	Eucalypt-dominated woodland with trees up to 15m tall, with occasional scattered shrubs. The ground-layer is mostly grasses, sedges and herbs. Plants in minor drainage lines can include species tolerant of waterlogged soils. The drainage lines may once have resembled a linear wetland or system of interconnected small ponds. Occurs on low-lying ephemeral to intermittent drainage lines, typically on fertile colluvial/alluvial soils on a wide range of fertile substrates. Average annual rainfall is generally less than 600mm per annum.	Tree canopy cover of River Red Gum (<i>Eucalyptus camaldulensis</i>), 15 trees per hectare. Scattered large shrubs of Blackwood (<i>Acacia melanoxylon</i>) and Wirilda (<i>Acacia retinodes</i>), with small sized shrubs of Tree Violet (<i>Melicytus dentata</i>).	Scrambling understorey of Small leaf bramble (<i>Rubus parvifolius</i>), Ruby Saltbush (<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>), Grassland Wood-sorrel (<i>Oxalis perennans</i>), Twinning Glycine (<i>Glycine clandestine</i>) with tussocks of Wallaby-grass (<i>Rytidosperma</i> species), Spear-grass (<i>Austrostipa</i> species), Weeping Grass (<i>Microlaena stipoides</i> var. <i>stipoides</i>) and Common Tussock-grass (<i>Poa labillardierei</i>). Wetter species include Common Reed (<i>Phragmites australis</i>), Pacific Azolla (<i>Azolla filiculoides</i>), Common Duckweed (<i>Lemna disperma</i>).

Grassland vegetation communities of the Victorian Volcanic Plain cont.

Ecological Vegetation Class (EVC)	Description	Indicator Species	
		Canopy	Understory
125 Plains Grassy Wetland	Usually treeless, with occasional Eucalypt. A sparse shrub layer may be present. Grasses, small sedges and herbs characteristically dominate the ground cover. The vegetation is typically species-rich on the outer verges but species-poor in the wetter central areas. Heavy clay which holds moisture. Average annual rainfall is less than 700mm per annum.	Occasional trees of River Red Gum (<i>Eucalyptus camaldulensis</i>) or Swamp Gum (<i>Eucalyptus ovata</i>).	<p>A mixture of species able to tolerate inundation including, Native willow-herbs (<i>Epilobium</i> species), Rushes (<i>Juncus</i> species), Spike-sedges (<i>Eleocharis</i> species), Running marsh-flower (<i>Villarsia raniformis</i>), Floating Pondweed (<i>Potamogeton tricarlinatus</i>), Australian lilaeopsis (<i>Lilaeopsis polyantha</i>), Fairy Aprons (<i>Utricularia dichotoma</i>), White Purslane (<i>Neopaxia australasica</i>), Poison Lobelia (<i>Lobelia pratoides</i>), Prickfoot (<i>Eryngium vesiculosum</i>) and Water ribbons (<i>Triglochin procera</i>).</p> <p>A mixture of grasses adapted to wetter areas Reed bent-grass (<i>Deyeuxia quadrisetata</i>), Common Swamp Wallaby-grass (<i>Amphibromus nervosus</i>), Brown-black Wallaby-grass (<i>Rytidosperma duttonianum</i>), Common Tussock-grass (<i>Poa labillardierei</i>) and Australian Sweet-grass (<i>Glyceria australis</i>).</p>

Ecological Vegetation Class (EVC)	Description	Indicator Species	
		Canopy	Understorey
175 Grassy Woodland	A variable open Eucalypt woodland with trees up to 15m tall, or occasionally a Sheoak/Acacia woodland to 10m tall. The ground layer is a diverse mix of grasses and herbs. Shrubs are usually sparse. Occurs on sites with deeper, more friable soils with moderate fertility, on gentle slopes or undulating hills on a range of geologies. Rainfall variable, from 550-700mm per annum.	Tree canopy cover of Swamp Gum (<i>Eucalyptus ovata</i>), Narrow-leaf Peppermint (<i>Eucalyptus radiata</i>), Manna Gum (<i>Eucalyptus viminalis</i>) and Drooping Sheoak (<i>Allocasuarina verticillata</i>) with small trees to large shrubs of Lightwood (<i>Acacia implexa</i>), Black Wattle (<i>Acacia mearnsii</i>), Golden Wattle (<i>Acacia pycnantha</i>), Sweet Bursaria (<i>Bursaria spinosa</i>), Drooping Cassinia (<i>Cassinia arcuate</i>) and Tree Violet (<i>Meliclytus dentata</i>).	An understorey of Common Wallaby-grass (<i>Austrostipa caespitosa</i>), Weeping Grass (<i>Microlaena stipoides</i> var. <i>stipoides</i>), Common Rice-flower (<i>Pimelea humilis</i>), Berry Saltbush (<i>Atriplex semmibaccata</i>), Sheep's Burr (<i>Acaena echinata</i>), Common Raspwort (<i>Gonocarpus tetragynus</i>), Nodding Saltbush (<i>Einadia nutans</i> ssp. <i>nutans</i>), Sieber Crassula (<i>Crassula sieberiana</i>), Kidney Weed (<i>Dichondra repens</i>), Wattle Mat-rush (<i>Lomandra filiformis</i>), Black-anther Flax-lily (<i>Dianella revoluta</i>) and Small-leaved Clematis (<i>Clematis microphylla</i>).

Paddock trees of the Victorian Volcanic Plain

Paddock trees provide an important role at a local and landscape level.

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Local function of scattered trees

- Foraging sites
- Shelter
- Refuge (e.g. hollows, bark)
- Ground layer (micro enviros, shade, logs, litter)
- Large old trees can provide a higher diversity and abundance of habitat including fallen logs supporting ground layer habitats

Landscape function of scattered trees for biodiversity

- Connectivity for use and movement of animals through the landscape
- Assist in the dispersal of plants and animals throughout the landscape

Problems of removing scattered trees

- Increased gaps between trees are detrimental to movement of species
- Loss of habitat structure for nesting and sheltering of fauna

Managing paddock trees

- Fence around existing trees to allow natural regeneration to occur. The fence must be wider than the canopy of the tree for seedlings to regenerate and survive
- Limit stock access when seedlings are regenerating
- Allow debris to remain on the ground
- Avoid fertiliser application, drift and cultivation near native trees
- Control the spread of weeds and pest animals
- Retain standing dead timber, rocks, logs and stumps as habitat for birds, bats, lizards and other native fauna



Paddock trees
E. camaldulensis

Native flora of the Grasslands of the Victorian Volcanic Plain

Grasses



Kangaroo Grass
Themeda triandra



Spear Grass
Austrostipa spp.



Wallaby Grass
Rytidosperma spp.

Canopy



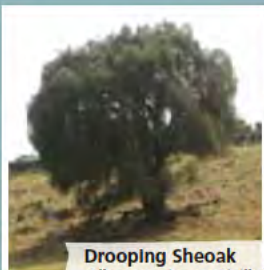
River Red Gum
Eucalyptus camaldulensis subsp. *camaldulensis*

Orchids



Golden Moth Orchid
Diuris basaltica

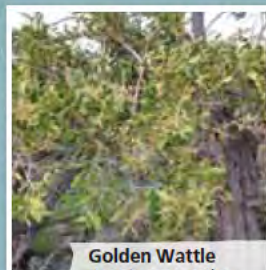
Shrubs



Drooping Sheoak
Allocasuarina verticillata



Silver Banksia
Banksia marginata



Golden Wattle
Acacia pycnantha

Native flora of the Grasslands of the Victorian Volcanic Plain cont.

Wildflowers



Blue Devil
Eryngium spp.

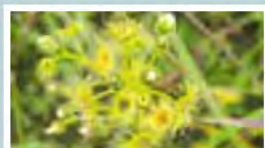


Image: D. Reynolds

Spiny Rice-flower
Pimelea spinescens subsp. *spinescens*



Featherheads
Ptilotus macrocephalus



Sundew
Drosera spp.



Button Wrinklewort
Rutidosia leptorrhynchoidea



Hoary Sunray
Leucochrysum albicans var. *tricolor*



Common Everlasting
Chrysocephalum apiculatum



Milky Beauty-heads
Calocephalus lacteus



Murnong
Microceris lanceolata



Showy Podolepis
Podolepis jaceoides



Lemon Beauty-heads
Calocephalus citreus



Pink Blindweed
Convolvulus erubescens



Chocolate Lily
Arthropodium strictum



Scaly Buttons
Leptorhynchos squamatus



Bulbine Lily
Bulbine bulbosa



Sheep's Burr
Acaena echinata

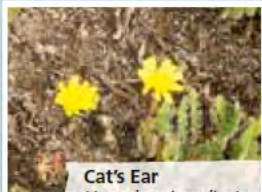


Common Crane's bill
Geranium retrorsum

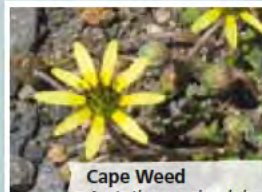
Bush invaders of Grasslands and Grassy Woodlands



Boxthorn
Lycium ferocissimum



Cat's Ear
Hypochaeris radicata



Cape Weed
Arctotheca calendula



Chilean Needle Grass
Nassella neesiana



Thistles
Silybum species



Large Quaking Grass
Briza maxima



Onion Grass
Romulea rosea



Veldt Grass
Ehrharta species



Serrated Tussock
Nassella trichotoma



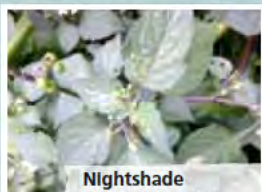
Sow Thistle
Sonchus species



Phalaris
Phalaris aquatica



Aster Weed
Aster subulatus



Nightshade
Solanum species



Bathurst Burr
Xanthium spinosum

Fauna of the Victorian Volcanic Plain



Image: Trevor Pescott

Southern Boobook



Image: Trevor Pescott

Black-shouldered Kite



Image: Trevor Pescott

Laughing Kookaburra



Image: Trevor Pescott

Golden Sun Moth



Image: Trevor Pescott

Growling Grass Frog



Image: Trevor Pescott

Superb Fairy Wren



Image: Trevor Pescott

Striped Legless Lizard



Image: Trevor Pescott

Fat Tailed Dunnart



Image: Craig Morley

Eastern Yellow Robin



False Garden Mantid



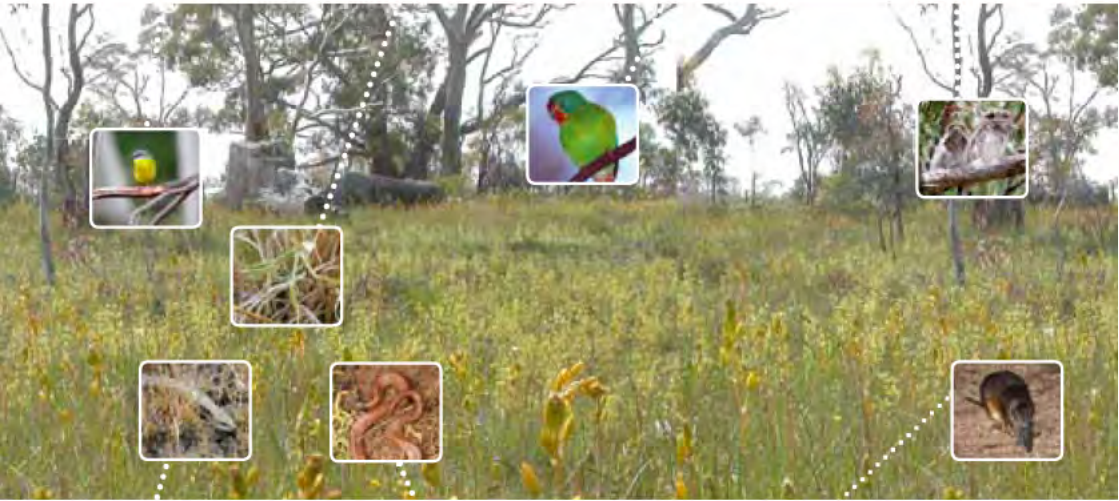
Swift Parrot



Tawny Frogmouth

Image: Trevor Pascott

Image: Craig Morley



Blue Tongue Lizard



Little Whip Snake



Southern Brown Bandicoot

Image: Stuart McCallum

Fauna of the Victorian Volcanic Plain cont.

Grassland Fauna Types (Focal Spp.)	Focal Species	Habitat Requirements	Recommended Management	Importance of Management
Grassland Amphibians	Growing Grass Frog <i>Litoria raniformis</i> (VULNERABLE) Common Froglet <i>Crinia signifera</i> Spotted Marsh Frog <i>Limnodynastes tasmaniensis</i>	Permanent and ephemeral wetlands, flooded grasslands, living amongst reeds, sedges, rushes and tussock grasses.	Maintain natural wetland systems. Exclude stock in times of heavy rain.	Frogs and tadpoles play an important role within the food chain as they attract predators such as water birds (egrets, herons and brolgas). Amphibians are seen as an indicator of environmental health.
Grassland Reptiles Snakes, skinks, lizards	Striped Legless Lizard <i>Delma impar</i> (VULNERABLE) Blue Tongue Lizard <i>Tiliqua scincoides scincoides</i> Little Whip Snake <i>Rhinoplocephalus flagellum</i>	Rely on ground features such as cracks in the soil, leaf litter, rocks and logs for shelter.	Retain fallen logs, branches and leaf litter. Managing biomass to create inter-tussock spaces to provide bare areas of ground for soil cracks. Sensitive to agricultural activities such as tilling and ploughing which eliminate cracks in the soil. Reduce predation by controlling feral cats and foxes.	Small lizards and skinks are an important food source for birds and mammals such as the Fat-tailed Dunnart.
Grassland Invertebrates Grasshoppers, beetles, moths, ants, worms, spiders	Golden Sun Moth <i>Synemon plana</i> (CRITICALLY ENDANGERED)	Variety of habitats, soil and soil crevices, plants, logs and leaf litter.	Management practices should be sensitive to the needs of invertebrates, allowing soil cracks and retention of vegetation during breeding seasons.	Continued pressure from urbanisation and agricultural practices cause fragmentation, structure change and deplete food sources, reducing species ability to function and breed. Invertebrates play a key role in ecological functioning of grassland ecosystems.

Grassland Fauna Types (Focal Spp.)	Focal Species	Habitat Requirements	Recommended Management	Importance of Management
Grassland Mammals	Fat-tailed Dunnart <i>Sminthopsis crassicaudata</i> Southern Bent-wing bat <i>Miniopterus schreibersii bassanii</i> (ENDANGERED)	Occur in open woodlands and grasslands sheltering within tree stumps, hollow logs and underneath rocks.	Retain scattered paddock trees, hollow logs and rocks as these provide valuable shelter and attract food resources. Tussock grasses provide shelter from predators and areas for diggings.	Highly fragmented habitat has severely declined populations of mammals within grassland ecosystems. Connectivity through corridors and the retention of old paddock trees are important step to reducing the decline.
Monotremes	Echidna <i>Tachyglossus aculeatus</i>	Found in woodland and grassy areas, preferring the base of tussock grasses or underneath rocks to dig burrows.	Maintaining a healthy understorey, including fallen logs, branches, tree stumps, rocks and leaf litter are available. Control of feral cats and foxes to reduce predation.	Retention of understorey structure is important to provide food and shelter for the Echidna.
Grassland Birds Small / Medium Birds	Fairy Wren <i>Malurus cyaneus</i> Eastern yellow robin <i>Eopsaltria australis</i> White wing chough <i>Corcorax melanorhamphos</i>	Require a diverse array of habitat. Tussock grasses and low shrubs provide food and refuge from predators for smaller birds.	Scattered trees are an important aspect in the landscape and provide hollows for nesting and shelter. They also act as stepping stones to facilitate movement of species within the landscape. Increase diversity of understorey to provide food and shelter. Limit impact of grazing animals and enhance ephemeral and permanent wetland areas. Reduce predation by controlling fox and feral cats.	Habitat loss and fragmentation through urban and agricultural development have caused considerable decline to grassland bird species. It is important to protect areas of grassland, grassy woodland and wetland areas for these species to continue.
Hollow dependent	Swift Parrot (hollow dependent) <i>Lathamus discolor</i> (ENDANGERED) Painted Honeyeater-hollow dependent <i>Pedionomus torquatus</i> Kookaburra <i>Dacelo novaeguineae</i> Mopoke <i>Ninox novaeseelandiae</i>	Large trees are important for providing shelter and nesting sites.		
Birds of prey	Black-shouldered Kite <i>Elanus axillaris</i>			
Ephemeral and permanent wetland areas.	Brolga <i>Grus rubicunda</i> (VULNERABLE)			



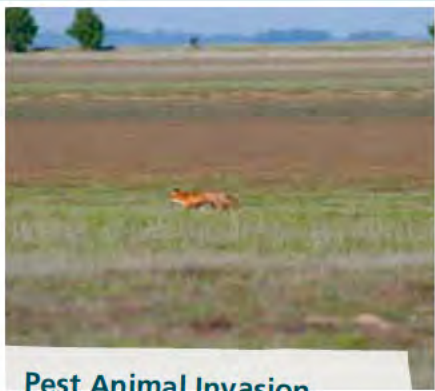
Biomass Management

A small bluebell is swamped by dense grass biomass.



Ecological Burn

An ecological burn being conducted to open up inter-tussock spaces and increase wildflower growth.



Pest Animal Invasion

A targeted fox program will reduce predation on native fauna.



Rabbit and Hares

Rabbit and hares degrade soil and reduce natural regeneration.

Management considerations

Managing grasslands and grassy woodland ecosystems within your property will vary dependent on the species and past use of the site. It is best to start with an initial survey of the site to help understand what native and exotic species plant and animal are present.

Compiling this information with the aid of aerial maps can determine the scale of each issue, where these issue lie within the overall site and points of significance. It is often useful to break the site up into management zones (e.g. vegetation types, weed density, significant species).

The information you gather will then determine a starting point and an overall goal for your site or each management zone. Once management activities are underway a monitoring program provides an effective way of keeping records on what activities helped or hindered, which will then allow you to adjust techniques as needed.

A photopoint is an easy way to see visual change of your site over a period of time. Set up a post overlooking your site, mark the spot where the camera will sit and take photos at set intervals.

Management Consideration	Activity	Description	Issue	Timing
Biomass management	Grazing	To control biomass of grasslands, retain diversity and reduce annual weeds. Intensity, frequency and timing of livestock grazing contribute to how a grassland will respond and manage.	Grazing can cause soil disturbance, introduce nutrients and exotic plants and animals. Palatability of grassland species (grazing may decline some species which are more palatable while others are left ungrazed). Avoid overgrazing. Maintain stocking rates at or below current carrying capacity. Flexibility in a grazing system to respond to seasonal events and situations.	Varies dependent upon grassland diversity, dominant native species, weed density, paddock size, stock numbers and type. It is recommended to remove stock during times of native plant growth, commonly from mid spring to early summer.

Management Considerations cont.

Management Consideration	Activity	Description	Issue	Timing
Biomass management (cont.)	Burning	Ecological burns can be used as a tool to reduce biomass and stimulate growth. Ecological burns can be used as a tool to reduce biomass, control weeds and aid in the germination of many native grassland species.	Accumulation of biomass (dead and living plant material) negatively impacts both flora and fauna species, through loss of diversity, decreased function and alteration of habitat structure.	The frequency of biomass removal depends on the rate of growth and closure of intertussock spaces. Seek advice from NRM agency.
	Cut and bale	Cut and bale can be a useful tool if burning is not an option, its effect will vary dependent on the time and frequency of slashing. Height of slashing with also effect different species, mowing below 10cm will cause death in some plants species.	Leaving slashed material on the ground can smother plants, it is best to remove from area.	Timing of slashing should occur before or after periods of active growth and seed set. Avoid slashing when the area is wet to reduce soil disturbance.
Soil disturbance		Avoid activities that result in excessive soil disturbance such as ploughing, earth works, vehicles and machinery, stockpiling, rock removal etc. in or near patches of the ecological communities.	Soil disturbance can displace native animals and create opportunities for weeds to invade. It can also remove important crust of algae, lichens or mosses that are important for soil health.	
Exotic plant invasion		Weed management is a priority to stopping degradations to remnant patches. Some weeds will have more impact on the health of grassy communities than others and should be prioritised for control (perennial).	Introduced plants compete with native plants for space, water and nutrients and may lead to pasture degradation.	Dependent upon the growth of the targeted weed.

Management Consideration	Activity	Description	Issue	Timing
	Herbicide application	Take care that chemical applications don't adversely affect the ecological communities. Use a combination of weed removal techniques, such as back pack spraying, hand removal and burning as designed in your management plan.	Herbicides can kill native grassland plants and can also injure grassland animals such as insects and frogs.	Dependent upon the growth of the targeted weed.
Pest animal invasion		Reducing foxes and feral cats will help alleviate predation pressures on native fauna. Rabbits and hares damage soil structure and impact heavily on plant regeneration.	An integrated pest animal program will help to determine the best way to reduce pest animal impacts. Joining in with neighbours will provide a better outcome.	Dependent upon the measure of the program.
Fertiliser application		Promoting native grassland on your property will save you applying fertiliser. When fertiliser use is required, ensure they are not used in or near the native grasslands or grassy woodland.	Native grassland plants prefer low nutrient soils. The application of fertilisers can kill native plants and favour weed species.	
Revegetation		Revegetation may be appropriate to extend and buffer an ecological community on your site, or to manage any large weed patches that have been treated with herbicide. Use only native local species appropriate to the ecological community at your site.	Revegetation can include planting of tubestock and sowing or direct seeding.	Depending upon the seasonal conditions most revegetation is undertaken during Autumn through to Spring.

CASE STUDY 1:

Moolapio Grasslands

Rod White, Greening Australia,
Grassland Restoration Officer

In 2007 Greening Australia embarked upon a partnership with Alcoa of Australia, Point Henry, to form the Moolapio Project.

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Since this time over 15 hectares of species-rich grassy woodland has been restored (a community listed as Critically Endangered under the EPBC Act 1999). This is likely to represent the largest area of complex grassland re-established onto a bare-field site in the Southern hemisphere.

The Moolapio grasslands were re-constructed using techniques developed by the Grassy Groundcover Restoration Project (GGRP), an internationally recognised research initiative undertaken between Greening Australia and the University of Melbourne. This program developed science-based techniques for grassland restoration which have proven to be highly successfully at Moolapio in restoring the once wide-spread native grassy red gum woodlands that had been replaced by agriculture.

A unique component of the GGRP 'methods' centres on creating in-ground and containerised seed production areas (SPAs) where native species are grown in cultivation as seed crops for the production of large volumes of seed (grass and wildflower).

Seed from most of the grassland species utilised would be difficult or impossible to obtain in comparable volumes from field populations. The SPA model also limits pressures created by repeated seed harvest on remnant populations, of an already threatened flora.

Utilising seed from both the field and SPAs, over 70 grassland species from the region were direct-sown using specialist seeding technology into the grassland establishment areas at Moolapio. These included the nationally endangered *Leucochrysum albicans* var. *tricolor* (Hoary Sunray) and *Rutidosia leptorrhynchoides* (Button Wrinklewort).

This project successfully demonstrated that highly modified landscapes can be transformed back into what they once were if the will exists to do so. The techniques used and lessons learned at Moolapio are being transferred to great success across South Eastern Australia to assist in the restoration of grassy ecosystems in Victoria, Tasmania, Canberra, New South Wales and South Australia.

For further information contact
Rod White of Greening Australia
rwhite@greeningaustralia.org.au

**Moolapio Grassland Nationally
Endangered Hoary Sunray**

*(Leucochrysum albicans
var. tricolor)*



CASE STUDY 2:

Grazing Native Pastures - Shelburn Property

Property Manager
Gordon Brown

Gordon Brown is the property manager of a 3,000 acre grazing property in Sheldford. Gordon has been at the property for three and a half years and has since undertaken rotational grazing within the native pasture paddocks which have benefited the sheep through an increase in fattening and also significantly reduced the cover of *Phalaris*.

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The property has also benefited from being involved with the Conservation and Carbon Capture Project run as part of the Australian Governments Biodiversity Fund and delivered by the Corangamite Catchment Management Authority. It allowed Gordon to revegetate 80 hectares along creeklines and rocky ridges increasing bird numbers and diversity, along with sightings of echidnas. Native Wallaby and Spear grasses occur throughout much of the property that is dominated by basalt rock.

During the last three years Gordon has strategically grazed paddocks to reduce the prevalence of weeds particularly *Phalaris* which was outcompeting most native species and forming large Tussock areas.

By controlling the density of *Phalaris* and allowing the native grasses to seed, Gordon has seen an increase in the amount of native grass cover and a reduction in the density of *Phalaris*. Another weed of concern within the property is Serrated Tussock (*Nassella trichotoma*), since the *Phalaris* has been heavily controlled the Serrated Tussock has been easier to see within the paddocks and has allowed a targeted approach through annual spot spraying.

Gordon stocks the native pastures throughout winter and de-stocks during spring to allow for native grasses to set seed over summer. This timing also works well in reducing *Phalaris*. Depending upon the timing Gordon has found native grasses to be higher in protein adding weight to the stock quicker.

Of note Gordon is concerned about a new weed occurring in small areas on the farm, mainly in high traffic areas such as access tracks. Parramatta Grass (*Sporobolus africanus*) is native to South Africa, has a clumping nature, growing to 50cm high with green seed heads (spikelets) up to 20cm long (Flowering occurs October to June). The leaves are tough and wiry, blue-green in colour.



Recently grazed paddock consisting of Wallaby Grass and Spear Grass



Corangamite Catchment Management Authority

64 Dennis Street, Colac VIC 3250

t: 03 5232 9100 f: 03 5232 2759

e: info@ccma.vic.gov.au

w: www.ccma.vic.gov.au



This project is supported by Greening Australia, through funding from the Australian Government's National Landcare Programme and the Corangamite CMA.