Healthy Landscapes

A practical guide to caring for land in the Mount Alexander region







About Connecting Country

Connecting Country is a community organisation working to restore landscapes across the Mount Alexander region of central Victoria. Since beginning in 2007 we have completed over 60 regional restoration projects involving more than 250 landholders. Together we have worked to protect and restore around 10,000 hectares of land across the Mount Alexander region.

Connecting Country's work is based on four action areas:

- Support Landcare through our Landcare Facilitator and 30 local Landcare and Friends groups.
- Restore landscapes through on-ground actions such as protective fencing for existing habitat, revegetation, and pest plant and animal control.
- Engage community through environmental education workshops, information sharing, an informative website, social media and volunteer involvement.
- Monitor biodiversity and landscape health through citizen science with a focus on woodland birds and arboreal mammals.

We collaborate with local landholders, volunteers, Landcare and other community groups, Traditional Owners, government agencies and philanthropic organisations, providing support, skills and resources to restore landscapes. For further information please visit our website **www.connectingcountry.org.au**

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Introduction

We at Connecting Country are constantly inspired by the enthusiasm and hard work of landholders across the Mount Alexander region to restore and protect our natural assets. However, there is still much to be done. This guide aims to empower farmers and other landholders to understand their land, and act to improve wildlife habitat, increase farm productivity, and protect soil and waterways. By sharing the practical tools in this guide we can work together for a healthy, productive and resiliert landscape.

Connecting Country operates on Dja Dja Wurrung Country within Mount Alexander Shire and surrounds (photo: Geoff Park)

Traditional Owners

In the Mount Alexander region we are on Dja Dja Wurrung / Djaara Country. In using the term and concept of 'Country' in the name for our organisation, we hope to acknowledge and encourage the concept of stewardship for the land by all its inhabitants. The Dja Dja Wurrung / Djaara people are recognised as the First People of Central Victoria including the Mount Alexander region.

We acknowledge the elders of the Dja Dja Wurrung community and their forebears as the Traditional Owners of Country. Before European colonisation, the natural places within Dja Dja Wurrung Country were well known, had a name and song, and were celebrated as part of Dja Dja Wurrung culture. We recognise the vital role Djaara people play as ongoing custodians of the land and waters of the region, and we value their living culture and unique role in the life of this region.

In 2014 Dja Dja Wurrung Clans Aboriginal Corporation developed the Dhelkunya Dja – Dja Dja Wurrung Country Plan 2014-2034, re-affirming their aspirations and describing the future of the Traditional Owners of Dja Dja Wurrung Country.

¹Dja Dja Wurrung People have lived on our traditional lands and cared for our Country over many thousands of years. For us, Country is more than just the landscape, it is more than what is visible to the eye - it is a living entity, which holds the stories of creation and histories that cannot be erased.' (Dhelkunya Dja 2014-2034)

We also acknowledge all other Indigenous people of the region.

Recent historical legacy

Nearly two centuries ago, British colonists arrived in central Victoria. Before long, gold was found, sparking the world's second major gold rush. During the 1850s people came from Britain, Europe, America and later from China. Soon tens of thousands of people flocked to the Forest Creek valley, around the area now called Castlemaine.

Miners cut down the trees and dug up the land. As alluvial gold became harder to find, they used crushing equipment, chemical treatments and sluicing to access the remaining gold deposits. They brought new plants and animals, and left behind a starkly degraded landscape. Much of the productive topsoil was washed away and drainage lines eroded. The more fertile areas of the region were cleared and developed as farmland for grazing and cropping. Over subsequent decades, trees were repeatedly cut to supply timber for firewood and construction.

The environmental and cultural legacy of this history remains today. The extensive loss of topsoil and disruption of waterways has changed how the ecosystems operate. The areas of remaining native bush that exist in our ever-changing landscape are vastly different in appearance, structure and health compared to pre-colonisation.

Although we are fortunate to have remnant patches of bush in the Mount Alexander region, they exist as islands and linear strips in our agricultural landscapes, and many are disconnected from other patches and landscape features like waterways. This loss of connectivity affects their health and capacity to support native plants and animals. Many patches lack a multi-layered understorey, and the healthy layer of logs, fallen branches, bark and leaf litter that our native animals need to survive and thrive.

Dja Dja Wurrung Country

Mount Alexander Shire



Land use and landholders

The Mount Alexander region's landholders range from rural residential and lifestyle properties around towns, to larger working farms. The dominant agricultural land use is sheep and cattle grazing, with some cropping, orchards, vineyards and market gardens in more fertile areas. Some larger properties are being converted into smaller, diversified, boutique farming and lifestyle properties.

In recent decades, people have moved to the region, attracted by the lifestyle, community and environment. New landholders are joining the growing community of local farmers and other landholders in protecting remnant bush, and managing agriculture and biodiversity in complementary ways.

Agriculture in the Mount Alexander region is changing. Farmers have long cared for the land, but now there is a stronger recognition of the role natural systems play in supporting farm productivity and long-term viability. People are also increasingly concerned about the source of their food, and whether it is ethical, healthy and sustainable.

Although some agriculture practices are new, many involve a revival of old methods that relied more on natural processes than machinery and synthetic chemicals. Some of the approaches used in our region include regenerative agriculture, holistic management, and permaculture.

Making connections

Connecting with other landholders, community and Landcare groups in you local area can be a great way to share knowledge, inspiration, and support.



Landcare and community

Our region is home to around 30 active Landcare and Friends groups, representing one of the highest levels of Landcare engagement in the country. Every group is different, some work on private properties, public reserves or both to protect remnant vegetation, control weeds and pest animals, help threatened species, and do revegetation.

Along with Connecting Country, many other community groups are focused on the environment and sustainability in our region. These include: Friends of the Box-Ironbark Forests, BirdLife Castlemaine District, Castlemaine Field Naturalists Club and Mount Alexander Sustainability Group. These groups can be a great way to connect with others, learn about the local flora and fauna and get active in the community.

Planning and government

Our region lies largely within the Mount Alexander Shire local government area. The Shire provides services for residents, and maintains some of the roadsides, parks and other public land within the region. The Shire has a planning scheme that determines land use and development on both public and private land within the shire. It contains State and Local planning policies, zones and overlays, and other provisions that affect what you can and cannot do on your property.

Multiple agencies are responsible for managing land, waterways and biodiversity within our region, including:

- North Central Catchment Management Authority.
- Victorian Department of Environment, Land, Water and Planning.
- > Parks Victoria.
- > Coliban Water.

Further information

To read the Dhelkunya Dja – Dja Dja Wurrung Country Plan 2014-2034: www.djadjawurrung.com.au

To learn more about Connecting Country and Landcare in the Mount Alexander region: www.connectingcountry.org.au

To access the Mount Alexander Shire planning scheme: www.mountalexander.vic.gov.au



Before taking action on your property, take time out to observe and appreciate what is happening in your patch. Learning about your landscape will help you work with the strengths of your land, respect its limitations and avoid potential problems.

1940

Get to know your soil

Learning about soil will help you whether you are running stock, establishing pasture, growing crops, addressing erosion or revegetating your property. Your property's soil structure and health will affect the types of land management activities your property can sustain. Knowing about your soil is critical to managing issues like fertility, erosion, compaction and waterlogging.

Our local soils range from very old sedimentary soils to much younger basalt soils formed at least 30-50,000 years ago. Relatively speaking they are low in nutrients, with low to moderate suitability for agriculture. In the Mount Alexander region our soils originate from several different geological and geomorphic processes. We can group our soils together in the following categories:

- > Sedimentary soils are widespread in our region. They typically formed from sediments from streams, lakes or ancient seas. Sedimentary soils are very old and weathered particles of sand and clay, often making them relatively low in nutrients. They can be vulnerable to erosion.
- > Volcanic soils are scattered in a few areas of our region and formed from weathered volcanic material. These soils are relatively fertile and hold water well. Waterlogging can be an issue for plant growth.
- > Granitic soils have very large particles made up of quartz and feldspars. They are highly permeable and can often be low in nutrients. In the Mount Alexander region we have a horseshoe shaped belt of granite stretching from Nuggetty through to Ravenswood and south to Elphinstone.
- > Riverine plain soils are a very small part of our geology, and are located around Cairn Curran and north towards Lanecoorie. They are formed from fine silt and clay sediments deposited from floods. Being lower in the landscape, these soils tend to become waterlogged easily.

Soils derived from these different landscape categories support different vegetation, as plants and soil are interconnected – they help form and sustain each other. Plant growth, health and diversity reflects soil health, and is affected by physical, chemical and biological properties. There are many resources and opportunities to learn about your soil. Visit the Healthy Landscapes Guide website to get started.

Learn where the water flows

Every farm or property is part of a catchment – an area of land naturally defined by hills or mountains. Rainfall and run-off within the catchment move down-slope eventually reaching low-lying points such as creeks and rivers.

Our region is located on the inland slopes of the Great Dividing Range, so waterways here flow north towards the Murray River and form part of the Murray-Darling Basin. Larger reservoirs include Cairn Curran Reservoir on the Loddon River and Lake Eppalock, which receives flows from the Campaspe and Coliban Rivers.

Our region's creeks include Forest Creek, Campbells Creek, Barkers Creek and the Jumcra (Jim Crow Creek), along with many smaller seasonal creeks and wetlands. These creeks have been a focus of restoration efforts by landholders and local groups, in some cases for decades.

Rivers and water features are the lifeblood of the country, carrying water throughout the landscape and providing important refuges and corridors for wildlife. At the property scale, how the land is managed has an influence on the quality of water on your property and in the wider catchment. Protecting our waterways is a fundamental part of creating a healthy and connected landscape. For more information visit the Healthy Landscapes Guide website.

Soil landscape categories in the Mount Alexander region



Adapted from Indigenous plants for North Central Victoria: a planting guide, compiled by Greening Australia Victoria 1999

Learn about local vegetation

The remarkable Box-Ironbark Forests extend along the inland slopes of the Great Dividing Range in Victoria. The name Box-Ironbark Forest refers to some of the dominant Eucalypt canopy trees. It is estimated that more than 83% of their previous extent has been cleared. The remnants of these forests now exist as isolated patches and trees, with some larger continuous blocks.

Our local Box-Ironbark Forests and woodlands support a marvellous array of wildflowers, shrubs, fungi, insects, reptiles, frogs, mammals, and birds. While our region has some Box-Ironbark Forest, it is also home to open woodlands and grassy plains, granitic plateaus, forest and shrublands, creeklines, gullies and swamps.

Despite being heavily degraded, these habitats still provide critical resources for many fauna species. For example, the intermittent mass flowering of Eucalypts are abundant sources of nectar and pollen for Swift Parrots that migrate from Tasmania. Black Wattle provides abundant sap for possums and gliders, and indigenous tussock grasses are important homes for lizards and butterflies.

Ongoing threats include expanding development, weeds, pest animals, firewood collection, fragmentation, mining, inappropriate burning and climate change. If these threats continue at current rates, the capacity of our landscape to recover from natural and human disturbances will decline, and further plants, animals and ecosystems will be lost from our landscape forever.

Wattles flowering in late winte Kalimna Park, Castlemaine (photo: Connecting Country)

Explore your local habitat

A healthy landscape contains a complex interactive network of elements, it is a lot more than just grass and trees. A property with a greater diversity of elements is likely to support many native animals as it provides the food, shelter and resources that our local wildlife need to grow and thrive.

Which of these elements do you have on your property?

Tree hollows and fissures, usually take over 100 years to develop and provide vital nesting and roosting sites for many species of birds and mammals. Large old trees provide food and shelter for birds, mammals, insects and reptiles in their leaves, flowers, fruit, bark and pollen. Roots penetrate rock and hold soil.

Mistletoe provides nectar, fruit, and semi succulent leaves, often at different times to the surrounding bush, providing critical food for wildlife when nothing else is available. Provides nesting sites for birds, and valuable, higher nutrient leaf litter.

> Wooden fence posts and stumps provide perching, nesting, resting and foraging habitats for birds and reptiles.

Mid-story and understorey shrubs provide structural habitat - a place for small birds to shelter from predators and build nests. Flowers, fruit and seeds, attract a rich array of insects, lizards, birds and mammals.

Dead standing trees provide perching, nesting and foraging sites and roosting sites for microbats,

Leaf litter, bark and branches help retain moisture in soil, promotes fungi, bacteria and tiny organisms which in turn help to decompose the material releasing nutrients. It creates habitat for insects which feed many other animals. Fallen timber is extremely important providing perching, nesting, resting and foraging habitats for birds and reptiles.

Herbs, grasses and groundcovers

provide important shelter and feeding areas for reptiles, frogs, birds, mammals and invertebrates. They protect soil from moisture loss, erosion and weed invasion. Native animals including insects, spiders, reptiles, frogs, birds, bats and other mammals perform complex interactions with plants and other animals that keep the whole ecosystem healthy and in balance.

Mosses, fungi and lichens are tiny organisms that create a crust on rocks and soil absorbs water and captures seed.

Get to know the neighbours

Our region is home to many special plants and animals, some that are in serious decline. Here are a few of our favourites.



Woodland Birds (photo: Geoff Park)

A suite of 24 bird species associated with drier woodlands on slopes and plains north of the Great Dividing Range.

- > Need protection of remnant vegetation, restoration of missing understorey plants, revegetation to improve habitat connectivity, weed and feral animal control, and retention of fallen timber.
- > Victorian Temperate Woodland Bird Community is listed as Threatened under the Victorian Flora and Fauna Guarantee Act 1988. Studies in central Victoria demonstrate an alarming acceleration in the decline of most species in recent years.



Brush-tailed Phascogale (photo: Jess Lawton)

A small, nocturnal, treedwelling, carnivorous marsupial with a black brushy tail.

- > Needs large old trees, protection and restoration of habitat, control of cats and foxes, and plenty of leaf litter, logs and tree stumps on the ground.
- Have typical home ranges of 40-100 hectares
- Listed as Threatened under the Victorian Flora and Fauna Guarantee Act 1988, and considered vulnerable to localised extinction.



Eltham Copper Butterfly (photo: Elaine Bayes)

A small copper-coloured butterfly with a complex lifecycle.

- > Lives in bushland within Kalimna Park (Castlemaine) and Castlemaine Botanical Gardens, representing the largest remaining population of this species in the world.
- Needs healthy, unburnt understorey with Sweet Bursaria plants and Notoncus ants to complete its complex lifecycle.
- Listed as Endangered under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999.



Powerful Owl (photo: Damian Kelly)

A large grey, brown and white owl with a deep 'woo-hoo' call heard at night.

- > Needs large patches of intact and connected native forests for their home range, including old trees with large hollows to nest.
- Multiple breeding pairs known within the Mount Alexander region.
- Listed as Endangered under the Victorian Flora and Fauna Guarantee Act 1988.

above left to right: Rough-barked Eucalypts provide important foraging sites for many animals such as this White-throated Treecreeper (photo: Jacqui Slingo); Echidna foraging in leaf litter (photo: Nathan Johnson)



Swift Parrot (photo: Rob Geraghty)

A slim, active, medium-sized and mostly green parrot with a red face, blue crown and long purple-red tail.

- Breeds in Tasmania then flies across Bass Strait to forage on flowering Eucalypts in central Victoria.
- Needs healthy flowering eucalyptus woodlands with lots of nectar and pollen.
- > Listed as Critically Endangered under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999.



Silver Banksia (photo: Bonnie Humphreys)

A small tree with large, dark green leaves and yellow flowers massed in cylindrical spikes.

- > Was once scattered across the Mount Alexander region but today is almost gone from the landscape.
- Exists mostly as isolated old trees that are at high risk of inbreeding and further decline.
- Needs revegetation to bolster numbers, connect isolated populations and provide reliable seed sources.



Laughing Kookaburra (photo: Frances Howe)

A large bird from the kingfisher family, off-white and brown, known for its raucous call.

- Needs tree hollows for breeding, and healthy numbers of insects, worms, crustaceans, small reptiles, frogs and birds for food.
- > Identified as in decline in south-eastern Australia in 'The State of Australia's Birds' 2015 report, along with many other relatively common birds.



Bibron's Toadlet (photo: Matt Clancy)

A small brown-black toadlet with a marbled underbelly and yellow markings.

- > Needs healthy creeks, dams and waterways, plus rocks, logs and leaf litter for shelter, and grassy areas beside waterways to breed in.
- Listed as Endangered under the Victorian Flora and Fauna Guarantee Act 1988.

Actions you can take on your property

| Issue | Description | Actions |
|--|---|---|
| Climate change | Changes in climate affect the distribution, growth, life-cycles and survival of native plants and animals, causing decline of vulnerable species. | Protect remnant vegetation (section 3.2) |
| | More extreme weather events such as bushfires, heatwaves, drought and floods damage native vegetation and kill wildlife. | Revegetate your land (section 3.3) |
| | Hotter and drier conditions make revegetation more difficult. | Get involved with a local group |
| | Changing weather conditions contribute to new and emerging weeds and pests. | change |
| Vegetation clearing | Removal of native vegetation for housing, agriculture, or fire control efforts removes wildlife habitat, and contributes to erosion and weed invasion. | Protect remnant vegetation (section 3.2) |
| | | Help hollow-using wildlife (section 3.6) |
| | | Care for paddocks (section 3.8) |
| Loss of connectivity | Vegetation clearing creates isolated patches that prevent animals and plant material (pollen and seeds) from moving across the landscape. | Protect remnant vegetation (section 3.2) |
| | Lack of connectivity contributes to inbreeding, and prevents wildlife accessing alternative food sources and other essential resources. | Revegetate your land (section 3.3) |
| | Lack of connectivity prevents animals and plant material escaping from threats such as drought, climate change, weeds and pest animals. | |
| Urbanisation | Clearing land for housing removes wildlife habitat. | Protect remnant vegetation |
| | Garden plants escape and become potential new weeds. | (section 3.2) |
| | Fire hazard reduction efforts around urban areas damage native vegetation. | Control weeds (section 3.4) |
| | Uncontained pet cats and dogs kill or exclude native animals. | (section 3.5) |
| Weeds | Weeds displace native plants, reduce resources available for native wildlife, and degrade habitat quality. | Control weeds (section 3.4) |
| | Weeds invade agricultural land, reducing productivity and sometimes poisoning stock. | |
| Pest animals | Rabbits, hares and deer eat native plants, discourage natural plant regeneration, reduce agricultural productivity, and contribute to soil erosion. | Control rabbits (section 3.5) |
| | Cats and foxes kill native animals. | |
| Erosion and contamination | Loss of soil makes it hard for native plants to establish and reduces agricultural productivity. | Protect remnant vegetation (section 3.2) |
| | Waterways are affected by sediment and water quality declines. | Revegetate your land |
| | Herbicides, pesticides, fertilisers or nutrients from animal wastes contaminate soil and runoff, damage native vegetation and cause algal | Manage your dam as habitat |
| | blooms in waterways. | (section 3.7) |
| Firewood collection and fire prevention | Removal of trees, fallen logs, branches, bark and/or leaf litter causes a decline in the wildlife that rely on them. | Protect remnant vegetation (section 3.2) |
| enorts | | Help hollow-using wildlife (section 3.6) |
| | | Obtain firewood from a sustainable source |
| Inappropriate burning practices | Timing, frequency or intensity of planned burns can damage plants and animals directly, and can impact their reproductive capacity or the resources they rely on for food, shelter and nesting. | Protect remnant vegetation (section 3.2) |

Recognise on-farm benefits

Taking care of natural assets on your farm provides benefits, not just for the environment but for farm productivity, and individual and community well-being. The actions set out in this guide will help keep your land healthy and productive for future generations. Research demonstrates that protecting and improving wildlife habitat and other natural assets on farms can improve farm productivity, and bring multiple social, environmental and financial benefits.

Explore our future climate

The Mount Alexander region has a temperate climate characterised by hotter summers, cool winters and average annual rainfall less than 600mm. Summer high temperatures are usually around 30°C although days above 40°C are increasing. In winter frosts are moderately common and overnight temperatures can drop below zero. Winter months on average experience the most rain.

In 2019, CSIRO published the Victorian Climate Projections based on medium and high greenhouse gas emissions scenarios. For the Loddon Campaspe region (including the Mount Alexander region) they predicted:

- > Maximum and minimum daily temperatures are highly likely to continue to increase over this century.
- Extreme rainfall events are highly likely to become more intense on average through the century, but remain variable in space and time.
- By the 2030s, daily maximum temperatures are expected to increase by an average of 0.8°C to 1.7°C (above 1990s temperatures).
- > Rainfall will continue to be very variable, but over the long term it is expected to decline in winter and spring, and possibly autumn.
- > By the 2050s, the climate of Bendigo could be more like the current climate of Shepparton.

The impacts of climate change on our local environment are difficult to predict. However, it is expected that the mix of plant and animal species able to persist in our region will continue to change. Some native plants and animals will decline or disappear, while some species may become more widespread or abundant. We are also likely to see new weed and pest animal species emerging.

Further information

For full climate projections: Victorian Climate Projections (2019) by JM Clarke, M Grose, M Thatcher, V Round and C Heady C. CSIRO, Melbourne Australia. www.connectingcountry.org.au/healthylandscapes

To learn more about plants and animals in the Mount Alexander region:

Wild plants of the Castlemaine district by Castlemaine Field Naturalists Club: www.castlemaineflora.org.au

Native trees and shrubs of south-eastern Australia (2009) by Leon Costermans. New Holland Publishers.

Trees of Victoria and Adjoining Areas (2006) by Leon Costermans, Costermans Publishing.

Weeds of the south-east: an identification guide for Australia (2016) by F.J. Richardson, R.G. Richardson, R.C.H. Shepherd. R.G. and F.J. Richardson

Eucalypts of the Mount Alexander Region (2016) by Bernard Slattery, Ern Perkins and Bronwyn Silver. Friends of the Box-Ironbark Forests (FOBIF).

Wildlife of the Box-Ironbark Country (2005) by Chris Tzaros. CSIRO Publishing.

Victoria's Box-Ironbark Country – a field guide (2002) by Malcom and Jane Calder. Victorian National Parks Association Inc.

For more resources visit the Healthy Landscapes Guide website: www.connectingcountry.org.au/ healthylandscapes

Faraday vista (photo: Jane Satchell)



3.1 Make a plan

As a landholder, you may have lots of ideas for improving your property, but it can be difficult to know where to start. Making a plan helps you prioritise your actions, and can avoid wasting time, money and resources on activities that do not help you achieve your short and long-term goals.

Getting to know your land takes time, but is fundamental to good planning. Whether you have recently purchased your property or are already many projects along on your land management journey, there is always more to learn. Refer to 'Understand your land' (chapter 2) for help with this.

Good planning can guide you to create a resilient, beautiful, productive landscape that fits your vision for your property and life. It can also save you much disappointment and frustration!

Get started

A property management plan can be as simple, detailed, or creative as you wish. The most important thing is that it is useful to you! It should be easy to refer to and to adapt as your property and priorities change over time.

A good plan is targeted to the landholder's specific property, aspirations and capacity. You can download a sample property management plan from Connecting Country's website and adapt it to your needs. The Australian National University (ANU) has a Smart Farms program, which provides another example of a management plan.

A simple approach is to:

- Describe the existing property and its natural assets and processes.
- Identify landscape restoration goals and priorities.
- > Set out practical management actions to achieve these goals.
- Include monitoring and evaluation to measure progress (e.g., photo points).



Describe your property

Having a thorough understanding of the existing natural assets - such as creeklines, shelterbelts, remnant vegetation and rocky outcrops - is a great starting point for developing a plan to protect and improve your property.

To describe your property and its natural assets:

- Obtain an aerial image of your property, available from Google Earth, North Central Catchment Management Authority's iMap, or a drone.
- > Find out about historical land uses on your property from neighbours or other community members, or search historical maps and aerial photos.
- Check for areas of Aboriginal cultural heritage sensitivity and find out how to protect them.
- Document current property conditions on your aerial image to make a map.
- Mark built and farm assets such as fences, paddocks, crops, dams, roads and buildings.

- Mark existing natural assets, including creeks, shelterbelts, native vegetation, primary production, rocky outcrops and paddock trees, and note their condition.
- Mark any current threats such as invasive plants, invasive animals, erosion, flood prone sites and historical land management practices.
- > Identify natural assets that adjoin your property, such as existing vegetation patches or corridors of native vegetation.

To identify the natural processes happening on your property:

- Consider how water moves through your property.
- Identify any areas where vegetation is regenerating naturally.
- > Review how wildlife might use remnant vegetation or creeklines on your property as stepping stones to access other areas of habitat in the landscape.
- > Consider if you can join up areas of existing vegetation or work with your neighbours to create linkages between natural features and manage threats in a complementary way across the landscape.

Identify your goals and priorities

Goals will vary greatly from landholder to landholder. What do you want to achieve at your property? Take time to reflect on your goals in creating a healthy landscape and why are they important in the long term. Once you are clear about what you want to achieve, it is then possible to identify which assets to prioritise for management actions.

Depending on your priorities, here are a few ideas for increasing the biodiversity and health of your landscape:

- > Increase native tree canopy cover.
- Increase the cover and diversity of native understorey species.
- Increase recruitment of native woody plant species.
- Eliminate woody weeds (to less than 1% cover).
- Stop high-threat herbaceous and grassy weed cover from increasing.
- Maintain or increase the cover of organic leaf litter.
- Link existing areas of native vegetation to improve landscape connectivity.
- > Provide shelter and shade for stock.
- > Improve dam or creek water quality.
- > Create habitat for threatened species.

Use your property map and management plan to identify assets and threats in order of priority, and target your actions accordingly.

Set out practical management actions

Once you have identified priorities, you can develop actions to protect your assets, address threats and achieve your property goals. It is rarely possible to achieve everything at once. Use the priorities in your property management plan to target your actions according to available resources.

Talk to your neighbours, local Landcare group or government agencies about your plan. Many people have practical local experience from improving the natural assets on their properties. They can be well placed to discuss what worked, what did not work and why.

Consider your available resource base. It may include your own labour and skills, your available funds, help from family and friends, paid contractors, and/or assistance from government or community organisations. Your local Landcare group will be useful for getting an idea of costs and possible funding opportunities that may arise.

If using contractors, obtain quotes for identified management actions and allocate your budget. Connecting Country maintains a local contractor list, available on our website. Neighbours can be a good source of local contractor contacts.





Measure and celebrate progress

Monitoring can be a simple as identifying several photo points on your property where you take photos regularly to acknowledge and celebrate your progress. A simple way to monitor is to identify several locations (photopoints) on your property where you take photos in the same direction at regular intervals (e.g. every 12 months). This creates a series of 'before' and 'after' photos capturing change from your actions e.g. weed control or revegetation, as well as ecological change over time.

Further information

Obtain aerial images of your property from Google Earth: www.google.com/earth

Check for areas of Aboriginal cultural heritage sensitivity: www.aboriginalvictoria.vic.gov.au/ cultural-heritage-sensitivity

Download Connecting Country's sample site management plan: www.connectingcountry.org.au/ makeaplan

Download the Australian National University's 'Ten ways to improve the natural assets on a farm': www.sustainablefarms.org.au/ ten_ways

View Connecting Country's local contractor list: www.connectingcountry.org.au/ get-support

For more resources visit the Healthy Landscapes Guide website: www.connectingcountry.org.au/ healthylandscapes

3.2 Protect remnant vegetation

As most of our region was cleared for mining, timber and agriculture, any remaining native vegetation, is extremely valuable for wildlife habitat, and provides many on-farm benefits. Remnant vegetation is essentially indigenous plants growing in their natural environment. Protecting bush with lots of plant species and a complex structure is the highest priority. However, even a single large old tree, or a patch of native grasses or shrubs is worth protecting.

Areas of remnant vegetation cannot be readily replaced. They may contain rare or threatened plants, or examples of native plant communities that are absent from adjoining land. Patches of relatively intact bush, with trees and diverse layers of shrubs, grasses and herbs, are more resilient to extreme weather events and threats like weeds, so can require far less ongoing management than revegetation.

Revegetation is a valuable tool to increase species diversity, and expand or reconnect existing patches of bush to provide habitat for wildlife. However, the process of reestablishing high quality habitat in cleared areas is very labour-intensive and slow. Large trees can take hundreds of years to grow and develop the tree hollows and create the fallen timber essential for many local wildlife species. Leaf litter can take decades to rebuild. Soil conditions in disturbed areas often favour weedy grass growth or inhibit growth of native plants, and some plant species are difficult to source or are unavailable.

Protecting what native vegetation is already there, and providing the conditions for it to regenerate naturally, is much cheaper and easier than re-establishing it from scratch.

Eucalypts and other plants often self-seed, and if protected from grazing animals and weed competition, can start to establish. It is far easier to protect areas of seedlings with plant guards or fencing than investing in the planning, site preparation, planting, and ongoing maintenance of revegetation.

Benefits of protecting remnant vegetation

- > Protect essential nesting, shelter and food resources for threatened species and other wildlife.
- > Provide natural pest control by creating havens for native wildlife that eat pest insects.
- Improve water quality in dams and watercourses.



Reduce grazing pressure

When native vegetation is browsed heavily, plants struggle to flower or set seed, and they have less habitat value. Grazing pressure also creates soil compaction and increased nutrient loads from manure. To help your remnant vegetation grow and thrive, exclude stock with fencing, and control pest animals such as rabbits. The best type of fencing for your property depends on the animals you want to exclude and the location in the landscape. Talk to your neighbours, if possible, and research what has worked for others. Avoid using barbed wire and consider wildlifefriendly fencing design principles to avoid injuring local wildlife. Maintain your fences so that they are effective and useful in the landscape. Consider removing fences that removing fences that are no longer needed.

Protect waterways

Waterways, creeks, drainage lines and other wet areas are all particularly sensitive to hard hooved stock and compaction. Where possible restrict stock access by fencing the waterway and consider creating an off-stream watering point. This will help to prevent erosion and improve water quality by reducing nutrients, pathogens and sediments entering the waterway.

Consider flood-prone fencing design when fencing waterways to avoid damage during future floods.

Protect paddock trees

Paddock trees are often the oldest and most valuable habitat elements in agricultural landscapes. When paddock trees are cleared, it takes generations to replace the habitat they provided, including the insects and abundant nectar for birds and mammals, thick bark with cracks and crevices for microbats and small reptiles, and hollows for many significant species. Even standing dead trees, fallen branches and leaf litter offer valuable resources and should be retained wherever possible

Many paddock trees across our region are suffering die-back caused by old age, pests and disease, nutrient loading, soil compaction and lack of protection from intensive agricultural practices. These valuable giants are disappearing from our farming landscapes, often with no younger trees to replace them. However, we can take action to protect paddock trees to extend their life, and establish future generations.

To help protect paddock trees and establish new ones:

- Fence off paddock trees from stock and machinery, including space around them to promote natural regeneration.
- Incorporate existing paddock trees into revegetation plantings to improve the health of paddock trees and habitat value of revegetation.
- > Leave dead paddock trees standing if possible – they contain cracks, crevices and hollows for wildlife such as microbats, and perching sites for birds of prey, parrots and water birds.
- Install stock-proof guards around young trees within paddocks if fencing is not feasible.



Leave rocks, logs, branches and leaf litter

Leave logs on the ground to provide important resources for fungi, insects, reptiles, frogs, birds and small mammals.

Clearing up rocks, logs, branches and leaves will exclude many woodland animals by removing the habitat elements they depend on. It will create a simple habitat and favour animals that are already common in our towns and farms, like magpies, cockatoos, rabbits, foxes and hares.

We all want to protect our properties from bushfire. However, make sure you check the latest research and guidelines on fire hazard reduction. Some historical practices are now considered ineffective for fire control, but highly damaging for the environment. For example, removing leaf litter creates bare ground and encourages weeds, which create their own fire hazard.

If you do need to remove logs and branches for safety or access, consider moving them to another location where they can continue to provide habitat.

Protect soil

Although it will take hundreds of years to rebuild the topsoil that was lost throughout our region, we can take steps to prevent further losses. Protecting soil can be as simple as maintaining as much groundcover as possible. In remnant vegetation areas this means leaving logs, leaf litter and branches to protect the soil from erosion, and avoiding activities that disturb the protective soil layer. Protecting seedlings and regenerating vegetation from stock and wildlife with guards or fencing is also helpful as they provide leaf litter, and their roots stabilise the soil.

Fixing major erosion, such as extensive rill erosion, tunnel or gully erosion, requires specialist advice and planning. However, for minor erosion, such as sheet erosion or the beginning of rill and gully erosion, laying branches or weed-free straw bales along the contour of the slope will slow down the flow of water. Planting on exposed soil, including at the top of the slope can also help.

Our local native plants are adapted to local soils, which are naturally low in nutrients. Adding nutrient-rich fertiliser, straw mulch, compost or animal manure to native plants can damage native plants, encourage weeds, and contaminate waterways.

Protect paddock trees by leaving logs and litter to reduce soil compaction by stock, weed establishment, and including them in areas of revegetation where possible (photo: Jacqui Slingo)

Undisturbed soils develop a protective layer on the surface. This delicate layer protects the soil, reduces moisture loss, and creates an important microclimate. It can take years to recover once disturbed.

To protect soils for native vegetation:

- Address minor erosion by slowing down water flow with branches, weed-free straw or by planting deep-rooted perennials.
- Avoid adding fertiliser, manure or other nutrient-rich materials.
- Avoid ploughing or disturbing the soil surface.

Enjoy healthy habitat

If you are fortunate enough to have existing habitat on your property, you probably know some of the plants and animals that visit or live there. In taking care of your existing habitat, you may notice plants naturally regenerating, and new birds or other animals moving in.

Further information

Wildlife friendly fencing: www.wildlifefriendlyfencing.com

Fencing in flood-prone areas: www.water.vic.gov.au/flood-pronefencing-guidelines

Protect paddock trees: www.platypus.org.au/paddocktrees

Balance the needs of fire hazard reduction and biodiversity: www.cfa.vic.gov.au/ FireEcologyGuide_Final_web.pdf

Erosion management and control: www.agriculture.vic.gov.au/farmmanagement/soil/erosion

For more resources visit the Healthy Landscapes Guide website: www.connectingcountry.org.au/ healthylandscapes

3.3 Revegetate your land

Taking time to plan and prepare your revegetation will safeguard your investment and give you the best chance of seeing your plants thrive, mature, and reproduce. Get clear on the purpose of your planting to identify the best approach for your revegetation project.

Choose your approach

You may want to create shelter or shade for stock, increase farm biodiversity, reestablish understorey species, mitigate erosion, safeguard or establish paddock trees, improve visual appeal of your property, help wildlife or increase soil carbon, or perhaps you just love plants!

There are many ways to do revegetation. Consider the time you have available for planning, planting and maintenance, and your budget. It is usually best to start small and learn what works for your property. After your first planting season, you may want to adapt your approach. The main revegetation methods used in our region are tubestock planting and direct seeding.

Tubestock are small plants grown in forestry tubes. After planting they require guarding, watering and maintenance. In our region, it is best to support new plants by watering for a year or two after planting, especially during hot or dry weather. You will need to remove weeds, replace lost guards, and remove guards once the plant is established. Planting tubestock is a relatively easy and inexpensive way of getting started with revegetation.

Direct seeding uses a machine to sow seeds into a furrow in the soil. It is an effective method for large-scale revegetation. Seeds remain in the soil until the conditions are right for germination, requiring minimal maintenance, but assumes some seed and plant losses. As direct seeding requires specialist machinery and knowledge, it is best to find a local experienced operator.

Decide if you need to plant

Revegetation is a valuable tool to increase species diversity, re-establish a shrub layer or expand or reconnect existing patches of bush. However, it is very labour-intensive!

Protecting and encouraging natural regeneration is far easier and cheaper. As a first option consider protecting natural regeneration (seedlings that selfsow) from stock, wildlife, pests animals and weeds before investing in other revegetation methods.

Decide where to plant

When prioritising where to plant, a good approach is to:

- > Create connections or extend natural features on your property and in the surrounding landscape by planting around dams, paddock trees, or adjoining creeklines, roadside vegetation, shelterbelts, or neighbouring bush.
- Expand the width of existing patches native vegetation (whether remnant vegetation or revegetation).
- Plant around paddock trees to increase the habitat value of both the paddock tree and of the planting.
- > Plant in gullies and around waterways and dams.
- Avoid planting too close to houses and infrastructure to minimise fire risk.

Benefits of revegetation

- Improve biodiversity by connecting existing vegetation and natural features such as paddock trees, shelterbelts, dams, areas of regeneration and riparian zones.
- Protect stock by providing shade and shelter, reducing stress and losses during extreme weather, and improving productivity.
- > Provide natural pest control by creating havens for predators that eat pest insects, such as insects, spiders, small birds and microbats, increasing crop yield and reducing the need for insecticides.
- > Add to the value of your property.



Consider layout and access

Although bigger plantings can support more animals, they require a lot of work. Aim for the biggest planting you can comfortably plant, manage and maintain. Often it is better to start small and increase your revegetation incrementally. Even small plantings can provide valuable habitat.

When deciding where to plant, try to visualise the plants at their full size. For most indigenous shrubs, 3-5m apart is a general guide. For large canopy trees like Eucalyptus, you may want to plant 20-30m apart. If you are planting grasses or small shrubs, you may plant much closer.

Consider how you will access the site for planting, watering, and ongoing weeding and maintenance. You may want to allow for vehicle access for easier ongoing maintenance.

The layout of your planting is a personal decision. When planting a shelter belt you would usually plant tall plants in the middle, working down to the smallest plants on the edge. If you are planting a screen and want to maximise access for watering and weeding, you may want to mix the species but plant in straight lines. You may be planting for the love of plants and like the look of a grove of Sheoak. Whatever arrangement of plants you choose, it will benefit local wildlife.

Decide what to plant

Think about what is already growing at your site. If you have an abundance of a particular plant, it makes sense to choose a different species, rather than plant more of the same. If you have existing Eucalypts or natural Eucalypt regeneration, a good approach is to just plant missing understorey plants. Encouraging and protecting natural regeneration is far less work than planting and maintaining tubestock.

Many of our local forests and woodlands have lost their diverse understorey vegetation, especially key shrubs. If you have existing remnant vegetation, or wish to connect neighbouring patches of bush, there are many understorey plants that look great, and provide small birds and mammals with essential food, nesting sites and protection from predators. Planting a variety of native species that flower at different times will help provide resources for animals throughout the year.

Our region has several nurseries specialising in native plants grown from seed or cuttings (collected under licence), from the local area. This means the plants are adapted to local conditions, not invasive and provide resources for local wildlife. The terms 'native' or 'Australian native' are often confusing. Australia is a big place with a wide range of climates. Just because a plant is native to Australia does not make it suitable for your local environment. Some native plants are bred for appearance or garden purposes, and far removed from a natural indigenous plant. They may not be adapted to local conditions, or they can grow too well and spread into bushland creating new weeds.

When revegetating we aim to achieve a diverse mix of different types of local plants, like a natural ecosystem. Planting lots of large showy flowering plants (such as non-local grevilleas) may look nice, but favour the animals that use them, such as large honeyeaters. These birds can dominate the area and aggressively chase away the smaller woodland birds. Planting a diverse range of species provides a variety of food, shelter and nesting resources for a range of native animals across the seasons.

Suggested plants for revegetation in the Mount Alexander region are provided in the following table. These species generally grow well and are easy to source within our area. If you are planning a large revegetation project, it is best to order tube stock several months in advance so the nursery can grow what you need.





Indigenous plants and provenance

The terms 'indigenous' and 'provenance' often come up when discussing native plants. Indigenous means that a plant originated from the area that it is indigenous to, for example Silver Wattle is indigenous to Central Victoria. Silver Wattle can also be indigenous to other areas, such as New South Wales or Tasmania, which is why provenance is important. Provenance relates to the genetics of a plant. Planting a Silver Wattle from Tasmania in Central Victoria may mean that it is not suited to local conditions. Planting a Silver Wattle of local provenance means that the seed was collected locally hence is likely to tolerate local soil and weather conditions. Some species such as Silver Wattle may be adaptable to a wide range of conditions, so a plant from Castlemaine provenance would still grow in Elphinstone. Other species require more specific conditions. For example, a Woolly Wattle from Elphinstone would not grow well in Muckleford. A good plant nursery will tell you where the seed was collected to grow their plants.

Suggested revegetation planting list for the Mount Alexander region

Planting a diversity of the species in the following table will provide important habitat resources for a range of insects, birds, mammals and reptiles.

| Common name | Species name | Lifeform | Occurrence in region | Habitat value and features |
|--|--|--|--|--|
| Gold-dust Wattle | Acacia acinacea | Low growing, suckering shrub | Widespread and common | Flowers, pollen and seed for insects and birds. Insect foraging for birds. |
| Rough Wattle | Acacia aspera | Small dense shrub | Widespread and common | Low habitat for small animals. |
| Silver Wattle | Acacia dealbata | Medium suckering shrub | Widespread and common from swampy areas to hilltops. | Dense midstorey habitat. Sap as food for mammals. |
| Spreading Wattle | Acacia genistifolia | Small to medium open shrub | Widespread and common | Flowers mostly in winter and spring. |
| Lightwood | Acacia implexa | Long-lived, suckering understorey tree | Widespread and common | Roosting sites for birds. Flowers in summer. |
| Black Wattle | Acacia mearnsii | Fast growing understorey tree | Fairly widespread and common, especially in wetter areas | Sap as food for mammals. Roosting sites for birds. |
| Blackwood | Acacia melanoxylon | Long-lived understorey tree | Fairly widespread and common, prefers creeklines and wetter areas. | Dense shade and roosting sites for animals. |
| Hedge Wattle | Acacia paradoxa | Fast growing, dense prickly shrub | Widespread and common | Dense shelter or small birds, reptiles and mammals. |
| Golden Wattle | Acacia pycnantha | Fast growing, short lived medium shrub | Widespread and common | Pollen and seed for insects and birds. Sap as food for mammals. |
| Varnish Wattle | Acacia verniciflua | Medium sized shrub | Fairly widespread and common, especially in grantic areas. | Pollen and seed for insects and birds. |
| Drooping Sheoak | Allocasuarina verticillata | Long-lived small tree | Widespread and common | Woody cones on female plants, providing food for large parrots like Black Cockatoo. Pollen on male plants, attracting insects. |
| Buloke | Allocasuarina leuhmanni | Very long-lived and slow growing understorey tree. | Mainly scattered throughout the north west Threatened species | Woody cones on female plants and pollen on male plants. Host plant for Threatened Buloke Mistletoe. |
| Silver Banksia | Banksia marginata | Long-lived medium shrub or understorey tree | Once widespread, now rare | Pollen and nectar for insects, birds and mammals. |
| Sweet Bursaria | Bursaria spinosa | Long-lived small to medium shrub | Widespread and common | Shelter and habitat, particularly for small birds. Host plant for caterpillars of Eltham Copper Butterfly. |
| Hop Bush | Dodonaea viscosa | Fast growing, medium shrub | Widespread and fairly common | Dense screening, shelter and nest sites. |
| River Bottlebrush | Calllistemon sieberi | Long-lived medium shrub | Scattered mainly along watercourses | Pollen and nectar-rich flowers for insects, birds and mammals. |
| Black-anther Flax-lily | Dianella revoluta | Tussock-forming | Widespread and common | Refuge for small animals. Pollen for insects and birds. |
| Late-flowered Flax-lily / Matted Flax-lily | Dianella tarda D. amoena | Tussock forming | Widespread and scattered Threatened species | Refuge for small animals. Berries for insects, birds and reptiles. |
| Prostrate Hop-bush | Dodonaea procumbens | Prostrate shrub | Uncommon and sparse Threatened species | Dense prostrate foliage, providing shelter for small animals. |
| Eucalyptus Tree | Eucalyptus spp | Long-lived tree | Widespread and common | Masses of nectar, bark, seed and sap for insects, birds and mammals. |
| Purple Coral-pea | Hardenbergia violacea | Climbing creeper | Widespread and common | Purple flowers, pollen, nectar and seed for insects, birds and mammals. |
| Bushy Needlewood | Hakea decurrens | Medium shrub | Widespread and scattered | Prickly foliage providing dense shelter, particularly for small birds. |
| Heath Tea-tree | Leptospermum myrsinoides | Medium shrub | Widespread and scattered in heathy areas | Dense foliage provides good screening. Nectar-rich flowers for birds and mammals. |
| Tree Violet | Melicytus dentatus | Long-lived medium shrub | Scattered but fairly common | Dense prickly plant with berries, providing refuge and food for small birds and animals. |
| Common / Velvet / Grey Tussock Grass | Poa labillardierei P. morrisii P. sieberiana | Tussock forming | Widespread and common | Refuge for small animals. Seed for insects and birds. Host plant for caterpillars. |



Site preparation is key in helping your plants survive. Weed control is essential as weeds compete with your seedlings for space, water and nutrients. Start controlling weeds at your planting location as soon as possible, and ideally remove all weeds prior to planting. Prioritise perennial grasses (such as Phalaris) and woody weeds such as Blackberry and Gorse, as these can quickly out-compete your seedlings.

Mechanical ripping may be helpful in bare paddock sites where there are no native plants. Ripping creates soil disturbance and is not appropriate for some situations, especially areas with potential cultural significance, near waterways, with rocky soils, or prone to erosion.

Select planting tools

For planting small numbers of tubestock plants we recommend using a mattock, or a shovel if you are lucky to be planting in loam soil. If you are digging hundreds of holes and your budget allows, a hand-held or vehicle-mounted auger can save time. They can be hired from local equipment hire specialists. The size of hole you drill will depend on your site conditions, but we generally recommend a minimum of 40cm wide by 30cm deep.

Specialised planting tools such as a Hamilton tree planter are not well suited to our region's shallow and rocky soils, which require loosening with a shovel or mattock. These tools may suit larger planting projects, when combined with large-scale soil preparation such as ripping.

Plant tubestock

To plant tubestock, use a mattock to loosen the soil to about the size of a standard 10 litre household bucket to ensure enough loosened soil to accommodate a tree guard. Creating more loose soil around the roots makes it easier for the plant to establish and grow.

Dig out enough soil from the hole to enable you to bury the roots of the plant. Make sure all the roots are well covered and firm down the soil around the plant. Heap up the soil around the outer edge of the hole to create a small dam, big enough to hold at least half a garden bucket of water, preferably more. This is important to allow water to be absorbed and not run off, away from the roots. It is essential to water-in the newly planted seedling immediately, to allow the soil to settle around the roots and remove any air pockets in the hole. Adjust the dam walls as necessary, to contain the water.



above left to right: Tubestock ready to be planted (photo: Jacqui Slingo); Create a well large enough to hold at least half a garden bucket of water (photo: Bonnie Humphreys); Protecting your plants with corflute or other guards is recommended (photo: Leonie Van Eyk); Remove weeds inside and around the guard regularly to give your plants a better chance of survival (photo: Frances Howe)

Protect your plants

Protecting your plants from stock, pest animals and wildlife is vital for revegetation success. Protecting your plants with guards is highly recommended. Plant guards protect young plants from hungry or curious animals, such as rabbits, wallabies, kangaroos, deer and stock (if not excluded by fencing).

Plants guards are a cost-effective way to protect your plants. Selecting the right guard depends on the animals active in your area, plus cost, reusability and material preferences. Connecting Country often uses rigid corrugated plastic (corflute) guards with two hardwood stakes as a good compromise between cost and longevity. Pros and cons of some common guards are shown in the following table.

Comparison of the main guard types for tubestock

| Guard type | Cost | Longevity | Comments |
|----------------|--------|---|---|
| Milk carton | Low | Low not reusable | Breaks down, biodegradable, less light and space for plant |
| Plastic sleeve | Low | Low reusable if care taken | Can blow away, causing plastic pollution, not biodegradable |
| Corflute | Medium | Medium hardy and reusable | Not biodegradable |
| Wire mesh | High | High reusable, robust and long lasting | Requires assembly, expensive, labour-intensive |

Water and maintain your plants

To give your plants the best chance of survival, they need ongoing care to help get established. To protect your plants and provide the resources they need flourish:

- Water until plants are established and during dry periods.
- Check guards and fences, and repair or replace as needed.
- Control weeds within and around the plant guards (usually within 0.5 m radius is enough).
- Check for other threats, such as new pest animals.

Watering during the first year or two and during extended dry weather can significantly improve plant survival rates. It is better to water more deeply, less often, to encourage deeper root growth. Avoid frequent smaller watering (less than 5 litres) as this encourages roots to grow towards the surface, where they dry out quickly. During extended hot and dry times, weekly watering may be necessary. Make alternative plans for watering if you intend to be away so that your plants will be healthy when you return.

Consider how you will be watering, the amount of water each plant needs and how you get water to the site. For example, using a 1,000-litre water cube to give each plant 5 litres, you can water around 200 plants, allowing at least an hour to gravityfeed water out of the cube.

Consider mulch but avoid adding nutrients

Australian plants have adapted to our local soils over millions of years. Unlike most introduced garden plants, native plants generally prefer a low-nutrient environment. Avoid adding fertiliser or compost to your revegetation planting as it can reduce success and increase weed growth.

Mulch can help protect plants from harsh summers by insulating the roots and reducing evaporation to keep moisture in the soil. However, it is not necessary for revegetation success, and can add excess nutrients, affect soil chemistry and prevent rain from reaching the plant roots. If you do use mulch, ensure it is weed-free aged wood chips or sugar cane mulch.

Like mulch, weed matting can help insulate roots, reduce moisture loss from the soil, and suppress weed growth. However, it is an extra expense and can reduce rainwater penetration. It must be secured with pegs and checked regularly, as it often blows away.

Remove your plant guards

'When can I remove the plant guards?' is a common question without an easy answer. If you can see the tops of the plants are being nibbled, leave the guard on. If the plant is bursting out of the guard, it is probably safe to remove the guard. Always aim to remove the guard before the plant grows so big that the guard is stuck. Some species such as Hop Bush and spiky plants are usually less palatable to grazing animals, while others like Sheoak are very tasty. If you do remove guards, check the plants regularly to see if they are being eaten, and reinstall or replace with larger guards if needed.

Enjoy seeing your plants grow

Watching your revegetation grow from year to year can be extremely rewarding. In a short time you will likely notice more insects and small birds making use of these valuable new resources.

Further information

Connecting Country contractor list: www.connectingcountry.org.au/ education-resources/get-support

Guide for establishing native vegetation in Victoria www.greeningaustralia.org.au/Aguide-for-establishing-nativevegetation-in-Victoria.pdf

Shelterbelts:

www.sustainablefarms.org.au/ shelterbeltbrochure

For more resources visit the Healthy Landscapes Guide website: www.connectingcountry.org.au/ healthylandscapes



Planting for a changing climate

Climate change is impacting revegetation success in our region through increased variability in rainfall patterns and seasonal conditions, and changes in insect populations affecting pollination and predation. Some landholders are already finding that extra watering may be necessary, or that watering requirements are changing. Trial plantings are underway involving local native species grown with seed sourced locally, and from hotter, drier, and cooler, wetter parts of their range. Many factors are considered when trialing this approach and seeking the latest available science is recommended, particularly for sites within bushland.



3.4 Control weeds

Weeds are invasive plants that reduce the long-term health of local landscapes. They compete with or eliminate native plants, harbour pest animals and reduce farm productivity. They are a major threat to Australia's native plants and animals, as well as agriculture. Most weeds were introduced to our region through agriculture or from garden plants. They typically spread by wind, water, vehicles, equipment and soil movement, and on footwear and clothing.

Sometimes weeds may appear useful. They might play a role in protecting bare soil from erosion and retaining soil moisture, or you may see small birds nesting in a weedy shrub such as Gorse. However, one Gorse bush can quickly spread and dominate the landscape, creating a monoculture that makes it impossible to farm or for wildlife and indigenous plants to survive.

Weeds reduce plant diversity. Our native animals need access to a diverse range of indigenous plants to provide for all their various food and shelter needs throughout the seasons. The landscape restoration community and ecologists consider that weeds damage ecosystem function, reducing their resilience and capacity to provide the full range of resources that native plants and animals need.

Check your legal responsibility

Everyone has a responsibility to make sure we are not introducing, spreading or creating new weed infestations.

Invasive plants that cause major environmental or economic harm, or have the potential to cause such harm, are listed as 'noxious' under the Victorian Catchment and Land Protection Act 1994 (CaLP Act). However, not all damaging invasive plants are listed under legislation. Unlisted weeds can also cause damage and are categorised as environmental, agricultural, new and/or emerging weeds depending on their impact and how recently they were recorded in a particular area.

Legal responsibility for weed control

| I here are four legislated categories of |
|--|
| invasive plants identified under the CaLP |
| Act. Noxious weed lists vary based on |
| catchments, with our region falling within |
| the North Central Catchment. Noxious |
| weeds listed by catchment area can be |
| found on the Victorian Government's |
| classification of invasive plant status. |
| |

Weeds of National Significance (WONS) are identified at a national level based on their invasiveness, potential for spread, and environmental, social and economic impacts. Their management requires coordinated action at a national level.



Gorse (*Ulex europaeus*) creates monocultures where almost no other plants can grow (photo: Bonnie Humphreys)

| Weed Classification | Responsible party | Requirement |
|--------------------------|--|---|
| State prohibited | State Government | Eradicate on all land across Victoria Report to the Victorian government hotline (136 186) |
| Regionally prohibited | Landholder, lessee or manager | Eradicate these species from their land |
| Regionally controlled | Landholder, lessee or manager | Prevent growth and spread on their land |
| Restricted weeds | Landholder, community, State government | Do not sell, trade or transport these species or their propagules |

Benefits of controlling weeds

- > Promote healthy functioning ecosystems with a diverse range of native plants and animals.
- > Reduce competition with crops and pasture, maintaining or enhancing their health and productivity.
- > Reduce potential risks to stock from poisonous weeds.
- > Help prevent weeds spreading to neighbouring properties and areas of bushland.

Understand your weeds

Before commencing weed control, think about how to target your efforts to maximise your success. To plan your approach:

 List the weeds you want to control or are concerned about. Visit www.connectingcountry.org.au/ healthylandscapes for some common and emerging weeds in our region.

Learn about your target weeds to understand how they grow and reproduce:

- > What lifeform are they (tree, shrub, creeper, bulb, grass or herb)?
- > Are they an annual or perennial?
- > How do they propagate (vegetatively (fragments of leaf, stem, roots, runners, suckers), by seed or bulbs)?
- > How do they spread (wind, water, clothing, animals, soil movement)?

- > When are they actively growing or dormant (for example, do they die off in cooler months)?
- > When do they flower, produce seed, germinate?
- > What environmental triggers help them or set them back (for example, do they die in frosts, or do better in wetter years)?
- Get a map of your property and mark the weed infestations, their approximate age, cover and control measures required.
- Mark any areas of high-quality vegetation or other assets you want to protect.
- Make a calendar of best times to control your target weeds throughout the year. Woody weeds like Gorse may require only one treatment per year, whereas some annuals like thistles may need attention only after rain.
- > Update weed mapping annually or as required.
- > Take before and after photos, even if just to celebrate your achievements!

Prioritise your weeds

Managing weeds can be hard work. Be realistic about the time you have available and what you can achieve. It is usually more effective to manage and maintain a smaller area well, than try to do everything less thoroughly. If you cannot treat all your weeds annually, consider choosing a particular species or area of your property to target first.

Prioritising selected species or areas of your property each season will give you the best chance of controlling weeds effectively over time. Your priorities will depend on the weeds present on your property and what assets you are protecting (e.g., crops, native vegetation). Consider which weeds will have the greatest impact, their current distribution, ease of control and potential to spread. If you have areas of high-quality vegetation on your property, consider working to protect them first. It is far easier to protect and repair than re-establish native vegetation.

Weed control methods

Remove weeds manually

- > Control weeds as seedling when their root systems are smaller, making them easier to remove and creating less soil disturbance.
- > Control weeds before they flower and set seed.
- Remove any seeds or fruit and carefully place in a bag for disposal before you begin, this is key to reducing accidental spread and new infestations.
- > Minimise the area of soil disturbance, as it creates opportunities for new weeds to germinate and establish.



Hand pull

- Loosen the soil around the plant with a pick or mattock and grasp stem at ground level.
- Rock plant backwards and forwards to loosen roots, and pull out gently.
- Tap the roots carefully to dislodge any soil, replace and pat down.
- Leave the hand pulled weeds on site to decompose (except seed or fruit).



- Use a hoe or mattock to chip out the plant at or below ground level ensuring the first few centimetres of root are removed to prevent regrowth.
- Leave the chipped-out weeds on site to decompose (except flowers and seeds).



Trowel out

- Move any leaf litter away from the base of plant.
- Dig down next to the stem to reach the first bulb or tuber.
- Remove all bulbs or tubers, checking carefully for small bulbs around or near the 'parent' bulb
- Dispose of weeds off site by carefully bagging all root material as this can readily reshoot. Small plants can be placed so roots are not in contact with soil, e.g., hang in a tree so the plant and tuber/root dry out.

Select the best treatment method

The most effective way to control weeds is with an integrated approach, using multiple control methods, coordinating with neighbours (where possible) and maintaining a long-term strategy. Understanding your infestation and how your weeds grow and reproduce will enable you to choose the most effective methods.

The best control methods will depend on the weed species and its lifeform (tree, shrub, creeper, bulb, grass or herb), as well as the size and maturity of the infestation, season, location, other plants present and personal preferences.

We recommend doing your own research by talking with your community, contacting a weed specialist, and using books and internet resources, to help clarify your specific weed situation.

See below for a description of the main weed control methods relevant to our region.

Work together

Weeds are persistent problems in our landscape. Once established, they can require years, or even decades, of commitment to reduce their impact. Do not lose heart! Everyone is in the same position. Weeds do not respect fences or boundaries. Managing weeds can bring neighbourhoods together or sometimes create conflict. If possible, discuss weed control with your neighbours and highlight the benefits of everyone treating their weeds at the same time. This increases your individual return on investment. Even if you are not able to work together, it is still worth treating weeds on your property.

Landcare can be a great way to increase and coordinate community participation in weed control. To find out how to contact your local Landcare see further information.

Check licence requirements

Take care to protect your health and safety, especially when using chemicals. Follow relevant guidelines, wear appropriate protective equipment and always use according to the label. All chemicals have a Material Safety Data Sheet (MSDS) that outlines health and safety information about the product. These are also available on the internet. Some chemicals also require the user to undergo specialised training. To purchase and use these chemicals you need to have a current Agricultural Chemical User Permit (ACUP). You may wish to work with or employ a weed contractor who has the appropriate licenses.

Apply chemical herbicide

- > Treat deciduous species (such as hawthorn and willows) during spring and summer when their leaves are green and they are actively growing.
- > Work with a partner, with one person to cut/drill and another to quickly apply herbicide.
- > Apply herbicide immediately after drilling/cutting before the wound seals.
- > Use a brush, applicator bottle or dabber (available from rural suppliers and hardware stores) to apply herbicide.



Cut and paint

- > Use secateurs, loppers or a handsaw to cut the main stem of the plant, as close to the ground as possible to prevent reshooting.
- > Cut the stem horizontally to prevent herbicide from running off the stump.
- > Apply undiluted herbicide to the exposed flat surface as quickly as possible (within 30 seconds) of cutting to ensure the herbicide is drawn into the roots.

Drill and fill

- Drill a row of holes using an electric or cordless drill around the main trunk below the lowest limb. Alternatively use an axe or chisel to make down-sloping cuts, although this can be less effective on thick-barked trees.
- Drill or cut on a 45 degree down-sloping angle to create holes approximately 5cm apart (3cm apart for willows) going deep enough to reach the growing layer just underneath the bark.

To stay safe

- > Vary your body position and take breaks to avoid fatigue.
- > Use appropriate tools, such as a long-handled hoe to avoid bending over when chipping out weeds.
- > Always follow the label instructions provided with the herbicide.
- > Wear impervious gloves and avoid all direct contact with the herbicide.
- > Wash hands, skin and clothing thoroughly immediately after herbicide use.
- Inject or fill each hole as they are made with undiluted herbicide within 30 seconds.
- > Treat all main trunks arising from the ground, treating each stem for multistemmed trees.
- > Check the plants after 4-6 weeks and retreat where necessary.
- Leave dead trees standing to provide habitat and soil stabilisation, if safe to do so.

Adapted with permission from original drawings by Virginia Bear published by the Australian Association of Bush Regenerators.

Weed lifeforms and common control methods

The following information provides a guide to the major weed lifeforms and the main weed control methods suited to each lifeform. There will always be exceptions to the rules and not all plants fit neatly into these categories.

Woody weeds, trees and shrubs

Woody weeds can usually reproduce through seeds, and some reproduce vegetatively by suckers or runners, or even regrow from bits of root fragments left in the soil.

Some have dormant periods throughout the year and it is best to remove them before seed set.

Includes Gorse, Blackberry, African Boxthorn, Broom and Radiata Pine.

Example Blackberry can reproduce from runners, suckers, and seed. Successful control requires a combination of methods over several years.

Control methods

Manual removal

- > Use for seedlings and isolated plants. Avoid using for weeds that can regrow by suckers, runners, or root fragments (e.g., not recommended for Blackberry, Willows).
- > Remove when soil is moist, for easier extraction, and less soil disturbance.

Cut and paint

- > Use for woody weeds.
- > Apply when plants are actively growing

Drill and fill

- > Use drill and fill method for larger trees such as Radiata Pine.
- > Apply when plants are actively growing.

Creepers

Creepers can often reproduce through stem fragments and roots as well as seed. They are often difficult to control because of the need to remove all root fragments and underground storage organs, as well as seed.

Some have dormant periods so are not visible for parts of the year.

Includes English Ivy, Bridal Creeper, Blue Periwinkle, Bluebell Creeper and Common Bindweed.

Example Bridal Creeper can reproduce through seed as well as underground storage organs. Successful control relies on removing all roots and seeds.

Control methods

Manual removal

- > Take special care when digging out to remove all parts of the plant.
- > Be aware some creepers have underground tubers that break up when disturbed (e.g., Bridal Creeper).
- > Aim to remove all seeds as well.
- > Manual removal is suitable for isolated plants, larger infestations will likely require herbicide spray.

Cut and paint

> Use for creepers with woody stems (e.g., English Ivy). Apply when plants are actively growing.

Herbicide spray

- > Use herbicide spray for larger infestations.
- > Choose a herbicide that will translocate to the roots

Bulbs, tubers and corms

These plants have underground storage organs that enable them to access resources they need more readily. They produce 'daughter' bulbs, seeds, and some can reproduce vegetatively.

They are often dormant for part of the year.

Includes Soursob, Cape Tulip, South African Weed Orchid and Bulbil Watsonia.

Example South African Weed Orchid is a perennial with underground tubers. Dormant for much of the year, it emerges in autumn, producing flower spikes and seeds in summer.

Control methods

Manual removal

- > Use for isolated plants.
- Take care to remove as many 'daughter' bulbs as possible.
- Remove soil from around the plants if needed to gather all bulbs.

Herbicide spray

- > Use for larger infestations where appropriate.
- Choose a herbicide that will translocate to the bulb
- > Apply just before flowering for best results, as the bulbs have used most of their reserve energy, but not yet reproduced.
- > Apply when plants are actively growing.



Blackberry (photo: Jacqui Slingo) Bridal Creeper (photo: Bonnie Humphreys)

South African Weed Orchid (photo: Bonnie Humphreys)

Grasses

Grasses have strappy leaves and fibrous roots, and may be annual or perennial.

Grasses reproduce via seed or vegetatively. Some spread via runners (prostrate stems that produce roots). Some produce seeds in their stems, so control requires removal of the whole plant.

Includes Annual Meadow-grass, Quaking Grass and Brome, Serrated Tussock, Pampas Grass, Phalaris, English Couch, Water Couch and Divided Sedge.

Example Serrated Tussock is a highly invasive perennial grass producing thousands of seeds each year. It is unpalatable to stock. As an emerging weed in our region, early control is essential to prevent major impacts on agriculture.

Control methods

Manual removal

- > Use for smaller infestations, or where weeds are growing amongst native grasses.
- Remove annual grasses (e.g., Annual Meadow-grass, Quaking grass, Brome) before seed set.
- > Bag grasses that contain seed within the stems (e.g., Serrated Tussock, and other Needle grasses) carefully to avoid spreading seed.

Herbicide spray

- > Use for large infestations, larger-rooted tussock grasses (e.g., Phalaris) and creeping grasses (e.g., Couch, Divided Sedge), which are difficult to remove manually.
- > Apply when plants are actively growing and before seed set for best results.
- > Choose a selective herbicide for grasses, taking care in situations where weedy grasses are mixed with native grasses.

Herbs

Herbs can be annual, biannual or perennial, and may be soft or woody. Some herbs have long tap roots, making them difficult to remove.

Some can regrow from root or stem fragments. They may have tiny, winddispersed seeds, while others rely on animals to brush past and spread them.

Includes Miners Lettuce, Chickweed, Four-leaved Allseed, Spear Thistle, Gazania, Variegated Thistle, St Johns Wort, Sheep Sorrel and Hoary Cress.

Example Stinging Nettle is a herbaceous perennial covered in tiny spines that irritate the skin on contact.

Control methods

Manual removal

- > Use for small infestations or any herbs that do not regrow from root and stem fragments.
- > Control annuals (e.g., Miners Lettuce, Chickweed, Four-leaved Allseed) before seed set, as after seed set the plant will dieback naturally anyway.
- > For herbs with taproots (e.g., Spear Thistle, Gazania, Variegated Thistle), remove ('chip out') at least the first few centimetres of root to prevent regrowth.

Herbicide spray

- Use for large infestations, and herbs that spread from horizontal stems, suckers or roots (e.g., St Johns Wort, Sheep Sorrel, Hoary Cress).
- Choose an appropriate herbicide for your target weed.
- > Some herbicides target 'broad-leaf' plants and leave grasses, while others translocate into the roots, making them effective for weeds with long tap roots. Apply when plants are actively growing.

Watch out for new and emerging weeds

Some weeds have been around for a long time, while others have only recently arrived in our region. Like all plants, weeds have preferred growing conditions. Some weeds are still spreading within our landscape, while others have largely occupied all the suitable areas already. As new varieties of garden plants are constantly being introduced, we must be careful not to create new weeds. Consider what you plant in your garden and lookout for signs of garden plants escaping, especially where located near bushland. Everyone has a responsibility to avoid creating new infestations of weeds.

As the climate changes, we can expect to see a shift within weed species, as the changing conditions create new opportunities for weeds to establish and spread. Some existing weeds will spread beyond their current range, while others will likely contract. Unfortunately, we can expect a new suite of weeds to appear.

New weeds are weeds not present in our region, but that are expected to survive, reproduce and spread successfully, and have a major impact on our region if allowed to establish. They may have successfully established in nearby areas, or originate from regions with similar conditions.

Some emerging weeds that have been found in our area, but not yet become widespread, include Chilean Needle Grass (Nassella neesiana), African Love Grass (Eragrostis curvula), Caltrop (Tribulus terrestris), South African Weed Orchid (Disa bracteata), Blanket Weed (Galaenia pubescens), Serrated Tussock (Nassella trichotoma), Lesser Reed-mace (Typha latifolia) and Grey Sallow (Salix cinerea).

The Victorian Government has an excellent website on early invader weeds including weed management resources and lists of emerging weeds for each region and who to notify.



Serrated Tussock (photo: Ivan Carter) Stinging Nettle (photo: Bonnie Humphreys)

Consider supplementary weed control

Supplementary weed control methods are rarely successful in removing weeds when used in isolation. They are best used in combination with the major control methods of manual removal, cut and paint, drill and fill, and herbicide spray. The following supplementary methods can help reduce vigor of plants or volume of seed produced, or buy time until major methods can be employed:

- Graze young weed growth with stock in paddocks or non-environmentally sensitive areas to reduce weed growth and delay seed set.
- Slash or mow annual grasses to delay seed set or reduce woody weed growth such as Gorse. Slashing of perennial grasses such as Phalaris will reduce mass of growth and buy time until mechanical or chemical methods can be used.
- > Groom or mulch woody weeds as a first step to create access for followup spraying, or cut and paint methods. Some new mechanical groomers can cut vegetation and spray herbicide simultaneously.
- > Cultivate soil prior to weed flowering. This method is useful in paddocks of annual grasses or weeds that do not re-grow from vegetative fragments.
- Burn weeds to reduce biomass. Burning can be used for infestations of legumes such as Broom or Gorse to reduce the biomass and break the dormancy of seed stored in the soil, stimulating mass germination. Follow-up control is essential. Burning may also be useful for some annual weeds, if timed effectively to break the seed production cycle. It is only effective on non-fleshy weeds such as Annual Meadow-grass and Erect Chickweed, but not effective for plants such as Cape Weed.
- Create competition by replacing weeds with preferred plants to prevent reinfestation. Bare soil is an invitation to weed infestations.
- > Use biological control to reduce the vigour or seed set of some plants, slowing their spread and making them easier to manage.

Record, map and report weeds

All weed infestations can be recorded on the Atlas of Living Australia, an online public database of plants and animals. Their Biocollect portal allows you to record and manage small to large projects, produce maps, and save your data online. These tools can be helpful to track progress over time, to attract funding or grant report.

If you identify a new weed species on your land, remove it immediately. Reporting on the Atlas of Living Australia and the Victorian Government hotline (phone 136 186) is recommended.

Celebrate your weed control achievements

Weed control is hard work. Take time to acknowledge the 'missing' weeds you have removed, and celebrate your achievements in creating space for native plants and animals in the landscape.

Further information

Local Landcare group contacts: www.connectingcountry.org.au/ landcare

Declared noxious weeds: www.agriculture.vic.gov.au

Map or manage a weed control project on BioCollect: www.ala.org.au/biocollect

Early invader weeds resources: www.environment.vic.gov.au

Record a weed sighting: www.ala.org.au

Report a State Prohibited weed: Victorian Government hotline **136 186**

For more resources visit the Healthy Landscapes Guide website: www.connectingcountry.org.au/ healthylandscapes



Cactus Warrior volunteers at work on a community field day (photo: Lee Mead)

HEALTHY LANDSCAPES

3.5 Control rabbits

Rabbits live in all parts of our region. They reduce pasture availability, destroy crops, modify and destroy habitat, cause erosion, compete with native animals for food and shelter, and spread weeds and disease. They cause long-term damage to ecosystems already under pressure from disturbance and climate change, and are major contributors to the decline of native plants and animals across our region. While there are other pest animals of concern in our region, this guide focuses on rabbit control, as it is the focus of most local landholder requests for assistance.

Rabbits are cute and furry but also incredibly damaging to vegetation, pasture, cultural heritage and landscape health. Rabbits are well adapted to the central Victorian climate. They cope well with extended dry periods, and breed quickly, becoming reproductively mature at only four months old and breeding up to four times per year. Less than one rabbit per hectare is all it takes to stop the regeneration of native plants. Rabbit browsing of seedlings and other vegetation can denude whole areas, contributing to erosion, and reducing farm productivity and biodiversity.

Controlling rabbits requires a long-term vision, persistence and cooperation from the community and surrounding landholders.

Understand your legal responsibility

The Catchment and Land Protection Act 1994 (CaLP Act) is the overarching legislation defining which animals are declared as 'Established' pest animals in Victoria. Landowners must control animals listed as 'Established' pest animals under the Act, which means taking action to prevent their spread, and as far as possible eradicate them from the property.

Established pest animals in Victoria include European Rabbit, European Hare, Red Fox, and wild or feral cats, dogs, goats and pigs.

Pest animals that are considered a threat to agriculture, biodiversity, or community health, but not listed as Established, are termed Restricted. Sightings of Restricted animals in the wild should be reported to the Victorian Government hotline (phone 136 186).

Plan your rabbit control

The most effective control programs:

- Start by monitoring rabbit activity to identify rabbit locations and the size of the problem.
- > Use monitoring information to select multiple control methods appropriate to the situation.
- Match control actions to the timing of rabbit breeding cycle and behaviour on your property.
- Involve multiple landholders working together.
- > Take a long-term approach.
- Include persistent ongoing monitoring and follow up.

What would our landscape look like without rabbits?

Because rabbits have been present in the region for so long, it's difficult to know what the vegetation would look like if they were not here.



Benefits of controlling pest animals

- > Promote healthy growth of native plants and animals.
- Reduce loss of crops and pasture plants, maintaining or enhancing their health and productivity.
- Reduce disturbance and overgrazing by rabbits and associated potential for soil erosion.
- Help prevent pest animals spreading to neighbouring properties and areas of bushland.



Understand rabbit behaviour and lifecycle

Understanding a little rabbit behaviour helps you to select the best control methods for your property. The following infographic outlines the general seasonal changes in rabbit behaviour you can expect to observe throughout the year.



Identify and monitor rabbit activity

Monitoring gives you a baseline population size to assess how effective your control methods are, and to track seasonal change.

Monitoring rabbits can be as simple as spotlighting by foot or vehicle along a fixed route on your property close to sunset or sunrise, noting numbers of rabbits seen, and where they run to when disturbed. Not all rabbits live in burrows, some will shelter above ground in harbour such as Blackberry, Gorse, or stacks of timber.

Alternatively, you can check for signs that indicate the presence of rabbits including burrows, fresh scratchings, droppings and browsing damage on plants. Fresh rabbit dung is black and shiny, whereas old dung is grey and dry. Rabbit signs can help identify if rabbits are active, but do not give a reliable estimate of numbers. A control program is worthwhile even if rabbit numbers appear low.

Use an integrated approach

For best long-term results, use integrated rabbit control through consistent and timely application of several rabbit control methods that consider rabbit biology and lifecycle stages. A comprehensive rabbit control program targets adult and juvenile rabbits living above and below ground, and removes places where they shelter.

If possible, talk with your neighbours to coordinate control methods to achieve longer-term results. Consider joining your local Landcare group to connect with others controlling rabbits in your area. Check if any assistance is available from government agencies or community groups, and consider seeking a grant to start your own neighbourhood campaign.

Check permit requirements

The use of many poisons requires an Agricultural Chemical User Permit (ACUP). Given the specific skills and licences required, many landholders choose to engage a qualified contractor.

Regardless of the control method, it is essential to manage pest control as humanely as possible.

Develop a rabbit control program

Rabbit control programs typically include removing access to the resources rabbits need to survive (homes, shelter or food sources), baiting with Pindone and fumigating and ripping warrens.

A rabbit control program may comprise:

- Monitor to identify if and where rabbits are present and assess population numbers.
- Remove harbour that shelters rabbits, such as dense weeds, piles of materials and rubbish.
- Fumigate and rip warrens to reduce the population, and destroy homes and shelter to reduce the chance of reinfestation.
- Establish bait stations to target the surviving population.
- Monitor and review to check the need for repeat action.

Set up rabbit-baiting

Pindone baiting is a relatively inexpensive, easy and effective method of rabbit control that landholders can readily implement themselves. Poisoned oats or carrots treated with Pindone and dyed green are available from rural suppliers. A small 2.5kg bucket is usually sufficient to treat a lifestyle property. No licence is required to purchase Pindone.

Pindone is considered relatively safe for use where pets and wildlife are present. Generally, birds tend not to recognise green oats as food. By placing the bait in a bait station, possums and kangaroos are reluctant to enter and access the bait. All poisoned rabbits must be collected daily to avoid poisoning pets and wildlife. Birds have a low risk of secondary poisoning with Pindone. Pindone is generally only life-threatening for pets if they eat several poisoned rabbits and are not given the antidote. Vitamin K1 is an antidote commonly available from vets.

Fumigate and rip warrens

Warrens are used for shelter and breeding by rabbits. Because fumigation relies on the rabbits being directly affected by the poison it is necessary to chase rabbits underground before fumigating, and follow up with ripping of warrens to reduce chances of re-infestation.

People using this method must hold an ACUP, be directly supervised by an ACUP holder, or engage a licenced contractor to do the fumigation for you. Check warrens for signs of re-opened burrows and re-fumigate as required.

Before you start digging, consult Landcare Victoria's helpful Aboriginal Cultural Heritage guide to understand your responsibility to protect cultural heritage.

If there is any chance underground services occur on the property, contact Dial Before You Dig and a services locator if needed, to locate them.

Previous rabbit control programs in North Harcourt and Sutton Grange have shown that areas where warrens were destroyed by cross-ripping were far slower to be recolonised by rabbits. Engaging an experienced operator will save you time and money. Understanding what is involved in ripping will help you to prepare and get better results.

For successful warren ripping:

- Plan to rip all warrens as soon as possible after poisoning, preferably in autumn when numbers are low.
- > Choose the appropriate machinery.
- Smaller excavators are suitable for confined areas and cheaper per hour, but may take longer.
- Larger excavators are more versatile to reach around boulders, into gullies and up steep slopes.
- > Bulldozers are suited to open paddocks, faster and may suit steeper hills if the burrows are readily accessible.
- > Just before ripping, chase rabbits out of cover into burrows. Avoid using dogs if there is any chance poisoned rabbit carcasses are present.
- Be available to help direct the machinery operator to the next burrow and ensure none are missed.

Consider complementary rabbit control

Biological control, shooting and ferreting can be useful in reducing rabbit numbers, but are rarely effective when used alone, as unless shelter and warrens are destroyed, new rabbits will quickly re-occupy the area. They are considered complementary methods for use in combination with harbour removal, baiting, warren fumigation and ripping.

Shooting is not safe or appropriate across much of the Mount Alexander Shire, due to our relatively high population density. Shooters must be licenced and have permission from all relevant landholders and neighbours. Check restrictions with your local government.

Ferreting can be used for removing rabbits from under buildings, rock crevices and other areas that are difficult to fumigate or rip.

Biological controls such as Rabbit Haemorrhagic Disease Virus (RHDV1, previously known as Calicivirus) and RHDV2 have been extremely effective at reducing rabbit numbers in some locations. However, they only provide short-term knock-down of the population. Over time, some rabbits develop immunity reducing effectiveness.

Rabbit-proof fencing is used to exclude rabbits. Construction is expensive and labour-intensive, and it must be wellmaintained to be effective. It can be useful to protect smaller, high value areas.

Enjoy the benefits of protecting the bush

Enjoy the benefits of protecting your natural bushland, farm or garden from the effects of pest animals. Your hard work will help your existing native vegetation to regenerate naturally, and give your revegetation the best chance to thrive, contributing to health of the landscape.

Summary of rabbit control methods

| Control method | Description | Permit requirements | Usually implemented by | Effectiveness |
|--------------------|---|---|--|--|
| Baiting | Establish bait stations containing poisoned, dyed oats, typically containing Pindone. | No licence required to purchase Pindone. Use of 1080 requires ACUP and is not suitable where people, wildlife or pets are present. | Landholders, licenced contractors (see Connecting Country website for Contractor list) | Effective, in combination with other methods. Most effective when less feed around i.e. late summer. |
| Harbour removal | Remove places where rabbits shelter, such as dense weeds like Gorse and Blackberry, and piles of materials. | - | Landholders | Effective, in combination with other methods. |
| Warren fumigation | Use tablets to create poison gas to kill rabbits in their warrens (typically aluminium phosphide fumigant). | ACUP required. | Licenced contractors (see Connecting Country website for Contractor list) | Effective in combination with other methods, only controls rabbits in the warren. |
| Warren ripping | Following fumigation use an excavator to destroy warrens making them unusable. | Check for underground services and comply with cultural heritage requirements. | Experienced contractors | Effective, in combination with other methods, only controls rabbits in the warren. |
| Biological control | Introduce a carefully selected virus that targets rabbits. | - | Government | Effective, in combination with other methods. |
| Shooting | Stalk and shoot rabbits with firearms. | Firearms licence, not suitable where people, stock, wildlife or pets present. | Licenced shooters, where safe and appropriate | Complementary only, use in combination with other methods. |
| Ferreting | Introduce ferrets to burrows to flush out rabbits, then capture escaping rabbits in nets. | - | Contractors | Complementary only, use in combination with other methods. |
| Exclusion fencing | Fence property with rabbit-proof fencing. | - | Landholder, contractor | Expensive and requires ongoing maintenance. Effective, in combination with other methods. |



Further information

Pest animal control resources and information: www.pestsmart.org.au/pestanimals

Restricted and priority species in Victoria: www.agriculture.vic.gov.au

Rabbit control resources: www.feralscan.org.au/ handyresources

Step-by-step guide to protecting cultural heritage: www.landcarevic.org.au/aboriginalcultural-heritage-guide

Dial before you dig: www.1100.com.au

How to set up a bait station: www.connectingcountry.org.au/ education-resources/take-action/ pest-animal-control/

Ripping and warren fumigation: www.vran.com.au/resources

HEALTHY LANDSCAPES

3.6 Help hollow-using wildlife

In the Mount Alexander region a legacy of gold mining, land clearing and timber harvesting means that large old trees with hollows are scarce. Where there is a lack of natural tree hollows, nest boxes can help. A nest box is an artificial enclosure provided for hollow-dependent animals to live and nest in. Providing a well-constructed and maintained nest box on your property can provide a supplementary home for native animals while natural tree hollows develop.

Protect existing tree hollows

The best thing you can do for hollowdependent fauna is to retain any hollowbearing trees on your property, alive or dead. Many vulnerable species rely on hollows in fallen timber, stumps and fence posts. These hollows often take over one hundred years to develop. Never remove hollow logs from the bush because it reduces habitat quality and removes hollows that an animal may already be using.

If you need to harvest timber from your property, plan well ahead so at least some trees are left to grow to maturity. Consider planting a wood lot, or purchase your timber and firewood from a sustainable source.

Decide if nest boxes are needed

If you are lucky enough to have plenty of old trees with a variety of tree hollows, nest boxes are not needed. If your property has few or no large trees, nest boxes can help wildlife. Some sources recommend installing nest boxes if you have fewer than three to ten hollow-bearing trees per hectare (WMB 1990).



Benefits of helping our hollow-using wildlife

- > Protect and increase valuable homes for threatened species such as Brush-tailed Phascogale, and the numerous other native mammals and birds that rely on hollows to shelter and reproduce.
- > Promote natural pest control by encouraging native predators that eat pest insects (like phascogales, small birds and microbats), increasing crop yield and reducing the need for insecticides.
- > Increase crop yield by providing homes for native animals that pollinate crops.

above left to right: Australian Owlet-nightjar, a nocturnal species (photo: Jane Rusden); Brush-tailed Phascogale nests are messy (photo: Jess Lawton); Sugar Gliders create neat nests of Eucalyptus leaves (photo: Jess Lawton); Avoid disturbing breeding activity of animals like this Common Brushtail Possum (photo: Connecting Country); A colourful home for parrots (photo: Miles Geldard Wildlife Nestboxes)

Help with the wildlife housing crisis

Many of Australia's terrestrial mammals, microbats and bird species depend on tree hollows for roosting, nesting, or food. Without hollows they cannot successfully breed or survive. These include possums, gliders, microbats, kookaburras, parrots, treecreepers, reptiles such as geckos, and even frogs!

Hollows are a highly limited resource in our local forests and woodlands. The scale of clearing and removal of large old trees in our region has been enormous. Trees were logged for railway sleepers, mine shaft infrastructure, baker's ovens, boilers, heating and construction. Few large old trees remain, and they are still being removed. You can help to combat the housing shortage for our wildlife by protecting our existing large trees, establishing the next generation of large trees, and installing nest boxes.

Make or buy nest boxes

Nest boxes are available to buy or can be built by anyone with woodworking skills. Each animal has specific nest box needs. If you want to build your own, research the best nest box design and installation methods. Each nest box should be constructed in accordance with guidelines for the target species, and templates are available online. If you prefer to buy, purchase your nest boxes from a specialist nest box builder such as Wildlife Nestboxes, as they construct their nest boxes based on scientific research and field experience.

Choose which animals to target

The Mount Alexander region is home to many animals that rely on hollows in trees or logs, including mammals, birds, frogs and reptiles.

If you have decided to install nest boxes think about the types of animals that live in the area and which species you would like to encourage. Nest boxes are most valuable if your area provides the food and other resources the animal needs.

The table overleaf shows just some of our local creatures that may benefit from suitable nest boxes and their habits.

Choose where to install nest boxes

Ideally nest boxes should be installed on indigenous eucalypts without natural hollows and with a diameter of more than 25cm, on or close to the main trunk. Climbing animals prefer rough-barked trees, whereas birds and bats are less fussy. Nest boxes should be placed high enough to be safe from predators such as foxes, but low enough for safe monitoring and maintenance. Always keep safety in mind, especially if using ladders to install or check nest boxes. Orientation facing south or southeast is best, as this means the box is shaded by the trunk when summer sun is hottest.

Once installed, it may take months or years before a nest box is occupied. Activity can be seasonal, and different animals use nest boxes in different ways.



Some local animals that use hollows and nestboxes in our region

| Animals | Example of nest box usage | Timing |
|---|--|---|
| Arboreal mammals Brush-tailed Phascogale Common Brushtail Possum Feathertail Glider Sugar Glider (Krefft's Glider) Yellow-footed Antechinus | Brush-tailed Phascogales , also known as Tuans, are nocturnal carnivorous marsupials around 30cm long, with a grey body and black bottle-brush tail. After mating in early winter the males die. Young are born during winter, initially kept in the mother's pouch then left in the nest while she forages at night. | Shelter through the year and breeding from June to September. |
| Bats 11 species of microbat | Microbats are active catching insects at night. During the day they rest in dense colonies. They prefer having multiple roosts and move around in response to temperature, parasites and predators. | Roosting during daytime throughout the year. |
| Parrots Yellow-tailed Black-Cockatoo Musk Lorikeet Little Lorikeet Purple-crowned Lorikeet Crimson Rosella Eastern Rosella | Crimson Rosellas usually breed in spring and summer. Females incubate the eggs, and both parents care for the young. Chicks fledge at 25 days but remain dependent on the parents for a further 35 days. | Breeding from September to February. |
| Other large birds Australian Wood Duck Australian Owlet-nightjar Barking Owl Southern Boobook (Mopoke) Eastern Barn Owl Laughing Kookaburra | Laughing Kookaburras may mate for life and build their nests in a tree hollow or burrow. Both parents incubate the eggs and care for the chicks. Young birds often stay with their families for several years. You may see a family with six or more Kookaburras. | Breeding from September to January. |
| Small birds White-throated Treecreeper Brown Treecreeper Spotted Pardalote Striated Pardalote Tree Martin Grey Shrike-thrush | Striated Pardalotes are small, lively birds and parents share the tasks of building the nest, incubating the eggs and feeding the young. | Breeding from September to February. |

Common nest box problems and solutions

| Issue | Description | Action |
|-----------------------|--|---|
| Bees | European honeybees move into the nest box and establish a hive | Use nest boxes that have an anti-bee treatment (preventative measure). Contact your local beekeeper to remove the bees. Wait until bees move on, as most nest boxes are likely too small to sustain a long-term bee colony. |
| Ants | Ants move into the nest box and establish a colony | Temporarily prop the nest box lid open to make it less appealing to ants. Avoid pest strips as small birds and mammals may be affected by the poison. |
| Introduced birds | Non-native birds, such as Common Mynas or Starlings, move into the nest box | Remove nesting material and eggs. Repeat if necessary. Cover the nest box entrance hole temporarily if birds are persistent. |
| Large parrots | Cockatoos and galahs chew on the nest box, to maintain their beak condition or gain entry to the nest box | Do not feed cockatoos and galahs. Try covering nest box with wildlife-safe bird netting or chicken wire temporarily and wait until cockatoos lose interest. |
| Feral predators | Foxes and free ranging cats access the nest box eating eggs, young or adults | Keep cats indoors or in outdoor cat runs. Install nest boxes as high above the ground as possible, but low enough so they can be safely monitored and maintained. Protect nest box inhabitants by installing 1m wide polycarbonate sheets around the trunk above and below the nest box. |
| General wear and tear | Nest box condition deteriorates due to weather exposure, animal use or other damage | Leave the nest box in place if inhabited by an animal. If the nest box is vacant, remove and repair it. Most repairs can be done by a skilled handyperson, or by contacting a local nest box builder. Aim to repaint your nest box every five to ten years to protect the timber. Light colours are cooler in summer, and help prevent nest boxes getting too hot during heat waves. |

Maintain your nest boxes

Nest boxes typically have a lifespan of about five to twenty years, and like any home they deteriorate over time and need maintenance. It is useful to assess nest boxes regularly to check for any unwanted visitors and ensure nest boxes are still usable. Unwanted visitors include introduced birds (such as Common Mynas), feral bees and ants. Common issues and solutions are described in the table above.

Monitor and enjoy your nest boxes

Monitoring nest boxes is a great idea, providing you do not disturb any resident wildlife. Wildlife must not be handled without a valid permit. You can monitor nest boxes or natural tree hollows by stag watching (watching quietly at dusk) or installing a wildlife camera nearby. You can also monitor nest boxes using an endoscope-type camera (available to borrow from Connecting Country), or carefully climbing a ladder, lifting the lid and inspecting. Use the least disruptive method to answer your specific monitoring questions.

We recommend entering your observations into public databases.

Further information

Nest box designs, monitoring field guide and public database resources: www.connectingcountry.org.au/ monitor-change

Nest box usage in Victoria: www.ari.vic.gov.au/ useofnestboxesgeneralguide

Wildlife-safe fruit tree netting: www.wildlife.vic.gov.au/managingwildlife/wildlife-and-fruit-trees

WMB. 1990, **Wildlife needs natural tree hollows**, Victorian Land for Wildlife Note No.6, Department of Natural Resources and Environment, Melbourne.

For more resources visit the Healthy Landscapes Guide website: www.connectingcountry.org.au/ healthylandscapes



Unexpected visitors

Some species have overlapping habitat needs, hence can use nest boxes designed for other species. Sugar Gliders often inhabit Brush-Tailed Phascogale nest boxes, Owlet Nightjars may use Crimson Rosella nest boxes, and Australian Wood Ducks may use Laughing Kookaburra nest boxes. This is not a problem, but be aware your nest box may attract unexpected visitors. Animals such as possums and Brush-tailed Phascogales use multiple nesting sites, so consider installing multiple nest boxes for these animals.

3.7 Manage your dam as habitat

The Mount Alexander region was once home to diverse healthy waterways including natural pools, swamps, soaks and floodplains. Most of these natural waterways and wetlands were heavily disturbed by historical gold mining and agriculture, and no longer function as they once did. Although natural pools and wetlands are now rare in our region, thousands of constructed dams dot the landscape. These dams are valuable landholder assets, providing water for stock, irrigation, firefighting, households and recreation.

With some modifications, dams can provide multiple benefits for farm productivity and landscape health. Managing your dam with habitat in mind can provide reduced nutrient loads, better water quality for stock, healthy populations of insects for crop pollination and pest control, homes for wildlife, and an attractive place to enjoy. These wetter areas across the landscape are essential refuges, supporting plants and animals during drought, and are likely to become more important with increasing climate change.



Exclude stock

Where stock have access to a dams and wetter areas, they compact the soil around the edges making it difficult for plants to establish. Water quality suffers through sedimentation from soil disturbance and erosion, increased turbidity, and increased nutrients and pathogens from animal manure.

Fencing your dam allows plants the opportunity to establish in and around the water. These plants provide habitat for a healthy and diverse populations insects and wildlife. They stabilise the banks, filter sediment and nutrients, and reduce the risk of algal blooms and parasites.

Ideally the dam is completely fenced, and water pumped to a watering trough located away from the dam. If this is not possible for your situation, partial fencing or any steps to reduce stock impact will be positive for your dam. To manage your dam or waterway:

- > Fence off all or part of your dam or waterway. If possible, divert water to a trough for stock watering, or restrict stock access to just a small area with a hardened ground surface.
- > Allow enough space around the dam to create a vegetation buffer between stock and the water to filter runoff and capture nutrients and sediment. Ideally allow at least a 10m wide buffer between the high water level
- Consider access in your fencing design, for maintaining plantings and access if required for emergency firefighting.

Benefits of managing dams as habitat

and the fence.

- > Create shelter, breeding and foraging habitat for a wide range of native aquatic and terrestrial animals, attracting insects (including butterflies and dragonflies), worms, snails, yabbies, fish, frogs, tortoises, bats, birds, lizards and mammals.
- Extend the life of the dam by reducing erosion and sedimentation.
- > Improve water quality for stock, leading to greater weight gain through better hydration and nutrient absorption, and fewer harmful parasites.
- Improve water quality for household, recreation, irrigation and other uses, and reduce the risk of algal blooms.



Plant a buffer of native vegetation

Creating a vegetated buffer between stock and the water will filter nutrients and animal wastes, improving water quality. The larger the buffer the more effective it will be.

Plant a range of species selected to suit the different wet and dry zones within the planting site to support a diverse ecosystem of invertebrates, frogs, fish, reptiles, birds and mammals:

- > Sedges and rushes planted on the dam edges filter sediment.
- > Larger shrubs and trees planted further away provide shade and reduce evaporation.
- > Smaller shrubs, herbs, grasses or submerged plants provide structural habitat and food resources for different animals.

Plants vary in their ability to filter water and actively grow at different times of the year. Some may grow better in your specific conditions, so planting a diversity of species will help you identify which ones work for you.

Order your plants from a local supplier who grows plants adapted to your local conditions from locally-sourced seed.

Create dam habitat





Create shallow and deeper areas

Most dams are designed to store as much water as possible. Typically they have steep gradients and deep centres to maximise water storage and minimise evaporation. However, steep gradients limit the capacity for plants to establish. A combination of shallow and deeper areas, that fill and dry out naturally depending on conditions, provide a wider range of habitats for aquatic plants and animals.

If modifying an existing dam, incorporate shallow gradients and a range of depths into the earthworks design where possible. A shallow gradient increases the area that wets and dries as the water level goes up and down, and allows a greater diversity of plants to grow, as different plants thrive on the dam banks, mudflats and in shallow and deeper water. It creates a greater range of wildlife habitats, attracting a diversity of insects, frogs, birds and other animals.

Provide logs and structures

Natural wetlands and waterways contain fallen trees and branches that help create microclimates and diverse sheltered habitats for plants and animals. Rocks, shrubs, logs and branches also offer safe breeding places, shelter from predators, vantage points for hunting and roosting sites for a diverse range of insects, frogs, reptiles and birds. Logs can be positioned on the bank or partially submerged in the water. Logs emerging from the water provide safe basking sites for turtles and roosts for birds.

You can improve habitat and encourage native wildlife and plants to colonise a dam by leaving standing dead trees, and keeping or adding logs as valuable features to support a healthy food web. Avoid taking logs and branches from other natural areas as they are already providing habitat. If your dam lacks logs, consider adding some weed-free branches from garden pruning to provide structure and resources.

Enjoy the benefits of managing dams as habitat

Excluding stock will have an immediate positive impact on water quality in your dam or waterway. As native plants grow in and around the water you will likely notice more insects and birds, and may hear frogs calling. Over time your dam or waterway will become a thriving wetland ecosystem and a valuable resource for your property.

Further information

Farm dam enhancement: www.sustainablefarms.org.au/ farmdamenhancement

Farm dam handbook: www.waternsw.com.au/ farmdamhandbook

Managing farm dams: www.agriculture.vic.gov.au/ managing-dams

For more resources visit the Healthy Landscapes Guide website: www.connectingcountry.org.au/ healthylandscapes



Excluding stock has allowed native vegetation to grow in and around this healthy farm dam (photo: Gen Kay)

Farm dam planting list for the Mount Alexander region

| | | | Location within dam | | |
|---------------------|-------------------------------|--------------------------------|------------------------------|---|--|
| Lifeform | Common name | Scientific name | Banks dry all year | Mud flats submerged seasonally | Deeper water mostly submerged |
| Large tree | River Red-gum | Eucalyptus camaldulensis | *** | | |
| | Yellow Box | Eucalyptus melliodora | 談 | | |
| | Swamp Gum | Eucalyptus ovata | | *** | |
| Shrub | Silver Wattle | Acacia dealbata | | | |
| | Blackwood | Acacia melanoxylon | | | |
| | River Bottlebrush | Callistemon sieberi | *** | | |
| | Burgan | Kunzea phylicoides | | | |
| | Woolly Tea-tree | Leptospermum lanigerum | *** | | |
| | River Tea-tree | Leptospermum obovatum | *** | | |
| Herb | Water Plantain | Alisma plantago-aquatica | * | | 談 |
| | Lesser Joyweed | Alternanthera denticulata | * | | |
| | Swamp Pennywort | Centella cordifolia | 談 | 談 | |
| | Common Sneezeweed | Centipendia cunninghamii | 談 | 談 | |
| | Swamp Crassula | Crassula helmsii | *** | | |
| | Kidney Weed | Dichondra repens | *** | | |
| | Austral Brooklime | Gratiola peruviana | 談 | ** | |
| | Shining Pennywort | Hydrocotyle sibthorpioides | *** | | |
| | Australian Liliaeopsis | Lilaeopsis polyantha | *** | | |
| | Angled Lobelila | Lobelia anceps | *** | | |
| | Matted Pratia | Lobelia pedunculata | *** | | |
| | Australian Gypsywort | Lycopus australis | 談 | ** | *** |
| | Small Loosestrife | Lythrum hyssopifolia | 談 | ** | |
| | River Mint | Mentha australis | | ** | |
| | White Purslane | Montia australasica | *** | * | |
| | Upright Water-milfoil | Myriophyllum crispatum | *** | * | |
| | Slender Knotweed | Persicaria decipiens | *** | | |
| | Creeping Knotweed | Persicaria prostrata | ** | 談 | |
| | River Buttercup | Ranunculus inundatus | 談 | 談 | |
| | Streaked Arrow-grass | Triglochin striata | 談 | 談 | |
| Tufted plant | Common Swamp Wallaby-grass | Amphibromus nervosus | * | 談 | |
| | Bog Club-sedge | Bolboschoenus medianus | | 談 | |
| | Tall Sedge | Carex appressa | 談 | 談 | |
| | lassel Sedge | Carex fascicularis | | *** | |
| | Basket Sedge | Carex tereticaulis | * | *** | |
| | Flecked Flat-sedge | Cyperus gunnii | * | *** | |
| | Broom Rush | Juncus sarophorus | <u> </u> | *** | |
| | Common Tussock-grass | Poa labillardierei | 100 A | *** | |
| Creeping plant | Soft I wig-seage | Baumea rubiginosa | -SV/ | *** | |
| | Fen Seage | | ※ | ※ | |
| | Common Chika ruch | | | ※ | SW2 |
| | Common Spike-rush | | 30% | 100 A | |
| | laint loof Ruch | | NV2 | ※ | 1905 - C |
| | Joint-lear Rush | | | 90F | |
| | Pale Rush | Juncus pallidus | | ※ | |
| | River Olub and re | | | ※ | sW. |
| Culture and a local | Hiver Club-seage | Schoenopiectus tabernaemontani | 2014 | 200 200 | 200 200 |
| Submerged plant | water Ripbons | Cycnogeton procerum | | *** | <u></u> |
| | Feimeed | vailisheria australis | | | *** |

3.8 Care for paddocks

If you keep stock on your property, good grazing management can help make quality pasture available for stock throughout the year, and keep your soil and pasture healthy. Pasture quality is just as critical for stock as the quantity of pasture available.

Our local soils and plants are easily damaged by introduced animals with hard hooves like sheep and cattle. Overgrazing can be a serious problem resulting in erosion, loss of species diversity, increase in weeds, and changes in relative proportions of pasture species.

Consider your grazing approach

There are many approaches to sustainable pasture management, but it all comes down to looking after the health of your paddocks, and the soils and plants within them. Managing pasture is vital to provide adequate feed to grazing animals and keep your land productive into the future. Grazing management organises stock to ensure they make the best use of the pasture and helps conserve biodiversity and ground cover, a key ingredient to a healthy environment.

There is no set formula for achieving sustainable grazing. Pasture makeup will vary from property to property. The best approach for your property depends on climate, land type and condition, pasture quality and plant species composition, animals, stocking rates and grazing frequency. However, management generally falls into one of the following grazing regimes, with some farmers using a combination of techniques to allow more flexibility in responding to environmental variables:

- > Continuous grazing Stock are left in the same paddock throughout the entire growing season. Where stocking rates are very low this can be effective although, if stocking rates are too high, overgrazing in summer and autumn can be an issue. This approach does not allow time for palatable species to rest and recover, reducing their ability to seed and ultimately their overall presence in the landscape. It can enable unpalatable or unwanted plants to increase and dominate.
- > Rotational grazing Stock are moved around through multiple paddocks, giving other paddocks time to rest. This method can enable higher stocking rates, but requires active monitoring and more intense management. It can also require a larger area of land, to provide enough paddocks to move stock throughout the year.
- > Crash grazing Stock are introduced to an area at high stocking rates for a short period only, sometimes only a few days. This technique can be used to promote the presence of certain preferred plants or reduce the presence of unwanted plants, depending on timing. It requires careful consideration of what plants are present in the system, and their growth patterns, flowering and seeding times. It can be appropriate in remnant vegetation in certain circumstances, such as where there is a need to reduce growth of annual weedy grasses.

Benefits of caring for paddocks

- > Stabilise soils and increase ground-cover year-round.
- Reduce soil erosion from wind and water, improve water infiltration rates, and improve soil moisture retention.
- > Help pastures hold more moisture and remain greener during summer, reducing fire risk.
- Increase pasture resilience during drought, providing more reliable feed for stock when feed is scarce.



Avoid overgrazing

To help increase grazing productivity and reduce the impact of grazing on the landscape:

- Make sure your paddocks always have ground cover. If you are finding bare areas of soil, consider reducing stocking rates, offering supplementary feeding or resting the area. Bare soils lose their ability to absorb moisture and contain less nutrients and beneficial soil microorganisms.
- > Give plants a rest from grazing throughout the year to increase their ability to seed and increase their presence in the landscape. This can be achieved through light stocking rates or rotational grazing.
- > Consider what plant species you have and their flowering times, especially in mixed or native pastures. Give plants time to flower and produce seed so they can persist and increase in the landscape.
- > Keep stock out of wet areas while they are saturated, to reduce soil compaction, pugging and erosion. Consider fencing waterways and keeping a buffer of vegetation around them to increase water quality and environmental function. Consider off stream watering points for your stock.
- > Continually assess your paddocks, looking at the pasture and how much the stock are eating, and adjusting stocking rates accordingly. Consider the impact of both stock and other grazers such as rabbits and kangaroos.
- Move stock before pasture is grazed to below 5cm high.
- Contain use of supplementary feed to a specific area to reduce the risk of introducing weeds.

Establish multiple paddocks

Setting up more than one paddock for grazing will give you options for reducing grazing pressure. Too much grazing pressure in one paddock results in animals selectively feeding on the more palatable pasture species and leaving the unpalatable grasses and weeds. Using fencing to create more paddocks may cost more in materials and labour to establish, but will give you more flexibility in the longer term.

If possible, divide your pasture into four or more smaller paddocks and rotate a single group of animals through these paddocks. You can permanently fence the areas or use temporary electric fencing to restrict stock movement.

Promote native pastures

Native pastures include deep-rooted, perennial native grasses and herbs that have evolved to suit our local soils and climate. They are more frost-tolerant and better able to withstand hot and dry periods, as their deeper roots can access moisture lower down in the soil profile. They can help stabilise soils, prevent erosion, improve water infiltration and moisture retention, and provide groundcover year-round. Native pastures also support many native animals including birds and reptiles.

While intact native grasslands are rare in the Mount Alexander region, much of our grazing land includes at least some native perennial plants. If you already have native grasses in your paddocks, they can be maintained and increased with a grazing plan tailored to your specific situation. It is best to consult a grazing management specialist for guidance. With good management, native pastures can be drought hardy, providing more reliable feed for stock when feed is scarce elsewhere. They are also more fire resistant and recover quickly if burnt. To protect and promote native pastures:

- Control the timing and intensity of grazing to retain cover and allow desirable native plants to seed, recover and persist.
- Allow native perennial grasses to rest and recover from grazing.
- Control exotic pasture plants by strategically grazing these areas before invasive plants set seed.
- Consult a grazing management specialist for guidance.

Reap the benefits of caring for your paddocks

Taking care of your paddocks provides benefits for both the natural environment and farm productivity, building resilience and helping keep your land healthy and productive for future generations.

Further information

Sustainable Farms: www.sustainablefarms.org.au

Grazing pasture management: www.mla.com.au

Regenerative agriculture resources: www.nccma.vic.gov.au/projects/ regenerativeagriculture

North Central Victoria Regional Sustainable Agriculture Strategy: www.nccma.vic.gov.au/resources/ publications/north-central-victoriaregional-sustainable-agriculturestrategy

For more resources visit the Healthy Landscapes Guide website: www.connectingcountry.org.au/ healthylandscapes



Connecting Country's mission is to connect people and landscapes in ways that support a healthy, resilient and productive natural environment. Our vision is for the people of the Mount Alexander region to be proud of the beautiful, productive, healthy and diverse landscapes, habitats, forests, waterways, flora and fauna that we have supported and created in our region.

Connecting Country works on the ground to connect people, protect habitat, restore landscape linkages, monitor biodiversity and fight species extinction.

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