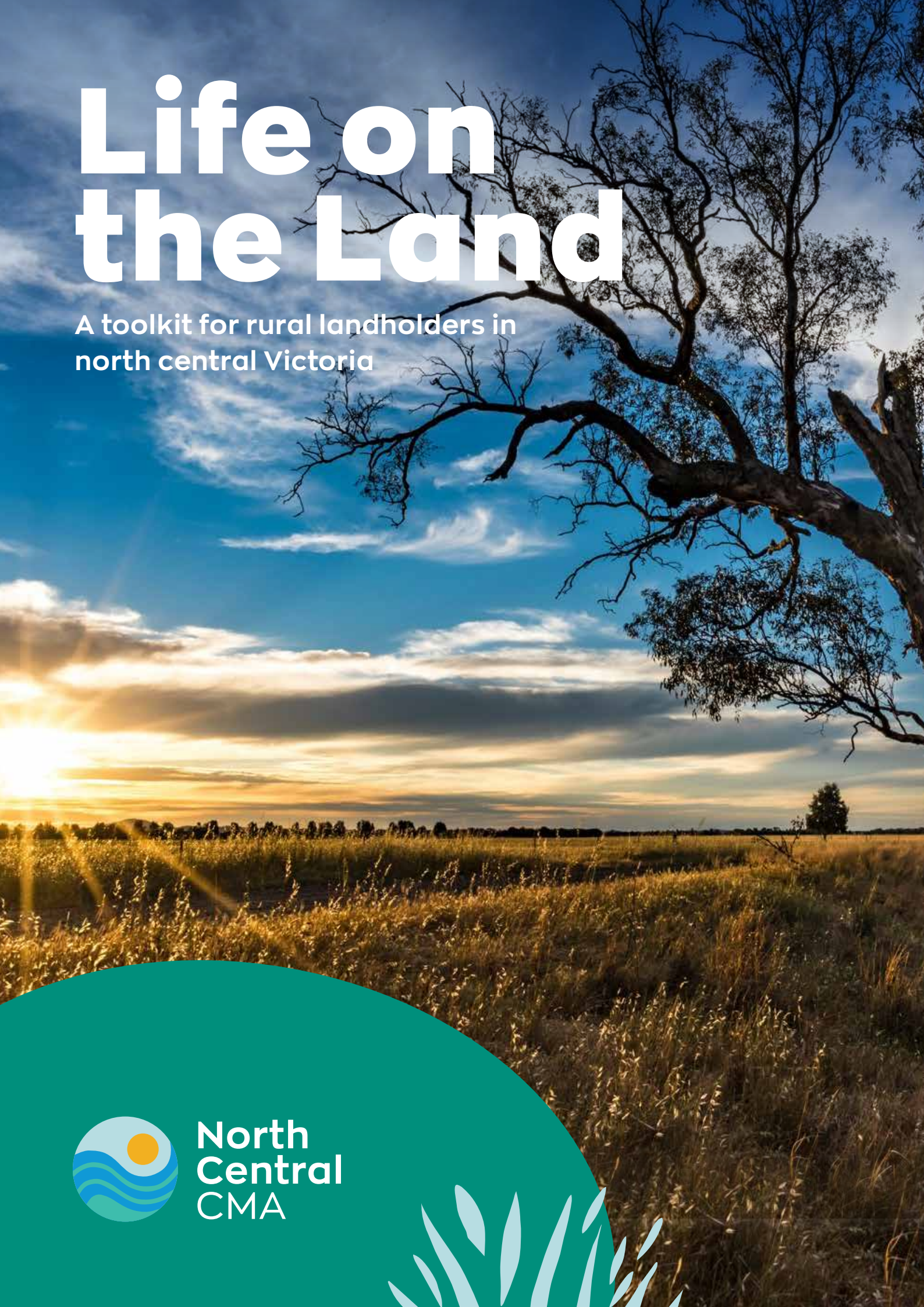
Life on the Land

A toolkit for rural landholders in north central Victoria



North Central CMA

Acknowledgement of Country

The North Central Catchment Management Authority acknowledges Traditional Owners within the region, their rich culture and spiritual connection to Country. We also acknowledge the contribution and interest of Aboriginal and Torres Strait Islander people and organisations in land and natural resource management, and pay respects to Elders past, present and emerging.

Acknowledgements

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VICTORIA State Government | Energy, Environment and Climate Action

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1. Our Place

The **Life on the Land - A toolkit for rural living in north central Victoria**, aims to assist new and existing land managers, particularly those in rural areas, to protect and restore the health of their land and the broader environment. We use the term land manager to refer to anyone who is managing, farming, living or working on a rural property in north central Victoria.

The toolkit provides a starting point for information on a variety of topics, ranging from revegetation to pest management, to enhancing pockets of remnant paddock trees to testing your soil.

The toolkit is divided into two sections. The first section, Our Place, provides you with information about the north central region; where we live, our climate, our water and our unique landscapes.

The second section, Your Place, contains practical information on how you can improve and protect your property. It describes key topics such as biodiversity, soils, plants and animals, and connects you to your community so you can enjoy the best life on the land. We hope it helps you secure sustainable livelihoods and landscapes that will be enjoyed for generations to come.

Based on the 2013 Caring for Country guide, we have developed a new toolkit with the latest best practices for managing land and water on your property. As we live in a digital world with information constantly changing, we have also included links to resources and organisations so you can connect directly.

We hope you find this guide useful and thank you for contributing to the sustainability and health of our natural environment.

Enjoy your life on the land in the north central region!

North Central Catchment Management Authority

The North Central Catchment Management Authority (CMA) oversees the coordinated management of land, water and biodiversity in the north central region of Victoria.

The North Central CMA was established in 1997 under the Catchment and Land Protection Act 1994 and also has functions and powers under the Water Act 1989. Our purpose is to connect rivers, landscapes, and people to deliver lasting positive change. We know that we achieve the best results for our region's natural resources and our communities when we work with others. In fact, all of what we do we simply can't do alone. For more than 20 years our focus on working with others has been fundamental to all our achievements and strengthens our focus for the future.

The 2021-27 North Central Regional Catchment Strategy provides the overarching plan for our business and everyone involved in land, water and biodiversity management within the north central region. It provides a roadmap for our collective efforts to care for our catchments over the next six years.

For more information on what we can do together for our catchment visit www.northcentral.rcs.vic.gov.au

First Nations people

The north central region includes the traditional lands of the Barapa Barapa, Dja Dja Wurrung, Taungurung, Yorta Yorta, Wamba Wemba, Wadi Wadi people and clans represented by Barengi Gadjin Land Council (Wotjobaluk, Jaadwa, Jadawadjali, Wergaia and Jupagulk).

First Nations people have cared for the land, water, plants, animals and ecosystems of the north central catchment area for thousands of years and have an enduring and deep physical and spiritual connection to Country.

Barapa Barapa

The Murray River is not a boundary for the Barapa Barapa people whose territory stretches south to Boort, north beyond Deniliquin in NSW, and along the Murray including the tributaries of the Murrumbidgee and Loddon Rivers.

Barengi Gadjin Land Council

Barengi Gadjin Land Council Aboriginal Corporation (BGLC) represents Traditional Owners from the Wotjobaluk, Jaadwa, Jadawadjali, Wergaia and Jupagulk peoples (collectively referred to today as the Wotjobaluk Nations or Wotjobaluk Peoples). The Wotjobaluk Nations include Lake Hindmarsh, Lake Albacutya, Pine Plains Lake, Lake Werringrin, Lake Coorong, Warracknabeal, Beulah, Hopetoun, Dimboola, Ouyen, Yanac, Hattah Lakes and the Wimmera River (Barrenggi Gadyin).

Dja Dja Wurrung

Dja Dja Wurrung Country embraces the Upper Loddon and Avoca rivers, running east, through Maldon and Bendigo to Castlemaine and west as far as St Arnaud. It takes in the area close to Lake Buloke. The northern reaches encompass Boort, across the northwest to Donald, while Creswick and Daylesford mark the southern frontier. The southwest includes Navarre Hill, Mount Avoca, Stuart Mill, Natte Yallock, Emu and the eastern headwaters of the Wimmera River.

Taungurung

Taungurung Country encompasses the area between the upper reaches of the Goulburn River and its tributaries north of the Great Dividing Range. Moving from the Campaspe River in the west, eastwards to the Great Dividing Range, the Ovens River in the north and south to the top of the range.

Wadi Wadi

The Wadi Wadi Nation straddles the Murray River near Swan Hill, extending west towards Ouyen and south of Robinvale. Wadi Wadi traditional Country includes the major river red gum stand in Nyah Vernifera Forest.

Wamba Wemba

The Wamba Wemba Nation straddles both sides of the Murray River and takes in Deniliquin, Moulamein and Swan Hill. As well as part of the Murray, Wamba Wemba Country also includes the major tributaries of the Edward River and Wakool River.

Yorta Yorta

Yorta Yorta lands lie on both sides of the Murray River. Starting from Cohuna to Albury/Wodonga, including Echuca, Shepparton, Benalla, Corowa and Wangaratta, and extends north to Deniliquin.

Cultural values across the region

Throughout the north central region, the landscape is embedded with the physical imprint and spiritual connections of thousands of generations of First Nations people of the traditional lands of the Barapa Barapa, Dja Dja Wurrung, Taungurung, Wadi Wadi, Wamba Wemba, Wotjobaluk (represented by the Barengi Gadjin Land Council) and Yorta Yorta.

Aboriginal Cultural Heritage refers to the knowledge and lore, practices and people, objects and places that are valued, culturally meaningful and connected to identity and Country.

These cultural values include physical and tangible items such as remnant native vegetation, burial sites, artefact scatters, shell middens, stone structures and scarred trees. These physical reminders reveal the deep connection that First Nations people have had with this landscape. Tangible heritage includes all the physical items, such as stone artefacts, axe grind markings and shell middens. Intangible cultural heritage includes cultural knowledge and practice (e.g. indigenous biocultural knowledge, language, stories and ceremonies) passed down from generation to generation, and often has a strong connection with Country.

Help us protect Cultural values

The *Aboriginal Heritage Act 2006* provides for the management of cultural heritage, covering both tangible and intangible heritage. First Peoples – State Relations can help land managers understand the *Aboriginal Heritage Act 2006* and how to protect Aboriginal cultural heritage. To discover more about how to recognise, respect and protect Aboriginal cultural heritage visit www.firstpeoplesrelations.vic.gov.au.

Our Region

Where we live

Covering 13 per cent of Victoria, the region is bordered by the Murray River to the north, the Great Dividing Range and Wombat State Forest to the south, Mt Camel Range to the east, and the western boundary of the Avon Richardson catchment to the west. The region's main rivers are the Campaspe, Loddon, Avoca and Avon-Richardson rivers, which form part of the southern Murray-Darling Basin. The region also has a diversity of natural environments, including rivers and floodplains, box-Ironbark forest and woodlands, iconic river red gum forests and Riverine Plain grasslands.

These habitats contain significant biodiversity, including many endangered flora and fauna species. From mountain forests to floodplains, north central Victoria contains some of the most diverse landscapes and land uses in the state.

The north central region continues to grow in population, with a regional hub centered in Bendigo, and expanding townships of Kyneton, Woodend, Castlemaine, Echuca and Swan Hill. Eighty-seven per cent of land in the region is privately owned and most of it is used for agriculture. As such, landholders and community based Natural Resource Management (NRM) groups play a huge role and make a significant contribution by caring for their land and local places, protecting and improving the health of soils, waterways and native vegetation, and habitats across the region.

Fast facts:

Annual rainfall: rain varies across the region from 300mm in the northwest to over 1,200mm in the southeast

Temperature: to the south temperatures can fall below 1°C during the winter months, while to the north regularly reaches above 40°C in summer

Population: over 250,000 people

Land use: 87% of the region is privately owned and most of it is used for agriculture.

Our Catchment

A catchment is an area of land bounded by natural features, such as hills or mountains, where water collects.

In a catchment all the rain and run-off water is collected at a high point, usually a mountain range, and makes its way to a low point in the landscape, such as a dam, river, wetland or underground, into the groundwater system.

During periods of low rainfall, the groundwater system can slowly feed water into the river system. Natural and human-made waterways and water storages such as rivers, dams, lakes and wetlands co-exist alongside bushland, plants, animals, people, towns and farms in a catchment.

Healthy catchments provide a source of clean drinking water, habitat for plants and animals, natural vegetation and waterways for recreation, reliable and clean water for livestock and irrigation, and opportunities for sustainable agriculture and industry.

What we do matters

The health of a catchment depends on how people living and working in the catchment manage land and water and how they interact with the landscape.

The way we manage water, livestock, land and gardens, design houses, dispose of waste, collect firewood, treat our waterways, and care for trees, soil and other vegetation all affect our catchment and our overall wellbeing.

Figure 1.1: Connected waterways

Our Climate

The climate of north central Victoria

The climate of north central Victoria is generally Mediterranean with cool moist winters and warm dry summers. The north and west of the region are substantially warmer and drier than the south and east. Summer temperatures range from warm in the elevated southern regions (average maximum temperatures less than 25°C) to hot in the north (more than 30°C).

Maximum winter temperatures are usually around 12-15°C but increase from south to north of the region. Frosts are common throughout the region. Annual rainfall varies considerably ranging from 350mm per year in Swan Hill to over 1,200mm per year in the far south-east. On average, there are 82 days each year where at least 1mm of rain falls.

Our climate is changing

Land managers and the wider community in the north central region are no strangers to the effects of climate change and climate variability. In recent times we have experienced major climate events including drought, floods and fires.

These events remind us all that we need to prepare now for future climate change events in the region that will have a significant impact on the region's environment, economy and community. In addition to increasing average temperatures, climate change will result in hotter and drier conditions in Victoria, with increased incidence of extreme events such as heatwaves, bushfires and storm surges.

Climate change adaptation is a process of adjustment so we can all prepare for, or respond to, the impacts of climate change. Adaptation is already occurring in the north central region, land managers and communities have been responding to drought, flood and fire through a range of actions that minimise future risk, by improving water security and conserving high value agricultural soils. Work undertaken by many Landcare and community groups to buffer remnant vegetation and improve landscape connectivity is supporting adaptation of natural assets through improved participation and coordinated action.

To better prepare for the future challenge of climate change, the North Central CMA has worked with partner organisations to develop a regional Climate Change Adaptation and Mitigation Plan and other resources such as those to support climate adapted revegetation in the region (visit https://www.nccma.vic.gov.au/resources/publications/). Table 1.1 provides some Climate predictions for north central region (CSIRO 2019).

Table 1.1: Climate predictions for the north central region (source: CSIRO 2019 Victorian Climate Projections)

Climate projections for the north central region	Level of confidence
Average temperatures will continue to increase in all seasons	Very high
More hot days and warm spells	Very high
Fewer, but possibly damaging, frosts	High
By late in the century, less rainfall during the cool season	High
Even though mean annual rainfall is projected to decline, heavy rainfall intensity is projected to increase	High
A harsher fire-weather climate in the future	High

Our Water

Waterways across north central Victoria supply us with water for drinking, agriculture and gardening, and provide special places to enjoy outdoor activities such as fishing, swimming, birdwatching and boating. For First Nations people, water is central to culture, identity and community wellbeing.

Healthy waterways support many environmental values such as native fish, riparian vegetation, habitat for plants and animals, drought refuges and rare or threatened species.

Figure 1.2: Waterways and wetlands of the north central region

Rivers and creeks

North central Victoria has four river catchments that form part of the Murray-Darling Basin: Campaspe, Loddon, Avoca and Avon-Richardson. The region's waterways, which include more than 100,000km of streams and 1,600 wetlands, have economic, environmental, cultural and social importance to First Nations people and regional communities.

Rivers play a major role in shaping catchments. They are living systems that have evolved over a long period of time in response to an extremely variable climate. The shape and ecology of rivers are largely dependent on their flow variability. The volume and speed of water flowing through a river can significantly impact the entire ecosystem around it. A river's catchment, which includes the slope, geology, soil, vegetation, and surrounding land uses, also affects the river's condition.

Wetlands

In north central Victoria wetlands comprise of swamps, billabongs, lakes, salt marshes, bogs, soaks and mudflats. Wetlands are areas that have developed special characteristics because they are wet on a regular or semi-regular basis. The term also applies to depressions in the landscape.

Wetlands are vital ecosystems in our landscape as they bridge the gap between our waterways and the surrounding land. They play an essential role in maintaining water quality, reduce the impact of flooding and serve as feeding and breeding grounds for many important plant and animal species.

Across the north central region wetlands are very important culturally, socially and economically. As a unique part of our landscape they are increasingly popular for tourism and recreation, and in many cases contain significant Aboriginal Cultural Heritage sites. They are often valuable resources for agriculture, timber and seed harvesting, fishing, education and research.

Despite a growing recognition of their many values and functions, wetlands remain one of our most endangered environments. In Australia many wetlands are transient, remaining dry for part or all of the year and filling only during wet seasons after rain. Consequently, the location and identification of less well-known wetlands can be difficult, especially in dry years. Wetlands are often exposed to threats, which can negatively impact their health and even lead to their disappearance.

Changes to water flow can significantly alter wetlands, bringing about disruptions in natural productivity cycles, creating changes in vegetation, and affecting the normal exchange of nutrients and organic matter between rivers and floodplains – an exchange needed to keep wetlands healthy.

Changes in land use and land management practices such as grazing livestock and cropping have reduced the quality of water available to wetlands. Salt levels have risen because of these practices, which can have a drastic effect on the health of wetlands.

Groundwater

Groundwater is an important source of water for many property owners and is used by one in ten Victorians. Groundwater can be sourced from private bores, springs or public water supplies. A licence from the local water corporation is needed to extract groundwater for irrigation purposes unless the water is for domestic or livestock use.

Domestic or livestock use involves using water for household purposes such as watering pets, cattle, and other stock, as well as irrigating a kitchen garden. However, it does not include water use for dairies, piggeries, animal feedlots, poultry, or for any other intensive or commercial purposes.

Before boring for groundwater, contact your local council and water corporation. The zone or overlay controls on a property, or activities will require permits and approvals.

Groundwater Dependent Ecosystems

When groundwater occurs close to the surface, it can support the hydrology of aquatic ecosystems, including rivers, lakes, springs and soaks. In times of drought, Groundwater Dependent Ecosystems can provide critical refuge and allow for the persistence of aquatic species in otherwise dry environment.

Mineral springs

Natural mineral springs are found in the southern part of north central Victoria, especially around Daylesford. The springs in this area are fed by rain falling onto recharge areas along the crest of the Great Dividing Range. Water feeds downwards into a deep groundwater system where it reacts with the underground rock. Minerals from the rock dissolve into the water. The mineralised waters then travel up to 45km from the crest of the Great Dividing Range before emerging as mineral springs at the surface.

Mineral springs have always been valued for their available water resource and recreational, health and wellbeing properties. Today some springs experience high visitation and have become popular natural tourist destinations locally, regionally and internationally.

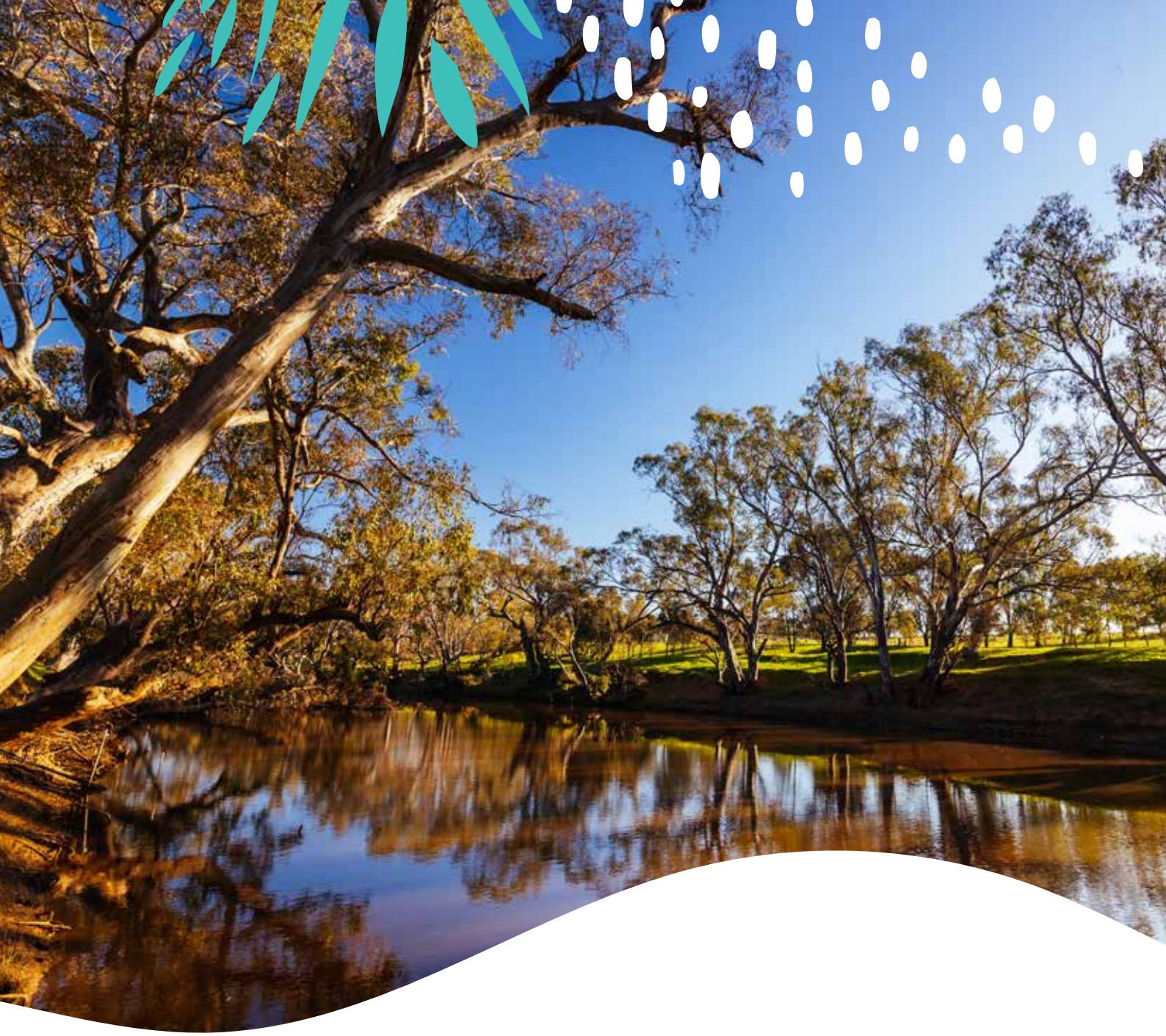
There are two main threats to mineral springs. The first is contamination, which reduces quality and changes the chemistry of the water, and the second is low rainfall and water extraction causing reduced flows and low water tables. Mineral springs continue to be at risk from the historical impacts of gold mining, urban development, poor agricultural practices and saline groundwater contamination, and are routinely and rigorously monitored to ensure they are maintained and protected for everyone to enjoy.

Water for irrigation

In the north central region, irrigated agriculture is concentrated within the Goulburn Murray Irrigation District (GMID), in the north of the region on the Riverine Plains. Areas include the Torrumbarry, Loddon Valley and the Rochester-Campaspe areas. Irrigators in the Torrumbarry Irrigation District receive their water via the Torrumbarry Weir on the Murray River. Water is diverted at the weir through the National Channel into Gunbower Creek to supply irrigators near Cohuna.

Loddon Valley irrigators receive their water via two separated systems, the Loddon and Goulburn rivers. The Waranga Western Channel carries water from the Goulburn River system to supply irrigators in the southern areas of the Loddon Valley Irrigation District. Water is supplied to irrigators in the Rochester-Campaspe Irrigation District via the Waranga Western Channel and from the Campaspe River.

Land use is constantly changing across the Loddon Campaspe Irrigation Region. There is an increasing area of dryland within the region where water is no longer intensively applied to farm land. Water entitlements have also been transferred or sold permanently to other irrigation districts or may have been purchased to protect and maintain environmental values or for human consumption.



Safe, clean water for everyone

Everyone in the region including communities, local councils and water authorities must preserve the quality of our water to safeguard public health, protect our water supply, reduce water tariffs, and ensure a secure and reliable long-term supply of drinking water. Inappropriate land use and development can undermine the safety and reliability of water supplies in our catchments.

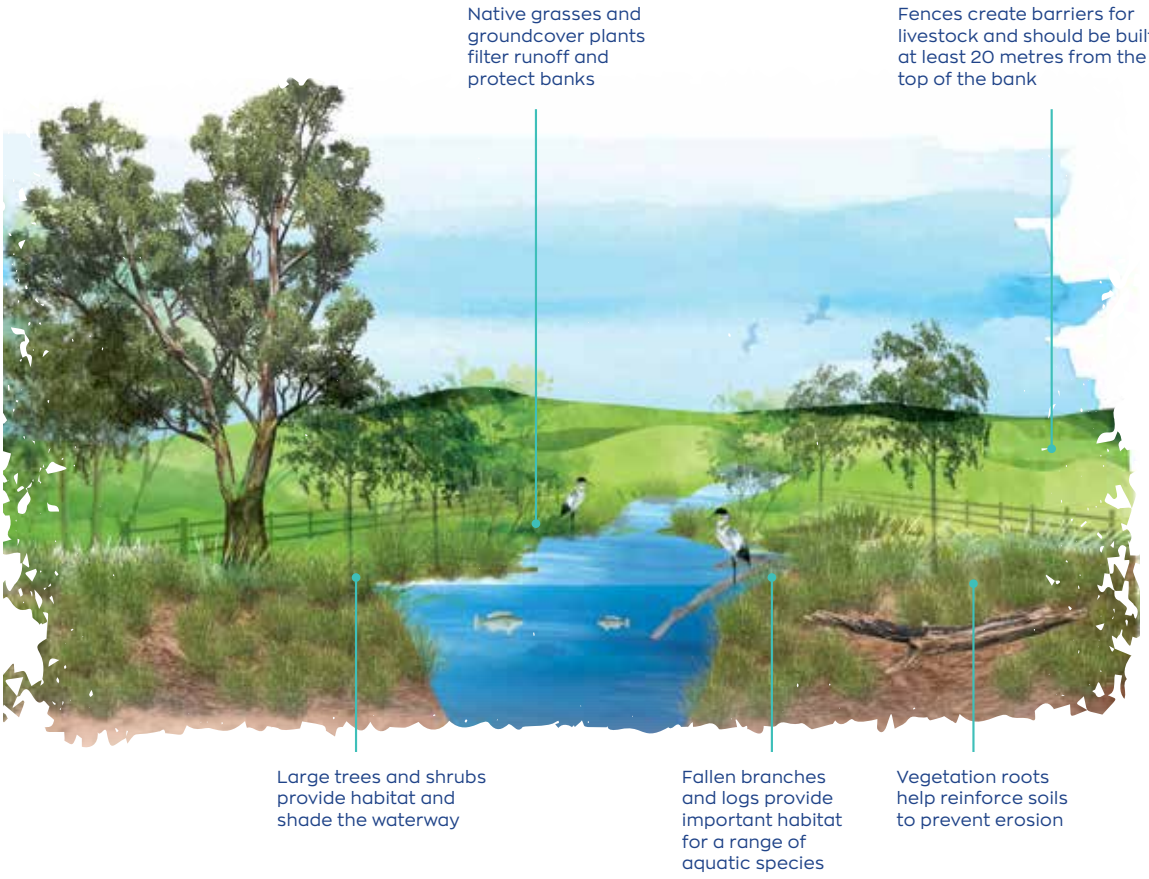
Catchment protection and water quality have become some of the most significant issues confronting rural land use planning in Victoria. Authorities and local communities need to work together to safeguard the region against the cumulative impact of individually insignificant developments and activities.

Best practice - what you can do to help look after our waterways

Water quality is a key measure of a catchment's health. Humans and their activities can negatively impact the health of streams and waterways through increased salinity, increased sediments and nutrients, reduced oxygen and changes to the pH and water temperature, all affecting catchment health and aquatic ecosystems.

Land managers need to be aware of their impact and the consequences for others in the catchment.

Healthy riparian zone



Degraded riparian zone

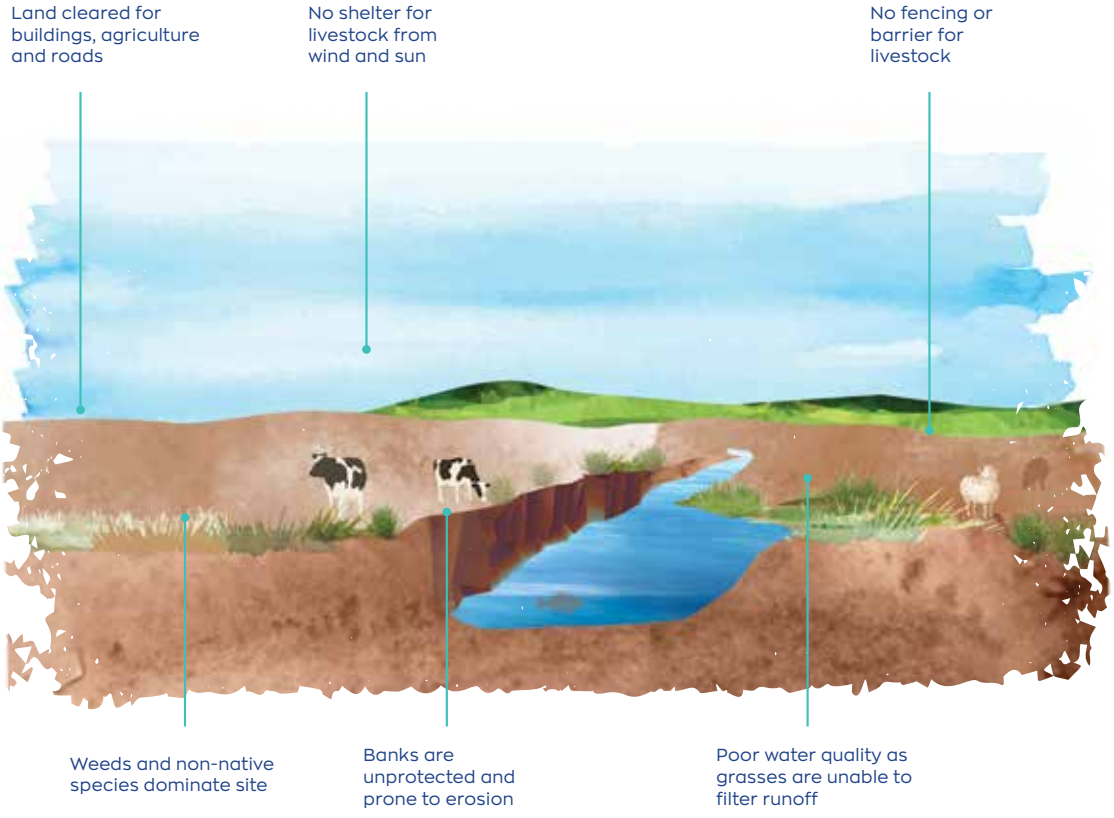


Figure 1.3: Healthy versus degraded riparian zones

Case Study

WaterWatch

The North Central WaterWatch program has been active since 1993. From Wycheproof to Woodend, Cohuna to Creswick and Swan Hill to Echuca, Waterwatch works with volunteers across the region to monitor the health of our waterways.

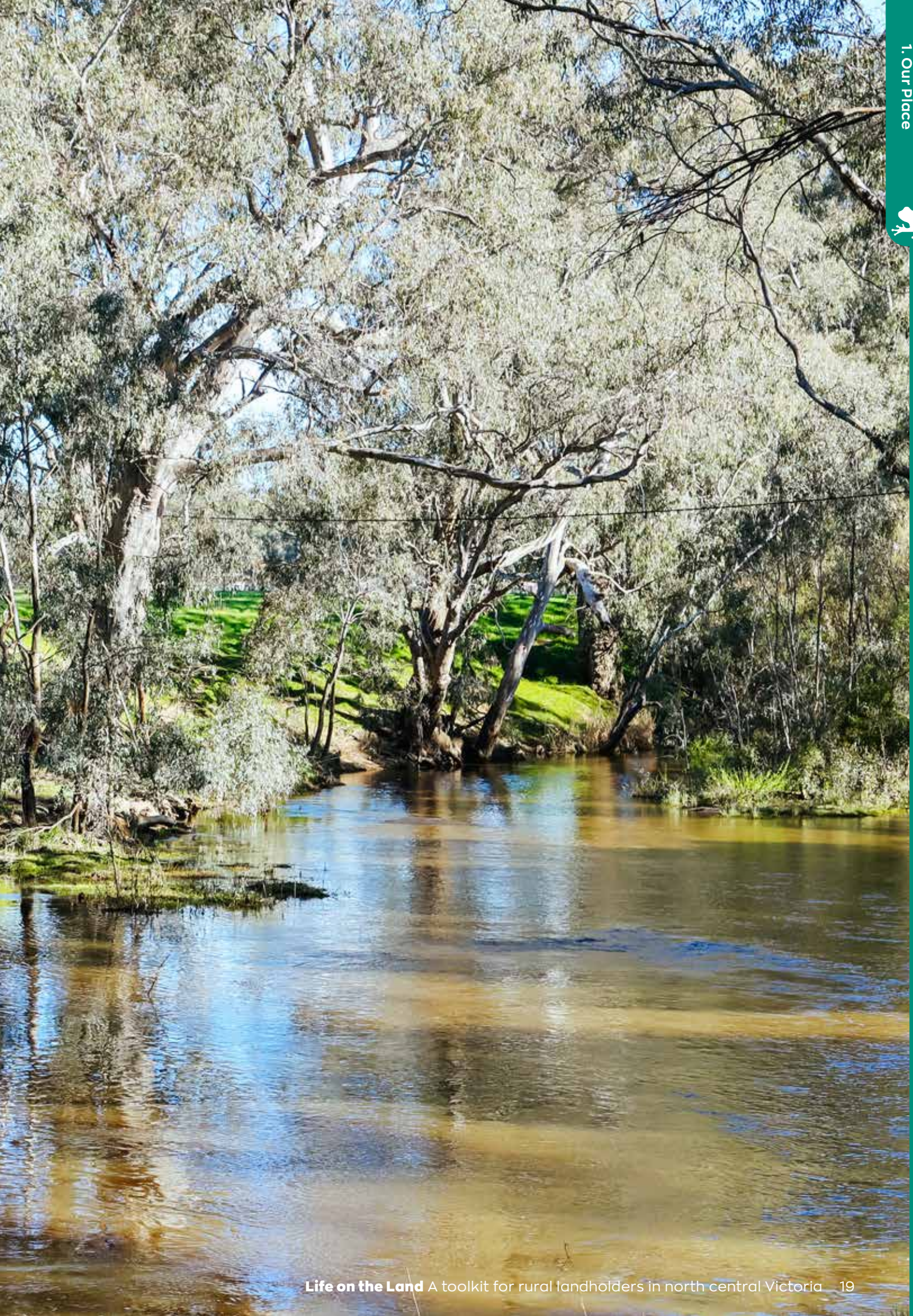
North Central WaterWatch is a water quality education and monitoring program, which aims to increase community understanding participation and ownership of local water quality issues. WaterWatch is all about everyday people and the extraordinary actions they take volunteering countless hours monitoring, planting, communicating and caring for their local creeks, wetlands, groundwater and rivers.

> “WaterWatch is about the faces and actions of thousands of Victorians and caring for their local creeks, wetlands, groundwater and rivers.”

North Central WaterWatch operates a network of more than 60 community water-quality monitors spread across 100 monitoring sites. The data collected by these monitors is stored in a regional database, from which specific reports can be requested. Community events are also held to raise awareness about water quality issues.

WaterWatch also engages with local schools in an environmental education program called *River Detectives*. *River Detectives* is a free and fun way to connect young people to nature through citizen science and monitoring waterways. Schools are provided with equipment, training and teaching resources. Students learn how water, land, plants, animals, people and communities are all connected.

If you’d like to participate in the North Central WaterWatch program or River Detectives Program or want any further information, please contact the North Central CMA at www.ncccma.vic.gov.au



Our Biodiversity

What is biodiversity?

Biodiversity is a term used to describe the variety of all living things (plants, animals, fungi and microorganisms) and their interactions.

Biodiversity constantly changes over time as new species evolve and extinction occurs. Scientists measure biodiversity at three levels:

- Species diversity: the different plants, animals and microorganisms
- Genetic diversity: the genes they contain
- Ecosystem diversity: the ecosystems of which they form part of.

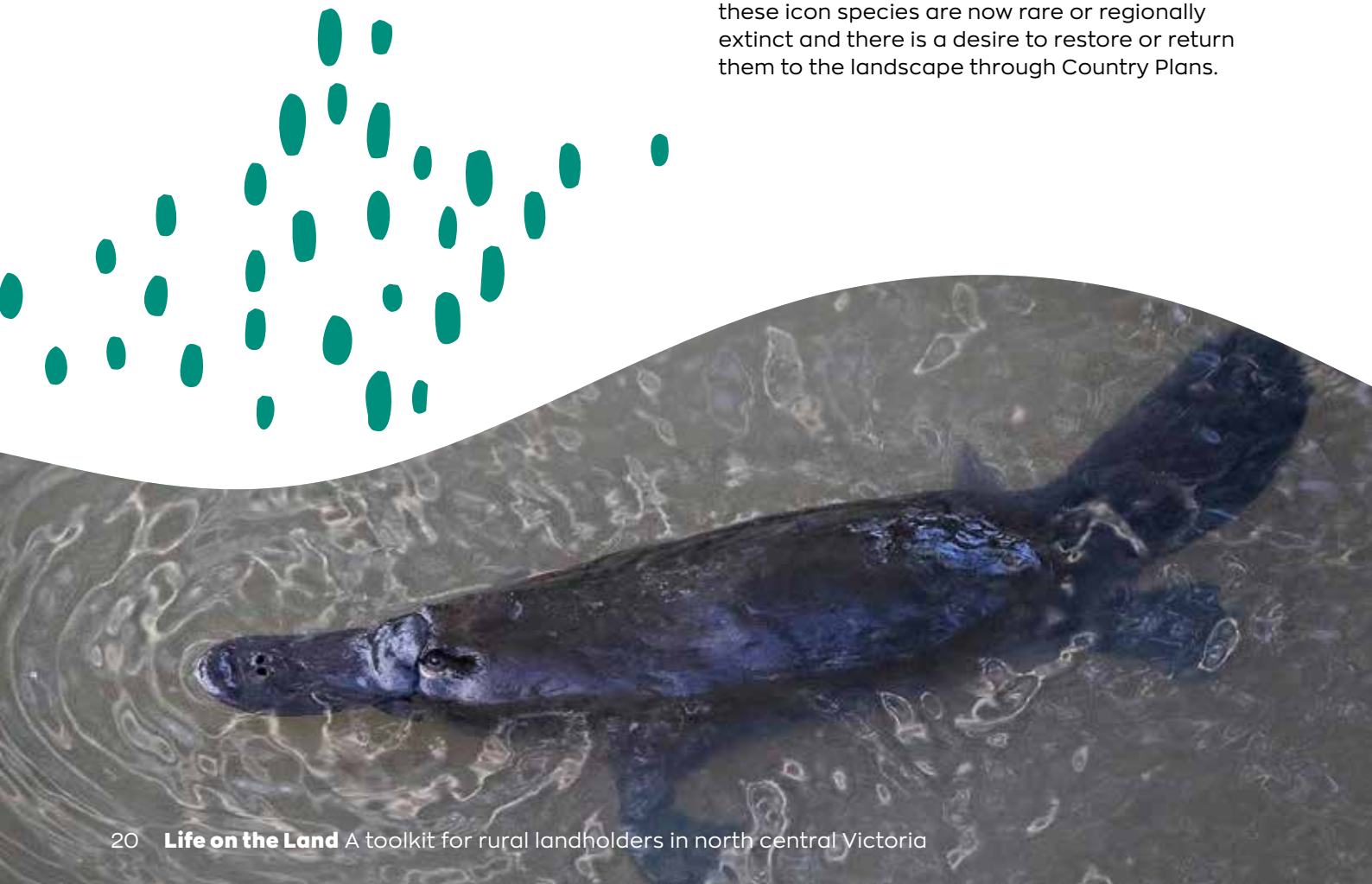
All species, including human beings, are intrinsically linked by their interactions with each other and the environments they live in.

Why is biodiversity so important?

Biodiversity provides a range of vital ecosystem goods and services that underpin the health of the land and water, the flora and fauna, and the communities of the north central region. The surrounding plants and animals help rebuild soil, clean water and air, store and cycle nutrients, provide climate stability and help repair damaged ecosystems.

From a human perspective, the conservation of biodiversity provides significant cultural, economic, educational, environmental, scientific and social benefits. With a predicted increase in extreme weather events and climate change, an environment rich in biodiversity offers the best chance for ecosystems to adapt to change.

For First Nations people, biodiversity is important for Country to be healthy. Many native plant and animal species have particular significance for First Nations people, either spiritually or as a source of traditional food and fibre. Several of these icon species are now rare or regionally extinct and there is a desire to restore or return them to the landscape through Country Plans.



Threats to our biodiversity in the north central region

Since European occupation, the north central Victorian landscape has undergone significant changes due to gold mining, agricultural production and urban land development. As a result, the region has become one of the most highly cleared and fragmented landscapes in Australia, with only 19 per cent of its original vegetation remaining.

This has negatively impacted the region's biodiversity, natural ecosystems and the services they provide. While development has resulted in a productive and vibrant regional economy, it continues to threaten the region's biodiversity and it is now crucial to protect and rebuild biodiversity assets for the future.

Some of these threats to biodiversity are the consequences of historical land clearance (e.g. salinity), some are new and unprecedented (e.g. climate change) but most are the same human activities that brought about the massive alterations to the landscape in the nineteenth and twentieth centuries.

Threatened native animal species

At a national level, threatened flora and fauna species and communities are listed under the *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*. Victoria lists threatened flora and fauna species, communities and threatening processes on the *Flora and Fauna Guarantee Act 1988 (FFG Act)*.

More than 100 threatened flora and 40 fauna species have been or are recorded in the north central region on the 2020 Victorian Biodiversity Atlas, a full list is provided in the Appendices.

Threats and their impacts on biodiversity include:

Threats:

- Clearing for agriculture, urban or other uses
- Climate change
- Weed invasion
- Over-grazing by livestock, feral animals and native herbivores
- Salinity
- Soil disturbance
- Habitat fragmentation and isolation
- Alterations to natural fire regimes
- Altered hydrology
- Invasive exotic species e.g. rabbits, goats, carp
- Timber and firewood harvesting practices

Impacts:

- Reduction in species richness and diversity
- Decline in habitat quality and condition
- Decline in water quality
- Loss of landscape function
- Decline in soil health
- Decline in landscape amenity and intrinsic value.

Native vegetation

Plants form an essential part of the biodiversity of an area and they provide valuable habitat for native animals. Native vegetation includes more than just trees - it comprises of all the plants that naturally occur in the area such as shrubs, grasses, groundcovers, herbs, mosses, fungi and lichens.

The north central region is home to many threatened flora species and communities. A few examples that are known to occur in the region include, the Natural Grasslands of the Murray Valley Plains, the White Box-Yellow Box and Blakely's Red-Gum ecological community (EPBC Act) and the Northern Plains Grassland community listed on the *Flora and Fauna Guarantee Act 1988 (FFG 1988)*.

Significant remnant native vegetation is found throughout north central Victoria on the Riverine Plains to the north, through the Box-Ironbark Forest ecosystem of the Goldfields, down to the wetter forests around the Macedon Ranges in the Central Victorian Uplands, across to the Volcanic Plains in the southwest and up to the Wimmera and Mallee regions along the western border.

Bioregions

Bioregions are a landscape-scale classification of environments using a range of attributes such as climate, geomorphology, geology, soils and vegetation. There are 28 bioregions identified within Victoria. In the north central region, there are 8 bioregions. These are:

- Central Victorian Uplands
- Goldfields
- Murray Fans
- Murray Mallee
- Northan Inland Slopes
- Victoria Riverina
- Victorian Volcanic Plain
- Wimmera

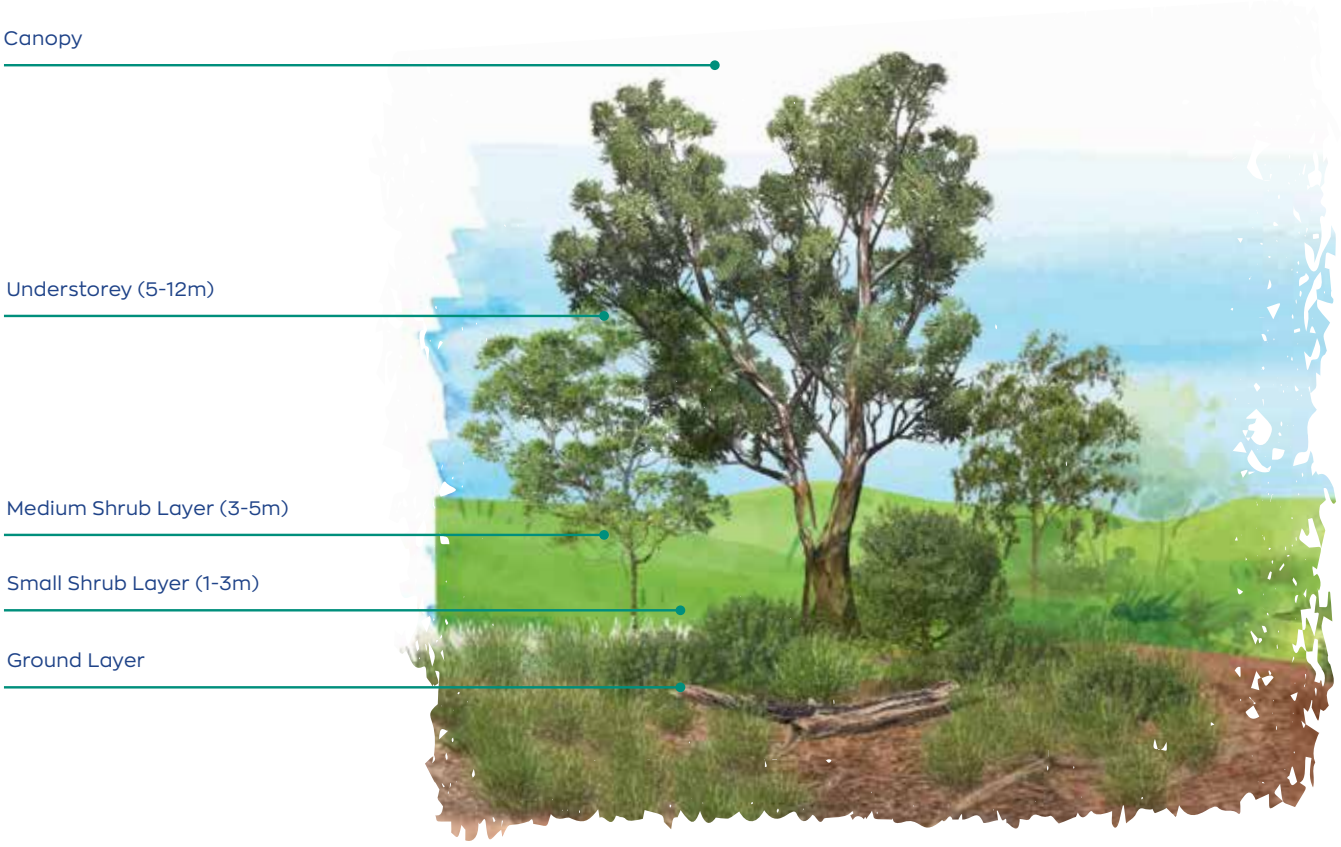


Figure 1.4: Native vegetation structure layers

Vegetation types

Plants typically grow in association with each other in their natural setting. In Victoria, these plant associations are referred to as Ecological Vegetation Classes (EVCs) and can be categorised based on vegetation structure, floristic characteristics, and other environmental factors like geomorphology, rainfall, aspect and fire frequency. EVCs can be used to plan various vegetation management activities and revegetation on your property.

Threatened native plant species

Around 108 plant species are threatened in north central Victoria, with 36 listed nationally threatened and 106 listed under Victoria's *Flora and Fauna Guarantee Act 1988*.

Some examples of rare and threatened plant species are provided in Table 1.2 below. A complete list is included in Appendix 4.

Table 1.2: Native plant species found in north central Victoria and their conservation status (source: DEECA)

Common name	Scientific name	EPBC act status	FFG act status	DEECA Status
Australian anchor plant	*Discaria pubescens*	—	Listed as threatened	Rare in Victoria
Clover glycine	*Glycine latrobeana*	Vulnerable	Listed as threatened	Vulnerable in Victoria
Matted flax-lily	*Dianella amoena*	Endangered	—	Endangered in Victoria
Slender darling-pea	*Swainsona murrayana*	Vulnerable	Listed as threatened	Endangered in Victoria
Southern shepherd's purse	*Ballantinia antipoda*	Endangered	Listed as threatened	Endangered in Victoria
Spiny rice-flower	*Pimelea spinescens subsp. spinescens*	Critically endangered	Listed as threatened	Vulnerable in Victoria
Turnip copperburr	*Sclerolaena napiformis*	Endangered	Listed as threatened	Endangered in Victoria
Yellow-lip spider-orchid	*Calendenia xanthochila*	Endangered	Listed as threatened	Endangered in Victoria

Threatened native animal species

It is not surprising that many native animal species in Australia are in decline due to the impacts of European occupation. In Victoria alone, 10 mammal species have become extinct since European occupation and approximately 101 native species in north central Victoria are now officially listed as threatened due to depleted or unknown populations. Some of these animals are on the brink of extinction.

Some of the threatened native animal species found in north central Victoria and their conservation status under the *EPBC Act 1999*, *FFG Act 1998* and DEECA Advisory List of Threatened Vertebrate Fauna in Victoria (DEECA 2013) are listed in Table 1.3. Our native animal species rely on plant habitat for survival, and land managers are recognising the importance of both plant and animal communities and are taking action to conserve these ecological values.

Table 1.3 Native animal species found in north central Victoria and their conservation status (source: DEECA)

Common name	Scientific name	EPBC act status	FFG act status	DEECA Status
Barking owl	*Ninox connivens*	-	Listed as threatened	Endangered
Bearded dragon	*Pogona barbata*	-	-	Vulnerable
Brolga	*Grus rubicunda*	-	Listed as threatened	Vulnerable
Bush stone-curlew	*Burhinus grallarius*	-	Listed as threatened	Endangered
Brush-tailed phascogale	*Phascogale tapoatafa*	-	Listed as threatened	Vulnerable
Grey-crowned babbler	*Pomatostostomus temporalis temporalis*	-	Listed as threatened	Endangered
Growling grass frog	*Litoria raniformis*	Vulnerable	Listed as threatened	Endangered
Lace monitor (or tree goanna)	*Varanus varius*	-	-	Endangered
Macquarie perch	*Macquaria australasica*	Endangered Vulnerable	Listed as endangered	Endangered
Malleefowl	*Leipoa ocellata*	Vulnerable	Listed as threatened	Endangered
Murray cod	*Maccullochella peelii*	Vulnerable	Listed as threatened	Endangered
Pink-tailed worm lizard	*Aprasia parapulchella*	Vulnerable	Listed as threatened	Endangered
Powerful owl	*Ninox strenua*	-	Listed as threatened	Vulnerable
Regent honeyeater	*Xanthomyza phrygia*	Endangered	Listed as threatened	Critically endangered

Protect wildlife

All native animals are protected by law under the *Wildlife Act 1975* (unless exempted under licence or other government orders). Some of these species are further protected under legislation such as the *FFG Act 1988* or the *EPBC Act 1999*.

For information about your obligations regarding the Victorian Acts, your first point of contact should be DEECA. Your property may be covered by an overlay to protect vegetation or a threatened species. Contact your local government planning department to find out.

Snakes

Killing or interfering with native wildlife – including snakes – is an offence. Snakes are protected in Victoria under the *Wildlife Act 1975*. Ironically, most cases of snakebite occur when people are trying to catch or kill snakes.

Contact DEECA Customer Service Centre on 136 186 to get details of your nearest licensed snake catchers (they usually charge a fee for service).

Case Study

Plains-wanderer – north central Victoria a stronghold for this unique threatened species

The Plains-wanderer is a small, cryptic, ground-dwelling bird that predominately occurs in semi-arid, tussock-forming native grasslands in south-eastern Australia. Listed as critically endangered under the *EPBC Act 1999*, the species was also ranked the number one bird species in the world for conservation action based on its taxonomic distinctness and high risk of extinction in 2019.

The Northern Plains Grasslands in north central Victoria are a stronghold for the species with the Patho Plains and lower Avoca Grasslands home to one of the last remaining Plains-wanderer populations in the world. For more than a decade, the North Central CMA has been working with landholders who live on the grasslands, and other key stakeholders including Parks Victoria, Trust for Nature, First Nations groups, conservation groups, the Victorian Plains-wanderer operations group and the National Recovery Team, to protect and restore critical habitat for the species.

There are estimated to be less than 1,000 individuals left in the wild today. North Central CMA Project Manager Laura Chant said the key to the quail-like bird's survival was protecting and improving habitat through land management practices and controlling predators such as foxes.

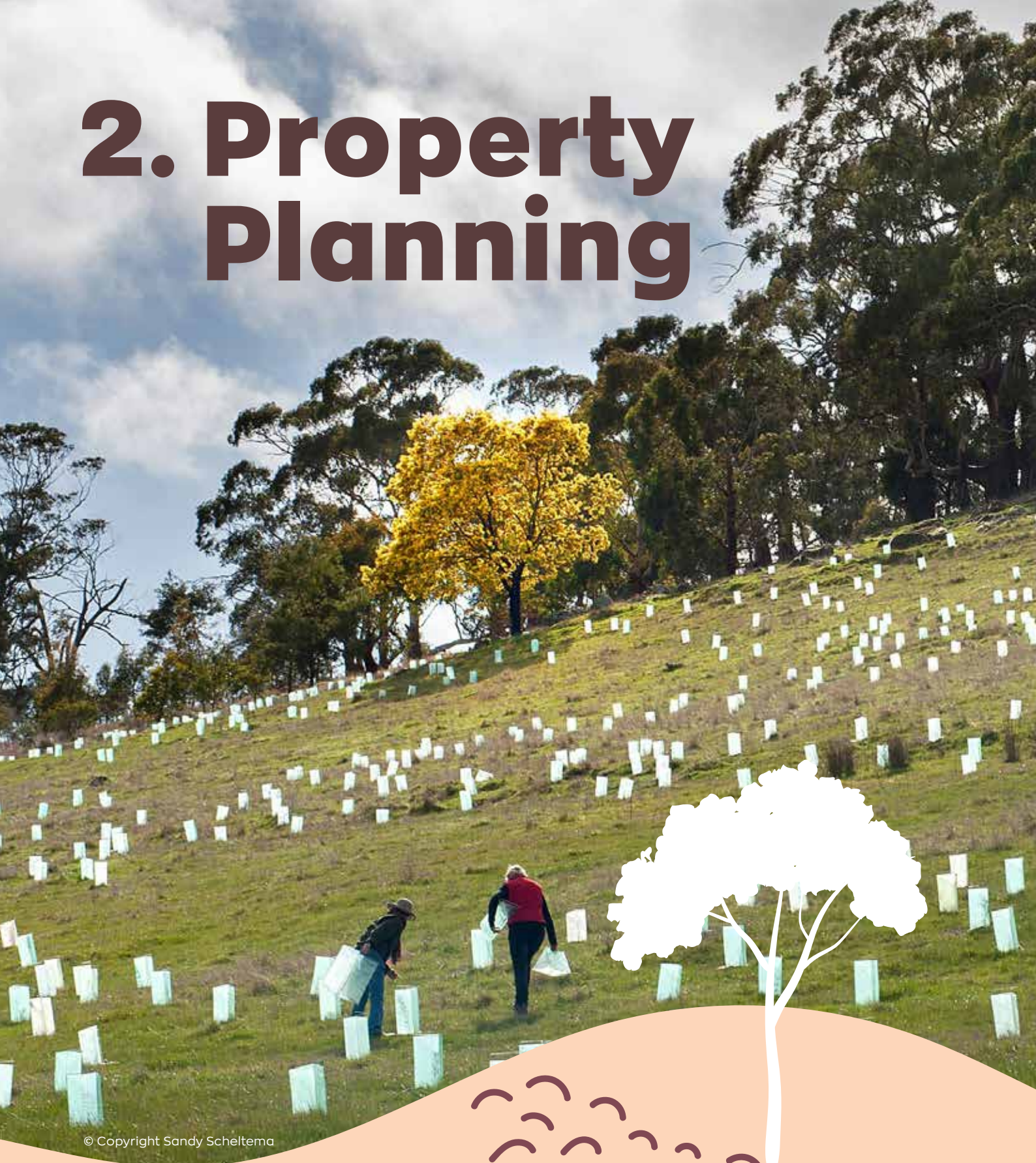
"There's nothing like the Plains-wanderer in the world. It's unique and worth protecting," she said. "The work we are all doing is focussed on creating the species' preferred habitat condition and removing key threats such as foxes to help it survive and, one day, thrive. And right now, the results look promising."

Autumn 2024 monitoring undertaken by Dan Nugent from Bush Heritage Australia detected 33 adults (19 female and 14 male) and 17 juveniles, including two clutches of chicks, which estimates out to a population of 731 in the sites under management though Trust for Nature covenants and on public land. "These numbers are encouraging from a conservation perspective, as they suggest imminent regional extinction is unlikely," Mrs Chant said. " Some of the land these birds call home was impacted by the 2022 floods, so to see the numbers remain steady is good news. It also highlights that previous long-term investment in vegetation management and active fox control, delivered in partnership with landholders and partners is working. The next step is to keep the focus on habitat enhancement and predator control with an aim to increasing Plains-wanderer numbers."

North Central CMA are a member of the Commonwealth Regional Delivery Partners panel and are currently delivering the Plains for Wanderers 2023-2028 project, funded by the Australian Government Natural Heritage Trust.

> "In Victoria, habitat loss driven by conversion of native grasslands to croplands is a major threat."

2. Property Planning



Property Planning

Before purchasing a small rural property or farm there are several important aspects that need to be considered. These include potential land use options, access to water and your legal obligations and responsibilities.

The Property Planning chapter aims to inform you of things you need to consider before you purchase a rural property. We also provide you with some advice on how you can design a property plan to help you achieve your life on the land goals and discuss the several different property management options that are available.

Setting a vision for your land

If you have just bought a rural property, a property plan can help you achieve your life on the land goals. This will help you to play an effective role in supporting a healthy landscape in the north central region.

Property plans take a wholistic view of the land and are useful for both farmers and rural residential landholders. A simple property plan (see Appendix 3) will help get you started. Table 2.1 will help you understand the landscape and property features you need to consider.

Skills and knowledge

Many rural residential land managers don't always have the skills, knowledge or time to manage their land in a way that supports environmental values. Before making a tree change it is good to have an understanding of whether you have the skills to undertake what is involved in land management.

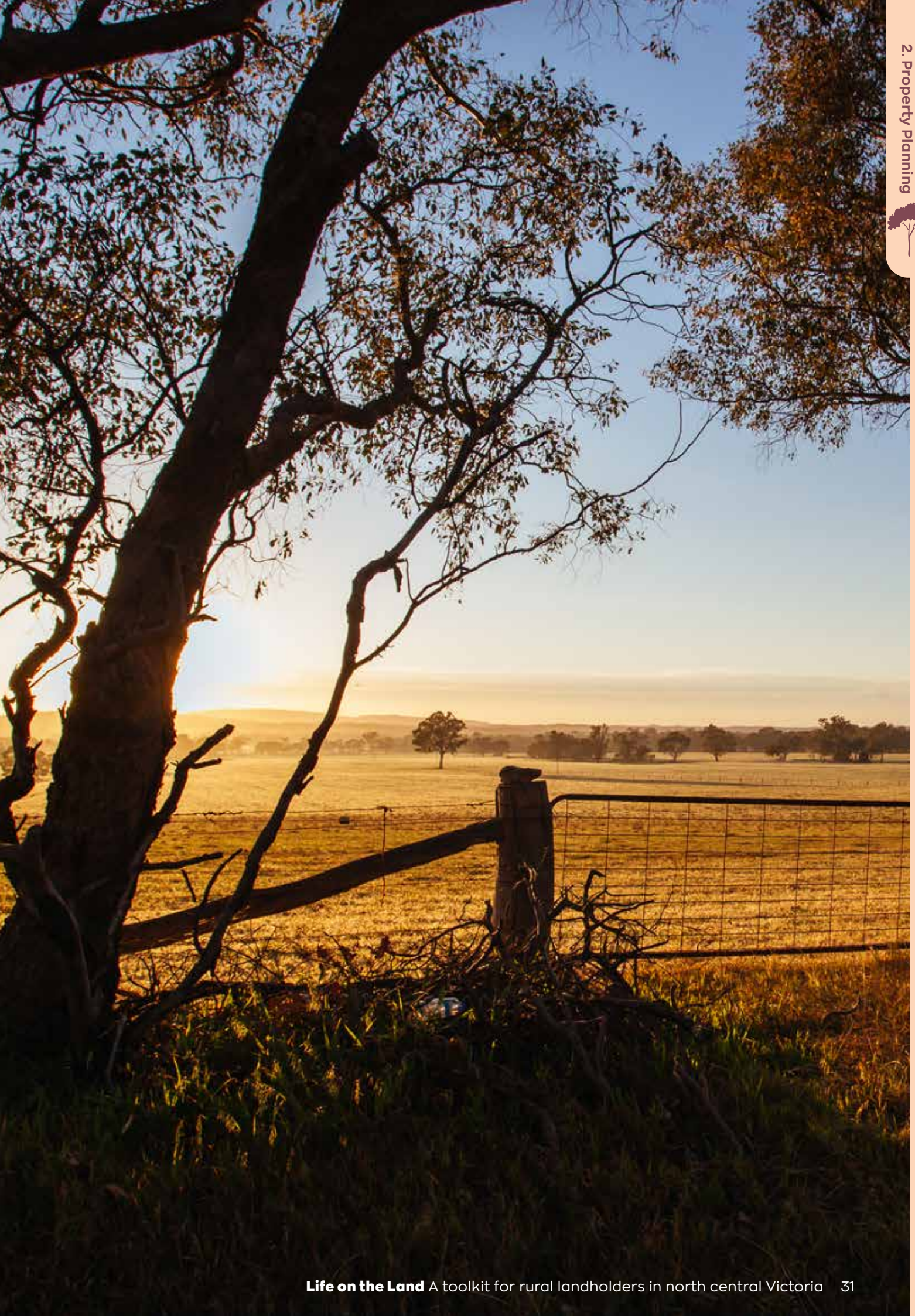
- Do you require training in land management?
- Are local contractors available to provide support services (e.g. fencing, transporting livestock)?
- Is agistment, leasing or share farming an option?

Understand your property before you buy

Working through the following checklist will help determine whether a property is suited to your life on the land requirements.

Table 2.1. Before you buy a rural property checklist

Checklist	Considerations
Animal management	• Are there any restrictions on agriculture or the number of animals that can be kept on the property? • Does the property have adequate infrastructure such as fencing, stockyards, shade and watering points? • Is grazing livestock on the property an option? How many livestock could the property carry? How much feed and water will any livestock need? • Is there a risk of previous chemical or disease contamination that might affect the ability to graze livestock? • What animals do my surrounding neighbours have?
Approvals	• What are my legal obligations for managing the property? • Are there restrictions on land use? How is my land zoned?
Community services	• Isolation or seclusion can be very appealing, but how remote is too remote for you and your family? • How far away from your property are healthcare, shops, fuel and other services you require? How long is the commute and how regularly will you take the trip? • How far away from your property are schools and transport? • What are the surrounding employment opportunities?
Cultural and historical values	• Assess the property's cultural and historical assets • Aboriginal places and objects can be found all over Victoria and are often near major food sources such as rivers, lakes, swamps and the coast. • Laws exist to protect Aboriginal and European heritage. • Find out whether your property has any recorded Aboriginal cultural or significant heritage places or sites.
Natural assets	• Assess the property's natural resource assets. What native plant and animal species are located on the property? • Do you need to repair any serious land degradation issues? • Are there any signs of salinity or erosion on the property?
Pest management	• Are there serious pest plants or animals and what level of threat and/or control is required?
Property access	• Who is responsible for local road maintenance? Is my road a shared road? • What is the road access like? Can you access the property in all weather conditions?
Property infrastructure	• Do the fencing, sheds, water pumps, dams, drains, bores, irrigation and water supply infrastructure meet your needs for the property? • What will the ongoing costs be for their maintenance?
Surrounding landscape	• Investigate land use on neighbouring properties and the likely impact on your land and lifestyle • What existing activities are in my neighbourhood? Identify any intensive animal industries, sewerage treatment facilities and processing plants nearby.
Utility services – water, electricity, sewer, internet, road	• Not all rural localities enjoy easy access to utilities typically associated with modern life. Check the availability of water, electricity, waste disposal, internet and phone services. • What council services (e.g. waste disposal) are available? What do these services cost?



Property management options

The traditional concept of owning and managing your own small property or farm is just one of several different property management options available. Other options include leasing, agistment or share farming. These alternative options can be a great way to get into farming as they reduce the capital outlay required and the level of risk. For small landholders these options can provide a mechanism by which their land can be managed by an experienced farmer while they still enjoy the country lifestyle.

Agistment

Agistment of livestock is a feeding option that farmers can utilise when stock feed is short on their home property. It can also provide a risk management option against climate variability and high feed costs. The arrangement is usually short-term and can be informal. A written agreement is highly recommended to avoid disputes, as it clearly stipulates the responsibilities of each party.

Share farming

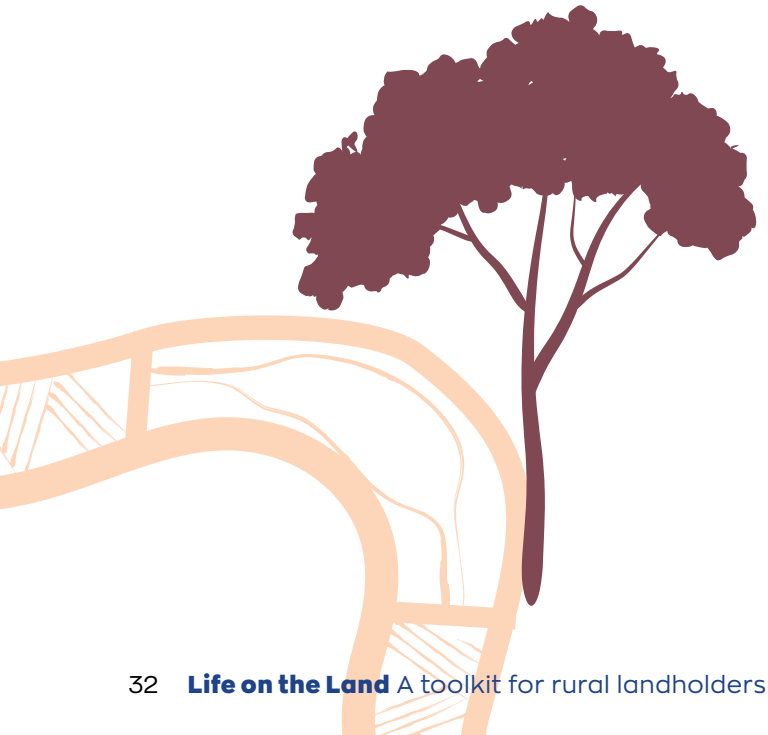
Share farming is an arrangement between the share farmer(s) and the landowner to share the work, costs and income from the property. The arrangement should form a written contract that clearly outlines the responsibilities of each party, for example: start and finish dates, income and cost sharing arrangements, agreed farming practices and so on. Several industry groups have standard contracts that can be adapted to the individual situation.

Leasing

Leasing land is a longer-term arrangement that offers more secure income than share farming for the landowner. The returns to the landowner are not influenced by variations in climate, commodity prices or farming ability. The arrangement also offers a more certain future to the lease.

A written agreement is required to document how the land can be used, all the conditions the tenant must follow and a dispute resolution process. For example, the agreement may include items such as stocking rates, fertiliser applications and agreed crop rotations.

A lease longer than three years can be registered on the land title to give security of tenure regardless of whether the land is sold during the lease period.



Case Study

This farm needs a farmer

Melissa Joy and her family moved to Kyneton a few years ago. Melissa wanted to give her young family all the benefits of a rural lifestyle but it wasn't long before a lack of land management experience caused a few problems.

"I was so excited about living on acreage but I didn't really know what I was in for. I thought it would just be a 'bigger' suburban block but there's so much more to it than that," she said.

Melissa learnt through her own experience how costly mistakes could be when starting out on a larger property.

By chance, Melissa met with her neighbour and retired farmworker Noel Jenner who brought some local and practical advice.

"Noel was fantastic. His mentoring meant that we have been able to better manage our land to get the most out of it."

It occurred to Melissa that many other tree changers were in the same situation as her family and that help was available, it was just a matter of making the right connections.

Melissa went on to establish a community development project, This Farm Needs a Farmer which aimed to connect tree changers with retired and active farmers, local businesses, services and advice providers. She was awarded the prestigious 2018 Victorian AgriFutures™ Rural Women's Award for her work founding This Farm Needs a Farmer.

Since the project, Melissa has now pivoted to working on the Regenerator farm management program and hosting the Life on the Land exhibition tent at the Kyneton Agricultural Show.

"Tree changers are interested in managing their properties sustainably and are hungry for advice and guidance. There is always something new to learn and I hope these events are a way to support successful farm lifestyles," she said.

3. Water at Home

Water at Home

Water is a precious resource in north central Victoria, as climate variability can result in periods of drought and low water supplies for everyone.

Population growth in major towns, such as Bendigo, is placing further pressure on our waterways and water supply systems. It is becoming increasingly important for communities in the region to conserve water to ensure we have enough to get through even the driest summers. Using less water also means there is more for our rivers and streams, which helps keep them and us healthy.

On average, a person uses about 200 litres of water every day. Only five to 10 litres of this water is required for basic survival, including drinking and food preparation. The remaining 190 litres are used for lifestyle purposes such as showering, toilets, washing clothes and the garden. Over half of this water ends up as wastewater. Some communities have been able to reduce their daily water usage to 130 litres per person by implementing water-saving practices and products. Figure 3.1 below describes some top tips for saving water at home and in the garden.

The Water at Home chapter aims to inform you about simple water-saving practices you can do at home. We also explain water storage solutions and provide you with how you can maintain healthy water for you and the region to enjoy.

Figure 3.1: Top tips for saving water at home and in the garden

Water savings for your household	Water savings for your garden
Install a rain watertank for water storage	Recycle water where possible and use grey water in your garden
Install water-saving devices – AAA rated shower heads, grey water systems and dual flush toilets	Plant native, indigenous plants. They are water-wise and can handle the local climate.
Reduce shower times to 4 minutes	Water your garden in the early morning or late at night when evaporation is low
Turn the tap off when brushing your teeth	Mulch your garden beds. Mulch can reduce water evaporation up to 70%
Fix taps and toilets that leak. A small drip can waste over 200 litres of water per day	Group plants with similar water needs together
Use the dishwasher and avoid rinsing the dishes prior. Use economy cycle on the dishwasher	Water plants on alternate days. Water the garden less often but more thoroughly
	Keep lawn areas to a minimum

Water storage - rainwater tanks

Collecting rainwater simply involves collecting rain from the roofs of buildings and storing it in rainwater tanks for later use. It can be used for various purposes such as drinking, washing, bathing and gardening, provided that the system is well maintained and the water is clear and has little taste or smell.

The benefits of rainwater tanks are that they can reduce water bills, conserve water and serve as water storage all year. Using rainwater can save large amounts of purchased water especially for watering your garden, which accounts for 35-50 per cent of domestic water use.

Further savings can be made when rainwater is used for toilet flushing (about 20% of domestic water use), as well as in the laundry, kitchen and bathroom. It can also be used in pools and for washing cars.

In many rural areas rainwater is used for all domestic needs since there is no access to the mains supply. Additionally, it provides a resource for year-round firefighting, especially during the peak of summer when dams can sometimes be empty when water is needed the most.

Things to consider when installing a rainwater tank:

- Size of tank – this will depend on roof capacity, local rainfall and the amount of water storage required.
- Water pressure - you will need to consider a pump or header system to provide water pressure.
- Water quality – to ensure water is fit for consumption, consider what could contaminate your water such as leaf litter from surrounding trees. Consider installing leaf guards, filters and first flush systems.

House and garden

Recycling grey water is an effective way to save water, especially during times of drought and water restrictions. Grey water is wastewater that doesn't come from the toilet and includes water from various sources such as kitchen sinks, washing machines, laundry tubs, hand basins, showers and baths. This water may contain organic materials, pathogens, bacteria, viruses and cleaning products. Plants will readily use the nutrients in the cleaning products and organisms in the soil will digest pathogens. So, it's a safe and eco-friendly way to keep your garden healthy.

Homeowners on a budget can install temporary systems, which simply involve connecting a pipe from your washing machine to your garden. These systems are useful during summer or in droughts and are designed for immediate grey water use only.

Alternatively, homeowners can install specialist systems that recycle grey water year-round, although a permit is required from your local council before installation and an agreed on-site treatment plant management program must be followed.

Best practice for recycling grey water for use in the garden

Do your research before installing a system for grey water reuse. All grey water should only be used when following basic safety guidelines, as it can pose risks to human health and the environment. The Environmental Protection Authority (EPA) supports water conservation methods and believes that grey water can be used effectively and safely in domestic situations by following several simple tips outlined in Table 3.1 below.

Table 3.1: Best practice management tips for recycling grey water for use in the garden

Do	Don't
✓ Use wastewater only from baths, showers, hand basins and washing machines, preferably the final rinse water	✗ Use grey water on vegetables or other edible plants if the crop is to be eaten raw
✓ Only use grey water on the garden and rotate which areas are watered	✗ Use grey water that is contaminated, e.g. wastewater used to launder nappies
✓ Only apply the amount of water that the soil can absorb	✗ Use kitchen wastewater (including from dishwashers) due to the high concentration of food wastes and chemicals that are not readily broken down by soil organisms
✓ Always wash hands after watering with grey water	✗ Store grey water for more than 24 hours
✓ If it rains or the ground is wet, stop using grey water	✗ Let children or pets drink or play with grey water
✓ Stop using grey water if it smells or plants don't appear to be healthy	✗ Allow grey water to flow from your property or enter stormwater systems
✓ Use natural and safe detergents, cleaning agents and soaps (e.g. low phosphorus, environmentally friendly) to prevent contamination of water	
✓ Use grey water immediately	
✓ Deliver grey water by sub-surface drip irrigation	

Water storage - dams

A dam is anything which collects or stores water by means of excavation, a bank, a barrier or other earth works. Dams modify the volume, speed and frequency of water flow. Diverting too much water from waterways for dams can greatly reduce inflows, causing nutrient build up and impacting available habitat for aquatic plants and animals. Building a dam in a proclaimed water supply catchment means that some of the water that was relied on as part of the domestic water supply system for a town or city is diverted away from the system.

Landholders must check the licensing and/or planning permit requirements before constructing or modifying a dam. Planning permits are required by some local councils to build a new dam or to extend an existing one. If the proposed or existing dam is on a waterway, a permit may also be required from the relevant water authority. The permit will assess height and capacity of the dam and other important conditions to ensure large and potentially hazardous dam owners take proper precautions to protect life and property.

Other dam considerations

Before constructing or modifying a dam, alternative water storage options should be considered, such as rainwater tanks and gravity fed watering systems.

Rainwater tanks can be used to collect reliable, good quality water from buildings at relatively low costs. They also have minimal construction and maintenance requirements compared to dams. With no exposure to wind they also have lower evaporation losses.

Rainwater can be used for household consumption, livestock watering and/or garden irrigation.

For livestock watering, a gravity-fed system is used to transfer water to troughs around the property. Water is pumped from a rainwater tank to a header tank using a windmill, solar pump, electric pump or fuel pump. The header tank supplies water under pressure to troughs using gravity. Header tanks are located higher than the troughs but if your rainwater tank is higher, a header tank is not required.

Best practice for healthy dams

A healthy farm dam is an important resource supplying water for livestock, irrigation, gardens and fire management, providing valuable wildlife habitat and increasing farm productivity and property values. Farm dams need careful management to ensure they are kept in good condition. Table 3.2 shows several management strategies to create healthy dams.

Table 3.2 Management strategies to enhance dam health

Consideration factors	Management strategy
Water quality	Manage livestock access to the dam by fencing and providing alternate water source. This will reduce water contamination and damage to dam wall structure.
Trees	Plant mat-forming perennial species or small shrubs with outward-extending fibrous roots. 100% pasture cover should be maintained on the spillway, drainage lines and depressions all year round to prevent erosion. Don't plant trees and deep-rooted shrubs on the dam wall, spillway or inflow area as their roots can cause tunnelling and leakage.
Construction or integrity of dam	Check dam walls regularly for signs of damage from burrowing animals or plants. Leaking dams waste water and can contribute to erosion.
Pipes	Check pipes in the dam wall regularly to ensure they aren't blocked.
Reduce evaporation	Plant shelter belts against the prevailing winds to help prevent evaporation.
Enhance biodiversity	Plant native plant species (trees, shrubs, groundcovers and aquatic plants) that would typically be found in local wetlands in and around the dam to provide habitat for fish, frogs, birds and other wildlife. A log, dead tree or an island in the dam are excellent roosting sites, and islands provide security from predators such as foxes. Wildlife-friendly dams can provide a number of co-benefits such as improved water quality, shade and shelter for livestock and natural pest control in pastures.

On large properties it may not be possible to carry out all the management strategies described above on all dams. However, you can prioritise different actions according to the dam's proximity to waterways, size, usage patterns and existing features or problems.

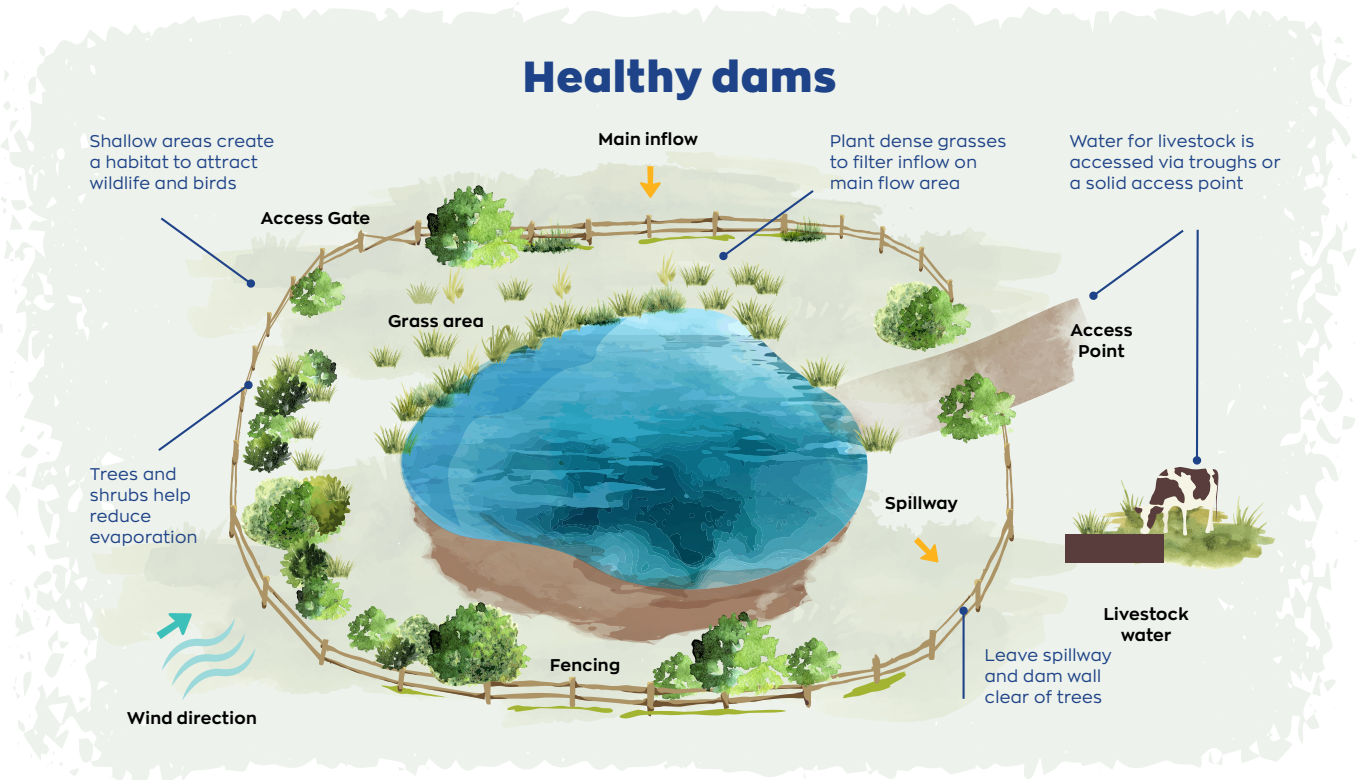


Figure 3.2: Healthy dams

Contributing to good water quality

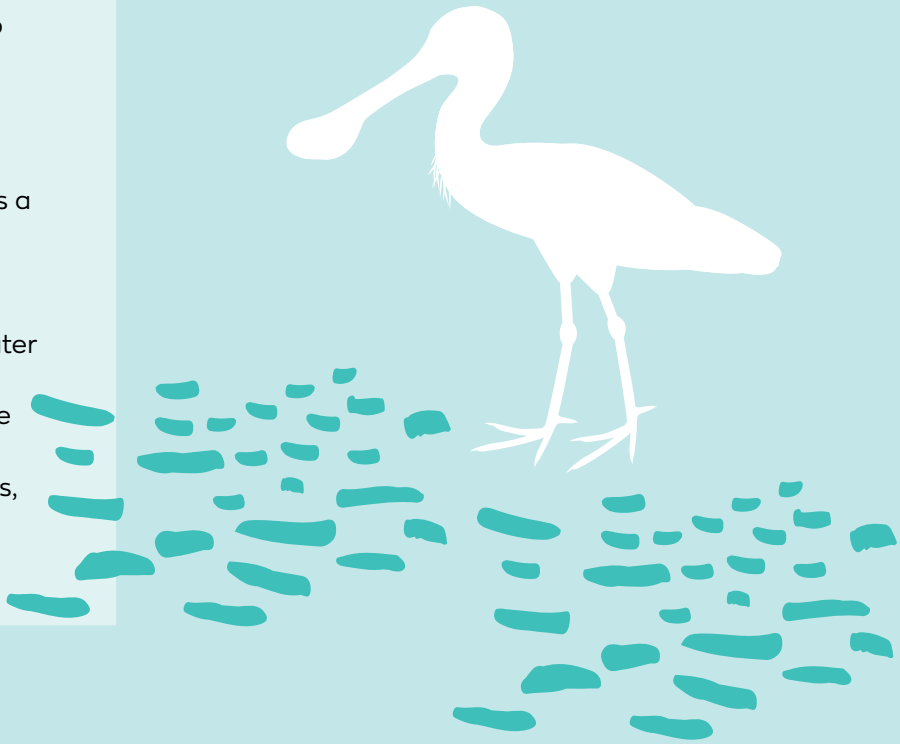
Protecting the health of waterways is a crucial part of owning a property, and run-off has to be managed so it does not affect water quality. Polluted water such as septic effluent and contaminated surface run-off must be kept clear of dams, as well as rivers, streams and drainage lines crossing your property. Land managers should aim for the water draining from their property to be as clean as when it arrived.

Good planning and managing run-off by planting trees, shrubs and grasses as buffers helps stop nutrients, pathogens, chemicals and sediments from entering waterways and water storages.

Helpful Hints

Positive actions for catchment health include:

- Get involved in Landcare, Waterwatch or other local community groups for advice and support
- Use chemicals efficiently and carefully, or seek alternative methods where possible
- Retain and replant native vegetation to prevent erosion
- Protect stream bank vegetation so it provides a filter against pollution
- Install fencing to protect stream bank vegetation from livestock so it provides a filter against pollution
- Manage on-site wastewater treatment systems (septics) properly
- Improve your wastewater and stormwater treatment systems
- Manage land to prevent or minimise the impact of large-scale bushfires
- Report accidental spills near waterways, such as fuel, chemical or fertiliser.



4. Healthy Habitats

Healthy Habitats

The Healthy Habitats chapter focuses on environmental values and aims to explain how to read your natural landscape and improve it with vegetation to enhance the biodiversity values on your property.

Read your natural landscape

Much of the remaining vegetation or remnant vegetation in the north central region is found across small rural properties, farmland and public land. Patches of remnant vegetation provided vital habitat for many species, including endangered plants and animals. Protecting creatures of all sizes – down to the tiniest microorganism – and their habitats, helps reverse the effects of human activities that threaten life and life-support systems, and agricultural productivity.

Get to know your land's natural landscape features. Consider patches of existing trees (remnant vegetation and large old trees), dead trees, fallen timber, wildlife, creeks, drainage lines, depressions, adjacent vegetation, and neighbouring public/private land and roadsides.

Which of these elements do you have on your property?

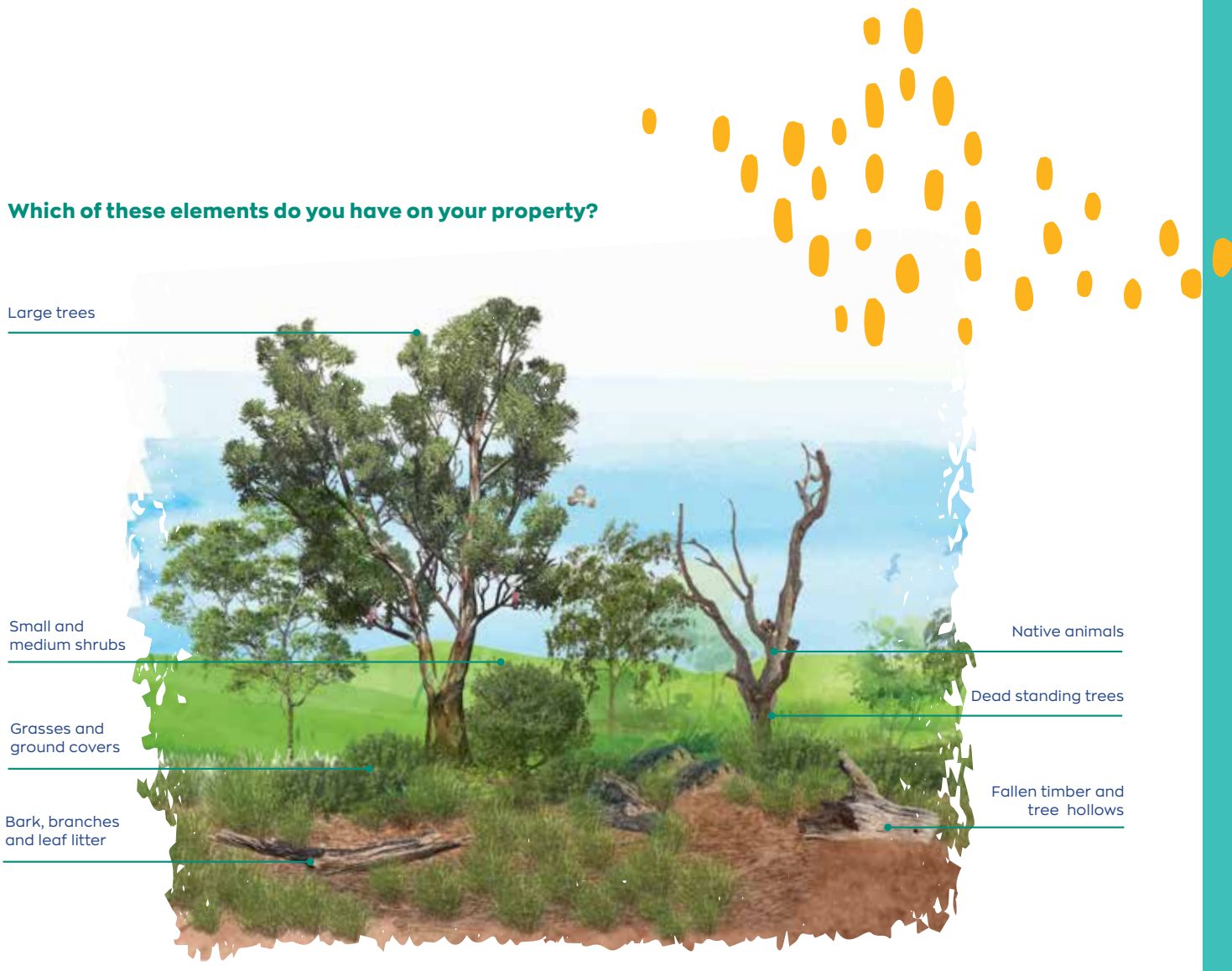


Figure 4.1: Landscape and property features to consider when completing a property plan

Native vegetation regulations

Recognising the importance of native vegetation, the Victorian Government has regulations controlling its removal and destruction. All landowners must check with their local council before attempting to cut down, trim, clear or otherwise remove native vegetation on private or public land. This includes herbs, grasses and other ground flora – not just trees.

Planning controls and regulations form part of all local council planning schemes. Planning schemes regulate land use and development and apply to all public and private land so all people and organisations must comply with the requirements of their local planning scheme.

Planning schemes also include overlay controls, which may specify additional requirements, including native vegetation protection, regardless of the size of the block. State and local planning controls are regularly reviewed and do change. Early discussions with local council staff will confirm whether a planning permit is necessary and identify any other requirements.

Looking after the native vegetation on your property

Native vegetation forms a vital part of any rural property and, on a broader scale, the catchment you live in and its biodiversity. Just like managing weeds, looking after soil health and water quality is an integral part of being a responsible landholder, so too is looking after vegetation in our landscapes.

We can all contribute to looking after native vegetation by:

- Protecting remnant vegetation
- Enhancing remnant vegetation
- Building on remnants
- Creating landscape links.

Helpful Hints

Simple tips for maintaining and improving the biodiversity on your property:

- Learn about the local plant and animal species in your areas
- Connect with local community groups undertaking biodiversity projects
- Protect and improve existing vegetation and habitat, including large old paddock trees
- Expand existing remnant trees by revegetating, including alongside roads or other vegetated land (public or private)
- Link remnants by establishing wide corridors or large patches of native vegetation, to create corridors or 'stepping stones' in the landscape for species to live in and move through
- Replace vegetation in critical areas such as along creeks, drainage lines and depressions
- Reinstate wetlands by allowing natural water flows to drain into them
- Keep it natural-leave fallen timber, large dead standing trees and rocky outcrops for habitat
- Control your pest plants and animals
- Manage domestic stock to protect remnants and waterways.

Gaining an intimate knowledge of your land takes time – time over the seasons, time comparing good and bad years and how your land responds, and even time as you become more aware and educated. The more you know, the more you and your property will grow.

Protecting remnant vegetation

Remnant native vegetation is very valuable, partly because it is so difficult to re-create, and should be the initial focus of protection and management. Compared to starting from scratch, remnant vegetation (even in poor condition) is often more stable, less weedy and often more species-rich than restored landscapes.

Protection measures might include fencing, eliminating rabbits from the site, and weed control. Carefully controlled grazing, and/or even the use of fire (with appropriate approvals in place), might be an option to manage very grassy sites to maintain an open structure and diversity.

After protection, wait and observe. Often plants – perhaps even different species – will regenerate naturally. You can then decide whether further assistance is needed. Keep in mind that bulbous/tuberous plants might only appear seasonally, especially in spring.

Enhancing remnant vegetation

Remnant vegetation has often been degraded by grazing (rabbits, domestic stock or even kangaroos and wallabies), weed invasion, inappropriate fire regimes, or physical disturbance such as historical gold mining.

Controlling or reducing these threats is a good place to start when thinking about enchaining remnant vegetation on your property.

Restoring the landscape with the reintroduction of missing shrubs or ground layer species can greatly improve the remnant areas. Making small changes can help support biodiversity and protect the natural landscape.

TIP: You can find out which vegetation type (based on Ecological Vegetation Classes) occurs on your property by visiting the Department of Energy, Environment and Climate Action website and selecting the Biodiversity Interactive Map.

Helpful Hints

There are so many benefits to gain from improving our natural landscapes with revegetation projects using indigenous plant species. These include:

- Improving the appearance of degraded landscape
- To stabilise soil, reduce erosion and improve water quality
- Providing shade and shelter for livestock and native animals
- Reducing invasive weeds such as blackberry, gorse and serrated tussock
- Enhancing native plants and providing habitat for wildlife
- Providing a source of wood products
- Generating carbon for carbon credits
- Maximising vegetation connectivity
- Adding economic, commercial and social value to your land.

Building on remnants

Expanding from your remnant vegetation is the most efficient way to add habitat value and encourage natural regeneration. Expansion could include fencing off and revegetating a linear area next to roadside vegetation. Extending out from remnants along drainage lines, down from hill-top vegetation, or around paddock remnants is a great way to create a larger area. Streamside and drainage line vegetation is especially important habitat.

Create landscape linkages

Think about how you can contribute to linking up remnants through the landscape and enabling species to move around.

For example, mobile animals such as some birds, bats and kangaroos can use creek lines, roadside vegetation and other remnants as 'stepping stones' to sustain and guide them through the landscape. Although mobile species such as birds and bats can cope with gaps between good habitat, less mobile or cover-dependent species need continuous pathways or corridors of suitable habitat.

Ideally, aim to link patches of remnant vegetation to maximise the effect. If possible, target areas on your property that contain streams, drainage lines, depressions or wetlands. These areas once supported relatively high-value habitats for native animals. If you can link a remnant higher in the landscape down to your lower revegetated areas, then you are providing an interface between terrestrial and aquatic habitat, and creating diversity.

Remember, links don't necessarily have to be physical connections to be useful. Depending upon the species – both plant and animal – habitat links may include gaps of 50 metres, 500 metres or more, to create an effective landscape connection.

Other landscape priorities for revegetation

Salinity control

If they are cleared, hills in much of north central Victoria allow rainfall to percolate down into the groundwater, causing saline discharge further down the slope on adjoining flat land. This is especially common in sedimentary and metamorphic country (refer to soils chapter for further information). Revegetating hill country may help reduce salinity in the long-term. Hill country is suited to direct sowing.

Waterway protection

Native vegetation also acts as a protective buffer in and around waterways. It maintains good water quality, prevents erosion and provides very rich wildlife habitat. Direct seeding can be problematic in in areas where flooding occurs or areas prone to erosion. Tubestock planting is often highly successful due to increased soil moisture near waterways, and natural regeneration is often prolific following floods if parent plants are present.

Large old paddock trees

Large old paddock trees can provide shade for livestock and help to maintain watertables at depth and prevent salinity. They also provide significant habitat for native animals, including hollow-dependent species. These trees are often stressed from exposure to extreme weather, ringbarking at their base from livestock rubbing and chewing the bark, and high levels of nutrients from livestock manure and urine. Large old paddock trees have a limited life and there are usually no replacement trees.

It is vital to keep large old trees. They are an irreplaceable feature of the landscape and an invaluable habitat for wildlife. The habitat value of a tree is considered to be proportional to its age – the older the tree, the more nectar it produces – and the rough bark provides lots of places for insects to hide and other animals to forage. As trees reach the age of 100 years or more, they begin to form hollows. With further ageing, a variety of hollows are formed and the tree becomes a multi-storey housing complex for many different animals. Conservation of less mature trees is also extremely important, as these will be the next generation of large old paddock trees and should be fenced beyond drip zone to protect roots and enhance natural recruitment.

If you are going to revegetate some of your property, consider fencing off areas that include large old trees. This will enable natural regeneration to occur with a greater chance of survival. It is much easier and cheaper than planting tube stock and helps protect precious habitat.

What should you do with dead and fallen trees?

Old dead trees and fallen timber (sometimes referred to as woody debris) provide great habitat for birds and other animals. Before you clean up or burn your fallen timber, consider its value as habitat. A variety of animals use old dead trees for habitat. For example, the threatened brush-tailed phascogale prefers to look for food, such as insects, on dead standing trees. Because old dead trees are often hollow, many animals continue to use them as homes and for protection. Birds also look for these trees for perches – either for basking in the sun, resting, announcing their presence or to spot prey.

The importance of fallen timber is also often overlooked. Try a little test – carefully look under some fallen timber and see how many different insects there are. You might even see a frog or gecko. (Remember to carefully replace the timber to maintain the habitat.) If you're patient and watch carefully from a distance, you will notice that birds (and small mammals) also use fallen timber as part of their habitat.

Restoring landscapes with revegetation

The benefits of using indigenous plants for revegetation and improving habitat are now well recognised by farmers and land managers. The following section discusses the various revegetation methods and how to plan a successful revegetation program.

Revegetation methods

The three revegetation methods commonly used are natural regeneration, direct seeding and planting of seedlings (also referred to as tubestock planting). The selection of the revegetation method should be matched to the site, size of the project and budget. Land managers may choose to use a combination of revegetation methods to successfully improve their landscape.

1. Natural regeneration:

Supporting the natural germination of seedlings from seeds found in the soil profile or seedbank. Seeds maybe transferred by animal activities or fall and sprout from existing or nearby vegetation.

2. Direct seeding:

Using hand or mechanical methods seeds are sown into place at preferred location.

3. Tree planting:

Using hand or mechanical methods seedling plants (tubestock) are planted into the preferred location.

Table 4.1: Revegetation techniques and considerations

Revegetation techniques	Considerations
Natural regeneration	If you have native remnant vegetation on or next to your property there is an opportunity for natural regeneration to occur, whereby plants grow from seed naturally distributed to the site. Careful use of fire can also be used to regenerate native vegetation, as it releases seed from the canopy, creates a nutrient-rich seedbed and eliminates competition. **Advantages:** This is often the cheapest and most efficient way to increase the numbers of native plants. In some cases all that is required is the removal or reduction of grazing (by rabbits, livestock or even kangaroos and wallabies) allowing seeds to germinate from soil seedbanks or from seed transported to the site by water, wind or birds. **Disadvantage:** It can be very slow and require more maintenance such as ongoing weed control.
Direct seeding	Direct seeding involves sowing seed directly into prepared soil by hand or mechanical sowing. Preparation is essential and may involve soil ripping, weed control and fencing. **Advantages:** It is generally a more efficient method of revegetation, as time, labour and costs are lower than tree planting. It also allows a mixture of species and plant types (trees, shrubs and groundcovers) to be sown at once and plants are more robust due to better root growth. **Disadvantages:** Direct seeding often requires more planning and preparation, the establishment can be patchy and take several years and the method isn't suitable for heavy textured soils or deep, non-wetting sands.
Tree planting	Seedlings are planted by hand or using a mechanical seedling planter into the soil. Preparation is essential and may involve soil ripping, weed control and fencing. **Advantages:** The method is more reliable, immediate results and plant placement can be controlled. **Disadvantages:** Sites initially look unnatural, fewer species are planted and it involves high establishment costs. Seedlings grown in small nursery tubes are referred to as tubestock and are the most common source of plants for rural revegetation projects. A lower cost container-grown alternative to tubestock has been developed. Plug array or cell tray methods consolidate a large number of individual, small tubes into one tray. These trays allow cheaper production of seedlings and, depending on the design, may allow for healthier root systems in the plants. Both types of containers can be used for growing seedlings at home.

Figure 4.2: A simple guide to planning a revegetation program

Best practice for a revegetation project

It is a good idea to understand the time, materials and equipment, costs and the steps involved in undertaking a revegetation program. This will ensure that you will have a better chance of success with plant survival rates and not waste your time or money.

Seven best practice tips for revegetation programs are described below.

1. Planning – assess and understand site conditions including existing native vegetation, proximity to remnant vegetation, seasons and weather patterns and any limiting factors (e.g. pest plants and animals).

2. Preparing the ground – for example, weed management, soil preparation and/or fencing.

3. Pest management – Implement an integrated rabbit management program to increase the success of your program. Rabbits graze heavily on new plantings.

4. Seeds and seedlings – Selecting appropriate plant species considering indigenous overstorey, understorey and groundcover species. Choosing the right planting design and layout – plant placement, densities and the size and shape of the site to meet landholder objectives (e.g. shelter, biodiversity and/or control wind erosion).

5. Revegetation – Plant using the most appropriate technique(s) including natural regeneration, direct seeding or tree planting.

6. Site maintenance – Regular checks on your planting sites for plant health, plant survival rates, soil moisture, soil nutrients, fencing infrastructure, and impacts of rabbits and weeds.

7. Monitor – Record baseline data and review your plant survival rates to improve your future revegetation programs. Taking before, during and after photos of your revegetation site from a fixed point is one easy way to monitor success.

With climate variability, land managers should seek local advice from Landcare groups, neighbours and advisory organisations before embarking on a revegetation project. Table 4.2 provides a general calendar guide to timing your revegetation activities.

Table 4.2: Guide to timing of revegetation activities (source: Greening Australia)

	Year 1				Year 2			
Activity	**Spring**	**Summer**	**Autumn**	**Winter**	**Spring**	**Summer**	**Autumn**	**Winter**
1. Planning*	■	■						
2. Preparing the ground								
Soil preparation	■	■	■					
Weed control*	■	■	■					
3. Pest animal management								
Pest control	■	■	■	■				
Fencing	■	■						
4. Seeds and seedlings								
Seed collection, cleaning and ordering*	■	■	■					
Plant orders and propagation*	■	■	■					
5. Revegetation								
Natural regeneration	■	■	■	■	■	■	■	■
Direct seeding and planting					■	■	■	
6. Maintenance					■	■	■	■
7. Monitoring	■	■	■	■	■	■	■	■

■	Refers to the timing of activities for both semi-arid and medium to high rainfall environments
■	Refers to medium to high rainfall (500mm plus p.a.) areas only
■	Refers to semi-arid (250-500mm rainfall p.a.) areas only

*These activities should commence in advance of the seasons shown. Ideally:

- Begin planning two or more years ahead of seeding or planting
- Start weed control at least 12 months prior to seeding or planting or earlier depending on the site; order seed two years before seeding or planting
- Order plants at least twelve months prior to planting

Monitoring of revegetation

Monitoring allows us to learn what actions are most effective. Using this information, we can then improve and adapt the revegetation program to get the best outcomes for your property and the wider region.

By keeping good records and undertaking a simple monitoring program, it will help you understand:

- Costs associated with site preparation, planting and watering (if undertaken)
- What species survived and where
- How well plant species survive – under what environmental conditions, what are the preferred revegetation techniques and management conditions, and other factors such as grazing.

Conservation covenants

Landholders who would like to permanently protect remnant vegetation on their own properties can also do so with a conservation covenant. A conservation covenant is a voluntary, legally binding agreement negotiated between the landholder and registered conservation organisation, such as Trust for nature, which is then registered on the property's title. Landholders can contact Trust for Nature to arrange a visit and assessment of their property. Once the conservation values of a covenanted property have been identified, a specialist management plan is developed with Trust for Nature's regional staff.

Climate Ready Revegetation

Revegetation established today will likely see significant changes in temperature and rainfall over the coming decades due to climate change. Climate adjusted seed sourcing is one strategy that can be used to build climate resilience into your revegetation. This involves using seed that has been sourced from areas where plant populations are growing in similar conditions today as the predicted future climatic conditions of your restoration site. This seed can then be combined with locally sourced seed.

For more information visit www.nccma.vic.gov.au/resources

Connect

Many organisations are willing to provide advice and support for managing and enhancing native vegetation.

A great way to start is to join your local Landcare group – you will quickly learn about the importance of the remaining vegetation in your area, how to build or repair a fence, methods of pest plant and animal control, and so on. Visit the Victorian Landcare Gateway website or contact the North Central CMA to find your local Landcare group.

Other organisations include:

- Field Naturalists Clubs
- Greening Australia Victoria
- Natural Resources Conservation League
- Gould League
- ENVIRONS Australia
- Landcare
- Victorian Farmers Federation
- Trust for Nature
- Conservation Volunteers Australia
- Society for Growing Australian Plants
- Australian Conservation Foundation
- World Wildlife Fund for Nature
- Environment Victoria
- Friends of the Box Ironbark Forest

5. Pest Plants and Animals

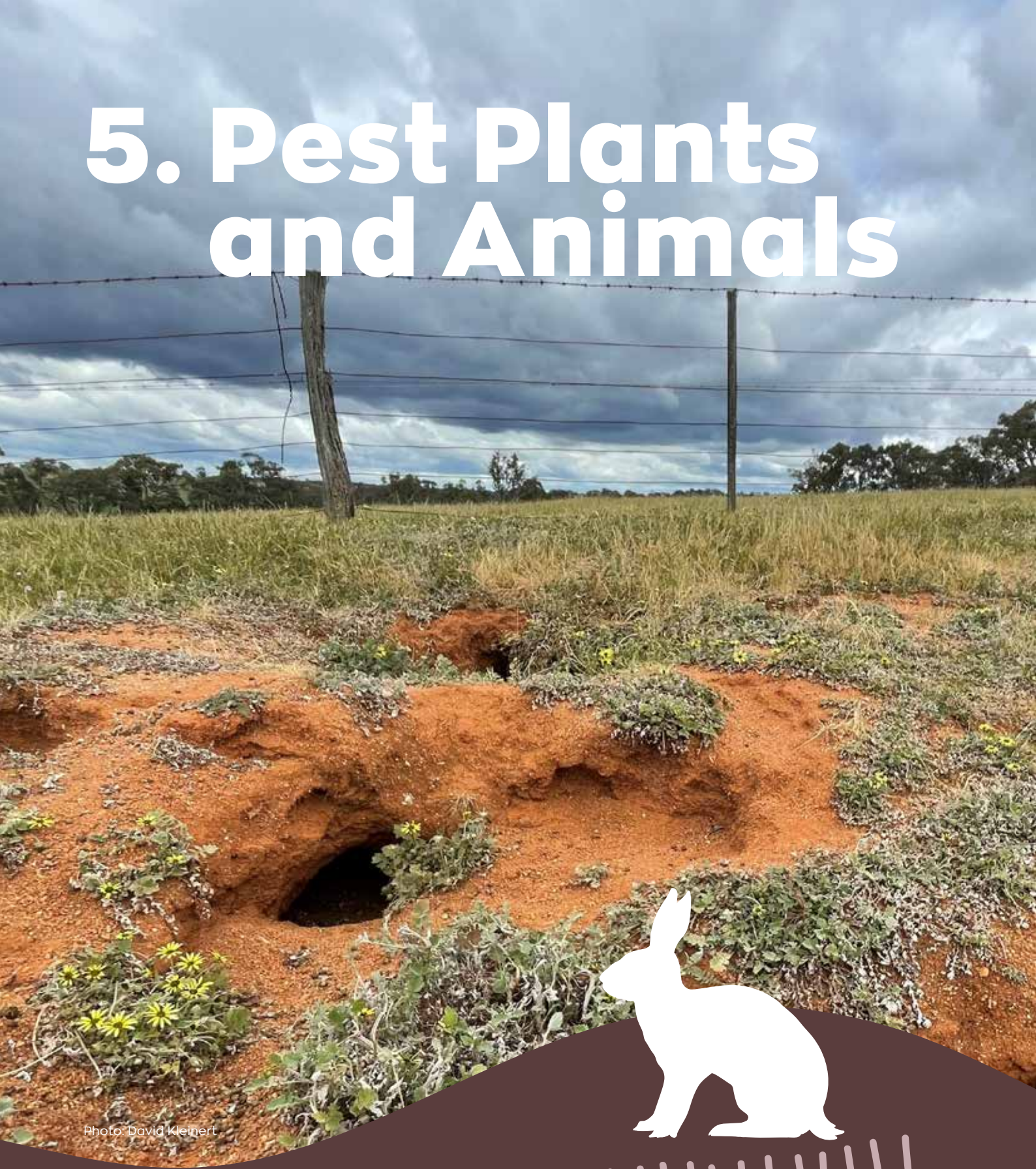


Photo: David Kleinert

Pest Plants and Animals

It doesn't matter how big or small your property is, managing pest plants and animals is everyone's business.

Unfortunately, it is not a matter of if but when your property will be challenged by a threat caused by pest plants and animals, and diseases. Controlling pest plants and animals is a long-term commitment. By being informed and working together to take action, we can protect what we value most.

Our region's native plants and animals are irreplaceable. This chapter aims to inform you about the impact of pest plants and animals, and how you can take action to manage them on your property.

Pest plants

Weeds cost the community millions of dollars each year in lost productivity and have a significant impact on the natural environment. All land managers have a responsibility to manage weeds on their land, irrespective of whether the land is public or private land.

What is a weed?

A weed may be defined as a plant growing in the wrong place or an aggressive plant that thrives when natural environments are disturbed or inappropriately managed.

They can be introduced plant species or plants native to Australia but growing outside their natural range. Weeds are introduced to an area through deliberate spread by humans (e.g. gardens and exotic tree plantings), accidental spread by humans (e.g. weed seeds or plant pieces carried on farm machinery or brought in with grain or fodder) and/or natural spread by wind, water, birds or animals (e.g. seed eaten by birds). Weeds negatively impact farm productivity, the environment, the economy, human health and amenity.

As a land manager, it is important to be able to identify weeds that may pose a threat to your land or neighbouring land. Early identification will enable you to implement management plans that prevent weed establishment or spread.

Noxious weeds

Under the *Catchment and Land Protection (CaLP) Act 1994* certain plants are declared as noxious weeds in Victoria and are classified as State Prohibited, Regionally Prohibited, Regionally Controlled or Restricted. In addition, as part of the National Weeds Strategy some weeds are also classified as Weeds of National Significance and require coordinated action across the country.

Noxious weeds may negatively impact agricultural productivity and/or the natural environment.

Land managers that fail to comply with the responsibilities outlined in the *CaLP Act* may be issued with a Directions Notice and/or a Land Management Notice by the DEECA, outlining the measures that must be undertaken for the control or eradication of the noxious weed species on their land. If works aren't carried out, the land manager may be liable for prosecution and severe fines, and/or DEECA may enter the property and carry out the works at the owner's expense.

Environmental weeds

Environmental weeds are plant species that predominately invade natural areas and compete with, or choke out, native plant communities. They cause damage to native plant communities by competing with naturally occurring vegetation for moisture, nutrients and light.

Native animal populations can also be affected by the change in vegetation due to the replacement of their natural food source and habitat with exotic species. Weed species also tend to provide harbour for pest animal species and some can be poisonous to livestock and other animals.

Some environmental weeds may have been introduced accidentally, for example, as a contaminant of imported grain or fodder, however, most have been introduced as a garden or decorative plant and then have escaped into the environment. The most common methods of spread are from dumped garden waste containing bulbs, seed or root pieces, deliberate planting in inappropriate areas and from birds or animals spreading seed. Some common environmental weeds include Cootamundra Wattle *(Acacia baileyana)* and Gazania *(Gazania linearis)*.

Land managers can help reduce the impacts of environmental weeds by controlling these weeds on their land and preventing their spread to other areas. Table 5.1 describes each of the noxious weed classifications and the associated land manager responsibilities.

Table 5.1: Legislative requirements of weed management in Victoria

Noxious weed classification	Description	Example
State prohibited weeds	Do not occur in Victoria, or it is reasonably expected that they can be eradicated from the state. DEECA is responsible for the management of these species wherever they occur throughout Victoria, whether it is on public or private land. Reporting these species to DEECA will ensure that treatment and removal are carried out in a safe and timely manner. If you suspect a State Prohibited Weed is on your property, please contact DEECA immediately on 136 186.	• Hawkweeds • Horsetails • Knotweed • Parthenium Weed • Alligator Weed
Regionally prohibited weeds	Are not widely distributed across north central Victoria but are capable of spreading further. It is reasonable to expect that these weeds can be eradicated from north central Victoria. Control is the responsibility of both public and private land managers on their land and VIC Roads on Declared Roads under the *Victorian Transport Act 1983*.	• Boneseed • Scotch Thistle • Soldier Thistle
Regionally controlled weeds	Exist in north central Victoria and are usually widespread. Continued control measures are required to prevent further spread to clean land. Control is the responsibility of both public and private land managers on their land and VIC Roads on Declared Roads under the *Victorian Transport Act 1983*.	• Silverleaf Nightshade • St John's Wort • Cape Tulip • Boxthorn • Bathurst burr • Blackberry • Gorse • Horehound • Patterson's Curse • Prickly Pear • Wheel Cactus
Restricted weeds	Seriously threaten primary production, Crown Land, the environment or community health in another state or territory and have the potential to spread into and within Victoria. If sold or traded in Victoria there would be an unacceptable risk of it spreading within Victoria and to other states and territories. There is no requirement for land managers to control restricted weeds on their property. However, they cannot be traded or transported within Victoria.	• Willow • Hawthorn • Cape Broom
Weeds of national significance (WONS)	As part of the National Weeds Strategy, 32 WONS have been identified, which require coordinated action across all states and territories to reduce their impact on Australia's productive capacity and natural ecosystems. The weeds are determined according to their: invasiveness, impact, potential to spread and socioeconomic and environmental values. Control is the responsibility of land managers as per the Victorian categories of noxious weeds described above.	• Parthenium Weed • Silverleaf Nightshade • Black Willow • Willow • African Boxthorn • Athel Pine • Bridal Creeper • Blackberry • Boneseed • Cape Broom • Chilean Needle Grass • Gorse

Weed management

There are various means of managing and controlling weeds, ranging from hand weeding to chemical treatment to biological control. Successful weed management typically involves a management plan, integrating several control techniques and continuation of maintenance over many years.

A weed management plan identifies the characteristics and weaknesses of the weed and matches the problem with a range of control techniques. The management plan also considers whether revegetation, pasture regeneration or crop establishment is necessary, once the weed has been removed, to prevent re-infestations, increase farm productivity and/or improve the quality of native vegetation.

Regular monitoring and follow up management are required to prevent weed re-growth and control new germinations and infestations. Best results are often seen where neighbours or communities work cooperatively to control weed species over a broad area.

Best-practice tips

For best results weed management should be implemented as part of an integrated management program which involves the use of several management strategies. The best results are achieved when neighbours work together to control pest plants across a landscape, rather than just on individual properties. Talk to your neighbours and your local Landcare group to work out a plan for coordinated action.

- Work with your neighbours
- Make a long-term management plan and stick to it
- Review and amend your plan as appropriate.
- Seek professional advice
- Aim to treat every plant
- Don't let plants set seed; understand plant cycles and when to treat plants
- Make weed control part of your annual program.

The following Table 5.2 describes several weed control methods and a description of each method.

Table 5.2: Weed control methods, descriptions and considerations

Weed control method	Description and considerations
Environmental management	Environmental management aims to alter the conditions required by a particular weed. It includes the use of fire, moisture and nutrient control, over-planting and/or grazing management to reduce the competitiveness and survival of the weed.
Mechanical control	Mechanical weed control refers to physical activities that inhibit weed growth by removing or damaging the weed. It includes hand weeding, slashing, mowing, grooming, felling and cultivation. Mechanical weed control often involves the use of machinery or powered tools so machinery hygiene is critical to prevent the spread of weed seeds or plant parts between sites or properties.
Chemical control	Chemicals designed to control weeds are called herbicides. When used correctly they are a highly effective weed control strategy. They control weeds either by speeding up, stopping or changing the plant's normal growth patterns by defoliating the plant or drying out its leaves or stems. Herbicides can be specific, meaning they target a particular type of plant, or nonspecific, meaning they have the potential to kill any type of plant. Land managers should take great care when using herbicides as incorrect use can cause a number of problems, such as damage to non-target species, spray drift, soil residuals and health risks involved in their handling and storage.
Biological control	Biological weed control uses another living species, usually other plants, insects, fungi or pathogens (diseases), to inhibit the growth of the weed species. It is useful in situations where land managers want to avoid chemical or physical control and in 'hard to access' locations. It can be a lengthy process that doesn't eradicate the weed but reduces its population and spread. For example, Bridal creeper Leafhopper can be used to biologically control Bridal creeper, *Myrsiphyllum asparagoides*.

Case Study

Regaining the land from gorse

Michaela and her husband Sam recently moved onto their family farm in central Victoria. The property had been left unmanaged for five years and had become a dense thicket of prickly gorse. Stock were the only thing keeping gorse under control and once removed, the weed infestation quickly spread. Michaela knew that gorse was one of the worst weeds in Australia, reducing pasture productivity, harbouring pests and increasing fire risk; but she was determined to tackle the weed.

Why did you want to manage your gorse?

"The risk of fire was a huge concern for us. It's a highly flammable plant, the plants are tall and dense and it would have been an inferno if it ever caught alight. We were unable to use the paddocks and the infestation was an eyesore. However, we were determined to restore the farm to its former glory and protect the surrounding bushland."

How did you treat the gorse on your property?

"Before we worked with contractors, we did tackle a small amount of spraying by ourselves, but we didn't get far. It can be tough work especially if you don't have the right equipment or time.

"We then chose to work with an experienced contractor to do a mulching and spraying program. We planned a program mulching in the first year and spraying in years two and three. After the third year we were committed to do the follow-up maintenance.

"We aimed high. We aimed to treat the infestation all at once as we wanted to reduce the amount of seed that would return into the soil seed bank and have to be treated the following year."

How did you find a contractor?

"I went to a Victorian Gorse Taskforce field day to learn about how to control gorse. I was able to get some local contacts and also connect with community and community groups working on weeds."

What does your property look like after the on-ground work?

"The change has been huge! We can now access gates and fence lines and we can use the paddocks again. Aesthetically it's so much nicer, we have a view and we no longer feel overwhelmed by the large infestation.

"I grew up in Melbourne and I always wanted to live in the country. I never anticipated that I'd be taking on this much gorse. Having said that, I feel really satisfied that we have. We've inspired our neighbours and they will be doing their properties next."

"We aimed high. We aimed to treat the infestation all at once as we wanted to reduce the amount of seed that would return into the soil seed bank and have to be treated the following year."

Photo: Nicole Garfi

Gorse (Ulex europaeus) is an introduced plant from Europe that has become one of Australia's worst weeds.

Photo: Nicole Garfi

Effective gorse management

Gorse (Ulex europaeus) is an introduced plant from Europe that has become one of Australia's worst weeds. It is a common weed in the north central region. Below is a step-by-step process to prepare, plan and control gorse. These steps can also be modified to manage other weed species.

1. Assess your property

Where is the gorse problem on your property? Make a map of the size, density and location of the infestation.

2. Get advice

Use the Victorian Gorse Taskforce website and the Virtual Extension Officer to understand the best methods of control.

3. Work with your neighbours

Speak with neighbours, local Landcare groups or weeds contractors for information and support. Discuss your chosen control method.

4. Plan for success

Create a simple and realistic management plan that outlines what are you hoping to achieve in the short, medium and long term.

5. Take action

Carry out your control according to your plan. Deliver an integrated weed control program using several methods - cut and paint chemical, grooming, chemical control, competition and fire.

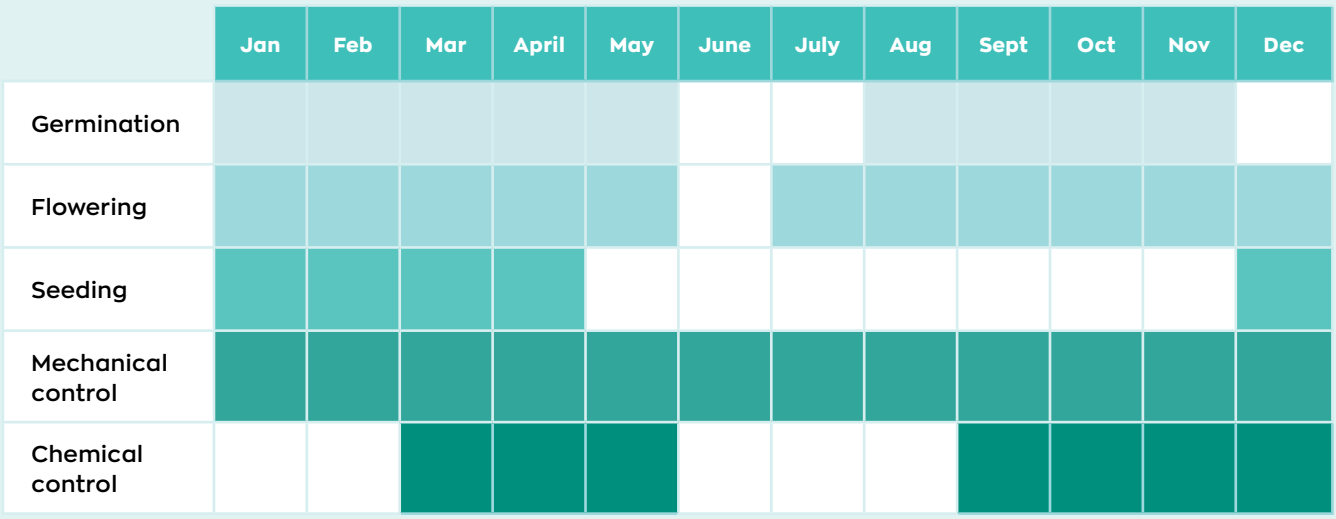
6. Monitor and follow-up

Monitor your gorse control efforts and continue with methods that prove successful.

7. Keep going and don't stop!

Weed control works best if you are treating plants before they go to flower to prevent further seeding. Make weed control part of an annual maintenance program.

Figure 5.1: Gorse growing and treatment calendar



Pest animals

Pest animals have an enormous impact on the environment as they out-compete and prey on native animals. They cause huge financial losses for farmers, can impact human and animal health, and cost the community millions of dollars each year. Invasive pest animals are introduced (non-native) species that are or have the potential to become established in the wild through escape from captivity, deliberate or accidental release and accidental or illegal importation.

Pest animals are a living reminder of the mistakes of our history. Rabbits, foxes, goats, deer and trout were brought to Australia by early European settlers for sport and food. Cats, dogs and goldfinches were pets that escaped and established wild populations.

In Victoria, invasive animals are classified under the *Catchment and Land Protection Act 1994 (CaLP Act)* as to their threat to agriculture and the environment.

Landowners have a responsibility to control those declared as established invasive animals such as European hares and rabbits, red foxes, feral pigs and goats. Government departments take the lead to control animals that are declared as prohibited, controlled or regulated or may be considered exotic pest animals.

No pest species can live in a landscape without having some impact either indirectly through habitat disturbance and change, or directly through competition, predation and spread of disease. We all have a role to play in pest animal management. By working together, we can reduce the impact of pest animals in Victoria.

Best-practice tips

For best results, pest animal management should be undertaken as part of an integrated management program, which involves the use of several management strategies. The best results are achieved when neighbours work together to control pest animals across a landscape, rather than just on individual properties. Talk to your neighbours and your local Landcare group to work out a plan for coordinated action.

Helpful Hints

Key considerations when planning a pest management program:

- Aim to be pest free
- Work together with neighbours
- Assess the damage and activity on your property and conduct monitoring
- Deliver your integrated control methods at the right time of year, in the right order
- Adapt and improve your program
- It is important to continue to monitor pest numbers/damage after your control program so that you can treat any re-infestations.

Photo: David Kleinert

Rabbits

The European rabbit is Australia's most serious pest animal. The introduced species compete with native wildlife for food and shelter and have contributed to the extinction of numerous native species. They also compete with livestock for food and damage native vegetation, cultural and heritage sites, and community assets.

Rabbits graze selectively, feeding heavily on palatable grasses and herbs and avoiding unpalatable weeds. This leads to the loss of native species and the spread of weeds. Rabbits are well suited to Australian conditions and breed prolifically. They can reproduce throughout most of the year and under ideal conditions one pair of rabbits can increase to 180 rabbits in approximately 18 months.

When the rabbits reach maturity, they leave the family burrow, seeking new territory and breeding. Survival rates of young rabbits increase significantly when they have safe harbour such as warrens, wood heaps, rubbish piles, sheds, shipping containers and woody weeds.

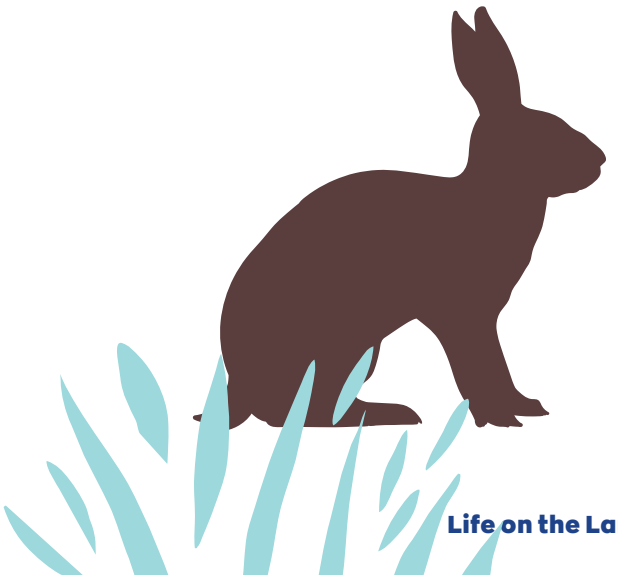
Effective rabbit management

Effective rabbit management requires an integrated approach using all control tools that suit your property. Every rabbit should be exposed to as many different control tools as possible to ensure those missed will be managed with another.

Managing rabbits on your property

Typically, rabbit management programs in the past have been delivered around protecting agricultural properties. However, it is fast becoming recognised as an essential activity to be undertaken for the enhancement of native plants and the protection of revegetation projects. Researchers have proven that it only takes a few rabbits to seriously impact the regeneration and recruitment of sensitive native plant communities.

There are several methods used in rabbit control and each has been reviewed on their humanness. Techniques that cause the least amount of pain and suffering to rabbits or 'the target animal' with the least harm or risk to 'non-target animals' such as native and domestic animals, people and the environment must be used.



An integrated rabbit program uses a combination of control techniques such as, monitoring the rabbit issue and effectiveness of the control program, harbour management, baiting, ripping and fumigation. Below are some important considerations for a successful rabbit management program:

Harbour removal: Making your property an unfriendly rabbit environment will help prevent re-invasion and population recovery.

Planning: Good planning is essential for maximising the effectiveness of your rabbit control program. Be prepared to deliver an annual program that may run for consecutive years, subject to the size of the issue. Rabbit management is not a fix-and-forget problem, management will require considerable effort to address the rabbit population.

Access to products: To purchase and use 1080 and PAPP pest animal bait products in Victoria, you or a contractor must either:

- Have an Agricultural Chemical Users Permit (ACUP) with a 1080 endorsement
- Have a Commercial Operators Licence (COL) with a vermin destroyer endorsement
- Hold a valid 'Licence To Use Pesticides' (LTUP) with an authorisation for the control of pest animals
- Get the product from an accredited supplier
- Use the product according to the label directions and stipulations for the use of 1080 and PAPP pest animal bait products in Victoria.

Timing: The most effective time to bait is usually during a hot, dry, non-breeding season. See Figure 5.2 Rabbit management program annual calendar.

Frequency: To be most effective, bait in late summer and follow up with other management methods.

Monitoring: Rabbit Scan is a free resource for landholders and groups to record rabbit populations, rabbit impact and rabbit management programs. The program can be downloaded to mobile devices or computers and is user friendly.

The table below describes a summary of rabbit management methods, implementation and special considerations.

Table 5.3: Rabbit management methods and considerations

Control	Implementation	Considerations
Harbour removal	Remove all places where rabbits can shelter and breed.	Remove dense woody weeds like gorse and blackberry, piles of rubbish materials and abandoned vehicles.
Exclusion fencing	Involves installing a rabbit-proof fence to set specifications.	May not be suitable for broad acre scenarios due to expense.
1080 baiting (1080 or sodium monofluoroacetate is a lethal poison registered to control rabbits)	• Determine where rabbits are actively feeding • Run a free feed program to familiarise rabbits with the bait before you lay poison baits. This will help identify where rabbits are feeding, reduce toxic bait wastage, and enable a maximum kill of the target species • Set up bait stations or lay a bait trail containing poisoned, dyed oats/carrots, containing 1080 before Autumn break in locations frequented by rabbits to provide optimum opportunity for baits to be taken • Ensure alternate food sources are scarce, making bait more attractive • Determine the amount of poison bait required as per product label • Monitor the non-target species risk.	To purchase and use 1080 pest animal bait products in Victoria you must either: • Have an Agricultural Chemical Users Permit (ACUP) with a 1080 endorsement • Have a Commercial Operators Licence (COL) with a vermin destroyer endorsement • Hold a valid Licence To Use Pesticides (LTUP) with an authorisation for the control of pest animals. Bait placement or bait placement design must be such that non-target access is minimised. Note that 1080 ingestion can also kill non-target animals, in particular, dogs and livestock as there is no available antidote. All uneaten and unused bait must be disposed of as per directions of use on product label.
Pindone baiting (Pindone is an anticoagulant agent)	• Determine where rabbits are actively feeding • Run a free feed program to familiarise rabbits with the bait before you lay poison baits. This will help identify where rabbits are feeding, reduce toxic bait wastage, and enable a maximum kill of the target species • Set up bait stations or lay a bait trail containing poisoned, dyed oats/carrots, containing 1080 before Autumn break in locations frequented by rabbits to provide optimum opportunity for baits to be taken • Ensure alternate food sources are scarce, making bait more attractive • Determine the amount of poison bait required as per product label • Monitor the non-target species risk.	Operators need to read the label and take precautions to safeguard against exposure. Product should only be used in areas where it is impractical or unsuitable to use 1080. Useful in urban/residential and semi-rural areas. Potential risk of poisoning non-target animals e.g. native species such as macropods and others species.

Warren destruction (ripping)	Warren destruction involves the mechanical removal of warrens where rabbits live and shelter. Warrens are destroyed using machinery following a baiting program, when rabbit populations numbers are low. The technique used will vary depending on local conditions such as infrastructure, native vegetation, cultural heritage values, soil type, position of warrens and the type of equipment available.	Warren destruction is the most cost effective and the long lasting control method. Rabbits don't persist in areas where warrens have been effectively destroyed. It involves specialised equipment such as excavators and skilled operators. Care should be taken not to damage environmental or culturally sensitive areas.
Fumigation (Aluminium phosphide)	A smoking machine is used to help find every warren opening. An aluminium phosphide fumigant tablet is placed into the warren and activated by moisture, as per product label. The entrance of warren is closed using soil. The tablet releases poisonous phosphine gas into the warren when activated by moisture. Every warren entrance must be treated. Regularly check all warrens, immediately re-treat any opened warrens with fumigant.	Fumigate should be used as a follow-up technique after baiting and warren destruction. It is not a cost effective method to reduce large rabbit populations. Aluminium Phosphide is a Schedule 7 poison. To purchase Aluminium Phosphide in Victoria you must have an Agricultural Chemical Users Permit (ACUP). Schedule 7 poisons can only be used by the holder of an ACUP or under the direct supervision of an ACUP holder. Operators need to read the label and take precautions to safeguard against exposure.
Shooting	Skill required by licenced shooters to hunt small populations of rabbits.	Shooting should only be used to control small, isolated rabbit populations and is not an effective control measure for large numbers or general control. It is time-consuming and not suitable in all areas.

Rabbit management program annual calendar

Figure 5.2: Rabbit management program annual calendar

	Summer			Autumn			Winter			Spring		
Rabbit management	**Dec**	**Jan**	**Feb**	**Mar**	**April**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**
Rabbit behaviour	Breeding stops, rabbit disperse						Breeding begins			Peak breeding		
Monitor activity												
Remove harbour												
Monitor & record rabbit numbers												
Bait to reduce numbers												
Warren destruction												
Implosion												
Fumigation												

Foxes

With an estimated one million foxes in Victoria, the impact on native fauna and agriculture is staggering. Although foxes prey heavily on rabbits, about a quarter of their diet is native wildlife. Ground-dwelling mammals are easy targets, as are birds, possums, lizards, beetles and other insects. Researchers have estimated that one fox can eat about 32 kilograms of native wildlife each year and can range over several kilometers a night.

In Victoria, red foxes *(Vulpes vulpes)* are declared as established pest animals under the *Catchment and Land Protection Act 1994 (CaLP Act)*. Under the *CaLP Act*, landowners have a responsibility to take all reasonable steps to prevent the spread of, and as far as possible eradicate, established pest animals from their land.

Effective fox management

Effective fox management requires an integrated approach using all control tools that suit your property. Every fox should be exposed to as many different control tools as possible to ensure those missed will be managed with another.

Managing foxes on your property

Fox integrated management includes using a combination of the following control techniques: baiting, harbour management where applicable, fumigation, shooting, exclusion fencing, guardian animals and property hygiene. Poison baiting is one of the most effective methods of fox control. Foxes can be difficult to manage but it is not an impossible task. Below are some important considerations for a successful fox management program:

Harbour removal: Making your property an unfriendly environment for foxes will help prevent re-invasion and population recovery. Foxes live in dens which can be found in various places, such as underneath buildings, creek banks, old vehicles and rubbish heaps.

Helpful Hints

Reducing rabbit numbers will affect foxes but it will also force foxes to meet the rabbit shortfall with native species. For this reason, it is critical to coordinate fox and rabbit control programs.

Planning: Good planning is essential for maximising the effectiveness of your fox control program. Be prepared to deliver an annual program that may run for consecutive years, subject to the size of the issue. Fox management is not a fix-and-forget problem, management will require considerable effort to address the fox population.

Access to products: To purchase and use 1080 and PAPP pest animal bait products in Victoria you or a contractor must either:

- Have an Agricultural Chemical Users Permit (ACUP) with a 1080 endorsement;
- Have a Commercial Operators Licence (COL) with a vermin destroyer endorsement;
- Hold a valid Licence To Use Pesticides (LTUP) with an authorisation for the control of pest animals;
- Get the product from an accredited supplier;
- Use the product according to the label directions and stipulations for the use of 1080 and PAPP pest animal bait products in Victoria.

Timing: The most effective time to bait is usually during late winter and spring when fox populations are at their lowest. This is generally just before breeding and is directly followed by a time of high food demand, when the young cubs are being reared.

Frequency: To be most effective bait twice a year, during late winter and spring.

Monitoring: FoxScan is a free resource for landholders and groups to record fox populations, fox impact and fox management programs. The program can be downloaded to mobile devices or computers and is user friendly.

Table 5.4: Fox management methods and considerations

Control	Implementation	Considerations
Harbour and den removal	Remove all places where foxes can shelter and breed.	Remove dense woody weeds like gorse and blackberry, piles of rubbish materials and abandoned vehicles.
Exclusion fencing	Involves installing a fox proof fence to set specifications.	Not suitable for broadacre scenarios due to expense. Useful for domestic gardens, conservation areas and where there are high-value commodities.
1080 baiting (sodium monofluoro-acetate) is a lethal poison registered to control foxes	• Determine where foxes are actively feeding • Run a free feed program to familiarise foxes with the bait before you lay poison baits. This will help identify where foxes are feeding, reduce toxic bait wastage, and enable a maximum kill of the target species • Set up bait stations in locations frequented by foxes to provide optimum opportunity for baits to be taken • Ensure alternate food sources are scarce, making bait more attractive • Determine the amount of poison bait required as per product label • Fox baits must be buried as per the product label • Monitor the non-target species risk.	To purchase and use 1080 pest animal bait products in Victoria you must either: • Have an Agricultural Chemical Users Permit (ACUP) with a 1080 endorsement • Have a Commercial Operators Licence (COL) with a vermin destroyer endorsement • Hold a valid Licence To Use Pesticides (LTUP) with an authorisation for the control of pest animals. Bait placement or bait placement design must be such that non-target access is minimised. Note that 1080 ingestion can also kill non-target animals, in particular, dogs and livestock as there is no available antidote. All uneaten and unused bait must be disposed of as per directions of use on product label.
PAPP baiting (Para-aminopropiophenone) is a lethal poison registered to control foxes	• Determine where foxes are actively feeding • Run a free feed program to familiarise foxes with the bait before you lay poison baits. This will help identify where foxes are feeding, reduce toxic bait wastage, and enable a maximum kill of the target species • Set up bait stations in locations frequented by foxes to provide optimum opportunity for baits to be taken • Ensure alternate food sources are scarce, making bait more attractive • Determine the amount of poison bait required as per product label • Fox baits must be buried as per the product label • Monitor the non-target species risk.	To purchase and use PAPP pest animal bait products in Victoria you must either: • Have an Agricultural Chemical Users Permit (ACUP) with a PAPP endorsement • Have a Commercial Operators Licence (COL) with a vermin destroyer endorsement • Hold a valid Licence To Use Pesticides (LTUP) with an authorisation for the control of pest animals. Bait placement or bait placement design must be such that non-target access is minimised. Note that PAPP ingestion can also kill non-target animals, in particular, dogs and livestock as there is no available antidote. All uneaten and unused bait must be disposed of as per directions of use on product label.”

Control	Implementation	Considerations
Den destruction	Den destruction is undertaken by hand shovel or by ripping using a tractor or bulldozer fitted with a single tined ripper. The technique used will vary depending on local conditions such as native vegetation, cultural heritage values, soil type, position of den and the type of equipment available. You should revisit dens each year in May to June and August to September to measure the fox activity, control foxes and destroy dens.	Den destruction is a cost effective and provides lasting control. Care should be taken not to damage environmental or culturally sensitive areas.
Canid pest ejectors	Canid Pest Ejectors (CPEs) are a relatively new mechanical device used to eject a measured dose of 1080 or PAPP directly into the mouth of a fox. The CPE is activated when a fox pulls firmly on a lure, which propels a poison-filled capsule directly into the mouth of the animal. CPEs can be used in a similar way to other baiting methods. The CPEs can be used many times as long as they are well maintained.	To purchase and use PAPP pest animal bait products in Victoria you must either: • Have an Agricultural Chemical Users Permit (ACUP) with a PAPP or 1080 endorsement • Have a Commercial Operators Licence (COL) with a vermin destroyer endorsement • Hold a valid Licence To Use Pesticides (LTUP) with an authorisation for the control of pest animals. Bait placement or bait placement design must be such that non-target access is minimised. Note that PAPP or 1080 ingestion can also kill non-target animals, in particular, dogs and livestock as there is no available antidote. All uneaten and unused bait must be disposed of as per directions of use on product label.
Fumigation (carbon monoxide can be used to control foxes)	Carbon monoxide (CO) is used to fumigate active fox breeding or natal dens. Fumigation should be used when the vixen and cubs are confined to the den during August to October. Revisit dens each year in May to June and August to September to measure the fox activity and to fumigate and destroy dens.	Fumigate should be used as a follow-up technique after baiting and den destruction. It is not a cost effective method to reduce large fox populations. There are no special training requirements or licenses to use carbon monoxide den fumigants to control foxes in Victoria. Operators need to read the label and take precautions to safeguard against exposure.
Shooting	Skill required by licenced shooters to hunt populations of foxes. Shooting is the most target-specific and humane form of fox control.	Shooting should only be used to control small, isolated fox populations and is not an effective control measure for large numbers or general control. It is time-consuming and not suitable in all areas.

Photo: Jason Wishart

Feral pigs

Feral pigs are considered an environmental pest due to their selective feeding, trampling and rooting for plants and invertebrates. They also compete with native wildlife for food, water, shelter, and prey directly on various wildlife species and their eggs. Feral pigs cause significant damage in agricultural areas. They prey on newborn lambs, compete with livestock for pasture and can damage infrastructure such as fencing and water facilities.

Feral pigs can also transport weeds and ground rooting behavior creates ideal conditions for weed establishment. Feral pigs can be hosts or vectors of many parasites and diseases, some of which can affect animals or people. They are also potential carriers of exotic diseases, with the biggest concerns for Australia being Foot-and-Mouth Disease and African Swine Fever.

Feral pigs are found at several locations throughout Victoria, though their populations are mostly isolated and occur at relatively low densities. In the north central region most established populations can be found along the Murray River corridor. New populations may continue to emerge as conditions change.

Effective pig management

Effective feral pig management requires an integrated approach using all control tools that suit your property. Every pig should be exposed to as many different control tools as possible to ensure those missed will be managed with another.

Managing pigs on your property

Pig integrated management includes baiting, trapping, harbour management where applicable, shooting, exclusion fencing and property hygiene. Poison baiting is the most effective method of pig control. Following are some important considerations for a successful feral pig management program:

Planning: Good planning is essential for maximising the effectiveness of your feral pig control program. Be prepared to deliver an annual program that may run for consecutive years, subject to the size of the issue. Pig management is not a fix-and-forget problem, management will require considerable effort to address the pig population.

Harbour removal: Making your property an unfriendly environment for pigs will help prevent re-invasion and population recovery. Shelter is vitally important for feral pigs as it provides them with shade and protection from predators. Feral pigs typically prefer to live in moist environments that can provide a reliable and adequate food and water supply.

Access to products: To purchase and use 1080 and PAPP pest animal bait products in Victoria you or a contractor must either:

- Have an Agricultural Chemical Users Permit (ACUP) with a 1080 endorsement;
- Have a Commercial Operators Licence (COL) with a vermin destroyer endorsement;
- Hold a valid Licence To Use Pesticides (LTUP) with an authorisation for the control of pest animals;
- Get the product from an accredited supplier;
- Use the product according to the label directions and stipulations for the use of 1080 and PAPP pest animal bait products in Victoria.

Timing: Undertake baiting and trapping in drier times when water is scarce and alternate feed is also scarce – pigs will be more likely to eat bait. It is also better to bait prior to breeding season.

Frequency: To be most effective bait twice a year, during late winter and spring. Bait when alternative feed is scarce e.g. during a dry summer. Timing may vary due to climatic conditions.

Monitoring: FeralPigScan is a free resource for landholders and groups to record pig populations, pig impact and pig management programs. The program can be downloaded to mobile devices or computers and is user friendly.

Table 5.5: Feral Pig management methods and considerations

Control	Implementation	Considerations
Harbour removal	Remove all places where pigs can shelter and breed.	Remove dense woody weeds like gorse and blackberry and piles of rubbish materials.
Exclusion fencing and trapping	Involves installing a pig proof fence to set specifications. There are a range of trap designs can be used to trap feral pigs. The trap designs are typically a mesh enclosure and contain a lure or bait that feral pigs find attractive. Pigs typically gain access through a one-way entrance and are unable to escape. To comply with animal welfare legislation, traps must be checked at least every 24 hours to minimise the time that trapped feral pigs or non-target species are held. Trapped feral pigs must be quickly and humanely destroyed. Feral pigs trapped during a control program must not be released from traps.	May not be suitable for broad acre scenarios due to expense.
1080 baiting (sodium monofluoroacetate) is a lethal poison registered to control pigs	• Determine where feral pigs are actively feeding • Run a free feed program to familiarise feral pigs with the bait before you lay poison baits. This will help identify where feral pigs are feeding, reduce toxic bait wastage, and enable a maximum kill of the target species • Set up bait stations in locations frequented by pigs to provide optimum opportunity for baits to be taken • Ensure alternate food sources are scarce, making bait more attractive • Determine the amount of poison bait required as per product label • Monitor the non-target species risk.	To purchase and use 1080 pest animal bait products in Victoria you must either: • Have an Agricultural Chemical Users Permit (ACUP) with a 1080 endorsement • Have a Commercial Operators Licence (COL) with a vermin destroyer endorsement • Hold a valid Licence To Use Pesticides (LTUP) with an authorisation for the control of pest animals. Bait placement or bait placement design must be such that non-target access is minimised. Note that 1080 ingestion can also kill non-target animals, in particular, dogs and livestock as there is no available antidote. All uneaten and unused bait must be disposed of as per directions of use on product label.
Shooting	Involves the use of firearms to control feral pigs. Shooting is the most target-specific and humane form of feral pig control. Spotlight and/or the use of a thermal scope are effective shooting methods.	Skill required by licenced shooters to hunt populations of feral pigs. It is time consuming and not suitable in all areas.

Sodium nitrite (HOGGONE is a lethal poison registered to control pigs)	• Determine where feral pigs are actively feeding • Run a free feed program to familiarise feral pigs with the bait before you lay poison baits. This will help identify where foxes are feeding, reduce toxic bait wastage, and enable a maximum kill of the target species • Set up bait stations in locations frequented by feral pigs to provide optimum opportunity for baits to be taken • Ensure alternate food sources are scarce, making bait more attractive • Determine the amount of poison bait required as per product label • Feral pig baits must be buried as per the product label • Monitor the non-target species risk.	HOGGONE feral pig bait is the only registered feral pig bait that contains sodium nitrite. You do not need special authorisation to purchase and use it (e.g. an ACUP). However, you must adhere to the product label and undertake a thorough risk assessment before using any HOGGONE feral pig bait

Freshwater pests

Freshwater pests are non-native or native plants and animals that have been introduced into waterways where they do not naturally occur. Freshwater pests can harm our environment and biodiversity and can have a big impact on our community.

Freshwater pests can include a range of species such as plants, algae, fish, turtles, crayfish, frogs, snails, leeches and insects. Some freshwater pests such as Goldfish *(Carassius auratus)* and Alligator Weed *(Alternanthera philoxeroides)* have been recorded in our regional waterways (rivers, creeks, lakes and wetlands) and in human-made environments, such as garden ponds, channels, and private and public dams.

Living in waterways makes these pests difficult and expensive to get rid of once established. Monitoring is essential to detect and prevent new freshwater pests from reproducing quickly and can rapidly spread to new areas in our region.

Freshwater pests in Victoria are declared under the *Fisheries Act 1995 (Fisheries Act)* or the *Catchment and Land Protection Act 1994 (CaLP Act)* and are managed according to the related regulations.

Managing freshwater pests on your property

Below are some tips for managing freshwater pests:

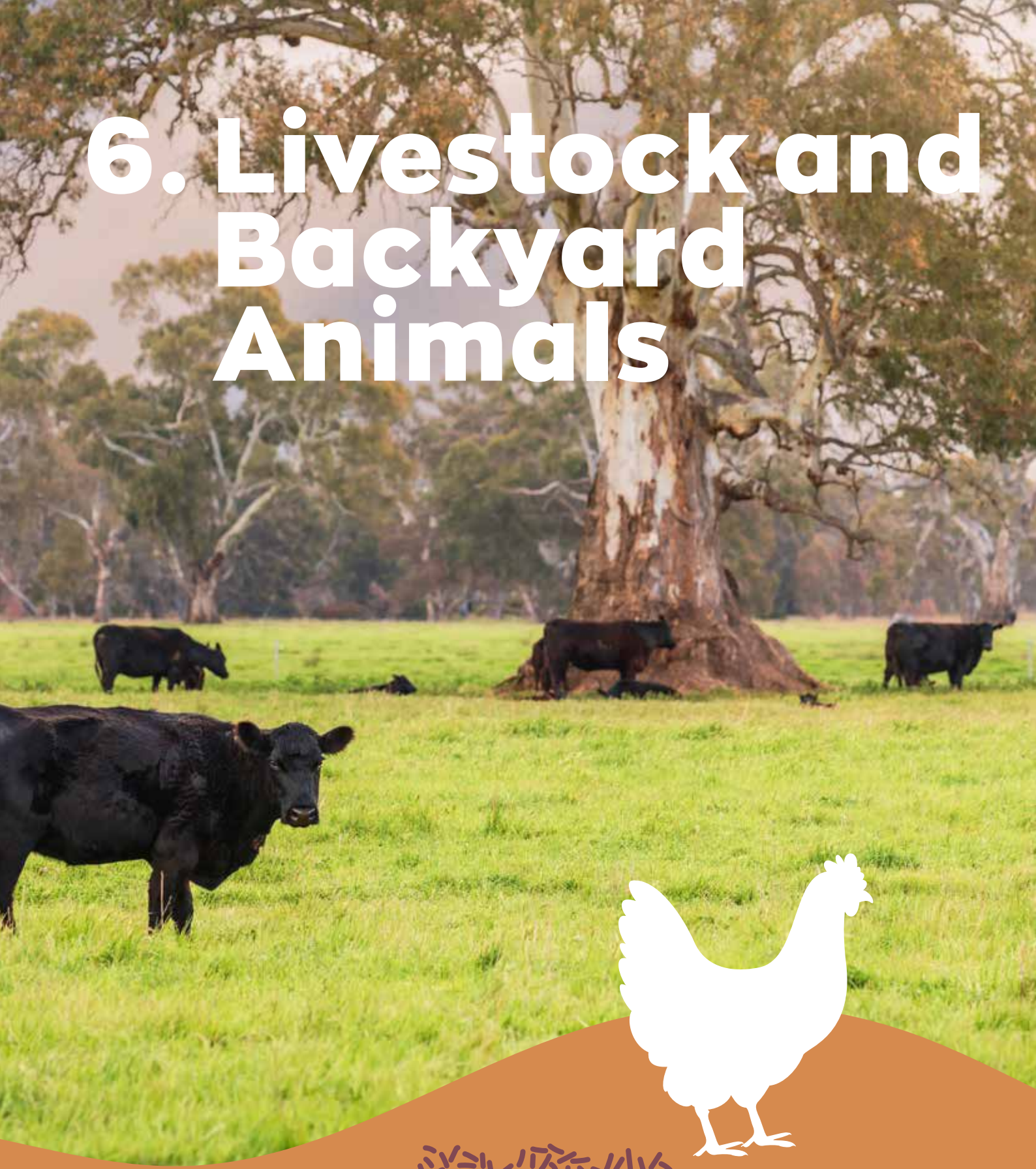
- Learn the difference between native freshwater species and freshwater pests
- Use local native freshwater plants and animals in your garden ponds and dams
- Do not move plants and animals between waterways e.g. dams to rivers
- Do not dispose of unwanted live bait or freshwater pests in waterways
- Act fast and report any sightings of freshwater pests to the Victorian Government.

Connect

Victoria has four community pest management groups - Victorian Blackberry Taskforce, Victorian Gorse Taskforce, Victorian Rabbit Action Network and Victorian Serrated Tussock Working Party that provide resources, grants and training programs for the community.

Agronomists and/or pest control contractors can be engaged by land managers to plan pest management strategies and ensure the right product, rate and method of application is used. They will have the knowledge, qualifications, equipment and experience required for your area.

6. Livestock and Backyard Animals



Livestock and Backyard Animals

Victoria has more than 21,000 farm businesses which generate more than $20 billion each year. The majority of farms support livestock animals including cows, sheep, horses, goats and pigs. The region boasts a varied landscape that is well-suited to a wide range of agricultural activities.

The Livestock and Backyard Animals chapter aims to inform you of things you need to consider before you purchase backyard and livestock animals. We also provide you with some general advice on bees, chickens, sheep and cows, and good animal welfare practices.

Understand your animal's needs before you buy

There are numerous industry bodies and government departments that can provide land managers with the most current and best information on the management of livestock and animal welfare. Before you buy backyard animals or livestock, we encourage you to work through the following checklist in Table 6.1.

Table 6.1: Before you buy backyard animals and livestock checklist

Checklist	Considerations
Research	• Determine what backyard animals or livestock you want to manage • Determine what industry can help support your choice? How can you improve your knowledge • Are there restrictions on land use? How is your land zoned? How was your land use used before? • What are your legal obligations for managing livestock or backyard animals on your property? • What animals or livestock do your neighbours have? • What will be your ongoing financial obligations to maintaining the animal?
Prepare your property	• How will you feed, water and care for your animals/livestock? • What infrastructure do you need? e.g. fencing, water access, housing and stock yards • What are the fencing requirements for your select breeds? • Do you require any machinery or vehicles?
Animal management	• Aim to understand the animals including breeding and genetics, biology, diet requirements, behaviour and how to handle the animals and draft an animal health plan • How will you breed and raise your livestock? • What healthcare/welfare equipment do you need? • How will you manage your animals if you are absent or if there is an emergency or natural disaster?
Markets	• Determine if you are going to sell your livestock/produce or keep it for personal consumption • Where can you purchase/sell your livestock? E.g. saleyard auction, direct sale • Determine the markets you will access and the economic values of your stock • Determine your requirements for owning, keeping and moving livestock.

Animal health and welfare

There are several legal requirements under the Victorian domestic animals and animal welfare legislation that livestock owners need to follow to ensure good health and prevention of diseases.

Animal health and welfare is extremely important. Land managers must provide livestock with the appropriate care, food, water, shelter and management (e.g. exercise). For more detailed information on legislations, animal health and welfare contact Agriculture Victoria.

Animal diseases can significantly impact animal health, welfare and productivity. Land managers should take a proactive approach to managing animal health by:

- Learning about the common animal diseases in their local area
- Aiming for prevention rather than cure
- Developing a disease management plan
- Improving animal nutrition to prevent nutritional diseases and boost immune systems.

Property Identification Codes

Property Identification Code (PIC) identifies the property on which livestock graze or where livestock are kept. Livestock species that require a PIC include cattle, sheep, goats, pigs, alpacas, llamas, deer, horses, camels, emus and ostriches (more than 10), and poultry (more than 50 birds). All livestock business must also have a PIC, such as sale yards and stock agents.

PICs are issued by Agriculture Victoria free of charge. They are used for tracing and controlling animal disease that may be detected, locating properties, and contacting livestock owners and industry representatives. For more detailed information on PICs contact Agricultural Victoria.

National Livestock Identification System

The National Livestock Identification System (NLIS) is Australia's system for identification and traceability of livestock. The NLIS provides lifetime traceability for cattle, sheep and goats, recording information from property of birth to end of life.

- All livestock are identified by a visual or electronic ear tag/device
- All physical locations are identified using a Property Identification Code (PIC)
- All livestock location data and movements are recorded on the central NLIS Database.

If a disease outbreak were to occur, the NLIS would be used to quickly isolate and manage the disease. For more detailed information on NLIS contact Agriculture Victoria.

Livestock

Livestock can play an important role in commercial farm businesses and lifestyle properties. They produce a range of products including meat, wool, milk and eggs, and in grazing systems can be used to manage productive pastures. Livestock can also be grown for enjoyment or recreational purposes.

Beef cattle

Beef cattle production is usually part of a mixed farming operation in north central Victoria, supplying both domestic and export markets. Main beef breeds of cattle include Angus, Brahman, Charolais, Hereford, Limousin, Murray Grey, Santa Gertrudis, Shorthorn and Simmental.

The majority of cattle graze on native and introduced pastures, converting grass to weight and subsequently beef. To maintain animal growth, land managers use supplementary feeding of hay, grain or silage when seasons impact pasture growth.

The main objective of beef cattle production is to produce as much lean meat as possible in the time available. Farmers can sell their cattle at different ages and target different markets, which include: the vealer market (calves sold off the mother at nine months of age), the yearling market (12 months), the feedlot market (18 months) or the grass-fed market. For more detailed information contact Agricultural Victoria, BetterBeef Network, Meat & Livestock Australia or your local stock agent.

Dairy

In north central Victoria the majority of dairy farms are located in the Torrumbarry, Loddon Valley and Rochester-Campaspe irrigation areas in the northern part of the region. A major advantage of irrigated dairy farms is their access to water supply, which gives them a degree of control over the amount of pasture and forage produced on farm. This is particularly beneficial during summer as many farms rely on supplementary feeding to adapt to drier conditions and maintain animal growth.

The dominant breed of dairy cow in Australia is the Holstein Friesian, accounting for about 70 per cent of all dairy cattle in Australia. Jerseys are the second most popular breed in Australia and their milk is ideal for butter production. Other breeds include the Aussie Red, Illawarra, Brown Swiss, Guernsey and Ayrshire. For more detailed information contact Agriculture Victoria, Dairy Australia or your local stock agent.

Sheep

Victoria has the second largest sheep population in Australia with over 14.6 million sheep out of 70 million. In north central Victoria the three main types of sheep enterprises are:

1. Prime lamb or sheep meat producers who specialise in producing lambs for meat. Wool and mutton are secondary forms of income
2. Wool growers who specialise in wool production, where the meat is the secondary form of income
3. Live export producers who raise lambs and sheep for export to other countries.

Selecting the right sheep breed(s) and genetics is crucial when planning a prime lamb, sheep meat or wool growing enterprise. Sheep breeds can be classified according to their endpoint; maternal breeds, dual purpose breeds and terminal (meat sire breeds).

Wool breeds can be further classified by the length or type of wool produced. The majority of sheep grown in Australia are pure-bred Australian Merinos, which have been selected for their bright white and extremely soft fleece. Merinos can be classified into four distinct classes based on the type of wool produced; superfine, fine, medium and strong. The strong wool Merino breeds are not common in north central Victoria. For more detailed information contact Agriculture Victoria, Australian Wool Innovation or the BestWool/BestLamb Network.

Managing livestock near water

Livestock that are allowed free and uncontrolled access to riparian land can directly foul the water with their waste. They also increase soil erosion by over-grazing and forming bare walking tracks and camping areas. These impacts reduce water quality for downstream users by introducing:

- Pathogens from livestock faeces, which can increase the risk of disease
- Nutrients from livestock faeces and urine, which can lead to algal blooms
- Sediments from erosion and soil disturbance, which may harm aquatic life and clog waterways.

The simplest way of regulating livestock access and grazing pressure on riparian land is to erect a fence between it and the rest of the property. Funding may be available to land managers for fencing and provision of off-stream watering points. Contact your local Landcare group or the North Central CMA.

Backyard animals

Honey bees

Beekeeping is fast becoming a popular interest for many land managers, providing honey for families and pollinating fruit and berry flowers.

Hives can be kept in most parts of Victoria. However, beekeepers do have a duty of care for bees just like other animals. Once the decision has been made to keep bees, beekeepers have a legal and moral obligation to maintain the bees in both a healthy state and kept in such a way that they do not become a bother to other people, especially close neighbours.

If you own one or more hives of bees you must register as a beekeeper and manage them following the *Livestock Disease Control Act 1994*, *Livestock Disease Control Regulations 2017* and the *Apiary Code of Practice 2011*.

Managing beehives on your property

Below are some general tips for managing bees on your property:

- Join a beekeeping association, club or connect with a local apiarist
- Provide a sufficient water supply for your apiary
- Quarantine and monitor new bee colonies before introducing them to your current apiary
- Observe hive density limits for properties in urban areas
- Ensure bee flight paths don't interfere with neighbouring land
- Monitor bee health to prevent disease and infection to neighbouring colonies as this could impact the bee industry
- If you lose interest, make sure you sell or give the hives away to someone who can look after them properly.

For more detailed information contact Agriculture Victoria or the Australian Honey Bee Industry Council.

Backyard chickens

Raising backyard chickens for eggs, meat or permaculture has many benefits. Just like any other animal, chicken owners have a legal and moral obligation to maintain the chickens in a healthy state and ensure birds have a safe and comfortable coop that can be easily cleaned to reduce diseases.

There are legal requirements under the Victorian domestic animals and animal welfare legislation that backyard poultry owners need to follow to ensure good health and prevention of diseases.

For more detailed information on poultry compliance, chicken health and producing safe eggs at home contact Agriculture Victoria.

Managing chickens on your property

Below are some general tips for managing backyard chickens on your property:

- Regularly clean and disinfect your chicken or poultry coop including feeders, drinkers and equipment
- Replace nesting materials frequently
- Keep your bird's feed and water clean – no droppings or animal waste
- Your birds should drink the same quality water as you — clean, fresh and cool
- Feed birds a good quality feed with well-balanced nutrition
- Always wash your hands with warm water and soap after handling birds, eggs or other materials in the coop
- Keep birds safe from predators such as foxes
- Prevent contact between your birds and wild birds, rodents or pets; they can transmit diseases to your birds
- Know what to look for with avian diseases such as Bird flu (avian influenza)
- If you suspect a sick bird, report on the Emergency Animal Disease Hotline 1800 675 888
- If you own 50 or more poultry for any purpose, you must get a Property Identification Code (PIC) from Agriculture Victoria.

7. Healthy Soils

Photo: Sandy Scheltema

Healthy Soils

Healthy soils are fundamental to rural living and food production. Australian soils are among some of the oldest and most weathered in the world. They generally contain low levels of organic matter and if not carefully managed can erode and degrade easily.

The Healthy Soils chapter discusses the value of good soil health and provides a simple soil health checklist that you can complete for your paddock or home garden.

Soils of north central Victoria

The soils of north central Victoria vary widely and reflect differences in soil forming processes dictated by factors such as geology, landform, stream activity, vegetation, climate and age.

These factors produce a variety of different soils, which vary in fertility, acidity, structure and many other features. Soils are characterised based on the landscape formation and the Australian Soil Classification System. Soil colour is an important characteristic of the soil as it can provide an indication of the soil's drainage characteristics. Soil colour may also help determine the different layers (horizons) of the soil, such as topsoil and subsoil.

Figure 7.1: Soil Health Guide - Soil Colour

Black - Soil rich in humus, often fertile

Brown - Presence of organic matter, often relatively fertile

Pale - Low levels of organic matter and clay minerals, normally infertile

Red - Well drained soil, high in clay and iron minerals

Yellow - Moderately drained soils, high in clay and iron minerals

Grey - Poorly drained soils, often waterlogged

Soil health

Soil is one of our most valuable natural assets, providing structural support, water and nutrients for plant growth.

Maintaining healthy soils is essential for farmers and land managers in north central Victoria to support healthy productive agricultural industries, contribute to food security and deliver soil related ecosystem services (e.g. clean water and air).

The best way to evaluate the health of your soil is to test your soil condition and measure changes over time. Monitoring can help to identify the availability of nutrients and indicate any deficiencies or excesses that may exist. Regular monitoring can help you make informed decisions on how you can improve or maintain your soil health.

Effective soil monitoring

There are a range of soil monitoring procedures available. The North Central CMA has developed a free resource called the Soil Health Guide – Soil Carbon Edition. It is an easy-to-read, practical guide to help land managers understand your soil and provide management options for building soil carbon.

It also provides information to help identify possible soil health issues using a simple nine step soil health checklist. The checklist is a series of visual assessments that are cheap and easy, and can be done using home-made equipment.

Helpful Hints

The nine-step soil health checklist includes assessing:

- Groundcover
- Evidence of soil life
- Soil colour
- Soil pH
- Texture
- Top soil
- Soil structure
- Soil compaction layers
- Soil stability (slaking and dispersion).

Before you start the soil health checklist remember to:

- Read all the monitoring information in the Soil Health Guide before you begin
- Soil monitoring should ideally be conducted annually during the main growing season e.g. late winter or early spring
- Prepare your monitoring equipment including soil health scorecard
- Select your test sites – choose sites that vary e.g. properties best soils to worst
- Undertake the nine-step soil health tests
- Review soil health results and follow up on low scores
- Repeat soil tests annually to monitor changes in soil health.

Soil carbon

Soils can absorb more carbon from the atmosphere than it releases, which makes soil the largest carbon sink (or reservoir) on the planet. Other carbon sinks include plants and the oceans.

Soil carbon contributes to biological, physical and chemical functions in soil and is a vital component of productive agriculture. Over the coming decades, there is likely to be an increasing focus on maintaining global soil carbon stocks and exploring pathways for enhancing soil carbon stores.

Maintaining or building reserves of soil carbon can offer many benefits. Farmers and land managers can adopt a range of carbon management practices to enhance fertility and productivity, and help prepare and adapt to climate change. For example, utilising moisture monitoring to plan irrigation and improve water use efficiency or diversifying farm use.

Carbon farming

Carbon farming is the process of changing agricultural practices or land use to increase the amount of carbon stored in the soil and vegetation (sequestration), or to reduce greenhouse gas emissions from livestock, soil or vegetation (mitigation).

Carbon farming programs aim to achieve both economic and environmental benefits and can potentially offer landholders financial incentives to reduce carbon pollution.

Rural properties and farm businesses have a variety of options with regard to how they may choose to utilise any carbon or emissions gains that occur on their farms, including:

- Using programs to balance against their own farm emissions
- Selling carbon to other entities via carbon markets
- Using towards certification programs for low emissions or carbon neutral produce (e.g. low emissions milk, meat or grain).

Seek advice

To make an informed decision it is always best to seek advice on any emerging markets. The carbon market is different to the traditional income sources farmers receive when selling food and fibre.

Questions you should consider:

- How long is the project?
- What are my obligations? Will I need legal and financial advice?
- What are the risks and opportunities for my property?

As the market expands land managers should consider the long-term goals for their property and which options will suit their situation best.

8. Healthy Communities

Healthy Communities

The health of our community can relate to the health of our catchments. Both rely on the active involvement of people in the region.

Community resilience

Staying healthy and well is important so you can enjoy life's good times; and by increasing resilience you can cope and bounce back after an unexpected change or challenge in your life.

You can strengthen your resilience by:

- Building healthy relationships
- Managing your stress and anxiety levels
- Knowing what activities help and keep you positive in tough times
- Knowing who you can call on and where to ask for help.

Get involved

Our region is fortunate to have more than 200 active community based NRM groups including Landcare, as well as other sustainable agriculture and environmental volunteer group and networks actively working across the region, generating significant social, environmental and economic benefits.

Joining a community group is a great way to get to know people in your local area. It also provides a number of other benefits, such as opportunities to develop new skills and experience, and to make a contribution to the local community. There are a wide variety of different community groups in north central Victoria, such as Landcare, agriculture, craft and sporting groups. If an existing community group doesn't meet your needs or interests why not start your own group.

Citizen science

Citizen science programs involve volunteers collecting scientific data to support monitoring programs that improve understanding and management. Citizen science approaches have been proven to engage, connect and empower communities within their local environment and change their appreciation of place. It is a collective and cost-effective approach to sharing important local and ecological information about land, water, climate and biodiversity resources.

The North Central CMA is now integrating citizen science into several catchment management projects. There are many citizen science programs in the region, including the long-running Waterwatch and Landcare programs. These programs are a great way to meet like-minded people and enhance your links to our north central community and the environment.

Case Study

Connecting with community and the land

Tell us about yourself and your family?

My name is Jen. I'm married to Russ, and we have three older children – Rachael, Katy and Jake.

Russ is a Structural Firefighter Instructor, and I work as a Casual Relief Teacher. Russ is enthusiastic about brewing beer, while I'm increasingly passionate about integrating agriculture and nature to regenerate soils, grasslands, vegetation and biodiversity. I completed my Certificate IV in Agriculture last year at Bendigo TAFE.

What made you want to move from a city to a rural location?

I have always felt a strong connection to the land, having grown up in northeast Victoria on a livestock farm with Angus cattle and some sheep. After university, I moved to Melbourne for a graduate year in nursing, but twelve months of city living was enough for me. Russ and I then moved to Bendigo, and after twenty years in town, we bought our 20-acre property in Axe Creek four years ago. It was the best decision we ever made! Our move was driven by our love for horses but I've always felt more at home in a rural setting and am committed to improving our land stewardship.

We are currently transitioning towards practising regenerative agriculture and plan to achieve this goal by expanding vegetation and implementing fencing to facilitate holistic grazing practices, allowing us to rotate stock and rest pastures for extended periods.

My aspiration is to establish a reputation (albeit on a small scale) for environmentally enhancing agriculture, leaving the land in a better state than when we acquired it. I also want to advocate for the community and the environment by actively engaging with stakeholders in environmental stewardship, particularly for small landholders.

What features and values attracted you to the bush block you purchased?

Our small property, located in a nice area, was a fairly blank canvas. It's far enough from town to provide a sense of solitude, yet close enough for an easy drive into town.

What advice do you wish you were told before purchasing or doing improvements or even moving to a rural lifestyle?

None specific however, I would say to others if they ask before purchasing or moving to a rural lifestyle is to connect with and join your local Landcare group, get involved in the community and don't make any big improvements straight away; observe the seasons and do your research before making big changes.

> "I would say to others if they ask before purchasing/moving to a rural lifestyle is to connect with, join your local Landcare group, get involved in the community"

What improvements have you made to your property? E.g. fencing, revegetation, water storage, pest management, passive house, solar

So far, with funding from our Axe Creek Landcare Group grants, we have revegetated 10 per cent of our property, planting more than 250 trees and shrubs. We have begun fencing smaller paddocks to enable holistic grazing of our stock and are in the process of setting up the "Equicentral system" for our horses. This year, we plan to build shelterbelts across the front of our property to increase on-farm biodiversity, create additional micro-climates, provide shelter and shade, serve as windbreaks and enhance carbon storage in our soils. We have a seasonal waterway that flows after significant rain and I aim to fence it off along with the farm dam to restore the riparian zone with appropriate vegetation.

Have you sought advice or connected with Natural Resource Management (NRM) groups?

When my father returned to full-time farming in the early 1990s, he joined the local Landcare group, along with many other farmers dedicated to stewardship, and attended numerous workshops. Inspired by this I contacted our local Axe Creek Landcare Group and joined even before we moved onto our property. I have greatly benefitted from the group's knowledge, enjoyed planting days, and taken advantage of and learned much from many workshops and educational opportunities within the Landcare movement.

What has been the biggest surprise of living life on the land?

The biggest surprise for me living life on the land is how much I am learning and how much more I want to learn about Country, and how to work with nature.

Biggest challenge of living life on the land?

The biggest challenge may be realising the dreams and plans I have for our land within the constraints of time and money, and having the patience to see them come to fruition!

Being a good neighbour

Living in rural areas often means your nearest neighbour is quite some distance away. However, how you manage vegetation, weeds, domestic animals, livestock, water, fire, fencing, machinery, vehicles and noise can significantly impact your neighbours and your relationship with them. Regular communication and consideration of your neighbours is an important part of rural living and can even assist with property management. For example, coordinating weed or pest control with neighbouring properties can be more effective and minimise the spread of invasive weeds and pests.

When considering a move to a rural area, potential landowners should be mindful that although it may seem quiet and picturesque, it can change through the seasons. Farming is a legitimate activity in rural areas and particular noises, smells or other inconveniences may be unavoidable (such as orchards operating scare guns, or slow heavy vehicles and livestock using roads).

Helpful Hints

Resolving conflicts

Problems often arise between neighbours when they don't understand what is happening and why. Avoid potential conflict by adopting a number of strategies. You can:

- Get to know your neighbours and understand more about their farm and land management practices
- Be respectful of your neighbour's privacy, space and right to farm
- Control your pets and livestock so they don't stray onto the neighbouring property or harass other livestock. Notify your neighbours if their animals stray onto your property
- Be mindful that tree plantings may impact your neighbour's views and work cooperatively when managing vegetation on property boundaries
- Prevent pest, weed and disease spread onto your neighbour's property through appropriate preventive management strategies.

If a conflict does arise, try to reach a mutually agreeable solution through good communication as soon as possible. Remember that you could be neighbours for some time and good relations will make things easier. Good communication strategies include: talking directly, choosing an appropriate time to meet, actively listening, talking it through and working through the solution(s). If you are unable to resolve the conflict seek mediation and advice from a third party, for example, your local council or government agency. Legal action should be a last resort, as it is often expensive and may not result in the desired outcome for either party.

Noise, dust and smoke

Landowners should avoid causing pollution (e.g. noise, dust, smoke and smell) wherever possible, especially when it affects your neighbours. If a noisy activity or one that produces dust, smoke or smell is unavoidable, it's best to advise your neighbours beforehand. Many disputes between neighbours relate to noise, such as motorbikes, barking dogs, generators or pumps. Where possible, landowners should plan their property so that noise is minimised along property boundaries. For example, situating kennels and animal enclosures away from your neighbours' homes or boundary and/or planting trees along the boundaries to buffer noises. If you are using motorbikes and 4WD on public land, all vehicles must be registered, and drivers must be licensed and comply with park regulations.

Unsealed roads and roadside verges are common throughout rural areas. During dry periods they can produce a lot of dust, whilst they can be quite wet and muddy during rainy periods. It is important to drive to the road and weather conditions to prevent accidents and injury to the driver and other road uses. Drivers should slow down to reduce the dust produced, especially when houses are located close to the road. Slowing down also allows drivers to better anticipate wildlife, livestock and heavy vehicles that may be on the road.

Landowners should be careful when planning to burn off paddocks or light bonfires, as you will be responsible for damage to neighbouring properties if the fire escapes. Fires shouldn't be lit between October and March and landowners should always check the fire danger ratings and fire restrictions before burning.

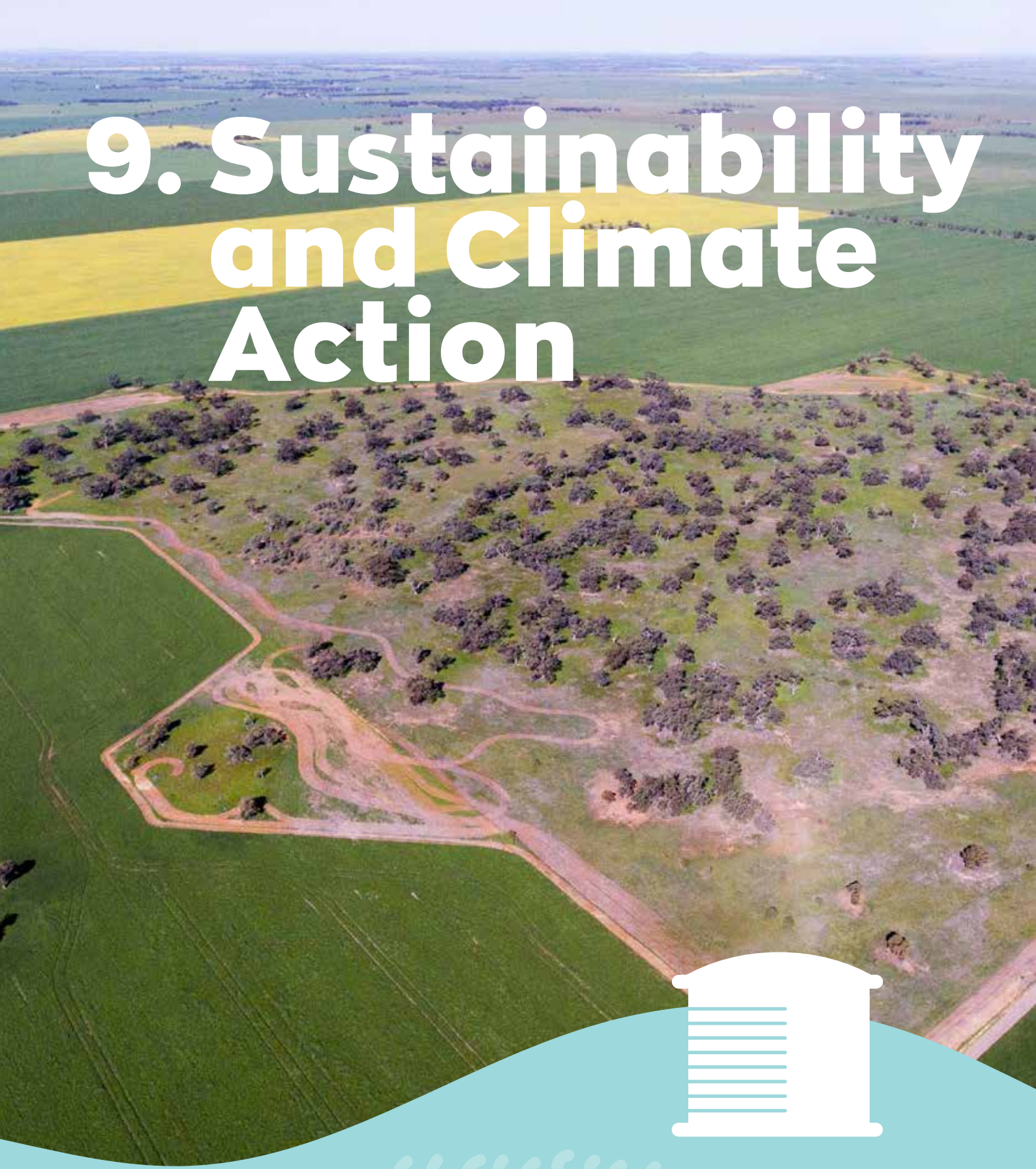
Boundary fencing

Responsibilities concerning boundary fence maintenance and construction are set out in the *Fences Act 1968*. Different responsibilities apply to different landowners. If your neighbour is a private landowner (person or company) fence maintenance and construction costs should generally be shared equally between neighbours. When constructing a new fence, landowners should get two quotes for materials and construction costs and discuss these costs and payment shares with their neighbour. If the fence is in good condition, the neighbour is not obliged to share the cost of a new, better looking fence. If your property borders state or federal government owned land (e.g. State forests or reserves) then you have to meet the full cost of fence construction and maintenance. Refer to the further information section below for more details. Landowners must keep their fences in good working order. Animals must not stray off your property onto your neighbour's property or the road. If they do and cause an accident or damage to your neighbour's property, severe penalties may apply.

Organic farming

If you are planning to farm organically, let your neighbours know what this means. Plan suitable buffers between properties and try to work out an agreement if they need to alter their management practices to prevent pesticide drift onto your property. Reward your neighbours for helping you out. Organic farmers also need to advise water authorities, councils and public land managers who use pesticides for pest and weed control on roadsides and adjoining land.

9. Sustainability and Climate Action



Sustainability and Climate Action

Sustainability is the practice of using natural resources responsibly today, so they are available for future generations tomorrow. The Sustainability and Climate Action chapter discusses topics on waste management, sustainable garden techniques and house design.

Managing waste

Managing waste is an important part of rural living, as poor management can negatively impact the health and viability of soils, waterways and neighbouring properties. Wastes may include household garbage, domestic effluent (sewage and grey water), organic matter, chemicals, large waste items and dead animals.

Managing each of these wastes sustainably can save time and money, and protect rural properties and the surrounding environment from negative impacts. The disposal of waste on rural properties is limited to green waste (e.g. compost and tree branches) and limited numbers of dead livestock. The disposal of all other waste on rural properties is prohibited. The burning of waste on rural properties is also prohibited except for tree branches. Wastes from rural properties should be disposed of, or recycled, at landfills and transfer stations.

Before collection or disposal, waste should be stored in a manner that will not contaminate water, land or risk the health of humans, livestock or crops.

Helpful Hints

Reduce, reuse and recycle

There are three simple ways to cut down your waste and make a big difference to the environment:

1. Reduce

Consider carefully the things you buy and refuse the things you don't need. This may involve: selecting products with minimal packaging and/or recyclable packaging, buying in bulk to reduce the amount of packaging you accumulate, replacing plastic bags with reusable bags and containers, and planning your meals to avoid wasting food.

2. Reuse

Reuse or repair items instead of disposing of them to reduce waste and save money. This may involve: donating unwanted items to charity, washing and reusing takeaway containers and glass jars, repairing household items instead of replacing them and consider using recycled materials.

3. Recycle

Waste products can be reprocessed into new products saving resources and reducing pollution. A broad range of items can be recycled including: glass, hard plastics, metal, paper and cardboard. Recycling facilities are available in most areas. Check with your local council for further details and what products can be recycled. Specific recycling programs may be available for certain items, such as electronic goods (e.g. mobile phones, which contain heavy metals), waste oil, unwanted or expired farm chemicals (ChemClear) and farm chemical drums (the national drumMUSTER program collects and recycles empty, cleaned, non-returnable farm chemical containers). Furthermore, homeowners can recycle kitchen and garden waste into valuable garden nutrients by composting.

Home composting

Up to half of the waste thrown out by households is organic material which can be composted. This includes food scraps, garden clippings, herbivore animal manure and paper. Composting can benefit your garden by returning nutrients to the soil, improving its structure and water holding capacity. The majority of product is waste material found in and around our homes.

Put simply, composting is mixing organic matter with air, water and soil microbes/fauna (such as worms, insects, bacteria and fungi), which break the organic matter down into a rich compost.

Helpful Hints

Compost Tips:

1. You can create compost using worm farms or larger compost heaps and bins. Choose a compost method that suits your lifestyle and a location that is in part shade
2. Know what to compost – in simple terms, compost materials fall into green or brown piles. Green includes leaf litter, grass, green weeds and kitchen vegetable scraps. Brown materials include woody weeds, paper and cardboard, dry leaves and straw
3. Know what to avoid - avoid the addition of too much salty water or ash from wood fires. Also avoid the addition of diseased plants, meat, fat, oil or household cleaners
4. Layer your material – compost heaps typically contain 20 parts carbon to one part nitrogen by volume. Dry, brown and woody garden material is usually high in carbon, while soft, green garden waste and food scraps are usually high in nitrogen.

Sustainable gardening

Sustainable gardening can be defined as garden design and management that maximises human wellbeing and environmental benefits. It can involve a broad range of activities that aim to reduce the consumption of water, energy and materials or increase local food production and biodiversity. Table 9.1 outlines creative design and management techniques that can be employed to achieve a more sustainable garden.

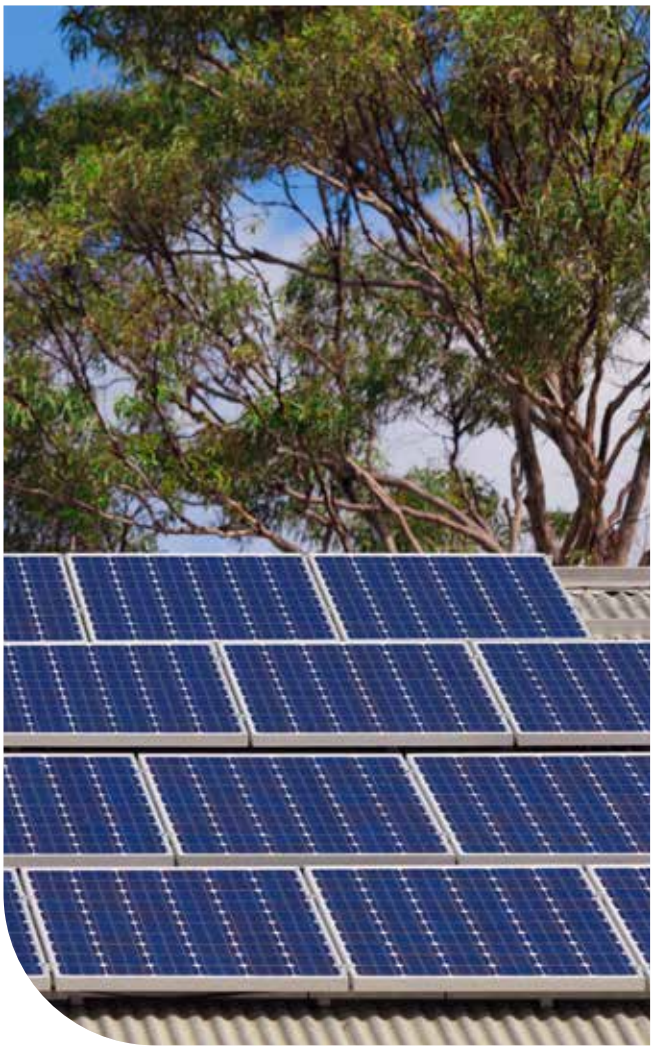
Table 9.1: Sustainable garden techniques

Goal	Gardening techniques
Water efficient garden	• Install rainwater tanks • Recycle grey water • Increase soil water storage (e.g. improve soil structure, mulch) • Use no or low, efficient irrigation • Water during the cool of the day slowly, to allow water to infiltrate around the root zone - don't water again until the soil is dry • Abide by council watering restrictions • Incorporate wicking garden beds • Grow water-wise plants (e.g. plants with silver foliage, succulents) • Indigenous plants are most suited to the local climate.
Energy efficient garden	• Minimise fossil fuel usage (e.g. petrol lawn mowers and hedge trimmers) • Maximise energy efficiency of appliances, tools and machinery (e.g. pumps and lighting) • Reduce embodied energy (energy required to produce the goods) in landscaping materials, tools, machinery and chemicals • Minimise the use of pesticides and fertilisers • Utilise solar powered lighting.
Minimise the use of materials	• Use materials that can be either reused or recycled • Buy local materials over imported ones if appropriate • Select materials that are produced sustainably
Minimise offsite impacts	• Ensure fertiliser applications closely match plant demand so nutrients don't escape from the garden into natural waterways • Remove invasive garden plants (weeds), which may spread to nearby bushland or farms (e.g. gazanias and ivy).
Increase local food production	• Grow herbs, vegetables and fruit trees • Recycle food wastes using compost bins and worm farms • Incorporate a chicken run for fresh eggs.
Increase biodiversity within the garden	• Grow a diversity of plant types (e.g. trees, shrubs, grasses and groundcovers) and species • Provide a range of animal habitats - dry, damp, sunny, shady, enclosed and open areas • Incorporate or retain indigenous plant species (contact local indigenous nurseries for further information) • Link garden plantings to surrounding bush • Maintain leaf litter rather than completely removing it • Retain dead trees, stumps and shrubs where possible as they supply soil nutrients and offer habitat niches • Incorporate nesting boxes.

House design

If you're building on a rural property, you have a great opportunity to create a sustainable house that is designed to be efficient in water and energy resources, while also minimising waste. The added bonus is that your home will be cost-efficient over time, comfortable, cheap to maintain and will complement our unique environment.

By incorporating the basic concepts of sustainable design, your home can be up to 5°C warmer in winter and up to 10°C cooler in summer, making it brighter and more comfortable throughout the year. It's very simple to apply these concepts to your new house or to an existing dwelling.



The main principles of energy-smart house design

- Daytime living areas with large north-facing windows to receive unobstructed winter sun
- Internal planning to create zones that reduce the amount of energy required for heating and cooling
- Windows appropriately orientated and sized with protection from winter heat loss and summer heat gain
- Adequate thermal mass (heavy building materials) to stabilise indoor temperatures
- Adequate insulation in walls, ceilings and floors
- Good draught-proofing
- Cross-ventilation for summer cooling
- An efficient hot water system and fittings
- Efficient lighting and appliances
- Landscape design that helps modify the microclimate for more comfortable conditions inside

Photo: Lauren Hull

10. Extreme Events

Extreme Events

Emergencies can happen to anyone, at any time and have a big impact on your life. They can also have major implications for animal welfare and the financial viability of rural properties. Experience shows that people who plan and prepare for emergencies can reduce the impacts of the emergency and in some instances recover more quickly afterwards.

The Extreme Events Chapter focuses on weather emergencies and aims to explain how you can take simple steps to prepare plans and incorporate strategies to ensure the safety of all persons, livestock and houses.

Plan and stay safe

Climate change has the potential to impact our environment, community and economy. Governments, industry, communities and land managers need to start preparing for and adapting to climate change now, in order to minimise the negative impacts of climate change which is predicted to include more frequent and intense storm and rainfall events and harsher fire seasons.

Everyone should have an Emergency Plan, which outlines what to do before the emergency to be ready, what to do during the emergency to keep safe and minimise the impacts on people, livestock and property; and what to do after the emergency to access assistance, recover and return to normal life as soon as possible.

Create and regularly review your Emergency Plan with members of your household. Store your plan with a home emergency kit. The State Emergency Services (SES), Country Fire Authority (CFA) and Red Cross have practical tools, information, templates and apps available to assist homeowners and rural property owners develop an Emergency Plan. Emergency Plans are also useful for other types of emergencies such as earthquakes and tremors, medical emergencies, power, gas or mains water outages, industrial accidents or chemical spills.

Know your risks

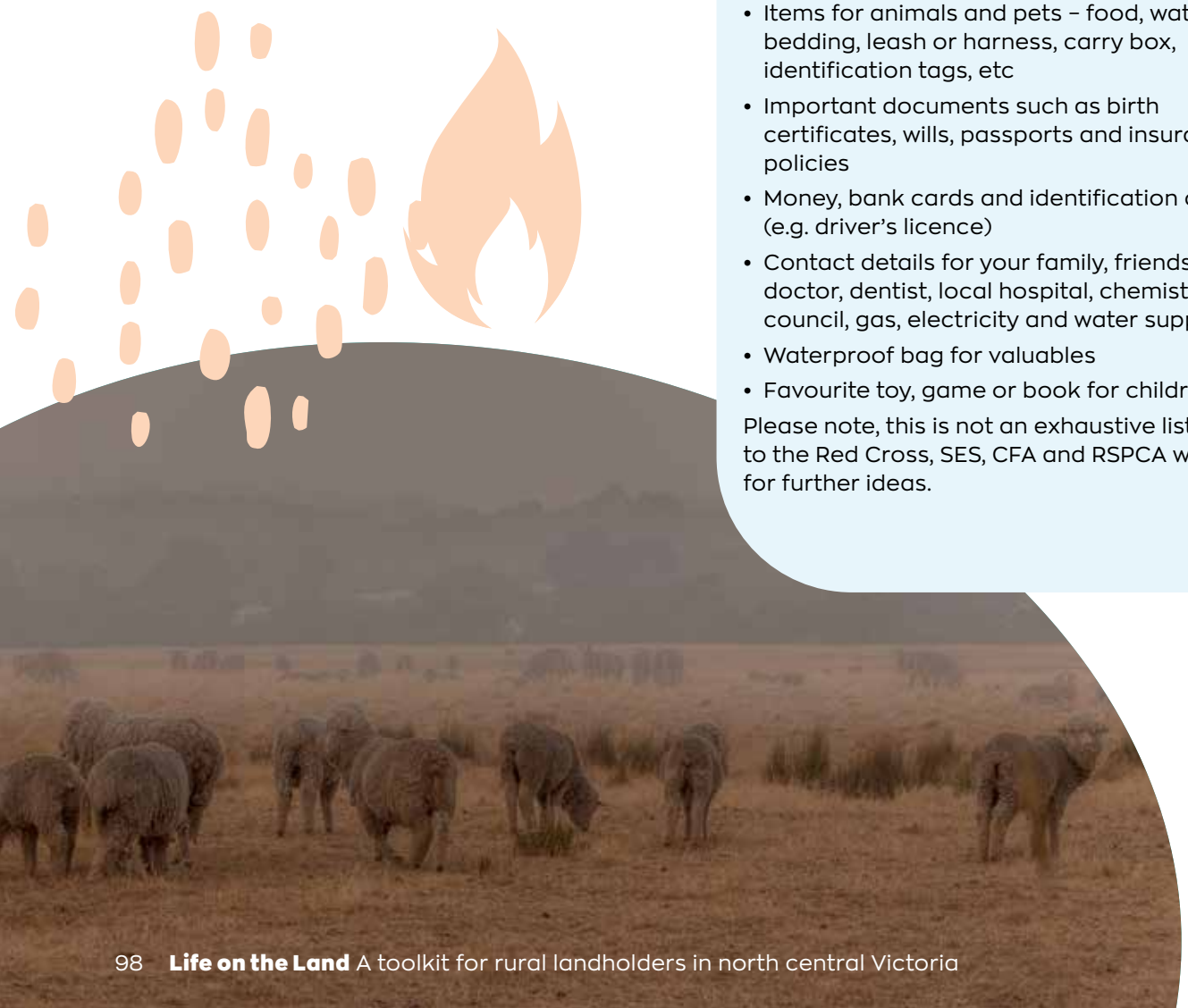
The first step in developing an Emergency Plan for your property is to conduct a risk assessment, which identifies potential threats to the property and their possible consequences.

Things to consider in your risk assessment include:

- **Location –** Is your property close to other homes or isolated? Check the historical records for the incidence of natural disasters in your area. Does your property border bush or grasslands? If so, what the implications for fire? Is your property close to watercourses prone to flooding? Is there easy access for emergency service vehicles and ordinary vehicles?
- **Topography –** Is your property on flat, low-lying and/or steep land? This will influence the speed and intensity of fire. Check the historical records for flood and heights. Are there any natural refuge areas on the property or nearby?
- **Vegetation –** What type and amount of vegetation are on the property, adjacent or nearby? Such areas can increase the risk of fires or falling trees during storms. Furthermore, bushfires behave differently in different types of vegetation such as grass or paddocks, forest and woodland, and bush and grassland fringes.
- **Weather –** What direction do the most common damaging weather patterns (e.g. storm fronts or strong winds) come from? What weather conditions are forecast? What is the Fire Danger Rating in your district (this is reported daily during the fire season)?
- **Local warning information –** Do you have access to local and reliable official emergency warnings? Do you know how these warnings relate to your property? For example, do you understand how the upstream and local river heights impact flood levels and areas on your property?
- **Farm use –** Does having livestock or animals restrict your ability to respond to an emergency? Can you evacuate livestock quickly?

Home emergency kits

Home and property owners should put together a home emergency kit, which contains everything you may need to cope in an emergency and/or if you need to relocate. It should be kept handy, regularly updated and be suitable for any emergency at any time. All household members should be aware of the kit, its contents and its location.



Helpful Hints

The kit should include:

- A copy of your Emergency Plan e.g. Red Cross RediPlan
- First aid kit
- Medicines, prescriptions and toiletries
- Portable radio, torch with spare batteries
- Mobile phone, charger and other technology
- Food basics and water for three days
- Warm, waterproof clothes and protective shoes and gloves
- Wool blankets, sleeping bags, tents
- Any special items for young children, elderly and people with different abilities (e.g. glasses, mobility aides)
- Items for animals and pets – food, water, bedding, leash or harness, carry box, identification tags, etc
- Important documents such as birth certificates, wills, passports and insurance policies
- Money, bank cards and identification cards (e.g. driver's licence)
- Contact details for your family, friends, doctor, dentist, local hospital, chemist, vet, council, gas, electricity and water suppliers
- Waterproof bag for valuables
- Favourite toy, game or book for children.

Please note, this is not an exhaustive list. Refer to the Red Cross, SES, CFA and RSPCA websites for further ideas.

Manage your risks

Home and property owners can reduce the risks and the impacts of emergencies, such as fire and floods, by preparing their property. The following tables 10.1, 10.2 and 10.3 contain practical risk management actions that you can do to prepare for fire, flood and thunderstorms.

Table 10.1: Risk management actions that can be taken to prepare for fire

Timing	Risk management actions
Before and during fire season	• Prepare your home emergency kit and keep it in a handy spot • Clean gutters and downpipes of leaves and rubbish • Ensure roof is in good repair and roofs are firmly fixed • Ensure underfloor areas are enclosed or sealed • Fix metal spark-proof screens to external vents • Eliminate gaps in external eaves where burning embers might enter • Ensure you have a hose that is long enough to reach every part of the house • Consider installing a roof sprinkler system, preferably using a water source from a reticulated supply (e.g. diesel powered pump drawing water from a rainwater tank or swimming pool) • Consider installing non-combustible shutters, as when they're fully closed they can prevent windows breaking from flying debris and radiant heat • Store fuels and chemicals away from the house. The pressure relief valves on LPG gas tanks should be directed away from the house • Store wood away from the house • Clear fine fuels from around the house (e.g. grass, bark and leaves) • Keep grass areas well trimmed and watered around the house, grass should be less than 10 centimetres high • Reduce leaf litter (dead leaves) to no more than one centimetre high around the house • Remove or trim shrubs, there should be no shrubs over one metre next to or below windows • Trim tree branches overhanging the house • Ideally don't grow plants near your house that have a high content of volatile oil or resin, as they can burn fiercely (e.g. conifers, bottlebrushes and eucalypts). Instead keep plants away from buildings or utilise plants with a high moisture or salt content that maybe able to slow down a fire (e.g. fruit trees, succulents or saltbushes) • Install firebreaks by ploughing, applying herbicides or grading around the property or house block. They can provide access for surveillance or fire fighting activities • Ensure key areas around building and stockyards are well grazed to reduce fuel loads • Incorporate pasture rotations and grazing management to maintain short, green feed (e.g. lucerne or summer active perennials) • Prepare safe refuge areas for livestock by: cultivating, grading, slashing or applying herbicides; Eating out small paddocks with livestock grazing; Planting non-flammable tree lines that incorporate rapid, easy access to laneways and roads from grazing areas • Maintain adequate stockyards and loading facilities • Ensure you have a defendable emergency supply of feed that will meet your livestock's feed requirements for up to a week. Consider feed storages off-property if possible • Consider all-steel fireproof fencing in key areas such as stockyards, boundaries and laneways.

Timing	Risk management actions
When a fire is approaching	• If you are planning to leave early you should do so early in the morning or even the night before during high fire danger periods. Leaving early means leaving long before the fire is in your area and long before you see flames • Don't rely on mains water supply for sprinklers or home defence. Instead access water from rainwater tanks, dams or swimming pools • Seal gaps, vents and roof spaces to prevent embers entering the house • Close doors and windows, move doormats, outdoor furniture and other flammable objects away from the house • Hose down the house walls, roof and garden (use sprinkler system if available) • Block downpipes and fill gutters with water • Fill baths, sinks, buckets and other containers with water (for dousing fires that might be caused by embers entering the house) • Place wet towels and blankets against gaps in doors and windows • Close curtains and shutters but don't take shelter in any part of the house where you can't see the fire's progress • Keep informed via radio reports and keep your phone line free • Wear loose fitting overalls or long-sleeved shirt and pants made from natural fabrics, not synthetics, which may melt and cause injury. Underwear and socks should also be of natural fibres • Wear strong shoes or boots • Wear safety goggles, gloves, a hat and smoke mask (or large, wet handkerchief over mouth and nose) • Restrain and confine small pets (cats, dogs and birds) so that you can easily find them and evacuate if the situation deteriorates. Ensure that pets can be identified if they become lost, including your contact details on the cage. If you decide to stay, put the pets in a room inside the house where they won't get in the way of your efforts protecting the property or livestock. Don't shut them in a shed, kennel or hutch outside as they will have no chance of saving themselves in a fire • Move livestock to safe refuge areas (e.g. relatively bare paddocks, stockyards) or open all the internal property gates so that livestock have greater range of access on the property. Never leave an animal tethered or confined (e.g. stable) during a fire as they will have no chance of survival if a fire is approaching.
If you need to evacuate	• Complete the above if safe to do so • Pack the car including your home emergency kit • Take pets with you if safe to do so • Turn off mains power and gas • Leave the front gate open so emergency services have easy access to your property.
During a fire	• If you plan to stay and defend your property refer to the CFA for advice on your personal capacity, property preparation, house design and construction, recommended equipment and resources and what you can expect to happen during a bushfire. You should develop a Bushfire Survival Plan and be aware that defending your home is very risky – you could be seriously injured, suffer psychological trauma or die. The safest option is to leave early.

Table 10.2: Risk management actions that can be taken to prepare for a flood

Timing	Risk management actions
Before a flood	• Prepare your home emergency kit and keep it in a handy spot • Use topographic maps and known flood levels to plan paddock layout and access laneways to higher refuge areas • Where possible, install exit gates in fences at key locations to prevent livestock being isolated by floodwaters • Prepare built-up feed pads to safe heights, you will need to determine the risk and cost benefit of events that have the probability of occurring once in 20, 50 or 100 years • Maintain feed reserves in accessible storage above flood level • Consider road access in flood times for ease of livestock evacuation. That is, you may have to walk or swim livestock to safety if road access isn't possible during a flood and livestock weren't relocated early • Work with your neighbours to plan group strategies and to provide assistance during floods.
When a flood warning has been issued for your area	• Listen to your local radio station for information • Stack furniture and possessions above the likely flood level (e.g. on beds and in the roof) • Move garbage, chemicals and poisons to a high place • Secure objects that float and may cause damage • Move livestock to higher ground • Check your car and fill it with fuel • Check Home Emergency Kit and fresh water stocks • Place important documents, valuables and medical supplies into a waterproof case in an accessible location.
If you need to evacuate	• Empty freezers and refrigerators, leaving doors open (to avoid floating and subsequent damage) • Collect and secure valuables (papers, money, photo albums, etc) • Take your pets with you if it is safe to do so, or provide adequate food and water and move them to a safer place • Turn off mains power, water and gas • Whether you leave or stay, put sand bags in the toilet bowl and over all laundry and bathroom drain holes to prevent sewage backflow into your home • Take your Home Emergency Kit and mobile phone with you • Lock your home and take recommended relocation routes for your area • Do not drive into water of unknown depth and current.
During a flood	• Keep your Home Emergency Kit safe and dry • Do not eat food which has been in contact with flood waters • Do not drink flood water and boil all tap water • Don't use gas or electrical supplies until they have been safety checked • Beware of snakes and spiders which may move to the safety of your home • Avoid wading as water may be contaminated. Do not drive or walk through flood waters of unknown depth or current • Listen to the local radio and follow all warnings and advice.

Table 10.3: Risk management actions that can be taken to prepare for severe thunderstorms

Timing	Risk management actions
Before a severe thunderstorm	• Prepare your home emergency kit and keep it in a handy spot • Be aware of severe thunderstorm patterns in your area • Regularly trim trees, remove branches overhanging buildings, and clear gutters and downpipes • Regularly clear the yard of loose materials and rubbish • Ensure buildings are well maintained (e.g. secure loose roof tiles) • Fit glass windows and doors with shutters or insect screens, and protect sky lights with wire mesh • Check boats are securely moored or protected on land • Maintain emergency feed reserves for livestock • If you have intensively housed livestock or dairy cattle ensure you have access to emergency power and suitable wiring connections for key machinery (e.g. water supply and milking equipment) • Install power failure and temperature alarm systems in fully enclosed intensive livestock sheds • Install back-up storage facilities for effluent disposal systems to avoid contamination of waterways during power failures.
When a severe thunderstorm approaches	• Have your home emergency kit ready • Clear or secure loose objects from around buildings and the house yard • Clean and check roof, guttering and down pipes • Have plastic sheeting and large garbage bags available for rain protection; and masking tape for windows • Listen to your local radio station for information • Make sure pets and livestock are secure and have adequate shelter • Move vehicles under cover or protect them with blankets and tarpaulins • Disconnect electrical appliances • Shut all doors and windows • If outdoors, seek solid enclosed shelter • If driving, stop clear of trees, power lines and streams. In a thunderstorm with severe winds or tornados don't stay in your vehicle, instead seek refuge in a building or if that's not possible lie flat in a ditch and protect your head.
During a storm	• Stay inside away from doors and windows, preferably in small interior room or stairwell on the lowest floor of the building. Ideally choose a room with walls that are reinforced with pipes (e.g. bathroom) or concrete. If possible crouch underneath heavy furniture and protect your head with a pillow or mattress • Avoid using corded telephones and anything connected to an electrical outlet such as computers.

Emergency contacts

Below is a list of emergency contacts. These organisations also have websites that can provide valuable information in a time of need.

Table 10.4: Emergency contacts

Police Fire Ambulance	**000**	
SES	**132 500**	www.ses.vic.gov.au
CFA	**1800 226 226**	www.cfa.vic.gov.au
Poisons Info Line	**13 11 26**	www.betterhealth.vic.gov.au
Red Cross	**1800 733 276**	www.redcross.org.au
Beyond Blue	**1300 22 46 36**	www.beyondblue.org.au
Kids Help Line	**1800 55 1800**	www.kidshelpline.com.au
Lifeline	**13 11 14**	www.lifeline.org.au
13YARN	**13 92 76**	www.13yarn.org.au/
Agriculture Victoria - horses and livestock welfare	**136 186**	www.agriculture.vic.gov.au/farm-management/emergency-management/emergency-animal-welfare/horses-and-livestock-in-emergencies
Wildlife Victoria - native animal welfare	**03 8400 7300**	www.wildlifevictoria.org.au

Appendix 1: Further Resources

Further Resources - Our Climate

Bureau of Meteorology
www.bom.gov.au

Climate and Weather
www.agriculture.vic.gov.au/climate-and-weather

Climate Change in Australia
www.climatechangeinaustralia.gov.au/e

CSIRO
www.csiro.au/en/research/environmental-impacts/climate-change/climate-change-information

North Central Climate Change Adaptation and Mitigation Plan
www.nccma.vic.gov.au/sites/default/files/publications/nccma_final_climate_change_mitigation_plan_2015.pdf

Victoria's Climate Change Strategy
www.climatechange.vic.gov.au

Further Resources – Property Planning

Extension Aus
www.extensionaus.com.au

Farm Management
www.agriculture.vic.gov.au/farm-management

Farm Style Australia
www.farmstyle.com.au

Planning Victoria
www.planning.vic.gov.au

Whole Farm Planning
www.extensionaus.com.au/irrigatingag/docs/irrigation-in-northern-victoria/whole-farm-planning

Victoria Farmers Federation
www.vff.org.au/category/environment-planning

Further Resources – Water at Home

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

My Smart Garden
www.mysmartgarden.org.au/smart-water-gardening

Save Water
www.savewater.com.au

Smart Gardens for a Dry Climate
www.coliban.com.au/files/2020-11/Smart%20Gardens%20for%20a%20Dry%20Climate%202020_Website.pdf

Revegetate your dam
www.sustainablefarms.org.au/resources/farm-dams-guide

Water Management
www.agriculture.vic.gov.au/farm-management/water

Further Resources – Healthy Habitats

Atlas of Living Australia
www.ala.org.au

Birdlife Victoria
03 9347 0757 | www.birdlife.org.au

Climate adapted seed sourcing for the north central region
www.nccma.vic.gov.au/resources/publications

Conservation Volunteers Australia
1800 032 501 |
www.conservationvolunteers.com.au

Dial before you dig
www.1100.com.au

Greening Australia
1300 886 589 | www.greeningaustralia.org.au

Landcare Victoria Inc
03 9034 1940| www.landcarevictoria.org.au

Trust For Nature
1800 999 933 | www.trustfornature.org.au

Further Resources – Healthy Soils

Agriculture Victoria - Introduction to Soil Carbon
www.rise.articulate.com/share/b_EzK-EEgNcGsFOsQgcFPmuA-Gf6RIcf#

Carbon Farmers Australia
www.carbonfarmersofaustralia.com.au/carbon-trading/Resources

Local Lands Services - What is Healthy Soil?
www.lls.nsw.gov.au/__data/assets/pdf_file/0020/1270541/11-What-is-a-Healthy-Soil_FINAL.pdf

North Central CMA Source Soil Health Guide 2024
www.nccma.vic.gov.au/projects/agriculture/soil-health-guide

Soil Care
www.soilcare.org

Sustainable Farms:
www.sustainablefarms.org.au

Land management:
www.mla.com.au

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

Further Resources – Biosecurity

Agriculture Victoria
136 186 | www.agriculture.vic.gov.au

Feral Scan
www.feralscan.org.au

Landcare Victoria Inc
03 9034 1940 | www.landcarevictoria.org.au

Pest Smart
www.pestsmart.org.au/pestanimals

Victorian Blackberry Taskforce
www.vicblackberrytaskforce.com.au

Victorian Gorse Taskforce
www.vicgorsetaskforce.com.au

Victorian Rabbit Action Network
www.vran.com.au

Victorian Serrated Tussock Working Party
www.serratedtussock.com

Further Resources – Sustainability

Bendigo Sustainability Group
www.bsg.org.au

ChemClear
www.chemclear.org.au

Chemical Management
www.agriculture.vic.gov.au/farm-management/chemicals

drumMUSTER:
www.drummuster.org.au

Environment Protection Authority
www.epa.vic.gov.au

Planet Ark's Recycling Near You:
www.recyclingnearyou.com.au

Sustainable Farms
www.sustainablefarms.org.au

Sustainability Victoria
www.sustainability.vic.gov.au

Your Home – design for lifestyle and the future
www.yourhome.gov.au

Further Resources – Healthy Communities

Birchip Cropping Group
03 5492 2787 | www.bcg.org.au

Country Women's Association of Victoria
03 9827 8971 | www.cwaofvic.org.au

Mind Maintenance Toolkit
www.farmerhealth.org.au/mind-maintenance-toolkit

National Centre for Farmers Heath
03 5551 8533 | www.farmerhealth.org.au

The Rural Adversity Mental Health Program
www.ramhp.com.au

Victorian Farmers Federation (VFF)
02 6269 5666 | www.vff.org.au

Rural Financial Counselling Service
1300 045 747 |
www.ruralfinancialcounselling.org.au

Appendix 1: Further Resources

Further Resources – Preparedness

Agriculture Victoria
136 186 | www.agriculture.vic.gov.au/farm-management/emergency-management

CFA Country Fire Association
1800 226 226 | www.cfa.vic.gov.au

Farmsafe Australia
www.farmsafe.org.au

Flood Eye
www.nccma.vic.gov.au/flood-information/flood-eye

SES
132 500 | www.ses.vic.gov.au

Red Cross
1800 733 276 | www.redcross.org.au

Appendix 2: Key Contacts

Local Government

Buloke Shire Council
1300 520 520 | www.buloke.vic.gov.au

Central Goldfields Shire
03 5461 0610 | www.centralgoldfields.com.au

City of Greater Bendigo
03 5434 6000 | www.bendigo.vic.gov.au

Gannawarra Shire Council
03 5450 9333 | www.gannawarra.vic.gov.au

Hepburn Shire
03 5348 2306 | www.hepburn.vic.gov.au

Loddon Shire Council
03 5494 1200 | www.loddon.vic.gov.au

Macedon Ranges Shire Council
03 5422 0333 | www.mrsc.vic.gov.au

Mitchell Shire Council
03 5734 6200 | www.mitchellshire.vic.gov.au

Mount Alexander Shire Council
03 5471 1700 | www.mountalexander.vic.gov.au

Northern Grampians Shire Council
03 5358 8700 | www.ngshire.vic.gov.au

Pyrenees Shire Council
03 5349 1100 | www.pyrenees.vic.gov.au

Shire of Campaspe
1300 666 535 | www.campaspe.vic.gov.au

Swan Hill Rural City Council
03 5036 2333 | www.swanhill.vic.gov.au

Government

Agriculture Victoria
www.agriculture.vic.gov.au| 136 186

Department of Environment, Energy and Climate Action
136 186 | www.deeca.vic.gov.au

Engage Victoria
1300 366 356 | www.engage.vic.gov.au

Energy Victoria
1300 366 356 | www.energy.vic.gov.au

Environment Protection Authority
1300 372 842 | www.epa.vic.gov.au

First Peoples State Relations
1300 366 356 |
www.firstpeoplesrelations.vic.gov.au

North Central Catchment Management Authority
03 5448 7124 | www.nccma.vic.gov.au

Parks Victoria
13 19 63 | www.parks.vic.gov.au

Solar Victoria
1300 366 356 | www.solar.vic.gov.au

Victoria Government
1300 366 356 | www.vic.gov.au

Volunteer Victoria
1300 366 356 | www.volunteer.vic.gov.au

Wildlife
136 186 | www.wildlife.vic.gov.au

Water Corporations

Central Highlands Water
1800 061 514 | www.chw.net.au

Coliban Water
1300 363 200 | www.coliban.com.au

Goulburn Murray Water
1800 013 357 | www.g-mwater.com.au

Goulburn Valley Water
03 5832 0400 | www.gvwater.vic.gov.au

Grampians Wimmera Mallee
1300 659 961 | www.gwmwater.org.au

Lower Murray Water
03 5051 3400 | www.lmw.vic.gov.au

Western Water
1300 650 422 | www.westernwater.com.au

Registered Aboriginal Parties

Djaara
03 5444 2888 | info@djadjawurrung.com.au

Yorta Yorta Nation Aboriginal Corporation
5832 0222 | reception@yynac.com.au

Taungurung Land and Waters Council
5784 1433 | www.taungurung.com.au/contact-us

Wamba Wemba Aboriginal Corporation
admin@wambawemba.com

Barengi Gadjin Land Council
5381 0977 | admin@bglc.com.au

Appendix 3: A Simple Property Plan

Obtain a good map of your property that shows the features of the property.

Satellite imagery/online aerial photographs and surveyor plans are useful.

Step 1: Check

Undertake a site assessment

a. Identify the following land features:

- Landscape types and physical features
- Soil types and characteristics and health (are soils productive, saline, sodic. Are there areas of ersosion)
- Slope and rocky outcrops
- Waterways including streams, gullies, drainage and flood lines and dams
- Current land uses
- Areas of natural vegetation and vegetation type
- Wildlife habitat areas, the presence of wildlife and status e.g. threatened and/or endangered species
- Climate, rainfall and seasonality
- Infrastructure such as fences and boundaries, productive paddocks, shade shelter-belts, woodlots, dams, water tanks and troughs, lanes and gates
- Drought, fire and flood management.

b. Property SWOT analysis

- Identify the property's strengths, weaknesses, opportunities and threats considering:
- Strengths you can take advantage of e.g. areas of high quality soils, water supply, good infrastructure
- Weaknesses that will need attention before they cause problems e.g. weed infested areas, damaged fences, historical land practices
- Opportunities to develop resources further e.g. moving fence lines to improve management, labour hire
- Threats that could affect the property e.g. erosion, pest diseases.

c. Write notes about your proposed land use and consider your short medium and long term goals for the property. Consider the following:

- Planning for new infrastructure such as houses, sheds, stockyards, windbreaks, dams, roads and fence alignments
- Seasonal calendar and methods to control and prevent weeds and pest animals
- Methods to sustain or improve water quality for stock and downstream users
- Vegetation management including methods and timing of any proposed clearing for increased production or efficiency as well as revegetation in disturbed areas
- Wildlife management strategies
- Methods to control stormwater and prevent erosion
- Ways to reduce bushfire hazards
- Conserve soil, preserve and enhance trees
- Options for treating and disposing of wastewater and rural rubbish
- Legal and planning requirements
- Methods to improve stock or alternative water sources for stock
- Appropriate work safety procedures
- Available finance and works budget
- Available labour.

Step 2: Do

a. Make a base map to record the condition your property is in now.

Illustrate the permanent features such as the property boundary, waterways, vegetation, structures, contours and land types.

b. Make your long-term vision map.

On a second property map, illustrate where you want to see improvements the fences, productive paddocks, shelter-belts, wildlife habitat areas, woodlots, dams, troughs, lanes and gates.

c. Make an Action Plan

• Prioritise and record actions.

Step 3: Review

Constantly monitor, improve and reshape your goals as necessary.

Appendix 4: Listed flora and fauna communities and species

Threatened ecological communities listed on the EPBC Act include:

- Buloke Woodlands of the Riverina and Murray Darling Depression Bioregion
- Grassy Eucalypt Woodland of the Victorian Volcanic Plain
- Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia
- Natural Grasslands of the Murray Valley Plains
- Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains
- White Box-Yellow Box-Blakely's Red Sum Grassy Woodland and Derived Native Grassland.

Threatened fauna recorded in the north central region from the Victorian Biodiversity Atlas, accessed August 2020

Common Name	EPBC	FFG
Alpine tree frog	Vulnerable	L
Australasian bittern	Endangered	L
Australian grayling	Vulnerable	L
Australian painted-snipe	Endangered	L
Bar-tailed godwit	Vulnerable	
Curlew sandpiper	Critically Endangered	L
Eastern curlew	Critically Endangered	L
Eastern hare-wallaby	Extinct	L
Eastern quoll	Endangered	L
Eltham copper butterfly	Endangered	L
Flat-headed galaxias	Critically Endangered	X
Golden sun moth	Critically Endangered	L
Great knot	Critically Endangered	L
Greater glider	Vulnerable	L
Greater sand plover	Vulnerable	
Grey-headed flying-fox	Vulnerable	L
Growling grass frog	Vulnerable	L
Heath mouse	Endangered	L
Long-nosed potoroo	Vulnerable	L

Common Name	EPBC	FFG
Macquarie perch	Endangered	L
Malleefowl	Vulnerable	L
Murray cod	Vulnerable	L
Murray hardyhead	Endangered	L
Painted honeyeater	Vulnerable	L
Pink-tailed worm-lizard	Vulnerable	L
Plains-wanderer	Critically Endangered	L
Red knot	Endangered	
Regent honeyeater	Critically Endangered	L
Regent parrot	Vulnerable	L
Silver perch	Critically Endangered	L
Sloane's froglet	Endangered	
South-eastern long-eared bat	Vulnerable	L
Southern greater glider	Vulnerable	L
Spot-tailed quoll	Endangered	L
Striped legless lizard	Vulnerable	L
Superb parrot	Vulnerable	L
Swift parrot	Critically Endangered	L
Trout cod	Endangered	L
White-throated needletail	Vulnerable	L
Yarra pygmy perch	Vulnerable	L

Threatened flora recorded in the north central region from the Victorian Biodiversity Atlas, accessed August 2020

Common Name	EPBC	FFG
Angular saltbush		L
Annual buttons		L
Australian anchor plant		L
Basalt peppercress	Endangered	L
Ben major grevillea	Vulnerable	L
Bendigo spider-orchid		L
Black gum	Vulnerable	L
Blunt club-sedge		L
Bow-lip spider-orchid		L
Brilliant sun-orchid	Vulnerable	L
Buloke		L
Button wrinklewort	Endangered	L
Candy spider-orchid	Vulnerable	L
Castlemaine spider-orchid		L
Chariot wheels	Vulnerable	L
Charming spider-orchid	Endangered	L
Clover glycine	Vulnerable	L
Clumping golden moths		L
Crimson spider-orchid	Vulnerable	L
Cut-leaf burr-daisy		L
Dainty phebalium		L
Dookie daisy		L
Douglas' spider-orchid		L

Common Name	EPBC	FFG
Downy swainson-pea		L
Dwarf swainson-pea		L
Eastern spider-orchid	Endangered	L
Pepper-cress	Vulnerable	L
Fragrant leek-orchid	Endangered	L
Grey grass-tree		L
Hairy tails		L
Hoary scurf-pea		L
Inland leek-orchid		L
Jericho wire-grass		L
Kamarooka mallee		L
Large-flower crane's-bill		L
Large-fruit yellow-gum		L
Large-headed fireweed	Vulnerable	L
Limestone sida		L
Little pink spider-orchid	Endangered	L
Lowly greenhood	Endangered	L
Magnificent spider-orchid		L
Marbled marshwort		L
Maroon leek-orchid	Endangered	L
Matted flax-lily	Endangered	L
Mcivor spider-orchid	Endangered	L
Narrow goodenia		L
Nealie		L

Common Name	EPBC	FFG
Northern golden moths		L
Northern sandalwood		L
Ornate pink-fingers	Vulnerable	L
Pale leek-orchid	Vulnerable	X
Pale plover-daisy		L
Plains billy-buttons		L
Plains spurge		L
Plump swamp wallaby-grass		L
Prince-of-wales feather-moss		L
Purple diuris		L
Purple eyebright	Endangered	L
Red swainson-pea	Vulnerable	L
Red-cross spider-orchid		L
Ridged water-milfoil	Vulnerable	L
River swamp wallaby-grass	Vulnerable	X
Robust greenhood	Critically Endangered	L
Rock orchid		L
Rough eyebright		L
Rough-seed wire-grass		L
Salt paperbark		L
Scented bush-pea		L
Scented spider-orchid		L
Shiny daisy-bush		L
Silky glycine		L
Silky swainson-pea		L
Slender club-sedge		L
Slender darling-pea	Vulnerable	L
Slender water-milfoil		L
Small milkwort		L
Small quillwort		L

Common Name	EPBC	FFG
Small scurf-pea		L
Small sickle greenhood		L
Small-leaf wax-flower		L
Soft sunray		L
Southern shepherd's purse	Endangered	L
Spiny rice-flower	Critically Endangered	L
Spotted emu-bush		L
Stiff groundsel	Endangered	L
Striped water-milfoil		L
Stuart mill spider-orchid		L
Swamp diuris		L
Swamp leek-orchid		L
Swamp sheoak		L
Tan leek-orchid		L
Tawny spider-orchid	Endangered	L
Tough scurf-pea		L
Turnip copperburr	Endangered	L
Umbrella wattle		L
Velvet daisy-bush		L
Venus-hair fern		L
Wavy marshwort		L
Weeping myall		L
Western water-starwort		L
Whipstick westringia	Endangered	L
White sunray	Endangered	L
Whorled zieria		L
Winged peppercress	Endangered	L
Yarran		L
Yarran wattle		L
Yellow-lip spider-orchid	Endangered	L
Yellow-tongue daisy		L

North Central CMA