



Wimmera Catchment Management Authority

Regional Land Partnerships Program Action Plan



National
Landcare
Program



Wimmera CMA

We acknowledge the Traditional Owners and other Aboriginal and Torres Strait Islander Peoples across the region and pay respect to Elders past, present and emerging.

“A healthy Wimmera catchment where a resilient landscape supports a sustainable and profitable community.”

Regional Land Partnerships Program Action Plan

This document is an Addendum to the Wimmera Regional Catchment Strategy 2021-27.⁽¹⁾ It sets out an action plan for how the Wimmera region can contribute to achieving the 5-year Outcomes and Investment Priorities of the Australian Government’s Regional Land Partnerships Program.

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ARI	Arthur Rylah Institute for Environmental Research
BGLC	Barengi Gadjin Land Council
BRP	Biodiversity Response Planning
CaLP Act	Catchment and Land Protection Act 1994
CMA	Catchment Management Authority
DELWP	Victorian Government Department of Environment, Land, Water and Planning
EMAC	Eastern Maar Aboriginal Corporation
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
EVC	Ecological vegetation class
FDf	Future Drought Fund
FFG Act	Flora and Fauna Guarantee Act 1988
GEOGLAM	Group on Earth Observations Global Agricultural Monitoring Initiative
NLP	National Landcare Program
NRM	Natural resource management
RCS	Regional Catchment Strategy
RLP	Regional Land Partnerships Program
SERTBC	South-eastern red-tailed black cockatoo
SMP	Strategic Management Prospects
TEC	Threatened ecological community
VBA	Victorian Biodiversity Atlas
Wimmera CMA	Wimmera Catchment Management Authority

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Introduction

This Action Plan is an addendum to the Wimmera Regional Catchment Strategy 2021-27 (RCS). The RCS provides the overarching strategic directions for the region's land, water, biodiversity, community and local areas. This Action Plan:

- *sets out how the Wimmera Natural Resource Management (NRM) region will contribute to achieving the 5-year Outcomes and Investment Priorities of the Australian Government's Regional Land Partnerships Program;*
- *identifies regional Investment Priorities aligned to national Outcomes for Ramsar sites, threatened species, threatened ecological communities and sustainable agriculture; and*
- *sets out current funded projects and additional complementary projects and management actions to protect and enhance the Wimmera's unique environment.*

Regional Land Partnerships Program

The Regional Land Partnerships Program (RLP) is a core component of Phase 2 of the Australian Government's National Landcare Program from July 2018 until June 2023. Investment under the RLP is being delivered through a regional model. The Australian Government has engaged service providers to deliver projects in 54 management units. Wimmera CMA is the service provider for the Wimmera Management Unit (the Wimmera).

The Australian Government has provided funding under the RLP to support projects that contribute to six long-term and associated 5-year Outcomes (Table 1). Environment Outcomes focus on the recovery of threatened species, protecting threatened ecological communities, and reducing threats to globally important wetlands and world heritage sites. Sustainable agriculture Outcomes focus on improving on-farm soil, biodiversity and vegetation, and increasing the capacity of farms to adapt to climate change and evolving market demands. All these Outcomes are relevant to the Wimmera except for Outcome 3 as there are no World Heritage sites in the region.

Table 1: Regional Land Partnerships Program Outcomes ⁽²⁾

# Long-term Outcome	5-year Outcome
1 The ecological character of Ramsar sites is maintained or improved.	By 2023, there is restoration of, and reduction in threats to, the ecological character of Ramsar sites, through the implementation of priority actions.
2 The trajectory of species targeted under the Threatened Species Strategy, and other Environment Protection and Biodiversity Conservation Act 1999 priority species, is improved.	By 2023, the trajectory of species targeted under the Threatened Species Strategy, and other Environment Protection and Biodiversity Conservation Act 1999 priority species, is stabilised or improved.
3 The natural heritage Outstanding Universal Value of World Heritage properties is maintained or improved.	By 2023, invasive species management has reduced threats to the natural heritage Outstanding Universal Value of World Heritage properties through the implementation of priority actions.
4 The condition of Environment Protection and Biodiversity Conservation Act 1999 listed Threatened Ecological Communities is improved.	By 2023, the implementation of priority actions is leading to an improvement in the condition of Environment Protection and Biodiversity Conservation Act 1999 listed Threatened Ecological Communities.
5 The conditions of soil, biodiversity and vegetation are improved.	By 2023, there is an increase in the awareness and adoption of land management practices that improve and protect the condition of soil, biodiversity and vegetation.
6 Agriculture systems have adapted to significant changes in climate and market demands.	By 2023, there is an increase in the capacity of agriculture systems to adapt to significant changes in climate and market demands for information on provenance and sustainable production.



Natural Resource Management Planning in the Wimmera

One of Wimmera CMA's responsibilities as a core service provider for the Wimmera under the Regional Land Partnerships Program is to maintain the currency of natural resource management planning and the prioritisation of management actions. This involves ensuring that Natural Resource Management Planning is consistent with a set of specific Australian Government requirements. These requirements are listed in Appendix 1. Wimmera CMA has developed this Regional Land Partnerships Program Action Plan in consultation with relevant stakeholders to ensure that these requirements can be clearly viewed in the one document.

Regional NRM plans in Victoria are legislated under the *Catchment and Land Protection Act 1994* (CaLP Act) as Regional Catchment Strategies. The strategies are prepared by Catchment Management Authorities in consultation with regional communities and stakeholder organisations and groups. They are approved by the Victorian Ministers responsible for administering the CaLP Act. RCSs are updated approximately every six years.

Wimmera CMA worked with regional stakeholders and the community to renew the Wimmera RCS during 2019 to 2021. The Wimmera CMA Board approved the Wimmera RCS 2021-27 on 22 June 2021 and it was submitted to the Victorian Minister for Water at the end of June 2021 for consideration and approval.

The Wimmera has a robust regional NRM planning framework comprising the Wimmera RCS and its sub-strategies and action plans. RCSs are high-level strategies, with reference to more comprehensive, targeted and detailed documentation located in regional sub strategies and action plans. They include:

- Regional Land Partnerships Program Action Plan (this document)
- Wimmera Waterway Strategy 2014-22
- Wimmera Carbon Ready Plan 2016
- Wimmera Invasive Plant and Animal Management Strategy 2019

The RCS and its sub-strategies and action plans work together to:

- Support, integrate and give regional context to a suite of Australian Government and Victorian Government legislation, policies and strategies,
- Provide a framework for prioritising investment in activities that contribute to NRM Outcomes,

- Coordinate the activities of partner organisations, groups, landholders and community members across the Wimmera, and
- Complement, support and inform local and regional strategies and plans related to economic, social, cultural and environmental wellbeing.

Figure 1 depicts the Wimmera's NRM planning framework, including the relationship of the RCS and this Action Plan to Australian Government, Victorian Government, and regional and local strategies and plans.

Development of the Regional Land Partnerships Program Action Plan

Wimmera CMA worked with regional stakeholder organisations and community groups to develop a new Wimmera Regional Catchment Strategy 2021-27 and this Action Plan, informed by the:

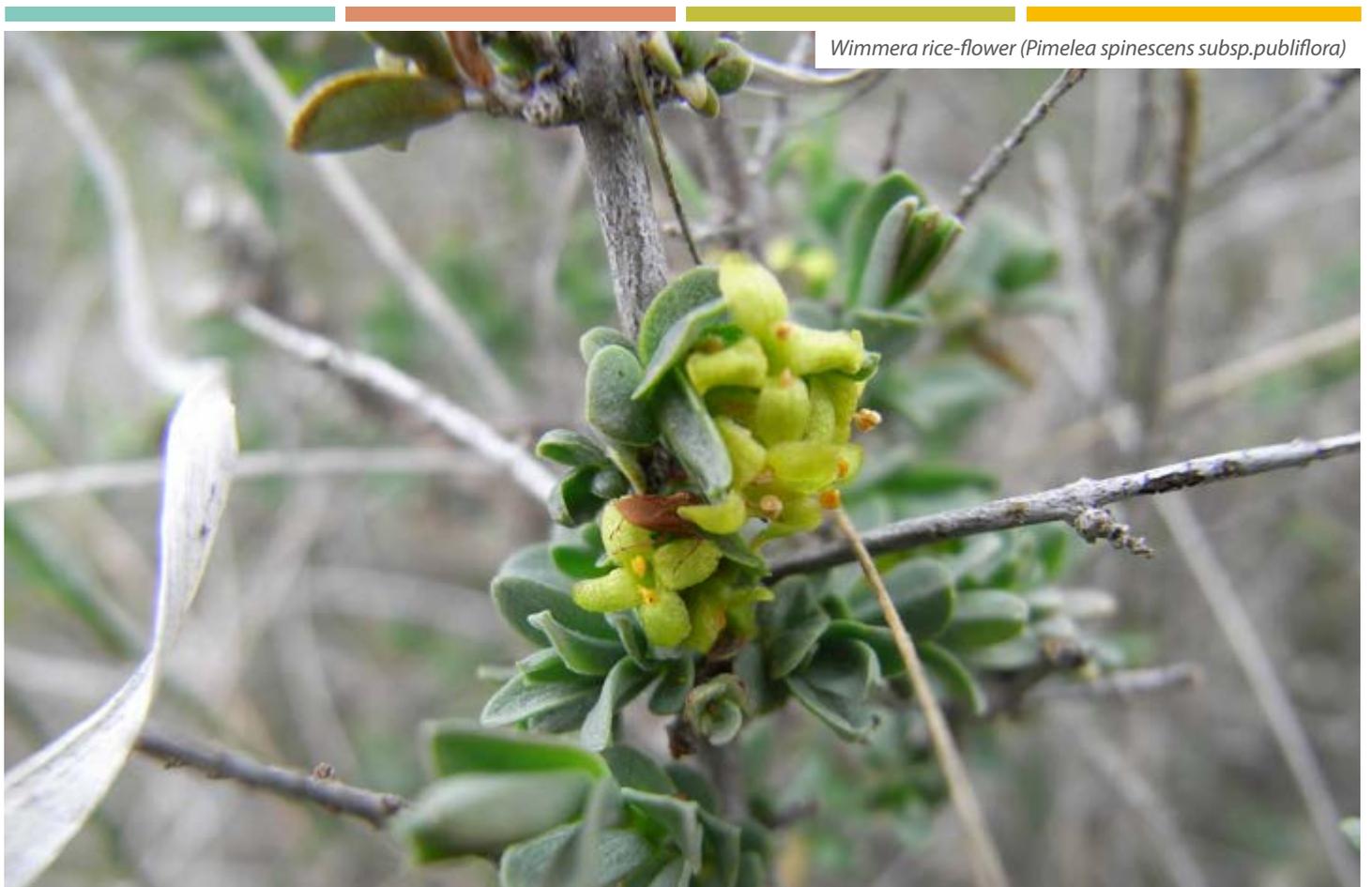
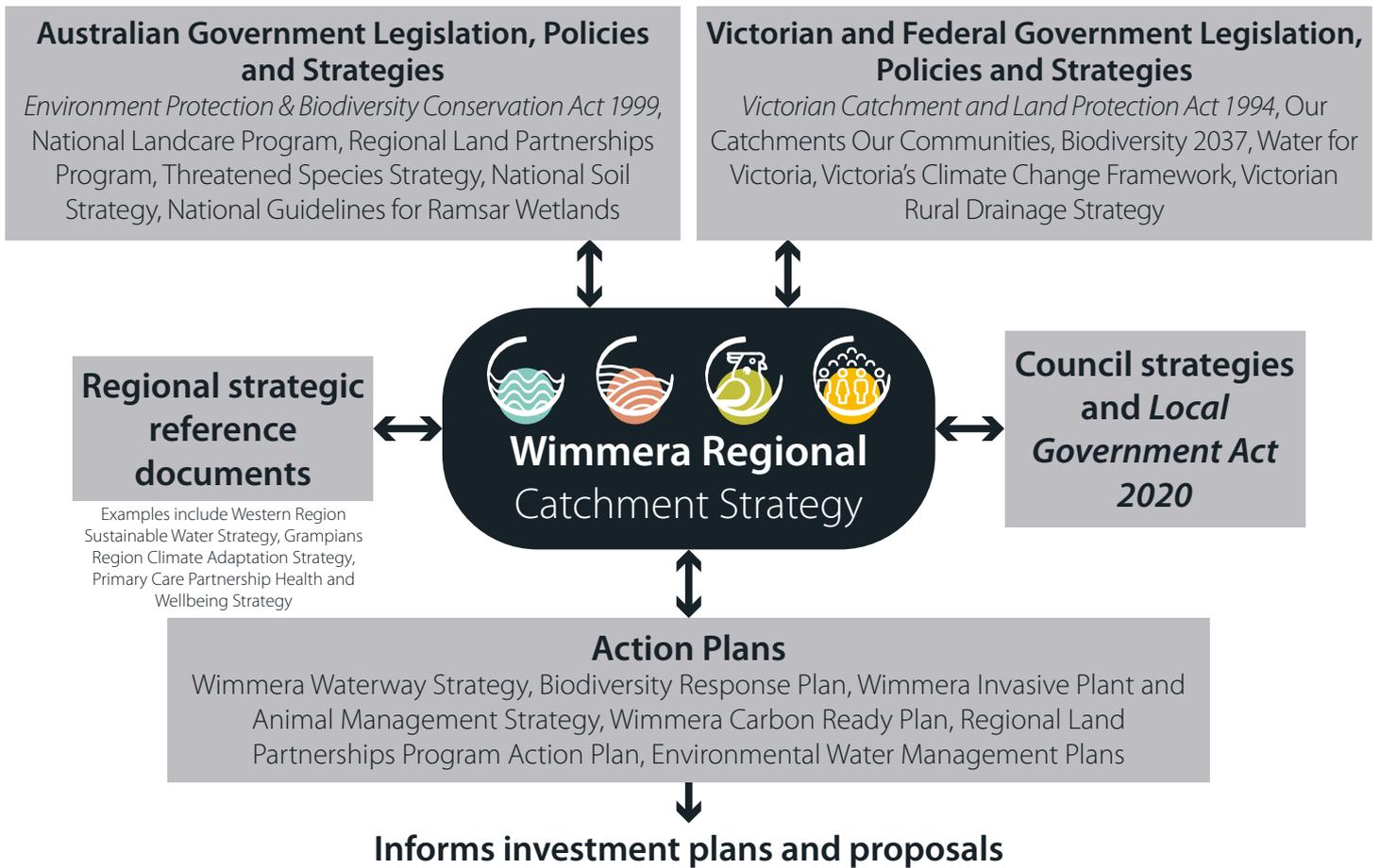
- Findings of the review of the Wimmera RCS 2013-19
- Priorities and aspirations of stakeholder organisations and community groups
- Workshops and planning conducted for Biodiversity Response Planning in the Wimmera led by the Department of Environment, Land, Water and Planning
- Australian Government and Victorian Government legislation, strategies and policies, including the Australian Government's RLP Outcomes and Investment Priorities
- Regional sub-strategies and action plans
- Feedback provided by the community.

Appendix 2 sets out the steps, timeline and process for developing this Action Plan and engaging and consulting with stakeholders.

The following sections of this Action Plan summarise the aspirations of First Nations People and stakeholders. The subsequent sections are based around the 5 Outcomes of the Australian Government's Regional Land Partnerships Program that are relevant in the Wimmera. These sections address Wimmera Ramsar sites, threatened species, threatened ecological communities and sustainable agriculture by:

- Identifying Investment Priorities,
- Summarising the location of natural assets, condition and threats and impacts,
- Prioritising and identifying projects and management actions,
- Summarising methods for assessing the effectiveness of management actions, and
- Identifying key collaborations for project delivery.

Figure 1: Policy context for the Wimmera Regional Catchment Strategy 2021-27 and this Action Plan

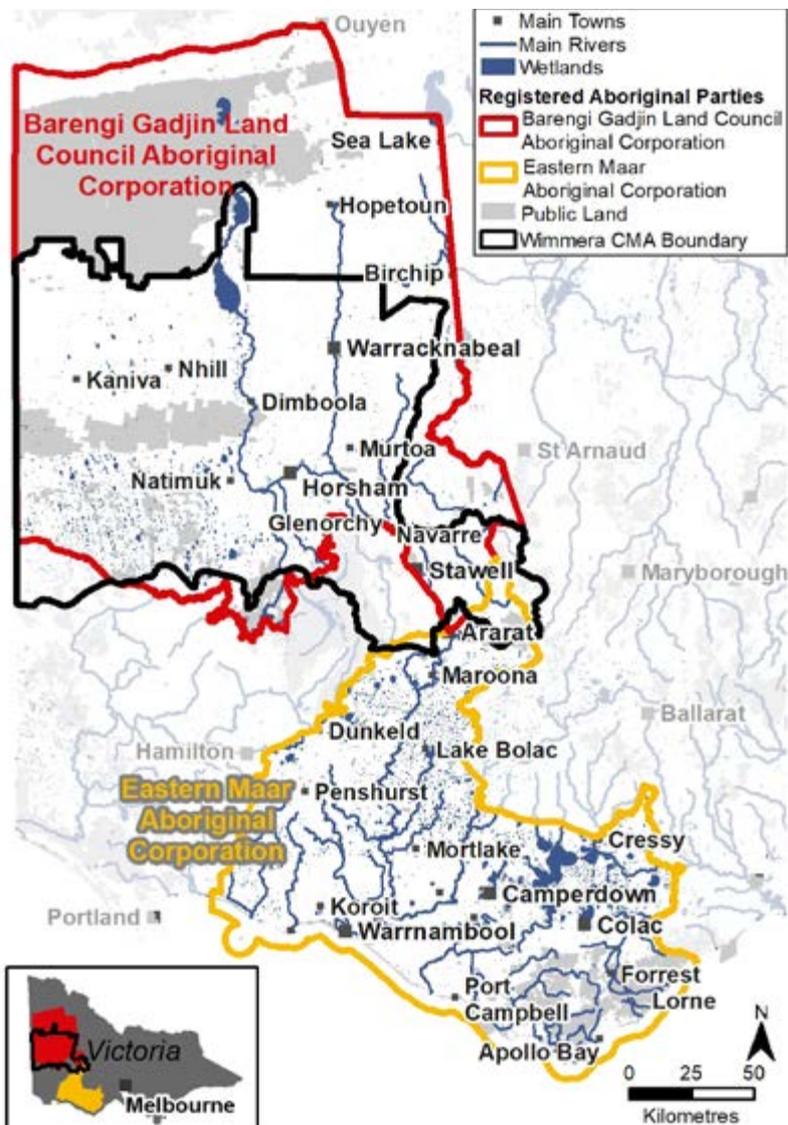


First Nations Peoples' aspirations

The Wimmera region includes the traditional lands of the Wotjobaluk Peoples represented by the Barengi Gadjin Land Council Aboriginal Corporation (BGLC) and the Eastern Maar represented by Eastern Maar Aboriginal Corporation (EMAC).

Figure 2 shows where the respective Registered Aboriginal Party boundaries intersect with the Wimmera region. The traditional lands of the Wotjobaluk Peoples cover most of the Wimmera region. The traditional lands of the Eastern Maar Peoples extend into the south-eastern corner of the Wimmera region, into the upper catchment local area.

Figure 2: Barengi Gadjin Land Council Aboriginal Corporation and Eastern Maar Aboriginal Corporation



Wimmera CMA partners and works closely with BGLC and EMAC, seeking to incorporate and support their goals and Traditional Ecological Knowledge through planning and projects. Consultation and engagement processes to develop the Wimmera Regional Catchment Strategy and this Action Plan are summarised in Appendix 2. The following summarises key points discussed with BGLC and EMAC.

Barengi Gadjin Land Council Aboriginal Corporation

Discussions with BGLC highlighted the following points:

- The Wimmera is a living cultural landscape rich in values, heritage and kinship.
- First Nations communities bring diverse life experiences and connections to cultural landscapes and special places.
- Integrated catchment management can be a platform for activities that contribute to self-determination by First Nations communities.
- Partnership-based activities have a direct benefit for rehabilitating places. They also have a broader impact of highlighting the role and responsibilities of First Nations Peoples in managing Country and contributing to the health and wellbeing of the environment and the community.
- It is important to recognise links between healthy Country and health, healing and wellbeing for First Nations Peoples. This includes economic wellbeing.
- Cultural heritage protection is an important aspect of integrated catchment management, but it is just one aspect. First Nations communities' interests in participation and engagement in integrated catchment management and partnerships with CMAs and other organisations across the sector are much broader than just cultural heritage protection.
- Two-way learning and ongoing collaboration in planning and management across the Wimmera is vital. It is about bringing together, understanding and applying First Nations and scientific knowledge. This will strengthen partnerships between First Nations People, landholders, volunteer groups and other organisations and result in better outcomes for the region.
- Wotjobaluk Peoples are keen to see more opportunities to reconnect to Country, and reconnection can happen in lots of different ways and mean different things to different people.

Eastern Maar Aboriginal Corporation

Discussions with EMAC highlighted the following points:

- EMAC and Traditional Owner Groups are moving towards self-determination and roles where they are the decision-makers, involved in governance and leading strategy and management of Country.
 - Separate economic benefit from social and cultural wellbeing. Social and cultural is not necessarily always about money and economic benefit. Social, health and wellbeing outcomes for Traditional Owners come about through healthy Country, access to Country and looking after Country.
 - Communicate with the EMAC community by accessing EMAC's communication channels to let the community know what CMAs and agencies are doing and invite participation.
 - On Country visits and walking Country need to be part of strategy and planning activities, rather than sitting in a meeting room or online.
- Supporting community who live off-Country to engage with and learn about Country is a priority, particularly for children and young people.
 - Reinstating traditional land management practices with acknowledgement of the principles of understanding Country, understanding objectives and implementation of management objectives.
 - Invest in research to document intangible values, such as stories and place names. This is important to understand what has been taken and where to go for information.
 - Translate strategic thinking into tangible outcomes for looking after Country and something meaningful for community wellbeing.
 - EMAC are provided with information about projects happening within their territory and have opportunities to be involved in long-term and ongoing programs (for example river health), as opposed to little projects.
 - The cultural and social outcomes of projects should be acknowledged and should sit high as a priority consideration.



Silo art at Sheep Hills

Wimmera regional outcomes

Implementation of this Action Plan will complement many of the RCS's 20 and 6-year Outcomes of relevance to First Nations People including improving the health of Country. RCS outcomes specific to First Nations communities are listed in Table 2.

Table 2: Wimmera RCS outcomes that support First Nations Peoples in the region

20-year Outcomes	Section of RCS	Page
The knowledge and experience of First Nations People is informing river and stream, wetland, groundwater, land and biodiversity planning, management and delivery in the Wimmera.	Water theme: rivers and streams, wetlands and groundwater sub themes	17, 21 & 27
	Land theme	33
	Biodiversity theme	40
Rivers and streams with high environmental, social, cultural and economic values are improving their value despite climate change.	Waterways theme: Rivers and streams sub theme	17
Wetlands with high environmental, social, cultural and economic values are maintained or improved despite climate change.	Waterways theme: Wetlands sub theme	21
Integrated catchment management provides a platform for activities that contribute to self-determination by First Nations communities.	Communities theme	46
6-year Outcomes	Section of RCS	Page
Ongoing collaboration and two way learning in river and stream, wetland, groundwater, land and biodiversity planning and management by supporting and strengthening partnerships with First Nations People.	Water theme: rivers and streams, wetlands and groundwater sub themes	17, 21 & 27
	Land theme	33
	Biodiversity theme	40
Healthier rivers and streams enable more on Country activities for First Nations People.	Waterways theme: Rivers and streams sub theme	17
First Nations communities are able to develop stronger connections between the RCS and their own strategies and plans where appropriate and to implement relevant actions.	Communities theme	46
Cultural landscapes are better understood	Communities theme	46

Earth oven recreation event, Wimmera River, Horsham



Traditional ecological knowledge

Traditional Ecological Knowledge and its role in First Nations People caring for Country is an important aspect of conserving the region's biodiversity. Traditional Ecological Knowledge refers to the evolving place-specific knowledge base of First Nations Peoples which reflects interconnections with the environment over thousands of years. This knowledge includes relationships between plants, animals, natural phenomena, landscapes and timing of events.

Guidance and feedback from First Nations partners, including BGLC, EMAC and local community members, has highlighted the importance of two-way learning that recognises traditional ecological knowledge is dynamic and adaptive. First Nations Peoples in this region have always adapted and transformed their knowledge systems in the face of environmental variability and change. First Nations knowledge holders, while acknowledging their elders, emphasise the central role of their own learnings and experience as knowledge is continuously reshaped and shared across community members.

This includes desired outcomes for Country that take an approach that connects traditional ecological knowledge with science inquiry to support two way learning and capacity-building between First Nations and integrated catchment management partners.

Activities such as native food trials discussed in the Sustainable Agriculture section of this Action Plan are delivered in a way that recognises the importance of traditional ecological knowledge being passed on and, where appropriate, being shared by Traditional Owners. Guidance from appropriate organisations such as BGLC is incorporated at every stage of the activity. Project partners are mindful that there are examples of Traditional Owner knowledge being exploited in the past in the native food industry. Traditional Owners in the Wimmera are seeking to support commercialisation of native food plants and access associated social and economic benefits while playing a central decision-making role and identifying strategies for guarding cultural and intellectual property.



English Language Program students from the Centre for Participation engage with Wimmera CMA's Aboriginal Water Officer at Big Water, Horsham

Stakeholder engagement and aspirations

Wimmera CMA had discussions and consulted with representatives from more than 40 stakeholder organisations and community groups involved in NRM and sustainable agriculture in the Wimmera. Discussions commenced in 2019 to review the Wimmera RCS 2013-19, and continued during 2020 and 2021 to revise and update the RCS and develop this Action Plan. The steps, timeline and process for engaging and consulting with stakeholders is set out in Appendix 2.

Stakeholder aspirations and priorities

Common themes that came through strongly from many stakeholders during the consultation processes include:

- Climate change and variability - the need to plan and manage for future climate scenarios as well as seasonal variability, in both protecting and managing the natural environment and sustainable agriculture
- Protecting, enhancing and connecting remaining habitat is important for healthy ecosystems and sustaining species and ecological communities, especially with changing climate
- Maintaining healthy soils is a big priority to support sustainable agriculture into the future
- Collaborations, capacity building, knowledge sharing, innovation and testing new technologies and approaches are all essential for supporting communities, individuals and farmers to manage natural resources
- Relationships and partnerships between agencies and groups are a strength of the region and need to be maintained and strengthened
- Managing the impacts of pest animals and weeds continues to be important to many stakeholders and community groups
- Maintaining viable communities is vitally important to support a healthy environment and volunteerism
- Ongoing incremental loss of native vegetation is an ongoing concern to many stakeholders
- It is important to manage the potential impacts of regional developments like mineral sands mining, highway duplications, and the expansion of wind farms, quarries, ecotourism and nature-based recreation.

STAKEHOLDER ASPIRATIONS FOR AUSTRALIAN GOVERNMENT PRIORITIES

Ngalpakatia/Ngelpagutya (Lake Albacutya) Ramsar Site

Some stakeholders expressed how important Ngalpakatia/Ngelpagutya (Lake Albacutya) is to the local area and a desire to see Ngalpakatia/Ngelpagutya (Lake Albacutya) fill with water. This is of particular interest to stakeholders located or with a strong interest in the local area, such as Hindmarsh Shire Council, Hindmarsh Landcare Network and Barengi Gadjin Land Council. Stakeholders expressed a desire to see the values and benefits that a full lake would bring to the local community, including recreational opportunities, nature and wildlife benefits, attracting more visitors to the region and flow on economic, health, cultural and wellbeing benefits to the local community. Stakeholders also highlighted the need to continue to protect and enhance habitat and protect cultural heritage in areas fringing the lake, with a need to continue to control rabbits and weeds and the impacts of recreational visitors.

Malleefowl

Malleefowl are an iconic species in the northern Wimmera and continuing with activities to aid the Malleefowl's recovery in the Wimmera is important. This includes continuing to control predators and enhance and connect habitat, continuing to carry out monitoring and research to allow for adaptive management, and fire management, particularly protecting vegetation in older age classes in the Little Desert National Park and surrounds.

Red-tailed Black-Cockatoo (south-eastern)

The iconic nature of the cockatoo in the south-west Wimmera was highlighted and the desire to continue to implement the National Recovery Plan for the cockatoo. Feedback was around continuing to focus on protecting and enhancing habitat, reducing threats and continuing monitoring and research to enable adaptive management.

Threatened plants and animals

Concerns were raised about the lack of funding currently available to support efforts to improve the trajectory of many threatened species in the Wimmera. Threats are ongoing and concerns were raised that climate change may exacerbate threats.

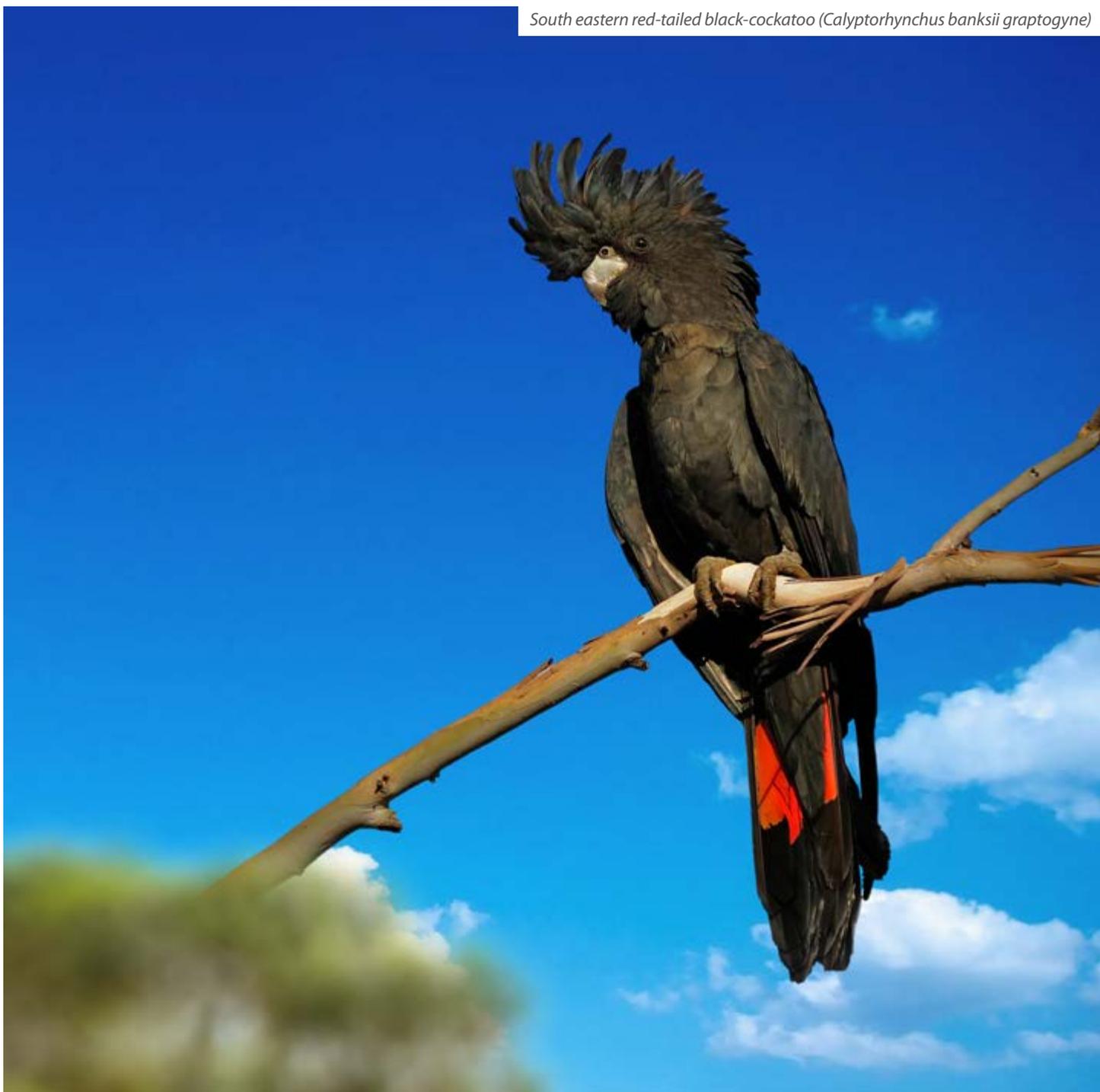
Threatened ecological communities

Many stakeholders expressed concerns regarding incremental loss and decline in condition of native vegetation and wetlands across the Wimmera. Aspirations included protecting native vegetation from clearing, enhancing vegetation condition and revegetating areas to improve landscape connectivity. Some stakeholders expressed concerns regarding loss of wetlands on private land with traditionally grazed areas being converted to cropping during dry years. Some stakeholders highlighted grasslands as a particularly depleted and vulnerable community in the Wimmera, noting that the remaining grassland areas require effort to protect them from clearing and degradation.

Sustainable agriculture

It is important to manage land resources including soils, water and vegetation for productivity, sustainability and resilience. Agriculture stakeholders highlighted the need to continue to provide professional and peer education to landholders and the community for productive and sustainable agricultural outcomes. Common aspirations included building healthy soils, retaining ground cover, farmers helping farmers, ensuring food quality, reducing chemical use, improved nutrients, and improved profitability.

South eastern red-tailed black-cockatoo (*Calyptorhynchus banksii graptogyne*)



Ramsar Sites

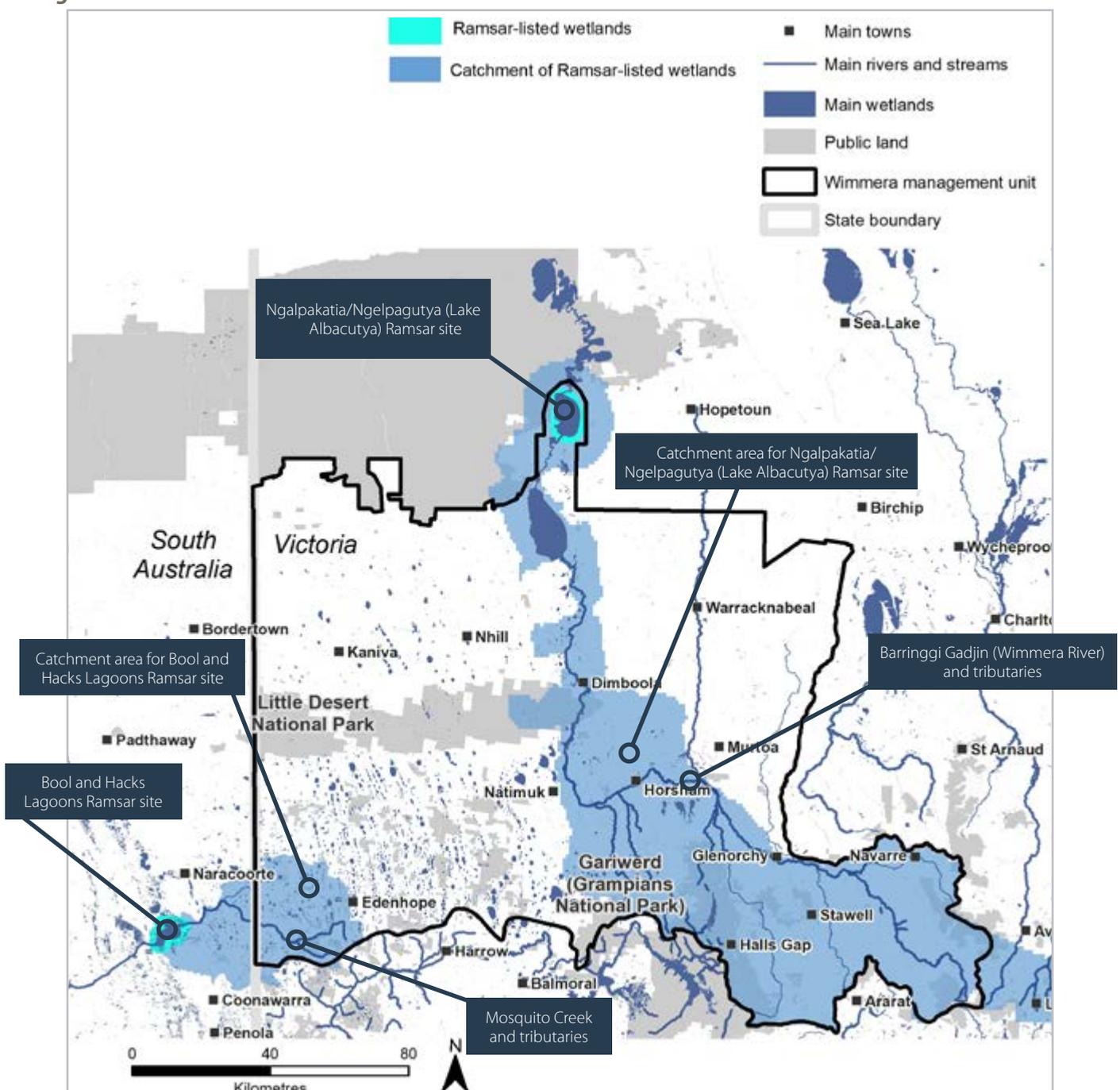
The Wimmera contains the Ngalpakatia/Ngelpagutya (Lake Albacutya) Ramsar Site and most of the catchment area for the Bool and Hacks Lagoons Ramsar site (Figure 3).

Ngalpakatia/Ngelpagutya (Lake Albacutya) was listed as a wetland of international importance under the Ramsar Convention in 1982. Ngalpakatia/Ngelpagutya (Lake Albacutya) is a large, 5,700-hectare seasonal intermittent freshwater lake and is one of a series of terminal lakes on the Barringgi Gadjin (Wimmera River), forming the largest land-

locked drainage system in Victoria.

Bool and Hacks Lagoons were listed as wetlands of international importance under the Ramsar Convention in 1985. The Bool and Hacks Lagoons Ramsar site is located near Naracoorte in south-eastern South Australia. A large part of the catchment that feeds Bool and Hacks Lagoons is in the south-west Wimmera, including Mosquito Creek and its tributary streams.

Figure 3: Wimmera Ramsar sites and their catchment areas



Outcomes and Investment Priorities

AUSTRALIAN GOVERNMENT OUTCOMES

Outcome 1 of the Australian Government’s Regional Land Partnerships Program focuses on maintaining and improving the ecological character of Ramsar sites:

Long-term Outcome: *The ecological character of Ramsar sites is maintained or improved.*

5-year Outcome: *By 2023, there is restoration of, and reduction in threats to, the ecological character of Ramsar sites, through the implementation of priority actions.*

WIMMERA REGIONAL OUTCOMES

The *Wimmera Regional Catchment Strategy 2021-27* establishes 20 year and 6-year regional Outcomes for Ngalpakatia/ Ngelpagutya (Lake Albacutya) and other significant wetlands like Bool and Hacks Lagoons Ramsar site. These outcomes support and contribute to achieving Outcome 1 of the Australian Government’s Regional Land Partnerships Program and are listed in Table 3.

Table 3: Wimmera RCS outcomes that support the Australian Government’s long-term and 5-year Outcomes for Ramsar sites

20-year Outcomes	Section of RCS	Page
The ecological character of the Ngalpakatia/ Ngelpagutya (Lake Albacutya) Ramsar Site is maintained.	Hindmarsh Local Area	56
The values and condition of wetlands with recognised significance are maintained or improved.	Waterways Theme: Wetlands sub-theme	21
Wetlands with high environmental, social, cultural and economic values are maintained or improved despite climate change.	Waterways Theme: Wetlands sub-theme	21
The knowledge and experience of First Nations People is informing wetland planning, management and delivery in the Wimmera.	Waterways Theme: Wetlands sub-theme	21

6-year Outcomes	Section of RCS	Page
Wetlands are monitored to ensure the condition and values of Ramsar and nationally significant wetlands are maintained and potential new listings are identified.	Waterways Theme: Wetlands sub-theme	21
Ongoing collaboration and two-way learning in wetland planning and management by supporting and strengthening partnerships with First Nations People.	Waterways Theme: Wetlands sub-theme	21
The condition of more wetlands on public land is improved.	Waterways Theme: Wetlands sub-theme	21
No new pest plants and animals are established beyond small, localised populations.	Waterways Theme: Wetlands sub-theme	21

INVESTMENT PRIORITIES

All Ramsar sites are Australian Government Investment Priorities. This includes the Lake Albacutya Ramsar Site in the Wimmera and Bool and Hacks Lagoons Ramsar site, whose catchment area is partly located in the Wimmera.

Ngalpakatia/Ngelpagutya (Lake Albacutya) Ramsar Site

INTRODUCTION

The Ngalpakatia/Ngelpagutya (Lake Albacutya) Ramsar Site is located in the Wimmera’s mid-north. Ngalpakatia/ Ngelpagutya (Lake Albacutya) is filled from extremely large floods in the Barringgi Gadjin (Wimmera River) and the majority of it’s catchment is within the Wimmera Management Unit (Figure 3).

The lake is characterised by alternating wet and dry phases and can support stable, relatively unchanged communities (climax communities) in both states. When dry, the lake supports grasslands and terrestrial fauna. When the lake holds water, an aquatic community develops which supports major breeding waterbird populations. There is an extensive eucalypt woodland surrounding the lake, dominated by river red gum (*Eucalyptus camaldulensis*) which is maintained by the lake’s hydrological regime and provides habitat for waterbirds and the nationally vulnerable regent parrot (*Polytelis anthopeplus*).

The lake is highly valued for its social, economic and cultural history. Ngalpakatia or Ngelpagutya (Lake Albacutya) is recognised as a significant place in Barengi Gadjin Land Council’s (BGLC) ‘Growing What is Good’ Country Plan. BGLC have identified Ngalpakatia/Ngelpagutya as a site for joint management with Parks Victoria. At Ngalpakatia/ Ngelpagutya shell middens, oven mounds, scarred trees, artefacts and stories highlight the Wotjobaluk Peoples’ deep and continuous connections.⁽³⁾

When full, the lake attracts visitors to enjoy water skiing, fishing, yabbing, bird watching and camping.

The Ramsar criteria met by Ngalpakatia/Ngelpagutya (Lake Albacutya) at the time of Ramsar listing are provided in Table 4.

Table 4: Ramsar site criteria applicable to Ngalpakatia/Ngelpagutya (Lake Albacutya) ⁽⁴⁾

Criterion No.	Criterion description	Ngalpakatia/Ngelpagutya (Lake Albacutya) description against criterion
Criterion 1	A wetland should be considered internationally important if it contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region	Ngalpakatia/Ngelpagutya (Lake Albacutya) is a representative near-natural example of a 'seasonal intermittent freshwater lake over 8 hectares within the Murray-Darling Drainage Division. It is also representative of a subterminal lake which fills from a north-flowing endorheic river, rare within the Murray-Darling Drainage Division.
Criterion 2	A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities	Ngalpakatia/Ngelpagutya (Lake Albacutya) supports breeding populations of the nationally vulnerable regent parrot (<i>Polytelis anthopeplus monarchoides</i>). This subspecies has a restricted distribution confined to arid south-eastern Australia, and the lower Barringgi Gadjin (Wimmera River) including Ngalpakatia/Ngelpagutya (Lake Albacutya) is one of three key population and breeding areas. Up to 3 % of the entire population of this subspecies has been recorded at Ngalpakatia/Ngelpagutya (Lake Albacutya) and breeding has been known to occur there several times. The eucalypt woodland at Ngalpakatia/Ngelpagutya (Lake Albacutya) provides ideal breeding habitat for the species, especially when the lake holds water.
Criterion 3	A wetland should be considered internationally important if it supports populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region	When full the lake supports regionally, nationally and internationally significant waterbirds. It is part of one of the key population areas for the nationally vulnerable regent parrot. Ngalpakatia/Ngelpagutya (Lake Albacutya) also supports a genetically unique population of river red gum (<i>Eucalyptus camaldulensis</i>) which has the highest known drought and salinity tolerance of all varieties tested in Australia.
Criterion 5	A wetland should be considered internationally important if it regularly supports 20,000 or more waterbirds	Ngalpakatia/Ngelpagutya (Lake Albacutya) supports very high numbers of waterbirds during its intermittent wet phases. When holding water, Ngalpakatia/Ngelpagutya (Lake Albacutya) has been known to support in excess of 20,000 waterbirds in 1993 and at least 10,000 to 100,000 waterbirds in 1982-83. Records prior to this time are deficient but expert opinion suggests that the lake would again support in excess of 20,000 when it receives sufficient flows
Criterion 6	A wetland should be considered internationally important if it regularly supports on percent of the individuals in a population of one species or subspecies of waterbird	Ngalpakatia/Ngelpagutya (Lake Albacutya) has supported in excess of 1 % of at least three waterbird species. Between 1981-1983 Ngalpakatia/Ngelpagutya (Lake Albacutya) supported up to 5 % of the national population of freckled duck (<i>Stictonetta naevosa</i>). In 1983 over 10,000 banded stilt (<i>Cladorhynchus leucocephalus</i>) were recorded which represents at least 4.5 % of the Australian population. In 1993 1,000 Australasian shoveler (<i>Anas rhynchos</i>) occurred at the lake meeting the 1 % threshold.

CURRENT CONDITION

When Ngalpakatia/Ngelpagutya (Lake Albacutya) was listed as a Ramsar site in 1982 the hydrological regime of the lake had been significantly altered from its natural condition due to long-term regulation of the Barringgi Gadjin (Wimmera River), commencing in the 1850s and increasing significantly from the 1920s to the 1960s. The lake has not contained water for extensive periods since the 1980s. It is almost two decades since there were any flows into the lake from Outlet Creek. This is due largely to lack of rainfall and natural flow.

In 2019 Wimmera CMA conducted a review of the environmental water requirements for the Wimmera's terminal lakes including Ngalpakatia/Ngelpagutya (Lake Albacutya). The report concluded that:

Even though the vast terminal lakes system of the lower Wimmera River has not received significant inflow for many years, it retains significant potential to be a unique and valuable wetland environment in both its wet and dry phases. The wetland values of the landscape have developed in response to millennia of episodic filling, with wet periods interspersed by long spells of low rainfall and dry conditions.

The episodic nature of the filling means that it is difficult to determine a 'normal' filling regime, however, the best available estimate suggests that the lakes of Wyperfeld National Park received inflow about every 20-30 years historically. The larger lakes in the south of the terminal lakes were inundated more frequently, perhaps as frequently as about every 5 years for Lake Hindmarsh and every 10 years for Lake Albacutya. Regulation of the system has significantly reduced the inundation frequency of the lakes. A 'normal' inundation frequency is more than 10 years for Lake Hindmarsh now, with Lake Albacutya now possibly being dry for more than 40 years between infilling. . . ⁽⁵⁾

Forty-four species of birds were observed at the lake during fieldwork in 2019, including two species listed as of conservation concern. This includes the brown treecreeper (*Climacteris picumnus*) which is listed as near threatened in Victoria and the regent parrot (*Polytelis anthopeplus*) which is listed as vulnerable to extinction under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999*. Nine regent parrots were observed, all on the western fringe of the lake. The health of the fringing eucalypt woodland is important for sustaining the regent parrot population.

The ecological character description for Ngalpakatia/ Ngelpagutya (Lake Albacutya) describes limits of acceptable change for critical ecosystem components and processes. Limits of acceptable change are defined as the variation that is considered acceptable in a particular measure or feature of the ecological character of the wetland. The limits of acceptable change for eucalypt woodlands at Ngalpakatia/ Ngelpagutya (Lake Albacutya) have been identified by Cibilic and White (2010) as:

- At least one successful river red gum recruitment event occurs every 20 years on average
- At least 75% of the 1993 extent of river red gum is maintained, and
- At least 75% of the extent of the eucalypt woodland community is maintained, based on a benchmark established as soon as possible after 1982. ⁽⁴⁾

Cook and Bayes observed during their 2019 investigation of tree health that there has been a recruitment event of river red gums at Ngalpakatia/ Ngelpagutya (Lake Albacutya) in the last 20 years. At least 75% of the extent of woodland communities that occurred in 1982 and 1993 are still present at Ngalpakatia/ Ngelpagutya (Lake Albacutya). However, evidence suggests that there is incremental progressive decline in the health of river red gum dominated communities. If the condition of this community continues to deteriorate its ability to support critical ecological processes will be compromised. ⁽⁶⁾

Cook and Bayes observed that between September 2016 and May 2019, 10% or 9 of the 90 river red gum stands assessed at Ngalpakatia/ Ngelpagutya (Lake Albacutya) experienced a change in condition. Four stands improved and five stands declined. Further details are provided in Appendix 3. ⁽⁶⁾ This data supports the suggestion by Cook and Just in their 2016 investigation of tree health that there are factors that influence tree health at Ngalpakatia/ Ngelpagutya (Lake Albacutya), probably including the depth to and salinity of groundwater, rainfall patterns (heavy localised rainfall events) and intermittent flooding (although this last factor has not occurred for many years). ⁽⁷⁾

Examination of rainfall data collected at the Rainbow (Pella) weather recording station over the last five years (Appendix 3) shows that there had been extensive periods of below average rainfall prior to both monitoring events. Periods of below average rainfall may have contributed to some tree stands declining in condition.

Those stands that improved in condition were all along the southern shore of the lake where groundwater salinity is highest, and the groundwater table is closest to the surface. Below average rainfall may be contributing to a continuing decline in the level of the saline groundwater table, decreasing stress on the trees in this area and allowing them to improve in condition. ⁽⁷⁾

Another factor affecting whether the river red gum community will survive at Ngalpakatia/ Ngelpagutya (Lake Albacutya) is recruitment. River red gum recruitment has been observed around the entire lake fringe, with sapling density ranging from 0 to over 50 per hectares. It is likely this recruitment was triggered by heavy rainfall in January 2011, September 2016 and December 2018. Whether this level of recruitment is adequate to sustain a viable river red gum community will depend on whether future conditions allow these regenerating trees to reach maturity, and on the success of future regeneration events. For example, foraging by pest herbivores and future rainfall may impact survival.

Cook and Bayes also explained that river red gum canopy cover around most of Ngalpakatia/ Ngelpagutya (Lake Albacutya) is well below what would be expected for a healthy Intermittent Swampy Woodland because of dieback and a fire that occurred in 2014. The high number of stands that are regenerating after the fire would suggest they could be impacted if fire occurred again soon after. In parts of the area that was burnt the tree canopy is regenerating quite well and, given more time and favourable environmental conditions, it may reach the 10% threshold for it to be considered healthy. Similarly, some areas with poor canopy cover because of dieback have a high enough density of sapling recruitment that could, if given enough time and favourable environmental conditions, replenish the tree canopy cover. ⁽⁶⁾

Sensitive pine-buloke woodlands are located on the dunes fringing the lake and Ramsar site. This community provides important habitat for a large number of birds including the regent parrot. Rabbits pose a threat to this community as grazing impacts heavily on recruitment and regeneration. Past works by Parks Victoria and BGLC in partnership with Wimmera CMA have successfully reduced rabbit numbers and facilitated regeneration of pine-buloke seedlings. It will be important to continue to keep rabbit numbers low to minimise impacts on pine-buloke communities and prevent movement of rabbits into the Ramsar site where they can impact on the river red gum communities.



THREATS AND IMPACTS

Ngalpakatia/Ngelpagutya (Lake Albacutya) faces a diverse number of threats. The main threats to the ecological character of the Ramsar site are reduced water availability, the decline of the fringing eucalypt woodland's health and invasive pest plants and animals. Bushfires have also put stress on the lake and surrounding ecosystems and inappropriate recreation has impacted some values.

The threats that are likely to have the largest impact on Ngalpakatia/Ngelpagutya (Lake Albacutya)'s values are:

- Reduced water availability due to water regulation and extraction, climate change, reduced rainfall and land use. For example, the conversion of land from grazing to cropping means more water is held in soil and commercial and farm dams also hold water that would otherwise find its way into tributaries of the Barringi Gadjin (Wimmera River) that ultimately flow into Ngalpakatia/Ngelpagutya (Lake Albacutya).
- Drought resulting in decline in health of the fringing eucalypt woodland.
- Invasive plants and animals impacting on native flora and fauna species.
- Bushfires - Ngalpakatia/Ngelpagutya (Lake Albacutya) was severely affected by a bushfire that burnt most of the lake area in early 2014. It impacted on the health of several stands of river red gums.
- Over grazing by native and introduced species impacts on low lying and regenerating flora, impacting on ecosystems and habitats.
- Inappropriate recreational activities such as four-wheel drive and motorbikes causing destruction of vegetation and removal of ground cover leading to erosion and loss of habitats.

Appendix 3 provides a detailed description of threats to Ngalpakatia/Ngelpagutya (Lake Albacutya), identified as part of the 2019 assessment of environmental watering requirements for the lake. ⁽⁵⁾

PROJECTS AND MANAGEMENT ACTIONS

Prioritising cost-effective management actions

Priority actions for Ngalpakatia/Ngelpagutya (Lake Albacutya) (Table 5) have also been informed through the ongoing partnership with Barengi Gadjin Land Council (BGLC), Parks Victoria and the local community to continually workshop and test new ideas to manage values and threats.

Wimmera CMA meet once or twice a year with Parks Victoria and BGLC to discuss priority management actions. Information that informs these discussions include:

- Monitoring results
- Field observations
- Logistical limitations impacting on management actions, for example potential impacts on cultural heritage
- Stakeholder input into investigations
- Stakeholder discussion on project implementation

These discussions and observations have informed the development of the new Wimmera Regional Catchment Strategy and the generation of priority management actions for this Action Plan. The priority management actions are outlined in Table 5, including a reference for where each management action has had its genesis. These include:

- Recommendations from Cook and Bayes' report on tree health and regent parrot surveys conducted at Ngalpakatia/Ngelpagutya (Lake Albacutya) in May 2019 ⁽⁶⁾
- BGLC's 'Growing what is good' Country Plan ⁽³⁾
- Ideas generated through consultation to develop the Wimmera Regional Catchment Strategy 2021-27 and this Action Plan.

BGLC's 'Growing what is good' Country Plan and discussions with BGLC have highlighted a desire to restore cultural flows to the lake. This will be challenging and potentially unfeasible without significant water reallocation and infrastructure or a change in climate patterns. This has not been included as a project in Table 5 but will be part of ongoing discussions between BGLC, DELWP, GMMWater, Wimmera CMA and other water entitlement holders around water sharing through the Victorian sustainability water strategy development process.

Management actions were tested with Parks Victoria and BGLC during the development of this Action Plan. They are the most feasible and cost-effective actions. The proposed priority actions also align with the key management and planning arrangements for Ngalpakatia/Ngelpagutya (Lake Albacutya) as outlined in the Ngalpakatia/Ngelpagutya (Lake Albacutya) Ramsar Site Management Plan. ⁽⁸⁾ They aim to maintain and, if possible, improve the ecological character of the site.

Current projects

A small Victorian Government program is being delivered to help maintain the ecological and cultural values of Lake Albacutya. The threat abatement project is being delivered in partnership with Parks Victoria and Traditional Owners and includes targeted pest plant and animal control and works to mitigate the impacts of recreational users. The project is funded from July 2020 until July 2024.

Proposed projects

This project proposal will enhance the ecological character of Ngalpakatia/Ngelpagutya (Lake Albacutya) by partnering with Parks Victoria and Barengi Gadjin Land Council to protect culturally significant areas and address the key threats of weed infestation and grazing impacting on a range of flora and fauna species including critically sensitive Pine-Buloke

Woodlands. These flora species provide critical habitat for the large number of birds that rely on the lake river red gum communities and sensitive pine-buloke woodlands. These flora species provide critical habitat for the large number of birds that rely on the lake including the regent parrot (*Polytelis anthopeplus*).

The proposal will be delivered as a partnership with Parks Victoria and Barengi Gadjin Land Council providing the opportunity for the local indigenous community to work on Country and undertake training and skill development providing future career opportunities.

Projects delivered around the Lake will be conducted in collaboration with the local community including landholders and community groups such as the Rainbow Landcare group. As part of this proposal, partners will continue to engage with the local community and raise the profile and awareness of Ngalpakatia/Ngelpagutya (Lake Albacutya) and its cultural values.

On-ground works will reduce critical threats to fringing vegetation posed by rabbits in culturally sensitive areas. This is a priority for helping to meet Australia's international obligations to protect native species and ecological communities, cultural heritage and cultural diversity at the site, facilitating natural regeneration and recruitment of the Pine-Buloke Woodland and other flora species that provide habitat for the large number and variety of waterfowl that rely on the Ramsar Site during wet periods.

Based on previous studies outlined above and the ongoing meetings and workshops with stakeholders and the local community to meet the objective 'By 2023, there is restoration of, and reduction in threats to, the ecological character of Ramsar sites, through the implementation of priority actions' the actions in Table 5 are prioritised for funding.

Lake Albacutya Ramsar Site



Table 5: Management actions for the Ngalpakatia/Ngelpagutya (Lake Albacutya) Ramsar Site

Action	How actions contribute to the 5 year Outcome	Threats addressed	Monitoring the effectiveness of management actions	Delivery partners	Funding
Investigation of groundwater and tree stand condition	Investigate the relationship between groundwater and tree stand condition at Ngalpakatia/Ngelpagutya (Lake Albacutya) and the other wetlands of the lower Barringi Gadjin (Wimmera River), allowing for more strategic revegetation and management actions. Recommended by Cook and Bayes (2019) ⁽⁶⁾	Lack of information	Indicator: The relationship between groundwater and tree stand condition is understood Method: Investigation completed Baseline: Relationship is not understood, no investigation completed Frequency: On completion of investigation	Parks Victoria Barengi Gadjin Land Council Wimmera CMA	Not funded
Mapping of tree health	Collaborate with the Arthur Rylah Institute for Environmental Research (ARI) to use remote sensing data to map tree stand condition in the lower Barringi Gadjin (Wimmera River) wetlands and to develop a method to monitor tree health into the future. Recommended by Cook and Bayes (2019) ⁽⁶⁾	Lack of information	Indicator: Tree stand condition is mapped Method: Mapping completed Baseline: No mapping of tree stand condition Frequency: On completion of investigation	ARI Parks Victoria Barengi Gadjin Land Council Wimmera CMA	Not funded
Regent parrot surveys	Conduct surveys of regent parrots during their breeding season in September and October for the next 4 years to determine a current baseline for the species. This would involve assessing feeding and mating behaviour which may influence management actions around enhancing food sources and breeding habitat. Recommended by Cook and Bayes (2019) ⁽⁶⁾	Lack of information	Indicator: Regent parrot population baseline is established Method: Surveys completed twice yearly Baseline: No population baseline Frequency: After 4 years	Parks Victoria Barengi Gadjin Land Council Wimmera CMA	Not funded
Climate change provenancing assessment	Investigate climate-adjusted provenancing as a strategy for climate-resilient ecological restoration, to guide a revegetation program specific for Ngalpakatia/Ngelpagutya (Lake Albacutya). This work will influence revegetation activities and silviculture practices. Recommended by Cook and Bayes (2019) ⁽⁶⁾	Climate change Lack of information	Indicator: Climate-adjusted provenancing investigation completed Method: Investigation completed Baseline: None Frequency: On completion of investigation	Parks Victoria Barengi Gadjin Land Council Wimmera CMA	Not funded
Assessing the pros and cons of grazing	Investigate the opportunities and risks (eg weeds and fire) associated with removing grazing from the lake bed including exclusion trials. This will help inform future decisions about grazing on the lake. 'Growing what is good' Country Plan ⁽³⁾	Lack of information Grazing Weeds Fire	Indicator: Investigation of pros and cons of grazing completed Method: Investigation completed Baseline: None Frequency: On completion of investigation	Parks Victoria Barengi Gadjin Land Council Wimmera CMA	Not funded

Action	How actions contribute to the 5 year Outcome	Threats addressed	Monitoring the effectiveness of management actions	Delivery partners	Funding
Assessing the Ramsar area	<p>Collaborating with Parks Victoria, Department of Environment, Land, Water and Planning (DELWP), BGLC, Australian Government and the local community to investigate opportunities to expand the Ramsar boundary to include for example Gurru (Lake Hindmarsh), Outlet Creek, Lake Agnes and Ross lakes. These areas provide similar values to Ngalpaktia/ Ngelpagutya (Lake Albacutya) and may warrant the same recognition and management.</p> <p>Raised during RCS consultation</p>	Lack of information	<p>Indicator: Ramsar area is assessed</p> <p>Method: Assessment completed</p> <p>Baseline: None</p> <p>Frequency: On completion of investigation</p>	<p>Parks Victoria</p> <p>DELWP</p> <p>Barengi Gadjin Land Council</p> <p>Australian Government</p> <p>Local community</p> <p>Wimmera CMA</p>	Not funded
Review Ramsar management Plan	<p>Review the Ramsar Management Plan for Ngalpaktia/Ngelpagutya (Lake Albacutya). Updating the plan based on new information gathered since 2013 and any new legislative or policy requirements.</p> <p>'Growing what is good' Country Plan ⁽³⁾</p> <p>Raised during RCS consultation</p>	All	<p>Indicator: Ramsar Management Plan is reviewed and updated</p> <p>Method: Review and update completed</p> <p>Baseline: None</p> <p>Frequency: On completion of review and update</p>	<p>Parks Victoria</p> <p>DELWP</p> <p>Barengi Gadjin Land Council</p> <p>Australian Government</p> <p>Local community</p> <p>Wimmera CMA</p>	Not funded
Protecting the lake's values through targeted pest plan and animal control	<p>Undertake targeted on-ground works to protect and enhance the lakes Ramsar site values including targeted pest plant and animal control. These on-ground works will also address the key threats of weed infestation and rabbit migration from the adjacent park and Outlet Creek by undertaking control works in these key areas. The success of these works will be measured by undertaking targeted effectiveness monitoring including vegetation and population assessments of priority and pest species.</p> <p>This would include 1,000 hectares of pest control and 3,600 hectares of weed control.</p> <p>Raised during RCS consultation</p>	Rabbits, weeds	<p>Indicator: Area treated for pest animals and invasive weeds</p> <p>Method: Measure the number of sites and hectares treated for rabbits and invasive weeds</p> <p>Baseline: None</p> <p>Frequency: Annually</p>	<p>Parks Victoria</p> <p>Barengi Gadjin Land Council</p> <p>Wimmera CMA</p>	Not funded
Managing the impacts of recreation	<p>Protect and enhance environmentally and culturally sensitive sites by undertaking works that minimize the impact of social and recreational activities through the installation of signage, bollards and fencing. The onground works would also include track maintenance and repairs to improve the experience for visitors whilst minimizing their impacts.</p> <p>Installation of 5 visitor facilities, 4 kilometres of fence/bollards and 2 kilometres of tracks is proposed.</p> <p>Raised during RCS consultation</p>	Inappropriate recreation	<p>Indicator: Sensitive sites are protected from recreational impacts</p> <p>Method: Number of sites protected</p> <p>Baseline: None</p> <p>Frequency: Annually</p>	<p>Parks Victoria</p> <p>Barengi Gadjin Land Council</p> <p>Wimmera CMA</p>	Not funded

Adaptive management

Given Ngalpakatia/Ngelpagutya (Lake Albacutya) has been a long-term dry lake, monitoring has focused on vegetation, regent parrots and threats such as rabbit numbers and weeds. When the lake is wet, it is proposed to seek additional or redirect funds to allow for a broader range of monitoring such as migratory bird species listed under international agreements and other limits of acceptable change indicators.

Given this, the proposed actions in Table 5 are not listed in order of priority.

METHODS FOR ASSESSING THE EFFECTIVENESS OF MANAGEMENT ACTIONS

A Ramsar Monitoring, Evaluation, Reporting and Improvement (MERI) Plan has been developed by DELWP to improve confidence in the effectiveness of management at the Ngalpakatia/Ngelpagutya (Lake Albacutya) Ramsar Site. Specifically, this plan provides the following for the Ngalpakatia/Ngelpagutya (Lake Albacutya) Ramsar Site:

- Assistance in tracking the status of ecological character
- Identification of priority critical components processes and services for monitoring at the site scale
- Identification of priority management interventions for evaluation of effectiveness
- Processes for improved reporting and management of the ecological character of the site.

Should activities be funded, elements of this will be adapted to develop project MERI plans.

Bool and Hacks Lagoons Ramsar Site

INTRODUCTION

This section describes priority actions that could be taken in the Wimmera CMA region to restore, and reduce threats to, the ecological character of the Bool and Hacks Lagoons Ramsar site in South Australia. It includes only those factors and actions that are relevant and feasible to management within Victoria.

The Bool and Hacks Lagoons Ramsar site is located near Naracoorte in south-east South Australia. The wetland lies in an interdunal flat and is made up of several shallow circular basins. ⁽⁹⁾

A large part of the catchment that feeds the Bool and Hacks Lagoons Ramsar Site is in the south-west Wimmera (Figure 3). Mosquito Creek and its tributaries are of high value given they provide most of the inflows into the Bool and Hacks Lagoons Ramsar Site in South Australia. Threatened species including yarra pygmy perch (*Nannoperca obscura*), growling grass frogs or southern bell frog (*Litoria raniformis*) and dwarf galaxias (*Galaxiella pusilla*) are found in Mosquito Creek.

Table 6 describes the Ramsar criteria met by Bool and Hacks Lagoons at the time of Ramsar listing. The Bool and Hacks Lagoons Ramsar site meets six of the nine Ramsar listing criteria.



Mosquito Creek

Table 6: Ramsar site criteria applicable to Bool and Hacks Lagoons ⁽⁹⁾

Criterion No.	Criterion description	Bool and Hacks Lagoons description against criterion
Criterion 1	A wetland should be considered internationally important if it contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region	The Bool and Hacks Lagoons Ramsar site, located in the South East Coast Australian Drainage Division, is an example of a freshwater wetland over fertile, alkaline soil. It is a semi-permanent wetland in an area where many wetlands of this type have been lost through regional drainage.
Criterion 2	A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities	Bool and Hacks Lagoons support a number of internationally and nationally listed vulnerable species including the Australasian bittern (<i>Botaurus poiciloptilus</i>), painted snipe (<i>Rostratula australis</i>), southern bell frog (<i>Litoria raniformis</i>), striped legless lizard (<i>Delma impar</i>), yarra pygmy perch (<i>Nannoperca obscura</i>), and dwarf galaxias (<i>Galaxiella pusilla</i>). It is also habitat for 22 species of internationally listed migratory birds.
Criterion 3	A wetland should be considered internationally important if it supports populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region	The Bool and Hacks Lagoons are, located in the South East Coast Australian Drainage Division, has a regionally significant diversity and abundance of species. One hundred and sixteen bird species have been recorded at the site, including 14 species of raptors. There are 67 species of waterbird that are resident or regular visitors to the site. The wetland also supports a high diversity of aquatic vegetation communities.
Criterion 4	A wetland should be considered internationally important if it supports plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions	The Bool and Hacks Lagoons are an important drought refuge and summer habitat for many species of waterbirds in southern Australia, including the freckled duck (<i>Stictonetta naevosa</i>). It is an important flocking ground for the southern Australian population of the brolga (<i>Grus rubicunda</i>), at times supporting around one third of the population for up to half a year. The site provides breeding habitat for 48 species of waterbirds, including important colonial breeding species and a migration stopover for 19 species of shorebirds.
Criterion 5	A wetland should be considered internationally important if it regularly supports 20,000 or more waterbirds	The Bool and Hacks Lagoons regularly supports in excess of 20,000 ducks. The straw-necked ibis (<i>Threskiornis spinicollis</i>) and the Australian white ibis (<i>Threskiornis molucca</i>) are common in the nesting season and numbers often exceed 50,000.
Criterion 6	A wetland should be considered internationally important if it regularly supports on percent of the individuals in a population of one species or subspecies of waterbird	Over 1% of the world population of several waterbird species including the Australasian bittern (<i>Botaurus poiciloptilus</i>), painted snipe (<i>Rostratula australis</i>), Australian shoveler (<i>Anas rhynchos</i>), Australian white ibis (<i>Threskiornis molucca</i>), black swan (<i>Cygnus atratus</i>), blue-billed duck (<i>Oxyura australis</i>), brolga (<i>Grus rubicunda</i>), freckled duck (<i>Stictonetta naevosa</i>), great white egret (<i>Ardea alba</i>) and straw-necked ibis (<i>Threskiornis spinicollis</i>) regularly use the Bool and Hacks Lagoons for the services the wetland provides such as food, shelter, breeding or flocking sites.

CURRENT CONDITION

Index of stream condition assessments in Mosquito Creek in 2010 indicated that water quality was very poor and that stream flows were very low because of land use change from grazing to forestry plantations.

In very high flow periods Mosquito Creek will flood for a period of days. Mosquito Creek recorded permanent flow (flow every day) until January 2001 when it ceased to flow for the first time. Since then, flows over summer have ceased every year. Now most flow is recorded in winter and spring and little to none in summer and autumn. The reduced availability of flow in the creek has significantly impacted on the quality of habitat found along it. Mosquito Creek used to have permanent pools along its length that were supported by the continuous discharge of shallow groundwater into the creeks. These pools supported several threatened and common native fish species and provided a secure population to repopulate the Bool and Hacks Lagoons Ramsar site after drought. The pools on the Mosquito Creek continue to degrade despite the relatively high rainfall since

2016. The highest total annual flow volume recorded at the Struan gauging station (at the bottom of Mosquito Creek in South Australia) was 78 gigalitres in 2016. ⁽¹⁰⁾

THREATS AND IMPACTS

The threats to Mosquito Creek and Bool and Hacks Lagoons as outlined in the Wimmera Waterway Strategy 2013-2022 and the South East Drainage and Wetland Strategy 2019 include:

- Reduced availability of freshwater inflows (base flow and flushing flows) as local aquifers are exhausted and rainfall declines and loss of permanent base flow in Mosquito Creek. Some of the issues causing these threats in Victoria include landuse change for example conversion of grazing to cropping or forestry.
- Degraded riparian vegetation and water quality because of clearing and grazing activities.
- Invasive flora and fauna.

PROJECTS AND MANAGEMENT ACTIONS

Prioritising cost-effective management actions

The prioritisation of actions in Victoria to help maintain and improve the values of Bools and Hack Lagoons have been influenced by two detailed planning documents that have already prioritised actions. These include:

- The Wimmera Waterway Strategy 2014-2022 ⁽¹¹⁾
- The South East Drainage and Wetland Strategy 2019. ⁽¹⁰⁾

These priorities were reassessed by Wimmera CMA in collaboration with Landscape South Australia – Limestone Coast during the process to develop this Action Plan. A set of priorities was agreed for management actions in Victoria that are logistically possible within current funding models and legislative arrangements.

Proposed Projects

The strategic opportunities identified in the Wimmera include:

- Improving the hydrological and physical condition of Mosquito Creek. Managing the interception of surface water is a priority.
- Reversing the deterioration of habitat quality in Mosquito Creek’s permanent pools.

Between 2016 and 2019 a small amount of work was conducted along Mosquito Creek by Wimmera CMA to protect and improve riparian vegetation. This was funded by the Victorian Government.

It is not deemed possible to physically influence landuse change such as forestry or the move from grazing to cropping as there are no legislative mechanisms to regulate this and decisions are generally based on economic opportunities. However, there is the potential for education to play a part in the communities’ decisions. There may also be merit in investigating market-based instruments to influence landuse or practice change.

Based on previous planning work outlined above and discussions with South Australian wetland managers, the actions in Table 7 are prioritised for funding to meet the Outcome: ‘By 2023, there is restoration of, and reduction in threats to, the ecological character of Ramsar sites, through the implementation of priority actions.

Table 7: Management actions for the catchment of Bool and Hacks Lagoons Ramsar Site in Victoria

Action	How actions contribute to the 5 year Outcome	Threats addressed	Monitoring the effectiveness of management actions	Delivery partners	Funding
Encourage and assist land managers to protect riparian values and water quality	This will protect the ecological character of the Ramsar Site by protecting water quality and the habitat integrity of the riparian zone and refuge pools that sustain native species that recolonise the Ramsar site following drought. This action will support land managers to establish: <ul style="list-style-type: none"> • Invasive fauna control in riparian areas, • Ground cover weed control in riparian areas, and • Riparian management agreements to limit stock access. 	Rabbits Weeds Grazing Water quality	Indicator: Area treated for pest animals and invasive weeds Area managed for grazing Method: Measure the number of sites and hectares treated for rabbits and invasive weeds Measure hectares under management agreement Baseline: 2018-21 annual average Frequency: Annually	Agriculture Victoria Wimmera CMA Landholders Landcare	Not funded
Discourage land uses that interfere with surface water availability close to Mosquito Creek and its tributaries	Actions include: <ul style="list-style-type: none"> • Establishing an education campaign to inform landholders of the impact of certain land uses, and • Investigating the cost-benefit of market-based instruments to change or maintain land used to those that are appropriate. <p>This will protect the ecological character of the Ramsar Site by reducing land uses that reduce surface water availability.</p>	Lack of water availability	Indicator: Areas returned or maintained as grazing Method: Measure the number of sites Baseline: 2018-21 annual average Frequency: Annually	Agriculture Victoria Wimmera CMA Landholders Landcare	Not funded

Threatened species and ecological communities

This section considers threatened species and threatened ecological communities together because the approach for developing and prioritising projects considered benefits to multiple threatened assets. Integrated projects have been developed where threatened species and threatened ecological communities are located together and management actions will benefit both.

There are 3,974 plant and animal species recorded in the Wimmera, including 3,169 plants, 61 invertebrates and 744 species of vertebrate fauna. ⁽¹²⁾ Ninety-five Wimmera species are listed as threatened under the national *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). A full list is provided in Appendix 4.

Native vegetation covers 31.5% of the Wimmera's 2.3 million hectares. Just over half (51%) of the remaining natural habitat is public land protected within the National Reserve System. The remaining 49% of the Wimmera's native vegetation is on private land. Declines in native vegetation extent and condition are still occurring. There are 7 ecological communities in the Wimmera that are listed as threatened under the EPBC Act.

Australian Government Outcomes

Outcome 2 of the Australian Government's Regional Land Partnerships Program focuses on protecting and recovering Australia's threatened animals and plants.

Long-term Outcome: *The trajectory of species targeted under the Threatened Species Strategy, and other EPBC Act priority species, is improved.*

5-year Outcome: *By 2023, the trajectory of species targeted under the Threatened Species Strategy, and other EPBC Act priority species, is stabilised or improved.*

Outcome 4 of the Australian Government's Regional Land Partnerships Program focuses on improving the condition of threatened ecological communities:

Long-term Outcome: *The condition of EPBC Act listed Threatened Ecological Communities is improved.*

5-year Outcome: *By 2023, the implementation of priority actions is leading to an improvement in the condition of EPBC Act listed Threatened Ecological Communities.*

Wimmera regional Outcomes

The Wimmera Regional Catchment Strategy 2021-27 establishes 20 year and 6-year regional Outcomes for the Wimmera's vegetation communities, habitat and flora and fauna species. These outcomes support and contribute to achieving Outcome 2 and Outcome 4 of the Australian Government's Regional Land Partnerships Program and are listed in Table 8. The RCS includes many outcomes aimed at protecting and improving habitat quantity and quality, species and ecosystem functions across river and stream, wetland and terrestrial environments. Table 8 includes the most relevant outcomes.

Table 8: Wimmera RCS outcomes that support the Australian Government's long-term and 5-year Outcomes for threatened species

20-year Outcomes	Section of RCS	Page
The biodiversity of the Wimmera is thriving because ecosystems are restored, habitat has been recreated and missing species have been returned.	Biodiversity Theme	40
The knowledge and experience of First Nations People is informing biodiversity planning, management and delivery in the Wimmera.	Biodiversity Theme	40
6-year Outcomes	Section of RCS	Page
Ongoing collaboration and two-way learning in biodiversity planning and management by supporting and strengthening partnerships with First Nations People.	Biodiversity Theme	40
Increase the extent, quality and protection of habitat on private land in the Wimmera.	Biodiversity Theme	40
Improve habitat quality on public land in the Wimmera.	Biodiversity Theme	40

6-year Outcomes	Section of RCS	Page
Ecosystems are being restored and species are being conserved by translocating locally extinct and vulnerable species within the Wimmera.	Biodiversity Theme	40
A coordinated regional scale monitoring program is providing up-to-date data on habitat, ecosystem and species trend and condition.	Biodiversity Theme	40
Vulnerable Wimmera vegetation communities and species have been identified and a strategic plan has been developed and management actions to mitigate threats are being implemented.	Biodiversity Theme	40
No new pest plants and animals are established beyond small, localised populations.	Waterways Theme:	21

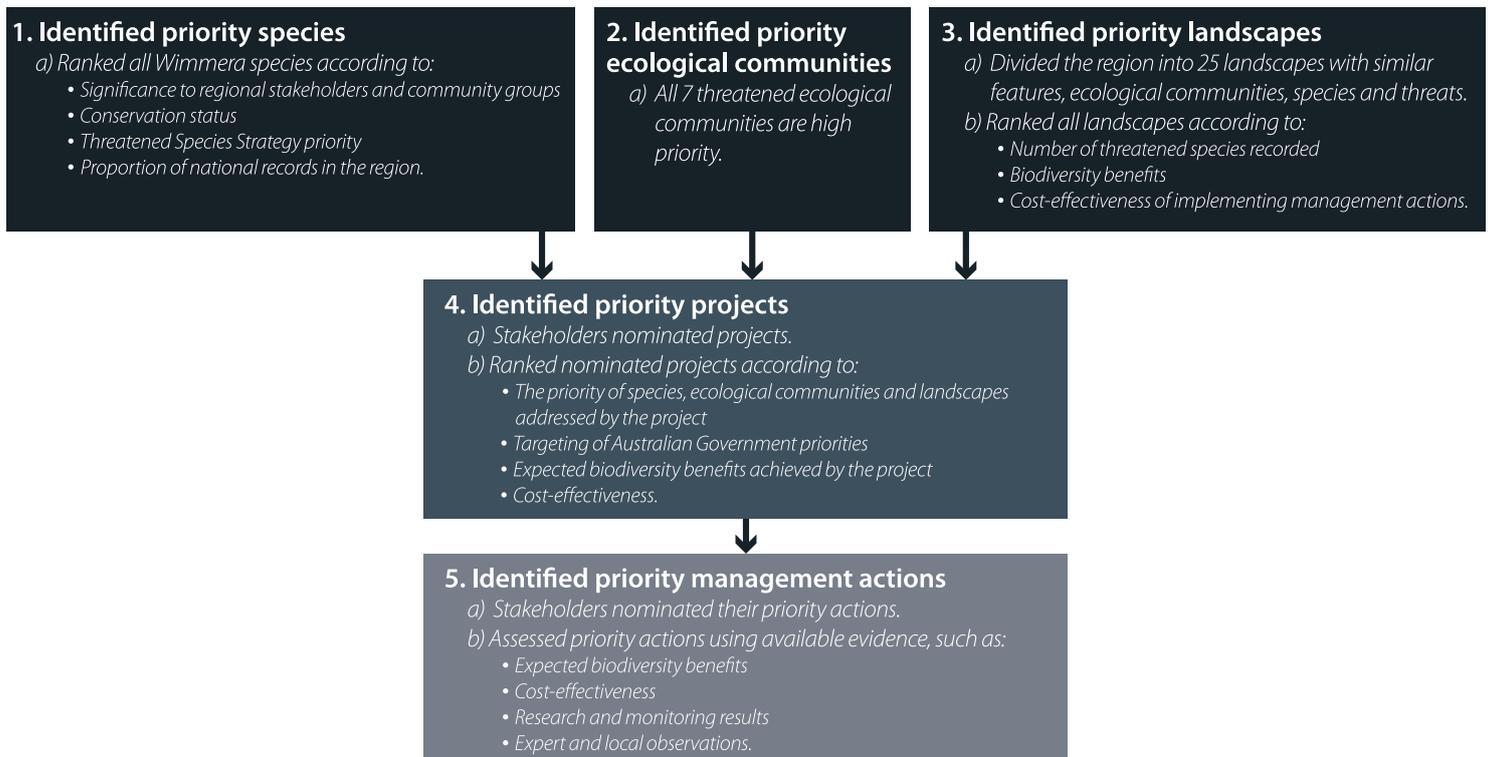
Investment Priorities

OVERVIEW OF PRIORITISATION PROCESS

Priority projects for the Wimmera’s threatened species and threatened ecological communities were identified by understanding the aspirations of regional stakeholders and community groups through a series of workshops and community groups through a series of workshops to develop project ideas and concepts. A systematic and repeatable ranking process was then used to rank these projects against a clear set of criteria. The workshops were led by Wimmera regional DELWP staff as part of the Victorian Government’s Biodiversity Response Planning process. Wimmera CMA collaborated with DELWP to ensure that Biodiversity Response Planning and development of the Wimmera Regional Catchment Strategy and this Action Plan aligned and were complementary. Further information on stakeholder engagement is outlined in Appendix 2.

Figure 4 summarises the steps taken for prioritising species, landscapes, projects and management actions. The series of workshops brought together regional stakeholders and community group representatives to prioritise species, landscapes and projects for investment and management effort.

Figure 4: Steps for prioritising projects and management actions for Wimmera species and ecological communities



The following sections describe the results of each of the prioritisation steps. Additional detail is provided in Appendix 5.

PRIORITY THREATENED SPECIES

The Threatened Species Strategy sets out the Australian Government's approach to achieving Outcome 2, including a commitment to improve the trajectories of 20 threatened mammals, 20 threatened birds and 30 threatened plants.⁽¹³⁾ These species have guided the Wimmera's Investment Priorities, together with other species listed as threatened under the EPBC Act and regional stakeholder and community priorities.

Development of this Action Plan included a regional prioritisation process that identified the Wimmera's highest priority threatened species. This process involved regional stakeholders, community group and other community representatives and First Nations group representatives via workshops. All species recorded in the Wimmera were given scores and ranked according to the following attributes:

- The Australian Government's Investment Priority species, including those identified as a priority under the Threatened Species Strategy
- Conservation status under the EPBC Act
- Regional stakeholder and community priorities and aspirations, including species identified during prioritisation workshops and consultation processes for the RCS, this Action Plan and DELWP-led Biodiversity Response Planning, and
- Proportion of the species' distribution in the Wimmera based on national records.

The detailed process for prioritising species is set out in Appendix 5.

Table 9 shows the 25 species that ranked the highest in the prioritisation process. The Wimmera rice-flower (*Pimelea spinescens subsp. spinescens*) topped the list, scoring highly as it is Critically Endangered under the EPBC Act, has a very small population size and is geographically restricted to the Wimmera. It was also identified as important to regional stakeholders and community group representatives.

Ten of the species ranked in the top 25 priorities in the Wimmera are also priorities under the Threatened Species Strategy's 20 threatened birds and 30 threatened plants.

This includes:

- Seven birds that reside, visit or have been recorded in the Wimmera:
 - Red-tailed black-cockatoo (south-eastern) (*Calyptorhynchus banksii graptogyne*)
 - Swift parrot (*Lathamus discolor*)
 - Plains-wanderer (*Pedionomus torquatus*)
 - Australasian bittern (*Botaurus poiciloptilus*)
 - Eastern curlew (*Numenius madagascariensis*)
 - Regent honeyeater (*Anthochaera phrygia*)
 - Malleefowl (*Leipoa ocellata*)
- Three plants that persist in the Wimmera:
 - Spiny rice-flower (*Pimelea spinescens subsp. spinescens*)
 - Turnip copperburr (*Sclerolaena napiformis*)
 - Button wrinklewort (*Rutidosis leptorrhynchoide*)

The Australasian bittern, eastern curlew and regent honeyeater have been recorded in the Wimmera but do not have any known established populations or are transient and don't visit regularly or stay for long periods. Currently, investment in these species and subsequent management actions are unlikely to have any meaningful impact on these species' trajectories.



Malleefowl chick (*Leipoa ocellata*)

Table 9: Priority species in the Wimmera. Top 25 results from the Wimmera species prioritisation process

#	Common Name	Scientific Name	Conservation status (EPBC Act)	Targeted under the Threatened Species Strategy	Stakeholder and community significance	Proportion of national records in the Wimmera
1	Wimmera rice-flower	<i>Pimelea spinescens subsp. pubiflora</i>	Critically Endangered		✓	1
2	Grampians globe-pea	<i>Sphaerolobium acanthos</i>	Critically Endangered			1
3	Red-tailed black-cockatoo	<i>Calyptorhynchus banksii graptogyne</i>	Endangered	✓	✓	0.45
4	Grampians pincushion-lily	<i>Borya mirabilis</i>	Endangered		✓	0.9
5	Swift parrot	<i>Lathamus discolor</i>	Critically Endangered	✓	✓	0.1
6	Spiny rice-flower	<i>Pimelea spinescens subsp. spinescens</i>	Critically Endangered	✓	✓	0.1
7	Grampians rice-flower	<i>Pimelea pagophila</i>	Vulnerable		✓	1
8	Plains-wanderer	<i>Pedionomus torquatus</i>	Critically Endangered	✓	✓	0.07
9	Pomonal leek-orchid	<i>Prasophyllum subbisectum</i>	Endangered			1
10	Wimmera bottlebrush	<i>Callistemon wimmerensis</i>	Critically Endangered			0.8
11	Forked spyridium	<i>Spyridium furculentum</i>	Endangered		✓	0.7
12	Turnip copperburr	<i>Sclerolaena napiformis</i>	Endangered	✓		0.35
13	Heath mouse	<i>Pseudomys shortridgei</i>	Endangered		✓	0.6
14	Australasian bittern	<i>Botaurus poiciloptilus</i>	Endangered	✓		0.3
15	Avenue cassinia	<i>Cassinia tegulata</i>	Critically Endangered			0.6
16	Candy spider-orchid	<i>Caladenia versicolor</i>	Vulnerable			1
17	Button wrinklewort	<i>Rutidosis leptorhynchoides</i>	Endangered	✓	✓	0.01
18	Eastern curlew	<i>Numenius madagascariensis</i>	Critically Endangered	✓		0.05
19	Wimmera spider-orchid	<i>Caladenia lowanensis</i>	Endangered			0.72
20	Regent honeyeater	<i>Anthochaera phrygia</i>	Critically Endangered	✓		0.01
21	Williamson's bush-pea	<i>Pultenaea williamsoniana</i>	Vulnerable			0.9
22	Malleefowl	<i>Leipoa ocellata</i>	Vulnerable	✓	✓	0.15
23	Mountain dragon Grampians form	<i>Rankinia diemensis (Grampians)</i>	Not Listed		✓	1
24	Freshwater isopod	<i>Synamphisopus ambiguus</i>	Not Listed		✓	1
25	Grampians bertya	<i>Bertya grampiana</i>	Not Listed		✓	1

There is strong regional interest in reintroducing species that once inhabited the Wimmera but are no longer present. This includes 3 of the 20 threatened mammals identified as priorities under the Threatened Species Strategy and a fourth species listed under the EPBC Act:

- Western quoll (*Dasyurus geoffroii*)
- Brush-tailed bettong (*bettongia pencillata*)
- Greater bilby (*Macrotis lagotis*)
- Western barred bandicoot (*Perameles bougainville*).

These species were not included in the prioritisation process as they are regionally extinct. Reestablishing populations of these threatened mammals would contribute to Outcome 2 by improving the trajectory of their populations while also restoring ecological functions in Wimmera ecosystems.

The platypus (*Ornithorhynchus anatinus*) is also a significant regional priority. Recently, the platypus has been listed as Vulnerable in Victoria under the *Flora and Fauna Guarantee Act 1988*. Once widespread in the region, the Wimmera platypus population is small and its geographic extent very limited. Platypuses are at very high risk of becoming extinct in the Wimmera. Platypus did not score highly in the prioritisation process as it is not currently listed under the EPBC Act and has a small proportion of national records in the Wimmera. Platypuses are extremely important to the regional community and have been identified regionally as highly significant and an Investment Priority.

PRIORITY THREATENED ECOLOGICAL COMMUNITIES

Seven ecological communities in the Wimmera are listed as threatened under the EPBC Act. These communities are all Investment Priorities for Outcome 4 in the Wimmera as they are all highly endangered and under threat of ongoing decline. They are listed in Table 10 together with their threatened status. Figure 5 shows their approximate location in the Wimmera based on equivalent Victorian ecological vegetation classes (EVCs). This is useful for showing possible locations but is likely to overestimate the quantity and extent of threatened ecological communities as not all mapped EVCs will meet the relevant criteria.

A detailed description of each threatened ecological community in the Wimmera is provided in Appendix 6.

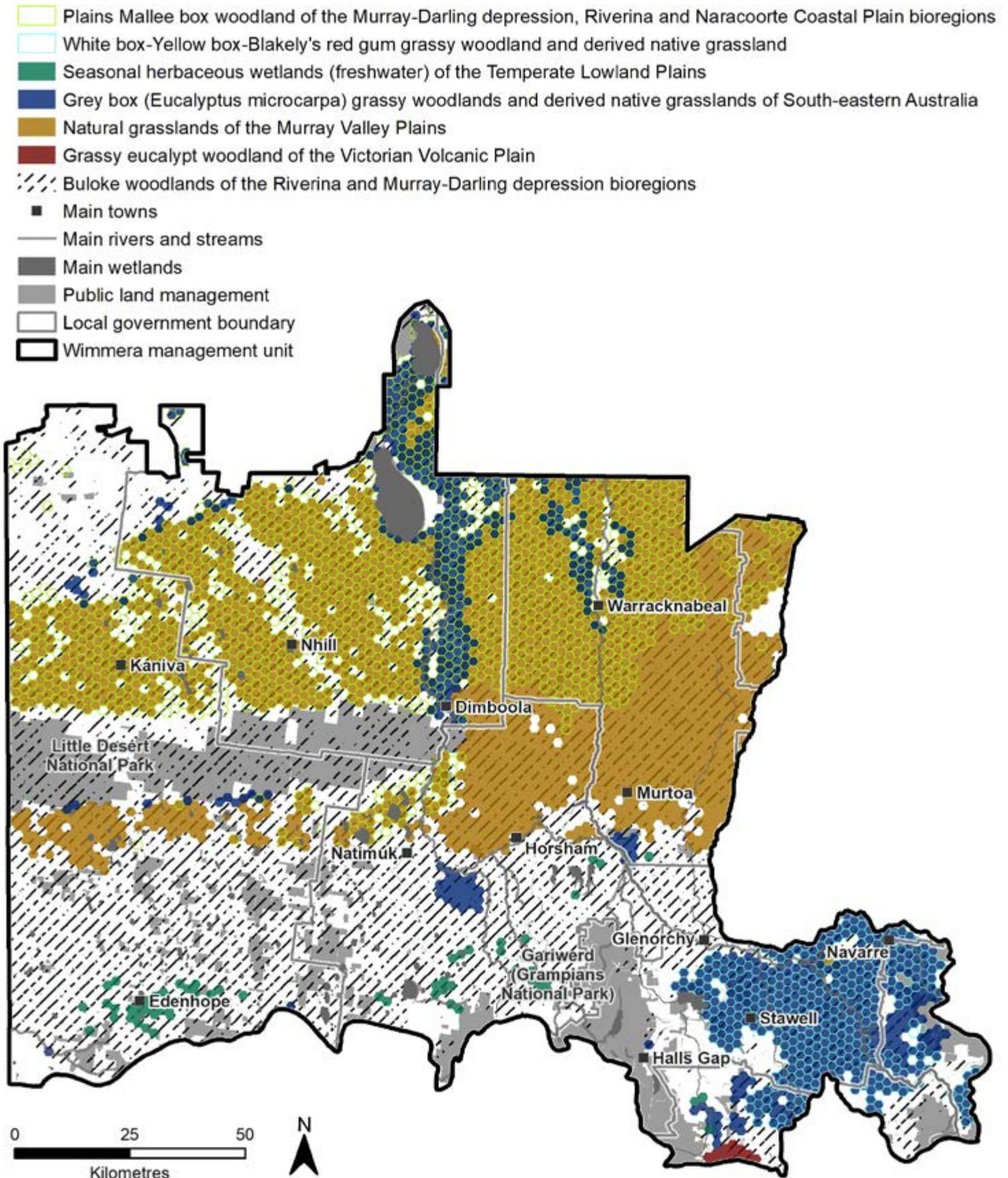
Table 10: Threatened ecological communities in the Wimmera

Threatened ecological community	Threatened status
Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions	Endangered
Grassy Eucalypt Woodland of the Victorian Volcanic Plain	Critically Endangered
Grey Box (<i>Eucalyptus microcarpa</i>) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered
Natural Grasslands of the Murray Valley Plains	Critically Endangered
Plains Mallee Box Woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions	Critically Endangered
Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains	Critically Endangered
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered



Buloke Woodland

Figure 5: Threatened ecological communities in the Wimmera



PRIORITY LANDSCAPES

Two community workshops focused on identifying and prioritising ‘focal landscapes’ within the Wimmera region. Focal landscapes were identified by stakeholder and community participants identifying natural landscapes and landscapes that were important to them. This resulted in the region being divided into 25 landscape areas containing similar suites of features, ecological communities, species and threats. Appendix 5 shows the results. Due to the subjective nature of this process, most of the focal landscapes were identified as important by the various participants.

Subsequently, the focal landscapes were prioritised using an analytical and data-driven approach. Landscapes were given scores and ranked according to:

- The relative number of threatened species recorded in the landscape
- Modeled biodiversity benefits
- The modeled cost-effectiveness of implementing management actions.

The Victorian Government’s Strategic Management Prospects tool was used to model and evaluate management actions (for example, rabbit control, revegetation, fox control) that should be implemented in different locations to elicit the most beneficial and cost-effective outcome for Victoria’s biodiversity. DELWP identified these priority actions and associated locations in two categories, those that fell into the top 3% of all activities (best cost-effectiveness) and top

10% of activities (second best cost-effectiveness). All the focal landscapes were evaluated and ranked using this data together with the relative number of threatened species present. Appendix 5 describes this process in more detail.

Figure 6 shows that the region’s highest priority landscapes include:

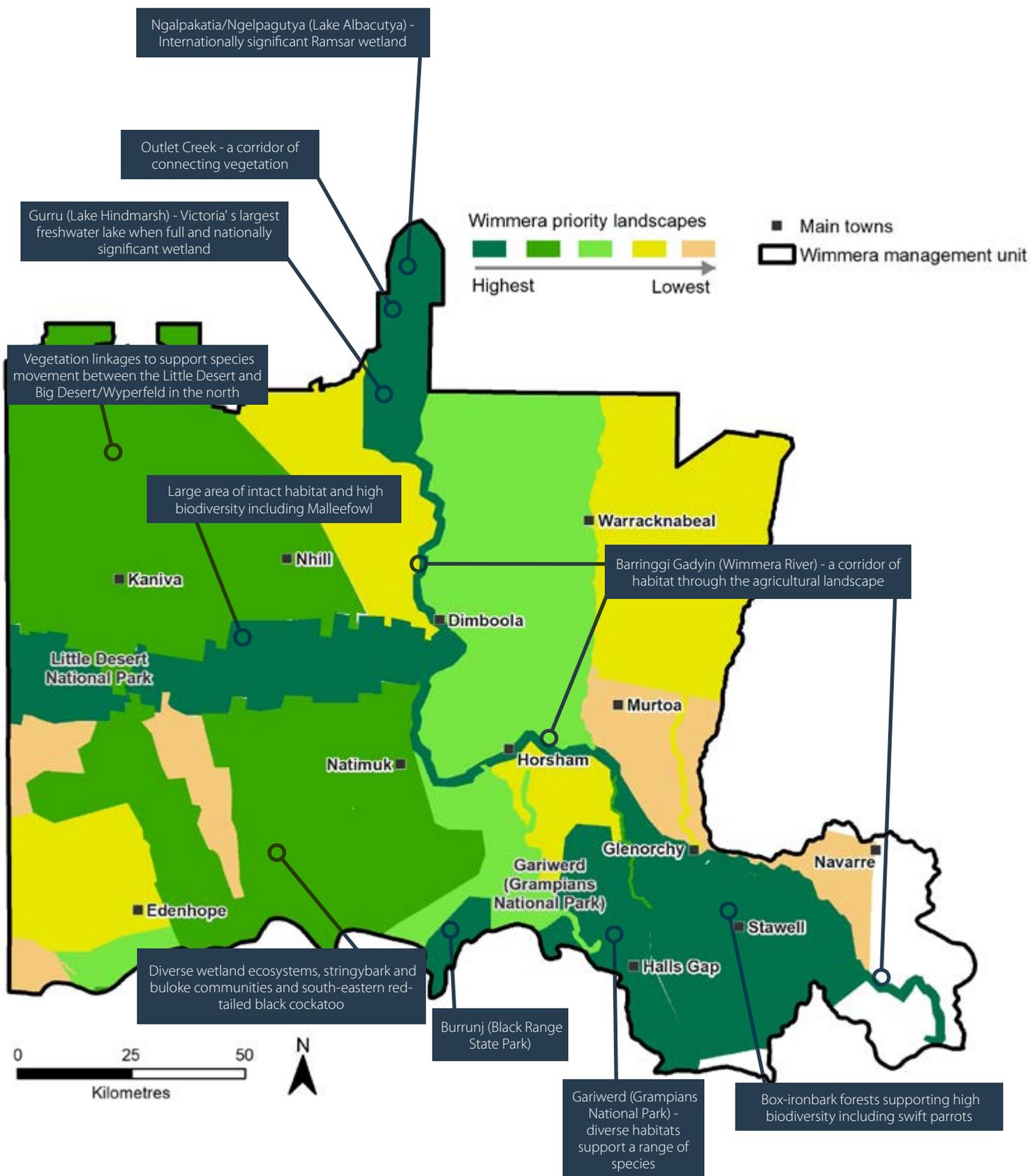
- Gariwerd (Grampians) National Park together with Burren (Black Range) State Park, supporting a diverse range of habitats and species, including one third of Victoria’s native flora species and about 17% of Victoria’s wildlife species. ⁽¹⁴⁾
- Little Desert National Park, the largest contiguous area of remnant native habitat in the Wimmera, protecting just over 130,000 hectares and supporting a vast array of biodiversity, including 80 nationally threatened plant and animal species. ⁽¹⁵⁾
- The Wimmera River corridor and its terminal lakes, including Ngapakatia/Ngelpagutya (Lake Albacutya) and Gurru (Lake Hindmarsh) system, provide a corridor of aquatic and riparian habitat through a largely agricultural landscape.
- Stawell and the surrounding area containing the western and southern most extent of Victoria’s box-ironbark forests, notable for their species richness and supporting threatened fauna like the swift parrot (*Lathamus discolor*)

Areas assessed as low priority are generally heavily agricultural landscapes with limited remnant habitat and species.



Little Desert National Park

Figure 6: Priority landscapes in the Wimmera



PRIORITY PROJECTS

The fourth workshop focused on understanding community and stakeholder aspirations for projects. Participants contributed project ideas and biodiversity aspirations. Wimmera CMA used the information gathered to identify and prioritise 19 projects for this Action Plan.

The project prioritisation process scored and ranked projects according to:

1. The priority of species, ecological communities and landscapes addressed by the project,
2. The extent that Australian Government’s Investment Priorities were addressed by the project, and
3. The extent that the project proposed strategic, cost-effective management actions as identified by the Victorian Government’s NatureKit and Strategic Management Prospect tools. This criterion assessed the proposed project’s management actions against those identified by NatureKit and Strategic Management Prospects that are both cost-effective and are likely to achieve multiple benefits to multiple species and ecosystems.

The project prioritisation categories and scoring system are described in detail in Appendix 5 along with the full list of prioritised projects.

This Action Plan includes the 6 highest ranked projects, listed in priority order:

1. Malleefowl conservation in the Wimmera
2. Swift parrot and box ironbark woodland protection and management
3. Restoring ecological function and cultural connection in the Little Desert landscape
4. Wimmera orchid protection and management
5. Wimmera grasslands restoration and management
6. Food for futures – Red-tailed black-cockatoo (south-eastern) conservation and management

The Action Plan also includes two additional projects:

7. Conserving the threatened ecological communities of the Wimmera
8. Rescuing the Wimmera’s platypus

The threatened ecological community project is included to protect, manage and slow the decline of these important regional assets. Threatened ecological communities have been identified for priority protection through the Wimmera Regional Catchment Strategy 2021-27 and Wimmera Carbon Ready Plan 2016. These strategies were developed following extensive consultation with a broad range of stakeholders, community groups and members across the region to identify priorities, challenges and desired outcomes.

Although the platypus project did not rank high in the prioritisation process it is included here because platypuses are at high risk of extinction in the Wimmera without immediate intervention. Platypus is also of high importance to the Wimmera community. The following section describes each of these projects.

MALLEEFOWL CONSERVATION IN THE WIMMERA

Introduction

This project will contribute to the Australian Government’s Outcome 2 by improving the trajectory of Malleefowl (*Leipoa ocellata*) in the Wimmera by:

- Reducing threats including predation by foxes and cats and the impact of herbivores on habitat quality
- Improving the extent, condition and security of high value Malleefowl habitat on private property by working with landholders to revegetate, control pest plants and animals, improve grazing management and create permanent conservation covenants
- Reestablishing corridors and linkages between isolated populations to allow for movement for breeding and genetic flow

Management actions to protect and improve Malleefowl habitat will have secondary benefits for threatened ecological communities including ‘Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions’ and ‘Plains Mallee Box Woodland of the Murray Darling Depression and Riverina Bioregions.’ This project will also contribute to the Australian Government’s Outcome 4 by implementing actions to lead to an improvement in EPBC listed threatened communities.

Primary target assets for this project are listed in Table 11.

Table 11: Primary target assets for Malleefowl conservation in the Wimmera

Target assets	Conservation status (EPBC Act)	Threatened Species Strategy priorities
Primary target assets		
Malleefowl (<i>Leipoa ocellata</i>)	Vulnerable	Priority bird
Secondary target assets		
Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions	Endangered	
Plains Mallee Box Woodland of the Murray Darling Depression and Riverina Bioregions	Critically Endangered	

The Malleefowl is an iconic threatened species in Mallee landscapes and the Wimmera supports several significant populations. The Malleefowl is generally distributed in the north-west of the Wimmera in semi-arid Mallee scrub (Figure 7). Malleefowl habitat is primarily contained in and adjacent to the Little Desert National Park, Nurcoung Flora Reserve, Dyurrite (Mount Arapiles)-Tooan State Park and the Big Desert and Wyperfeld region. The Wimmera population represents part of the species’ southernmost extent.

The local community has strong connections with Malleefowl conservation in the Wimmera and local partners have been involved in national recovery planning and action for many years. Knowledge and understanding of the Malleefowl in the Wimmera is high.

Current condition

In the Wimmera, monitoring of Malleefowl mound activity conducted between 2007 and 2020 suggests:

- The Wimmera population is relatively stable and varies up to +/-50% per year.
- An increasing trend in Malleefowl breeding activity over the past 20 years (possibly due to small sample size and drought conditions during the first 8 years of monitoring),
- About 70 breeding pairs may occur within the Wimmera (noting that this is an estimate based on limited data extrapolated over large areas), and
- Breeding populations have been relatively stable in the past 13 years. ⁽¹⁶⁾

Thirty-four of the 165 mounds surveyed at 10 Wimmera sites in 2019-20 showed signs of active breeding. This is high by historical standards however the trend in mound activity has been relatively constant over the last decade. ⁽¹⁶⁾

The Wimmera Malleefowl populations in the Little Desert National Park, Nurcoung Flora Reserve, Dyrurite (Mount Arapiles)-Tooan State Park and the Big Desert and Wyperfeld region are isolated and fragmented. The landscape between these reserves is largely agricultural and with limited vegetation cover.

Threats and impacts

The main threats impacting on Malleefowl include:

- Habitat loss and clearing of native vegetation for crop and sheep production,
- Fragmentation and isolation. Clearing of native vegetation for agriculture has resulted in fragmentation of Malleefowl into several small populations with limited opportunity for dispersal between them. Small and isolated populations are more vulnerable and likely to exacerbate the impact of other threats such as foxes, weed invasion, climate change and fire,
- Grazing pressure on Malleefowl habitat. Competing herbivores include kangaroos, rabbits, goats and sheep. Grazing and browsing reduces food available for Malleefowl. Herbivores can also cause long-term change to the structure and floristic diversity of habitats,
- Habitat degradation from weed invasion,
- Predation by the introduced fox, and cats and raptors to a lesser extent, is a major cause of Malleefowl mortality. Foxes are known to take Malleefowl at all stages of the bird's life cycle,
- Climate change. Projected changes in rainfall and temperatures, and concomitant changes in biota, are likely to threaten Malleefowl over their entire range,
- Fire, including wildfire and intentional prescribed burns. Large fires are a major threat to the conservation of Malleefowl. Populations of Malleefowl may suddenly be eliminated from vast areas that are burnt, and even if there are nearby sources of recolonisation, recovery in the burnt area to densities that occurred before the fire

appears to be very slow. Fire in Mallee habitats typically removes all parts of vegetation above the surface and thus fire has a major influence on the structure and floristic composition. The deleterious effect of fire appears to be mitigated if fires burn patchily. ⁽¹⁷⁾

Projects and management actions

The 'Protecting our Malleefowl' Project is funded under the National Landcare Program's Phase 2 Regional Land Partnerships Program from 2018 until 2023. This project aims to improve the trajectory of the Malleefowl population in the Wimmera by:

- Supporting land managers to address threats including predation, habitat loss, fragmentation and habitat degradation. The project is improving the extent, condition and security of high value Malleefowl habitat on private property by working with landholders to undertake targeted revegetation, pest plant and animal control, improve grazing management and create permanent conservation covenants. The project is revegetating agricultural land between key Malleefowl populations to improve connectivity.
- Collaborating with the Victorian and National Malleefowl Recovery Teams, project partners are controlling and monitoring foxes and cats across three National Malleefowl Adaptive Management Project sites. This will contribute vital information to this national project and help improve understanding of the impact foxes and cats have on Malleefowl populations.

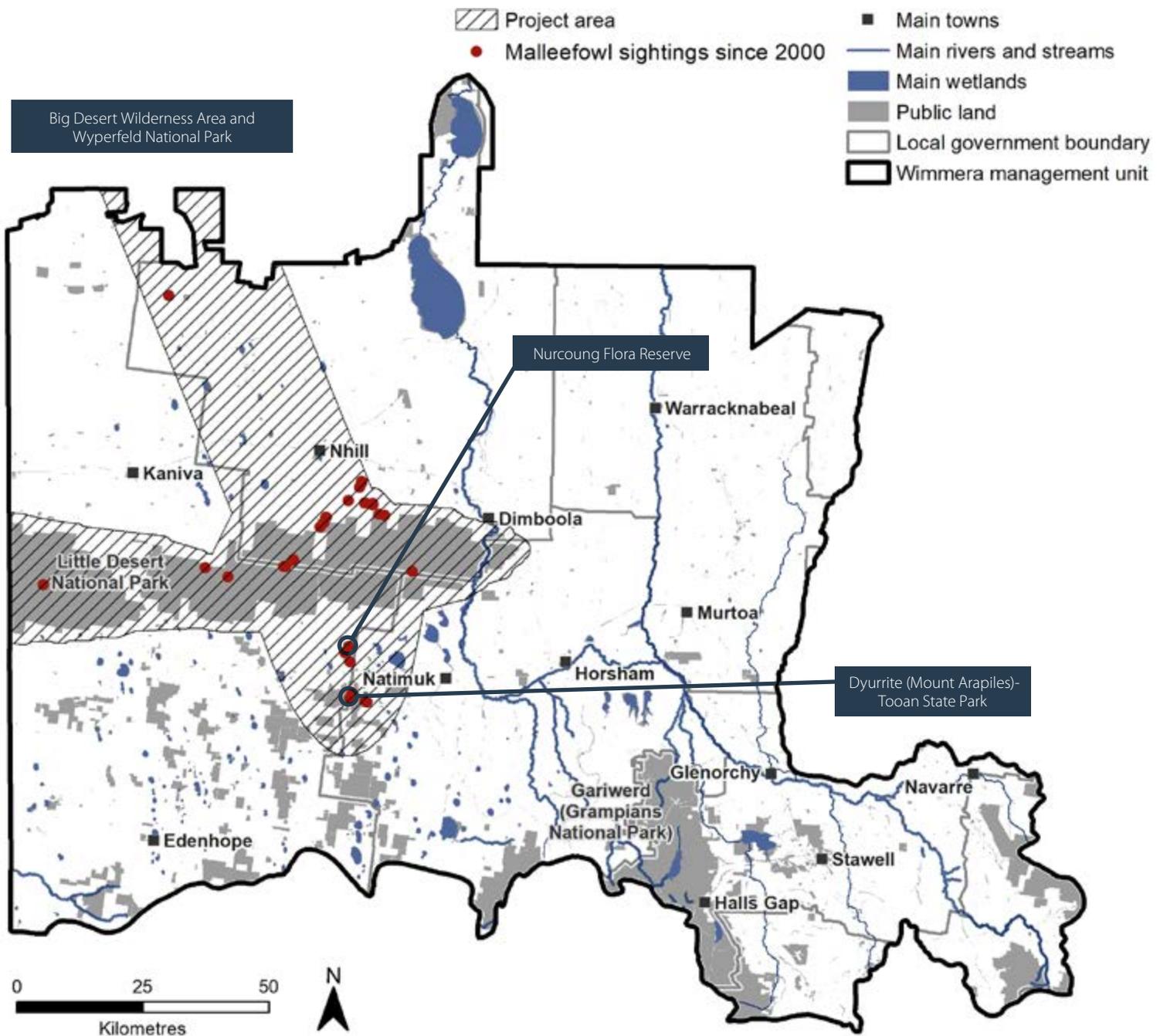
This Action Plan proposes continuing the management actions under the 'Protecting our Malleefowl' Project beyond 2023 and expanding the project to:

- Control total grazing pressure to improve the quality of vegetation and habitat. Overabundant herbivores include rabbits, hare, deer, goats and macropods
- Evaluate the genetic viability of the Wimmera's Malleefowl populations, providing information to determine if future genetic translocations are required to maintain genetically robust and healthy Malleefowl populations
- Increase the focus on protecting habitat and revegetating land between the Big and Little Desert area populations to provide corridors and linkages to facilitate movement for Malleefowl breeding and genetic flow

Management actions to protect and improve Malleefowl habitat will have secondary benefits for threatened ecological communities. Predator control and habitat improvement actions will also benefit species such as the silky mouse (*Pseudomys apodemoides*), little pygmy possum (*Cercartetus lepidus*) and rosenberg's goanna (*Varanus rosenbergi*).

Figure 7 shows the location of Malleefowl habitat in the Wimmera and the focus area for this project. It also shows Victorian Biodiversity Atlas records in the Wimmera since 2000. ⁽¹²⁾ Management actions are listed and described in Table 12 together with key collaborations and monitoring methods.

Figure 7: Project area for Malleefowl conservation in the Wimmera





Malleefowl (*Leipoa ocellata*) tending its nest

Table 12: Management actions for Malleefowl conservation in the Wimmera

Action	How actions contribute to the 5 year Outcome	Threats addressed	Monitoring the effectiveness of management actions	Delivery partners	Funding
Monitor activity at Malleefowl mounds to provide an index of breeding and population trend	<p>This information will:</p> <ul style="list-style-type: none"> Estimate the trajectory of Malleefowl populations, both regionally and nationally. Inform management decisions to improve the trajectory of Malleefowl. <p>Monitoring methods use the national protocol to ensure consistency across all regions and that data collected are robust, rigorous, and comparable among geographical areas.</p>	Lack of understanding	<p>Indicator: Change in Malleefowl Population Index</p> <p>Method: Survey activity at Malleefowl mounds using the national protocol</p> <p>Baseline: Assessments at the three National Malleefowl Adaptive Management Sites in the Wimmera</p> <p>Frequency: Annually</p>	<p>National Malleefowl Recovery Team</p> <p>Victorian Malleefowl Recovery Group</p>	<p>NLP2 Protecting our Malleefowl Project 2018-23</p> <p>Funding is required beyond 2023</p>
Protect and enhance Malleefowl habitat on private land	<p>This will improve the trajectory of Malleefowl by assisting private landholders to improve the condition of Malleefowl habitat and reduce predators on their properties. In return for financial assistance and technical support, landholders are required to undertake threat abatement activities including:</p> <ul style="list-style-type: none"> Protecting and improving Malleefowl habitat on private land using long-term management agreements and on-title covenants. Revegetating agricultural land between key Malleefowl populations to improve connectivity. 	<p>Loss of habitat through land use change and land clearing</p> <p>Grazing pressure</p> <p>Predation</p> <p>Habitat degradation from weed invasion and rabbits</p>	<p>Indicator: Amount of habitat under active threat management</p> <p>Method: Measure the increase in hectares under management agreement and threats treated including control of foxes, weeds and pest herbivores, and stock exclusion</p> <p>Baseline: 0 hectares</p> <p>Frequency: Annually</p>	<p>Wimmera CMA</p> <p>Landholders</p>	<p>NLP2 Protecting our Malleefowl Project (200 ha funded, 2018-23)</p>
Implement an integrated large-scale fox baiting and cat control program across public and private land in and adjacent to known Malleefowl habitat and locations	<p>This will improve the trajectory of Malleefowl by reducing the overall number of predators impacting on the population.</p> <p>This action will also assist the delivery of the National Malleefowl Recovery Team's Adaptive Management Experiment.</p>	Predation by foxes and cats	<p>Indicator: Change in fox and cat activity</p> <p>Method: Fox and cat activity collected from camera monitoring</p> <p>Baseline: None</p> <p>Frequency: Annually</p> <p>Indicator: Area (hectares) targeted for fox and cat control</p> <p>Method: Area targeted for fox and cat control</p> <p>Baseline: None</p> <p>Frequency: Annually</p>	<p>Parks Victoria</p> <p>Victorian Malleefowl Recovery Group</p> <p>National Malleefowl Recovery Group</p>	<p>NLP2 Protecting our Malleefowl Project 2018-23</p>

Action	How actions contribute to the 5 year Outcome	Threats addressed	Monitoring the effectiveness of management actions	Delivery partners	Funding
Additional proposed projects					
Continue existing NLP2 funded activities	As above	As above	As above	As above	Not funded beyond 2023
Expanded population monitoring	Current population monitoring is geographically limited. Improving our understanding of where Malleefowl are and the status of populations will improve our ability to target management actions and improve the overall trajectory of the species in the Wimmera.	Lack of knowledge	Indicator: Presence/absence, number of mounds and change in Malleefowl population index Method: Camera monitoring, Malleefowl mound activity surveys. Baseline: Initial surveys of new locations Frequency: TBC	Parks Victoria Victorian Malleefowl Recovery Group National Malleefowl Recovery Group	Not funded
Control total grazing pressure and investigate the impacts on key species, including Malleefowl, silky mouse, little pygmy possum and rosenberg's goanna	Habitat condition is a major factor contributing to the trajectory of key flora and fauna populations in the region. There is growing evidence that total grazing pressure is high and potentially having a negative impact on habitat condition. Consequently, reducing total grazing pressure could improve the trajectory of key species in the Wimmera including the Malleefowl.	Competition and habitat quality	Indicator: Change in abundance/activity index Method: Various Baseline: Various Frequency: TBC	Parks Victoria Victorian Malleefowl Recovery Group National Malleefowl Recovery Group	Not funded
Evaluate Malleefowl genetic population viability	In the Wimmera there are many small fragmented Malleefowl populations. This project would evaluate the genetic viability of the Wimmera's Malleefowl populations and provide critical information to determine if future genetic translocations are required to maintain genetically robust and healthy Malleefowl populations.	Genetic depression and inbreeding	Indicator: Genetic diversity Method: Genetic analysis Baseline: Current genetic status of Wimmera Malleefowl populations Frequency: TBC	Parks Victoria Victorian Malleefowl Recovery Group National Malleefowl Recovery Group	Not funded



Malleefowl (*Leipoa ocellata*)

SWIFT PARROT AND BOX IRONBARK WOODLAND PROTECTION AND MANAGEMENT

Introduction

This project will contribute to the Australian Government's Outcome 2 by improving the trajectory of swift parrot (*Lathamus discolor*) in the Wimmera. The project proposes to improve information about swift parrot behaviour and protect and enhance the quality and quantity of swift parrot habitat, including threatened box woodlands.

Management actions to protect and improve swift parrot habitat will have secondary benefits for threatened ecological communities including 'Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia' and 'White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland'. This project will also contribute to the Australian Government's Outcome 4 by implementing actions to lead to an improvement in EPBC listed threatened communities.

Primary target assets for this project are listed in Table 13.

Table 13: Primary target assets for swift parrot and box ironbark woodland protection and management in the Wimmera

Target assets	Conservation status (EPBC Act)	Threatened Species Strategy priorities
Primary target assets		
Swift parrot (<i>Lathamus discolor</i>)	Critically Endangered	Priority bird
Grey Box (<i>Eucalyptus microcarpa</i>) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered	
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	

After breeding in Tasmania, the swift parrot migrates to mainland Australia to forage over winter in the dry eucalyptus woodlands of Victoria and New South Wales. This includes the box-ironbark and eucalypt forests of the Wimmera's upper catchment local area. The National Recovery Plan for the species identifies priority habitat for protection and management that includes areas within the Wimmera. This includes Deep Lead, Illawarra and Jallukar Nature Conservation Reserves and Glynwylln and Illawarra State Forests (Figure 8).⁽¹⁸⁾

Box woodlands dominate in the upper Wimmera catchment. There are good stands on both public and private land and recent conservation investment in these ecosystems has been low.

Current condition

The condition of swift parrot habitat and how they use habitat in the Wimmera is largely unknown and warrants investigation.

Threats and impacts

Major threats to the swift parrot in the feeding habitats of the Wimmera include:

- Habitat loss and alteration,
- Agricultural tree senescence,
- Inappropriate fire regimes,
- Climate change, and
- Firewood collection.

Projects and management actions

This project focuses on:

- Monitoring swift parrot behaviour in the Wimmera to provide information to inform management effort, and
- Protecting, managing and restoring swift parrot habitat, including threatened ecological communities.

Figure 8 shows Victorian Biodiversity Atlas records in the Wimmera since 2000 and the focus area for this project.⁽¹²⁾ Management actions are listed and described in Table 14 together with key collaborations and monitoring methods.



Swift Parrot foraging

Figure 8: Project area for swift parrot conservation in the Wimmera

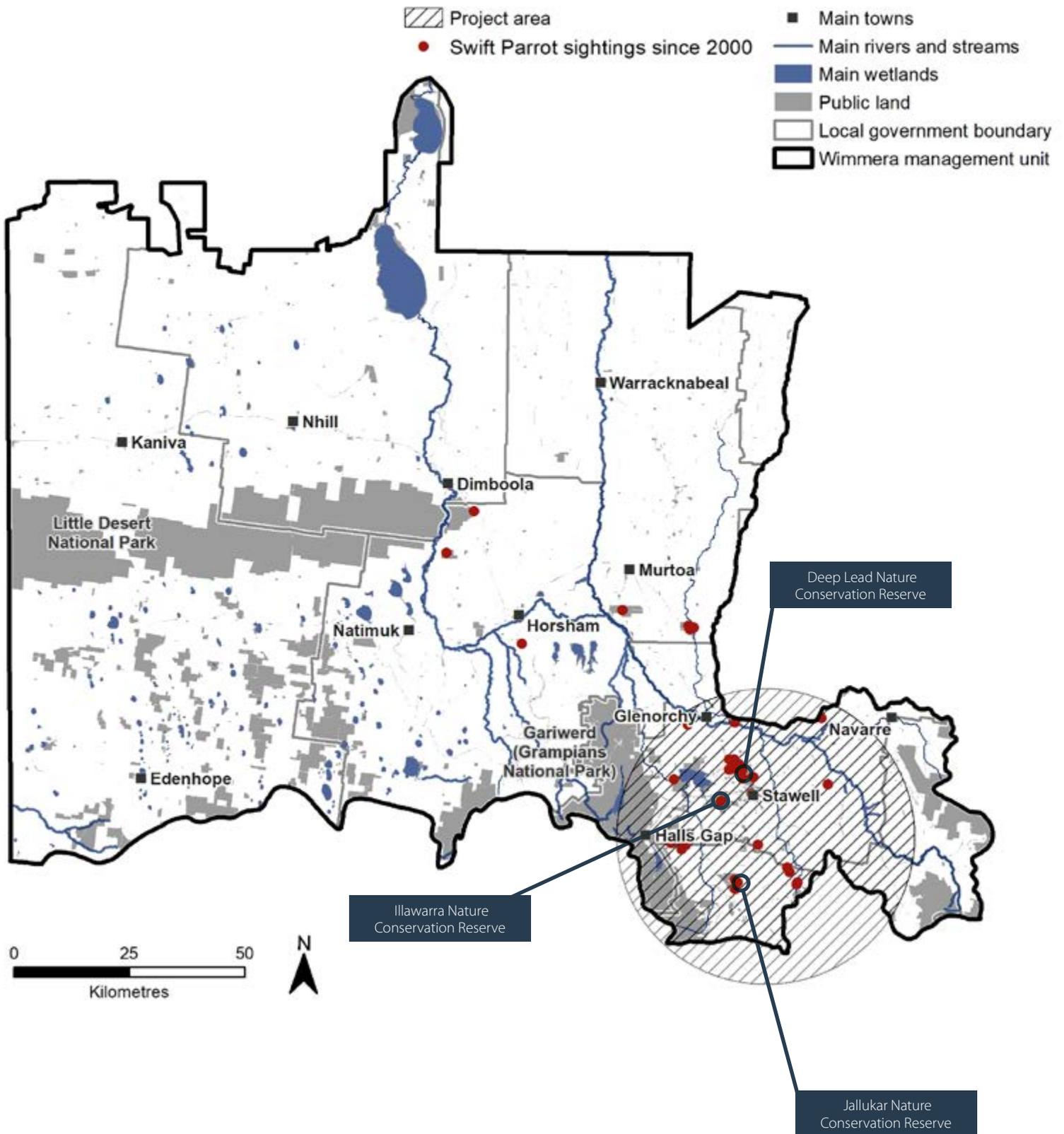


Table 14: Management actions for swift parrot conservation in the Wimmera

Action	How actions contribute to the 5 year Outcome	Threats addressed	Monitoring the effectiveness of management actions	Delivery partners	Funding
Swift parrot monitoring	Contributing to a bi-annual monitoring program will help evaluate the effectiveness of management actions and enable analysis of the species' trajectory	Lack of knowledge of the habitat use in the region	Indicator: Population information improves Method: Population monitoring Baseline: None Frequency: TBC	Birdlife Australia Landcare Project Platypus Birds Australia National recovery team	Not funded
Mapping, protecting, improving the management of, and restoring swift parrot habitat in the Wimmera	Improving foraging and roosting habitat in winter feeding grounds will contribute to stabilising and/or improving the trajectory of this species The project will include: <ul style="list-style-type: none"> Monitoring habitat use Implementing long term management agreements on private land On-title conservation covenants Revegetation works 	Habitat loss Habitat degradation	Indicator: Area of habitat protected, restored or where management has improved Bi-annual population Method: Measure the area Baseline: 0 Frequency: Annually	Trust for Nature Landcare Project Platypus Birdlife Australia	Not funded

RETURNING SPECIES TO RESTORE ECOLOGICAL FUNCTION AND CULTURAL CONNECTION IN THE LITTLE DESERT REGION

Introduction

This project will contribute to the Australian Government's Outcome 2 by improving the trajectory of 4 threatened species. The project proposes to reintroduce 4 priority species into 2 existing predator-proof enclosures to restore ecological functions and cultural connections in the Wimmera's Little Desert region.

The Little Desert and Big Desert/Wyperfeld regions of western Victoria suffered significant local extinctions of small mammals following European colonisation and Aboriginal displacement. The loss of species like these to an ecosystem is poorly understood and often over-simplified. These species undertake critically important ecological services that are now missing from the landscape. Fortunately, these areas have large tracts of contiguous, high-quality habitat that could support the reintroduction of these species.

Restoring these locally extinct species is of significant cultural importance to the Wotjobaluk Peoples. Their return will assist with the ongoing cultural and ecological restoration of Wotjobaluk Country.

Reintroducing these species in the Wimmera will benefit the national conservation effort to preserve these critically endangered species. The primary target assets for this project are listed in Table 15.

Table 15: Primary target assets for restoring ecological function and cultural connection in the Little Desert region

Target assets	Conservation status (EPBC Act)	Threatened Species Strategy priorities
Primary target assets		
Western quoll (<i>Dasyurus geoffroii</i>)	Vulnerable	Priority mammal
Woylie or brush-tailed bettong (<i>Bettongia penicillata</i>)	Endangered	Priority mammal
Greater bilby (<i>Macrotis lagotis</i>)	Vulnerable	Priority mammal
Western barred bandicoot (<i>Perameles bougainville</i>)	Vulnerable	

Current condition

Currently the western quoll, western barred bandicoot, brush-tailed bettong and greater bilby are thought to be no longer present in the Wimmera.

Since the loss of these species from the Wimmera, large areas of the Little Desert and Big Desert/ Wyperfeld region have been protected under the national parks and reserves system. The protection and management associated with reserve status has resulted in large areas of good quality habitat that could support their reintroduction.

Threats and impacts

On a national scale, the 4 priority species for this project are limited to only a handful of populations across Australia. This project seeks to address this by adding another population to contribute to securing the survival of these animals.

Introduced predators such as foxes and cats and loss of habitat are major threats contributing to the decline of these species.

Projects and management actions

This project seeks to reintroduce four priority species into two existing predator proof safe havens in the Little Desert region. The safe havens comprise 120 hectares.

This project will be supported by the existing and established cross-tenure landscape scale predator control program in the Little Desert Region. The ‘Protecting our Malleefowl’ Project is controlling foxes and feral cats in the Little Desert National Park and adjacent land to reduce predation on Malleefowl. Reducing fox and cat numbers will also benefit a range of other species and improves the chance of a successful small mammal reintroduction program. The project is funded

under the National Landcare Program’s Phase 2 Regional Land Partnerships Program from 2018 until 2023.

Leveraging existing infrastructure (predator proof safe havens), established management regimes (introduced predator control programs), and active fauna monitoring programs occurring in the region would facilitate the implementation of a very cost-effective project.

Figure 9 shows the proposed location for threatened species reintroductions in the Wimmera. Management actions for this project are listed and described in Table 16 together with key collaborations and monitoring methods.

Figure 9: Project area for priority threatened mammal reintroductions to restore ecological function and cultural connection in the Little Desert region

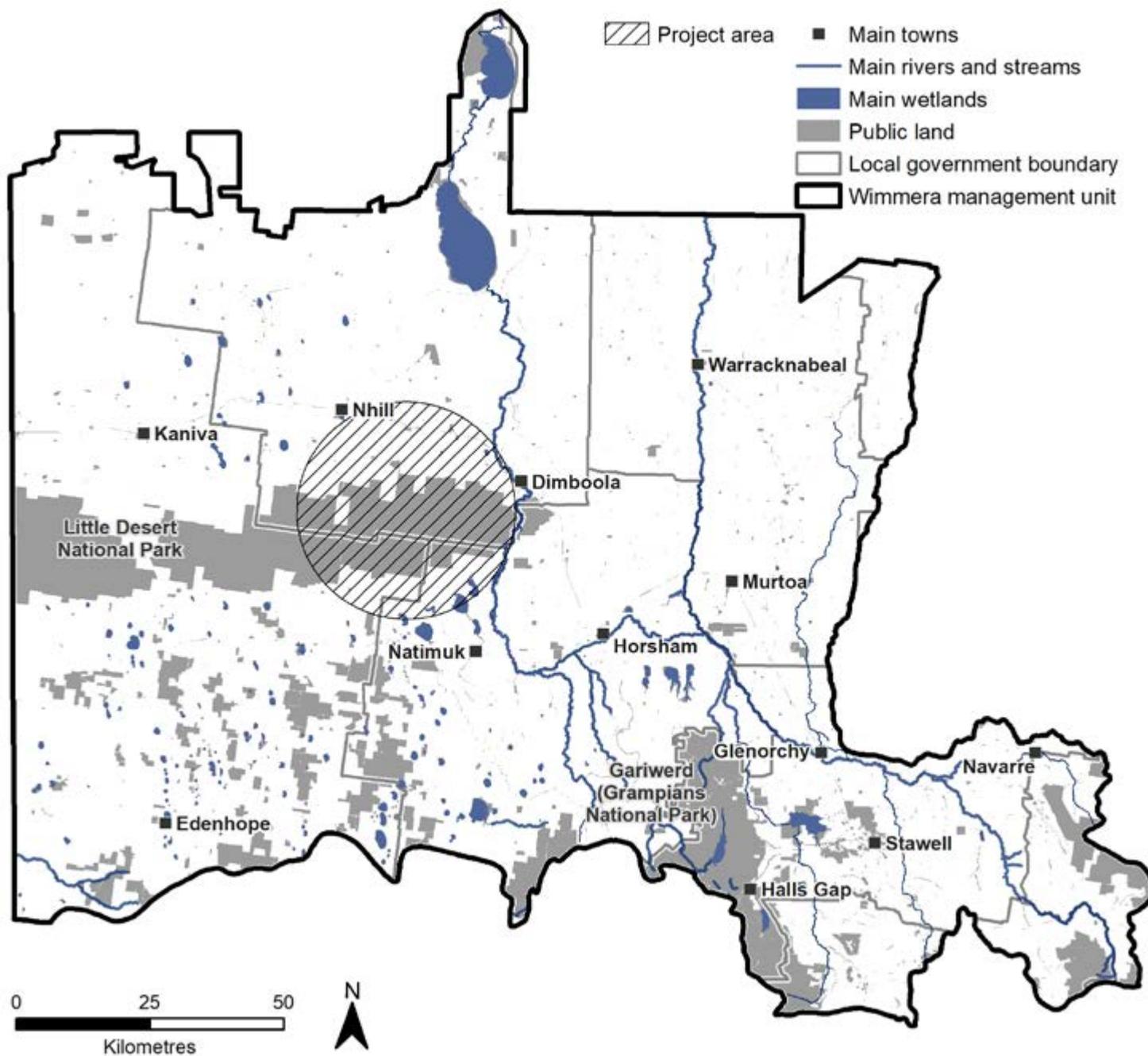


Table 16: Management actions for priority threatened mammal reintroductions to restore ecological function and cultural connection in the Little Desert region

Action	How actions contribute to the 5 year Outcome	Threats addressed	Monitoring the effectiveness of management actions	Delivery partners	Funding
Reintroduce important species back into the Wimmera-Mallee landscape	Improve the trajectory of up to four priority species, including western quoll, western barred bandicoot, brush-tailed bettong and the greater bilby by establishing new populations in 2 predator proof 120 hectare safe havens.	Small population number Small numbers of populations Limited distribution Predation	Indicator: Number of species and individuals successfully introduced Method: Population monitoring Baseline: None Frequency: Annually	FAUNA Research Alliance Barengi Gadjin Land Council Parks Victoria DELWP Deakin University Little Desert Nature Lodge Charles Sturt University Perth Zoo Local landholders	Not funded

WIMMERA ORCHIDS PROTECTION AND MANAGEMENT

Introduction

This project will contribute to the Australian Government's Outcome 2 by improving the trajectory of threatened orchids in known wild and reintroduced populations in high priority Wimmera locations. The project will:

- Expand the abundance and extent of orchid populations by collecting and storing seed, propagating and reintroducing threatened orchids into priority areas
- Monitoring known wild populations and reintroduced populations of orchids to assess threats
- Carrying out management actions such as weed and herbivore control to reduce the impact of threats on orchid populations.

The primary target assets for this project are listed in Table 17.

Table 17: Primary target assets for protecting and managing Wimmera orchids

Target assets	Conservation status (EPBC Act)	Threatened Species Strategy priorities
Primary target assets		
Yellow-lip spider-orchid (<i>Caladenia xanthochila</i>)	Endangered	Priority mammal
Tawny spider-orchid (<i>Caladenia fulva</i>)	Endangered	Priority mammal
Coloured spider-orchid, small western spider-orchid or painted spider-orchid (<i>Caladenia colorata</i>)	Endangered	Priority mammal
Wimmera spider-orchid (<i>Caladenia lowanensis</i>)	Endangered	
Sand-hill spider-orchid (<i>Caladenia arenaria</i>)	Endangered	

Target assets	Conservation status (EPBC Act)	Threatened Species Strategy priorities
Metallic sun-orchid (<i>Thelymitra epipactoides</i>)	Endangered	
Candy spider-orchid (<i>Caladenia versicolor</i>)	Vulnerable	
Elegant spider-orchid or blood-red spider-orchid (<i>Caladenia formosa</i>)	Vulnerable	
Spiral sun-orchid (<i>Thelymitra matthewsii</i>)	Vulnerable	

Current condition

Many orchid species found in the Wimmera are vulnerable to becoming extinct without a successful reintroduction program. Orchids are often located in small and isolated populations and subject to a range of threats.

Threats and impacts

Native orchids are impacted by lack of wild propagation and natural regeneration. There are several reasons for this, including:

- Small and isolated populations mean that propagation success and genetic variability is reduced. Small populations are less attractive to pollinators, impacting on breeding success.
- Native pollinators are impacted by competition with less suited introduced pollinators, including European honeybees (*Apis mellifera mellifera*).
- Invasive weeds are common and can outcompete native orchids.
- Over-grazing by herbivores including rabbits, hare and deer impacts on growth and ability to breed.
- Removal of fire as a natural disturbance, allows invasive weeds to outcompete native orchids.

Projects and management actions

Propagation in a specialised laboratory and nursery is the only means by which these species can be reproduced in sufficient numbers to significantly reduce the threat of them becoming extinct in the wild.

Wimmera orchids rely on a specific type of mycorrhizal fungi to germinate and sustain growth throughout their lifecycle. They also rely on their own unique species of pollinator such a wasp for reproduction. Research over the last 20 years has substantially improved orchid propagation and reintroduction techniques, identifying where pollinators live and enabling expert staff to capture and grow the relevant mycorrhizal fungi.

Figure 10 shows the focus area for this project. Management actions are listed and described in Table 18 together with key collaborations and monitoring methods.

Figure 10: Project area for threatened orchid conservation in the Wimmera

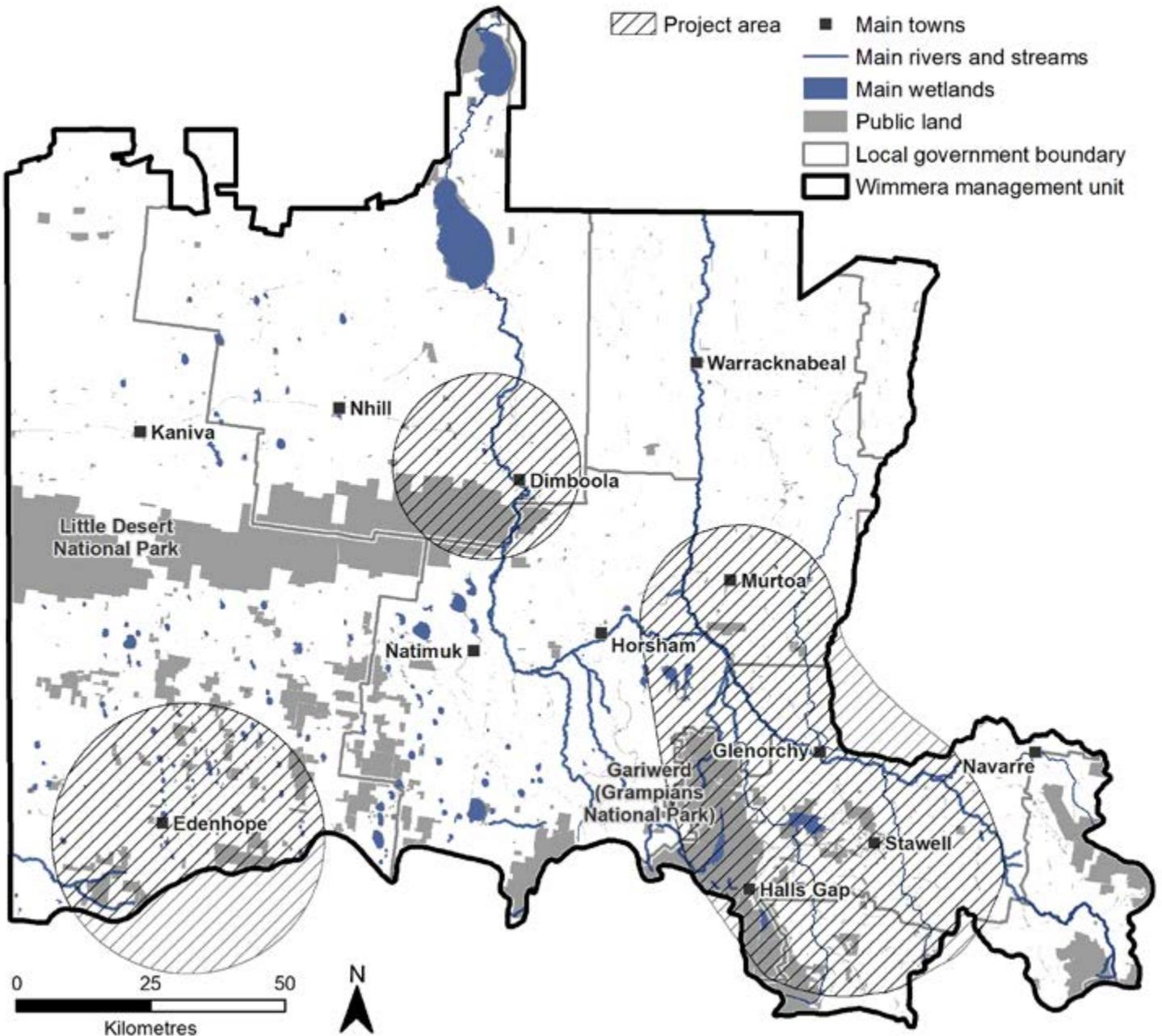


Table 18: Management actions for improving the trajectory of threatened orchids in the Wimmera

Action	How actions contribute to the 5 year Outcome	Threats addressed	Monitoring the effectiveness of management actions	Delivery partners	Funding
Propagate and reintroduce threatened orchids into priority locations in the Wimmera	This project seeks to improve the trajectory of EPBC-listed Wimmera orchids by expanding the number and extent of threatened orchids in the wild by reintroducing them into herbivore-proof enclosures in priority locations.	Lack of wild propagation and natural regeneration	Indicator: Number and type of orchids reintroduced Method: Surveys Baseline: 0 Frequency: Annually Royal Botanic Gardens Victoria	Wimmera CMA	Not funded
Monitor all reintroduced threatened orchid populations in the Wimmera and take actions to reduce threats	Monitoring will assess the success of reintroductions and enable threats to be identified and managed, contributing to the threatened species Outcome to stabilise the trajectory of EPBC-listed Wimmera orchids	Weed invasion Over-grazing by rabbits	Indicator: Population abundance and extent of reintroduced orchids Method: Surveys Baseline: Number reintroduced Frequency: Annually	Royal Botanic Gardens Victoria Wimmera CMA	Not funded
Monitor all known wild populations of threatened orchids in the Wimmera and take actions to reduce threats	Monitoring will assess the health of wild orchid populations and enable threats to be identified and managed, contributing to the threatened species Outcome to stabilise the trajectory of EPBC-listed Wimmera orchids	Weed invasion Over-grazing by rabbits	Indicator: Population abundance and extent of wild orchids Method: Surveys Baseline: Data collected in 2018 Frequency: Annually	Royal Botanic Gardens Victoria Wimmera CM	Not funded
Support and encourage all land managers that neighbour known wild and reintroduced populations to actively manage and support their protection	This action will help stabilise the trajectory of threatened orchids by ensuring that management of neighbouring land does not impact on orchid populations.	Weed invasion Over-grazing by rabbits Chemical spray drift	Indicator: Percentage of land managers adjacent to known wild and reintroduced populations committed to active management to support their protection Method: Survey Baseline: Baseline survey Frequency: Annually	Barengi Gadjin Land Council Parks Victoria Royal Botanic Gardens Victoria Wimmera CMA	Not funded



WIMMERA GRASSLANDS RESTORATION AND MANAGEMENT

Introduction

This project will contribute to the Australian Government’s Outcome 4 by implementing actions that lead to an improvement in *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) listed threatened grassland and grassy woodland communities. It will also contribute to Outcome 2 by improving the trajectory of threatened species associated with grassland communities. The project proposes to:

- Improve the protection and management of threatened grassland and grassy woodland communities on roadsides, public and private land, and
- Enhance threatened species within these communities by propagating and reintroducing new plants and reducing threats such as weeds, rabbits and lack of fire.

Threatened grassland communities occur as isolated remnants scattered across the agricultural landscape of the northern Wimmera plains, central Wimmera and upper Wimmera River catchment area (Figure 11). Several threatened plant and animal species rely on these grassland ecosystems for habitat, including the Wimmera rice-flower, turnip copperburr, button wrinklewort and striped legless lizard.

Table 19 lists the threatened ecological communities that will be targeted by this project and the species that will also benefit.

Table 19: Primary target assets for management actions to restore Wimmera grasslands

Target assets	Conservation status (EPBC Act)	Threatened Species Strategy priorities
Primary target assets		
Natural Grasslands of the Murray Valley Plains (Natural Grasslands)	Critically Endangered	
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Box-Gum Grassy Woodlands)	Critically Endangered	
Grey Box (<i>Eucalyptus microcarpa</i>) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia (Grey Box Grassy Woodlands)	Endangered	
Turnip copperburr (<i>Sclerolaena napiformis</i>)	Endangered	Priority plant
Wimmera rice-flower (<i>Pimelea spinescens subsp. pubiflora</i>)	Critically Endangered	
Button wrinklewort (<i>Rutidosia leptorhynchoides</i>)		Priority plant
Striped legless lizard (<i>Delma impar</i>)	Vulnerable	
Olive legless lizard (<i>Delma inornata</i>)	Vulnerable	
Plains-wanderer (<i>Pedionomus torquatus</i>)	Critically Endangered	Priority bird

Current condition

The former distributions of the Natural Grasslands, Box-Gum Grassy Woodlands and Grey Box Grassy Woodlands ecological communities are substantially reduced in the Wimmera. These communities are thought to have been formerly widespread across the highly fertile soils of the Wimmera plains and upper Wimmera River catchment area. Most of the Wimmera’s grasslands have been removed to make way for agriculture. Remaining grassland areas are scattered, isolated and often degraded remnants across their former range.

The ‘derived native grasslands’ component of the Box-Gum Grassy Woodlands and Grey Box Grassy Woodlands ecological communities refers to remnants where the tree overstorey has been removed and the grassy understorey remains.

Most Wimmera grassland remnants occur on private land and roadsides where they are at risk of clearing and disturbance. Most remnants are surrounded by agricultural land, limiting opportunities for native flora and fauna to move through the landscape. Their small, fragmented nature also increases their vulnerability to further decline by weed invasion, rabbits and other herbivores and impacts from actions in neighbouring agricultural land.

Threats and impacts

The main threats impacting on grassland ecological communities include:

- Vegetation clearance for cropping
- Increasing fragmentation of remnants
- Inappropriate grazing regimes
- Weed invasion and damage from feral animals such as rabbits
- Inappropriate tree plantings or revegetation works
- Changed fire regimes
- Application of farm chemicals such as pesticides and fertilisers, and
- Climate change and drought. Rainfall during the winter and spring growing seasons are predicted to be reduced under climate change scenarios, potentially impacting on floristic composition.

Projects and management actions

The main management actions for this project include:

- Increasing understanding of the condition of and threats to known grassland remnants and surveying for currently unknown remnants
- Monitoring previously recorded locations of threatened grassland species and surveying to identify new populations
- Improving the protection and management of threatened grassland and grassy woodland communities on roadsides, public and private land, and
- Propagating threatened grassland species and reintroducing them into protected grassland areas.

During the consultation process for the RCS and this Action Plan, some stakeholders expressed concern at the severe decline of Wimmera grassland and grassy woodland communities. These stakeholders highlighted that conserving remaining grasslands is a high priority and that action is required to protect grasslands from clearing and degradation. This view was also apparent during the Biodiversity Response Planning process.

Figure 11 shows the approximate location of Wimmera grasslands and grassy woodlands and the focus area for this project. It also shows Victorian Biodiversity Atlas records for priority nationally threatened grassland species since 2000. ⁽¹²⁾ Management actions are listed and described in Table 20 together with key collaborations and monitoring methods.

Figure 11: Project area for the conservation of threatened Wimmera grasslands and associated threatened species

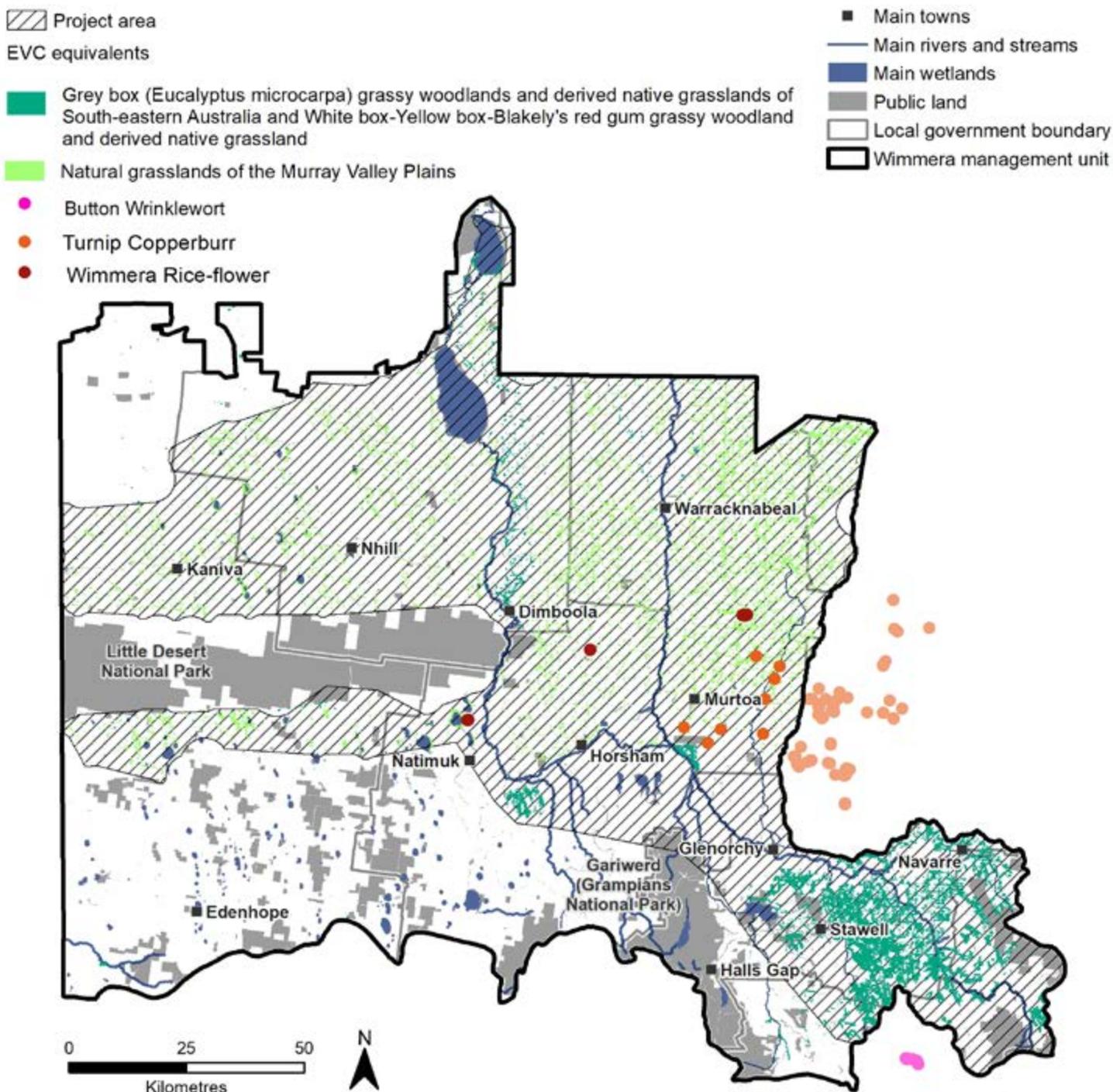


Table 20: Management actions for the conservation of threatened Wimmera grasslands, grassy woodlands and associated threatened species

Action	How actions contribute to the 5 year Outcome	Threats addressed	Monitoring the effectiveness of management actions	Delivery partners	Funding
Monitor known remnants and search for other remnant patches of grassland and threatened species on roadsides, public and private land	A monitoring program will improve information of the location, extent and condition of grassland communities and associated species, providing information to inform future management actions.	Lack of knowledge on status and current distribution and extent	Indicator: Improved information on remnant grasslands Method: Surveys and monitoring Baseline: None Frequency: TBC	DELWP Landcare BGLC Yarriambiack Shire Council Horsham Rural City Council West Wimmera Shire Council Regional Roads Victoria	Not funded
Protecting and enhancing the condition of existing grassland remnants and populations of threatened species	This action will reduce threats to grasslands and associated threatened species on roadsides, public and private land by supporting land managers to identify grasslands, avoid accidental damage and reduce threats including clearing, weed invasion and herbivory by rabbits.	Illegal and accidental clearing or damage Competition from weeds Predation by rabbits	Indicator: Area of grasslands protected and improved Method: Measure the area Baseline: None Frequency: Annually	As above	Not funded
Propagating threatened grassland species and reintroducing them into protected grassland remnants	Increasing the number of plants in threatened species populations will improve their trajectory.	Limited recruitment Small population size	Indicator: Successful reintroductions Method: Measure number of species introduced and surviving Baseline: None Frequency: Annually	As above	Not funded
Improving the knowledge of stakeholders and community members	Improving stakeholder and community's knowledge of grasslands and associated threatened species will maximise protection outcomes and reduce threats.	Lack of knowledge	Indicator: Improved stakeholder and community knowledge Method: Survey Baseline: To be surveyed at start of project Frequency: TBC	As above	Not funded
Ecological burning of grassland communities on roadsides	Improved management, weed control and more natural fire regimes will benefit all grassland species.	Lack of natural process	Indicator: Condition of grasslands Method: Condition assessments Baseline: To be determined pre-burn Frequency: Annually	As above	Not funded

FOOD FOR FUTURES - RED-TAILED BLACK-COCKATOO (SOUTH-EASTERN) CONSERVATION AND MANAGEMENT

Introduction

This project will contribute to the Australian Government's Outcome 2 by improving the trajectory of red-tailed black-cockatoo (south-eastern) (SERTBC) (*Calyptorhynchus banksii graptogyne*) by delivering a suite of integrated actions, including:

- Protecting and enhancing feeding and nesting habitat on private and public land by working with landholders to revegetate, create permanent conservation covenants, increase nest availability and reduce the impacts of weeds and overgrazing
- Improving information about population dynamics and food availability to guide future management actions

This project will also contribute to the Australian Government's Outcome 4 by implementing actions to lead to an improvement in the EPBC listed threatened community, 'Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions.' Buloke trees (*Allocasuarina leuhmannii*) provide a food source for the SERTBC.

The National Recovery Plan for the South-eastern Red-tailed Black-Cockatoo guides the recovery of this species. ⁽¹⁹⁾ The National Recovery Team, operating since 1997, is principally responsible for the implementation of the plan. The knowledge and understanding regarding SERTBC recovery in the Wimmera are very high.

The SERTBC is one of five subspecies of Australian red-tailed black-cockatoo. This subspecies is only found in south-western Victoria and south-eastern South Australia where it's natural range covers approximately 18,000 km². More than 17% of the SERTBC's known range is in the south-west Wimmera (Figure 12).

The primary target assets for this project are listed in Table 21.

Table 21: Primary target assets for the red-tailed black cockatoo (south-eastern) and it's habitat

Target assets	Conservation status (EPBC Act)	Threatened Species Strategy priorities
Primary target assets		
Red-tailed black-cockatoo (south-eastern) (<i>Calyptorhynchus banksii graptogyne</i>)	Endangered	Priority bird
Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions	Endangered	

Current condition

SERTBCs rely on stringybark, buloke and gum woodland habitats and scattered trees throughout their range for feeding and nesting. They are highly nomadic, moving throughout their range in response to food availability.

The Threatened Species Strategy Year 3 Priority Species Scorecard 2018 reported that:

- A single population of about 1,400 birds persists across its Victorian and South Australian range.
- The population is in ongoing slow decline.
- SERTBCs feed almost entirely on the seeds of three tree species, brown stringybark, desert stringybark and buloke. All of these must be mature before they produce seed.
- SERTBCs are highly dependent on deep hollows in very old eucalypt trees for nesting. Nesting habitat may limit populations in the future. Big hollows take centuries to form and an estimated 4-7% have been lost annually suggesting there may already be a serious shortfall in suitable hollow-bearing trees, manifest initially through increased competition with other hollow-nesters.
- Habitat loss through tree decline has been caused by drying climatic changes and fire disturbance.
- There is local support for the SERTBC, with numerous people involved in annual counts, rehabilitating landscapes and protecting nest trees.
- Significant recovery efforts have focused on habitat protection and regeneration, however numbers of young birds joining the population are falling for reasons that are unclear. ⁽²⁰⁾

The Wimmera supports 90% of the cockatoo's known buloke feeding habitat and around 55% of stringybark habitat. Much of the Wimmera's buloke habitat occurs on roadsides and as scattered paddock trees on private land. In contrast, 98% of the Wimmera's stringybark habitat occurs in medium-sized patches on public land.

Threats and impacts

The two major threats and impacts on the SERTBC population are:

1. Lack of and threats to food supply, and
2. Threats to nests and nesting sites.

Threats include:

- Fire frequency and intensity: Fire has a major impact on the quantity of food available. Prescribed burns and wildfires substantially reduce seed availability in stringybarks for at least nine years, before they produce seed crops similar in size to long-unburnt trees. Fire is also a major threat to large hollow-bearing nest trees.

- Habitat loss: including the loss of isolated trees in paddocks, particularly very old buloke food trees and nesting trees. There are a multitude of drivers for habitat loss including: changes in land use (grazing to cropping), stubble burning, natural attrition, illegal and legal clearing and legal and illegal firewood collection.
- Grazing impacts on forage sites: Uncontrolled grazing can contribute to the death and decline of trees on private land.
- Drought and climate change: Extended periods with low rainfall appear to reduce the capacity of stringybarks and buloke to set seed, reducing breeding success.⁽²⁰⁾

Projects and management actions

The 'Food for the Future – Improving the habitat of the South-eastern Red-tailed Black-cockatoo in the Wimmera' (Food for the Future) Project is funded under the National Landcare Program's Phase 2 Regional Land Partnerships Program from 2018 until 2023. This integrated tenure blind project aims to improve the trajectory of SERTBC recruitment by:

- Supporting land managers and the community to protect and enhance existing feeding and nesting habitat, and
- Creating new habitat.

The intent is to achieve an increase in the overall extent and quality of habitat over time. A key component of the program includes supporting the long-term monitoring and research program running in the region as part of the National Recovery Plan and implemented by the SERTBC Recovery Team. This has been supported by and involved the project partners.

This Action Plan proposes continuing the management actions under the 'Food for the Future' Project beyond 2023.

Figure 12 shows the SERTBC's range in the Wimmera and the focus area for this project. It also shows Victorian Biodiversity Atlas records in the Wimmera since 2000.⁽¹²⁾ Management actions are listed and described in Table 22 together with key collaborations and monitoring methods.

The priority actions in Table 22 were developed by Wimmera CMA in partnership with stakeholders including the National Recovery Team, Birdlife Australia, Trust for Nature, Greening Australia and Kowree Farm Tree Group. These priorities are based on the recommended actions in the National Recovery Plan, with some amendments made based on new information including engagement with the SERTBC Recovery Team.^(19, 20)

Management actions to protect and improve SERTBC habitat will have secondary benefits for the threatened ecological community, 'Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions.' Buloke woodland together with stringybark habitat are the target vegetation communities for this project.

Red-tailed black cockatoo (south-eastern) (*Calyptorhynchus banksia graptogyne*) feeding



Figure 12: Project area for SERTBC conservation in the Wimmera

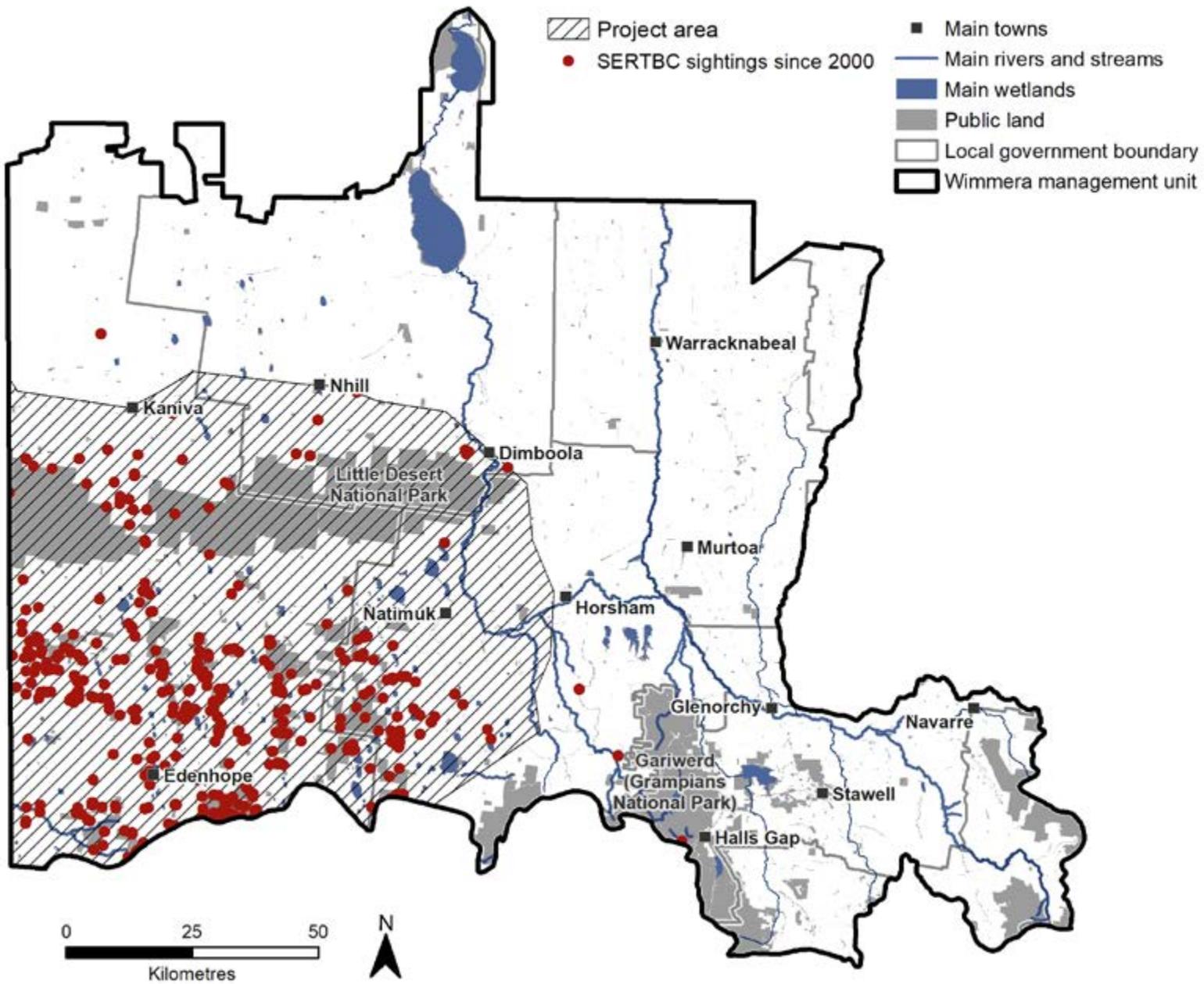


Table 22: Management actions for SERTBC conservation in the Wimmera

Action	How actions contribute to the 5 year Outcome	Threats addressed	Monitoring the effectiveness of management actions	Delivery partners	Funding
Actions funded until 2023					
Monitor SERTBC population	This will improve the trajectory of SERTBC by providing information about the population that will help to: <ul style="list-style-type: none"> Estimate the size and trajectory of the SERTBC population Inform management decisions to improve the trajectory of SERTBC 	Lack of understanding	Indicator: Population and distribution of SERTBC across its entire range Method: Annual count and Flock Count. Baseline: Data from previous annual counts Frequency: Annually	SERTBC Recovery Team	NLP2 Food for the Future Project until 2023
Protect and enhance feeding and nesting habitat on private and public land	This will improve the trajectory of SERTBC by protecting habitat, improving its quality and addressing threats by: <ul style="list-style-type: none"> Protecting and improving SERTBC habitat on private land using long-term management agreements and permanent on-title covenants Revegetate with feed tree species across private and public land Identify, monitor and protect nesting trees Install and monitor nesting boxes 	Loss of feeding and nesting habitat through land use change, land clearing and firewood collection Grazing impacts on forage sites Weed invasion of foraging habitat	Indicator: Amount of habitat under active management Method: Measure the increase in hectares under management agreement and improved by weed control and herbivore control Baseline: 2,448 ha of habitat was actively managed by landholders in 2018 Frequency: Annually	Wimmera CMA Landholders	NLP2 Food for the Future Project until 2023
Monitor the amount of food available annually by surveying stringybark capsules	This will improve the trajectory of SERTBC by providing information about the population that will help to indicate food availability which is a key predictor of breeding success. Monitoring the amount of food available annually via stringybark capsule surveys can also provide an indicator of the effectiveness of other management actions to improve habitat and food availability, including fire management, revegetation and improving management of habitat through agreements and covenants.	Food availability	Indicator: Understanding of food availability Method: Survey stringybark capsules Baseline: Previous surveys Frequency: Annually	SERTBC Recovery Team	NLP2 Food for the Future Project until 2023
Engage with key stakeholders and the community to facilitate the delivery of key recovery actions and increased awareness and understanding of the SERTBC	This will improve the trajectory of SERTBC by generating community awareness and understanding that could lead to positive actions being taken to protect the SERTBC. Activities delivered as part project will continue to raise the profile of the SERTBC and importance of threat abatement and habitat protection works	Lack of awareness and understanding	Indicator: Number of individuals engaged Method: Number of volunteers participating in actions that support SERTBC conservation and recovery activities. Number of key stakeholders engaged Baseline: Number of volunteers actively participating in recovery activities Frequency: Annually	Birdlife Australia SERTBC Recovery Team	NLP2 Food for the Future Project until 2023
Additional proposed projects					
Continue existing NLP2 activities and expand habitat protection and habitat restoration works	Various	Various	Various	All	Not funded beyond 2023

CONSERVING THE WIMMERA'S THREATENED ECOLOGICAL COMMUNITIES

Introduction

This project will contribute to the Australian Government's Outcome 4 by implementing actions that lead to an improvement in *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) listed threatened communities by:

- Improving information about the location and condition of remnant patches of threatened ecological communities
- Improving the extent, condition and protection of remnant patches on private property by working with landholders to revegetate, control weeds and pest herbivores including rabbits, improve grazing management and create permanent conservation covenants, and
- Reducing threats on public land including weed invasion and the impact of herbivores on habitat quality and plant regeneration.

Threatened ecological communities have been identified for priority protection through the Wimmera Regional Catchment Strategy 2021-27 and Wimmera Carbon Ready Plan 2016. These strategies were developed following extensive consultation with a broad range of stakeholders, community groups and members across the region to identify priorities, challenges and desired outcomes.

Table 23 lists the Wimmera's threatened ecological communities and primary target assets for this project.

Table 23: Primary target assets for conserving Wimmera threatened ecological communities

Target assets	Conservation status (EPBC Act)
Primary target assets	
Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions	Endangered
Grassy Eucalypt Woodland of the Victorian Volcanic Plain	Critically Endangered
Grey Box (<i>Eucalyptus microcarpa</i>) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered
Natural Grasslands of the Murray Valley Plains	Critically Endangered
Plains Mallee Box Woodland of the Murray Darling Depression and Riverina Bioregions	Critically Endangered
Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains	Critically Endangered
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered

Appendix 6 describes each threatened ecological community, setting out condition and threats in detail. A summary is provided here.

Current condition

The Wimmera's threatened ecological communities exist as patchy, highly fragmented and often degraded remnants significantly reduced from their former range. These communities are typically located on soils that are fertile and suitable for agriculture. As a result, they have been extensively cleared to make way for agriculture, leaving isolated remnants scattered through a grazing and broadacre cropping landscape. Many remnants have been grazed by sheep and native and introduced herbivores like rabbits, hares and kangaroos. Invasion by weeds has occurred in many instances. Most remnant patches of all threatened ecological communities are on private land, with small amounts also on public land and roadsides.

Threats and impacts

The main threats impacting on threatened ecological communities include:

- Clearing. Incremental clearing remains a problem despite legislative restrictions.
- Fragmentation. Scattered remnants in the agricultural landscape are isolated from other remnant patches and there is often limited connectivity.
- Weeds or introduced plants outcompeting native species, particularly in the ground layer.
- Inappropriate grazing pressure by introduced stock, rabbits, hares and kangaroos. Palatable species can be significantly reduced or completely removed, and regeneration is impeded.
- Overharvesting of firewood
- Lack of fire and fire of too high intensity. Complete absence of fire can affect species composition. Intense fires can lead to tree death and a change in species composition.
- Climate change and drought. Ongoing dry conditions can cause old trees and other vegetation to decline in health and impact on regeneration by seed.
- Inappropriate revegetation, particularly planting of trees and shrubs in grassland communities impacts on species composition and ecological functions.
- Cropping and altered hydrology impact on the seasonal herbaceous wetland community. Cropping in dry lake beds and changing hydrology through drainage changes significantly impacts on wetland vegetation and condition.

Table 24 identifies threats specific to each threatened ecological community.

Table 24: The main threats impacting on threatened ecological communities in the Wimmera

Common Name	Clearing	Fragmentation	Weed invasion	Inappropriate grazing regimes	Overharvesting of firewood	Lack of fire	Fire of too high intensity	Climate change and drought	Inappropriate revegetation	Cropping	Altered hydrology (drainage)
Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions	✓	✓	✓	✓		✓	✓	✓			
Grassy Eucalypt Woodland of the Victorian Volcanic Plain	✓	✓	✓	✓	✓	✓	✓	✓			
Grey Box (<i>Eucalyptus microcarpa</i>) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	✓	✓	✓	✓	✓						
Natural Grasslands of the Murray Valley Plains	✓	✓	✓	✓				✓	✓		
Plains Mallee Box Woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions	✓	✓	✓	✓	✓	✓	✓	✓			
Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains	✓	✓	✓	✓				✓		✓	✓
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	✓	✓	✓	✓	✓	✓	✓	✓			

Projects and management actions

This project seeks to implement actions that improve the Wimmera's threatened ecological communities. Proposed actions include:

- Surveys and assessments to improve information about remnant patches of threatened ecological communities, including their location, condition and threats. This will enable other management actions to be more targeted.
- Encouraging and supporting private landholders to create permanent conservation covenants or enter management agreements to improve protection and management of remnant patches. Management under agreements would include revegetation, controlling weeds and rabbits, and improving grazing management, and
- Reducing threats on public land including weed invasion and the impact of herbivores. This includes controlling sallow wattle (*Acacia longifolia*) that has invaded the 'White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland' community.

Figure 13 shows the approximate location of the Wimmera's threatened ecological communities and the focus areas for this project. Management actions are listed and described in Table 25.

There have been multiple past actions implemented by Wimmera CMA and partners over the last two decades to reverse the decline in the condition and extent of threatened

ecological communities, particularly 'Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions' and 'Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains' following their listing in 2012. Actions have included the development of the National Recovery Plan for Buloke Woodlands and landholder agreements for permanent protection and improved management on private land, enhancing condition and reducing threats. Wimmera CMA and partners can use this experience to refine and target projects for effectiveness, including cost-effectiveness.

The Wimmera Carbon Ready Plan refines the prioritisation of actions for native vegetation in the Wimmera. Through its development Wimmera CMA has developed a series of mapping tools that assist in prioritising actions for protecting and managing native vegetation. A key component of this is the recognition of threatened ecological communities.⁽²¹⁾

The management actions set out for threatened ecological communities directly align and contribute to several actions outlined in National Recovery Plans (where they exist for Buloke Woodlands and Box-Gum Grassy Woodlands) and outcomes in the Wimmera Regional Catchment Strategy. They are based on the most cost-effective and logistically feasible methods and in consideration of the best available research and information. This was discussed by project partners during the planning phase of developing and proposing projects for the NLP2 Regional Land Partnerships Program.

Decisions are based on:

- Gaps in understanding of the location and condition of threatened ecological communities
- Field observations
- Logistical limitations for example participation by private landholders in protecting and improving threatened ecological communities and applying covenants
- Stakeholder discussions on priorities, project design and implementation
- Likelihood of funding availability.

For Box-Gum Grassy Woodlands, remote sensing mapping and ground truthing was used to map the extent and density of sallow wattle (*Acacia longifolia*) in 2011 and 2016. The results from this large-scale mapping will be used to prioritise and target effort to remove sallow wattle and monitor the effectiveness of the control works.

There is no specific funding available in 2021-22 for delivering priority actions to protect and improve the condition of threatened ecological communities in the Wimmera.

Figure 13: Approximate location of the Wimmera’s threatened ecological communities

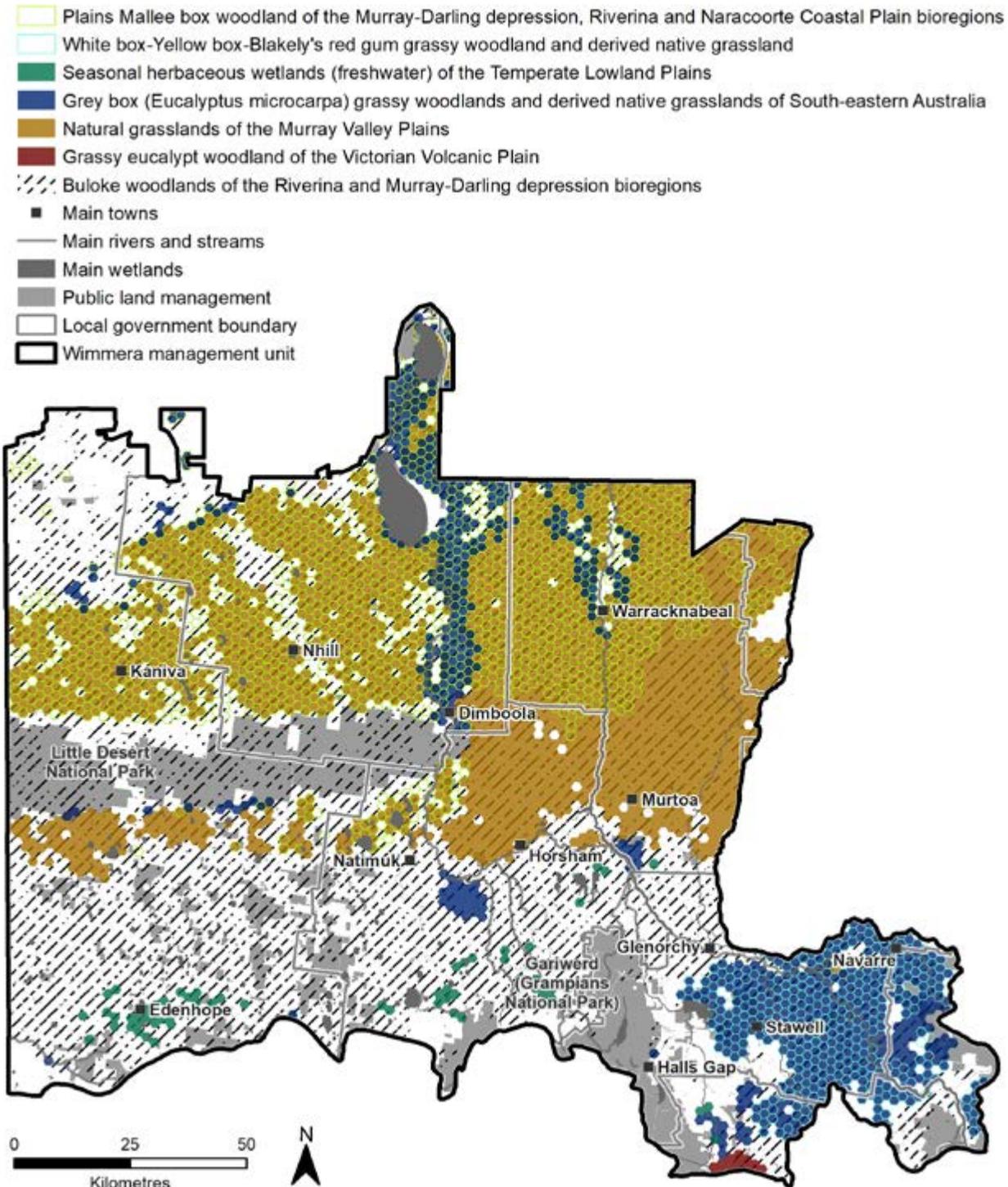


Table 25: Management actions for the Wimmera's threatened ecological communities

Action	How actions contribute to the 5 year Outcome	Threats addressed	Monitoring the effectiveness of management actions	Delivery partners	Funding
Identify and map locations where threatened ecological community remnants exist, ground truthing the location of equivalent EVCs, assessing condition and threats and identifying threatened species	This information will guide future management actions to improve the condition of threatened ecological communities.	Lack of information	Indicator: The location, condition and threats impacting on remnants is identified Method: Record the number and area of remnants assessed Baseline: None Frequency: Every 5 years	Wimmera CMA Parks Victoria Landholders	Not funded
Improve the management of roadside vegetation, including: fire regimes, weed and pest control and revegetation	Improved management of threatened ecological communities on roadsides would enhance their condition and ecological functioning.	Weed competition Herbivory by rabbits and hares Inappropriate fire regimes Accidental clearing	Indicator: Area of vegetation with improved condition Method: Assess condition of remnants on roadsides Baseline: To be determined at start of project Frequency: Every 5 years	Local Councils DELWP VicRoads BGLC Landcare Private landholders	Not funded
Develop management plans for threatened ecological communities on public land	The development of management plans for threatened ecological communities on public land will assist with determining, prioritising and coordinating actions for these areas.	Lack of information	Indicator: Management plans are developed Method: Monitor the number of management plans developed Baseline: None Frequency: Annually	Wimmera CMA Parks Victoria	Not funded
Achieve conservation management of significant stands of threatened ecological communities on private land	Encourage and assist private landholders to protect and improve the condition of threatened ecological communities on private land by establishing legally binding 10 year management agreements. Activities typically included in management agreements are controlling weeds, rabbits, hares and foxes; fencing to exclude stock; revegetating with native species and managing grazing.	Loss of vegetation through land use change, land clearing and firewood collection Grazing impacts Weed invasion	Indicator: Number of remnants and hectares under active management Method: Measure the increase in number of remnants and hectares under management agreement Baseline: Number of hectares under management agreement in 2021 (based on EVCs) Frequency: Annually Indicator: Amount of revegetation established to enhance threatened ecological communities Method: Measure the number of remnants and hectares revegetated with missing species Baseline: None Frequency: Annually Indicator: Amount of habitat treated for pest animals and invasive weeds Method: Measure the number of remnants and hectares treated for pest herbivores and invasive weeds Baseline: Number of hectares under management agreement in 2021 (based on EVCs) Frequency: Annually	Wimmera CMA Parks Victoria	Not funded
Cover significant remnants of threatened ecological communities with conservation covenants	Encourage and assist private landholders to permanently protect and improve the condition of threatened ecological communities on private land by establishing on-title covenants.	Loss of vegetation through land use change, land clearing and firewood collection Grazing impacts Weed invasion	Indicator: Amount of habitat permanently protected through on title covenants Method: Measure the increase in number of remnants and hectares under on-title covenant Baseline: Number of hectares under management agreement in 2021 Frequency: Annually	Trust for Nature	Not funded

Action	How actions contribute to the 5 year Outcome	Threats addressed	Monitoring the effectiveness of management actions	Delivery partners	Funding
Improve condition of and address threats impacting remnants of threatened ecological communities	This will improve threatened ecological communities via a competitive regional grants program that provides funding to local community groups to assist them to improve the condition of and address threats impacting threatened ecological communities. This will also increase community participation in their management.	Loss of vegetation through land use change, land clearing and firewood collection Grazing impacts Weed invasion	<p>Indicator: Amount of revegetation established to enhance threatened ecological communities Method: Measure the number of remnants and hectares revegetated with missing species Baseline: None Frequency: Annually</p> <p>Indicator: Amount of habitat treated for pest animals and invasive weeds Method: Measure the number of remnants and hectares treated for pest herbivores and invasive weeds Baseline: Frequency: Annually</p> <p>Indicator: Amount of habitat treated for pest animals and invasive weeds Method: Measure the number of remnants and hectares treated for pest animals like rabbits and hares and other herbivores and invasive weeds Baseline: Frequency: Annually</p> <p>Indicator: Amount of habitat treated for pest animals and invasive weeds Method: Measure the number of remnants and hectares treated for pest herbivores and invasive weeds Baseline: Frequency: Annually</p>	Landcare Networks Landcare Groups Other groups	Not funded
Carry out planned burns to maintain the health of threatened ecological communities, including Buloke Woodlands	This involves working with Forest Fire Management Victoria. It may involve exploring the potential for cultural burns with Barengi Gadjin Land Council.	Lack of fire	<p>Indicator: Amount of threatened ecological communities with a planned or cultural burn to maintain its health Method: Measure the number of remnants and hectares burnt to maintain its health Baseline: Frequency: Annually</p>	Forest Fire Management Victoria Barengi Gadjin Land Council	Not funded
Control sawlow wattle (<i>acacia longifolia</i>) infestations in Box-Gum Grassy Woodlands	This will lead to an improvement in the condition of Box-Gum Grassy Woodlands by removing an invasive competing weed in and adjacent to the Gariwerd (Grampians National Park).	Weed invasion	<p>Indicator: Amount of habitat treated for sawlow wattle Method: Measure the number of remnants and hectares treated for sawlow wattle Baseline: None Frequency: Annually</p> <p>Indicator: Condition of Box-Gum Grassy Woodland remnants Method: Floristic surveys Baseline: None Frequency: Annually</p>	Parks Victoria Landcare	Not funded
Build community support for conservation of threatened ecological communities	Increase community awareness, appreciation and understanding of the values associated with threatened ecological communities and ways people can get involved to reduce threats.	Lack of understanding and awareness	<p>Indicator: Number of individuals engaged Method: Number of volunteers participating in actions that support conservation of threatened ecological communities and recovery activities Baseline: Number of volunteers actively participating in recovery activities Frequency: Annually</p>	Wimmera CMA Other partners	Not funded

RESCUING THE WIMMERA'S PLATYPUS

Introduction

The platypus is a nationally and internationally iconic Australian monotreme and has a long connection with Traditional Owners and non-indigenous communities in the Wimmera. Wimmera residents and visitors have a long connection with the region's platypus community and have witnessed the gradual decline of this species.

Primary target assets for this project are listed in Table 26.

Table 26: Primary target assets for rescuing the Wimmera's platypus

Target assets	Conservation status (EPBC Act)
Primary target assets	
Platypus (<i>Ornithorhynchus anatinus</i>)	
Secondary target assets	
Glenelg spiny crayfish (<i>Euastacus bispinosus</i>)	Endangered
River blackfish (<i>Gadopsis marmoratus</i>)	
Southern pygmy perch (<i>Nannoperca australis</i>)	
Western swamp cray (<i>Gramastacus insolitus</i>)	
Obscure galaxias (<i>Galaxias oliros</i>)	

Current condition

Recently the conservation status of the platypus in Victoria has been reassessed and is now listed as Vulnerable in Victoria under the *Flora and Fauna Guarantee Act 1988*.

The Wimmera platypus population is small and isolated, with an estimated effective population size (Ne) of 9.84. Consequently, the risk of the platypus becoming regionally extinct in the Wimmera catchment is very high.

Wimmera CMA has monitored the Wimmera platypus population for over 20 years. This monitoring effort means there is a good understanding of the dire situation the Wimmera platypus population faces. Extensive surveys have confirmed the upper reach of the MacKenzie River now supports the only resident population in the Wimmera Catchment (Figure 14). This population is very small and geographically isolated, persisting in approximately, 15 kilometres of the river within Gariwerd (Grampians National Park).^(22; 23; 24; 25)

Platypuses were once widely distributed throughout the Barringgi Gadjin (Wimmera River) and its tributaries until at least the 1970s with populations persisting in the upper Wimmera until the early 2000s.^(26; 27) Platypuses persisted in the upper Wimmera region until the early 2000s. Previous strongholds in Barringgi Gadjin (Wimmera River) were decimated by the Millennium Drought and over-extraction of water from waterways to the point where populations became increasingly fragmented, and most have disappeared entirely.

Threats and impacts

The decline of the platypus in the Wimmera has been attributed to widespread clearing of native vegetation in the surrounding catchment, water extraction, reduced run-off, degraded habitat quality and reduced available surface water. More recently, the Millennium Drought from 2001 to 2009 saw the entire Barringgi Gadjin (Wimmera River) and its tributaries dry up. A small population of platypuses survived in the upper reaches of the MacKenzie River that received regular water flow to support stock and domestic use.

Projects and management actions

This project proposes to develop a conservation strategy for the Wimmera's platypus. This strategy will inform future management actions to improve the trajectory of the species. Wimmera CMA has worked with Cesar Australia to identify priority management actions, including translocating platypus to establish a second population in the Wimmera catchment. This work will inform the conservation strategy.

Figure 14 shows the location of platypus in the Wimmera and the focus area for this project. Management actions are listed and described in Table 27 together with key collaborations and monitoring methods.



Monitoring the MacKenzie River's platypus population

Figure 14: Project area for platypus conservation in the Wimmera

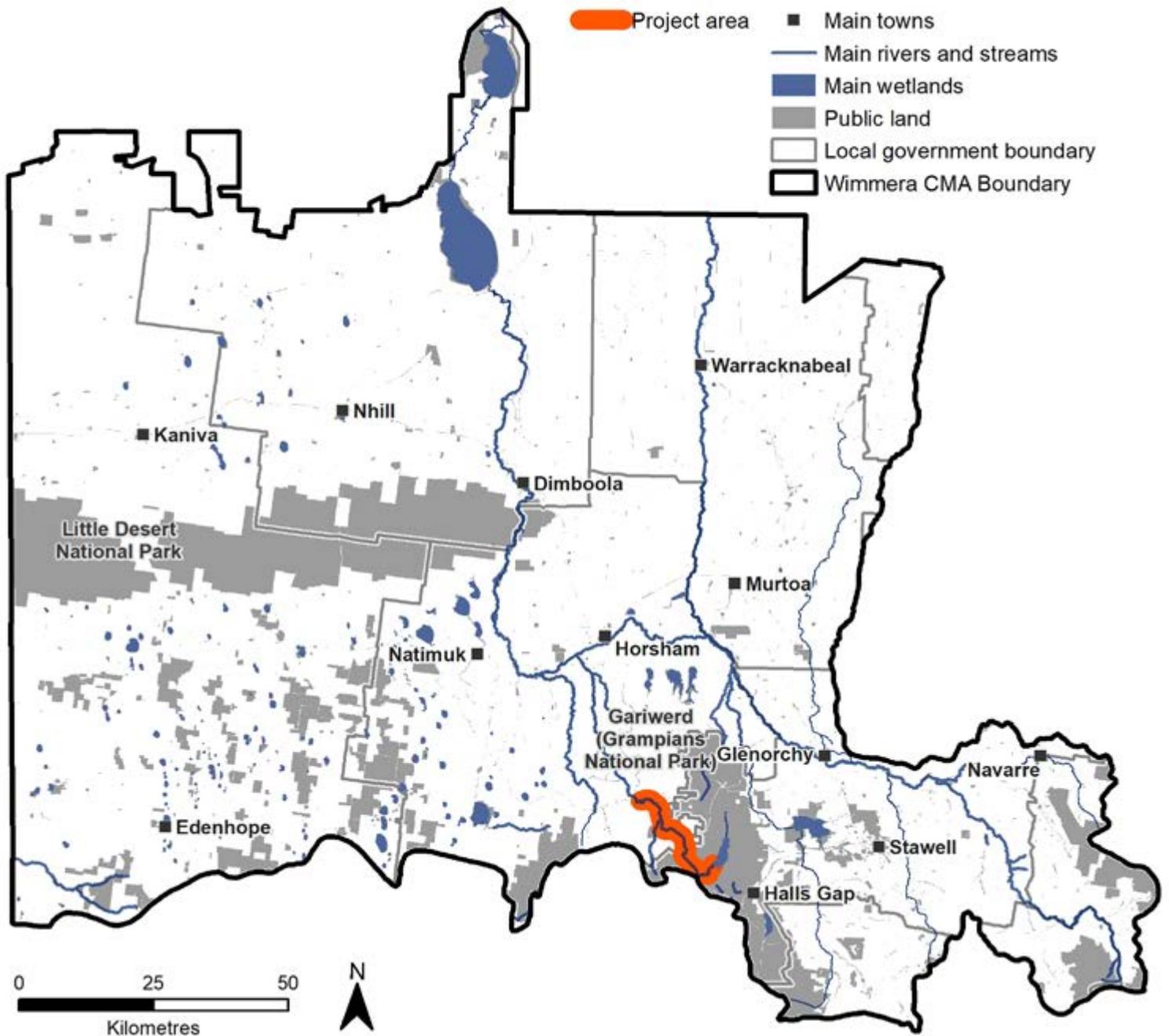


Table 27: Management actions for rescuing the Wimmera’s platypus

Action	How actions contribute to the 5 year Outcome	Threats addressed	Monitoring the effectiveness of management actions	Delivery partners	Funding
Develop and deliver a platypus conservation strategy for the Wimmera	<p>A platypus conservation strategy would set out:</p> <ul style="list-style-type: none"> Habitat improvement and management actions, Flow regime strategy, Establishing a second platypus population in the Wimmera catchment, Conducting genetic rescue of the MacKenzie River population. <p>These actions will dramatically improve the trajectory of the species in the region and secure it against local extinction.</p>	One small geographically isolated population of genetically depauperate animals	<p>Indicator: Conservation strategy is developed</p> <p>Method: Monitor plan development</p> <p>Baseline: None</p> <p>Frequency: Annually</p>	<p>Cesar Australia</p> <p>Laharum Landcare Group</p> <p>Parks Victoria</p> <p>DELWP</p>	Not funded

Sustainable agriculture

Wimmera soils are among the region's pivotal natural assets. Healthy soils underpin the production of food and fibre as well as the region's natural landscapes. Healthy soils play host to extraordinary biodiversity.

Almost 80% of land within the Wimmera supports a large agricultural sector which is vitally important to regional Victoria, the Victorian economy and national food security.⁽²¹⁾ The remaining approximately 20% of land comprises the Gariwerd (Grampians) and Little Desert National Parks, crown land and urban areas.

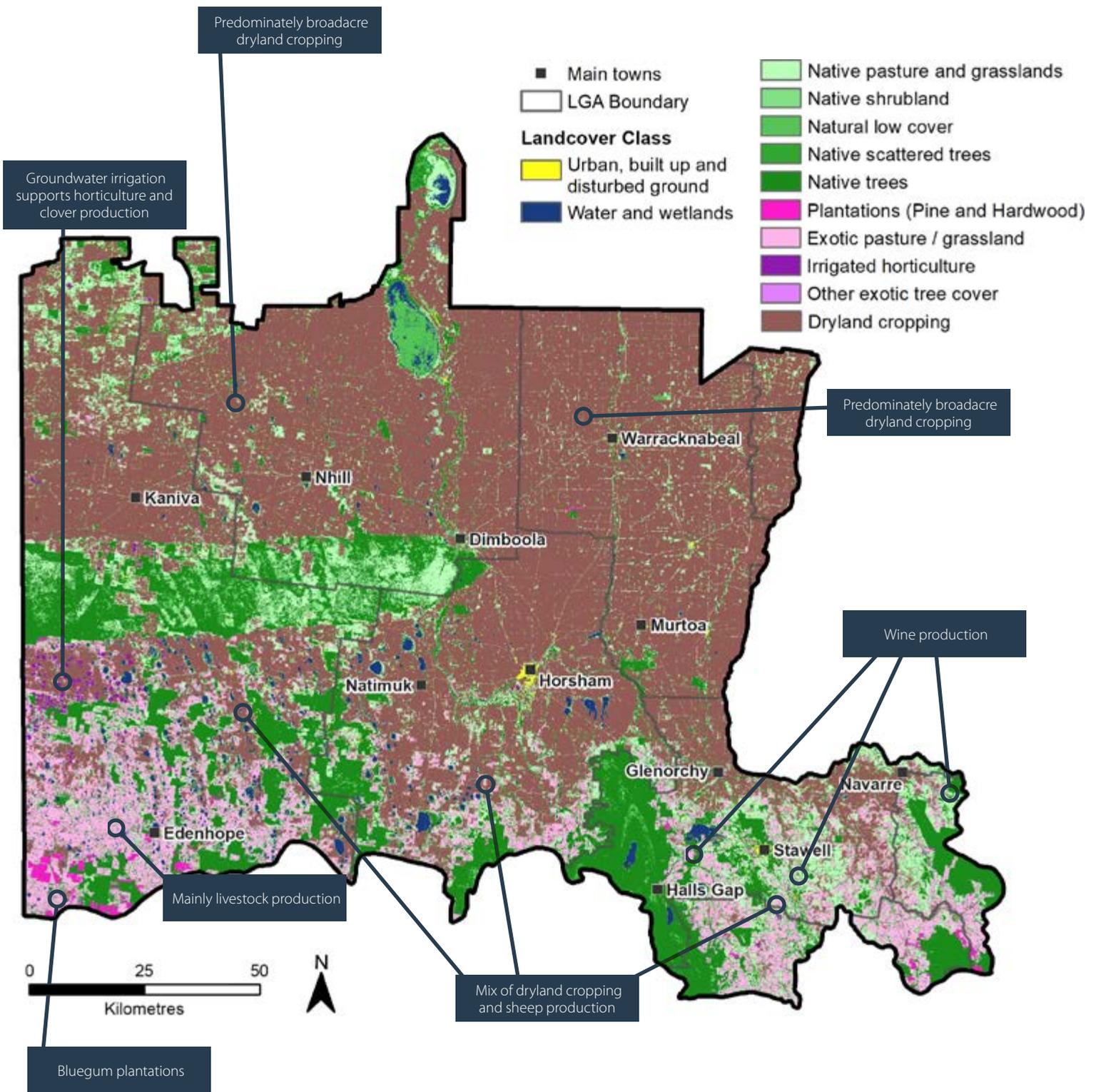
Grain production is the Wimmera and southern Mallee's biggest industry, providing 26% of Victoria's grains comprising cereals, legumes and oilseeds. This is followed by 16% of Victorian sheep meat production and 17% of Victoria's wool production.⁽²⁸⁾ Viticulture, olives and native flowers are also significant primary industries in the region.

Of the almost 80% of the Wimmera land used for agricultural production, dryland cropping comprises approximately 53%, pasture 23% and irrigated horticulture 0.5%. Figure 15 shows the northern Wimmera is mainly a broadacre dryland cropping area while sheep meat and wool production predominates in the south, particularly the south-western and south-eastern corners of the region. The small but valuable horticultural industry is in the mid-west of the region enabled by a valuable groundwater resource.⁽²⁹⁾

Mokepilly farmer Lachie Green uses portable electric fencing to rotationally graze livestock. This builds soil health and boosts livestock production.



Figure 15: The location of different land cover classes in the Wimmera from the Victorian Land Cover Time Series 2015-2019 ⁽²⁹⁾



Management of soils on private and public land influences the health of other natural assets, such as native vegetation and waterways, by providing a healthy foundation for plants and animals and acting as a buffer to prevent sediments entering waterways. Native vegetation and soil biodiversity on farms plays an important role in agricultural production, as well as contributing to biodiversity conservation across the region.

Maintaining and improving soil health and addressing productivity constraints is critical to enhancing the sustainability and resilience of Wimmera agricultural systems. Wind and water erosion, subsoil sodicity, and acid soils are sources of land degradation. Wimmera landscapes and soils have formed through landscape building episodes for over 500 million years in a variety of environments from the fluvial non-marine environments through to deep marine settings and explosive volcanic events. This has resulted in strongly weathered and fragile soils. Compounding this is the rising global demand for food and fibre, as well as government and industry ambitions to grow the value of agricultural trade whilst managing risks to the agricultural sector. These risks include the changing climate, and growing market preferences for products with demonstrable provenance and sustainability credentials.

Australian Government Outcomes and Investment Priorities

The Australian Government's Outcomes 5 and 6 are relevant to the Wimmera region:

Long-term Outcome 5: *The conditions of soil, biodiversity and vegetation are improved.*

5-year Outcome: *By 2023, there is an increase in the awareness and adoption of land management practices that improve and protect the condition of soil, biodiversity and vegetation.*

The Australian Government's Investment Priorities under this outcome that are relevant to the Wimmera include:

- Hillslope erosion
- Acidification
- Wind erosion
- Soil carbon
- Vegetation and biodiversity on farms

Long-term Outcome 6: *Agriculture systems have adapted to significant changes in climate and market demands.*

5-year Outcome: *By 2023, there is an increase in the capacity of agriculture systems to adapt to significant changes in climate and market demands for information on provenance and sustainable production.*

The Australian Government's Investment Priorities under this Outcome that are relevant to the Wimmera include:

- Agricultural systems adaptation to significant change

Wimmera regional outcomes

The *Wimmera Regional Catchment Strategy 2021-27* establishes 20 year and 6-year regional outcomes for Wimmera land and soils. The outcomes that support and contribute to achieving Outcomes 5 and 6 of the Australian Government's Regional Land Partnerships Program are listed in Table 28.

Table 28: Wimmera RCS outcomes that support the Australian Government's long-term and 5-year Outcomes for sustainable agriculture

20-year Outcomes	Section of RCS	Page
Healthy Wimmera soils support productive agriculture and a functioning natural environment.	Land Theme	33
Soils support productive agriculture and healthy, functioning natural environments.	All Local Areas	56, 62, 71, 77 & 83
Less soil is lost through erosion.	Upper Catchment Local Area	71
6-year Outcomes	Section of RCS	Page
Maintain ground cover at 70% or greater, annually.	Land Theme	33
Farmers adapt practices to a changing climate.	Land Theme	33
Increase land manager's knowledge of management practices that contribute to healthy productive soils.	Land Theme	33
More farm trials explore improved practices that contribute to soil health, productivity and less off-farm impacts.	Hindmarsh Local Area Upper Catchment Local Area	56 71
Stubble is retained in at least 80% of cropping paddocks over summer.	Horsham Local Area	62

6-year Outcomes	Section of RCS	Page
Land managers adapt practices and technologies to a changing climate.	Horsham Local Area	62
Increase land manager knowledge of management practices that contribute to health productive soils.	Horsham Local Area	62
Most paddocks have at least 70% ground cover maintained throughout the year.	Upper Catchment and Yarriambiack Local Areas	71 83
Ground cover is maintained on at least 80% of the area assessed.	West Wimmera Local Area	77
Farmers that are converting land from grazing to cropping are implementing management practices that maintain healthy productive soils in a changing climate.	West Wimmera Local Area	77
Alternatives to stubble burning and cultivation following wet seasons are explored.	Yarriambiack Local Area	83

Wimmera soils can be grouped into four areas with common soil types and distinct landscape characteristics (Figure 16):

1. Upper catchment (Upper)

- Steep hillsides and valleys are covered (60% of the area) by alluvial and volcanic clays and texture contrast soils where sandy and loamy surface soils overlay heavy clay subsoils.
- Supports a mixture of livestock and cropping.
- Main threats are water erosion, acid soils and sub-soil sodicity.

2. North eastern plains (NE)

- Characterised by hummocky dunes, flat plains, rises and lake lunettes. About 75% of the area is comprised of cracking and self-mulching clays that shrink and swell with changing moisture content.
- Supports the largest area of cropping in the Wimmera.
- Main threats are wind erosion and sub-soil sodicity.

3. North western plains (NW)

- Regular, parallel dunes or ridges alternate with swales or depressions. Scattered lakes and lunettes are also present. Ninety per cent of the area is covered by sodic clays in the swales and siliceous dunefield sands.
- Predominately supports cropping.
- Main threats are wind erosion and sub-soil sodicity.

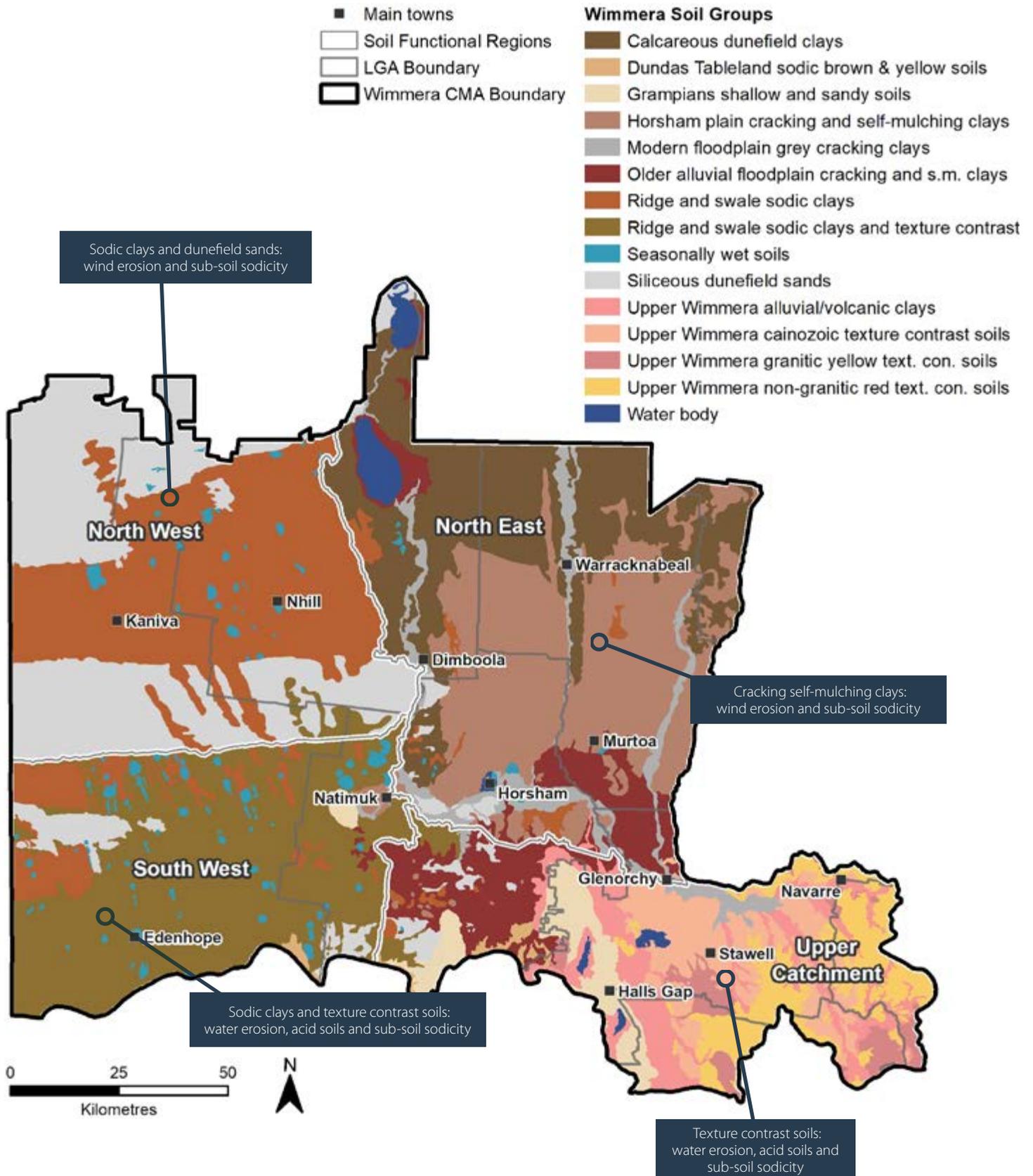
4. South west Wimmera (SW)

- Predominantly ridge and swale systems. Sodic clays and texture contrast soils cover 87% of the area.
- Supports a mixture of livestock and cropping.
- Main threats are water erosion, acid soils and sub-soil sodicity.



Farmers helping farmers transition to no-till cropping systems

Figure 16: Wimmera soil types and localised threats



Current Condition

The Wimmera Regional Catchment Strategy 2021-27 discusses the condition of Wimmera land and agricultural soils. A summary is provided here relevant to the Australian Government’s 5-year Outcomes and Investment Priorities.

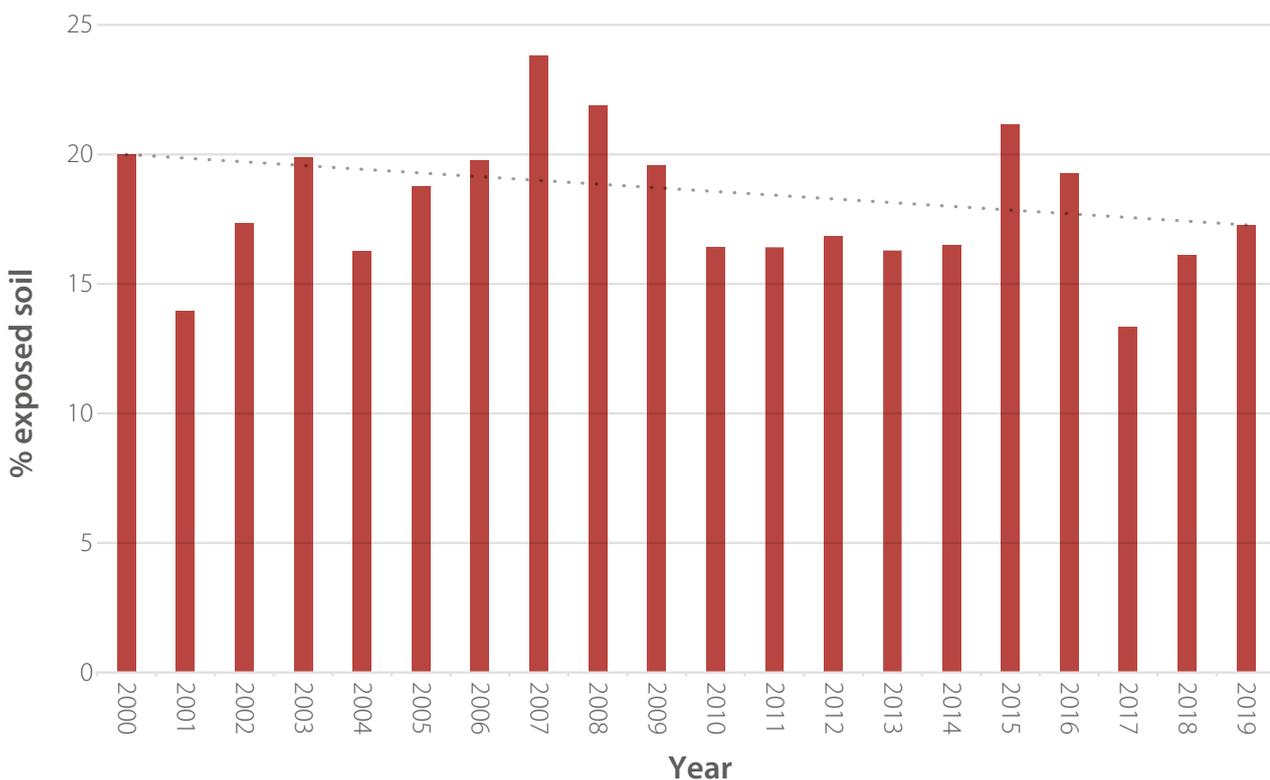
Many Wimmera growers and graziers have been adapting farm management practices in response to climate change and market demands. In the 30 years from 1989 to 2018, the Wimmera has experienced a 9% decrease in average annual rainfall, more frosts occurring later in the growing season and more hot days above 38°C. (30) In response, land managers are adapting practices and using technologies such as soil moisture probes, precision agriculture, minimum tillage and stubble retention to better inform land management practices that boost productivity and conserve soil and soil moisture.

Most of the output growth in the Wimmera over the past several decades was due to farm productivity growth, rather than an expansion in the amount of land and water used for agriculture. The Wimmera region has retained and even enhanced its reputation as a reliable supplier of high-quality agricultural produce. Social research indicates that land managers are concerned about the impact of drought and changing rainfall patterns on property viability. (31) Climate modelling predicts that the Wimmera will continue to experience significant change, including a reduction in growing season rainfall and an increase in the number of hot days, which will likely make agricultural productivity and profitability more challenging. (30) Management of soils must involve innovative strategies to support farmers to build capacity to adapt agricultural systems.

Feedback and guidance from local industry groups, combined with social research conducted in collaboration with Charles Sturt University indicates there has been an increase in the awareness and adoption of land management practices that improve and protect the condition of soil, biodiversity and vegetation. (31) In the northern Wimmera there is general understanding and continued practice of maintaining ground cover to reduce wind erosion amongst land managers. Similarly, in the southern Wimmera there is general understanding and continued practice of maintaining ground cover to reduce water erosion. This enables the retention and enhancement of healthy, productive soils and increases the amount of water available to plants to produce crops and pastures.

Established minimum tillage and stubble retention practices, maintenance of perennial pastures and ground cover, combined with climatic changes has likely led to a reduction in soil disturbance and erosion (Figure 17). Annual Wimmera Land Management and Land Use Transect Survey reports have tracked changes in land management trends since 1996. Over this time a 30% increase in the number of paddocks retaining stubble has been recorded in the northern Wimmera. (32) There has also been a dramatic decline in large erosion events such as the 1983 dust storm that engulfed Melbourne. Such events cause highly valuable topsoil from the Wimmera and Mallee to be lost, which takes decades, if not centuries to renew. (33)

Figure 17: Percentage of exposed soil in the Wimmera annually (34)



Land management practices across the catchment are consistently providing ground cover above the required thresholds across most of the catchment.⁽³⁵⁾ However, satellite mapping has demonstrated that ground cover percentage levels decline in dry years, particularly from November to April when crops have been harvested and over-grazing is more likely to occur. It is likely that predicted climate variability will impact ground cover levels, particularly during droughts and low rainfall occurrences. Practices focused on ground cover management to improve and protect the condition of soil will be particularly important during these times.

Soil organic carbon is the main component of soil organic matter. As an indicator for soil health, soil organic carbon is important for its contribution to food production, as mitigation and adaptation to climate change and the achievement of Australia's sustainable development goals. Increased soil organic matter content provides more nutrients to plants and improves water availability, both of which enhance soil fertility and ultimately improve food productivity. Moreover, soil carbon improves soil structural stability by promoting aggregate formation which, together with porosity, ensures sufficient aeration and water infiltration to support plant growth. Soil organic carbon is dynamic, and human impacts on soil can turn it into either a net sink or a net source of atmospheric greenhouse gases.

In the Wimmera, the impact of climate change and soil erosion on soil organic carbon stocks is quite variable according to the local area and soil type. While significant progress has been achieved by agencies such as Agriculture Victoria in understanding and explaining soil organic carbon dynamics, protection and monitoring of soil organic carbon stocks at a regional level still face complicated challenges. On-farm trials have demonstrated a correlation between the adoption of land management practices such as reduced tillage, stubble retention, green manuring, pasture phases, and application of organic amendments with small increases in soil organic carbon stocks at a paddock scale. Research investigating broader scales highlight scenarios where management practices that reduce disturbance have decreased soil carbon loss but have not resulted in absolute increases in soil organic carbon on average across Australia.⁽³⁶⁾

The Biodiversity section of the Wimmera Regional Catchment Strategy 2021-27 describes the condition of biodiversity and vegetation on farms.

Threats and impacts

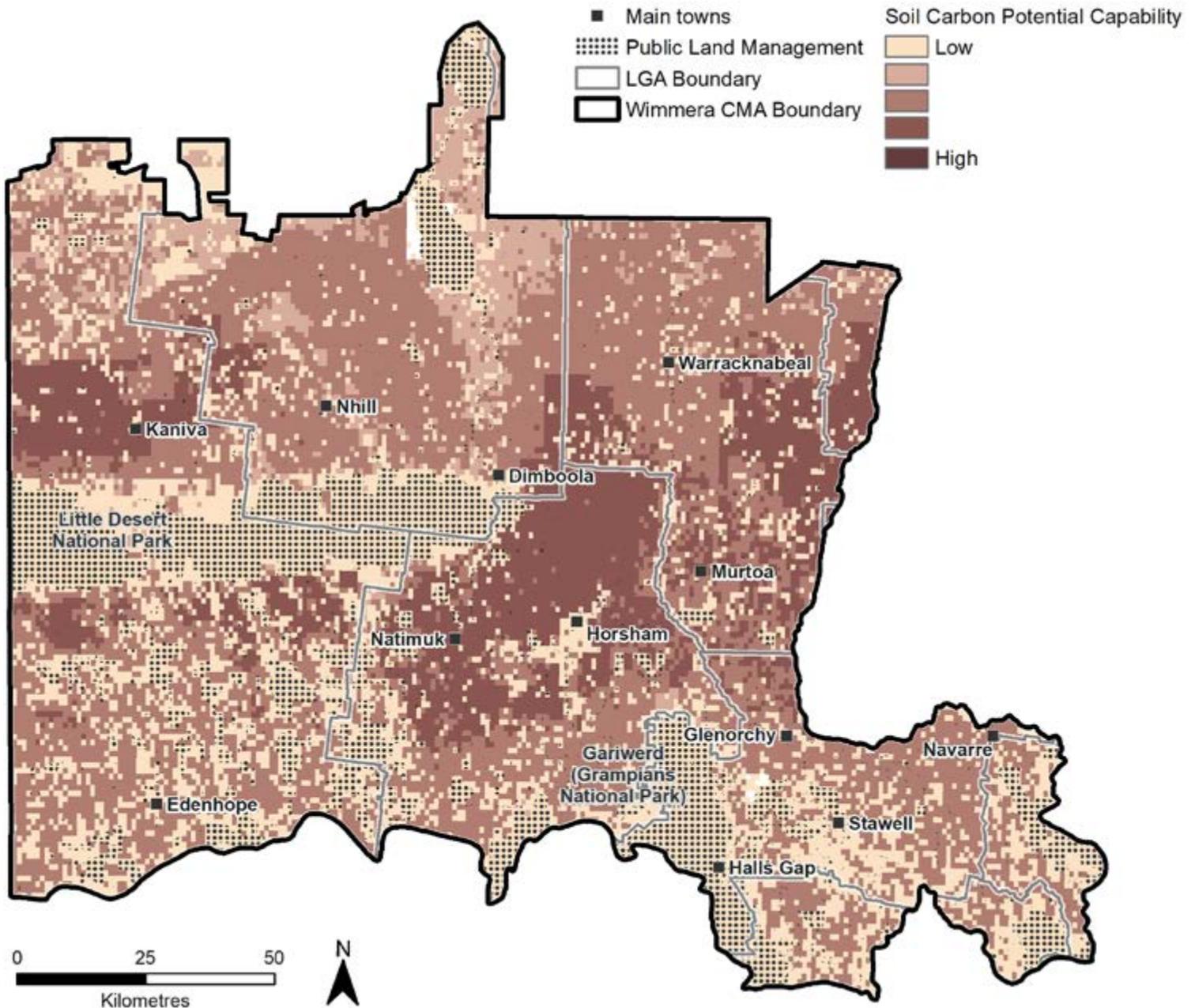
SOIL CARBON

While there is more work to do to understand regional soil organic carbon stocks in finer detail, in broad terms there are significant areas of the Wimmera where land use impacts associated with historical agricultural practices have limited the capture and retention of soil organic carbon. The increase in awareness and adoption of land management practices, highlighted above, which acknowledge the link between soil organic carbon and soil health, is likely to have increased rates of capture and retention of soil organic carbon at a regional level. Figure 18 shows an index of potential capability under current or altered management practices for the capture and retention of additional soil organic carbon on managed lands (agricultural lands and managed forests). The map was derived from Figure 3.13 in McKenzie et al. (2017) which is based on a model with three contributing indices, including capacity for soil organic carbon storage, potential to increase carbon inputs, and ability to retain soil organic carbon.⁽³⁷⁾ This data was used by the Australian Government, along with other inputs, to derive the summary of priorities for increasing soil carbon by management unit.

Soil pit demonstrations help land managers understand and manage soil health



Figure 18: Index of potential capability for the capture and retention of additional soil organic carbon on managed lands ⁽³⁷⁾



Areas classed as high potential are intended to reflect carbon stocks that are declining under current land management. Areas classed as medium potential are intended to reflect carbon stocks which are generally steady with significant potential for increases under current or altered land management. Almost 1,501,000 hectares of soils and land is classed high or medium potential in the Wimmera Management Unit. This represents approximately 8.7% of Australia’s total high or medium potential class land as identified in the Australian Government’s Potential Capability spatial data.

EROSION

All Wimmera soils are vulnerable to erosion, but some are more vulnerable than others. There is significant variability in soil structure, texture, and composition in the Wimmera at both the landscape and paddock scale. Understanding the type of soil and how prone it is to erosion can help avoid problems in agriculture as well as on waterways and infrastructure.

The risk of soil erosion by wind and water increases when soils are exposed or left bare of vegetative cover. The level of both living and dead vegetative cover is influenced by climate variability and land management practices. Soil

exposure can occur in the Wimmera when management practices such as cultivated fallow, stubble burning, and over-grazing reduce or remove ground cover.

Figure 19 shows the location and extent of the estimated threat and impacts from wind erosion to soil within the Wimmera. Areas classed as high risk on the map highlight land and soils where widespread wind erosion is threatening the long-term viability of local agricultural businesses and reducing the ecosystem services of clean air. Areas classed as medium risk highlight land and soils where locally significant wind erosion is threatening the long-term viability

of local agricultural businesses and reducing the ecosystem services of clean air. The map was derived from Leys et al. (2017) which is based on the risk of the loss of the total soil nutrient store, and the room for improvement in adoption of land management practices that can maintain ground cover within the Wimmera Management Unit. ⁽³⁸⁾ Almost 631,000 hectares of the Wimmera's land and soils with high or medium potential for capture and retention of additional soil carbon are also identified as at least medium risk for wind erosion.

Figure 19: Estimated wind erosion risk for agricultural lands in the Wimmera ⁽³⁸⁾

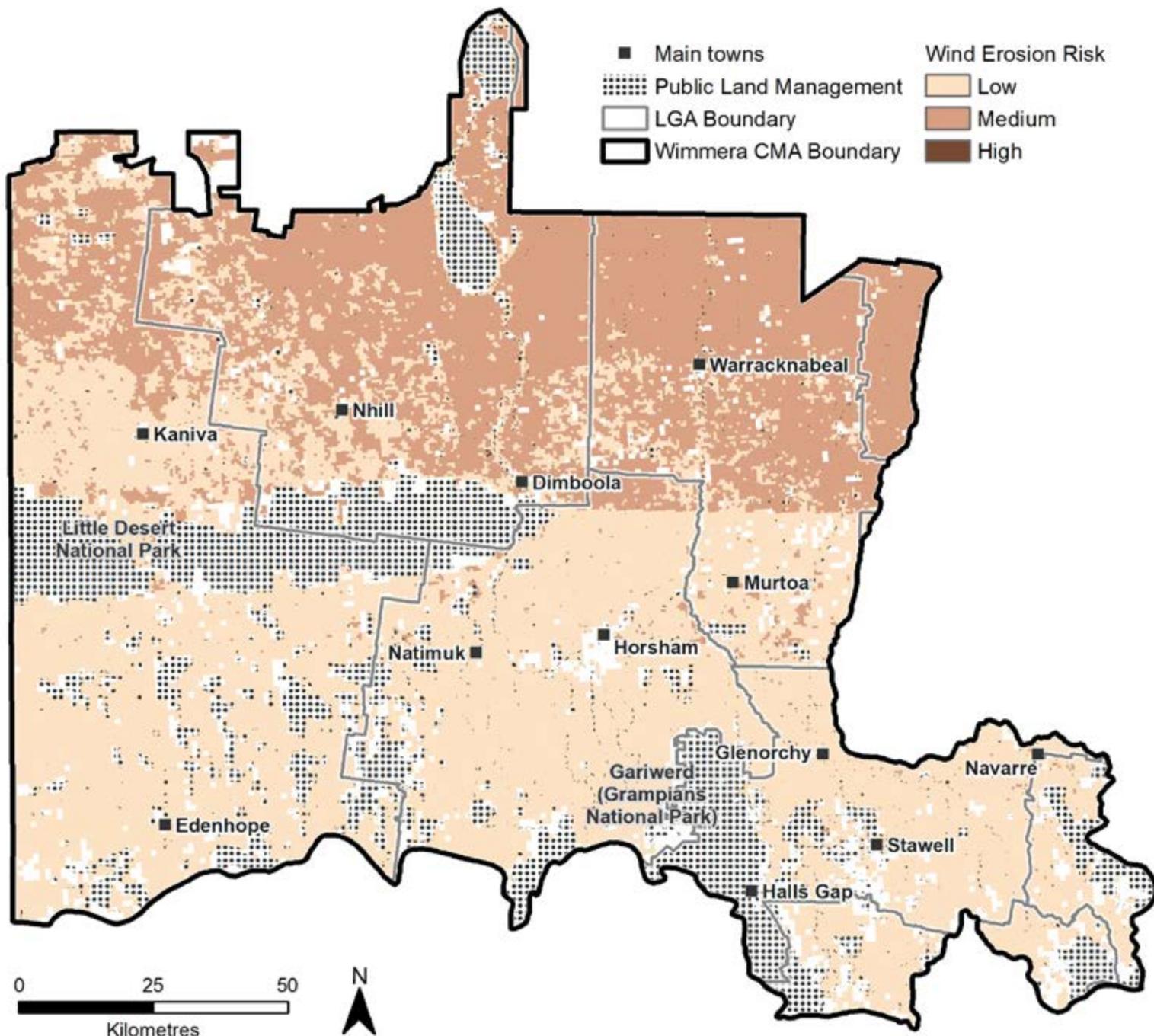
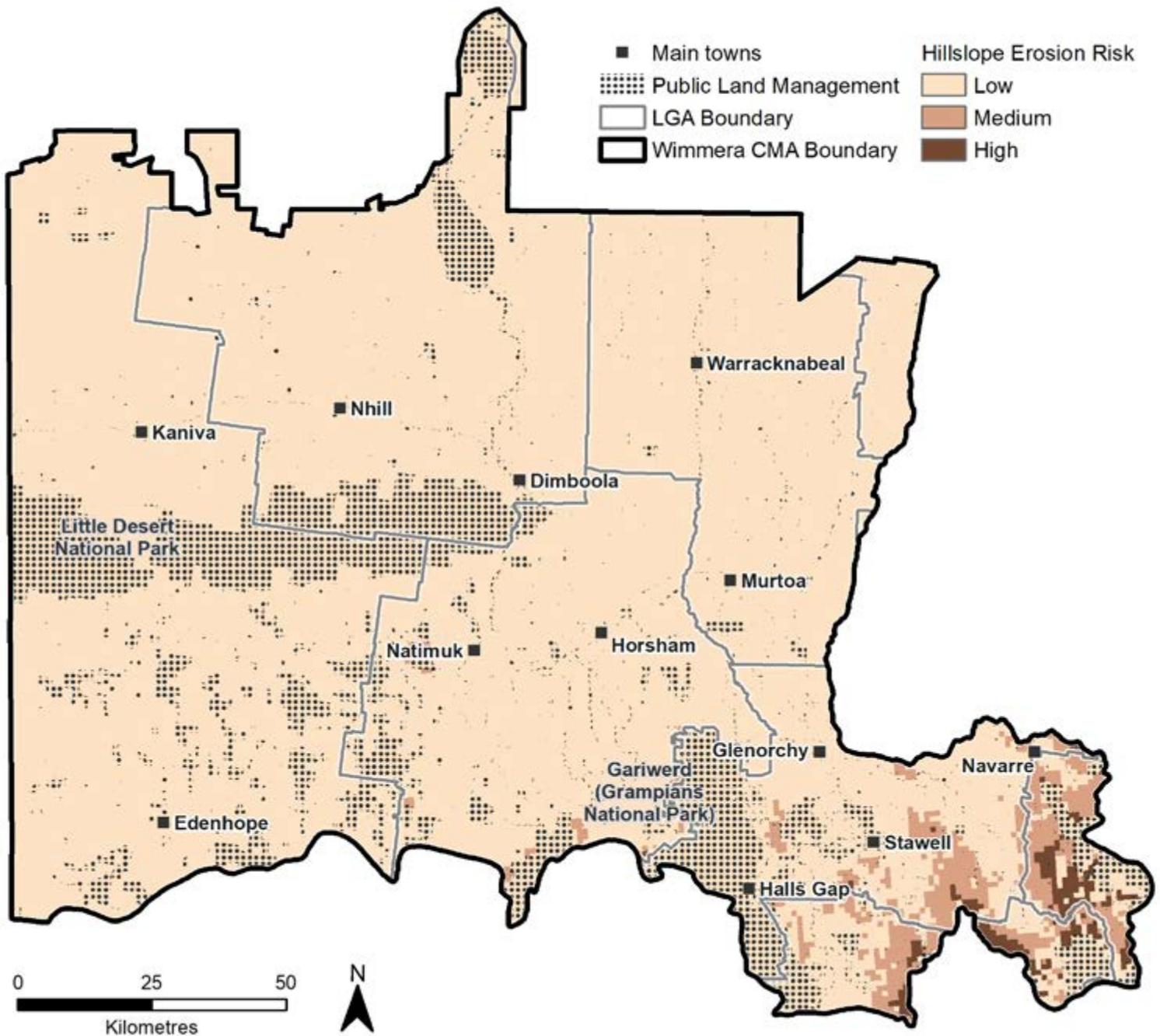


Figure 20 shows the location and extent of the estimated threat and impacts from hillslope erosion to soil within the Wimmera. The mapping uses an index of average relative nutrient loss rate as a result of hillslope soil erosion to provide a simple measure of hillslope erosion. It reflects average loss rates of total nitrogen, total phosphorus and soil organic carbon. The texture contrast soils of the upper Wimmera region on the hillslopes of Gariwerd and Pyrenees ranges present the vast extent of hillslope erosion risk. Texture contrast soils have characteristically light sandy/loamy surface soils that overlie heavy clay subsoils.⁽³⁹⁾ The

heavy clay subsoils tend to be compacted, which limits the drainage capacity of these soils and makes the lighter topsoils susceptible to erosion. Poorly drained subsurface clays combined with light and easily removable top soils, steep landscapes and the high rainfall of the Upper Catchment makes these soils particularly susceptible to water erosion. The hills and mountains of the Grampians, Pyrenees and Langi Ghiran range in the Western Uplands, along with colluvial granite and sedimentary slopes are extremely prone to tunnel and gully erosion, and sheet and rill erosion especially where cleared.

Figure 20: Estimated hillslope erosion risk for agricultural lands in the Wimmera⁽³⁸⁾



Areas classed as high risk highlight land and soils where hillslope erosion by water threatens the long-term viability of agricultural businesses if untreated. Areas classed as medium risk highlight land and soils where locally significant hillslope erosion by water threatens the long-term viability of some agricultural businesses if untreated. Close to 81,700 hectares of the Wimmera land and soils with high or medium potential for capture and retention of additional soil carbon are also identified as at least medium risk for hillslope erosion according to this data. ⁽³⁸⁾

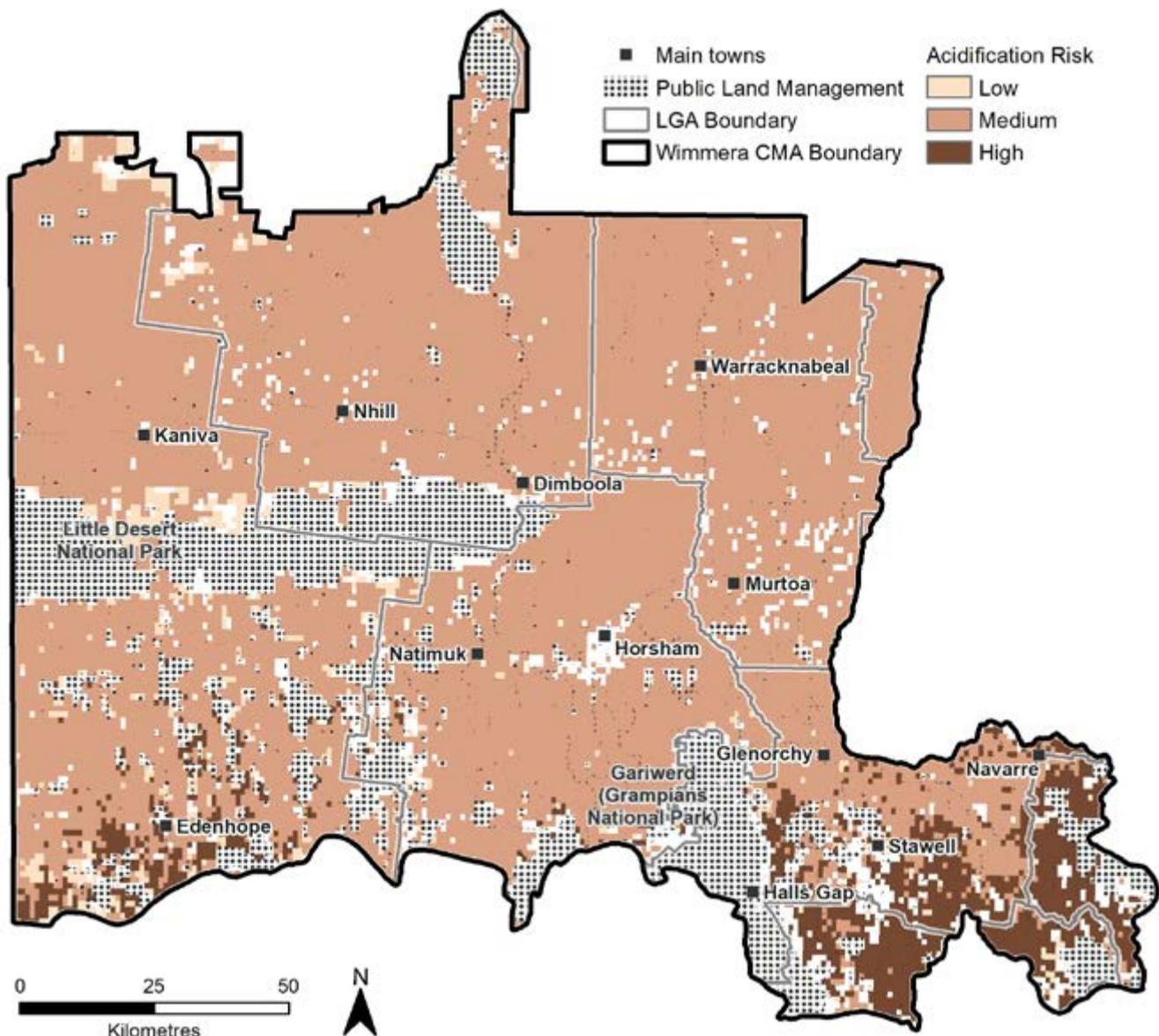
The Group on Earth Observations Global Agricultural Monitoring Initiative (GEOGLAM) Rangeland and Pasture Productivity Map Data indicated in September 2020, that 2.9% (55,366 hectares) were not protected from water erosion, mostly occurring in the north west region of the Wimmera Management Unit, away from the higher-risk water erosion regions found in the hillslopes of the upper catchment. The same data source also indicates that the total area of land susceptible to water erosion increases during summer and autumn, after crops have been harvested,

and preparations begin for sowing the next seasons crops. Reduced ground cover results from over grazing, cultivation and stubble burning. It is also reasonable to assume that the percentage of land protected from water erosion across the Wimmera will decrease during dry years and droughts. The GEOGLAM Rangeland and Pasture Productivity Map data generally indicate ground cover percentages are consistently high enough to control water erosion in higher risk areas. ⁽⁴⁰⁾

ACIDIFICATION

Figure 21 shows the location and extent of the estimated threat and impacts from acidification to agricultural soils within the Wimmera. The upper Wimmera catchment and south west Wimmera include high risk areas. Soil acidification can be accelerated by agriculture practices. Acid soils are associated with reduced plant growth and productivity, increases in the impact of toxic elements such as aluminium, and restricted soil biological activity. These impacts can ultimately lead to soil structure decline and erosion.

Figure 21: Ranking of estimated soil acidification risk for agricultural lands in the Wimmera ⁽³⁷⁾



The map was derived from Figure 2.6 in McKenzie et al. (2017) and is based on estimation of lime requirements and net acid addition rates of current land uses. Areas classed as high risk highlight land and soils where widespread acidification threatens the long-term viability of agricultural businesses if untreated. Areas classed as medium risk highlight land and soils where locally significant acidification threatens the long-term viability of some agricultural businesses if untreated. According to this spatial data, all land and soils with high or medium potential for capture and retention of additional soil carbon in the Wimmera Management Unit according to the Australian Government’s Potential Capability Index are also identified as either high or medium risk for soil acidification. ⁽³⁷⁾

A range of factors influence the land management practices used by farmers each year. Examples include the prevalence of pests such as mice, snails and slugs; high biomass of the previous year’s stubble and stubble lodging which makes inter-row sowing of crops difficult.

Prioritising management actions

Table 29 outlines the major threats to soil in the Wimmera. Extensive consultation was undertaken to complete this table with regional stakeholders, including Agriculture Victoria staff, Landcare facilitators, industry organisations, farmer-led groups and the wider Wimmera community.

Table 29 ranks the main threats to the condition of soils on agricultural land according to their level of risk. The table ranks each threat according to likelihood of the threat occurring, the potential consequence if the threat were to occur and other potential impacts the threat has on natural assets. Priority threats to address are those given an overall high risk rating.

Appendix 7 provides definitions and a key for determining the risk ratings in Table 29.

Table 29: Likelihood, consequence and risk of potential threats to Wimmera soils

Threat	Potential consequence	Sub-region based on soil type group (Figure 16)	Likelihood	Risk Rating
Soil carbon decline due to conventional farming practices used for cropping and grazing pastures	Major to moderate Low levels of soil carbon are associated with poor quality and low productivity. A significant portion (over 1.5 million hectares) of the Wimmera management unit has been classified as high or medium potential for the capture and retention of soil organic carbon.	Upper catchment	Possible	Moderate to High
		North eastern plains	Almost certain	High to Very High
		North western plains	Almost certain	High to Very High
		South west Wimmera	Possible	Moderate to High
Bare soil leading to wind erosion	Moderate <ul style="list-style-type: none"> Loss of soil fertility, biodiversity, and productivity Health hazard from dust Reduced wellbeing and mental health 	Upper catchment	Possible	Moderate
		North eastern plains	Possible	Moderate
		North western plains	Possible	Moderate
		South west Wimmera	Possible	Moderate
Bare soil leading to water erosion (hillslope erosion)	Minor to Moderate <ul style="list-style-type: none"> Sedimentation of waterways and wetlands, algal blooms Decline in water quality Reduced in-stream biodiversity Loss of soil fertility, biodiversity and productivity 	Upper catchment	Possible	Moderate
		North eastern plains	Unlikely	Moderate
		North western plains	Unlikely	Moderate
		South west Wimmera	Possible	Moderate
Sub-soil sodicity	Moderate <ul style="list-style-type: none"> Decline in soil structure, water logging, compaction. Poor root growth and loss of productivity Damage to crops and pastures 	Upper catchment	Possible	Moderate
		North eastern plains	Possible	Moderate
		North western plains	Possible	Moderate
		South west Wimmera	Possible	Moderate
Acidification of soils	Minor to Moderate <ul style="list-style-type: none"> Contribute to poor plant growth and soil erosion. Slow turnover of organic matter Loss of soil fertility Damage to plant roots and reduction in productivity 	Upper catchment	Likely	Moderate to High
		North eastern plains	Unlikely	Moderate
		North western plains	Unlikely	Moderate
		South west Wimmera	Possible	Moderate
Salinity	Minor <ul style="list-style-type: none"> Decline in water quality Reduced biodiversity Loss of productivity on salt affected land 	Upper catchment	Unlikely	Moderate
		North eastern plains	Unlikely	Moderate
		North western plains	Unlikely	Moderate
		South west Wimmera	Unlikely	Moderate

The Australian Government's Investment Priorities have been identified and incorporated in project planning and delivery based on the following high-resolution datasets from the Regional Land Partnerships Application:

- Hillslope erosion dataset: index of average relative nutrient loss rate from hillslope soil erosion
- Wind erosion dataset: ranking of estimated wind erosion risk for agricultural lands
- Soil acidification dataset: ranking of estimated soil acidification risk for agricultural lands
- Soil carbon dataset: index of potential capability for the capture and retention of additional soil organic carbon on managed lands (agricultural lands and managed forests) ⁽⁴¹⁾

Investment Priorities for 'Vegetation and biodiversity on-farms' and 'Agriculture systems adapting to significant change' are not geographically based and not shown in the Regional Land Partnerships Application mapping. These Australian Government priorities in the Wimmera Management Unit have been identified and incorporated in project planning and delivery.

In developing the outcomes and priority actions in Table 30 Wimmera CMA in partnership with stakeholders including the Agriculture Victoria, Perennial Pasture Systems, Birchip Cropping Group, the Victorian No-Till Farmers Association and Landcare also considered other evidence including:

- Wimmera Land Use and Land Management Transect Survey data
- GIS-based mapping used for the Wimmera Regional Catchment Strategy including soil types and vulnerabilities
- Expert field observations from stakeholder organisation extension officers
- Understanding the Social Drivers of Natural Resource Management in the Wimmera longitudinal social survey data. ⁽³¹⁾

The Wimmera Land Use and Land Management Transect Survey strategically collects spatial and temporal data of land cover and land management practices over 88,266 hectares across 1,262 paddocks for monitoring, evaluation and continuous improvement, including crop residue retention, which can influence soil carbon, and practices which can influence erosion risk, for the northern and the southern Wimmera during spring and autumn.

The Wimmera CMA commissioned Charles Sturt University to undertake a social survey, 'Understanding the Social Drivers of Natural Resource Management in the Wimmera' in 2017. This is a continuation of the previous surveys conducted in 2002, 2007 and 2012. This is the longest running social survey of rural landholders in natural resource management in Australia. Another survey is planned in coming years to add to our understanding of landholder trends.

Data from the latest survey, for example, indicated that around 80% of landholders agreed that they should manage their properties in expectation of extreme weather events. Landholders (79%) agreed that dry conditions and changing rainfall patterns could impact on property viability. This supports the assumption that many Wimmera landholders are conscious of the impacts a changing climate can have and the need to prepare for it. Results showed 45% of respondents had implemented current recommended practices related to minimum tillage, adaptive no-till and precision farming in cropping systems which to a large extent is designed to retain moisture, nutrients and structure in soils. These are all considered to be climate change adaptation actions.

About one third of landholders agreed there would be carbon farming opportunities on their property. This indicates, at present, carbon focused farming practices may not be seen as a widespread commercial opportunity compared to other income options and/or landholders do not understand the opportunities. As such, priority management actions incorporate a focus on ensuring landholders are aware of the opportunities available and the economics of these so they can assess their options.

Projects and management actions

Table 30 sets out management actions for Wimmera soils that directly align with and contribute to the Australian Government's Outcomes and Investment Priorities. These actions also contribute to regional, Victorian Government and Australian Government strategies including the Wimmera's Carbon Ready Plan and National Soil Research, Development and Extension Strategy.

The 'Building Carbon and Capacity' Project is funded under the National Landcare Program's Phase 2 (NLP2) Regional Land Partnerships Program from 2018 until 2023. The rationale for this project focused on the most cost-effective opportunities to develop and maintain regional-scale land partnerships in the Wimmera Management Unit to improve capture and retention of additional soil carbon. Project partners understand that by aiming to address carbon in soil we can address multiple Investment Priorities for the Australian Government, including Agricultural systems adapting to significant change, Hillslope Erosion, Wind Erosion, and Soil Acidification. The design of the project recognised the importance of the Australian Government's Investment Priority 'Potential for capture and retention of additional soil carbon' in the Wimmera Management Unit, where Australian Government spatial data identified approximately 8.7% of Australia's total high or medium potential class land, or 28.6% of Victoria's high or medium potential class land. It was developed as part of an integrated package with projects that address each of the Australian

Government’s 5-year Outcomes and Investment Priorities. Where this Project focuses on soil condition the Food for the Future project, for example, also tailored to the Wimmera agricultural landscape, increases awareness and adoption of land management practices that protect the condition of vegetation and biodiversity on-farm.

The ‘Regional Agriculture Landcare Facilitator’ is funded under the NLP2’s Core Services from 2018 until 2023. The Regional Agriculture Landcare Facilitator establishes and builds partnerships that support regional planning processes and project design to ensure regional management actions align with the Australian Government’s Investment Priorities for this management unit. The role works closely with Agriculture Victoria, Perennial Pasture Systems, Birchip Cropping Group, the Victorian No-Till Farmers Association and Landcare, as well as Regional Agriculture Landcare Facilitators based in neighbouring Management Units with similar priorities.

The ‘Data Driven Drought Resilience’ Project is funded under the Australian Government’s Future Drought Fund’s (FDF) Natural Resource Management Drought Resilience - Landscapes Program from 2021 until 2022. The project aligns Future Drought Fund Outcomes and Regional Land Partnership Program Outcomes 5 and 6 and aims to improve monitoring and understanding of soil moisture across paddock and catchment scales as a key input for farm and agribusiness decision making. This includes when preparing for and in response to drought.

Table 30 summarises current funded projects, identifies which management actions would benefit from additional funding and highlights new projects that would enhance the region’s ability to achieve the 5-year Outcomes.

Table 30: Management actions for sustainable agriculture in the Wimmera

Action	How actions contribute to the 5-year Outcomes	Threats addressed	Monitoring the effectiveness of management actions	Delivery partners	Funding
Wimmera Land Use and Land Management Transect	Regional scale paddock survey in spring and autumn used for monitoring, evaluation and continuous improvement of land management practices to protect soil health and soil biodiversity, and support agricultural systems to adapt to significant change.	Lack of understanding in relation to impacts of wind and hillslope erosion and practices which can influence erosion risk and retention of additional soil carbon	Indicator: Ground cover, land management Method: Strategically collects spatial and temporal data over 88,266ha across 1,262 paddocks Baseline: Data from previous biannual transect surveys Frequency: Every spring and autumn	Agriculture Victoria	NLP2 project ‘Building Carbon and Capacity’
Soil testing	Soil testing with farmer groups to support efforts to track soil health condition and trend, including soil organic carbon stocks.	Lack of understanding in relation to impacts of practices which can influence risks to soil carbon stocks and retention of additional soil carbon	Indicator: soil pH, soil nitrogen, organic carbon% Method: Trialling online soil test data sharing platform to amalgamate/ aggregate paddock data Baseline: Comparing with Agriculture Victoria soil test data and data from the first year of the project Frequency: pre- and post-project, where funding allows	Perennial Pasture Systems Birchip Cropping Group landholders	NLP2 project ‘Building Carbon and Capacity’
GIS-based mapping of soil moisture probe and weather stations	Identifying and recording which properties in the region are using certain technology, including details of make/ model, data management and who from this list is willing to engage in a regional data-sharing network.	Lack of understanding in relation to practices which can influence soil moisture retention and drought resilience, with links to erosion risk and retention of additional soil carbon	Indicator: Spatial extent and density of soil moisture monitoring probes and weather stations in the region Method: Online mapping portal recording locations of soil moisture probe and weather stations, in partnership with farmer groups and other industry stakeholders including suppliers and agronomists, to support project progress/achievement reporting Baseline: Baseline data undertaken at project commencement Frequency: Annually	Agriculture Victoria Perennial Pasture Systems Birchip Cropping Group Victorian No-Till Farmers Association Landcare Landholders	FDF project ‘Data Driven Drought Resilience’

Action	How actions contribute to the 5-year Outcomes	Threats addressed	Monitoring the effectiveness of management actions	Delivery partners	Funding
Surveys collecting information from farmers on the drivers of change	<p>To build longitudinal data highlighting trends in local landholder awareness and adoption of practices that improve and protect the condition of soil, and local landholder capacity to adapt agricultural systems to significant change.</p> <p>Surveys underpin the development of strategic level documents and strategies, and provide direction for the development of programs, projects and activities delivered to farmers who manage 80% of the Wimmera Management Unit.</p>	Lack of understanding in relation to trends in local landholder awareness and adoption of practices that improve and protect the condition of soil, and local landholder capacity to adapt agricultural systems to significant change	<p>Indicator: Social drivers, skills and knowledge</p> <p>Method: Mail-based randomised landholder survey to build longitudinal data highlighting trends in local landholder awareness and adoption of practices that improve and protect the condition of soil, and local landholder capacity to adapt agricultural systems to significant change</p> <p>Baseline: Historical social research dataset highlighting trends local landholder awareness and adoption of practices that improve and protect the condition of soil, and local landholder capacity to adapt agricultural systems to significant change</p> <p>Frequency: Pre- and post-project</p>	Social researchers	NLP2 project 'Building Carbon and Capacity' and 'Regional Agriculture Landcare Facilitator', and FDF project 'Data Driven Drought Resilience'
More detailed monitoring of a range of soil health parameters	To gain a more comprehensive understanding of soil health. Being able to access and interpret this data would also assist us to adopt even more targeted and timely approaches to extension in specific priority areas, as well as monitor trends and measure impact long term and Australian Government Investment Priorities.	Lack of understanding in relation to impacts of wind and hillslope erosion and practices which can influence erosion risk, retention of additional soil carbon	<p>Indicator: Biological, physical and chemical indicators of soil quality</p> <p>Method: Detailed on farm soil sampling sent to labs for testing, results documented and integrated into portals including Soils Cooperative Research Centre portals</p> <p>Baseline: Baseline data undertaken at project commencement</p> <p>Frequency: Annually</p>	<p>Agriculture Victoria</p> <p>Perennial Pasture Systems</p> <p>Birchip Cropping Group</p> <p>Victorian No-Till Farmers Association</p> <p>Landcare</p> <p>Landholders</p>	Not funded
In situ installation, calibration and networking of soil moisture monitoring probes and weather stations	Strategic in-situ probe installation and networking across the Wimmera management unit. This will include standard setting (eg. acceptable error ranges, sensor installation procedures, probe manufacturer, and maintenance of data) and crowdsourced information from existing probes to increase the density of the network. Data from the network can be used by farmers and agronomists to manage risk and build business resilience to climate variation. This project has been designed to assist in addressing farmer concerns raised in the Social Drivers of Change report and builds on the work the Wimmera CMA has completed in the space to date.	Lack of understanding in relation to practices which can influence soil moisture retention and drought resilience, with links to erosion risk, retention of additional soil carbon	<p>Indicator: Number of in situ soil moisture monitoring probes and weather stations installed, calibrated and networked with farmers</p> <p>Method: Number of units installed with farmers and key attribute data (type, date, participants, objective, priorities) will be captured and recorded to support project progress/achievement reporting</p> <p>Baseline: Baseline data undertaken at project commencement</p> <p>Frequency: Annually</p>	<p>Agriculture Victoria</p> <p>Perennial Pasture Systems</p> <p>Birchip Cropping Group</p> <p>Victorian No-Till Farmers Association</p> <p>Landcare</p> <p>Landholders</p>	FDF project 'Data Driven Drought Resilience'

Action	How actions contribute to the 5-year Outcomes	Threats addressed	Monitoring the effectiveness of management actions	Delivery partners	Funding
Planting to increase groundcover on vulnerable/degraded soils through trial and demonstration of alternative fodder species and novel establishment options	<p>Climate forecasting for the Wimmera predicts less rainfall and more hot days, which could likely lead to more instances of exposed soil, leading to higher erosion rates. This action seeks to find solutions to this risk, whilst also ensuring the sustainability of farm businesses through research of alternative pasture species and income streams. This activity also seeks to address farmer concerns identified in social drivers of NRM.</p> <p>To increase awareness and adoption of innovative grazing management practices such as perennial based fodder systems using alternative legume, grass and shrub species.</p>	Lack of understanding in relation to impacts of wind and hillslope erosion and practices which can influence erosion risk, retention of additional soil carbon	<p>Indicator: Number and extent of plantations, Number of farmers engaged</p> <p>Method: Number and spatial extent of sites established/supported with farmers and key attribute data (type, date, target audience, number of recipients, key messages) will be captured and recorded to support project progress/achievement reporting</p> <p>Baseline: Baseline data undertaken at project commencement</p> <p>Frequency: Annually</p>	<p>Agriculture Victoria</p> <p>Perennial Pasture Systems</p> <p>Birchip Cropping Group</p> <p>Victorian No-Till Farmers Association</p> <p>Landcare</p> <p>Landholders</p>	Not funded
Targeted and tailored farmer field days, with the inclusion of the option for continued mentoring	<p>Farmer group-led field day model is incorporated into all soil health projects. Based on experience and landholder feedback this partnership approach is considered to be most effective for achieving the required level of engagement and training.</p> <p>Social drivers research indicates that attending field days is a preferred learning approach for farmers. Research also indicates that field days lead to greater practice change if they're combined with mentoring opportunities.</p>	Lack of understanding in relation to impacts of wind and hillslope erosion and practices which can influence erosion. Lack of understanding in relation to practices which can influence soil moisture retention and drought resilience, with links to erosion risk, retention of additional soil carbon	<p>Indicator: Number of events, Number of individuals engaged</p> <p>Method: Key attribute data associated with delivery of engagement events (type, date, purpose, target audiences, and number of participants) will be captured and recorded to support project progress/achievement reporting</p> <p>Baseline: Baseline data undertaken at project commencement</p> <p>Frequency: Annually</p>	<p>Agriculture Victoria</p> <p>Perennial Pasture Systems</p> <p>Birchip Cropping Group</p> <p>Victorian No-Till Farmers Association</p> <p>Landcare</p> <p>Landholders</p>	NLP2 project 'Building Carbon and Capacity' and 'Regional Agriculture Landcare Facilitator', and FDF project 'Data Driven Drought Resilience'
Targeted and tailored farmer end-user training/workshops	<p>Farmer group-led training/workshop model is incorporated into all soil health projects. Based on experience and landholder feedback this partnership approach is considered to be most effective for achieving the required level of engagement and training.</p> <p>Activity delivery aligns with the needs identified in Social drivers surveys, as well as participant and project partner feedback.</p>	Lack of understanding in relation to impacts of wind and hillslope erosion and practices which can influence erosion. Lack of understanding in relation to practices which can influence soil moisture retention and drought resilience, with links to erosion risk, retention of additional soil carbon	<p>Indicator: Number of events, Number of individuals engaged</p> <p>Method: Key attribute data associated with delivery of engagement events (type, date, purpose, target audiences, and number of participants) will be captured and recorded to support project progress/achievement reporting</p> <p>Baseline: Baseline data undertaken at project commencement</p> <p>Frequency: Annually</p>	<p>Agriculture Victoria</p> <p>Perennial Pasture Systems</p> <p>Birchip Cropping Group</p> <p>Victorian No-Till Farmers Association</p> <p>Landcare</p> <p>Landholders</p>	NLP2 project 'Building Carbon and Capacity' and 'Regional Agriculture Landcare Facilitator', and FDF project 'Data Driven Drought Resilience'

Action	How actions contribute to the 5-year Outcomes	Threats addressed	Monitoring the effectiveness of management actions	Delivery partners	Funding
On farm trials and demonstrations	<p>Wimmera-specific, farmer-led trials are designed to test concepts in local conditions and accelerate uptake of agricultural land management practices that can increase soil carbon and therefore improve climate resilience. Further trials could be undertaken focused on biochar, multi species cover crops, pasture cropping, biochar, dung beetles, rotational grazing.</p> <p>Research indicates that adoption increases when there's farmer confidence that the recommended practice change make sense in a local context with proven financial and productivity gains. Wimmera specific trials and demonstrations are therefore required to build farmer confidence.</p>	Lack of understanding in relation to impacts of wind and hillslope erosion and practices which can influence erosion. Lack of understanding in relation to practices which can influence soil moisture retention and drought resilience, with links to erosion risk, retention of additional soil carbon	<p>Indicator: Number of on farm trials and demonstrations</p> <p>Method: Number of trials established/ supported with farmers and key attribute data (type, date, target audience, number of participants, key messages) will be captured and recorded to support project progress/ achievement reporting</p> <p>Baseline: Baseline data undertaken at project commencement</p> <p>Frequency: Annually</p>	<p>Agriculture Victoria</p> <p>Perennial Pasture Systems</p> <p>Birchip Cropping Group</p> <p>Victorian No-Till Farmers Association</p> <p>Landcare</p> <p>Landholders</p>	NLP2 project 'Building Carbon and Capacity' (partly funded – there are opportunities for enhanced outcomes if more funding was available)
Co-design and deliver online engagement and educational materials for Wimmera farmers, NRM sector reps and industry to support other actions including Communities of Practice	Farmer group-led communications model is incorporated into all soil health projects. Based on experience and landholder feedback this partnership approach is considered to be most effective for achieving the required level of engagement and training.	Lack of understanding in relation to impacts of wind and hillslope erosion and practices which can influence erosion. Lack of understanding in relation to practices which can influence soil moisture retention and drought resilience, with links to erosion risk, retention of additional soil carbon	<p>Indicator: Number of communication products developed/disseminated</p> <p>Method: Number of communication products developed/disseminated and key attribute data (type, date, target audience, number of recipients, key messages) will be captured and recorded to support project progress/ achievement reporting</p> <p>Baseline: Baseline data undertaken at project commencement</p> <p>Frequency: Annually</p>	<p>Agriculture Victoria</p> <p>Perennial Pasture Systems</p> <p>Birchip Cropping Group</p> <p>Victorian No-Till Farmers Association</p>	NLP2 project 'Building Carbon and Capacity' and 'Regional Agriculture Landcare Facilitator', and FDF project 'Data Driven Drought Resilience'
Establish a regional Community of Practice	<p>The Community of Practice will be established in partnership with farmer groups and include peer learning and extension to support application and use of the improved capability that emerges from the network of soil moisture monitoring probes and weather stations.</p> <p>Communities of Practice have been identified as a successful approach to fast track the delivery of outcomes to farming communities.</p>	Lack of understanding in relation to practices which can influence soil moisture retention and drought resilience, with links to erosion risk, retention of additional soil carbon	<p>Indicator: Number of Communities of Practice established/supported, number of partnerships</p> <p>Method: Key attribute data associated with establishment of Community of Practice (type, date, purpose, target audiences, and number of participants) will be captured and recorded to support project progress/achievement reporting</p> <p>Baseline: Baseline data undertaken at project commencement</p> <p>Frequency: Annually</p>	<p>Agriculture Victoria</p> <p>Perennial Pasture Systems</p> <p>Birchip Cropping Group</p> <p>Victorian No-Till Farmers Association</p> <p>Landcare</p> <p>Landholders</p>	FDF project 'Data Driven Drought Resilience'

Action	How actions contribute to the 5-year Outcomes	Threats addressed	Monitoring the effectiveness of management actions	Delivery partners	Funding
Trial of an innovative downscaling framework to train coarse resolution remote sensing soil moisture products against the data from the networked in-situ ground measurements	<p>To increase the estimation capacity of the in-situ network beyond the distribution of the point measurement stations, to catchment-scale application. Assumes enough area will be covered to have a material positive impact on farmers, NRM sector reps and industry capability to improve understanding of soil moisture trend and condition at the desired spatial scales.</p> <p>A project of this nature and scale has not been attempted before. Whilst the nature and complexity of the project does provide challenges, the benefits that can be provided to the agricultural community are significant.</p>	Lack of understanding in relation to practices which can influence soil moisture retention and drought resilience, with links to erosion risk, retention of additional soil carbon	<p>Indicator: Number of trials</p> <p>Method: Number of trials established/ supported with farmers and key attribute data (type, date, target audience, key messages) will be captured and recorded to support project progress/achievement reporting</p> <p>Baseline: Baseline data undertaken at project commencement</p> <p>Frequency: Annually</p>	<p>Agriculture Victoria</p> <p>Perennial Pasture Systems</p> <p>Birchip Cropping Group</p> <p>Victorian No-Till Farmers Association</p> <p>Landcare</p> <p>Landholders</p>	FDF project 'Data Driven Drought Resilience'
Focus groups and community based social marketing	<p>Deliver community based social marketing to better understand the continued use of management practices such as stubble burning and cultivation (particularly long periods of cultivated fallow), then use focus groups to develop trial and methods to overcome the perceived barriers and benefits to switch practices that retain ground cover and align with Australian Government Investment Priorities.</p> <p>The social drivers of research report provides incredibly valuable data that can be used by Wimmera CMA and Project Partners at a strategic level. Identifying and engaging with select groups of farmers will greatly assist in the development of individual projects to deliver more specific outcomes.</p>	Lack of understanding in relation to impacts of wind and hillslope erosion and practices which can influence erosion. Lack of understanding in relation to practices which can influence soil moisture retention and drought resilience, with links to erosion risk, retention of additional soil carbon	<p>Indicator: Number of focus groups established/supported, number of partnerships</p> <p>Method: Key attribute data associated with establishment of focus groups (type, date, purpose, target audiences, and number of participants) will be captured and recorded to support project progress/achievement reporting</p> <p>Baseline: Baseline data undertaken at project commencement</p> <p>Frequency: Annually</p>	<p>Agriculture Victoria</p> <p>Perennial Pasture Systems</p> <p>Birchip Cropping Group</p> <p>Victorian No-Till Farmers Association</p> <p>Landcare</p> <p>Landholders</p>	Not funded
Individual farmer engagement	<p>Time and resources allocated to support 'pioneer' farmers that are ahead of their peers in the region in navigating their way through the adoption of land management practices that increase the capture and retention of soil carbon.</p> <p>Social research indicates that farmers are more likely to change practice after observing and learning from neighbours or local farmers that are well known and respected. Working with pioneer farmers who are well and well respected within the region is therefore an efficient and effective means of delivering NLP outcomes.</p>	Lack of understanding in relation to impacts of wind and hillslope erosion and practices which can influence erosion. Lack of understanding in relation to practices which can influence soil moisture retention and drought resilience, with links to erosion risk, retention of additional soil carbon	<p>Indicator: Number of events, Number of individuals engaged</p> <p>Method: Key attribute data associated with delivery of individual farmer engagement (type, date, purpose, key messages) will be captured and recorded to support project progress/achievement reporting</p> <p>Baseline: Baseline data undertaken at project commencement</p> <p>Frequency: Annually</p>	<p>Agriculture Victoria</p> <p>Perennial Pasture Systems</p> <p>Birchip Cropping Group</p> <p>Victorian No-Till Farmers Association</p> <p>Landcare</p> <p>Landholders</p>	NLP2 project 'Building Carbon and Capacity' and 'Regional Agriculture Landcare Facilitator' (partly funded – there are opportunities for enhanced outcomes if more funding were available)

Action	How actions contribute to the 5-year Outcomes	Threats addressed	Monitoring the effectiveness of management actions	Delivery partners	Funding
Development of individual tailored property action plans	To identify characteristics and drivers/causes of problem areas, formulate property-specific actions to address these and identify any gaps in knowledge to inform future research, development and extension activities.	Lack of understanding in relation to impacts of wind and hillslope erosion and practices which can influence erosion. Lack of understanding in relation to practices which can influence soil moisture retention and drought resilience, with links to erosion risk, retention of additional soil carbon	<p>Indicator: Number of plans developed</p> <p>Method: Key attribute data associated with delivery of establishment of property plans (type, date, purpose, key messages) will be captured and recorded to support project progress/achievement reporting</p> <p>Baseline: Baseline data undertaken at project commencement</p> <p>Frequency: Annually</p>	<p>Agriculture Victoria</p> <p>Perennial Pasture Systems</p> <p>Birchip Cropping Group</p> <p>Victorian No-Till Farmers Association</p> <p>Landcare</p> <p>Landholders</p>	Not funded

First Nations Peoples' aspirations

There is growing interest in the feasibility of cultivating native food plants as a potential management practice for marginal land in particular. It is considered a potential practice to improve water use efficiency and value-adding through diversification and First Nations community members and regional partners are keen to investigate and better understand the potential for native food plant cultivation practices to address Investment Priorities such as carbon in soil in Wimmera conditions.

The Barenji Gadjin Land Council (BGLC) took over management of the Wail native food plant nursery and seed orchard and developed the Country Plan 'Growing what is good' in National Landcare Program phase one with support from Wimmera CMA. The plan outlines Traditional Owner aspirations, goals and long-term plans for natural resource management on Country including:

- Stronger land management partnerships, enterprises and employment around Wotjobaluk cultural practices including native food plants, and

- Opportunities to influence land management on private land.

A native food plant cultivation trial has been designed as part of Wimmera CMA's Building Carbon and Capacity project with BGLC, Agriculture Victoria's Aboriginal Landholder Information Service, and Victorian No-Till Farmers Association. Native food plant cultivation demonstration trials are identified as the most effective means in the Wimmera Management Unit to actively support Traditional Owners to:

- Build mutually beneficial, positive working relationships with and seek advice and assistance from farmers,
- Influence training needs for increasing productivity and increasing capture and retention of additional soil carbon on agricultural land,
- Access existing farmer networks and develop new networks,
- Access farmer mentors,
- Establish economically viable land-based businesses, and
- Build skills to proactively manage soil resources.

Traditional ecological knowledge

Guidance and feedback from partners including Barengi Gadjin Land Council and local First Nations community members has highlighted the importance of two-way learning that recognises traditional ecological knowledge is dynamic and adaptive. First Nations Peoples in this region have always adapted and transformed their knowledge systems in the face of environmental variability and change. First Nations knowledge holders, while acknowledging their elders, emphasise the central role of their own learnings and experience as knowledge is continuously re-shaped and shared across Community.

Together we aim to take an approach that connects traditional ecological knowledge with western science inquiry to support two-way learning and capacity-building.

Activities such as native food trials are delivered in a way that recognises the importance of Traditional Ecological Knowledge being passed on, and where appropriate being shared by, Traditional Owners. Guidance from appropriate organisations such as Barengi Gadjin Land Council is incorporated at every stage of the activity. Project partners are mindful that there are examples of Traditional Owner knowledge being exploited in the past in the native food industry, and Traditional Owners in our region are seeking to support commercialisation of native food plants and access associated social and economic co-benefits while playing a central decision-making role in this commercial development and identifying strategies for guarding Indigenous cultural and intellectual property.

Key collaborations

Plans and projects addressing Australian Government Investment Priorities for soils are developed as part of an ongoing consultation and project design process with partner organisations including Agriculture Victoria, Perennial Pasture Systems, Birchip Cropping Group, the Victorian No-Till Farmers Association and Landcare. This process has also included, for example, development of Smart Farms project bids with farmer group partners to maximise impact and avoid duplication. Discrete project proposals led by individual groups may be submitted through future Smart Farms processes. Our regional partnership approach with organisations leverages existing farmer group networks, and linkages with major agronomy groups, other grower groups and regional Landcare groups.

Advice and expertise of the Regional Agriculture Landcare Facilitator is utilised at all stages of project design and delivery. The Wimmera Partnership Forum, which brings together all farmer group, Wimmera CMA, Agriculture Victoria and Landcare extension staff in the Wimmera Management Unit for quarterly planning and review meetings at Grains Innovation Park, supports the implementation and review of management actions



Barengi Gadjin Land Council-led survey of culturally modified trees at Outlet Creek, south of Lake Albacutya

Implementation with comprehensive community consultation

Where appropriate Wimmera CMA and partners will consult with the community regarding the implementation of the outcomes, projects and management actions included in the Wimmera RCS and associated action plans including this Action Plan. This will be fit for purpose and tailored appropriately to the implementation of each project and management action that is funded for implementation.

As a first step, the RCS and its Action Plans were developed with comprehensive community consultation that engaged community groups and provided opportunities for the broader community to contribute.

There are a variety of ways that Wimmera CMA consults with the community regarding strategy, action plan and project implementation. This can include both direct consultation such as discussions and workshops and indirect consultation such as surveys and feedback forms. Wimmera CMA and partner organisations use relevant input and feedback to inform the design and implementation of projects and associated activities.

Ways that Wimmera CMA involve the community in contributing to and informing planning and implementation include:

- Wimmera CMA is governed by a board of community members responsible for developing strategic directions for land, water and biodiversity management in the region, and providing oversight of the management of the authority. Board members have experience and knowledge in one or more areas including land management, water resources management, natural resource management, primary industry, business management, and community engagement.
- Surveying rural landholders to understand the social drivers of natural resource management in the Wimmera and trends over time. Charles Sturt University have completed surveys on behalf of Wimmera CMA in 2002, 2007, 2011 and 2016. Survey information provided by rural landholders enhances the capacity of Wimmera CMA and partners to understand the priorities and motivations of landholders and to plan project design to meet rural landholders' needs.
- Stakeholder roundtables led by Wimmera CMA provide the opportunity for partners and stakeholder groups to discuss the implementation of projects they are delivering. The roundtable meetings generally include representatives from Landcare networks; local councils; Parks Victoria; Department of Environment, Land, Water and Planning; Barengi Gadjin Land Council; species recovery groups; Trust for Nature and Greening Australia.
- Project delivery meetings facilitated by Wimmera CMA provide stakeholders and partner agencies

with opportunities to provide feedback and discuss improvements and future directions.

- Community consultation activities related to participation and engagement with Barengi Gadjin Land Council and other First Nations groups adhere to the Aboriginal Participation Guideline for Victorian CMAs. Activities focus on learning and improving the way we work together for the benefit of Country and all People.
- Farmer group delivery partners collect feedback from participants in farmer workshops, trials and other capacity-building activities run in the region. This includes post-event surveys and other forms of evaluation supported by the Regional Agriculture Landcare Facilitator.
- Wimmera CMA seeks feedback from landholders when undertaking monitoring programs that revisit and assess on-ground outcomes at project sites, such as sites that protect and improve remnants of threatened ecological communities and habitat for threatened species.
- Projects involving Ngalpakatia/Ngelpagutya (Lake Albacutya) are largely developed in partnership with Parks Victoria as land managers, Barengi Gadjin Land Council and where appropriate local Landcare Groups.
- Wimmera CMA has fostered a strong relationship with stakeholders and the land managers they support through regular meetings with the Wimmera Partnership Forum, comprised of Landcare facilitators, Agriculture Victoria extension staff and representatives from farmer groups. The Wimmera Partnership Forum meets monthly to develop strategy in areas of shared need, as well as discuss emerging issues, project and extension opportunities and professional development. The Wimmera Partnership Forum has proven to be integral to informing the development and delivery of program design and implementation for National Landcare Program Investment Priorities.
- Soil health and sustainable agriculture projects are delivered by farmer-led groups like Perennial Pasture Systems, Victorian No-Till Farmers Association, Birchip Cropping Group and Landcare. All these groups are driven by Boards or committees of community members that contribute to decision-making about how projects will be delivered. These groups help facilitate consultation related to implementation by drawing on their networks and well-established methods of communication with members such as newsletters, social media, and annual forums to gather input on projects and improve performance.

The level and type of community consultation is largely dependent on the scope and requirements associated with funding provided by investors. It also depends on the expectations and needs of the sectors of the community involved in specific projects and issues.

Monitoring and reporting processes

Wimmera CMA will coordinate annual regional monitoring and reporting across Wimmera NRM agencies and partners that focuses on the extent that actions under this Action Plan have been completed. Wimmera CMA will prepare a report on the level of implementation of each of the management actions set out for outcomes and Investment Priorities in this Action Plan. This will be done in consultation with delivery partners and will depend on available funding.

Detailed Monitoring, Evaluation, Reporting and Improvement Plans will be developed for funded projects in line with the Australian Government's investment requirements.

Revision and renewal

Reviewing the RCS and this Action Plan are important steps in ensuring effective implementation and identifying improvements. Wimmera CMA will coordinate reviews of the RCS and this Action Plan after 3 and 6 years of implementation.

A mid-life review after three years will evaluate effectiveness and report on implementation progress. The mid-life review will report on:

- The region's progress towards achieving the RCS's desired 6-year and 20-year Outcomes,
- Contributions under the RCS and this Action Plan towards the Australian Government's 5-year Outcomes and Investment Priorities, and
- Minor changes to the Action Plan to ensure currency.

There will be a major review after six years including extensive community consultation, subject to funding be available.

Both the mid-term and final reviews will look back to the overall effectiveness of the RCS and Action Plan, and forwards, with recommendations for the future.

The Action Plan, or relevant sections of the plan, may be reviewed and updated outside of the 3 and 6-year review periods if substantial changes impacting on outcomes, priorities and actions are identified. Triggers for reviewing

and updating sections of the Action Plan could include, among other things:

- Changes to Australian Government policies, strategies, programs and Investment Priorities
- Natural disasters such as bushfires, drought, plague and floods
- Variations to registrations of Registered Aboriginal Parties (including boundary variation determinations)
- The evolving aspirations and capacity of First Nations groups
- Shifting priorities identified by stakeholders and the community
- New research, science or evidence impacting on information in the action plan, such as prioritisation or management approaches, and
- The Ngalkakatia/Ngelpagutya (Lake Albacutya) Ramsar Site being inundated or partially inundated with water, shifting management priorities from those associated with a dry lake to a wet environment.

The action plan will also be revisited and priorities reassessed with stakeholders according to the guidelines and directions of any new investment opportunities that arise.

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Appendix 1: Requirements for Natural Resource Management Plans

The Regional Land Partnerships Program (RLP) is a core component of Phase 2 of the Australian Government's National Landcare Program from July 2018 until June 2023. Government investment under the RLP is being delivered through a regional model that supports a range of projects contributing to four environment and two sustainable agriculture Outcomes.

The Australian Government has engaged service providers to deliver projects in 54 management units through to 2023. Wimmera CMA is the service provider for the Wimmera Management Unit (the Wimmera).

Under this arrangement, Wimmera CMA is required to maintain the currency of natural resource management planning and the prioritisation of management actions. This involves ensuring that Natural Resource Management Plan(s) are consistent with a set of specific Australian Government requirements. These requirements are:

The Natural Resource Management Plan(s) must:

- i. Identify and describe the 5-year Outcomes and Investment Priorities that are relevant to the Management Unit
- ii. Describe stakeholder aspirations for natural resource management in the Management Unit, and where possible, how these align with the 5-year Outcomes and other relevant Australian Government priorities
- iii. Identify and prioritise natural resource management actions based on knowledge of:
 - a. Location and condition of natural resources, including the Investment Priorities
 - b. Threats to, or impacts on, natural resources
 - c. Prioritisation methods for determining the most cost-effective management actions, including decision support and spatial mapping tools
 - d. Methodologies for assessing the effectiveness of management actions
- iv. Identify how the delivery of Projects will contribute to 5-year Outcomes and Investment Priorities for the Management Unit
- v. Identify how the Natural Resource Management Plan(s) will be implemented with comprehensive community consultation
- vi. Identify Indigenous Peoples' land and sea management aspirations for the relevant Management Unit, including how they relate to 5-year Outcomes, and strategies to prioritise and implement them
- vii. Incorporate Traditional Ecological Knowledge, where appropriate, in accordance with the agreed protocols and with approval of the Indigenous custodians of the knowledge
- viii. Describe key collaborations, for example between the Service Provider, industry and/or community groups, for the delivery of 5-year Outcomes
- ix. Identify the monitoring and reporting processes in place and how they are utilized to measure the achievements and the effectiveness of the Natural Resource Management Plan(s)
- x. Include any other content relevant to the Service provider's obligations under clause 4.2(a)

Appendix 2: Developing the Regional Land Partnerships Program Action Plan

This Appendix outlines the process and steps for engaging and consulting with stakeholders and community group representatives, including First Nations People, to develop the Wimmera RCS 2021-27 (RCS) and Regional Land Partnerships Program Action Plan.

Wimmera CMA had discussions and consulted with representatives from more than 40 stakeholder organisations and community groups involved in NRM and sustainable agriculture in the Wimmera.

Discussions commenced in 2019 to review the Wimmera RCS 2013-19. The review assessed what was achieved then focused on identifying future regional priorities, challenges and issues for consideration in the next iteration of the strategy. The review involved:

- Assessing and describing what was achieved under the RCS
- Meeting with individual stakeholders to discuss their aspirations, priorities, challenges and issues. These meetings specifically discussed RLP Outcomes and Investment Priorities
- Stakeholders were asked how they would like to be engaged in the development of the new RCS and Action Plan. Most indicated a preference for face-to-face discussions. Some preferred to provide comments on drafts. All stakeholders supported a coordinated and streamlined approach. The engagement undertaken was designed based on these preferences.

Stakeholder feedback from the review contributed to the way Wimmera CMA engaged stakeholders in the RCS and Action Plan. The Victorian Department of Environment, Land, Water and Planning (DELWP) led regional Biodiversity Response Planning (BRP) at the same time as the RCS was being developed. Wimmera CMA collaborated with DELWP and participated in the BRP process to ensure that the BRP, RCS and this Action Plan aligned, supported and complemented each other. BRP is a new area-based planning approach to biodiversity conservation in Victoria. It is designed to strengthen alignment, collaboration and participation between government agencies, Traditional Owners, non government organisations and the community.

RCS, Action Plan and BRP consultation occurred in meetings and discussions during 2020 and 2021, and moved online during much of 2020 due to Victorian Government measures to prevent the spread of COVID-19.

Developing the Wimmera Regional Catchment Strategy 2021-27

Steps to develop the RCS included:

- During the second half of 2020, Wimmera CMA staff developed working drafts, collating a range of information and evidence including:
 - Scientific information such as technical reports, monitoring reports and results, survey results, climate science for the Wimmera
 - Stakeholder input from the review
 - Stakeholder information provided over time through relationship discussions Wimmera CMA is involved in as part of doing business with partner organisations and stakeholders (roundtables, project bid conversations)
 - Targeted discussions with stakeholders on content.
- Theme-based papers were sent to stakeholders and the CMA Board's Business and Planning Committee in October for comment and revised in November and December 2020.
- In February and March 2021, a Stakeholder Consultation Draft RCS was provided to partner and stakeholder organisations and community groups for comment and discussion. The Wimmera CMA Board's Business and Planning Committee also reviewed this draft.
- Wimmera CMA refined the draft RCS, incorporating feedback from partner and stakeholder organisations and community groups, and continuing to work with stakeholders where necessary.
- A full draft was released for public consultation over four and a half weeks from 31 March until 3 May 2021. The draft was also provided to partner and stakeholder organisations and community groups for further comment.
- Following the public consultation period, Wimmera CMA revised the draft taking into consideration the feedback provided by the community and partner and stakeholder organisations during the public consultation period.
- Wimmera CMA's Board approved the final RCS in June 2021 and it was submitted to the Victorian Minister for Water for consideration and final approval.

Developing the Regional Land Partnerships Program Action Plan

Steps to develop this Action Plan included:

- Reviewing and consolidating relevant information collected during the development of the Wimmera RCS and also reports and information relevant to specific sections of the Action Plan. Wimmera CMA used feedback and contributions provided by stakeholders to develop this Action Plan.
- Collaborating with DELWP on BRP, including a series of 4 stakeholder workshops in February, October and December 2020 and May 2021. Workshops involved a range of local and regional biodiversity stakeholders including Barengi Gadjin Land Council and community groups. The workshops focused on identifying the region's biodiversity assets, focal landscapes, priority species and communities and projects. The planning process aims to identify priority biodiversity projects for BRP investment by the Victorian Government in the region. It also provided an opportunity to prioritise regional biodiversity assets and projects more broadly including Australian Government and regional priorities. Wimmera CMA worked closely with DELWP in developing the purpose, content, information and directions of the workshops and subsequently participated in all workshops, contributing information and hearing the contributions of stakeholders regarding their priorities. This has informed the approaches taken for biodiversity, including threatened species and threatened ecological communities, in the RCS and this Action Plan. Wimmera CMA has also worked with DELWP outside of the workshops to provide information, support, collaborate on prioritisation process decisions and ensure alignment with the RCS and this Action Plan.
- Drafts of relevant sections of this Action Plan were provided to relevant stakeholders for comment and further contributions, to ensure that the information captured during the consultation processes over time has been accurately reflected and retains currency.

Consultation with First Nations People

BARENGI GADJIN LAND COUNCIL ABORIGINAL CORPORATION

The traditional lands of the Wotjobaluk Peoples represented by the Barengi Gadjin Land Council Aboriginal Corporation (BGLC) cover most of the Wimmera region. Wimmera CMA partners and works closely with BGLC to ensure that Traditional Ecological Knowledge is incorporated into planning and projects.

Consultation to develop the RCS and this Action Plan involved a series of more than 15 discussions including 2 workshops carried out during 2019, 2020 and 2021. All 4 CMAs in BGLC's area of responsibility, including Glenelg Hopkins, North Central, Mallee and Wimmera CMA, met collaboratively with BGLC on 6 occasions to streamline discussions and ensure a consistent approach. The first workshop in February 2020 invited community members to participate in identifying priorities and desired outcomes. The second workshop in December 2020 involved BGLC staff in identifying aspirations and desired outcomes for integrated catchment management.

Following the second workshop, Wimmera CMA commenced drafting the RCS and this Action Plan, consulting with BGLC and meeting to discuss feedback and reach mutual agreement on content.

BGLC developed 'Growing What is Good' Country Plan 2017 during phase one of the National Landcare Program with support from Wimmera CMA. The plan identifies their vision, goals and priorities for healthy Wotjobaluk Community, Culture and Country. ⁽³⁾ The Country Plan has been a guiding document during the development of the RCS and this Action Plan.

EASTERN MAAR ABORIGINAL CORPORATION

The traditional lands of the Eastern Maar Peoples represented by the extend Eastern Maar Aboriginal Corporation (EMAC) into the south-eastern corner of the Wimmera region, into the upper catchment local area. EMAC received Registered Aboriginal Party (RAP) status over this area in February 2020.

EMAC developed the '*Meerreengeeye Ngakeepoorryeeyt*' Country Plan 2015 during phase one of the National Landcare Program. The plan identifies their vision and goals and has been a guiding document during the development of this Action Plan. ⁽⁴²⁾

'*Meerreengeeye Ngakeepoorryeeyt*' Country Plan's goals relevant to natural resource management. Consultation involved a series of 7 discussions including 2 workshops carried out during 2020 and 2021. All 3 CMAs in EMAC's area of responsibility, including Glenelg Hopkins and Corangamite, met collaboratively with EMAC where relevant to streamline discussions and ensure a consistent approach. The first workshop with EMAC staff in March 2021 focused on identifying desired outcomes. The second workshop with EMAC's Cultural Landscapes Subcommittee in April 2021 also focused on outcomes. Wimmera CMA continued to work with the other CMAs and EMAC to seek feedback as the document was developed.

Appendix 3: Ngalpakatia/Ngelpagutya (Lake Albacutya) Ramsar site

The following tables provide data to support information in the Regional Land Partnerships Program Action Plan about the condition of Ngalpakatia/Ngelpagutya (Lake Albacutya) and threats impacting on the Ramsar site.

Current condition

Cook and Bayes (2019) observed that between September 2016 and May 2019, 9 of the 90 river red gum stands assessed at Ngalpakatia/Ngelpagutya (Lake Albacutya) experienced a change in condition. Four stands improved and five stands declined (Table 31). Of those that improved two were sites that had been assessed with slight dieback in 2016 that had improved to healthy forest by 2019, one improved from having moderate dieback to slight dieback and one improved from having severe dieback to moderate dieback. Of those stands that had declined four had been assessed as healthy forest in 2016 and declined to having slight dieback in 2019 and one declined from having moderate dieback to severe dieback. No stands changed more than one category.

(6)

Table 31: Comparison of the number of one-hectare stands with different condition scores in 2016 and 2019

Classification	Number of stands 2016	Number of stands 2019
Healthy forest	16	14
Slight dieback	12	15
Moderate dieback	15	14
Severe dieback	25	25
Burnt but regenerating	32	32

This data supports the suggestion by Cook and Just (2016) that there are factors that influence tree health at Ngalpakatia/Ngelpagutya (Lake Albacutya), probably including the depth to and salinity of groundwater, rainfall patterns (heavy localised rainfall events) and intermittent flooding (although this last factor has not occurred for many years).⁽⁷⁾

Examination of rainfall data collected at the Rainbow (Pella) weather recording station over the last five years (Table 32) shows that there had been extensive periods of below average rainfall prior to both monitoring events. Periods of below average rainfall may be a contributing factor as to why some tree stands have declined in condition.

Table 32: Rainfall data from Rainbow (Pella)⁽⁴³⁾

Year	Rainfall (mm)
2014	276.5
2015	258
2016	411.5 (215 up to September)
2017	376
2018	265.5
2019	262.5
2020	299
Mean annual rainfall	301.3

Those stands that improved in condition were all along the southern shore of the lake where groundwater salinity is highest, and the groundwater table is closest to the surface. Below average rainfall may be contributing to a continuing decline in the level of the saline groundwater table, decreasing stress on the trees in this area and allowing them to improve in condition.⁽⁷⁾

Threats and impacts

Table 33 provides a detailed description of threats to Ngalpakatia/Ngelpagutya (Lake Albacutya). The table was developed as part of the assessment of environmental watering requirements for the lake.

Table 33: Description of threats to Ngalpakatia/Ngelpagutya (Lake Albacutya) Ramsar site ⁽⁴⁴⁾

Threats	Details	Potential impacts	Significance of threat	Likelihood of impacts	Timing of impacts
Natural System Modifications					
River regulation and changed water regime	Under the river regulation regime which was in place at the time of listing, the average overflow frequency of Ngalpakatia/Ngelpagutya (Lake Albacutya) was predicted to be once in 39 years, reduced from natural conditions (once in 4 years). However based on historical inflows, this has been increased to once in 12 years following the recovery of significant volumes of water for the environment.	Reduced frequency and duration of flooding. Interference with migration, reproduction, regeneration and recruitment processes. Reduced habitat availability and quality for waterbirds. Declining Eucalypt woodland health.	High	High	Short Term
Climate Change and Severe Weather					
Climate Change – reduced rainfall	Reduced rainfall, which occurred throughout the Barringgi Gadjin (Wimmera River) catchment since the mid-1990s has been one of the core issues for Ngalpakatia/Ngelpagutya (Lake Albacutya). Climate modelling suggests that in the future there is likely to be even less of the wet winter/springs required to get water into Gurru (Lake Hindmarsh) and Ngalpakatia/Ngelpagutya (Lake Albacutya). However, one key element of uncertainty is around extreme wet events during summer periods (such as the one experienced in 2011).	Reduced frequency and duration of flooding. Interference with migration, reproduction, regeneration and recruitment processes. Reduced habitat availability and quality for waterbirds. Declining eucalypt woodland health.	High	Medium	Short to Long Term
Ecosystem/community stresses					
Decline in eucalypt woodland health and degraded wetland buffer	The river red gum populations at Ngalpakatia/Ngelpagutya (Lake Albacutya) have experienced widespread dieback over the past decade or so due to the lack of inundation events at the lake and bushfires in 2014. Ngalpakatia/Ngelpagutya (Lake Albacutya)'s river red gum sub-species is however noted for its salt and drought tolerance which has aided in minimising the negative effects of prolonged dry periods experienced of recent times. Heavy rainfall events have also been noted as causing localised recruitment.	Reduces habitat for waterbirds and regent parrot.	Medium	High to Medium	Short to Medium Term
Human Intrusion and Disturbance/Biological Resource Use					
Recreation	Some species of waterbirds and the nationally vulnerable regent parrot are sensitive to disturbance during roosting periods. This disturbance comes in the form of walkers, swimmers, anglers, duck hunters and other recreational activities.	Recreational hunting and human activity may disturb waterbirds and regent parrot breeding.	Low	Unknown	Dependent upon hydrology

Threats	Details	Potential impacts	Significance of threat	Likelihood of impacts	Timing of impacts
Invasive and Overabundant Native Species					
Pests (carp, birds, bees, rabbits, foxes, cats, dogs)	<p>Carp are the main invasive aquatic pest species and only become an issue when the lake has filled and held water for a number of years</p> <p>Rabbits are the most noxious invasive species in the park and Wimmera CMA, along with Parks Victoria, have conducted extensive control and eradication projects in recent years</p> <p>Introduced predators (dogs, cats and foxes) and bees are also causing issues in the park through predation and nest competition.</p>	<p>Carp reduce habitat quality for fish, aquatic flora and fauna and waterbirds.</p> <p>Bees compete with waterbirds and regent parrot for tree hollows.</p> <p>Rabbits inhibit eucalypt woodland recruitment.</p> <p>Foxes, cats and dogs may prey on waterbirds and regent parrot.</p>	High to Medium	High to Medium	Short to Medium Term
Weeds	The Ngalpakatia/Ngelpagutya (Lake Albacutya) Ramsar Site has several Weeds of National Significance present, namely boneseed (<i>Chrysanthemoides monillifera</i>) and bridal creeper (<i>Asparagus asparagoides</i>). Extensive works have been done to control these species with projects continuing, these works are guided by recommendations under the <i>Wimmera Invasive Plant and Animal Management Strategy</i> .	<p>Degradation of eucalypt woodland.</p> <p>Reduced habitat quality for waterbirds and regent parrot.</p> <p>Competition with native vegetation for ground cover.</p>	High to Medium	High to Medium	Short Term
Overabundant kangaroos and native birds	Overabundant kangaroos are impacting on regeneration of vegetation. Overabundant native bird species compete with species such as regent parrots for nests.	<p>Overgrazing by kangaroos leads to reduced vegetation condition.</p> <p>Overabundant native bird populations affect regent parrot recruitment.</p>	Medium	High to Medium	Short to Medium Term
Agriculture					
Agricultural cropping	Historically the lake bed has been cropped though this has not occurred since Ngalpakatia/Ngelpagutya (Lake Albacutya) was Ramsar listed. Cropping of the lake bed ceased in the early 1980s. There are no plans to reintroduce it.	<p>The effect of cropping on the lake ecology is unknown, however it could have included:</p> <ul style="list-style-type: none"> Disturbance and erosion of lake bed soil and reduction in soil organic matter Reduction in diversity of terrestrial flora and fauna Reduction in post-flood nutrient pulse; Depletion of lake bed seed and egg bank, and Initial reduction in aquatic primary productivity and faunal density. <p>There is no information on how long these impacts persisted after cropping ceased.</p>	Moderate	Low	Long term
Agricultural grazing	Agricultural grazing on the lake bed of Ngalpakatia/Ngelpagutya (Lake Albacutya) has occurred for over 160 years as the area was classed as freehold prior to 1980. Formal grazing licenses were established in 1983 and covered a total area of 2,117ha. Currently around 40% of the wetland is being grazed.	There is potential that agricultural grazing by sheep on the wetland can effect recruitment of native species and can also aid in the spreading of weeds	Unknown	High	Long Term

Note: short term = 0-25 years, medium term = 25-50 years, long term = >50 years

Appendix 4: Nationally threatened species in the Wimmera

The following table includes the species in the Wimmera that are listed as threatened under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

Definitions:

- EX Extinct in the wild
- CR Critically endangered
- EN Endangered
- VU Vulnerable

Scientific Name	Common Name	Status
<i>Conilurus albipes</i>	White-footed Rabbit-rat	EX
<i>Pedionomus torquatus</i>	Plains-wanderer	CR
<i>Numenius madagascariensis</i>	Eastern Curlew	CR
<i>Calidris ferruginea</i>	Curlew Sandpiper	CR
<i>Lathamus discolor</i>	Swift Parrot	CR
<i>Sphaerolobium acanthos</i>	Grampians Globe-pea	CR
<i>Anthochaera phrygia</i>	Regent Honeyeater	CR
<i>Pimelea spinescens subsp. spinescens</i>	Spiny Rice-flower	CR
<i>Pimelea spinescens subsp. pubiflora</i>	Wimmera Rice-flower	CR
<i>Cassinia tegulata</i>	Avenue Cassinia	CR
<i>Callistemon wimmerensis</i>	Wimmera Bottlebrush	CR
<i>Bidyanus bidyanus</i>	Silver Perch	CR
<i>Synemon plana</i>	Golden Sun Moth	CR
<i>Botaurus poiciloptilus</i>	Australasian Bittern	EN
<i>Borya mirabilis</i>	Grampians Pincushion-lily	EN
<i>Caladenia lowanensis</i>	Wimmera Spider-orchid	EN
<i>Manorina melanotis</i>	Black-eared Miner	EN
<i>Prasophyllum subbisectum</i>	Pomonal Leek-orchid	EN
<i>Spyridium furculentum</i>	Forked Spyridium	EN
<i>Caladenia orientalis</i>	Eastern Spider-orchid	EN
<i>Caladenia audasii</i>	Mclvor Spider-orchid	EN
<i>Caladenia colorata</i>	Colourful Spider-orchid	EN
<i>Sclerolaena napiformis</i>	Turnip Copperburr	EN
<i>Prasophyllum suaveolens</i>	Fragrant Leek-orchid	EN
<i>Euastacus bispinosus</i>	Glenelg Spiny Crayfish	EN
<i>Maccullochella macquariensis</i>	Trout Cod	EN
<i>Macquaria australasica</i>	Macquarie Perch	EN

Scientific Name	Common Name	Status
<i>Charadrius mongolus</i>	Lesser Sand Plover	EN
<i>Calyptorhynchus banksii graptogyne</i>	Red-tailed Black-Cockatoo (south-eastern)	EN
<i>Stipiturus mallee</i>	Mallee Emu-wren	EN
<i>Pseudomys fumeus</i>	Smoky Mouse	EN
<i>Pseudomys shortridgei</i>	Heath Mouse	EN
<i>Isodon obesulus obesulus</i>	Southern Brown Bandicoot	EN
<i>Paralucia pyrodiscus lucida</i>	Eltham Copper Butterfly	EN
<i>Acacia enterocarpa</i>	Jumping-jack Wattle	EN
<i>Lachnagrostis adamsonii</i>	Adamson's Blown-grass	EN
<i>Caladenia tensa</i>	Rigid Spider-orchid	EN
<i>Eriocaulon australasicum</i>	Southern Pipewort	EN
<i>Eucalyptus crenulata</i>	Buxton Gum	EN
<i>Lepidium hyssopifolium s.s.</i>	Basalt Peppercross	EN
<i>Lepidium monoplocoides</i>	Winged Peppercross	EN
<i>Rutidosia leptorhynchoides</i>	Button Wrinklewort	EN
<i>Thelymitra epipactoides</i>	Metallic Sun-orchid	EN
<i>Westringia crassifolia</i>	Whipstick Westringia	EN
<i>Pterostylis despectans</i>	Lowly Greenhood	EN
<i>Euphrasia collina subsp. muelleri</i>	Purple Eyebright	EN
<i>Caladenia fulva</i>	Tawny Spider-orchid	EN
<i>Dipodium campanulatum</i>	Bell-flower Hyacinth-orchid	EN
<i>Caladenia xanthochila</i>	Yellow-lip Spider-orchid	EN
<i>Pezoporus occidentalis</i>	Night Parrot	EN
<i>Nannoperca obscura</i>	Yarra Pygmy Perch	VU
<i>Leipoa ocellata</i>	Malleefowl	VU
<i>Thinornis cucullatus</i>	Hooded Plover	VU
<i>Polytelis anthopeplus</i>	Regent Parrot	VU
<i>Hirundapus caudacutus</i>	White-throated Needletail	VU
<i>Pachycephala rufogularis</i>	Red-lored Whistler	VU
<i>Grantiella picta</i>	Painted Honeyeater	VU
<i>Potorous tridactylus trisulcatus</i>	Long-nosed Potoroo	VU
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	VU
<i>Litoria raniformis</i>	Growling Grass Frog	VU
<i>Psophodes leucogaster</i>	White-bellied Whipbird	VU
<i>Rostratula australis</i>	Australian Painted-snipe	VU
<i>Petrogale penicillata</i>	Brush-tailed Rock-wallaby	VU
<i>Lepidium pseudopapillosum</i>	Erect Peppercross	VU
<i>Maireana cheelii</i>	Chariot Wheels	VU
<i>Myriophyllum porcatum</i>	Ridged Water-milfoil	VU

Scientific Name	Common Name	Status
<i>Pimelea pagophila</i>	Grampians Rice-flower	VU
<i>Senecio macrocarpus</i>	Large-headed Fireweed	VU
<i>Swainsona murrayana</i>	Slender Darling-pea	VU
<i>Swainsona plagiotropis</i>	Red Swainson-pea	VU
<i>Thelymitra mackibbinii</i>	Brilliant Sun-orchid	VU
<i>Xerochrysum palustre</i>	Swamp Everlasting	VU
<i>Daviesia laevis</i>	Grampians Bitter-pea	VU
<i>Caladenia formosa</i>	Elegant Spider-orchid	VU
<i>Grevillea montis-cole subsp. brevistyla</i>	Langi Ghiran Grevillea	VU
<i>Eleocharis obicis</i>	Striate Spike-sedge	VU
<i>Maccullochella peelii</i>	Murray Cod	VU
<i>Delma impar</i>	Striped Legless Lizard	VU
<i>Nyctophilus corbeni</i>	South-eastern Long-eared Bat	VU
<i>Acacia glandulicarpa</i>	Hairy-pod Wattle	VU
<i>Asterolasia phebalioides</i>	Downy Star-Bush	VU
<i>Caladenia versicolor</i>	Candy Spider-orchid	VU
<i>Dodonaea procumbens</i>	Trailing Hop-bush	VU
<i>Glycine latrobeana</i>	Clover Glycine	VU
<i>Trichanthodium baracchianum</i>	Dwarf Yellow-heads	VU
<i>Phebalium lowanense</i>	Lowan Phebalium	VU
<i>Pultenaea williamsoniana</i>	Williamson's Bush-pea	VU
<i>Thelymitra matthewsii</i>	Spiral Sun-orchid	VU
<i>Grevillea bedgoodiana</i>	Enfield Grevillea	VU
<i>Tecticornia flabelliformis</i>	Bead Glasswort	VU
<i>Pterostylis cheraphila</i>	Floodplain Rustyhood	VU
<i>Caladenia ornata</i>	Ornate Pink-fingers	VU
<i>Pterostylis chlorogramma</i>	Green-striped Greenhood	VU

Appendix 5: Prioritising projects for threatened species and ecological communities

This Appendix details the process used to develop and prioritise projects for the Regional Land Partnerships Program Action Plan for the Wimmera's threatened species and threatened ecological communities. This process included 4 components:

1. Prioritising the Wimmera's species,
2. Prioritising the Wimmera's nationally threatened ecological communities,
3. Identifying and prioritising the region's landscapes, and
4. Identifying and prioritising projects to achieve the Australian Government's and regional outcomes for the Wimmera's highest priority threatened species and ecological communities.

Development and collaboration on Investment Priorities

Wimmera CMA engaged extensively with regional stakeholders and the community during the development of the new Wimmera Regional Catchment Strategy 2021-27, this Action Plan and the Victorian Government's Biodiversity Response Planning (BRP) process. Wimmera CMA has a good understanding of regional biodiversity and threatened species priorities and has used this information to inform the priority projects and management actions contained in this Action Plan.

Fortuitously, the timing for the development of this plan coincided with the BRP process led by DELWP. Wimmera CMA engaged early with DELWP and agreed to collaborate on stakeholder and community engagement for efficiency and to avoid 'engagement fatigue' with stakeholders. This resulted in a series of workshops with stakeholders and the community, led by DELWP, to workshop priority landscapes, priority species and priority projects. The initial workshops were conducted in-person and moved on-line due to Victorian Government restrictions on gatherings to prevent the spread of the coronavirus.

Stakeholders engaged include Department of Environment, Land, Water and Planning, Birdlife Australia, Trust for Nature, Greening Australia, Barengi Gadjin Land Council, Landcare, Project Platypus, Regional Roads Victoria, Agriculture Victoria, Parks Victoria, West Wimmera Shire Council, Horsham Rural City Council, Hindmarsh Shire Council, Yarriambiack Shire Council, Ararat Rural City Council, Northern Grampians Shire Council, Pyrenees Shire Council, Buloke Shire Council, Yarrilinks Landcare, Hindmarsh Landcare Network, the Country Fire Authority and community representatives, mainly representing Landcare groups.

Prioritising the Wimmera's species

The aim of the regional species prioritisation process was to work with the community and stakeholders to develop and implement a tool that would identify Investment Priorities in a rigorous and repeatable way. To achieve this, four categories were identified to evaluate all species that have been recorded in the Wimmera, considering:

- The Australian Government's Investment Priority species, including those identified as a priority under the Threatened Species Strategy
- Conservation status under the EPBC Act
- Regional stakeholder and community priorities and aspirations, including species identified during prioritisation workshops and consultation processes for the RCS, this Action Plan and DELWP-led Biodiversity Response Planning, and
- Proportion of the species' distribution in the Wimmera based on national records.

These categories and the scoring system are described in Table 34 and the result of this assessment can be seen in Table 35.

Table 34: Regional species prioritisation categories and scoring system

Category	Description	Score
Community Significance	Species identified by stakeholders and the community as important	Identified as regionally important = 0.25 Not identified as regionally important = 0
Conservation Status	EPBC Act listing	Extinct = 0.99 Critically Endangered = 0.8 Endangered = 0.6 Vulnerable = 0.4 Conservation Dependent = 0.2 Not Listed = 0
Australian Government Investment Priority	Has the species been identified as an Australian Government Investment Priority under the Threatened Species Strategy?	Yes = 0.5 No = 0
Estimated proportion of national records in the Wimmera region	Regional DELWP staff estimated the proportion of the species' national records/distribution in the Wimmera	The score equals the proportion. For example, 100% = 1.0, 50% = 0.5 and 0% = 0.0
Total Score	Sum of all categories	Sum of all categories

Table 35: Top 25 results from the Wimmera region's species prioritisation process

#	Common Name	Scientific Name	Community Significance Score	Conservation status (EPBC listing)	Conservation status score	Australian Government Investment Priority score	Proportion of national records in the Wimmera	Total Score
1	Wimmera rice-flower	<i>Pimelea spinescens subsp. pubiflora</i>	0.25	Critically Endangered	0.8	0	1.00	2.05
2	Grampians globe-pea	<i>Sphaerolobium acanthos</i>	0	Critically Endangered	0.8	0	1	1.8
3	Red-tailed black-cockatoo	<i>Calyptorhynchus banksii graptogyne</i>	0.25	Endangered	0.6	0.5	0.45	1.8
4	Grampians pincushion-lily	<i>Borya mirabilis</i>	0.25	Endangered	0.6	0	0.9	1.75
5	Swift parrot	<i>Lathamus discolor</i>	0.25	Critically Endangered	0.8	0.5	0.1	1.65
6	Spiny rice-flower	<i>Pimelea spinescens subsp. spinescens</i>	0.25	Critically Endangered	0.8	0.5	0.1	1.65
7	Grampians rice-flower	<i>Pimelea pagophila</i>	0.25	Vulnerable	0.4	0	1	1.65
8	Plains-wanderer	<i>Pedionomus torquatus</i>	0.25	Critically Endangered	0.8	0.5	0.07	1.62
9	Pomonal leek-orchid	<i>Prasophyllum subbisectum</i>	0	Endangered	0.6	0	1	1.6
10	Wimmera bottlebrush	<i>Callistemon wimmerensis</i>	0	Critically Endangered	0.8	0	0.8	1.6
11	Forked spyridium	<i>Spyridium furculentum</i>	0.25	Endangered	0.6	0	0.7	1.55
12	Turnip copperburr	<i>Sclerolaena napiformis</i>	0	Endangered	0.6	0.5	0.35	1.45
13	Heath mouse	<i>Pseudomys shortridgei</i>	0.25	Endangered	0.6	0	0.6	1.45

#	Common Name	Scientific Name	Community Significance Score	Conservation status (EPBC listing)	Conservation status score	Australian Government Investment Priority score	Proportion of national records in the Wimmera	Total Score
14	Australasian bittern	<i>Botaurus poiciloptilus</i>	0	Endangered	0.6	0.5	0.3	1.4
15	Avenue cassinia	<i>Cassinia tegulata</i>	0	Critically Endangered	0.8	0	0.6	1.4
16	Candy spider-orchid	<i>Caladenia versicolor</i>	0	Vulnerable	0.4	0	1	1.4
17	Button wrinklewort	<i>Rutidosia leptorhynchoides</i>	0.25	Endangered	0.6	0.5	0.01	1.36
18	Eastern curlew	<i>Numenius madagascariensis</i>	0	Critically Endangered	0.8	0.5	0.05	1.35
19	Wimmera spider-orchid	<i>Caladenia lowanensis</i>	0	Endangered	0.6	0	0.72	1.32
20	Regent honeyeater	<i>Anthochaera phrygia</i>	0	Critically Endangered	0.8	0.5	0.01	1.31
21	Williamson's bush-pea	<i>Pultenaea williamsoniana</i>	0	Vulnerable	0.4	0	0.9	1.3
22	Malleefowl	<i>Leipoa ocellata</i>	0.25	Vulnerable	0.4	0.5	0.15	1.3
23	Mountain dragon Grampians form	<i>Rankinia diemensis (Grampians)</i>	0.25	Not Listed	0	0	1	1.25
24	Freshwater isopod	<i>Synamphisopus ambiguus</i>	0.25	Not Listed	0	0	1	1.25
25	Grampians bertya	<i>Bertya grampiana</i>	0.25	Not Listed	0	0	1	1.25

Prioritising the Wimmera's threatened ecological communities

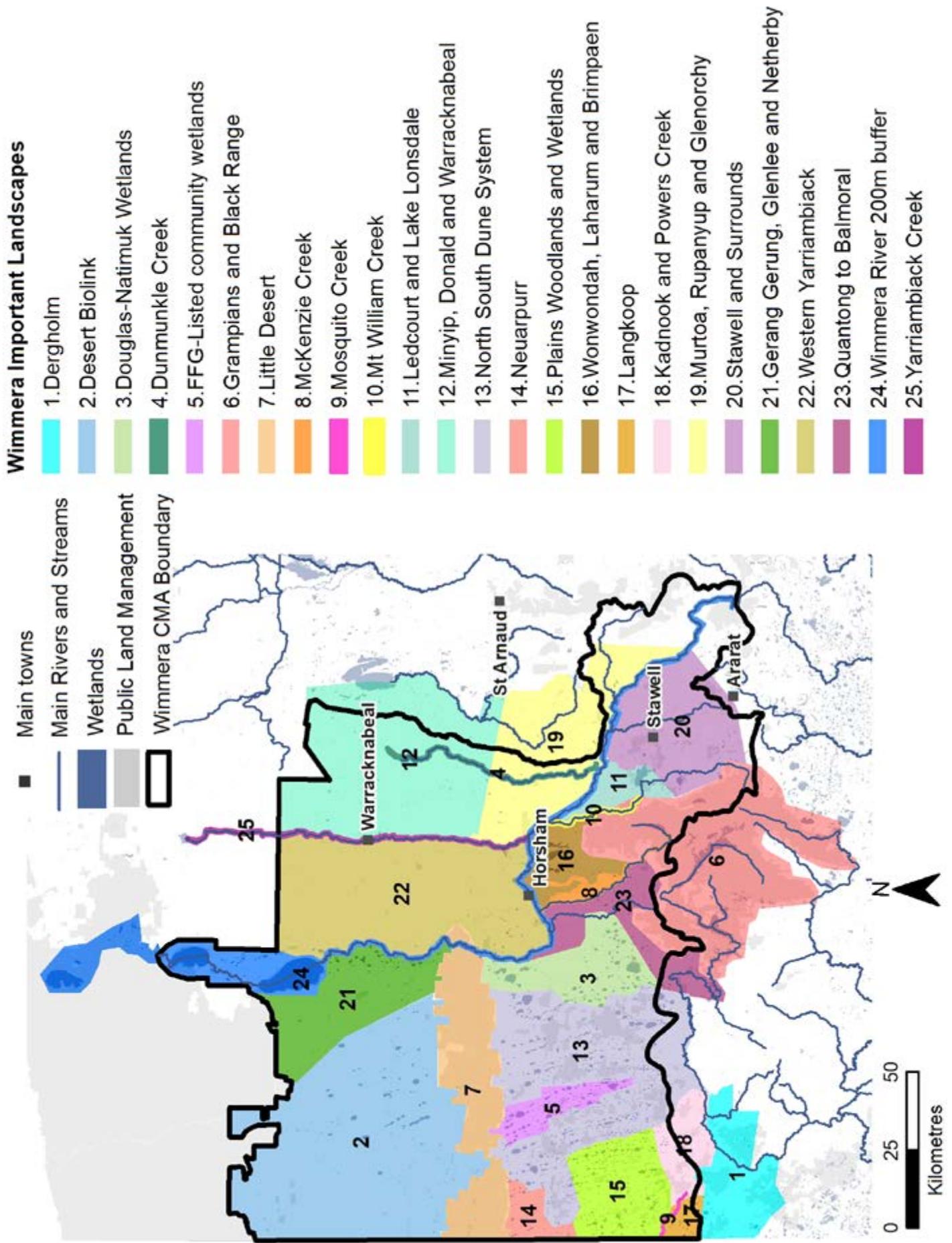
Seven ecological communities in the Wimmera are listed as threatened under the EPBC Act. These communities are all high priority for protection and management as they are all highly endangered and under threat of ongoing decline. Appendix 6 describes each of the Wimmera's threatened ecological communities, including their location, current condition and threats impacting on their condition and extent.

Prioritising the Wimmera's landscapes

Two stakeholder and community workshops for the BRP process focused on identifying and prioritising 'focal landscapes' within the Wimmera region. Firstly, focal landscapes were identified by stakeholder and community participants identifying natural landscapes and landscapes that were important to them. Figure 22 shows the focal landscapes before they were prioritised. Due to the subjective nature of this initial process, most of the focal landscapes were identified as important by the various participants. Subsequently, an analytical approach was taken to prioritise the focal landscapes.

Due to this process being a collaboration between DELWP and Wimmera CMA, the area considered for this work was the Biodiversity Response Planning area delineated by DELWP. This area includes most of the Wimmera region but also included some areas outside the Wimmera, including Gariwerd (Grampians National Park) and Burrunj (Black Range State Park).

Figure 22: Focal landscape map developed by DELWP as part of the landscape prioritisation process



The analytical focal landscapes prioritisation process was driven by information provided by DELWP's NaturePrint and Strategic Management Prospects (SMP) Tools. As part of the BRP process, Wimmera CMA was provided with the SMP outputs that identify which management actions (for example, rabbit control, revegetation, fox control) should be implemented in different locations, to elicit the most beneficial and cost-effective outcome for Victoria's biodiversity. DELWP identified these priority actions and associated locations in two categories, those that fell into the top 3% of all activities (best cost-effectiveness) and top 10% of activities (second best cost-effectiveness). All the focal landscapes were evaluated and ranked using this data together with the relative number of threatened species present. Table 36 shows the regional focal landscape prioritisation categories and scoring system. The outcome of this ranking can be seen in Table 37.

Table 36: Regional focal landscape prioritisation categories and scoring system

Category	Score
Area of top 3% of priority actions	Percentage of total focal landscape area where SMP had identified the top 3% of priority actions to occur. The higher the percentage, the higher the rank score
Area of top 10% of priority actions	Percentage of total focal landscape area where SMP had identified the top 10% priority actions to occur. The higher the percentage, the higher the rank score
Total area (combined top 3% and top 10%) of priority actions	Percentage of total focal landscape area where SMP had identified both the top 3% and top 10% of priority actions to occur. The higher the percentage, the higher the rank score
Threatened species	Number of threatened species known to occur in the focal landscape. The higher the number of species, the higher the rank score
Total rank	Sum of the total rank score. The lower the number, the higher the total rank

Table 37: Focal landscape prioritisation outcomes

Landscape name	Area (ha)	Area (ha) of top 3% priority actions	% area with top 3% actions	3% Rank	Area (ha) of top 10% priority actions	% area with top 10% actions	10% Rank	Area (ha) of total priority actions	% area of total priority action	Total Area Rank	Threatened species	Rank	Totals (from ranks)	Total rank	Rank Score
Grampians and Black Range	299006	198257	66%	1	906306	303%	2	1000000	369%	2	390	2	7	1	1
Little Desert	145081	58586	40%	2	484570	334%	1	543156	374%	1	287	12	16	2	0.96
Wimmera River	154327	29368	19%	7	160627	104%	4	189995	123%	5	489	1	17	3	0.92
Stawell and surrounds	128694	36982	29%	4	127891	99%	5	164873	128%	4	317	8	21	4	0.88
Ledcourt and Lake Lonsdale	26818	7829	29%	4	21977	82%	8	29806	111%	6	320	6	24	5	0.84
Dergholm area	84687	17353	20%	6	105636	125%	3	122989	145%	3	258	17	29	6	0.8
North-South Dune System	285143	11564	4%	10	277513	97%	6	289077	101%	7	304	10	33	7	0.76
Douglas-Natimuk Wetlands	116653	1033	0.90%	15	54428	47%	9	55461	48%	9	370	3	36	8	0.72
Mount William Creek	2535	132	5%	9	2224	88%	7	2356	93%	8	261	16	40	9	0.68
Desert Biolink	411451	4369	1%	13	138266	34%	11	142635	35%	12	319	7	43	10	0.64
Kadnook and Powers Creek	45221	775	2%	11	19311	43%	10	20086	44%	10	265	13	44	11	0.6
MacKenzie River	16739	1643	10%	8	4581	27%	12	6224	37%	11	264	14	45	12	0.56

Landscape name	Area (ha)	Area (ha) of top 3% priority actions	% area with top 3% actions	3% Rank	Area (ha) of top 10% priority actions	% area with top 10% actions	10% Rank	Area (ha) of total priority actions	% area of total priority action	Total Area Rank	Threatened species	Rank	Totals (from ranks)	Total rank	Rank Score
Quantong to Balmoral	70371	849	1%	13	17842	25%	14	18691	27%	13	309	9	49	13	0.52
Yarriambiack Creek (200m buffer)	16352	5694	35%	3	32	0.20%	25	5726	35%	12	289	11	51	14	0.48
West Yarriambiack grasslands	283197	241	0.08%	16	20262	7%	20	20503	7%	21	356	5	62	15	0.44
Gerang Gerung, Glenlea Netherby	117725	228	0.20%	18	8047	7%	20	8275	7%	21	361	4	63	16	0.4
Plains woodlands and wetlands	91493	1559	2%	11	11738	13%	16	13297	15%	16	193	24	67	17	0.36
Dunmunkle Creek (200m buffer)	10009	0	0	21	2580	26%	13	2580	26%	15	225	20	69	18	0.32
Wonwondah, Laharum and Brimpaen	44002	269	0.60%	17	4060	9%	17	4329	10%	18	243	18	70	19	0.28
Minyup, Donald, Warracknabeal	296621	647	0.20%	18	22383	8%	19	23030	8%	20	264	14	71	20	0.24
Murtoa, Rupanyup	177053	1002	0.60%	17	16278	9%	17	17280	10%	18	214	21	73	21	0.2
Flora and fauna guarantee-listed community wetlands	34945	4	0.01%	20	4807	14%	15	4811	14%	16	194	23	74	22	0.16
Mosquito Creek	867	0	0	21	50	6%	22	50	6%	23	197	22	88	23	0.12
Langkoop	19200	0	0	21	786	4%	24	786	4%	25	241	19	89	24	0.08
Neuarpuurr	24240	0	0	21	1566	6%	22	1566	6%	22	192	25	90	25	0.04

Prioritising projects

Priority projects for the Wimmera's threatened species and threatened ecological communities were identified by understanding the aspirations of the community and stakeholders through a series of workshops to develop project ideas and concepts. A systematic and repeatable ranking process was then developed to rank these projects against a clear set of criteria.

In developing the assessment criteria, the most cost-effective management actions were prioritised and 'focal landscapes' were developed. The focal landscapes prioritised the regional landscape to identify the key areas to focus investment and management.

A key element of the project prioritisation process outlined below was the use of information provided by DELWP's NaturePrint and Strategic Management Prospects (SMP) Tools. NaturePrint and SMP are a suite of spatially based decision-support products and tools that evaluate the impact of threats on species and ecosystems. Importantly, SMP evaluates the expected benefits and indicative costs of conservation actions across species and locations to help inform and direct cost-effective management and conservation efforts. For more background on NaturePrint and SMP please visit: <https://www.environment.vic.gov.au/biodiversity/natureprint>.

Both the focal landscape prioritisation and project prioritisation outlined below were heavily driven by the cost-effective, priority actions data provided by SMP. This provides confidence that the projects that ranked highly in the prioritisation process will deliver both ecological and cost-effective management outcomes.

REGIONAL PROJECT DEVELOPMENT

The fourth workshop of the DELWP BRP-RCS and Action Plan collaboration focused on understanding community and stakeholder aspirations. Participants were asked to brainstorm and communicate project ideas and biodiversity aspirations, whether they be well-planned project proposals, detailed concepts or simply ideas and aspirations. There were more than 120 projects, ideas and concepts collected across the workshop. At the time of writing this Action Plan, DELWP's BRP process was not ready to develop the information gathered any further. DELWP regional staff supported Wimmera CMA to use the information gathered to develop a trial project investment prioritisation process.

The first step was to take the information collected in the workshop and develop a list of project proposals. This involved removing concepts and ideas that did not have sufficient detail to be prioritised and removing or combining similar and complementary projects. This resulted in 55 projects. Next, projects that did not clearly identify a target biodiversity asset or aim to improve the status of biodiversity assets were removed. This resulted in a list of 19 projects to be prioritised.

PROJECT PRIORITISATION PROCESS

The project prioritisation categories and scoring system are described in Table 38 and the results of the project prioritisation can be seen in Table 39.

The project prioritisation process considered the following:

1. Did the project target federal Investment Priority assets? How many?
 - A key factor was identifying projects that target one or more Australian Government Investment Priorities, including species identified as priorities under the Threatened Species Strategy and EPBC-listed species.
2. Did the project target priority species identified by Wimmera stakeholders and community?
 - This criteria was included to help identify species that were important to the regional community or to regional conservation objectives.
3. Did the project target priority landscapes identified by Wimmera stakeholders and community using information from the Victorian Government's NatureKit and Strategic Management Prospect tools?
 - This criteria was included to take into account stakeholder and community aspirations and prioritise works conducted in areas that have been identified by NatureKit and SMP as areas of high biodiversity value and where it is cost-effective to implement management actions.
4. Was the project proposing strategic, cost-effective management actions as identified by the Victorian Government's NatureKit and Strategic Management Prospect tools?
 - Implementing cost-effective management actions is a key consideration. This criteria was used to assess the proposed project's management actions against those identified by NatureKit and SMP that are both cost-effective and are likely to achieve multiple benefits to multiple species and ecosystems.

Table 38: Wimmera project prioritisation categories and scoring system

Category	Scoring system
BRP Focal Landscape	Average focal landscape rank score of all focal landscapes the project proposed working in
Primary Target Assets	Average species prioritisation rank score of the project's primary target assets. Note: Nationally threatened ecological communities were not part of the species prioritisation process, as such all ecological communities were given a rank score of 0.75
Did the project target Australian Government Investment Priorities?	Yes = 0.5 No = 0.0
How many biodiversity assets will the project benefit?	Targets 5+ priority species or ecological communities = 1.0 Targets 4 priority species or ecological communities = 0.8 Targets 3 priority species or ecological communities = 0.6 Targets 2 priority species or ecological communities = 0.4 Targets one priority species or ecological communities = 0.2 Doesn't target any priority species = 0.0
Does the project align with SMP priority actions in the proposed location?	The proposed project: 100% actions are SMP priority actions = 1.0 ~ 80% actions are SMP priority actions = 0.8 ~ 60% actions are SMP priority actions = 0.6 ~ 40% actions are SMP priority actions = 0.4 ~ 20% actions are SMP priority actions = 0.2 0% actions are SMP priority actions = 0.0 Note: some proposed actions have not been considered by SMP, such as species translocations and reintroductions. These projects were given a score of 0.5.
Total rank score	Sum of all categories

Table 39: Priority projects in the Wimmera for threatened species and threatened ecological communities

Project Title	Project Objectives	Organisations	BRP Focal Landscape Score	Primary Target Assets	Secondary Target Assets	Target Asset Score	Target Australian Government Priority Investment	Target Australian Government Priority Investment Score	How many assets will the project benefit	How many assets will the project benefit Score	Does the project align with SMP	Total Rank
Habitat and vegetation protection and management – Little Desert region	To increase the protection of understorey by reducing total grazing pressure within the Little Desert region. Control and monitoring of all herbivores (rabbit, hare, deer, goat and macropods). Cross-tenure.	Parks Victoria, Wimmera CMA, DELWP, Landcare	0.96	Malleefowl Buloke Woodlands Plains Mallee Box Woodlands	Silky mouse Little pygmy possum Rosenberg's goanna	0.938	YES	0.5	4	0.8	0.8	4.00
Protecting our Malleefowl	Cross tenure, landscape scale cat and fox control in the Little Desert region. To continue expanded fox control and explore other fox control options. Monitoring and research. Improve knowledge on the population, extent and status of Malleefowl, including: additional LIDAR, assessment of small fragmented populations north of the Little Desert National Park, and genetic assessment of fragmented Malleefowl populations	Parks Victoria, Wimmera CMA, National Malleefowl Recovery Group, Victorian Malleefowl Recovery Group, Landcare	0.96	Silky mouse Little pygmy possum Rosenberg's goanna Buloke Woodlands Plains Mallee Box Woodlands	Silky mouse Little pygmy possum Rosenberg's goanna	0.938	YES	0.5	4	0.8	0.4	3.60
Swift parrot and box ironbark woodland protection and management	Protect and enhance the Victorian Temperate Woodland Birdland Community and Box-ironbark Woodlands occurring in the Wimmera. Establish permanent protection, long-term management agreements and improved management of remnant vegetation on private land and conduct revegetation.	Birds Australia, Trust for Nature, Greening Australia, Parks Victoria, Wimmera CMA, DELWP, Local Landcare	0.86	Swift Parrot Grey Box Grassy Woodlands White Box-Yellow Box-Blakely's Red Gum Grassy Woodland		0.828	YES	0.5	3	0.6	0.8	3.59
Restoring ecological function in the Little Desert	Restore connections to Country and ecological function by returning regionally extinct and locally uncommon wildlife back into the Little Desert landscape.	Parks Victoria, Wimmera CMA	0.96	Western barred bandicoot Burrowing bettong Brush-tailed bettong		0.993	YES	0.5	3	0.6	0.5	3.55
Wimmera orchids protection and management	Protect and manage wild populations and translocated populations of rare and threatened orchids in the area. Including weed and grazing control, protect areas where orchids occur, improve knowledge gaps.	DELWP, Royal Botanic Gardens Victoria	0.56	Pomonal leek-orchid Candy spider-orchid Wimmera spider-orchid Tawny spider-orchid Floodplain rustyhood Colourful spider-orchid		0.922	YES	0.5	5	1	0.5	3.48

Project Title	Project Objectives	Organisations	BRP Focal Landscape Score	Primary Target Assets	Secondary Target Assets	Target Asset Score	Target Australian Government Priority Investment	Target Australian Government Priority Investment Score	How many assets will the project benefit	How many assets will the project benefit score	Does the project align with SMP	Total Rank
Wimmera grasslands restoration and management	The Wimmera's grasslands have been extensively cleared and modified. This project aims to protect and enhance these grassland systems, including management and restoration of roadsides and remnant reserves; signage of important roadsides in conjunction with Councils. Education of landholders adjoining roadside grasslands. Compliance for illegal removal. Manage key threatened species within grasslands.	DELWP, Regional Roads Victoria, Local Councils, Wimmera CMA	0.328	Plains-wanderer Buloke Woodlands Grasslands of Murray Valley Plains Wimmera rice-flower Spiny rice-flower Turnip copperburr		0.889	YES	0.5	5	1	0.6	3.32
Food For Futures - Red-tailed black-cockatoo (south-eastern) (SERTBC) conservation and management	Continue the Food for Futures SERTBC conservation project. To encourage habitat restoration, food resources, habitat trees, and remnant protection. Restore food resources via revegetation. Community engagement. Support recovery group. Increase the protection of paddock trees during stubble burns and roadside vegetation.	Birds Australia, Trust for Nature, Greening Australia, Wimmera CMA, Landcare	0.78	Red-tailed black-cockatoo (south-eastern)	Buloke Woodlands	0.988	YES	0.5	2	0.4	0.6	3.27
Weed management in the northern Grampians and Stawell region	To control, manage and prevent establishment of new and emerging weeds in nationally significant ecosystems. Including tall wattle in the northern Grampians area, reserves and private land; acacia spp; Yarra burgan around Halls Gap; Cape tulip. To continue currently funded weed control in Stawell and Ararat to target boneseed (<i>Chrysanthemoides monilifera</i>) and other woody weeds like invasive acacias.	DELWP, Parks Victoria, Project Platypus	0.85	Grey Box Woodlands White Box-Yellow Box-Blakely's Red Gum Grassy Woodland		0.750	YES	0.5	2	0.4	0.6	3.10
Protecting the Wimmera's threatened flora	To implement recovery actions from National Recovery Plans and Flora and Fauna Guarantee Act 1988 (FFG Act) action statements for threatened flora within the Wimmera. This includes species recently reclassified by the common assessment method related to FFG Act implementation. The project will foster ownership of relevant land managers and target species and locations that are not benefiting from landscape scale actions.	DELWP	0.504	Turnip copperburr Wimmera rice-flower Spiny rice-flower Grampians rice-flower Grampians pincushion-lily,		0.986	YES	0.5	3	0.6	0.4	2.99

Project Title	Project Objectives	Organisations	BRP Focal Landscape Score	Primary Target Assets	Secondary Target Assets	Target Asset Score	Target Australian Government Priority Investment	Target Australian Government Priority Investment Score	How many assets will the project benefit	How many assets will the project benefit Score	Does the project align with SMP	Total Rank
Grasslands of the eastern Wimmera	Greening Australia and Jallukar Landcare Group grassland and grassy woodland maintenance and reinstatement. Surveying existing grasslands and developing and acting on management plans. Traditional Owner cultural burning. Builds on previous funded works around grassland seed supply and community capacity to identify and manage grasslands and grassy woodlands.	Greening Australia, Jallukar Landcare Group, Traditional Owners	0.8	Grey Box Woodlands White Box-Yellow Box-Blakely's Red Gum Grassy Woodland		0.750	YES	0.5	2	0.4	0.4	2.85
Grampians to Pyrenees Biolink	Funding to target revegetation activities in the upper catchment to link the Grampians range to the Pyrenees range along priority corridors as set out in the Grampians to Pyrenees Biolink Conservation Action Plan. Victorian Temperate Woodland Birdland Community and the southernmost extent of box-ironbark forests and woodlands occurring in the Wimmera will become critical habitat under climate change.	Project Platypus	0.6	Grey Box Woodlands White Box-Yellow Box-Blakely's Red Gum Grassy Woodland		0.750	YES	0.5	2	0.4	0.4	2.65
Understanding the ecological impact of management actions in the Little Desert region	Asset monitoring of small terrestrial vertebrates across the Little Desert National Park to understand the effectiveness of management actions.	Parks Victoria, Wimmera CMA, DELWP	0.96	Silky mouse Little pygmy possum Aprasia striolata		0.603	NO	0	4	0.8	0	2.36
Glenlee and Little Desert Biolinks.	Glenlee Biolink. Revegetation, remnant enhancement and connectivity in the Gerang Gerung and Glenlee landscape. To establish a Little Desert Edge Biolink focused project to enhance remnant vegetation and revegetate degraded land along the northern edge of the Little Desert, providing habitat for threatened species and connectivity for biodiversity.	Hindmarsh Landscape Network	0.4	Plains Mallee Box Woodlands, Malleefowl		0.750	YES	0.5	2	0.4	0.2	2.25
Mackenzie River invasive species management	To manage invasive species (both flora and fauna) along the Mackenzie River and other DELWP managed water frontages. Target species include cats, rabbits, foxes and weeds. Works with protecting platypus (reducing predation by foxes) and existing bird populations.	DELWP	0.56	Platypus		0.446	NO	0	1	0.2	1	2.21

Project Title	Project Objectives	Organisations	BRP Focal Landscape Score	Primary Target Assets	Secondary Target Assets	Target Asset Score	Target Australian Government Priority Investment	Target Australian Government Priority Investment Score	How many assets will the project benefit	How many assets will the project benefit Score	Does the project align with SMP	Total Rank
Outlet Creek Biolink	A project focused on the Outlet Creek Biolink. Revegetation, remnant enhancement and woody weed control along Outlet Creek on private land to enhance the corridor of Outlet Creek. Will help improve Major Mitchell Cockatoo habitat, manage Traditional Owner values and benefit Ross Lake.	Hindmarsh Landcare Network	0.92	Ross Lake Major Mitchell Cockatoo	Ngaiapakatia/ Ngelpagutya (Lake Albacutya)	0.163	NO	0	2	0.4	0.6	2.08
Wimmera platypus rescue	To establish a second platypus population in the Wimmera (potentially Barringgi Gadjin (Wimmera River), detailed work required to decide) and look at genetic rescue of the Mackenzie River population, including landscape scape predator control across the Laharum area.	Wimmera CMA	0.74	Platypus		0.446	NO	0	1	0.2	0.5	1.89
Mount Cole creek management and restoration	Manage environmental flows for the Mount Cole creek and potential platypus re-introduction.	Project Platypus	0.2	Blackfish Platypus		0.452	NO	0	2	0.4	0.5	1.55
Yellow-bellied glider survey and management	Improve the understanding and management requirement of the Mosquito Creek yellow-bellied glider population, including its potential importance in a state and national context.	Wimmera CMA	0.26667	Yellow-bellied glider		0.502	NO	0	1	0.2	0	0.97
Future proofing the Major Mitchell's cockatoo	To prepare for climate change, ensuring that the critical feeding and nesting requirements of Major Mitchell's cockatoo are enhanced to the south. They may start moving south with increasing temperatures and wildfires making habitat to the north less habitable or destroyed. Large scale planting of slender cypress pine (<i>Callitris gracilis murrayensis</i>) in Grey Box Grassy Woodland vegetation community.	Parks Victoria, Wimmera CMA, Mallee CMA	0.6	Major Mitchell's cockatoo		0.163	NO	0	1	0.2	0	0.96

Appendix 6: Threatened Ecological Communities

Priority threatened ecological communities

All of the Wimmera's nationally threatened ecological communities are high priority for protection and management. This Appendix describes each of the Wimmera's threatened ecological communities, including their location, current condition and threats impacting on their condition and extent.

BULOKE WOODLANDS OF THE RIVERINA AND MURRAY-DARLING DEPRESSION BIOREGIONS

The 'Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions' ecological community (henceforth called Buloke Woodlands) includes a number of closely-related woodland communities where buloke (*Allocasuarina luehmannii*) is usually a dominant or co-dominant tree. Other trees that may be prominent include slender pine (*Callitris gracilis*), white/murray pine (*Callitris glaucophylla*), black box (*Eucalyptus largiflorens*), yellow/blue gum (*Eucalyptus leucoxylon subsp. pruinosa*) and grey box (*Eucalyptus microcarpa*).

Buloke Woodlands are listed as endangered under the EPBC Act. Buloke woodlands provide critical habitat for several threatened and endangered species, including the red-tailed black-cockatoo (south-eastern). Actions to improve Buloke Woodlands are likely to benefit these species.

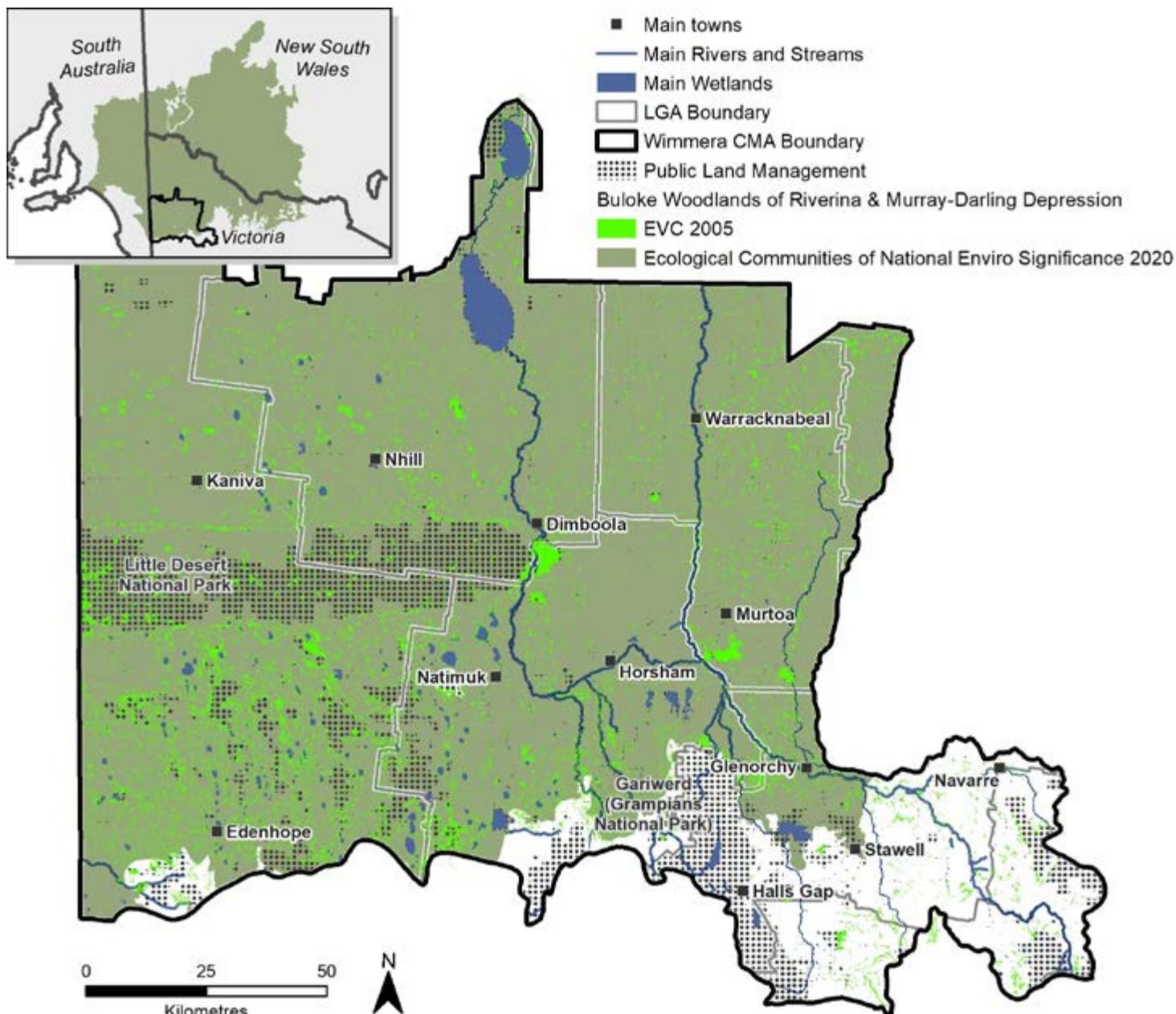
Location

Buloke Woodlands occur from south-eastern South Australia through north-western and northern central Victoria into south central New South Wales. The community occurs across a large area of the Wimmera Management Unit (Figure 23). Buloke Woodlands are a dominant feature of remnant native vegetation in the Wimmera. ⁽⁴⁵⁾

Figure 23 shows:

- The Australian Government's mapping of Ecological Communities of National Environmental Significance Distributions 2020 mapping. ⁽⁴⁶⁾
- Mapping of Victorian Ecological Vegetation Classes (EVCs) in which Buloke is the dominant or co-dominant tree (consistent with the ecological community description). ⁽⁴⁷⁾

Figure 23: Estimated extent of 'Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions' in the Wimmera



Condition

Buloke Woodlands in the Wimmera exist as a patchy, highly fragmented, mostly degraded community significantly reduced from their former range. The formerly extensive Buloke Woodlands are now represented by many scattered small remnants partly linked by the extensive, largely uncleared road network. ⁽⁴⁵⁾

Buloke Woodlands inhabit soils that are particularly suitable for agriculture. The woodland community has been extensively cleared to make way for agriculture, leaving isolated remnants scattered through a grazing and broadacre cropping landscape. Many remnants have been grazed by sheep and native and introduced herbivores like rabbits and kangaroos. The associated flora in many remnants is

dominated by introduced species and few of the plant species typical of Buloke Woodlands still co-occur with the bulokes themselves.

The National Recovery Plan notes that all stands of Buloke Woodlands are affected by a degree of degradation and species composition has changed and continues to change.

Based on the EVC mapping in Figure 23, a potential 154,200 hectares of EVCs containing buloke as the dominant or co dominant tree remain in the Wimmera. Most of these remnants are on private land (70%), with 20% on public land and about 10% on road casements. However it is unknown whether all of these remnants currently meet the criteria for the threatened ecological community. This depends on their species composition and condition and has not

been assessed for all locations. The map provides a guide for potential locations and sites that could be managed and improved to meet the criteria over time. These sites would require an on-ground assessment to determine if they are Buloke Woodlands.

Buloke is a widespread roadside tree throughout much of the Wimmera and still occasionally occurs as isolated paddock trees. Individual trees and groups of trees do not necessarily indicate the persistence of Buloke Woodland. The associated flora is usually dominated by introduced species and few of the plant species typical of Buloke Woodlands still co-occur with the Bulokes themselves.

The National Recovery Plan lists significant sites including small to medium reserves in the Wimmera at Glenlee, Barrabool and Barrett Flora and Fauna Reserves; Gerang Gerung North and South Flora Reserves among others. 'These sites have maintained Buloke Woodlands in good to excellent condition as they have not been subject to clearing, nor wildfires, and because nearby landholders have prevented build-up of rabbits and kangaroos.'⁽⁴⁵⁾

Threats and impacts

The main threats to Buloke Woodlands in the Wimmera include:

- Inappropriate grazing pressure by introduced stock, rabbits, hares and kangaroos. Undisturbed Buloke Woodlands contain many perennial species that are palatable to grazing animals and prone to local elimination under moderate to high grazing pressure. Regeneration is also prevented, as suckers and seedlings are grazed on and introduced annuals invade, outcompeting native perennials.
- Weeds or introduced plants which outcompete native species, particularly in the ground layer. The current abundance of introduced annuals in most stands of Buloke Woodlands is most likely an outcome of the current and immediate-past grazing regimes, with over-grazing providing the conditions for weeds to invade. It is likely that weeds substantially interfere with regeneration of native species.
- Incremental clearing remains a problem despite legislative clearing restrictions.
- Fire – both lack of fire and fire of too high intensity. Removal of fire together with removal of grazing tends to lead to Buloke Woodlands becoming increasingly woody. Intense fires can lead to tree death and a change in species composition.
- Fragmentation. Scattered remnants in the agricultural landscape are isolated from other stands of Buloke Woodlands and there is often limited connectivity.
- Dry climate and climate change. Ongoing dry conditions can cause old trees and other vegetation to decline in health and impact on regeneration of Buloke trees by seed.

GRASSY EUCALYPT WOODLAND OF THE VICTORIAN VOLCANIC PLAIN

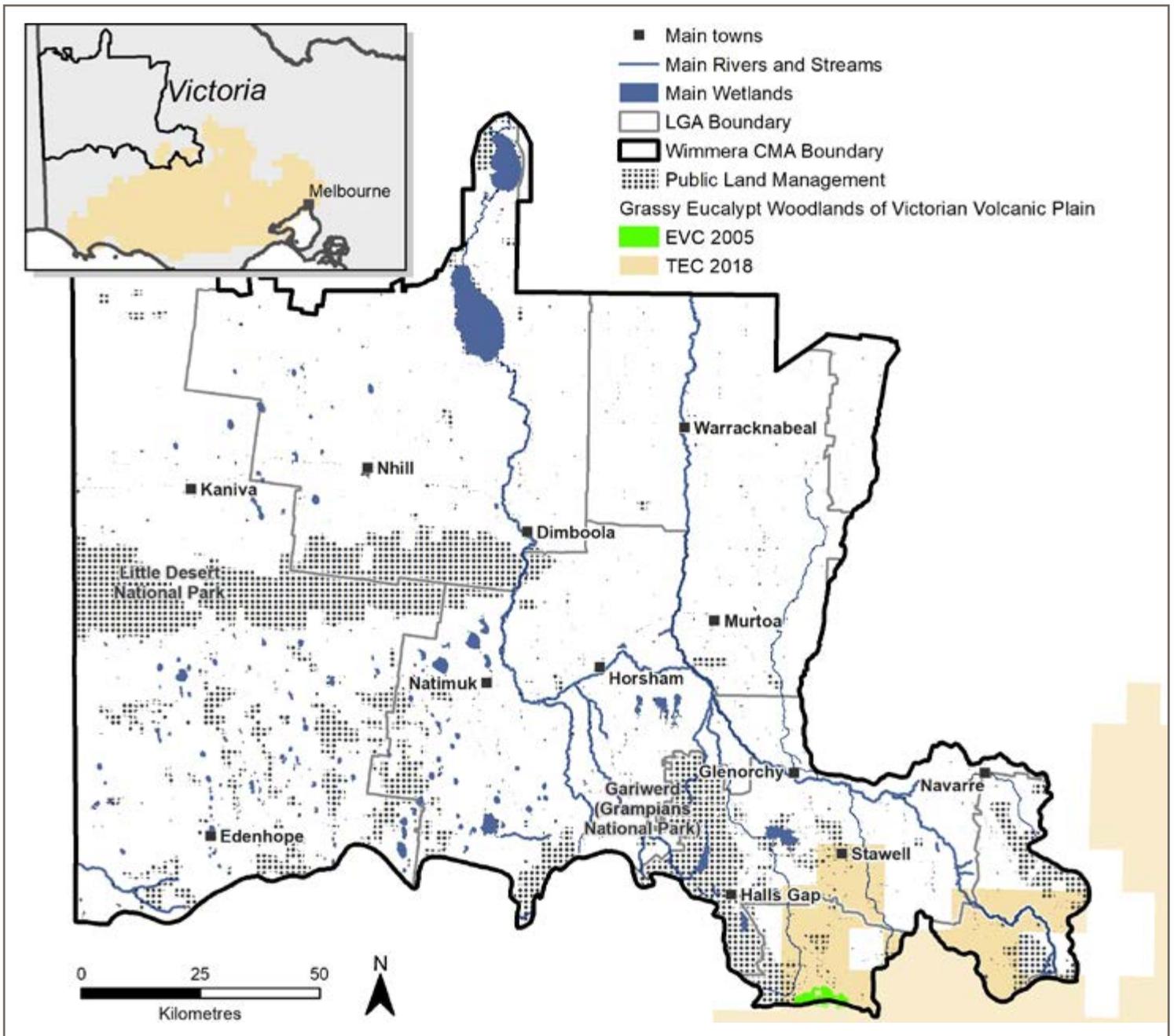
The 'Grassy Eucalypt Woodland of the Victorian Volcanic Plain' ecological community (henceforth called Grassy Eucalypt Woodlands) represents certain occurrences of grassy eucalypt woodlands. The Grassy Eucalypt Woodland is an open eucalypt woodland with a tree canopy typically dominated by river red gum (*Eucalyptus camaldulensis*). Other eucalypt species may also be prominent including swamp gum (*E. ovata*) or manna gum (*Eucalyptus viminalis*), grey box (*Eucalyptus microcarpa*) or yellow box (*Eucalyptus melliodora*). The understorey comprises a sparse shrub layer and a ground layer. This ecological community provides habitat to several nationally and state-listed threatened species.⁽⁴⁸⁾

Grassy Eucalypt Woodlands are listed as critically endangered under the EPBC Act.

Location

Figure 24 shows that this threatened ecological community is located south of the Great Dividing Range and specifically limited to the extensive Quaternary basalt plain of south-western Victoria. Small areas can be found in the south-eastern corner of the Wimmera Management Unit in the Upper Catchment Local Area.

Figure 24: Estimated extent of 'Grassy Eucalypt Woodland of the Victorian Volcanic Plain' in the Wimmera



Condition

Grassy Eucalypt Woodlands were formerly extensive across the Victorian Volcanic Plain. Less than five per cent now remains across its range, mostly as small and highly fragmented remnants. Many remnant patches are on private land with some patches on public land including roadsides, rail reserves and cemeteries.

The EPBC Act listing advice for Grassy Eucalypt Woodlands identifies Victorian EVCs that correlate with the ecological community. Based on these EVCs (mapped in Figure 24), a potential 1,000 hectares remains in the Wimmera. This may overestimate the extent by including patches that fall outside the definition of the ecological community. Most of these remnants are on private land (95%), with 0.1% on public land and 5% on road casements. It is unknown whether all these remnants currently meet the criteria for the threatened

ecological community. This depends on their species composition and condition and has not been assessed for all locations. The map provides a guide for potential locations and sites that could be managed and improved to meet the criteria over time. These sites would require an on-ground assessment to determine if they are Grassy Eucalypt Woodlands.

Grassy Eucalypt Woodlands were listed as critically endangered in 2009 as the community:

- Is severely declined in extent
- Has a very restricted distribution
- Faces continued threats
- Is very severely reduced in integrity. ⁽⁴⁸⁾

Little is known about the condition of the remnant patches in the Wimmera.

Threats and impacts

The main threats impacting on Grassy Eucalypt Woodlands in the Wimmera are:

- Clearing of native vegetation. There is a low level of protection in reserves. Most occurs under private land tenure.
- Fragmentation of remnants
- Land management practices.
- Weed invasion – weeds compete with native plants for space, water and nutrients and can reduce biodiversity.
- Climate change – directly threatens species that are unable to adapt to changed climate. Climate change is also likely to exacerbate existing threats like loss of habitat, altered hydrological regimes, altered fire regimes and invasive species. This could influence the future distribution and extent of the ecological community as well as the species composition affected by exacerbation of existing threats.
- Inappropriate grazing regimes – heavy grazing can reduce biodiversity by removing palatable species. It can also compact soil and accelerate weed invasion.
- Inappropriate fire regimes – Fire can be important to maintain grassy woodlands, especially when kangaroo grass is a significant feature of the ground layer. Absence of fire can allow grasses to become dense, outcompeting some other species, reducing biodiversity and habitat for some native animals. Fire that is too intense or too frequent can also have a negative impact on species that are unable to regenerate. ⁽⁴⁹⁾

GREY BOX (*EUCALYPTUS MICROCARPA*) GRASSY WOODLANDS AND DERIVED NATIVE GRASSLANDS OF SOUTH EASTERN AUSTRALIA

The 'Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia' ecological community (henceforth called Grey Box Grassy Woodlands) is an open woodland with a tree canopy dominated or co-dominated by grey box over an open to sparse ground layer of grasses and herbs.

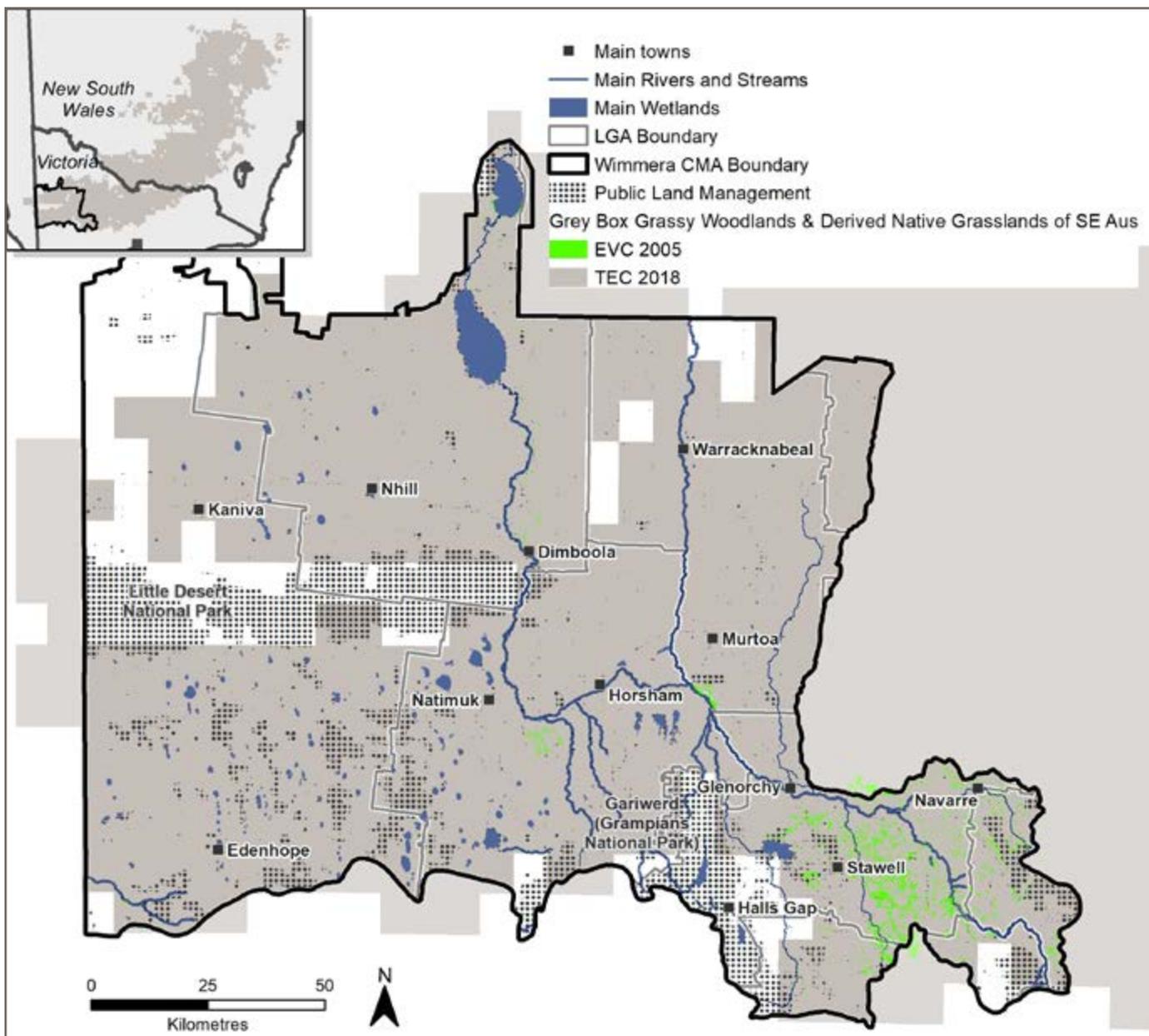
Grey Box Grassy Woodlands is listed as endangered under the EPBC Act. Parts of the ecological community are also listed as threatened under the Victorian *Flora and Fauna Guarantee Act 1988*.

Location

Figure 25 shows that Grey Box Grassy Woodlands mostly occur from central NSW through northern Victoria into eastern South Australia. The Australian Government's Threatened Ecological Community (TEC) mapping shows that this ecological community has the potential to be present across the entire Wimmera Management Unit.

The EPBC Act listing advice for Grey Box Grassy Woodlands identifies Victorian EVCs that correlate with the ecological community. ⁽⁵⁰⁾ These EVCs are located in the south-east of the Wimmera region in the Upper Catchment Local Area, scattered east of the Barringgi Gadjin (Wimmera River) in the north, adjacent to the Barringgi Gadjin (Wimmera River) near Lubeck and Longerenong and near Lower Norton.

Figure 25: Estimated extent of 'Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South eastern Australia' in the Wimmera



Condition

Based on the EVC mapping (Figure 25), a potential 19,215 hectares remains in the Wimmera. This may overestimate the extent by including patches that fall outside the definition of the ecological community. Most of these remnants are on private land (79%), with 13% on public land and about 8% on road easements. It is unknown whether all these remnants currently meet the criteria for the threatened ecological community. This depends on their species composition and condition and has not been assessed for all locations. These sites would require an on ground assessment to determine if they are Grey Box Grassy Woodlands. The map provides a guide for potential locations and sites that could be managed and improved to meet the criteria over time.

Threats and impacts

Grey Box Grassy Woodlands have suffered extensive clearing in the past, mostly for agricultural and pastoral purposes. The

main ongoing threats to the ecological community include:

- Incremental clearance of native vegetation for various purposes (e.g. cropping, infrastructure works and maintenance)
- Inappropriate grazing regimes
- Fragmentation into small remnants
- Loss or decline of mature trees due to dieback or other causes
- Lack of natural regeneration for understorey and canopy species
- Invasion by exotic plants
- Addition of fertilisers to improve sites
- Inappropriate application of herbicides
- Firewood collection, and
- Salinity. ⁽⁵⁰⁾

NATURAL GRASSLANDS OF THE MURRAY VALLEY PLAINS

The 'Natural Grasslands of the Murray Valley Plains' ecological community (henceforth called Natural Grasslands) is a type of natural temperate grassland with semi-arid characteristics, due to lower rainfall environment it occurs in. The structure is an open grassland to forbland in which trees and tall shrubs are sparse to absent. The vegetation is dominated by a ground layer characterised by a range of perennial grasses, forbs and small shrubs.

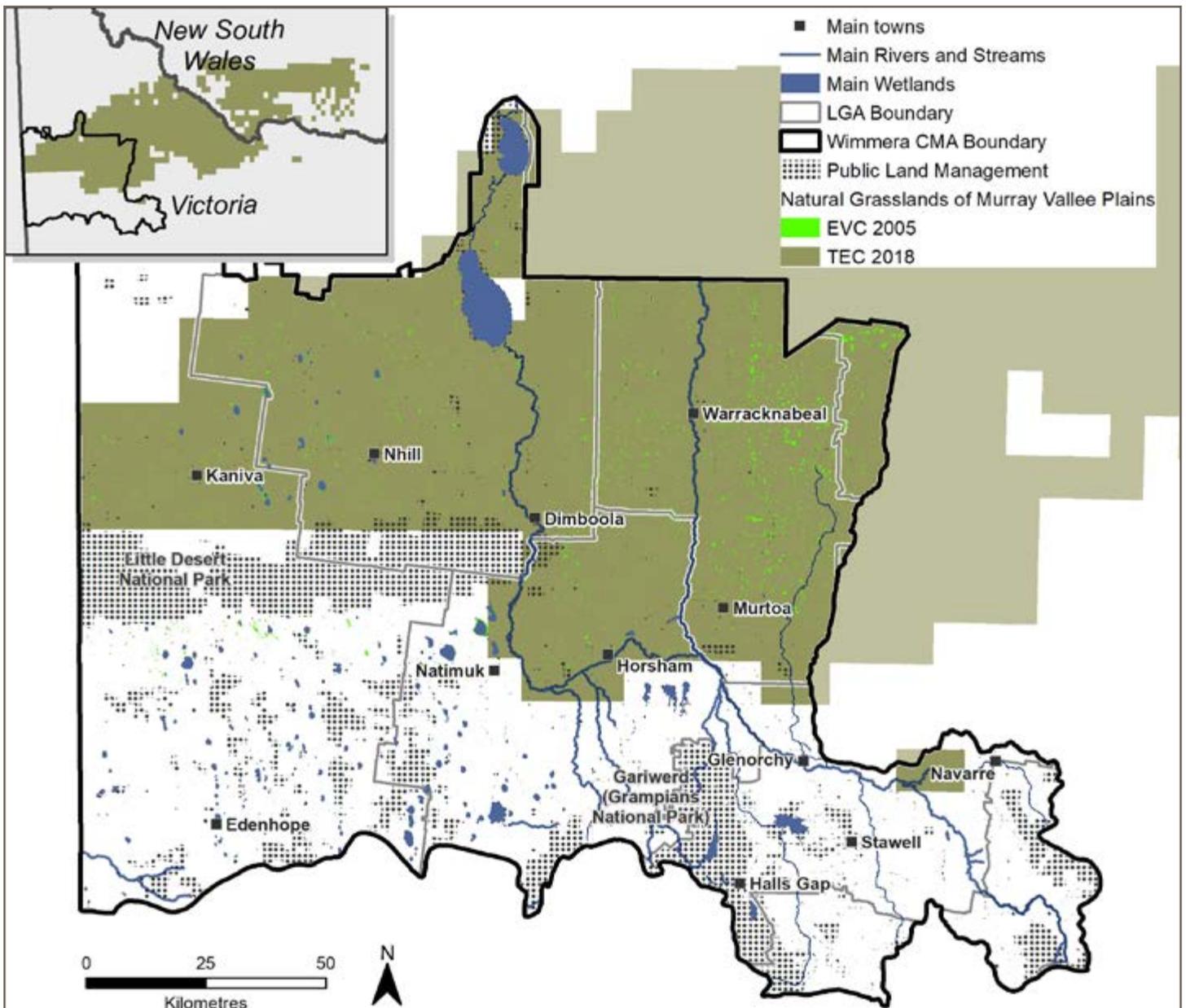
Natural Grasslands are listed as critically endangered under the EPBC Act. A substantial part of the ecological community is recognised as 'Northern Plains Grasslands', which is listed as threatened in Victoria under the *Flora and Fauna Guarantee Act 1988*.

Location

The Natural Grasslands of the Murray Valley Plains ecological community ranges predominately across the southern parts of the Riverina Bioregion in NSW and Victoria, and the Wimmera plains of Victoria. The Wimmera plains occur across the northern portion of the Wimmera Management Unit (Figure 26).

Natural Grasslands predominately occur on flat, alluvial lowland plains with heavy-textured grey, brown and red clays. This threatened ecological community was likely to be once widespread across the Wimmera on highly fertile soils ideal for cropping and grazing. Figure 26 shows that it is now reduced to scattered and isolated remnants across its former Wimmera range.

Figure 26: Estimated extent of 'Natural Grasslands of the Murray Valley Plains' in the Wimmera



Condition

Based on the EVC mapping (Figure 26), a potential 17,883 hectares remains in the Wimmera Management Unit. This may overestimate the extent by including patches that fall outside the definition of the ecological community. Most of these remnants are on private land (78%), with 7% on public land and about 15% on road easements. It is unknown whether all these remnants currently meet the criteria for the threatened ecological community. This depends on their species composition and condition and has not been assessed for all locations. These sites would require an on ground assessment to determine if they are Natural Grasslands. The map (Figure 26) provides a guide for potential locations and sites that could be managed and improved to meet the criteria over time.

The former distribution of Natural Grasslands is substantially reduced. Most patches now occur as small and highly fragmented remnants. Many remain on private land or roadsides where they are at risk of clearing or disturbance. The agricultural land that surrounds Natural Grassland remnants limits opportunities for the movement and spread of some native flora and fauna. Their small, fragmented nature also heightens opportunities for further degradation, such as by weeds, rabbits and other herbivores and impacts from actions in adjacent agricultural land. ⁽⁵¹⁾

Threats and impacts

The main identified threats to the Natural Grasslands of the Murray Valley Plains ecological community include:

- Vegetation clearance for cropping. Clearing and fragmentation of the ecological community are particularly serious and ongoing threats
- Increasing fragmentation of remnants
- Inappropriate grazing regimes
- Inappropriate tree plantings or revegetation works
- Application of farm chemicals such as pesticides and fertilisers
- Weed invasion and damage from feral animals, and
- Climate change - Rainfall during the winter and spring growing seasons are predicted to be reduced, potentially impacting on floristic composition.

PLAINS MALLEE BOX WOODLANDS OF THE MURRAY DARLING DEPRESSION, RIVERINA AND NARACOORTE COASTAL PLAIN BIOREGIONS

'Plains Mallee Box Woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions' (henceforth called Plains Mallee Box Woodland) was nominated (originally under the name 'Ridged Plains Mallee Woodland') as a potential threatened ecological community in 2015. It was listed as Critically Endangered in July 2021.

Plains Mallee Box Woodland is an open mallee eucalypt woodland. The canopy is typically dominated by 'mallee box' Eucalyptus species. Tussock grasses are prominent in the understorey in wet years, low chenopod shrubs occur in variable densities, and taller shrubs are generally sparse.

Location

Figure 27 shows that the Plains Mallee Box Woodland ecological community primarily occurs on the northern Wimmera plains, extending east from the South Australian border between the Little Desert and the Big Desert. It may also occur within the Little Desert and Natimuk areas. More broadly, the ecological community occurs across south-west New South Wales, north-west Victoria, and south-east South Australia (Figure 28).

Plains Mallee Box Woodland is associated with relatively medium-heavy textured soils on near-level sandplains. It occasionally occurs on gently sloping terrain surrounding and within landscape depressions typically with clay loam soils, or occasionally sandy clay loams or light clays. It was likely to be once widespread across the Wimmera on fertile soils ideal for cropping. Figure 27 shows that it is now reduced to scattered and isolated remnants across its former Wimmera range.

Figure 27: Estimated extent of 'Plains Mallee Box Woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions' in the Wimmera

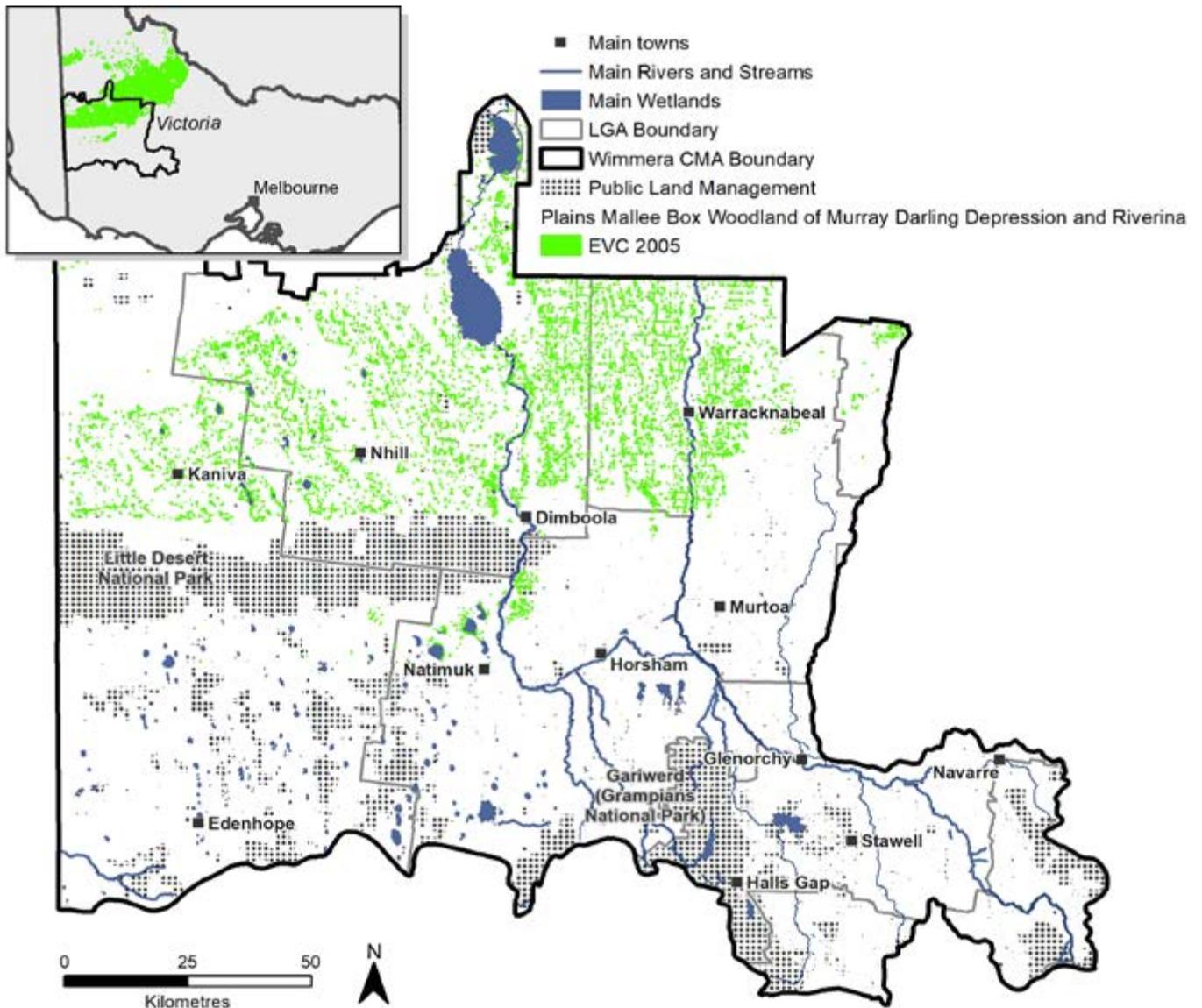


Figure 28: Regions where Plains Mallee Box Woodland may occur in Australia

(Note: this map is reproduced from the Consultation Guide for Landowners for this threatened ecological community).⁽⁵²⁾

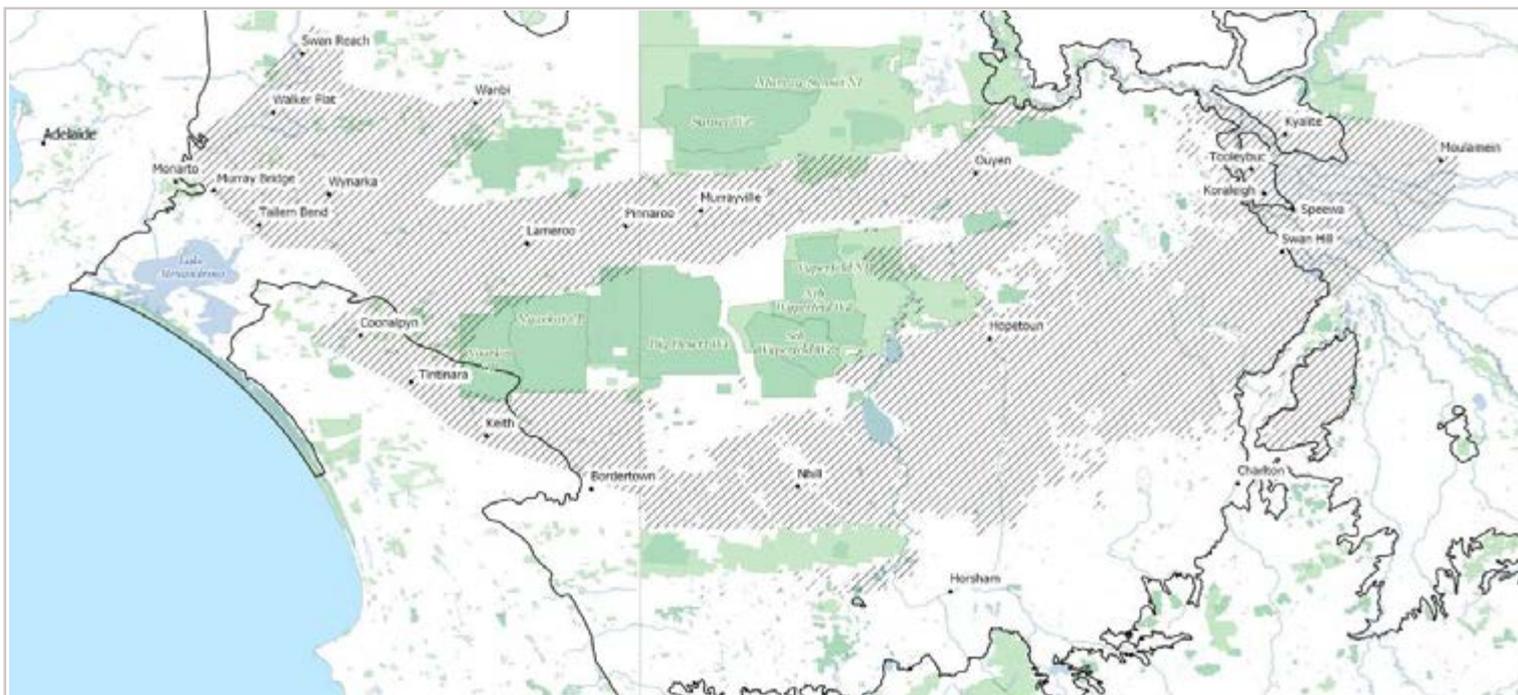


Figure 1. Regions where Plains Mallee Box Woodland may occur. Within these regions only approximately 5% of the original distribution remains. It is highly fragmented, mainly occurring as linear strips along roadsides.

-  – Regions where Plains Mallee Box Woodland may occur.
-  – Boundaries of Murray Darling Depression and Riverina Bioregions.

Condition

Based on the EVC mapping (Figure 27), a potential 9,408 hectares remains in the Wimmera Management Unit. This may overestimate the extent by including patches that fall outside the definition of the ecological community. Most of these remnants are on private land (75%), with 8% on public land and about 16% on road easements. It is unknown whether all these remnants currently meet the criteria for the threatened ecological community. This depends on their species composition and condition and has not been assessed for all locations. These sites would require an on ground assessment to determine if they are Plains Mallee Box Woodland. The map (Figure 27) provides a guide for potential locations and sites that could be managed and improved to meet the criteria over time.

The former distribution of Plains Mallee Box Woodland is substantially reduced as the environment where it occurs is suitable for dryland cropping. It is poorly represented in the public reserve system, with most remnants occurring on roadsides or as small, dispersed patches on farmland where they are at risk of clearing or disturbance. Remnants are highly fragmented, increasing opportunities for further degradation, such as by weeds, rabbits and other herbivores and impacts from actions in adjacent agricultural land.

Threats and impacts

Threats included in the listing advice for this ecological community are consistent with what occurs in the Wimmera and include:

- Clearing for agriculture and developments such as mining, quarrying and road maintenance
- Livestock grazing
- Altered fire regimes
- Invasive weeds
- Pest animals, particularly rabbits
- Overharvesting of firewood
- Climate change and severe weather especially drought.⁽⁵³⁾

SEASONAL HERBACEOUS WETLANDS (FRESHWATER) OF THE TEMPERATE LOWLAND PLAINS

The 'Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains' ecological community (henceforth referred to as Seasonal Herbaceous Wetlands) are temporary freshwater wetlands that are inundated on a seasonal basis, typically filling after winter-spring rains,

and then drying out. The vegetation is generally treeless and dominated by an herbaceous ground layer, often with a considerable graminoid component and with forbs present. ⁽⁵⁴⁾ These wetlands provide critical habitat for associated plant and animals which live in them permanently or use their resources on a seasonal or temporary basis.

Seasonal Herbaceous Wetlands are listed as critically endangered under the EPBC Act.

Location

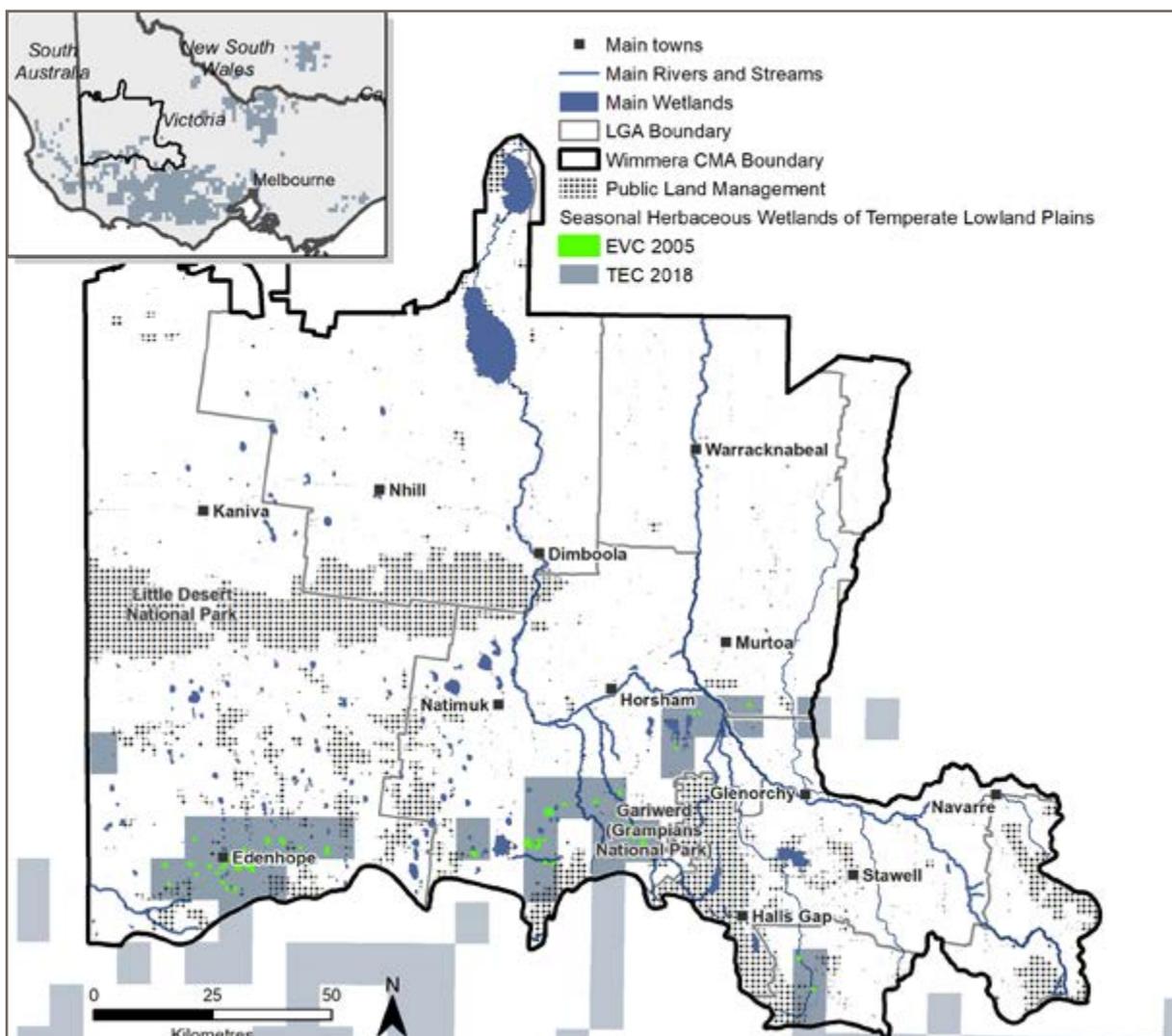
The Seasonal Herbaceous Wetlands ecological community occurs in Victoria, south-eastern South Australia (SA) and southern New South Wales (NSW). It specifically occurs within IBRA bioregions associated with lowland plains, notably the Victorian Volcanic Plain, South East Coastal Plain, Naracoorte Coastal Plain and Riverina bioregions, and the Wimmera subregion of the Murray Darling Depression bioregion. ⁽⁵⁴⁾ Figure 29 shows they typically occur across the southern portion of the Wimmera Management Unit. It is likely to

largely underestimate the extent of Seasonal Herbaceous Wetlands in the region as the vegetation communities in many Wimmera wetlands have not been surveyed or mapped.

Seasonal Herbaceous Wetlands occur primarily on private land in the Wimmera, with the generally flat landscape and fertile soils being highly conducive to agricultural production including cropping and grazing. Seasonal Herbaceous Wetlands occur on fertile soils on poorly defined seasonal drainage lines and depressions, or terrain characterised by gilgais. ⁽⁵⁴⁾ Gilgai landscapes occur in the Wimmera, generally on private land, and have not been mapped.

The Wimmera Management Unit has more than 3,000 wetlands that are over one hectare in size. Many of these are likely to be Seasonal Herbaceous Wetlands. More than 90% of the Wimmera's wetlands are on private land. This, combined with the large number of wetlands, makes it difficult to survey and obtain information on the type of vegetation present and its condition.

Figure 29: Estimated extent of 'Seasonal herbaceous wetlands of the temperate lowland plains' in the Wimmera



Condition

Due to the recent listing (2012) of Seasonal Herbaceous Wetlands, the vast numbers of wetlands in the Wimmera on private land, and issues related to resourcing and access, there has not been a systematic on-ground survey to identify and map Seasonal Herbaceous Wetlands and record their condition.

The condition of individual wetlands in the Wimmera varies considerably. Many are in good to excellent condition, but large numbers have been moderately to heavily degraded or lost. The trend in wetland modification is continuing but could be slowing. Analysis of data in 2017 shows that 23% of the region's wetlands have no modification compared to 2004 when this was 44%. Assessment of 985 wetlands in the south west Wimmera in 2004, 2011 and 2017 shows that 118, 262 and 268 wetlands were cropped respectively, indicating that cropping of wetlands did not materially increase between 2011 and 2017. ⁽⁵⁵⁾

Seasonal Herbaceous Wetlands are shallow seasonal wetlands that are most consistent with herb and sedge-dominated freshwater meadows and shallow freshwater marshes in Victoria. Shallow seasonal wetlands are under the highest threat in the Wimmera, with over 90% on private land and large numbers already modified.

Almost 400 freshwater meadows are considered lost since the 1970s. An assessment of data from 2017 indicates that only 195 of the 1,005 freshwater meadows in the region have no modification. Most modifications are drains and dams. ⁽⁵⁵⁾

Threats and impacts

The main demonstrated threats to the Seasonal Herbaceous Wetlands ecological community are:

- Clearing of native wetland vegetation
- Altered hydrology of wetlands such as draining or artificially flooding wetlands
- Altered water quality of wetlands including increased salinity, higher nutrient loads and pollution
- Increased fragmentation and landscape disconnection
- Weed invasion
- Inappropriate grazing regimes. ⁽⁵⁶⁾

The main potential threat to the Seasonal Herbaceous Wetlands ecological community is climate change, particularly predictions of continuing decline in rainfall and shifts away from regular patterns of rainfall. ⁽⁵⁷⁾ There are indications that changes in seasonal rainfall patterns are having an impact on the Seasonal Herbaceous Wetlands ecological community through more frequent drought.

WHITE BOX-YELLOW BOX-BLAKELY'S RED GUM GRASSY WOODLAND AND DERIVED NATIVE GRASSLAND

The 'White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland' ecological community (henceforth called Box-Gum Grassy Woodlands) are characterised by a species-rich understorey of native tussock grasses, herbs and scattered shrubs, and the dominance, or prior dominance, of White Box, Yellow Box or Blakely's Red Gum trees. ⁽⁵⁸⁾ The ecological community can occur either as woodland or derived native grassland, meaning a grassy woodland where the tree overstorey has been removed. ⁽⁵⁹⁾

Box-Gum Grassy Woodlands are listed as critically endangered under the EPBC Act.

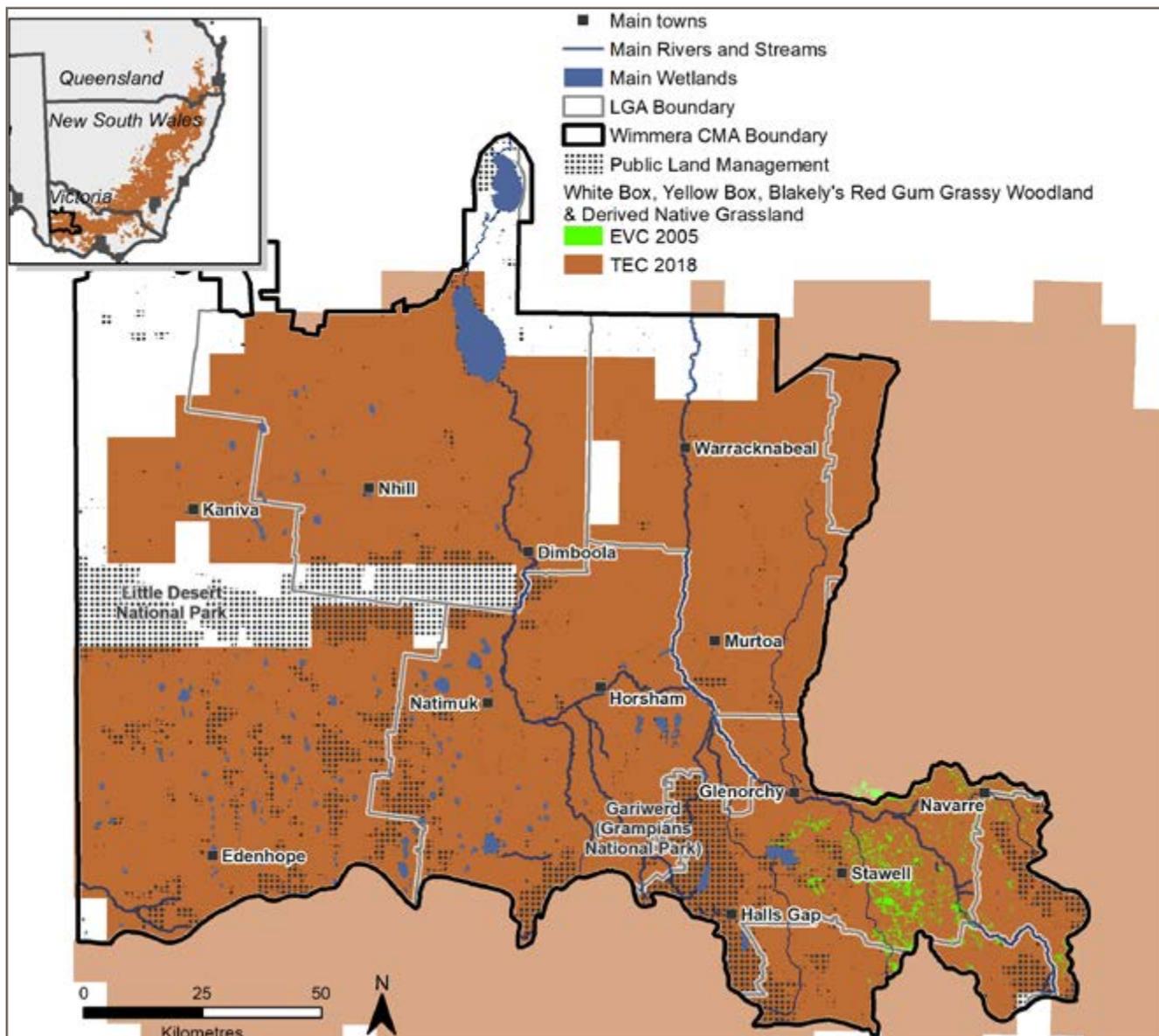
Location

Box-Gum Grassy Woodlands were once widespread along the western slopes and tablelands of the Great Dividing Range from southern Queensland through New South Wales and the Australian Capital Territory to Victoria. Based on mapping of equivalent EVCs, remnants of this community can be found east of Gariwerd (Grampians National Park) in the Upper Catchment of the Wimmera Management Unit (Figure 30). Several local partners have identified Box-Gum Grassy Woodlands as occurring in the south east of the Wimmera, for example around Lake Fyans and Illawarra Nature Conservation Reserve where previous land clearing has been less widespread.

The Wimmera region has an estimated more than 8% of the remaining White Box-Yellow Box-Blakely's Red Gum Grassy Woodlands.

Box-Gum Grassy Woodlands predominantly occur on privately owned land. This means the spatial distribution and quality of remnants remains largely unknown.

Figure 30: Estimated extent of 'White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grasslands' in the Wimmera



Condition

There are very few high-quality remnants anywhere across the former range of Box-Gum Grassy Woodlands. Current estimates indicate that there are only 405,000 hectares of the ecological community remaining and these are in various states of condition.⁽⁵⁹⁾

Based on the EVC mapping (Figure 30), a potential 13,200 hectares remains in the Wimmera Management Unit. This may overestimate the extent by including patches that fall outside the definition of the ecological community. Most of these remnants are on private land (85%), with 7% on public land and about 8% on road casements. It is unknown whether all these remnants currently meet the criteria for the threatened ecological community. This depends on their species composition and condition and has not been assessed for all locations. These sites would require an on

ground assessment to determine if they are Box-Gum Grassy Woodlands. The map (Figure 30) provides a guide for potential locations and sites that could be managed and improved to meet the criteria over time.

Box-Gum Grassy Woodland is one of the more poorly represented ecological communities in the national conservation reserve system. The ecological community generally occurs on fertile soils considered high quality for agriculture. Much of the ecological community is on privately owned land where it exists as isolated patches within an agricultural landscape of cropping, improved pastures, and/or disturbed vegetation communities.⁽⁵⁹⁾

The listing and conservation advice for Box–Gum Grassy Woodlands reports that:

- In Victoria, Ecological Vegetation Classes containing this ecological community have been heavily depleted, with only 6% of the original, pre-1750 distribution remaining.
- The ecological community generally occurs on fertile soils considered high quality for agriculture. Consequently, it has been preferentially cleared and very little is contained in public reserves (roughly 15% in the Wimmera).
- Remnant patches are highly modified by grazing.
- There are only a small number of areas remaining across the range that retain a highly diverse understorey dominated by native, perennial tussock grasses. These areas are extremely rare, and usually quite small and occur in isolated patches within an agricultural landscape.
- Areas of high understorey biodiversity tend to occur on public land that has not been used for domestic stock grazing or cropping, including cemeteries and roadsides. ⁽⁵⁸⁾

It is difficult to obtain an accurate picture of condition in the Wimmera due to the location of most remnants on private land.

Threats and impacts

The threats that led to the decline in Box-Gum Grassy Woodland continue to be ongoing. Threats include:

- Weed infestation particularly by sallow wattle (*Acacia longifolia*). Sallow wattle has been particularly invasive in the northern Gariwerd (Grampians National Park) region following disturbance by fire, outcompeting other species and potentially altering the floristic composition.
- Agricultural development. Clearing and modification of native vegetation continues to be a major threat.
- Changes in land use and management in and adjacent to Box-Gum Grassy Woodlands. Although Victoria has requirements to consider the impacts of native vegetation removal in planning approval processes, the removal and modification of Box-Gum Grassy Woodland continues.
- Grazing regimes and pasture management – can alter the structure and composition of the flora components of the ecological community through selective grazing of more palatable and regenerating species, trampling, soil compaction, changed soil nutrient status and weed invasion. Many of the ground layer species present in Box–Gum Grassy Woodlands are particularly sensitive to grazing which can cause loss of some native grasses, forbs, sedges and shrubs.
- Firewood collection and ‘tidying up’ - Dead standing trees and fallen timber provide protection and feeding substrates for a variety of woodland birds, mammals, reptiles, amphibians, and invertebrates. Fallen timber also provides the base material and environmental conditions for nutrient recycling. The disturbance caused during the collection of firewood can lead to the spread of weeds as a result of the removal of material and the movement of people and vehicles within remnants.
- Changed fire regimes
- Increased soil nutrients and use of chemicals on neighbouring farmland
- Mowing/slashing,
- Inappropriate regeneration, weeds, climate change, salinity, soil acidification, declining tree health and regeneration. ⁽⁵⁸⁾

There is insufficient data to determine the current degree and impact of these threats across the dispersed remnants of this ecological community in the Wimmera.

Appendix 7: Sustainable agriculture - risk rating definitions and key

Table 40: Risk rating definitions

Likelihood	Potential consequence	Risk
Almost certain Expected to occur every year	Not Significant No long-term effects	Very high Urgent mitigation action required
Likely Expected to occur at least once every five years	Minor Specific areas are affected but no widespread or unmanageable effects	High Mitigation action and adaptive management plan required
Possible Might occur at some time	Moderate Larger areas are affected, soil health and productivity impaired	Moderate Obtain additional information and develop mitigation plan if required
Unlikely Such events are known to have occurred, but rarely	Major Major widespread impacts on soil health, repair costly	Low Monitor threat occurrence and reassess threat level if likelihood or consequences change
Rare or Unknown May occur only in exceptional circumstances	Catastrophic Unable to repair damage	

Table 41: Key for determining risk ratings based on likelihood and potential consequence

Likelihood	Potential consequence				
	Not significant	Minor	Moderate	Major	Catastrophic
Almost certain	Medium	High	High	Very high	Very high
Likely	Medium	Medium	High	High	Very high
Possible	Low	Medium	Medium	High	High
Unlikely	Low	Medium	Medium	Medium	High
Rare or Unknown	Low	Low	Low	Medium	Medium

Wimmera CMA is one of 54 service providers engaged by the Australian Government under the Regional Land Partnerships Program to deliver projects in regional management units across Australia. These projects will contribute to achieving the Australian Government's 5-year Outcomes for the recovery of threatened species, protecting threatened ecological communities, reducing threats to globally important wetlands and world heritage sites, and contributing to sustainable agriculture.



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