



# Mallee Regional Catchment Strategy 2022–28



Public Consultation Draft  
May 2022

## ACKNOWLEDGEMENTS

We acknowledge the Traditional Owners, Aboriginal communities and organisations of the Victorian Mallee. We recognise the diversity of their cultures and the deep connections they have with their lands and waters. We value partnerships with them for the health of People and Country.

We also pay our respects to Elders past, present and emerging; and recognise the primacy of Traditional Owners' obligations, rights and responsibilities to use and care for their traditional lands and water.

A Steering Committee involving key regional partners was established to oversee the development of this Regional Catchment Strategy. The committee is chaired by Sharyon Peart (Mallee CMA Board Chair until 2021) and Allison McTaggart (Chair of the Mallee CMA Board from 2021), and has representation from: Mildura Rural City Council, Swan Hill Rural City Council, Yarriambiack Shire Council, Buloke Shire Council, Lower Murray Water, Grampians Wimmera Mallee Water, Parks Victoria, Department of Environment, Land, Water and Planning, and Mallee CMA Board. The project is also supported by the management and staff of the Mallee CMA, with technical input from many partner agencies.

### HAVE YOUR SAY

The Mallee Catchment Management Authority is inviting feedback on this Draft Mallee Regional Catchment Strategy; the primary integrated planning framework for land, water and biodiversity management in the region over the next 6 years (2022-28).

You can download a copy of the Draft Strategy from the Mallee CMA website at [www.malleecma.com.au/have-your-say](http://www.malleecma.com.au/have-your-say); or contact us to request a printed copy be sent to you.

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### How to submit your comments

- Make a submission online at <https://www.surveymonkey.com/r/MalleeRCS2022>
- Provide your feedback in an email to: [info@malleecma.com.au](mailto:info@malleecma.com.au)
- Provide your feedback by mail to: **Mallee Catchment Management Authority, PO Box 5017, Mildura VIC 3502**

Public consultation will close at 4.30pm on Friday 3 June 2022

### Disclaimer

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Mallee Regional Catchment Strategy 2022-28

ISBN: TBC



## FOREWORD



The Mallee is recognised nationally and internationally for the uniqueness and diversity of its natural assets, the importance of its dryland and irrigated agricultural industries, and the richness of its cultural heritage.

This Draft 2022-28 Mallee Regional Catchment Strategy (RCS) recognises our region's long history of caring for these natural, productive and cultural landscapes. By building on our past successes and lessons learnt, it aims to provide a six-year framework for action that supports and focuses the ongoing and coordinated efforts of all regional stakeholders.

To fulfil its purpose, the RCS sets long-term (20-year) and medium-term (6-year) outcomes that we are seeking for our Biodiversity, Waterways, Agricultural Land, Culture and Heritage, and Community assets; the 6-year strategic actions required to achieve these outcomes; the landscapes that our efforts will be focused on; and the collaborative partnerships that will support delivery.

I invite you to participate in the development of this important planning document by providing feedback on the Draft Strategy and having your say on the future management of shared natural assets in our region.

The success of this RCS is dependent on meaningful and ongoing engagement with all regional stakeholders. Capturing the aspirations, knowledge, priorities and expectations of the region's individuals, groups and organisations within the RCS development phase is a fundamental component of this process, enabling collaborative efforts in natural resource management.

A handwritten signature in blue ink that reads "Allison McTaggart". The signature is fluid and cursive.

Allison McTaggart

Mallee CMA Board Chair

May 2022

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# 1: THE REGION

## 1.1: LANDSCAPES

The Mallee region covers 39,939km<sup>2</sup>, around one-fifth of Victoria. The largest catchment area in the state, it runs along the Murray River from Nyah to the South Australian border and south through vast dryland cropping areas and public reserves (Figure 1).

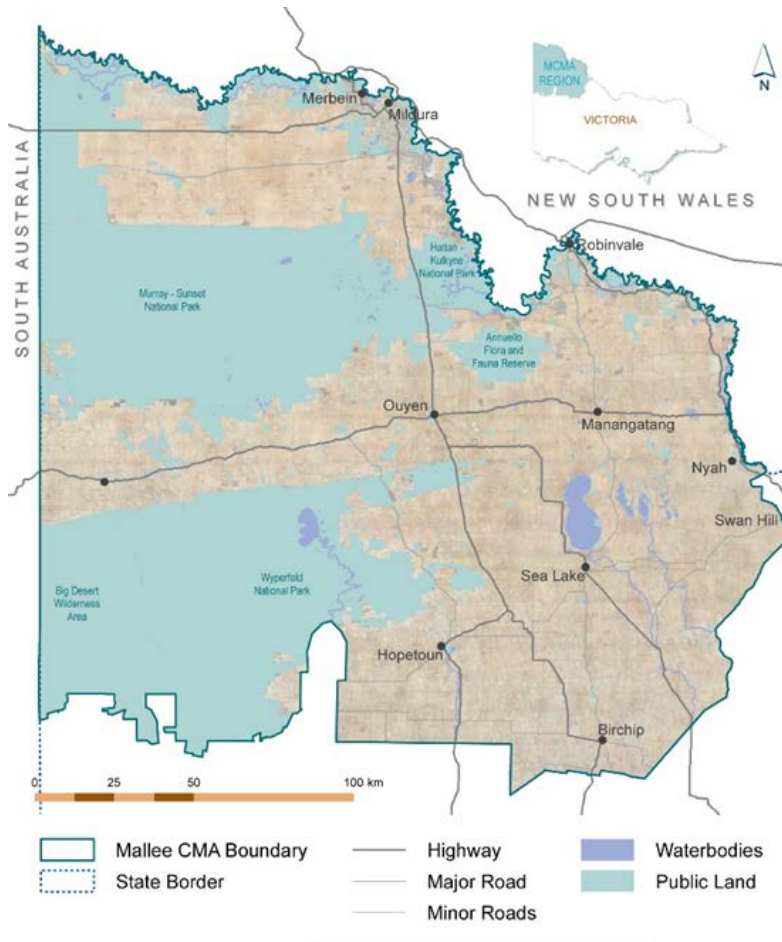


Figure 1: The Mallee Region

The Mallee is recognised nationally and internationally for the diversity and uniqueness of its natural, cultural and productive landscapes. Significant features include:

- An extensive network of national parks, state forests and crown reserves including Wyperfeld National Park, Big Desert Wilderness Park, and Big Desert State Forest; which collectively form the largest remnant of uncleared native vegetation in the agricultural areas of south-eastern Australia.
- The Hattah Lakes - recognised as internationally important under the Ramsar Convention on wetlands.
- Two internationally recognised Important Bird Areas (IBAs) encompassing the Murray-Sunset, Hattah, Annuello, Wyperfeld and Big Desert reserves - supporting populations of three globally threatened species: Malleefowl; Black-eared Miner; and Mallee Emu-wren.
- The wetland and floodplain ecosystems of the Hattah Lakes and Lindsay-Mulcra-Wallpolla Islands - recognised as Icon Sites under The Living Murray Program.
- A key part of Victoria's food bowl - producing over 30 percent of Victoria's cereals, and over 90 percent of all grape and nut production.
- A large number of Aboriginal cultural and heritage sites - unique in Victoria both for their concentration and diversity.



### 1.1.1 NATURAL LANDSCAPES

*The natural character of the region has been shaped by a climate of temperature extremes, low rainfall, and its underlying geology and hydrology; resulting in a series of unique ecosystems and natural features.*

The Mallee lies primarily within two broad landform regions: The Riverine Plain, which encompasses the entrenched floodplain of the Murray; and the Mallee Dunefields, a gently undulating plain formed by aeolian (wind) processes. A small area around Birchip lies within the Wimmera Plain.

Native vegetation across the Mallee once covered some 3,919,887 hectares, of which 52 percent is estimated to have been cleared. Much of the region's remaining vegetation has been reserved in large parks such as Murray-Sunset, Big Desert, Wyperfeld and Hattah-Kulkyne National Parks; extensive tracts of riverine and dryland state forests; and over 500 small reserves scattered throughout the agricultural area. These areas of public land are particularly significant given the largely cleared and fragmented agricultural landscape in which they occur.

Remnants on private land, and the roadsides and rail reserves dissecting this land, represent significant areas of our native vegetation. They are of particular importance for the threatened flora they contain, and for the connectivity opportunities they provide to our region's fauna.

Extensive water courses and wetlands are a key feature of the region, the Murray River and its environs being one of our most significant areas. North flowing intermittent streams, including Yarriambiack Creek and Tyrrell Creek, and the ephemeral wetland complexes in which they terminate (e.g. Wirrengren Plain, Lake Coorong and Lake Tyrrell) are defining features of the southern part of our region.

There are more than 900 wetlands in the Mallee region, 14 of which are listed as 'nationally significant'. The Hattah Lakes system is internationally recognised (under the Ramsar Convention) for its value to waterfowl and its importance in maintaining regional biodiversity. The wetland and floodplain ecosystems of the Hattah Lakes and Lindsay-Mulcra-Wallpolla Islands have also been recognised as Icon sites under The Living Murray program.

This complex mosaic of vegetation communities and habitats across the Mallee represents significant diversity and includes: Riverine forests and woodlands along the Murray River; the Mallee shrublands and woodlands of the dunefields; the Cypress-Pine, Buloke and Belah woodlands of the lunettes and plains; the woodlands and heathlands of the Big Desert; and the herblands of our ephemeral lakes.

The aquatic and terrestrial habitat provided by these landscapes supports a diverse and unique range of fauna, with many species associated with the more arid interior having their southernmost distribution in the Mallee. Species such as the Red Kangaroo, Giles Planigale, Mallee Ningai and Mitchell's Hopping Mouse are not found anywhere else in Victoria; and the Silky Mouse and Western Pygmy Possum are restricted to the Big and Little Deserts.

The Mallee has a particularly rich avifauna, with over 300 bird species having been recorded. The dominant groups, in both numbers and diversity, are the raptors, parrots and cockatoos; and in the Big Desert, the honeyeaters. Large old River Red Gums along the Murray River support many hollow dependent birds like the Regent Parrot. The Pine, Buloke and Belah woodlands support a different suite of hollow-dependent birds such as Major Mitchell's Cockatoo. Mallee woodlands and shrublands with porcupine grass understories support one of the iconic Mallee birds, the Malleefowl.

The number of reptile species in our region exceeds that of anywhere else in Victoria. At least 77 species of reptiles occur including; fresh-water turtles, geckos, legless lizards, dragon lizards, goannas, skinks, blind snakes, venomous snakes, and one python. Inland or more northern species such as the Beaked Gecko and the Coral Snake reach the southern edge of their distribution in the Victorian Mallee. Eleven frog species occur including the Growling Grass Frog and Bibron's Toadlet.

Nineteen species of native fish have been recorded in the watercourses and wetlands of the region including the Murray Cod and the Murray Hardyhead.

### 1.1.2 CULTURAL LANDSCAPES

*The Mallee has been occupied for thousands of generations by Indigenous people, with human activity at Direl (Lake Tyrrell) dated as far back as between 26,600 and 32,000 years ago; although use of the area possibly began as early as 45,000 years ago<sup>1</sup>.*

The region's rich and diverse Aboriginal heritage has been formed through the historical and spiritual significance of sites associated with this habitation, together with the enduring connection Traditional Owners/First Peoples have with the Mallee's natural landscapes.

The first inhabitants of our region were numerous Aboriginal tribes of different language groups, including Ngintait, Ngarkat, Latji Latji, Nyeri Nyeri, Wergaia, Wadi Wadi, Wemba Wemba, Jari Jari, and Tati Tati. Given the semi-arid climate of the region, ready access to more permanent water has been a major determinant of human habitation, and as such the highest density of identified Aboriginal cultural heritage sites are located around or close to areas of freshwater sources.

The high number of cultural sites throughout the Murray floodplain is unique in Victoria, both for their concentration and diversity and include large numbers of burials, middens and hearth sites. In the south of the region, freshwater lakes, streams and wetlands were focal points for the region's Traditional Owners. Many lakes were the sites of large gatherings of several family groups that afforded trade and cultural exchanges. Intangible cultural heritage is integral to these landscapes, including the traditional knowledge, practice and expressions (e.g. biocultural knowledge, ceremonies, language, stories) passed down from generation to generation.

### 1.1.3 PRODUCTIVE LANDSCAPES

*Despite the semi-arid nature of the region, the predominance of winter rainfall and access to reliable water from the Murray River has allowed the Mallee to develop into an agriculturally diverse region; with important irrigation areas in the north along the Murray, and extensive dryland cropping and grazing areas in the south, east and west. In total, some 62 percent of the region's area is given over to agricultural production.*

The productive capacity of our agricultural lands rose steadily over the last half of the 20th century in response to increased mechanisation, improved management techniques, and genetic improvement of crops. Today, agriculture remains our major land use and most economically important industry.

Dryland farming in the region covers some 2.4 million hectares and includes the cropping of a wide variety of cereals, pulses and oilseed crops such as wheat, barley, vetch, lupins, chickpeas, lentils and canola.

Livestock also forms a part of many farm operations and primarily includes sheep for their wool products and lambs for their quality meat. Cattle and goats are also present in smaller numbers. There has however been an overall decline in livestock numbers over the past decade as a larger proportion of farmers operate more intensive no-till or reduced till cropping systems, with a share of these no longer running livestock at all.

Irrigation in the Mallee extends adjacent to the Murray River corridor from Nyah to the South Australian Border; encompassing Private Diverters and the Pumped Irrigation Districts of Mildura, Merbein, Red Cliffs, Robinvale and Nyah. A 191,600 hectare groundwater irrigation district centred on the town of Murrayville also exists.

The major irrigated sectors are almonds, table and wine grapes, and citrus. Between 1997 and 2021, irrigation development reliant on water from the Murray River has increased from 39,470 hectares to 81,355 hectares, representing a more than doubling of the irrigable area. The industry has seen increased diversity in crop types and is becoming far more dynamic in response to climatic conditions and market forces. Almonds have become the single largest crop by area and water demand.

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<sup>1</sup> Richards et al. (2007), Box Gully: new evidence for Aboriginal occupation of Australia south of the Murray River prior to the last glacial maximum, *Archeology in Oceania* 42 1-11.

## 1.2: TRADITIONAL OWNERS

For many thousands of years, the Country was managed and cared for by local First Peoples. As custodians of the oldest living culture in the world, Traditional Owners have always understood the responsibility that comes with looking after and speaking for the Country of their ancestors and future generations.

In Victoria, there are three different processes for groups to become formally recognised as Traditional Owners of Country: as a Registered Aboriginal Party (RAP) under the *Aboriginal Heritage Act 2006*; through Native Title Determination under the *Native Title Act 1993*; and by Recognition and Settlement Agreement under the *Traditional Owner Settlement Act 2010*.

### 1.2.1 FORMALLY RECOGNISED TRADITIONAL OWNER GROUPS

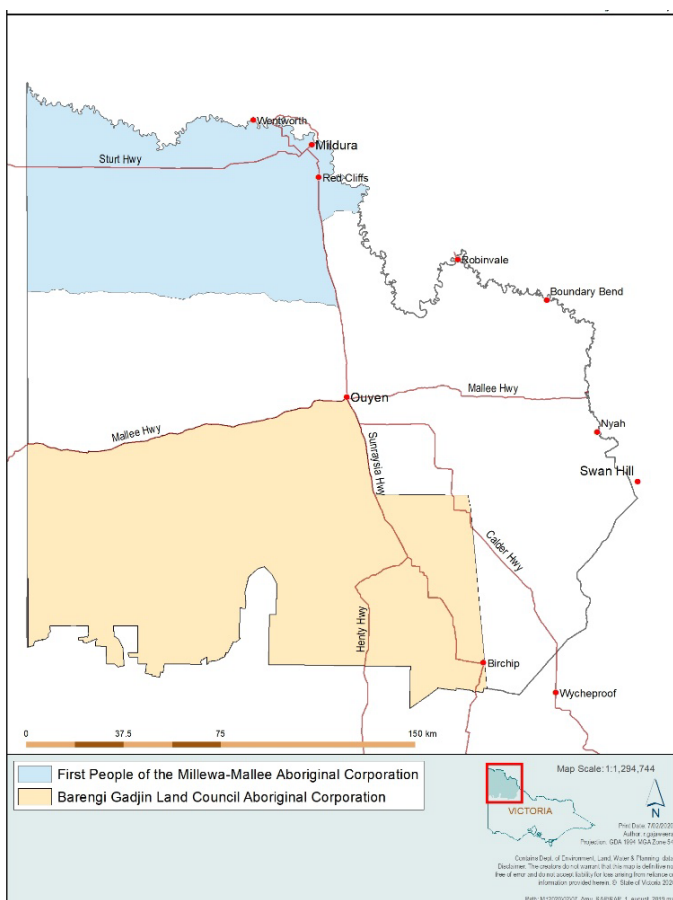


Figure 2: Registered Aboriginal Party Areas in the Mallee

Wotjobaluk Peoples to participate in the management of certain parks and reserves within the determination area established under an Indigenous Land Use Agreement (ILUA). The Wotjobaluk Peoples also assert interests in land outside the ILUA boundary.

The Victorian Government and BGLC are currently negotiating a Recognition and Settlement Agreement and associated Traditional Owner Land Management Agreement. This will enable the Wotjobaluk Peoples and the State of Victoria to jointly manage agreed national parks, conservation reserves and other Crown land when they are transferred to BGLC as Aboriginal Title.

The BGLC Country Plan: *Growing What is Good Country Plan — Voices of the Wotjobaluk Nations* (2017), highlights connections to Country, identifies impacts of colonisation, and outlines goals, priorities and actions to progress their

Traditional Owners have responsibilities – as Registered Aboriginal Parties – to protect the vast array of cultural heritage woven across the Victorian landscape, on all land tenure. There are currently two RAPs who represent the interests of Traditional Owners in their respective Country areas across the Mallee: Barengi Gadjin Land Council Aboriginal Corporation (BGLC) and First People of the Millewa Mallee Aboriginal Corporation (FPMMAC).

#### BARENGI GADJIN LAND COUNCIL

BGLC is the trustee for the Native Title rights and interest of the Wotjobaluk, Jaadwa, Jadawadjali, Wergai and Japagulk peoples, collectively known as the Wotjobaluk Nations; as recognised in a 2005 Native Title Consent Determination.

BGLC was appointed RAP status in 2007, with their area of responsibility encompassing much of the southern Mallee (Figure 2), including Wyperfeld National Park, and the Big Desert State Forest/Wilderness Area. It also extends into the Wimmera, North Central and Glenelg Hopkins regions.

The Wimmera Co-operative Management Agreement between the State and BGLC provides for the



vision of: *“Wotjobaluk Nations working together as custodians of Culture, Country, Heritage, Lore and Language; sharing our values and representing the rights and interests of our People”.*

The overarching goals of the Country Plan include: strong and healthy Culture; healthy Country; an engaged and connected community; recognition and respect; economic sustainability; healthy Peoples; and a strong voice.

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#### First People of the Millewa-Mallee Aboriginal Corporation

The FPMMAC RAP area encompasses a large portion of the northern Mallee (Figure 2), including the Murray River floodplain and its associated waterways; and parts of Murray-Sunset National Park.

FPMMAC was registered in 2015 and appointed RAP status in 2018. They are currently seeking to negotiate a Recognition and Settlement Agreement and Native Title determination over land that includes and extends their current RAP area.

FPMMAC has been formed by Latji Latji and Ngintait Traditional Owners. They are in the process of developing a *Country and Water Plan*, with their interim Country-Culture-People Action Plan (2020) identifying the following objectives: *“Our Action Plan and strategic Country and Water Plan seek to repair the natural environment and our people’s place in the environment:*

- *We will do this by rejuvenating the land, floodplains and river system, while rejuvenating our culture and people.*
- *We will do this with and by our people, in conjunction with the broader community and governments.*
- *We are implementing our Indigenous cultural model of self-determination, on Country with Culture for People”.*

#### 1.2.2 OTHER TRADITIONAL OWNER GROUPS

There are also several groups in the Mallee with strong connections to Country that do not currently have formal recognition. This includes Wemba Wamba, Wadi Wadi, Tati Tati, Weki Weki, and Nyeri Nyeri Traditional Owners.

These groups play an important and active role in the planning for, and delivery of, programs seeking to protect culture and cultural values on Country.

## 1.3: COMMUNITIES

### 1.3.1 PEOPLE

*The people of the Mallee are at the heart of the current and future management of our natural, productive and cultural landscapes.*

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#### POPULATION

The Mallee is home to over 64,000 people. The largest centre is Mildura and its surrounds (Irymple, Merbein and Red Cliffs), which with almost 45,000 people represents the key service and economic hub of the region. Other population centres of the region; including Robinvale, Ouyen, Sea Lake, Hopetoun, Murrayville and Birchip; make up about 15 percent of the population<sup>2</sup>.

The region's population grew by 1.6 percent between 2001 and 2006, 0.7 percent between 2006 and 2011, and a further 3.6 percent between 2011 and 2016. This growth was uneven across the region however, with strong growth in urban Mildura, matched by parallel losses from smaller communities<sup>3</sup>.

Overall, there are significant variations in population density across the region; ranging from over 2,000 people per km<sup>2</sup> in the urban Mildura area, to less than 0.2 people per km<sup>2</sup> across much of the dryland farming area.

The Mallee has a strong Indigenous heritage with some 3.8 percent of the total regional population, or 2,473 people, identifying themselves as Indigenous in the 2016 census; a significantly greater proportion than that of Victoria as a whole at 0.8 percent, or regional Victoria at 1.6 percent.

A diverse multi-cultural population has also helped to shape the region over the years and continues to provide many social and cultural benefits. While English is the first language of more than 81 percent of the population, the remaining 19 percent of the population speak another language at home including Italian (1.8%), Pacific (1.1%), Chinese (1%) and Mon-Khmer (0.8%).

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#### EDUCATION

Rates of school completion in the Mallee region are lower than those for regional Victoria as a whole. For example, Year 12 completion is approximately 27 percent, compared with 32 percent for all of regional Victoria. Tertiary education in the Mallee region is also lower than that for regional Victoria as a whole<sup>4</sup>.

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#### EMPLOYMENT

The 2016 census identified that 25,574 people were employed across the region. Agriculture is the main industry sector covering approximately 19 percent of those employed. Other important industries include Health Care and Social Assistance (16%) and Retail Trade (14%).

While employment in the agricultural sector declined from 25 percent in 2001 to 20 percent in 2006, it remained relatively stable over the next ten years at 19 percent in 2016. Projections of change in employment to 2026 suggest that improvements in technology and efficiency, combined with growth in other sectors, will further reduce the proportion of people employed in agriculture in the future.

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<sup>2</sup> Australian Bureau of Statistics 2016. Census of Population and Housing, Age in Single Years, <http://www.abs.gov.au/websitedbs/censushome.nsf/home/Data>

<sup>3</sup> Australian Bureau of Statistics 2016. Census of Population and Housing, Age in Single Years, <http://www.abs.gov.au/websitedbs/censushome.nsf/home/Data>

<sup>4</sup> Australian Bureau of Statistics 2016. Census of Population and Housing, Highest Year of School Completed <http://www.abs.gov.au/websitedbs/censushome.nsf/home/Data>

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## WELLBEING

Many communities in the Mallee are experiencing significant socio-economic disadvantage. All of the Local Government Areas within the region rank under Victoria's average socio-economic status on the Australian Bureau of Statistics' Socio-Economic Indexes for Areas (SEIFA) Index of Relative Disadvantage. However, community connectedness in the region is strong. The proportion of people reporting feeling part of the community, having reliable social support and volunteering in community activities is significantly greater than the average for regional Victoria<sup>5</sup>.

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## LAND MANAGERS

Some 62 percent of the Mallee is private land, with individual landholders being primarily responsible for its management. There are currently 1,599 rural land holdings across both the dryland and irrigation industries, representing a 33 percent decrease since 2011<sup>6</sup>.

To keep pace with declining terms of trade (ratio between prices received for produce and prices paid for inputs) farmers are striving to increase productivity and scale across both dryland and irrigated industries. This has led to fewer numbers of farmers and an increase in larger holdings in the Mallee.

The average age of rural landholders has however remained stable at 55 years, which is consistent with trends for regional Victoria as a whole<sup>7</sup>, and indicates that some generational change is occurring in the farming community across the region. The average length of time landholders have been managing their land is 35 years.

The remaining 38 percent of the region is public land, the majority of which is managed by Parks Victoria and the Department of Environment, Land, Water and Planning. This includes large areas, such as Wyperfeld National Park, which are managed in partnership with Traditional Owners under a co-operative management agreement. Local Government, VicTrack, VicRoads and a number of Crown Land Committees of Management also have land management responsibilities.

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<sup>5</sup> Australian Bureau of Statistics, 2016. Census of Population and Housing, Socio-Economic Indexes for Areas (SEIFA), Australia, 2016. <http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/2033.0.55.0012016?OpenDocument>

<sup>6</sup> Australian Bureau of Statistics 2015-16 Agricultural Census, <http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/7121.0Main+Features12015-16?OpenDocument>



### 1.3.2 PARTNERSHIPS

*The Mallee has a long history of building effective partnerships between all sectors of our community including individual farmers, industry groups, community based groups, Traditional Owners and government agencies and authorities.*

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#### COMMUNITY

The Mallee region has 25 active Landcare groups with over 500 rural properties having at least one person who is a member of Landcare. This equates to approximately 22 percent of all rural land holdings. Collectively, these groups facilitate activities that address local and landscape scale issues, across both public and private land, through works such as revegetation, pest plant and animal management, soil health and waterway management. They also build skills and social connections in the community through training and events.

There are also a suite of Community NRM focused groups that make a significant contribution to the management of our natural landscapes. These include 'Friends of' groups, Community Reference groups, and Citizen Science based groups such as the Victorian Malleefowl Recovery Group.

Partnerships with recreational groups that utilise the region's natural landscape (e.g. angling groups such as OzFish) support many conservation and enhancement efforts across the region.

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#### INDUSTRY

The presence of industry groups such as Dried Fruits Australia, Citrus Australia Limited, Australian Table Grapes Association, Murray Valley Winegrowers, Almond Board of Australia, Mallee Sustainable Farming and Birchip Cropping Group in the region provides landholders with access to the knowledge and resources of locally-relevant community-driven organisations committed to the ongoing development of a competitive and sustainable agricultural sector.

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#### TRADITIONAL OWNERS AND ABORIGINAL COMMUNITY

Traditional Owner rights and interests in the management and healing of Country is a core consideration in the application of partnership approaches to NRM. Traditional Owner groups include Barengi Gadjin Land Council, First People of the Millewa Mallee, Wemba Wemba, Wadi Wadi, Tati Tati, Weki Weki, and Nyeri Nyeri.

The diversity in Aboriginal representation across the region is also recognised, with input from broader stakeholders and partnership opportunities supported through community based forums and reference groups.

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#### NON-GOVERNMENT ORGANISATIONS

Organisations such as BirdLife Australia and Greening Australia are key delivery partners in regional efforts to conserve threatened bird species and restore native vegetation.

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#### GOVERNMENT

Local government is a key regional stakeholder and delivery partner. The Mallee encompasses seven Local Government Areas including all of the Rural City of Mildura, most of the Rural City of Swan Hill (not including the city of Swan Hill), the northern half of the Buloke Shire and Yarriambiack Shire, the northern third of Hindmarsh Shire and small sections of West Wimmera Shire and Gannawarra Shire. The Mildura and Swan Hill Rural City Councils together account for 90 percent of the region's population and 70 percent of the land area.

State government agencies and authorities also form a core component of our regional partnerships. These include the Department of Environment, Land, Water and Planning (DELWP), Department of Jobs, Precincts and Regions (DJPR), Parks Victoria (PV), the Mallee Catchment Management Authority (Mallee CMA), Grampians Wimmera Mallee Water

(GMMWater), Lower Murray Water (LMW), Goulburn-Murray Water (G-MW), First Peoples–State Relations, Trust for Nature (TfN), Victorian Fisheries Authority (VFA), Victorian Environmental Water Holder (VEWH), VicRoads, and VicTrack.

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## NEIGHBOURS

The management of our natural, cultural and productive landscapes requires effective cross-border partnerships and coordinated effort.

Within Victoria we border two other Catchment Management Authority (CMA) regions: Wimmera and North Central. In both cases we share different portions of the same river basins; with Wimmera, the Wimmera River Basin; and with North Central, the Avoca River Basin. The Mallee contains ephemeral northward flowing effluent streams from both systems including Yarriambiack, Outlet, Tyrrell and Lalbert Creeks. Significant remnants of the nationally threatened Buloke Woodlands vegetation community, Wyperfeld National Park, Big Desert State Forest, and large tracts of agricultural land also extend across these borders.

Uniquely for a Victorian Natural Resource Management (NRM) region, we also share our borders with two Australian states: South Australia and New South Wales. As with Victoria, both of these states have a range of entities with NRM responsibilities. These include CMAs, Traditional Owners, Landscape Boards, Water Authorities and a range of state government departments. Rivers, wetlands, agricultural land, biodiversity, cultural heritage and communities all interact at this tri-state level.

The breadth, scale and complexity of this cross-border relationship requires effective partnerships in diverse fields such as environmental watering, agricultural land management, soil health research, groundwater resource management, salinity interception and threatened species interventions.

As neighbours, regardless of our status and individual responsibilities, it is important that we recognise, and where possible, integrate each other's efforts to protect and enhance the natural, productive and cultural landscapes contained within these shared systems.

## 1.4: KEY DRIVERS OF CHANGE

*Ongoing pressures from a range of long-term and emerging threat processes directly influence the condition of our natural, cultural and productive landscapes. Regional efforts to manage these processes is vital to securing the environmental, economic, cultural and social values these landscapes provide.*

*The Mallee currently faces several challenges however that may compromise both the effectiveness of our management actions and the resilience of our landscapes. Conversely, there are also opportunities for improvement in how we plan for and deliver NRM.*

*Collectively, these threat processes, challenges and opportunities represent key drivers which have the potential to significantly influence outcomes achieved through this RCS and beyond. How we respond to these drivers will play a critical role in shaping the future condition of our region.*

### 1.4.1 CHALLENGES AND OPPORTUNITIES

#### CLIMATE

The condition of our natural, cultural and productive landscapes can vary significantly with seasonal conditions and events in the Mallee, where some annual climate variability is the norm, particularly in rainfall. Over recent years it has become increasingly apparent however that long-term climate trends are influencing the biophysical values these landscapes support, and the services they provide.

##### *Climate Variability*

The variability of our climate presents significant external risks to NRM in the Mallee. Weather extremes such as drought, flood, heavy frosts, hail, heat waves and high winds are not uncommon and can have severe impacts on the region. These extremes have the potential to either directly impact the region's management actions, or impact indirectly by generating damaging events such as fire or dust storms.

They can also influence the short-term capacity of individuals and organisations to be involved in management interventions on land that they manage by damaging infrastructure, or otherwise diverting financial or physical resources in order to respond to such events.

In many cases, these weather events pose short-term interruptions over a generally localised area. While they are significant and often traumatic to those directly affected, their impact does not usually extend across the entire region. Under these circumstances it is important that our NRM stakeholders have the flexibility to revise and adjust their programs without significant difficulty.

Drought is however an exception in terms of extreme weather as it typically impacts across large swathes of the landscape. Under these conditions it is important that there is a range of management responses available to our NRM stakeholders that can benefit both the landscape and our communities.

##### *Climate Change*

A changing climate has been identified as a critical issue facing the Mallee, with many impacts predicted under various greenhouse gas emission scenarios already being experienced. Key examples of changes that have occurred over the past 30 years in the Mallee include<sup>8</sup>:

- Annual rainfall has decreased by around seven percent, mostly in the autumn and spring months
- Dry years (lowest 30%) have occurred 13 times, and wet years (top 30%) have occurred six times
- Spring frosts have been more common and have been occurring later in the season
- More hot days, with more consecutive days above 38°C.

<sup>8</sup> Bureau of Meteorology and the CSIRO (2019): Regional Weather and Climate Guide – Mallee, Victoria.  
Mallee Regional Catchment Strategy 2022-28 Public Consultation Draft



Climate change projections produced for the Mallee by CSIRO<sup>9</sup> identify that these trends are expected to continue, with:

- Maximum and minimum daily temperatures continuing to increase over this century (very high confidence)
- Rainfall continuing to be very variable over time, but over the long term it is expected to continue to decline in winter and spring (medium to high confidence), and autumn (low to medium confidence), but with some chance of little change
- Extreme rainfall events are becoming more intense on average through the century (high confidence) but remaining variable in space and time
- The number and risk (i.e. Forest Fire Danger index) of fire days increasing (high confidence).

Based on these future climate scenarios, it is projected that by the 2050s, the climate of Mildura could be more like the current climate of Menindee, NSW, and Swan Hill more like Balranald, NSW.

These changes have potentially profound implications for our natural landscapes. Biophysical systems are inherently sensitive to changes in both weather and climate. This sensitivity allows for these systems to ‘react’ in a timely fashion to these changes using whatever adaptive strategies that are available to them. With predictions for increasing temperatures and a shift in rainfall seasonality, it is expected there may be a substantial change in ecological landscapes across the Mallee.

The capacity of our current biophysical assets to adapt in the face of such change is complicated by the modern, fragmented landscape within which they exist, with connectivity and scale directly influencing both the adaptive capacity and vulnerability of native vegetation (Figure 3).

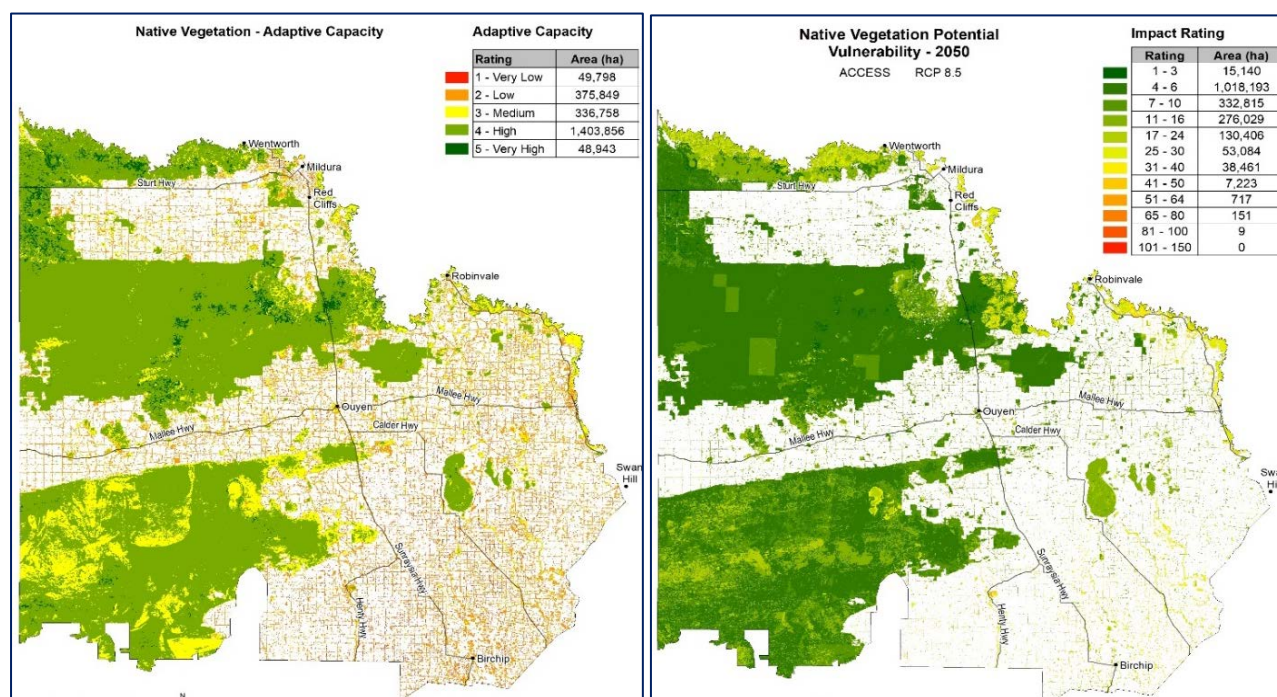


Figure 3: Adaptive capacity and potential vulnerability of native vegetation in the Mallee Region (adapted from Spatial Vision 2014).

Changed climate conditions are likely to contribute to significant change in the current biodiversity of the Mallee by exacerbating the negative impacts of existing threats such as habitat loss and fragmentation, invasive species, and broad scale bushfires. It has been suggested that under a changing climate, ecological conditions for plant communities in the Mallee (particularly those in the north and east) may be substantially changed by as much as 70 percent<sup>10</sup>.

<sup>9</sup> Clarke et al. 2019. Mallee Climate Projections 2019. CSIRO, Melbourne Australia

<sup>10</sup> Harwood, et al. (2014). 9-second gridded continental Australia potential degree of ecological change for Vascular Plants

Decreases in rainfall and higher evaporation rates will mean less soil moisture and consequently, less water for rivers and wetlands. Demand for water may also increase as a result of warmer temperatures and population growth. Therefore, our need to use water more efficiently will be even greater.

Lower flows and higher temperatures may also reduce water quality within the catchment and create a more favourable environment for potentially harmful algal blooms. These blooms contribute to fish deaths in waterways, but also pose significant economic costs. Drinking water has to be specially treated, regional tourism is often affected, and water for livestock has to be sourced elsewhere.

Climate change will potentially impact the types of crops we grow and the productivity of our agricultural systems. Any reduction in rainfall will place most farms under stress, particularly when linked to higher temperatures. Changes that will directly influence land use and management decisions in both dryland and irrigated agriculture, as farmers seek to counter new climate outcomes and maintain farm income.

Recent research estimates that by 2070, without adaptation, crop yields could be reduced by up to 30 percent for almond and citrus plantings, and 35 percent for some grape varieties. Strategies such as crop modelling, breeding and selection will be essential across all industries to help mitigate these impacts<sup>11</sup>.

The overall impacts of climate change on our communities are wide-ranging and complex. To adapt to changing conditions, our community needs to be resilient in the face of stresses and shocks. This will be key to both livelihood adaptation and the ability of the community to effectively manage the natural resource base for environmental, cultural, social and economic outcomes.

Despite the significance of climate change as a risk to the Mallee, we do have the opportunity to plan for these expected changes by identifying and implementing climate-ready adaptation options that influence land management decisions, provide habitat restoration for biodiversity migration, and improve knowledge to generate greater capacity for individuals and stakeholders to respond over time to pressures arising from a changing climate.

### ***Carbon Markets***

There are likely to be a number of ways in which our land managers can participate in emerging carbon market opportunities. This includes the sequestering of carbon through activities such as revegetation and land management practices (e.g. maintaining groundcover), and potentially the restoration of 'blue' carbon within waterway ecosystems.

In planning for and participating in these markets, it is essential the impacts (both positive and negative) of associated activities on our natural, productive and cultural landscapes are fully recognised.

Carbon markets that support bio-sequestration can also deliver a range of co-benefits for biodiversity. Incorporating activities such as biodiverse carbon plantings using vegetation communities specific to the location prior to clearing (i.e. rather than isolated monocultures), and native vegetation retention and protection on-farm, have the potential to increase habitat extent, connectivity and restoration outcomes on both public and private land. Conversely, both biodiverse and non-biodiverse (single species) plantings may impact negatively on water availability and agricultural production.

Ongoing collaboration between government partners, land managers and investors is required to maximise the potential biodiversity co-benefits that carbon focused projects can deliver.

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<sup>11</sup> Implications of climate change for horticulture in the Victorian Mallee: 2021 report for Mallee CMA and Agriculture Victoria.  
Mallee Regional Catchment Strategy 2022-28 Public Consultation Draft

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## **FIRE MANAGEMENT**

Fires are a dominant part of the Mallee landscape and are a major factor in determining the nature and distribution of our flora. Responses to fire by our vegetation communities vary widely; with many species dependent upon it for regeneration, and others with no adaptation to it at all.

Changes in fire frequency, intensity, and extent since European settlement has altered vegetation structure, and influences the mosaic of differently aged, post-fire vegetation communities across the landscape. The management of fire for ecological purposes is complex given that different fauna species require differently aged vegetation to meet shelter, food and breeding requirements; and that the ideal fire regime for many of our species is still largely unknown.

A key challenge for the region is to realise fire management objectives of protecting people and property, while meeting the ecological needs of our natural landscapes.

Forest Fire Management Victoria is responsible for developing an Annual Fire Operations Plan for the region's public land. The plan is developed in consultation with the Mallee community and identifies areas proposed for planned burning, drawing on best available knowledge regarding both bushfire and ecological risks.

This community engagement process provides opportunities for stakeholder knowledge transfer, the identification of key information gaps, and enhanced partnerships; all of which are integral to continuous improvements in managing fire for environmental gains.

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## **WATER AVAILABILITY AND DELIVERABILITY**

Assessments of water supply and demand from perennial horticulture in the southern Murray-Darling Basin have identified increasing challenges for plantings in the lower Murray region to meet their water needs in dry years, and that any new plantings could exacerbate water supply risks. If irrigated horticulture continues to expand without associated reductions in water demand (i.e. adaptive management, industry restructuring), there will be increased risk to supply for existing businesses and increased competition in the water market. Irrigator understanding of the limits to water availability, and therefore the limits to expansion, and how they will be enforced will be central to facilitating change. The impact of climate change (e.g. increased risk/intensity of drought) on water allocations under climate change also requires ongoing consideration.

Changes in both demand and supply have also increased the challenges of delivering water to where and when it is needed. Continued expansion of horticultural plantings in the Mallee regions of the Victoria, New South Wales and South Australia, has concentrated irrigation demand and shifted water use further away from major dams. Given that it takes three weeks to deliver water from the Hume Dam to Sunraysia, the challenge of providing peak demand (e.g. during heatwaves) is likely to become more difficult if peak irrigation continues to increase as existing plantings mature and new permanent planting are established across the tri-state Mallee regions. A challenge that will be further exacerbated under a changing climate where the frequency and duration of hot days are projected to increase.

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## CHANGING DEMOGRAPHICS

Small rural communities in the Mallee continue to experience population decline and increasingly older age profiles. This reflects the continuing trend for young people to leave rural areas and relocate to larger population centres (e.g. Mildura) to access a greater availability of employment, education, and training opportunities. In some areas, these population changes also coincide with a decline in key industries and the withdrawal of services, both public (e.g. schools and hospitals) and private (e.g. banking and retail), making living in these areas less desirable and further impacting on the wellbeing and sustainability of the remaining community.

The growth of our urban areas at the expense of our rural population presents a great challenge in sourcing the necessary co-investment of time and resources from a diminishing (and ageing) population of rural landholders and community-based NRM groups.

There is a risk that there will be insufficient people on the ground in large parts of our region to help implement the interventions that will protect and enhance our assets and the services they provide. Within this context it is essential that the capacity of our rural communities is recognised and that adequate support mechanisms are established where necessary. Opportunities for innovative and more efficient delivery mechanisms should also be encouraged.

The COVID-19 pandemic saw internal migration from cities to regions across Australia. Specifically, in Victoria, there was a 13 percent drop in regional Victorians moving to Melbourne in the six months to September 2020. Driven by four key factors; working from home, economic uncertainty and market conditions, restrictions on international borders and the impact on young adults; the pandemic has raised the possibility of a longer-term shift in migration patterns between capital cities and regional areas across the country<sup>12</sup>.

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## INNOVATION AND TECHNOLOGY

Increased application of existing and emerging technology has the potential to enhance both the effectiveness and efficiency of NRM in the Mallee. The Victorian Government's strategy for agriculture, for example, identifies modernisation as a core theme for agriculture to thrive over the next decade; estimating 80 percent of improvements in Australia's broadacre productivity since the late 1970s has come from technology, and that full application of digital agriculture could lift production by a further 25 percent<sup>13</sup>.

Overall advances in satellite, and other remote sensing technologies is vastly increasing the data available to support NRM decision making. Digital technologies such as drones, weather stations, soil moisture probes and sensors can support improved planning, implementation, monitoring and evaluation process. Applying technology to develop innovative engagement and communication approaches can also assist in overcoming participation barriers often identified by our rural communities (i.e. distance and time).

Digital connectivity and literacy can however impact the uptake of such technology. Connectivity varies significantly across the region, with many 'black spots' across more remote areas. Furthermore, only 60 percent of households in the Mallee report having internet access; 10 percent below the State average<sup>14</sup>.

Enhanced connectivity, together with increased awareness of the efficiencies that new technologies can provide will be important factors in influencing increased application across the Mallee.

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<sup>12</sup> Australian Government Centre for Population, Migration Between Cities and Regions: A quick guide to COVID-19 impacts Presentation: <https://population.gov.au/sites/population.gov.au/files/2021-09/the-impacts-of-covid-on-migration-between-cities-and-regions.pdf>

<sup>13</sup> Department of Jobs, Precincts and Regions (2020): Strong, Innovative, Sustainable - A new strategy for agriculture in Victoria.

<sup>14</sup> Australian Bureau of Statistics 2016. Census of Population and Housing, Type of Internet Connection <http://www.abs.gov.au/websitedbs/censushome.nsf/home/Data>

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## **SELF-DETERMINED PARTICIPATION AND LEADERSHIP BY TRADITIONAL OWNERS**

The region's natural landscapes are fundamental to Country and the cultural identity of Traditional Owners. Caring for and healing Country with traditional ecological knowledge and customs built over thousands of years of practice is integral to this connection.

By valuing and supporting Traditional Owner leadership and expertise, we can more effectively care for and heal Country with traditional ecological knowledge and customs; providing for ongoing ecological benefits and enhanced connections with Country.

The guiding principle for Traditional Owner participation and leadership is self-determination. This is described in DELWP's Pupangarli Marnmarnepu *'Owning Our Future'* Aboriginal Self-Determination Reform Strategy 2020-2025, which aligns with whole-of-government commitments set out in the Victorian Aboriginal Affairs Framework (VAAF), and the VAAF Self-Determination Reform Framework, which guides government and agencies to enable action towards Aboriginal self-determination. From an NRM perspective, this means empowering Traditional Owners to participate and lead, if and how they choose, efforts to manage and heal Country.

Prior to colonisation, Mallee landscapes were healthy and provided sustenance for the people and wildlife that lived here. With European settlement came foreign plants, animals, and changed management practices which impacted the land and the people. First Nations people were forced out of the landscape and could not maintain their obligations to Country. The First Peoples Assembly of Victoria and the Victorian Government have made a shared commitment to truth telling through the Yoo-rrook Justice Commission. The Commission is expected to establish an official record of the impact of colonisation on First Peoples in Victoria and make recommendations about practical actions and reforms needed. This will likely inform catchment management across the State and the Mallee region into the future.

The State of Victoria is also working with Aboriginal Victorians through the First Peoples Assembly to progress discussions on Treaty. Treaty is an agreement between governments and First Nations – it is an opportunity to recognise and celebrate the status, rights, cultures and histories of Aboriginal Victorians. It also helps address the wrongs to build stronger relationships between Aboriginal and non-Aboriginal Victorians, and the State.

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## **INCREASING RECOGNITION OF RECREATIONAL AND AMENITY VALUES**

Connections to nature are important for the well-being and social fabric of our communities. Recreational and amenity values provided by our natural landscapes are appreciated by both locals and visitors alike; supporting a suite of activities such as camping, walking, swimming, fishing, bird watching, boating, and community events.

Recreational sites can also provide opportunities for tourism and hospitality, attracting visitors from within and outside of the region. In small towns, features such as a waterway can provide for important social connections and income for local businesses.

Integrating the recognition and inclusion of these values into regional NRM planning and delivery processes allows for their ongoing protection and enhancement. This includes considering the impact (both positive and negative) of environmental focused management actions on sites with recognised, or potential, recreational and aesthetic values; and improving associated infrastructure to enhance accessibility and amenity.



## 1.4.2 MAJOR THREATS

### LAND USE CHANGE

#### *Habitat Loss and Fragmentation*

The extensive clearing of Mallee vegetation for agricultural production has resulted in a mosaic of scattered, often small and isolated patches of remnant vegetation dispersed across the landscape. While much of the pattern of the Mallee landscape was set many decades ago, there has been an ongoing loss of small vegetation patches which continues to add to this fragmentation threat.

This loss and fragmentation of native vegetation makes much of our biodiversity vulnerable to a range of threatening processes. Without effective connectivity and access to regenerative material, many fragmented and isolated habitats lack the necessary resilience to respond successfully to both ongoing and emerging threats.

Clearing vegetation around waterways and within their catchments has significantly changed the amount, quality and flow pattern of run-off entering waterways. Run-off from highly modified catchments is likely to contain high levels of sediment and nutrients, pollutants, and seeds of exotic plants.

Vegetation fragmentation decreases both the habitat value of individual patches for many fauna species and their ability to move through the landscape. Lack of connectivity is a major factor in the decline of many now threatened species in the Mallee.

Added to this is the challenge of under-representation. While large contiguous blocks of terrestrial habitat that remain in the Mallee are protected through the formal reserve system, they do not represent the entire diversity of the region's original habitat and associated ecosystems. A key example is the Buloke Woodland Community which was extensively cleared for agriculture and is now considered endangered at a national scale.

#### *Altered Hydrological Regimes*

Flow modification of the Murray River system has occurred to meet the needs of navigation, irrigation and urban water use. River regulation modifications include less variation in channel flows, a reduction in the frequency and duration of small and medium floods, weirs which raise water levels immediately upstream and redirection of flows into some anabranches to supply irrigators.

This has altered the wetting and drying phases of many wetlands and ephemeral anabranches, by either permanently inundating the area, or by restricting flows. Changes which can ultimately have a significant impact on important riparian habitat and associated vegetation communities (e.g. River Red Gum, Black Box), fish populations, nutrient cycling water quality, and channel/wetland shape and form.

The Avoca system, containing Lalbert and Tyrrell Creeks, is one of the least regulated rivers in Victoria. The construction of levees to restrict flooding of adjacent land and other management activities such as clearing, cultivation and the application of gypsum have however changed run-off patterns across the landscape. Additionally, the construction of catchment dams in the upper Avoca has reduced inflows into the creeks.

By contrast, the Wimmera River is heavily regulated and its two distributaries occurring in the Mallee, Yarriambiack and Outlet Creeks together with their associated wetlands, are largely influenced by headwater storage.

In terms of the region's off-stream wetlands, their natural run-off patterns have been significantly affected by land management (e.g. clearing and cultivation). While many of these wetlands were fed by a domestic channel to support water storage functions, following pipeline establishment they now rely on connections to receive water allocations.

### ***Water Quality***

Irrigation development can change saline groundwater flow patterns, increasing salt inputs to the floodplain and associated waterways. River salinity can increase even during high rivers and particularly on flood accessions when accumulated salt drains to the river.

This drainage of water from irrigation into low lying areas of frontage, the river, or the adjoining floodplain led to rising watertables and salinity, waterlogging and increased nutrients to waterways. This can increase the risk of algal blooms, lead to the decline or even death of native vegetation, and can impact the amenity of the affected site. Poor structural conditions of drains may also result in erosion, increasing sediment loads to waterways.

Failed or failing groundwater bores also present a threat to water quality within the Murrayville Groundwater Management Area (GMA), particularly where the Murray Group Limestone aquifer is overlain by the saline Parilla sands aquifer. The older stock and domestic bores drilled into the limestone aquifer are likely to deteriorate as the steel casing corrodes, allowing water from the saline aquifer above to enter the fresher limestone aquifer and cause contamination.

Proper capping and decommissioning of old bores is important to protect the water quality of the Murray Group Limestone Aquifer. This also applies to the numerous bores drilled over many years for monitoring and investigative purposes outside of the Murrayville GMA.

It is also possible that pumping for irrigation within the Murrayville GMA may increase the rate of naturally occurring lateral movement of saline groundwater from the east. Monitoring has not provided any evidence of this to date however.

### ***Soil Health Decline***

While the Mallee contains significant areas of naturally saline surfaces, it is estimated that some 55,000 hectares of land has become salinised since European settlement<sup>15</sup>. This induced or secondary salinity has occurred as a direct consequence of changed land use and management (i.e. the removal of deep rooted perennial vegetation for more shallow rooted, annual crops and pastures) which has unbalanced natural water table levels, causing a rise in saline water tables. Once water tables rise to within about two metres of the soil surface, groundwater is drawn up by capillary action, leading to salt accumulation and salt scalds.

These changes to soil chemistry can pose a significant threat to natural, cultural and productive landscapes. In some areas where salt levels are extremely high, no plant species can grow and ecosystem function is lost. In other areas, salt tolerant species have expanded significantly, replacing the original habitat.

Although the spread of dryland salinity is considered to have slowed or receded under extended dry periods, the threat is likely to increase if there is a return to wetter conditions, particularly an increase in episodic high intensity rainfall events over summer.

Seeps resulting from localised, perched water tables have however rapidly increased over the last decade due to a combination of landscape, seasonal and farming system factors; leading to the waterlogging, scalding and salinisation of productive cropping ground in swales, a reduction in paddock efficiencies, and increased machinery risks<sup>16</sup>.

Mallee agricultural soils are highly susceptible to wind erosion given their light structure, with the likelihood of erosion strongly linked to land management (e.g. groundcover) and climatic conditions (e.g. wind strength). Wind erosion processes can have a significant impact on production, including; loss of soil fertility, sand blasting of emerging crops, and localised 'blowouts'. Adverse effects off site extend to harmful airborne dust pollutants, reduced visibility, infrastructure inundation, and increased sediment and nutrient loads in waterways.

Sand drift can also inundate infrastructure and expose cultural sites, smother the ground layer of native vegetation, and threaten regeneration of the shrub layer and over-storey. Drift also destroys the habitat of ground dwelling fauna. The

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<sup>15</sup> Grinter, V., & Mock, I. (2009). Mapping the Mallee's Saline Land . Report for the Mallee Catchment Management Authority.

<sup>16</sup> McDonough, C (2020) Soaks are seeping across the Mallee – what can be done about it?

impact of erosion on vegetation remnants is greatest on the western and southern perimeters, where the smaller the remnant, the greater the edge effect. This impact is dramatic on the western and southern flanks of roadsides most noticeably where they intersect dunes.

While widespread changes in dryland management practices are supporting increased groundcover and overall soil stability, there is still a need for further improvement. The dust concentrations generated under current land practices across the Mallee impact both remote and urban areas through loss of air quality, clean-up costs and interruption to economic activity ( e.g. health impacts, closed building sites and airports). Wind erosion is also continuing to threaten the long-term viability of many agricultural businesses, and directly impacting the condition of native habitat.

Soil organic carbon (SOC), as the measurable component of soil organic matter, is critical to the physical, chemical and biological function of agricultural soils. SOC levels vary considerably (generally between 0.2 and 1.5 percent) across the region and are inherently linked to soil texture, which shifts from sandy loam in the north to clay loam/clay soils in the south.

Research indicates that carbon stocks in the Mallee may still be in a state of decline from initial clearing and cultivation of the native soil, and that further shifts in management practices are required to arrest this decline. In determining where and which management practices can potentially increase carbon stocks, two core factors have been identified: productivity needs to be maintained at a high level, relative to potential, to optimise biomass production and ensure that carbon capture by the plant flows through to the soil; and any chemical, physical or biological soil constraints need to be overcome to maximise water-use efficiency<sup>17</sup>.

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## INAPPROPRIATE FIRE REGIMES

Large-scale bushfires represent a key threat to Mallee biodiversity by reducing existing populations of native species, reducing resources available to those remaining species, and exacerbating the risk of existing threats (e.g. increased predation and grazing pressure). An increase in fire weather days under a changing climate has the potential to increase the frequency and intensity of large-scale bushfires across the region, further adding to management complexities.

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## PESTS AND DISEASES

### *Grazing Pressure*

Grazing and browsing by livestock, rabbits, feral goats, feral pigs and to a lesser extent deer influences vegetation health by reducing floristic diversity and altering structure. This reduces resilience to shocks (e.g. drought, fire), and ultimately the ability to function as effective habitat.

Grazing by livestock can cause significant damage to the ecology of native vegetation, particularly within small remnant patches on private land where damage is most prevalent today. Within riparian areas, livestock grazing can lead to increased bank erosion as well as increased run-off of sediment and nutrients to the waterway.

European rabbits represent a key risk to the condition of both smaller remnants and large reserves. Impacts from rabbits can be very selective and have a significant effect on regeneration processes within the region's Semi-arid Woodlands, including threatened Pine, Buloke and Belah communities.

Feral goats are predominantly browsers and less dependent on the herbaceous groundcover than rabbits, directly impacting seedlings and young saplings, and compromising regeneration of the shrub and canopy layers. Overabundant wildlife (i.e. kangaroos) also impact seedling and sapling survival.

Feral pigs are opportunistic omnivores, and their diet varies according to the seasonal availability of resources. While they show a preference for succulent green vegetation, they will also eat foliage, stems, rhizomes, bulbs; and a wide

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<sup>17</sup> McKenzie, N., & et. al. (2017). Priorities for improving soil condition across Australia's agricultural landscapes. Report prepared for the Australian Government Department of Agriculture and Water Resources. Canberra: CSIRO.

range of animal material (e.g. invertebrates, fish, frogs, reptiles, birds and small mammals). They primarily impact riparian habitat through their grazing, trampling, rooting and wallowing activities.

Rabbits, feral goats and feral pigs also cause damage to Cultural Heritage sites through their burrowing, trampling and wallowing habits.

### ***Introduced Predators***

Across Australia, it is estimated that foxes and cats combined are killing more than 2.6 billion mammals, birds, and reptiles every year, putting immense pressure on the survival of many native species<sup>18</sup>. The introduced red fox and feral cat played a large part in the extinction of at least 34 mammal species at a national scale, and continue to be implicated in the ongoing decline of many threatened fauna species<sup>19</sup>.

Foxes and feral cats are widespread across the Mallee and represent an ongoing threat to the persistence of native fauna species, further reducing the abundance and distribution of many threatened populations; with ground foraging and ground nesting species at particular risk.

### ***Environmental Weed Competition***

Environmental weeds can outcompete native species for space, light, nutrients and water; impeding regeneration processes. They reduce the diversity of native species within a vegetation community, changing its composition and structure. They can also impact on the use of popular recreational areas, affecting aesthetic values and limiting access.

Of particular concern are those weeds that have the capacity to change the character, condition, form or nature of ecosystems over substantial areas.

In some instances, weed proliferation may impact on water quality as a result of nutrient pulses caused by rapid shedding of leaves (e.g. willows). An ability to spread rapidly can also result in physical interruptions to water flow causing changes in water course behaviour.

Key terrestrial weeds currently impacting Mallee habitat include: African Boxthorn, Bridal Creeper, Prickly Pear and Wheel Cactus, Noogoora Burr, Willows, Spiny Rush, Wards Weed, and exotic annual grasses such as Buffel Grass. A new emerging weed in the Mallee, Buffel Grass is considered one of Australia's worst environmental weeds with the potential to transform large areas of native habitat if not adequately contained. Leafy Elodea, Arrowhead and Cabomba are key aquatic weeds threatening our waterways.

Overall risks posed by environmental weed infestations are expected to increase as a changing climate provides new opportunities for existing weed species by altering ecological niches, and aids the establishment of new species.

### ***Agricultural Pests and Diseases***

The weeds, pest and disease spectrum impacting dryland and irrigated agriculture is continually evolving with crop diversification and changes in management practice. Pest animals, insect incursions, plant diseases caused by nematodes, fungal, bacterial and viral causal agents, and weed competition, including herbicide resistant population, all add to the complexity, cost and risk of modern-day agriculture.

With these risks expected to increase as a range of new species (especially weeds) and the invasiveness of current species adapt to a changing climate, ongoing biosecurity and management is essential to minimising productivity losses. Plant genetics, biological controls and new technologies are also key components of the multipronged and collaborative approaches required to protect agricultural industries.

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<sup>18</sup> Stobo-Wilson et al. Counting the bodies: Estimating the numbers and spatial variation of Australian reptiles, birds and mammals killed by two invasive mesopredators. *Diversity and Distributions Journal*, March 2022.

<sup>19</sup> National Environmental Science Programme, Threatened Species Recovery Hub (2021).

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## **RECREATIONAL PRESSURES**

Mallee waterways, parks and reserves are popular recreational destinations for the local community and visitors from outside the region, making recreational use an important social value of these sites. However, the environmental impacts of this use also make it a key threat. The impacts of recreation can include littering and rubbish dumping, track proliferation, soil compaction and erosion, firewood collection, vandalism, and illegal hunting. As population and visitation increase, so do the potential impacts.

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## **CONSTRAINED REGENERATIVE CAPACITY**

The decline in vegetation cover and habitat complexity within remnant native vegetation can constrain or prevent regeneration, leading to loss of habitat in the longer term. While many of the threat processes detailed above are primary contributors to this process (e.g. fragmentation, grazing pressure), efforts to restore impacted habitat through revegetation must also consider the impact of a changing climate on species selection. Specifically, in terms of their genetic appropriateness for maintaining capacity in the current and future ecological landscape.

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## **MIS-ALIGNED COMMUNITY PERCEPTIONS**

Community opinions, approaches and values can run counter to the messages and knowledge about NRM, threatening the success of the wider communities' efforts to enhance their natural, cultural and productive landscapes. Such perceptions include 'right of unfettered access' that results in the removal of traffic management infrastructure; 'and 'we are doing no harm' where individuals are not aware of the cumulative and incremental impact of actions such as off-track access and firewood collection.



## 2: THE STRATEGY

## 2.1: INTEGRATED PLANNING AND DELIVERY

*The Regional Catchment Strategy is the primary integrated planning framework for land, water and biodiversity in each of Victoria's ten catchment management authority regions.*

Developed in partnership with regional stakeholders, the RCS provides a six-year framework for strategic action to support and focus the ongoing coordinated efforts of the region's land managers, Traditional Owners, industry and community groups, and government agencies.

The RCS is prepared under provision of the *Catchment and Land Protection Act 1994* (CaLP Act), which sets the overall purpose of the strategy as being:

- To establish a framework for the integrated and coordinated management of the catchment which will;
  - a. Maintain and enhance long term land productivity, while also conserving the environment
  - b. Aim to ensure that the quality of the state's land and water resources and associated plant and animal life are maintained and enhanced
- To establish processes that can be used to assess the condition of the state's land and water resources and the effectiveness of land protection measures
- To establish processes to encourage and support participation of landholders, resource managers and other members of the community in catchment management and land protection

Guidelines, produced by the Victorian Catchment Management Council (VCMC), provide the framework under which the 2022-28 RCS was developed; incorporating the overall principles of:

- An integrated catchment management (ICM) approach
- Regional ownership, embracing the regional delivery model, including co-delivery from committed partners
- A place-based systems approach, at regional and local levels
- Building on strong community engagement and stakeholder partnerships
- Regard for Aboriginal cultural values and traditional ecological knowledge
- A triple bottom line approach, including consideration of socio-cultural, economic, and environmental factors
- Being evidence-based, supported by science and defensible data
- Having the flexibility to adopt new technologies and new information as they arise



**Figure 4: The Mallee RCS employs an ICM approach by collectively addressing threats to natural, cultural and productive assets at the landscape (Local Area) scale.**

## 2.1.1 HISTORY

The 2022-28 RCS represents the fourth such strategy for the region; building on lessons learnt from the design, implementation and review of preceding documents.

Mid-term and final reviews of the 2013-2019 RCS were undertaken to understand and record the successes (or otherwise) and knowledge that resulted from implementation, and to inform RCS renewal processes. These reviews were based on key evaluation questions (KEQs) established under the RCS Monitoring, Evaluation and Reporting (MER) to provide assessments of impact, appropriateness, effectiveness, efficiency and legacy.

Stakeholder feedback on the RCS approach, performance and renewal processes was provided through a range of existing forums and targeted events. This included discussions with community, Traditional Owners, industry and government. Determining progress against RCS objectives and the identification of key strategic, policy and knowledge changes was also informed through consideration of the region's broader evidence base (e.g. Management and Condition Reporting, sub-strategy development and implementation).

Overall, the review identified that the approach applied by the 2013-19 RCS continues to provide an effective framework on which to base the 2022-28 strategy; recommending that subsequent renewal processes focus on testing, validating and (where required) updating the existing framework and associated priorities (i.e. rather than establishing a new framework and associated background material). Individual findings and associated recommendations that informed development of this RCS are outlined in Table 1.

**Table 1: Key findings and recommendations identified by 2013-19 RCS review processes.**

Key Findings	Recommendations
Grouping regional assets into nine individual themes (i.e. rivers; wetlands; threatened species, populations and communities; terrestrial habitat; soils; agricultural land; groundwater; culture and heritage; and community capacity for NRM) no longer aligns with key planning and reporting frameworks.	<ul style="list-style-type: none"> <li>• Consolidate river and wetland assets into a 'waterways' theme to align with the Mallee Waterway Strategy (2014-22) framework</li> <li>• Consolidate threatened species and ecological communities, and terrestrial habitat assets into a 'biodiversity' theme to align with the state-wide Biodiversity 2037 strategy</li> <li>• Integrate soils and groundwater assets utilised for production into the agricultural land theme to align with the Victorian Mallee Irrigation Region Land and Water Management Plan (2020-29), and the Mallee Dryland Sustainable Agriculture Strategy (2017-23).</li> </ul>
The asset- based approach applied to identify priorities at the landscape scale (i.e. <i>asset value x risk x intervention effectiveness</i> ) continues to provide an effective framework for integrating and targeting delivery.	<ul style="list-style-type: none"> <li>• Review existing landscape boundaries and incorporate new information (e.g. regional planning and prioritisation data, stakeholder aspirations) into a revised set of local areas to inform regional priorities and delivery</li> <li>• Apply the Mallee Waterway Strategy (2014-22) prioritisation framework to river and wetland related activities</li> <li>• Apply new decision support tools (e.g. Strategic Management Prospects, Habitat Distribution and Importance Models) to inform prioritisation of biodiversity related activities.</li> </ul>
Significant changes in government policy, planning and investment frameworks that may influence the region's strategic directions.	<ul style="list-style-type: none"> <li>• Identify key state and federal policy and planning changes, and incorporate into RCS renewal processes as appropriate.</li> </ul>
Significant changes in regional planning and prioritisation frameworks that may influence strategic/management directions and priorities at both the whole-of-region and landscape scale.	<ul style="list-style-type: none"> <li>• Identify key regional and local strategic/planning changes, and incorporate into RCS renewal processes as appropriate.</li> </ul>
Identification of five priority landscapes for biodiversity linkages by the Mallee NRM Plan for Climate Change (2016) builds on and enhances the RCS's targeted delivery framework.	<ul style="list-style-type: none"> <li>• Review and incorporate priority corridors as part of landscape scale (i.e. Local Area) approach to integrating and targeting delivery.</li> </ul>

<p>The scale and scope of RCS Implementation Plans developed for each priority landscape did not allow for annual review and renewal within available resources, impacting on currency and stakeholder engagement/application.</p>	<ul style="list-style-type: none"> <li>• Develop 'simple' Local Area Action Plans to identify investment priorities and potential delivery partners for each landscape</li> <li>• Undertake annual reviews with local stakeholders to ensure currency and facilitate increased collaborative action.</li> </ul>
<p>Capturing management actions undertaken by all regional delivery partners represented a key information gap impacting on the extent to which RCS implementation and achievements could be measured and reported. The different reporting requirements and data collection systems that each organisation operates under limits the extent to which whole-of-region data can be effectively collected and collated.</p>	<ul style="list-style-type: none"> <li>• Mallee CMA to continue to work with regional stakeholders and state government departments to identify opportunities for increased consistency in data collection, and improved data sharing processes.</li> </ul>

## 2.1.2 SCOPE

To fulfil its purpose, the RCS sets an aspirational vision for the management of natural, cultural and productive landscapes; the long-term (20-year) and medium-term (6-year) outcomes we seek to deliver through management of assets within these landscapes; and the 6-year strategic actions required to achieve these outcomes.

The concept of assets is fundamental to NRM in the Mallee. Our assets are the biophysical elements of the environment that give our region significance, substance and meaning to both the local and wider community.

Each asset has its own significance which is derived from a complex combination of environmental, cultural, social and economic values that are attached to it by society.

The Asset Based Approach (ABA) applied by this RCS examines an asset's significance against the level and trend of risks to ongoing asset condition, and the capacity and likelihood of effectively mitigating against those risks. This allows for the identification and prioritisation of interventions intended to protect or improve the condition of an asset in accordance with community and regional stakeholder expectations. This RCS applies two scales (whole of region and local landscapes) at which these *asset x risk x intervention* interactions are considered.

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### REGIONAL ASSETS

The RCS groups the key elements of our natural, cultural and productive landscapes that apply at a whole-of-region scale into five themes; Biodiversity, Waterways, Agricultural Land, Culture and Heritage, and Community Capacity for NRM. The definitions applied by the RCS to each theme are provided in Table 2.

**Table 2: Regional asset themes applied to this RCS.**

Asset Theme	Title
Biodiversity	Populations of threatened or significant species; occurrences of threatened ecological communities; and: terrestrial habitat provided by ecological vegetation classes and their contribution to landscape processes.
Waterways	Rivers, streams, their tributaries, surrounding riparian land (including the floodplain), individual wetlands, wetland complexes, and their associated floodplain ecosystems (including groundwater dependent ecosystems and the groundwater flow systems and aquifers they are reliant on).
Agricultural Land	All parts of the landscape that have been developed for the purpose of dryland and irrigated agricultural production (including the soil and water resources they are reliant on).
Culture and Heritage	All tangible and intangible Aboriginal culture and heritage that has recognised cultural, historical or spiritual significance, and Traditional Ecological Knowledge rejuvenation, protection and application in cultural landscapes management.
Community Capacity for NRM	The inherent knowledge, skills and motivation that the community has for effective and sustainable NRM.

*Section 3 (Themes) of the RCS outlines: the current condition of assets within each theme; factors influencing change in condition; priority directions for the future management of assets; the key federal, state and regional planning instruments informing these priorities; and the outcomes we are seeking to achieve through RCS implementation (i.e. 6-year targets) and beyond (i.e. 20-year targets).*

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## LANDSCAPE ASSETS

Landscape assets are spatial boundaries that group our biophysical systems into discrete local areas. These spatial boundaries provide the basis for integrated and targeted action by considering interactions between assets, associated threat processes, and potential management interventions; at a scale that is meaningful to local stakeholders.

As part of RCS renewal processes, landscape boundaries applied by the previous RCS were reviewed with key stakeholders to ensure they remain relevant and up-to-date with the most current available data. This included aligning, where appropriate, with complementary planning approaches, such as: Biodiversity Response Planning '*Landscapes of Interest*', Parks Victoria's '*Conservation Assets*'; and Mallee Waterway Strategy '*Waterway Management Units*'.

Figure 5A presents the eight discrete Local Areas established through this process: Murray River Floodplain; Cardross-Koorlong; Murray Scroll Belt; Murray Sunset Complex; Annuello-Wandown; Avoca Basin; Wyperfeld Complex; and North Wimmera Creeklines. Each of these Local Areas represent a social-ecological system within which stakeholder priorities and interests can be captured, and interactions between natural and cultural assets highlighted. It is also recognised that there will be cross-landscape connections, with boundaries intended to inform planning and reporting processes; rather than as a means to separate management approaches and delivery partnerships.

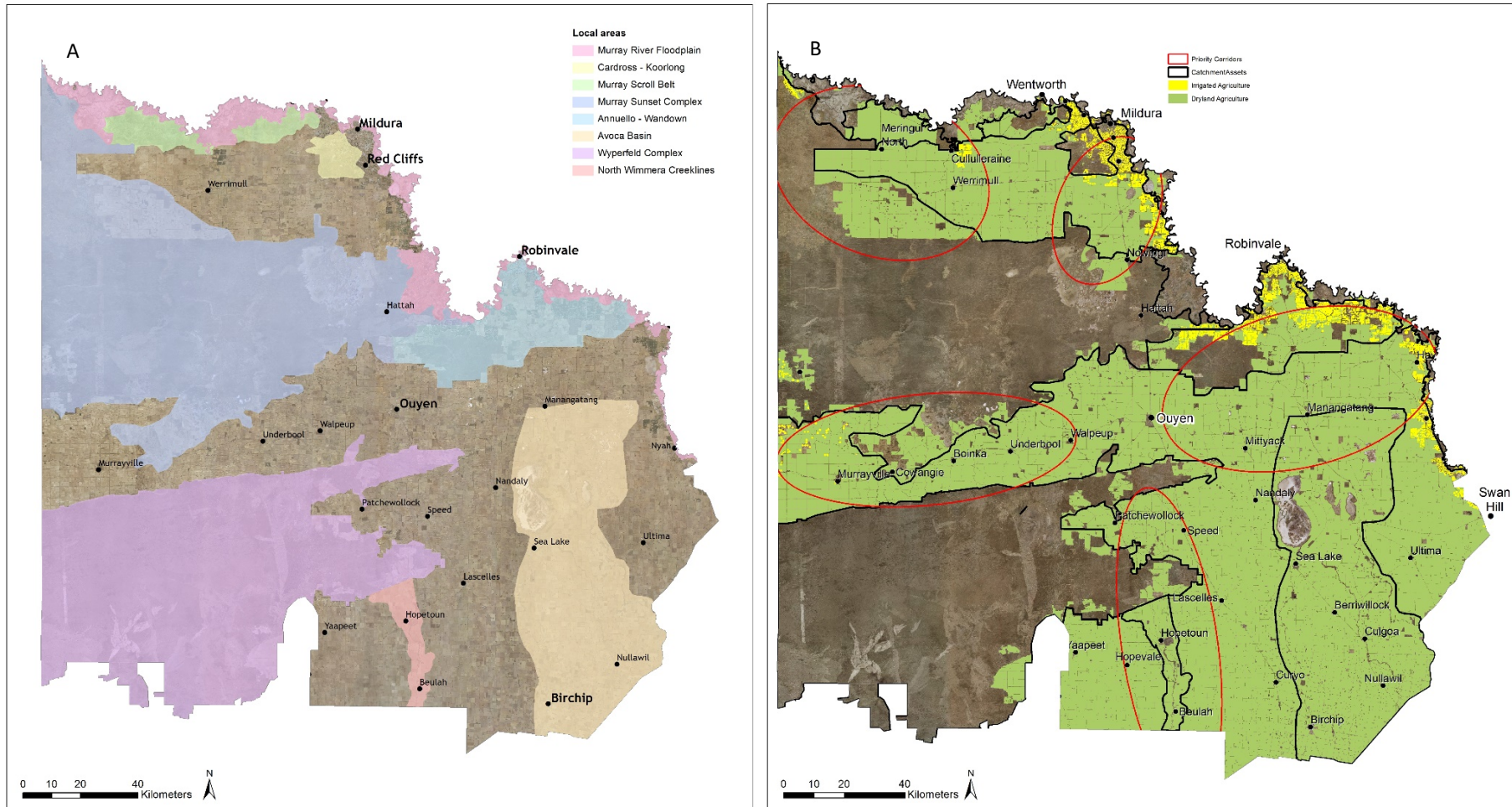
Sub-management units have also been identified for some Local Areas to recognise asset groupings/commonalities within the larger landscape, enabling associated planning and delivery processes to be undertaken at the appropriate scale (see Section 4).

Within this framework, dryland and irrigated agricultural land are considered dispersed landscapes with similar *threat x management* intervention interactions at the whole-of-region scale. Spatially delineating and considering them within each of the individual local areas would create inefficiencies in planning and delivery; and require significant replication regarding the documentation of associated values, threats, priorities and delivery partners within each Local Area. Agricultural land is therefore presented separately as an additional, dispersed Local Area (Figure 5B).

Priority bio-link corridors established by the Mallee Natural Resource Management Plan for Climate Change (2016) have also been incorporated into the Agricultural Land Local Area to support improved connectivity within this fragmented landscape and enhance natural pathways for wildlife movements; aiding species' dispersal for climate change adaptation. These corridors were identified as the most effective locations to enhance linkages between the region's significant ecological landscapes (i.e. Local Assets).

*Section 4 (Local Areas) of the RCS provides an overview of each Local Area, describing: significant values, major threats, priority management direction, medium-term (6-year) management targets, and potential delivery partners.*





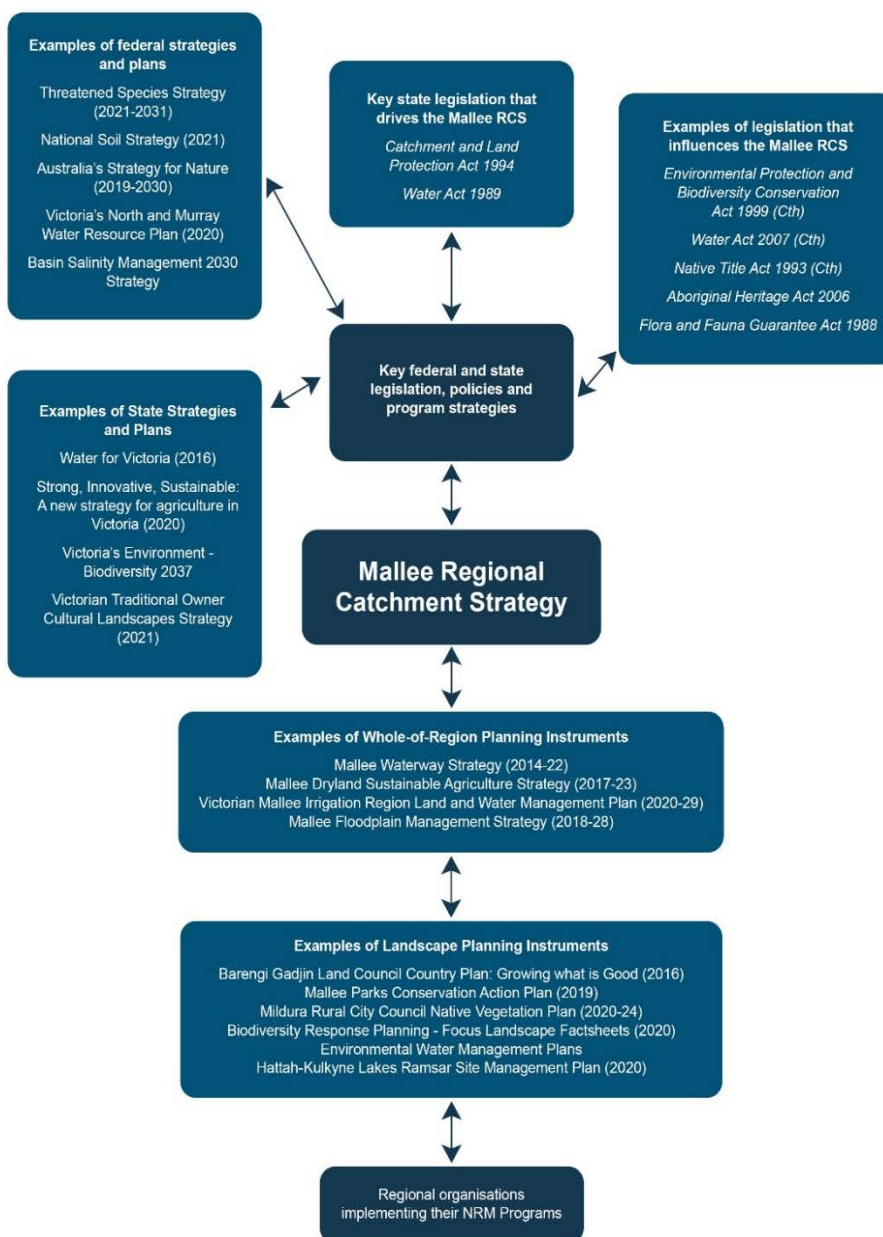
**Figure 5: Local area boundaries established by the RCS encompass; A- Discrete groupings of ecological landscapes boundaries; and B- Dispersed irrigated and dryland agricultural landscapes; and priority corridors (bio-links) for the re-establishment of native vegetation.**

### 2.1.3 DEVELOPMENT

Development of the RCS has primarily been informed by four key means, federal and state legislation, policies and strategies; regional strategies and action plans; landscape scale plans; and the Mallee community.

#### STRATEGIC FRAMEWORK

The Mallee RCS sits within a complex regulatory and policy framework that informs its development and which in turn gives it purpose and effect. By considering the relevant components of this framework in the identification of regional and landscape scale priorities, outcome targets and strategic management actions; the RCS provides a key mechanism for translating state and federal objectives into regional outcomes.



Key regional and local planning documents have also been integrated into the RCS development process to capture existing commitments and priorities developed through comprehensive stakeholder input.

Figure 6 provides an overview of the relevant federal, state, regional, and local legislation, policies, strategies, and plans which have informed the development of this RCS. A full listing of the key instruments considered throughout the RCS renewal process is provided in Appendix 1.

Figure 6: RCS Strategic Framework and examples of federal, state, and regional instruments which have informed renewal processes.

Implementation of the RCS also contributes to several international plans and agreements. This includes delivery against United Nations (UN) Sustainable Development Goals adopted by all United Member States (193 countries) in 2015 as a global framework for sustainable development to 2030.

Under the framework, environmental, social and economic development are indivisible, with the overall aim of: reducing poverty and inequality; promoting prosperity and well-being for all; protecting the environment and addressing climate change; and encouraging good governance, peace and security.

Figure 7 demonstrates how collective action at the local level (i.e. RCS implementation) supports delivery against sustainable development at the global scale.

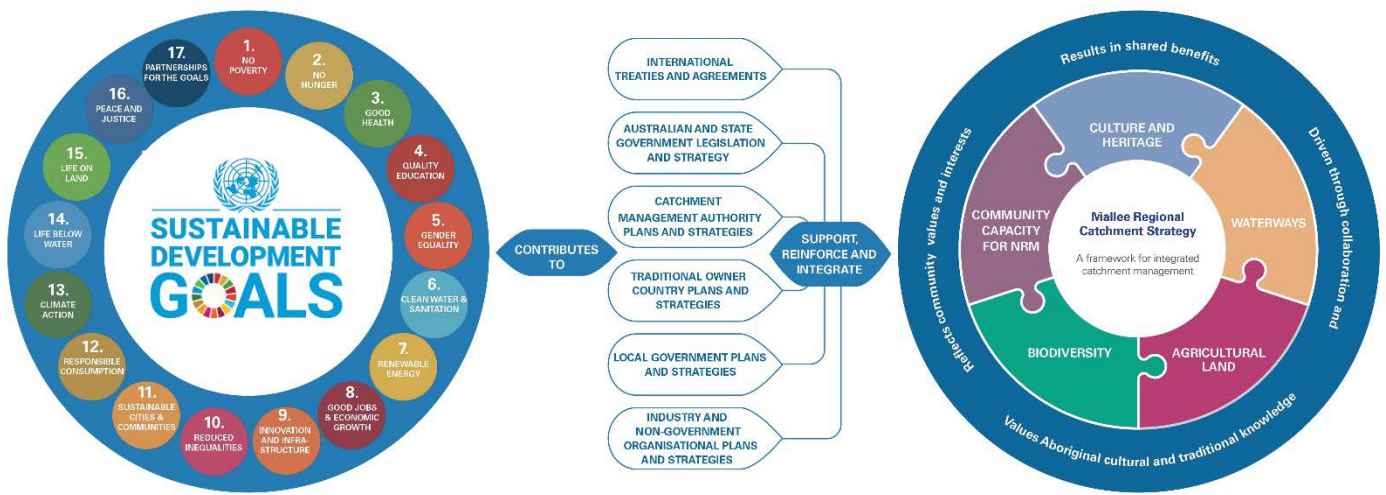


Figure 7: Regional Catchment Strategy interaction with United Nations Sustainable Development Goals (2015).



## COMMUNITY ENGAGEMENT

The success of this RCS is dependant on meaningful and ongoing engagement with all regional stakeholders. Capturing the aspirations, knowledge, priorities and expectations of the region’s individuals, groups and organisations throughout the RCS development phase is a fundamental component of this process.

Figure 8 provides a summary of the communication and engagement framework employed by RCS development processes. Key activities conducted under the framework to date have focused on the engagement of the Mallee RCS Steering Committee and existing community/expert forums. Issues, priorities and interests identified by local stakeholders at broader, program-based activities (e.g. workshops, on Country events) have also been considered to inform the development of this Draft RCS.

Appendix 2 provides further detail on the stakeholder forums and representatives engaged to date. Through this engagement, stakeholder representatives have provided valuable input into:

- Identifying regional and local scale strategies and plans to assist in identifying existing commitments and priorities
- Identifying the key drivers influencing Mallee NRM, including; new and emerging challenges and opportunities, and key threatening processes
- Reviewing asset groupings to form five Themes under which RCS implementation will be measured and reported at the whole-of-region scale
- Establishing medium-term (6-year) outcome targets for each Theme, and the indicators against which progress will be measured
- Identifying priority directions for the management of regional assets
- Reviewing Local Area boundaries to group regional assets into eight discrete landscapes
- Establishing management targets for each Local Area
- Identifying culturally important and/or locally significant values occurring within individual landscapes
- Identifying existing management programs and future investment priorities for Local Areas

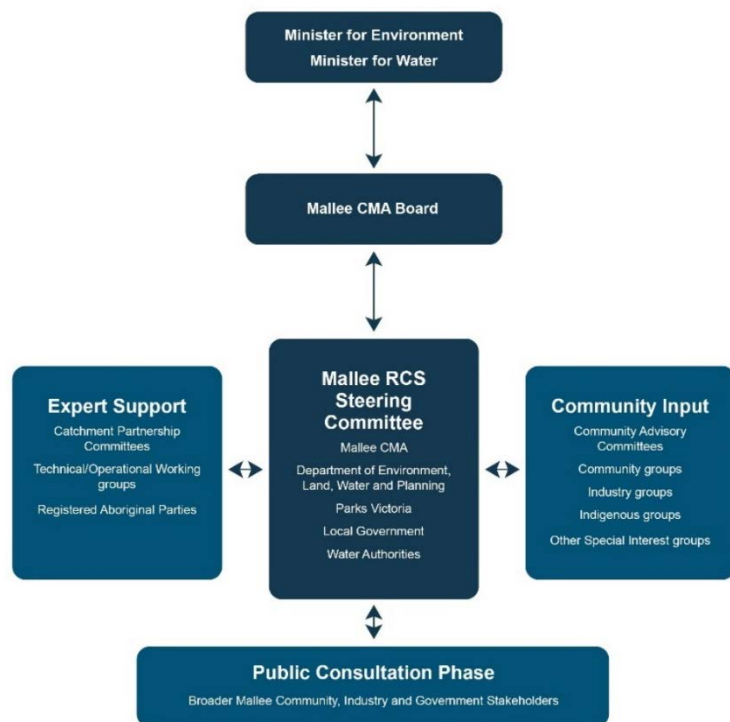


Figure 8: RCS Engagement Framework.

Feedback on this Draft RCS is now being sought from these stakeholders and broader regional/local audiences to inform preparation of the Final Strategy prior to seeking Ministerial approval.

## 2.1.4 IMPLEMENTATION

The RCS is based upon the following long-term (50-year) vision for ICM in the Mallee:

### *Healthy and resilient landscapes being cared for by connected communities*

Long-term vision (50-year) and outcome (20-year) statements are also identified for each of the RCS regional themes (Biodiversity, Waterways, Agricultural Land, Culture and Heritage, and Community Capacity for NRM) to help us to look beyond our immediate work programs and practical tasks; reminding us of where we are going and what we want to achieve.

Medium-term (6-year) outcome targets are also set for regional themes to provide a means by which RCS contributions can be measured (e.g. effectiveness, impact) at the whole-of-region scale. Management targets detailed for each Local Area identify the integrated (landscape-scale) actions to be delivered over the life of the RCS that will collectively provide for progress against desired outcomes for the region.

Delivery against the RCS's long, medium and short-term goals is underpinned by several guiding principles, specifically that:

- Community engagement and the involvement of land managers is crucial to the effective implementation of management actions
- Prevention of ecosystem damage and species' decline is more cost-effective than rehabilitation and recovery efforts
- Decision making should be based on the best available knowledge and decision support tools, however action should not be avoided solely due to lack of scientific certainty
- Decision making should recognise interactions between natural, cultural and productive assets; and that the management of one component can impact (positively or negatively) on others
- To achieve widespread and sustained improvements in our natural, cultural and productive landscapes; actions should also deliver social and economic benefits to the community
- Actions should be planned at the appropriate spatial and temporal scales, while also recognising resourcing expectations
- Planned actions should be flexible enough to adapt to changing circumstances and/or knowledge

*Individual long-term outcome targets are detailed for each regional theme in Section 3 (Themes), and for management targets for each Local Area in Section 4 (Local Areas).*

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## DELIVERY PARTNERS

Implementation of the RCS requires the support of Mallee stakeholders; that is all of the groups, organisations, communities, and individuals who play a role in managing our natural, cultural and productive landscapes. Collectively these stakeholders will be responsible for implementing the actions agreed to in this RCS.

Effective partnerships will support the delivery of priority actions across multiple jurisdictions and scales. The Mallee partnership model is complex, reflecting the diversity of landscapes in which we operate. Broad agreement among the region's delivery partners regarding their roles in implementing the RCS forms the basis for coordination of effort.

*Further detail on RCS delivery partnerships is provided in Section 1 (The Region), while potential collaborations to deliver against priority management actions are detailed in Section 4 (Local Areas).*

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## FRAMEWORK

A key learning from previous RCS's is that the strategy must allow for adaptation and refinement of regional priorities and MER approaches throughout the implementation phase. To facilitate adaptive management and continuous improvement processes, the 2022-28 RCS will be supported by a series of resources that inform the overarching strategic document, and act as a flexible and updateable repository of information (Figure 9).

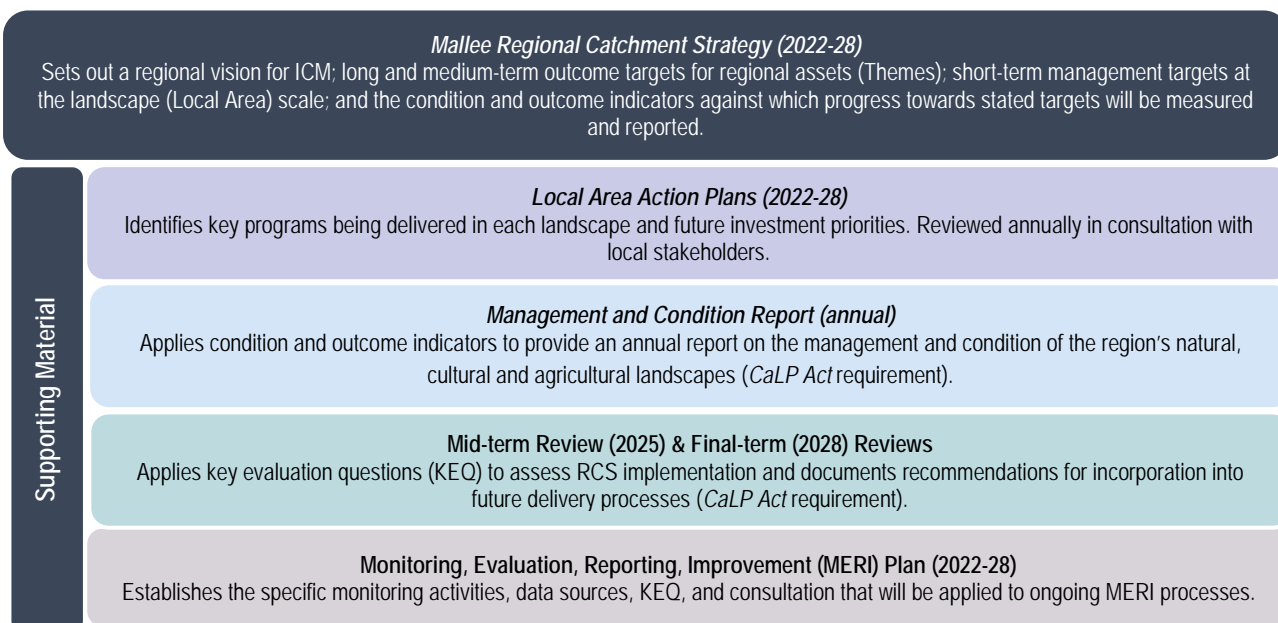


Figure 9: RCS Supporting Documentation

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## INTEGRATED AND TARGETED MANAGEMENT

The long-term condition of our regional assets is often threatened by a common suite of processes. For example, invasive plants and animals, salinity, recreational pressures and wind erosion have the potential to impact on many values within our natural, cultural and productive landscapes. Similarly, actions employed in the management of one asset type can impact (both positively and negatively) on others.

The 'asset' focused nature of many funding initiatives can result in programs that address threat processes in isolation, rather than considering *asset x threat* interrelationships. An approach which can result in duplication and inconsistencies.

Implementation of the RCS will recognise these interrelationships and seek to achieve integrated and multiple outcomes across asset types where possible. This means developing and implementing programs which consider and manage all significant asset types (i.e. Biodiversity, Waterways, Agricultural Land, Culture and Heritage, and Community Capacity) within a specific landscape, across all land tenures and management arrangements.

Figure 10 presents the regional *asset x landscape* interactions that will be applied to RCS delivery. Values and threatening processes relating to each of the five RCS Themes will be considered within the nine Local Area landscapes to identify priority management actions that deliver multiple outcomes.

Each of these landscapes present significant diversity in the natural, cultural and productive values they support; and in the processes that threaten their condition. The challenge is how we achieve the 'best' results with available resources. The RCS applies a targeted delivery framework to support the delivery of integrated 'whole-of-landscape' programs in locations that deliver the greatest environmental, economic, cultural, and social returns on our efforts.

*Further detail on how this targeted delivery framework has been applied to regional assets is provided for each of the RCS Themes in Section 3 (Strategic Directions).*



Integrated Catchment Management (ICM)				
Vision: Healthy and resilient landscapes being cared for by connected communities				
Terrestrial Habitat and: all Threatened Species and Ecological Communities	Rivers, streams, wetlands (including groundwater dependent ecosystems) and associated riparian land (including the floodplain)	Dryland and irrigated agricultural production (including the soil and water resources they are reliant on)	Tangible and intangible Aboriginal culture and heritage, and: the application of Traditional Ecological Knowledge to care for Country	Inherent knowledge, skills and motivation that the community has for effective and sustainable NRM
<b>Murray River Floodplain</b> (140,000 ha): Follows the Murray River from SA border to Nyah. Encompasses numerous waterways (including Hattah Lakes Ramsar Site and Living Murray icon sites) and Riverine Forest and Woodland assets. Supports 249 species and 2 ecological communities listed as threatened.				
<b>Cardross–Koorlong</b> (22,000 ha): Includes Cardross and Koorlong Lakes, Wargan Basins, and Koorlong State Forest. Primarily Chenopod Shrubland and Semi-arid Woodland assets. Supports 57 species and 2 ecological communities listed as threatened.				
<b>Murray Scroll Belt</b> (50,000 ha): Includes Neds Corner Station, a 30,000-hectare nature reserve. Primarily Chenopod Shrubland assets. Supports 131 species and 1 ecological community listed as threatened				
<b>Murray Sunset Complex</b> (872,000 ha): Includes Murray Sunset NP, most of Hattah-Kulkyne NP and Yarrara FFR. Primarily Mallee Triodia and Semi-arid Woodland assets; and the Raak Plain and Pink Lakes saline wetland systems. Supports 164 species and 4 ecological communities listed as threatened				
<b>Annuello–Wandown</b> (153,000 ha): Includes Annuello, Wandown and Menzies Flora and Fauna Reserves. Primarily Mallee Triodia assets, with some smaller Semi-arid woodland remnants. Supports 41 species and 2 ecological communities listed as threatened.				
<b>Avoca Basin</b> (430,000 ha): Includes Tyrrell, Wahpool and Timboram Lakes, Tyrrell and Lalbert Creeks, and woodland and grassland remnants. Supports 89 species and 5 ecological communities listed as threatened.				
<b>Wyperfeld Complex</b> (762,000 ha): Includes Wyperfeld, Big Desert, Wathe, and Bronzewing Parks/Reserves. Primarily Mallee Triodia, Heathland, Semi-arid Woodland, and ephemeral waterway assets. Supports 104 species and 4 ecological communities listed as threatened				
<b>North Wimmera Creeklines</b> (35,000 ha): Includes Yarriambiack Creek, Coorong and Lascelles Lakes, and small woodland and grassland remnants. Supports 17 species and 3 ecological communities listed as threatened.				
<b>Agricultural Land</b> (2,488,000 ha): Includes all land developed for dryland (2.4 million ha) and irrigated (88,000 ha) agriculture. Also encompasses the natural and cultural assets not captured within the 8 Local Areas outlined above.				

Figure 10: RCS Integrated Management Framework

## 2.2: MONITORING, EVALUATION, REPORTING AND IMPROVEMENT

*A critical component of any strategic instrument such as this RCS is its capacity for adaptive management. That is, can it respond to new information, unexpected outcomes and the uncertainty that is inherent to natural resource management. Ongoing application of a monitoring, evaluation, reporting and improvement (MERI) framework provides the capacity to understand and record the successes (or otherwise) and knowledge that come from RCS implementation.*

The primary intention of the MERI Framework is to form the basis to adequately review and report on the RCS at key points throughout its implementation phase. A secondary intention is that it supports all regional stakeholders to incorporate regional achievements into RCS implementation and reporting processes. For this to occur as part of stakeholders' existing processes, the Framework must provide for a variety of delivery and reporting approaches.



**Figure 11: Monitoring Black Box revegetation at Hattah**

land and water resources on behalf of the region. This report provides the opportunity to review the scope and scale of the region's interventions in accordance with expectations, document progress against medium-term (6-year) outcome targets; and present long-term trends in condition. The Management and Condition Report is made publicly available as an attachment to the Mallee CMA's Annual Report.

The CaLP Act also requires the CMA to undertake a mid-term and full-term review of the RCS, expanding on annual reporting processes by focussing on the overall impact, effectiveness, appropriateness, efficiency and legacy of RCS implementation.

These annual, mid-term and full-term reviews will be prepared with the expectation that they provide information and mechanisms to enhance implementation of this 2022-28 RCS, and inform development of the next RCS.

Factors such as changes in government policy, emerging threats and opportunities, resourcing shifts, and improved knowledge can all influence RCS relevance over its 6-year implementation period. Adaptive management is supported by mid-term review processes which provides for development of an RCS Addendum to consider: key changes, impacts on implementation, and how the region will respond to these changes over the life of the RCS.

As supporting documents to the RCS, Local Area Action Plans will also facilitate adaptive management processes. The Plans will be reviewed annually in consultation with regional stakeholders to ensure currency and inform ongoing investment/delivery priorities.

Table 3 outlines the foundational activities required to implement the MERI Framework and associated actions to be delivered over the life of the RCS. Delivery of these actions will be incorporated into wider RCS implementation processes.

A detailed MERI plan will be developed as a supporting document to the RCS (see Figure 9) to allow for the annual review of MERI activities and further support continuous improvement and adaptive management processes.

The RCS MERI framework will be applied at key intervals; annually, three-yearly (mid-point of RCS implementation) and six-yearly (end-point of RCS implementation).

The CaLP Act requires Mallee CMA to report annually on the management and condition of

**Table 3: Foundational activities and priority actions to support RCS MERI processes.**

Foundational Activity	MERI Action
<p><i>Asset Based Approach:</i> Continuous improvement/enhancement of regional evidence based on:</p> <ul style="list-style-type: none"> <li>• Asset values</li> <li>• Incidence, severity and impact of threatening processes</li> <li>• Effectiveness and efficiency of available interventions.</li> </ul>	Support investigations into the extent and distribution of the region's natural, cultural and agricultural assets.
	Support investigations into the values and services provided by the region's natural, cultural and agricultural assets.
	Support investigations into the extent, incidence and potential impacts of key threatening processes.
	Support the identification and validation of management actions which address key threats to the region's natural, cultural and productive landscapes.
<i>Monitoring Delivery Outputs (short-term):</i>	Support the ongoing collection and collation of management data to allow for effective and efficient evaluation and reporting at the landscape scale.
<i>Monitoring Delivery Impacts (short-term):</i>	Support the ongoing measurement, and where required development, of integrated threat incidence and impact monitoring programs to allow for effective and efficient short-term evaluation and reporting at the landscape scale.
<i>Monitoring Delivery Outcomes (medium-term):</i>	Support the ongoing measurement, and where required development, of outcome indicators to allow for effective and efficient evaluation and reporting at the whole-of-region scale.
<i>Monitoring Asset Condition (long-term):</i> Evaluation of the long-term changes in the condition of natural, cultural and agricultural assets at the whole-of-region scale.	Support the ongoing collation, and where required collection, of asset condition indicator data to allow for effective and efficient long-term reporting at the whole-of-region scale.
<p><i>Adaptive Management:</i> Identify and respond to improved knowledge and new/emerging threats and opportunities.</p>	Conduct annual reviews of Local Area Action Plans to capture changes in stakeholder priorities at the landscape scale.
	Conduct mid-term review, documenting key changes and required responses within RCS Addendum.
<p><i>Recording and Communicating Management and Outcomes:</i> Evaluations of RCS achievements against stated targets at the whole-of-region and Local Area scale.</p>	Provide an annual report on the condition and management of the region's natural, cultural and agricultural landscapes.
	Provide a mid and full-term evaluation report on the RCS.
	Maintain and update a Regional Evidence Base to record and communicate all aspects of RCS delivery and evaluation.

## 2.2.1 OUTCOMES FRAMEWORK

To provide for greater consistency in how RCS implementation is measured and reported across the state, an RCS Outcomes Framework was established by Victorian CMAs in consultation with DELWP and the VCMC.

The Framework was developed to align with the Department of Premier and Cabinet’s ‘Outcomes Architecture’ hierarchy, released in 2018 as part of the Victorian Government’s public-sector reform agenda. All Government agencies are required to apply this hierarchy and associated guidance material to their legislative reporting processes so as to facilitate consistent approaches, language and measures.

Applying this whole-of-government approach to the RCS enables all CMAs to demonstrate how regional outcomes and management activities deliver against state-wide policies and high-level outcomes at the landscape (i.e. Local Area), regional, and state-wide scale (i.e. aggregation across the ten CMA regions) as appropriate. Figure 12 outlines how the Mallee RCS Outcomes Framework aligns with the Victorian Government’s Outcomes Architecture hierarchy.

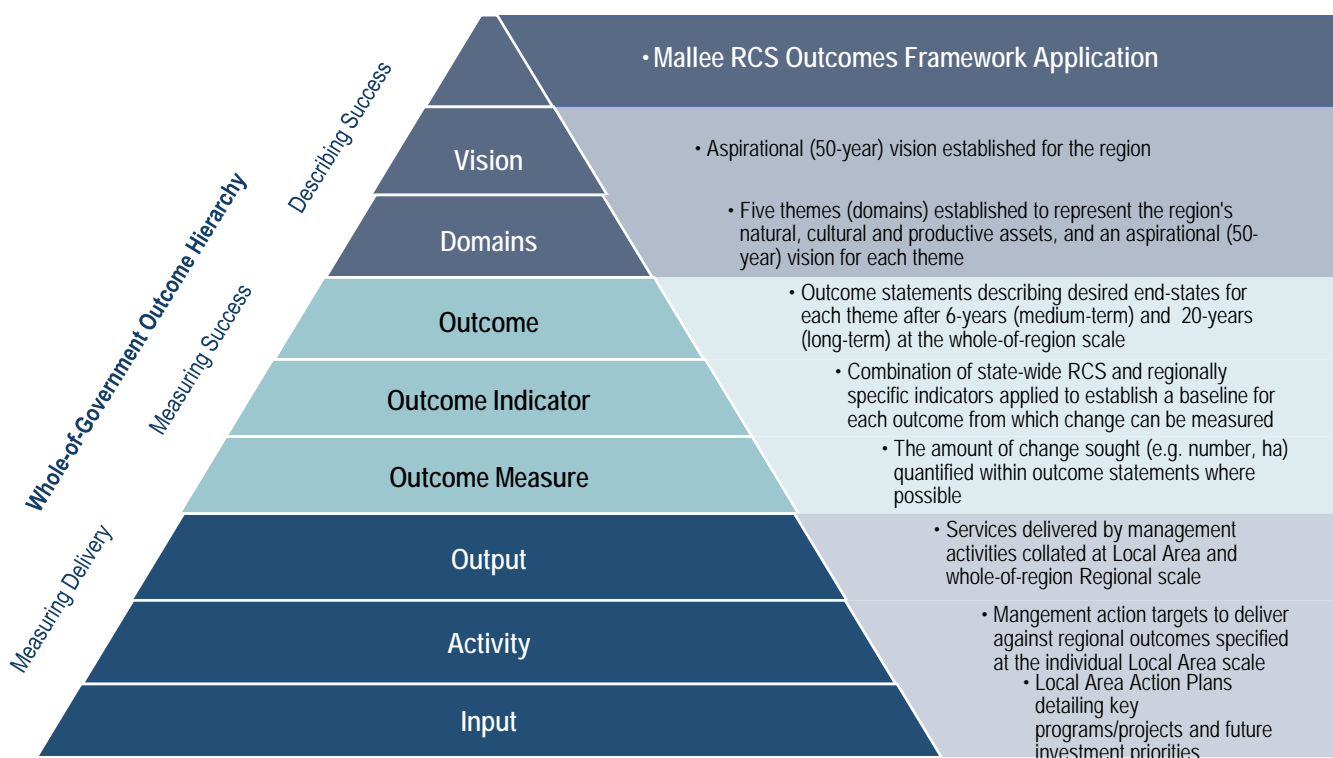


Figure 12: Whole-of-government Outcomes Architecture and Application of Mallee RCS Outcomes Framework

The RCS Outcomes Framework specifies a set of condition and outcome indicators aligned with state policy relating to each of the RCS Themes (see Appendix 3). Guidance notes detail the data source and presentation to be applied within the RCS for each indicator. This baseline and long-term trend data is provided, where available, for each indicator within the ‘Condition and Trends’ section of the associated Theme (see Section 3).

Regionally specific indicators have also been utilised throughout the Mallee RCS to ensure progress against all stated outcome targets is effectively measured and reported. While baseline data is available for the majority of these additional indicators, information gaps have been noted within the RCS for addressing through further development of the RCS MERI Framework and associated MERI Plan.

Figure 13 outlines the Mallee RCS Outcomes Framework; incorporating state-wide policy outcomes, regional long-term (20-year) outcome statements, state-wide RCS condition and outcome indicators, regionally specific indicators, and the region’s medium-term (6-year) outcome statements. The six-year management (i.e. activity) targets required to achieve regional outcomes are detailed for each Local Area in Section 4.

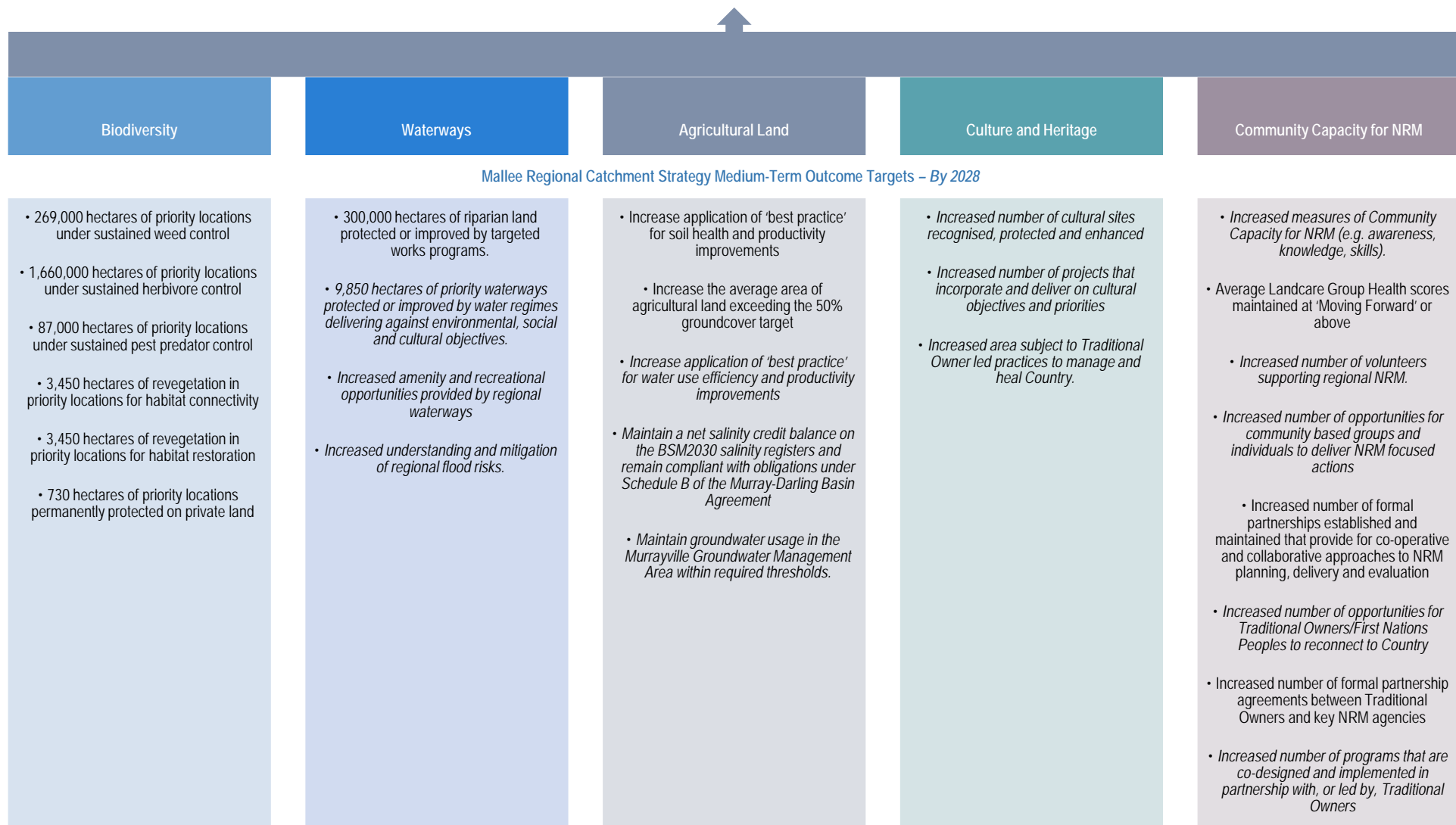
The RCS Outcomes Framework is informed by the knowledge and aspirations of regional stakeholders, with several key assumptions applied, specifically that:

- The region's priority management and strategic directions over the life of the RCS are the right mechanisms with sufficient scope and scale to contribute meaningfully to 20-year outcomes
- There will be sufficient resources available to the region over the life of the RCS to implement its priority management actions with sufficient scope and scale to contribute meaningfully to 6-year outcomes
- There is sufficient information, or access to information, over the life of the RCS that can be meaningfully applied to report on delivery against management targets, progress against outcome targets, and impacts on asset condition
- Externalities such as climate, demographic, and market conditions influence the Mallee over the life of the RCS in accordance with long-term median expectations
- Land managers and other regional stakeholders remain motivated and empowered to act on NRM principles.

Capturing management actions undertaken by all regional delivery partners currently represents a key information gap impacting on the extent to which the Mallee RCS Outcomes Framework can be applied. The different reporting requirements and data collection systems that each organisation operates under limits the extent to which whole-of-region data can be effectively collected and collated. Mallee CMA will continue to work with regional stakeholders and state government departments to identify opportunities for increased consistency in data collection, and improved data sharing processes.







**Figure 13: Mallee RCS Outcome Framework**

# 3: THEMES

## 3.1: BIODIVERSITY

**Vision: Biodiversity is healthy, resilient, and valued for the ecosystem services it provides.**

*Scope: Populations of threatened or significant species; occurrences of threatened ecological communities, and: Terrestrial habitat provided by ecological vegetation classes and their contribution to landscape processes#.*

*#While this biodiversity theme considers both terrestrial and aquatic threatened species and communities, it focuses on terrestrial habitat. Aquatic, riparian and floodplain habitat/ecosystem processes are addressed in the waterways theme. Building community knowledge of, and participation in biodiversity conservation is covered by the community capacity for NRM theme.*

### 3.1.1 OVERVIEW

The Mallee supports a diverse and unique array of native flora and fauna, several of which occur nowhere else in Victoria and many others at the edge of their range (e.g. representing the southernmost distribution), yet genetically distinct from their northern or southern relatives. This includes a greater diversity of reptiles than any other region in Victoria.

For the purpose of the RCS, this biodiversity theme considers those species and communities which are listed as threatened at either a federal or state level (i.e. under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) and/or the *Flora and Fauna Guarantee Act 1988* (FFG Act). Of particular note are our non-eucalypt woodlands which contain significant remnants of an EPBC listed ecological vegetation community (Buloke Woodlands of the Murray-Darling Basin Depression Bioregion) and five communities listed under the FFG Act (e.g. Semi-arid Herbaceous Pine Woodland Community).



Figure 14: Mallee Emu-wren (Photo Credit: Tom Hunt).

The region also provides critical habitat for the EPBC and FFG listed Mallee Bird Community which comprises 20 bird taxa<sup>20</sup>; six of which are also individually listed as threatened at both a federal and state level (i.e. Black-eared Miner, Mallee Emu-wren (Figure 14), Malleefowl, Red-lore Whistler, Mallee Western Whipbird, and Regent Parrot).

The FFG listed Lowland Riverine Fish Community of the Southern Mallee Darling Basin is dependent on regional waterways connected to the Murray River. Three species included in this community that occur in the Mallee are also listed under the EPBC Act (i.e. Murray Cod, Murray Hardyhead, Silver Perch).

Species identified as culturally significant to Traditional Owners/First Nations Peoples or iconic to the general community are also considered a priority by this RCS, regardless of conservation status. While it is recognised that all Country and

<sup>20</sup> 'Mallee Bird Community' is EPBC listed (endangered) as the Mallee Bird Community of the Murray Darling Depression Bioregion. FFG listing is as the Victorian Mallee Bird Community.

species are important to Traditional Owners/First Nations Peoples, species of particular note for the region include Red Kangaroo, Quandong, Malleefowl, Black Swan, Murray Cod, River Red Gum, Emu Bushes, Garland and Flax Lily, and Bull Rushes. There are also several species the general community identify as being iconic to their local landscapes. Examples include Buloke Woodlands, Malleefowl, Plains Wanderer, Regent Parrot, Major Mitchell’s Cockatoo, Murray Cod and Carpet Python.

In providing the basis for much of our complex and unique biodiversity, the region’s terrestrial habitat is significant not only for the environmental values it supports; but also for the economic, social, and cultural services it provides. This includes resilience against land degradation, protection from extreme weather events, carbon storage, connections to Country, recreational opportunities, and positive landscape aesthetics.

Overall, the survival of many native plants and animals is directly dependant on the extent and condition of our terrestrial habitat; with native vegetation playing a critical role in mitigating the impact of threats such as salinity and erosion on our natural, cultural and productive landscapes.

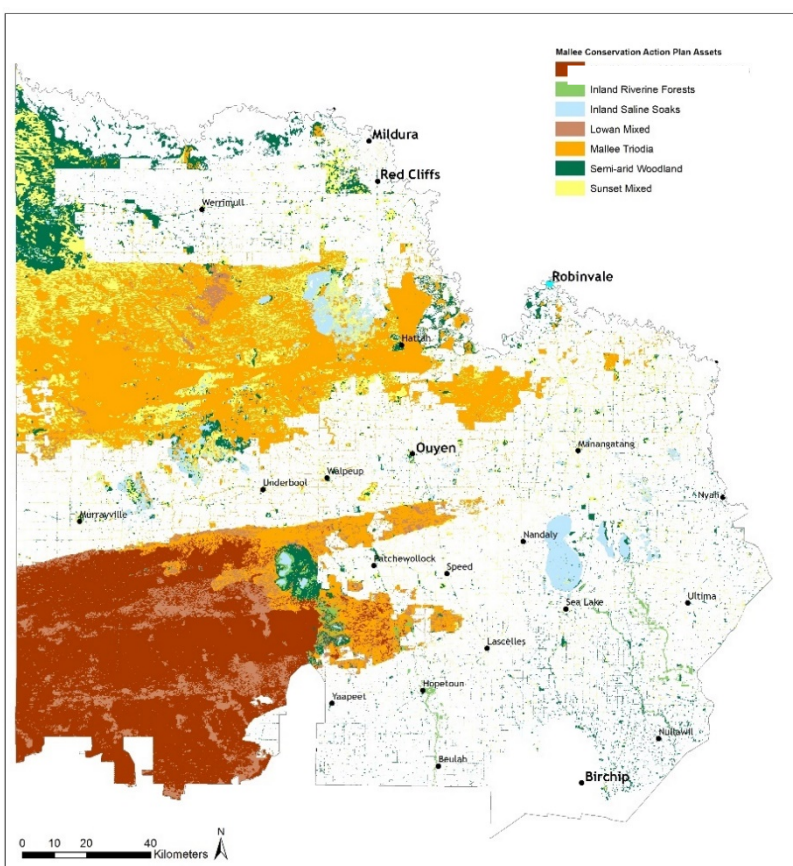


Figure 15: Mallee Ecosystems (source: Parks Victoria, 2021).

The terrestrial habitat of the Mallee is primarily defined by the prevailing native vegetation community at any particular location. In Victoria, these communities are classified into Ecological Vegetation Classes (EVCs). There are around 300 different EVCs in Victoria; 50 occur in the Mallee region.

EVCs can be further grouped into ecosystem classifications to represent vegetation communities that occur in similar types of environments (e.g. soil type, climate, topography) and which tend to show similar ecological responses to environmental factors such as disturbance (e.g. bushfire).

Application of this approach to group the Mallee’s terrestrial vegetation types identifies seven ecosystem classifications, reflecting the structural and compositional similarities of the constituent vegetation classes (Figure 15).

Just over half (2,047,654 hectares) of the region’s native vegetation has been cleared since European settlement, particularly

those vegetation communities growing on the more fertile alluvial soils (i.e. suitable for agriculture). Timber was also felled during early European settlement for the construction of both private and public infrastructure.

Large contiguous blocks of terrestrial habitat do however remain, predominantly in reserves such as Murray-Sunset and Wyperfeld National Parks, which are characterised by their infertile sandy soils. As such, these large remnant blocks do not represent the entire diversity of the region’s original habitat. Of the remaining native vegetation, only 12 percent occur on private land.

### 3.1.2 CONDITION & TRENDS

*This section provides an overview on the current condition of biodiversity in the Mallee. State-wide and regional indicators have been applied to establish a baseline, and where available identify long term trends, from which progress against our medium-term (6 year) and long-term outcome targets for biodiversity can be determined.*

#### THREATENED SPECIES AND COMMUNITIES

The 2018 State of the Environment report highlighted that a third of all of Victoria's terrestrial plants, birds, reptiles, amphibians, mammals, invertebrates and ecological communities are threatened with extinction.

As of June 2021, Victoria's *Flora and Fauna Guarantee Act 1998* (FFG Act) Threatened List included: 54 Extinct, 556 Critically endangered, 1,071 Endangered, and 303 Vulnerable species<sup>21</sup>. Of these: 86 Critically endangered, 229 Endangered, and 58 Vulnerable species/communities have been recorded as occurring in the Mallee. At a national (EPBC) level, the region supports seven Critically endangered, 12 Endangered, and 20 Vulnerable species/communities<sup>22</sup>.

Table 4 shows the number of flora and fauna species and communities currently listed as threatened under federal (EPBC) and state (FFG) instruments. A full listing of species/communities and their conservation status is provided in Appendix 4.

In general, historical habitat loss has been the primary circumstance for so many of our species and communities to be considered as threatened. This loss of habitat has not only compromised the abundance and distribution of our species, but has also increased the incidence and subsequent impact of other threatening processes (such as land and water salinisation, invasive plants and animals, altered hydrological regimes, soil erosion and constrained regenerative capacity).

**Table 4: Number of threatened species and communities recorded as occurring in the Mallee at each level of listing.**

	National EPBC Act	State FFG Act23
Flora Species	10	277
Fauna Species	22	93
Flora Communities	5	5
Fauna Communities	1	2

It is difficult to provide an overall picture of the current condition of the region's threatened species and ecological communities. Some populations are comprehensively observed and reported on, while others remain somewhat cryptic due to insufficient resources to support systematic surveys, or the nature of the species itself. Without an understanding of the trajectory of a larger range of species and communities, the number of species listed as threatened and their associated conservation status will continue to be applied as a proxy indicator of condition.

<sup>21</sup> VAGO (Victorian Auditor-General's Office). 2021. Protecting Victoria's Biodiversity: Independent assurance report to Parliament, no. 266

<sup>22</sup> Victorian Biodiversity Atlas: Database filtered to include records for 1990 – 2021 period only.

<sup>23</sup> Note: Recent changes to the FFG Act Threatened list have removed duplication by establishing a single comprehensive list of threatened flora and fauna species. All non-statutory lists under the Victorian Threatened Species Advisory List have now been revoked (source: <https://www.environment.vic.gov.au/conserving-threatened-species/threatened-list>).

## TERRESTRIAL HABITAT

Native vegetation across the Mallee once covered some 3,919,887 hectares, of which 52 percent is estimated to have been cleared since European settlement. The region’s remaining vegetation has primarily been reserved in large parks such as Murray-Sunset, Big Desert, Wyperfeld and Hattah-Kulkyne National Parks, extensive tracts of state forests, and over 500 small reserves scattered throughout the agricultural area.

Remnants on private land, and the roadsides and rail reserves dissecting the region also represent significant areas of native vegetation. These are of particular importance for the threatened flora they contain and for the connectivity opportunities they provide to our region’s fauna.

Modelling of native vegetation extent in the region over the past 30 years indicates significant variation within different vegetation classes. Overall however, it is estimated that there has been a three percent decline in vegetation cover since 1985 (Figure 16).

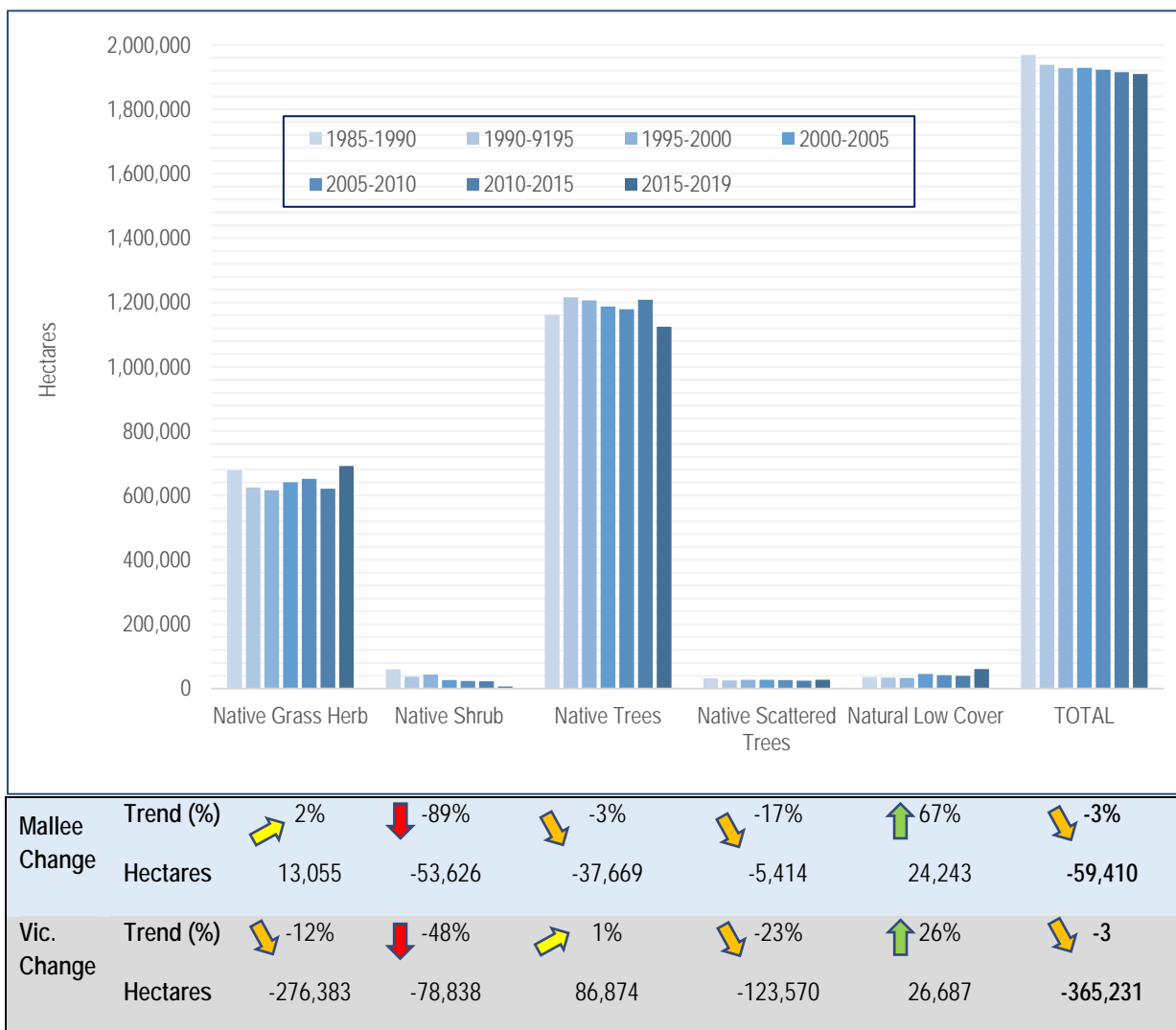


Figure 16: Native land cover change over seven periods of time - change trend & hectares presented as a comparison between 1st and last time period (source: Vic Spatial Data Library- Victorian Land Cover Time Series, August 2020).



State-wide modelling on the relative contribution of these areas to the protection of the full range of Victoria’s biodiversity values demonstrates that a significant proportion of the Mallee has high importance for biodiversity conservation. Of particular value are our large tracts of public land, given the largely cleared and fragmented landscape in which they occur (Figure 17).

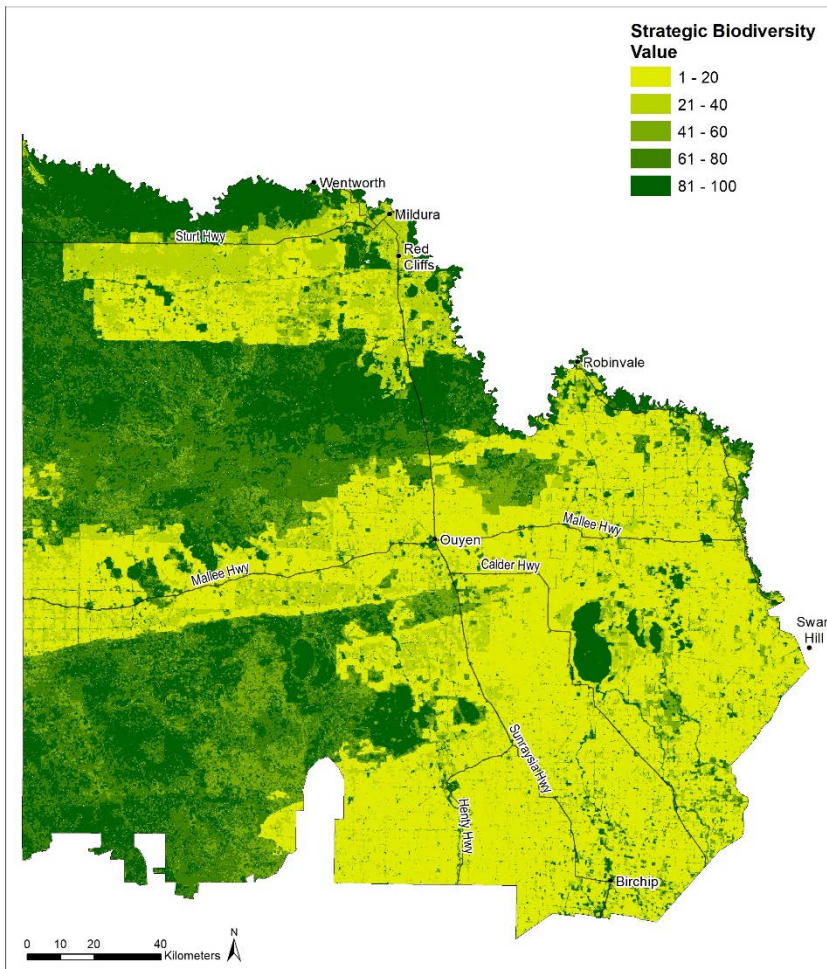


Figure 17: Strategic Biodiversity Values (source: NaturePrint – DELWP, 2018).

This Strategic Biodiversity Values (SBV v4.0) spatial tool ranks all locations across Victoria for their ability to represent threatened vertebrate fauna, vascular flora, and the full range of Victoria’s native vegetation (on a scale of 0 to 100). It combines information on important areas for threatened flora and fauna, levels of depletion, connectivity, vegetation types and condition to provide a view of relative biodiversity importance of all parts of the Victorian landscape. This enables comparison of locations across the state, within the Mallee region, and at a landscape scale.

Overall, the 2020 condition and trajectory of native vegetation (i.e. tree cover, vegetation condition, and vegetation growth) in the Mallee is considered to be stable to improving when compared to a 20 year (2000-2020) average. All three indicators improved from 2019; largely in response to slightly better climatic conditions experienced over the winter to spring period<sup>24</sup>.

Trends in measures of condition within major parks and reserves remain stable, if not improving as a result of management interventions undertaken over the past 30 years (e.g. reducing grazing pressure), and some large rainfall events experienced in the region over the same period<sup>25</sup>. Within the more fragmented areas of the landscape, remnant vegetation subjected to management interventions has also remained generally stable. Due to continuing threatening processes, declines in some measures of condition would however be expected within many remnants, especially those where threat mitigation actions have not occurred.

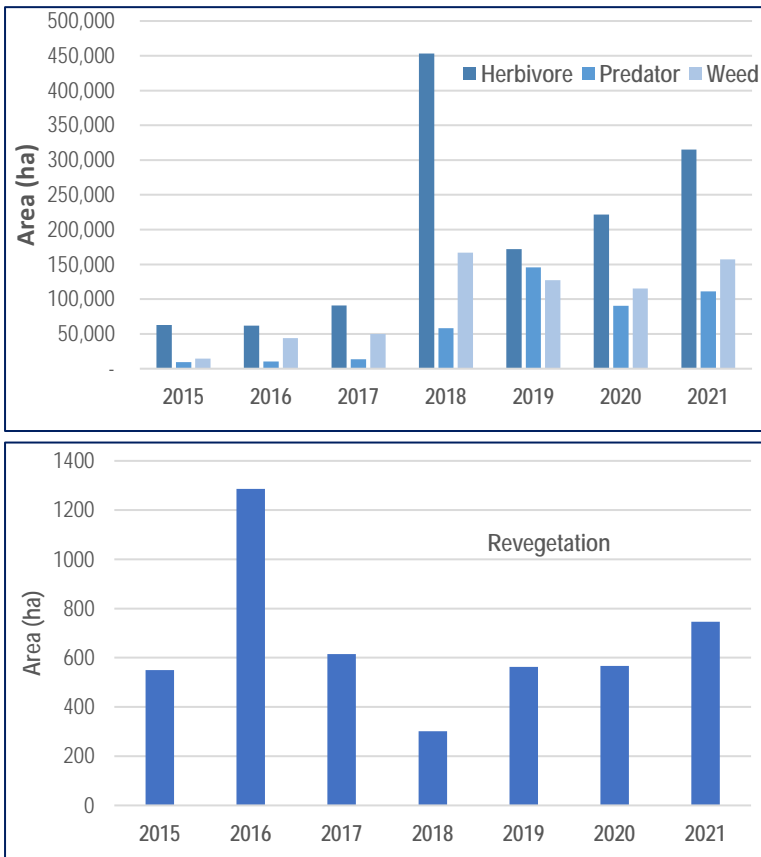
<sup>24</sup> Centre for Water and Landscape Dynamics (2021): 2020 Environmental Report Card - Mallee

<sup>25</sup> Parks Victoria: Conservation Action Plan for Parks and reserves managed by Parks Victoria, Mallee (2019).

## MANAGEMENT

The area over which targeted management actions are delivered in the Mallee has also been applied as a long-term indicator of biodiversity condition. Consideration of site-based (point of investment) monitoring of these works enables associated changes in threat incidence/impact and asset condition (where available) to be quantified and applied to broader assessments of the effectiveness of regional efforts to conserve biodiversity values.

Data presented in Figure 18 represents works delivered through Mallee CMA programs over the past seven years. It does not however capture the significant areas of threat mitigation actions undertaken annually by stakeholders through other funding initiatives, or by individual (e.g. private, volunteer) efforts<sup>26</sup>. Ongoing assessments have identified both a reduction in threat processes and associated habitat improvements resulting from these works.



**Figure 18: Area managed for key threats under Mallee CMA Programs**  
(source: Mallee CMA).

a reduction in threats (e.g., kangaroos, rabbits and herbaceous weed); evidence of habitat utilisation (i.e. movement/utilisation of species primarily birds using these areas as corridors); and improved ecosystem function (e.g. evidence of ongoing natural regeneration)<sup>29</sup>.

For example, long-term rabbit control programs in the Mallee continue to maintain numbers below the regional threshold of <1 per spotlight km required to support regeneration processes. In 2021, ongoing transect monitoring of rabbit activity within the Mallee's four remnant rangeland communities reported 91 percent of the kilometres surveyed had one or less rabbits recorded<sup>27</sup>. Site-based (annual) monitoring of targeted control programs identified that 61 percent of pre-treatment rabbit numbers were less than one rabbit/ha (range between 4 and 0 per ha); increasing to 88 percent of sites post-treatment (range between 3.5 and 0 per ha)<sup>28</sup>.

Monitoring of a selection of revegetation sites identified that between 2011-2021, 49 percent of planted tubestock was recorded as surviving, and 69 percent of directly seeded sites report germination; figures which continue to improve as previous learnings are employed. Furthermore, over the medium-term (i.e. >5 years) revegetation sites are showing evidence of ecological functionality returning to the site. Specific changes recorded include: improved soil condition (i.e. reduced erosion); a

<sup>26</sup> Addressing this information gap will be required under this RCS to support monitoring and reporting of progress against associated outcome and management targets.

<sup>27</sup> Parks Victoria (2021), Rabbit Transect Monitoring: unpublished data.

<sup>28</sup> Mallee CMA (2021), Rapid Rabbit Assessments, unpublished data.

<sup>29</sup> Mallee CMA (2021), Revegetation Monitoring, unpublished data.

### 3.1.3 PRIORITY DIRECTIONS

*This section outlines the major threats and drivers of change influencing the condition and management of biodiversity in the Mallee; core management and strategic directions that will guide delivery of our biodiversity related actions over the next 6-years; and the associated regulatory, policy and planning framework that informed their development.*

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#### MAJOR THREATS AND KEY DRIVERS OF CHANGE

Ongoing pressure from a range of long-term threats (e.g. climate variability, habitat loss, fragmentation, grazing pressure, competition from invasive weeds, introduced predators, inappropriate fire regimes, agricultural practices, recreational pressures, constrained regenerative capacity) and emerging threat processes (e.g. changing climate) are directly influencing the condition and resilience of Mallee biodiversity. Ongoing efforts to effectively manage these processes is vital to securing the long-term health of critical ecosystem processes and the services they provide to the region.

Conversely, there are also new initiatives that present the region with opportunities to improve how we plan for and deliver biodiversity conservation activities in the Mallee. These include participation in emerging carbon markets for biodiversity co-benefits, and increasing self-determined participation and leadership of Traditional Owners.

How we respond to these threat processes and opportunities will play an important role in shaping the future trajectories of our native species, ecological communities and terrestrial habitat.

*Further detail on the challenges, opportunities and major threats influencing Mallee biodiversity is provided in Section 1 (The Region – 4: Key Drivers of Change).*

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#### ALIGNED PLANS

Identification of the priority management and strategic directions detailed below has been informed by federal and state legislation, policies and strategies; regional strategies and action plans; and stakeholder priorities. The primary federal, state and regional instruments considered through this process are detailed in Appendix 1.

There is currently no overarching ‘whole-of-region’ plan that collates stakeholder strategic directions, priorities and targets for biodiversity conservation and management in the Mallee. For the purposes of this RCS, the Victorian Government plan for biodiversity (Biodiversity 2037) will be applied to fill this gap. Alignment with associated Biodiversity Response Planning processes will provide for regional interpretation and application.

*Biodiversity related planning frameworks that focus on specific landscapes (i.e. not whole-of-region) are identified within their associated ‘Local Area’ (see Section 4). This includes Traditional Owner Country plans, site-based management plans, and individual stakeholder theme and/or landscape-based planning.*

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#### MANAGEMENT DIRECTIONS

In considering the current condition of Mallee biodiversity, the key drivers influencing this condition, associated planning instruments, and stakeholder priorities; three key principles to direct our management efforts have been identified. Specifically, that biodiversity programs focus on actions that will collectively support:

- Protection and restoration of existing terrestrial habitat for increased function and resilience
- Re-establishment of terrestrial habitat for improved landscape context and connectivity
- Specialised interventions required for the conservation of specific threatened species or ecological communities.

This approach facilitates habitat focused planning and delivery which benefits multiple species at the landscape-scale, rather than planning for native vegetation and individual species conservation in isolation. An approach which aligns with the Victorian Government’s *Biodiversity 2037* premise that biodiversity management is more effective and efficient

if synergies and potential negative outcomes are considered, particularly under a changing climate where adaptive capacity and landscape resilience is critical to ongoing conservation efforts. It is also recognised that some endangered and critically endangered species will not benefit from this wider habitat focused landscape-scale approach, and will require specialised interventions.

In developing programs to deliver against these principles, the following priorities have been identified to inform how our management actions are planned and implemented:

- Community and government partnerships to support integrated cross tenure delivery
- Landscape scale interventions that reduce key threats and provide multiple species benefits
- Targeted/specialised interventions (where appropriate) that reduce key threats and provide location specific and/or single species benefits
- Climate ready interventions to provide for improved resilience and adaptive capacity
- Collaborations to maximise the potential of carbon plantings to deliver biodiversity co-benefits
- Recognition of Traditional Owner cultural objectives, knowledge and practice.

*Priority directions for building stakeholder, Traditional Owner and the broader community's participation in and capacity for natural resource management, including biodiversity, are outlined in Section 3.5 (Community Capacity for NRM).*

*Priority directions for the protection of Traditional Owner/First Peoples cultural values are outlined in Section 3.4 (Culture and Heritage).*

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## STRATEGIC DIRECTIONS

Mallee biodiversity is diverse and faces a complex suite of threats to its condition. Given the finite resources available to manage our terrestrial habitat and threatened species/communities, it is not feasible to expect that management actions to address all *asset x threat interactions* across the entire region can be implemented over the life of this RCS. To help ensure we achieve the 'best' results with the resources available, a targeted delivery framework is required.

### **Targeting Habitat Focused – Landscape Scale Delivery**

To inform this targeted approach, work undertaken by DELWP to help integrate and compare information on the expected benefits and indicative costs of conservation actions across species and locations has been applied. The Strategic Management Prospectus (SMP) is a state-wide spatial modelling tool that integrates and simultaneously compares information on biodiversity values, threats, effectiveness of management actions, and indicative costs of management actions for biodiversity across Victoria. This allows for the identification and prioritisation of management actions according to their cost-effectiveness (i.e. which) and their relative contribution to net conservation outcomes across all species (i.e. where)<sup>30</sup>.

The SMP tool was utilised to identify priority locations in the Mallee for the implementation of management actions contributing to state-wide (Biodiversity 2037) targets for weed control, herbivore control, pest predator control, and the re-establishment of revegetation.

Individual *action x location interactions* were then reviewed by regional stakeholders and further refined to incorporate local priorities and aspirations. Maps showing the results of these analyses (i.e. priority locations) for each management action type are provided in Appendix 5.

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<sup>30</sup> The Strategic Management Prospectus can be accessed online through the DELWP [NatureKit](#) site.

In the absence of SMP modelling for revegetation actions seeking to restore existing remnants (e.g. supplementary planting), priority locations will be identified on site needs (e.g. limited regenerative capacity of existing vegetation) x stakeholder priority basis, as part of landscape scale assessments.

Similarly, permanent protection actions will be targeted to underrepresented vegetation on private land to align with the National Reserve System's guidelines for establishing a comprehensive, adequate and representative reserve system.

### ***Targeting Specialised Interventions***

Threatened, culturally significant, or iconic species and communities identified as requiring specialised or site specific interventions are considered separately; with conservation status and Traditional Owner/local community priorities, along with expert conservation advice (e.g. EPBC Recovery plans) being key drivers in the identification of both species and management actions.

Decision support tools available from the DELWP NatureKit site, including habitat distribution and importance models, and specific need analysis for a number of listed species can also help inform this process.

### ***Additional Considerations***

To provide for continuous improvement and support adaptive management processes; ongoing application of local expertise, Traditional Owner knowledge, and best available science is also fundamental to the RCS biodiversity delivery framework.

### 3.1.4 REGIONAL OUTCOMES

This section outlines the medium-term (6-year) and long-term (20-year) outcome targets that regional stakeholders have collectively set for biodiversity management and conservation across the Mallee.

Our medium-term outcome targets (Table 5) for biodiversity have been developed to align with, and demonstrate how the Mallee RCS will contribute to state-wide (Biodiversity 2037) targets. Spatial representations of the region’s priority locations for weed control, herbivore control, pest predator control, and the re-establishment of revegetation are provided in Appendix 5<sup>31</sup>.

Delivery against these targets will be undertaken as part of the RCS’s integrated catchment management (ICM) – landscape-scale approach to NRM. Detail on specific management actions and targets to be implemented within individual landscapes, and the local stakeholders that will contribute to their delivery is provided in Section 4 (i.e. Local Areas).

**Table 5: Regional outcome targets for biodiversity management and conservation, and the priority directions that will inform their delivery.**

Critical Elements <i>What we need to focus on</i>	Priority Management Directions <i>How our actions will be implemented</i>	Priority Strategic Directions <i>How our actions will be targeted</i>	Medium -Term Outcomes <i>What we will deliver by 2028:</i>	Long-Term Outcomes <i>What success will look like by 2042:</i>
<ul style="list-style-type: none"> <li>Habitat protection and restoration</li> <li>Habitat re-establishment</li> <li>Specialised, species/site specific interventions (where required).</li> </ul>	<ul style="list-style-type: none"> <li>Community and government partnerships to support integrated cross tenure delivery.</li> <li>Landscape scale interventions to reduce threats - multiple species benefits</li> <li>Targeted/specialised interventions (where appropriate) to reduce threats - single species benefits.</li> <li>Climate ready interventions to provide for improved resilience and adaptive capacity.</li> <li>Collaborations to maximise the potential of carbon plantings to deliver biodiversity co-benefits.</li> <li>Recognition of Traditional Owner cultural objectives, knowledge and practice.</li> </ul>	<ul style="list-style-type: none"> <li>Priority locations for the delivery of landscape scale interventions identified through: <ul style="list-style-type: none"> <li>Cost-benefit analysis</li> <li>Local knowledge &amp; aspirations</li> </ul> </li> <li>Priority species x locations for the delivery of specialised/species specific interventions informed through: <ul style="list-style-type: none"> <li>Conservation status</li> <li>Cultural importance</li> <li>Local significance</li> <li>Specific needs analysis</li> </ul> </li> <li>Ongoing application of local expertise, Traditional Owner knowledge and best available science to support continuous improvement and adaptive management processes.</li> </ul>	<ul style="list-style-type: none"> <li>269,000 hectares of priority locations under sustained weed control*.</li> <li>1,660,000 hectares of priority locations under sustained herbivore control**.</li> <li>87,000 hectares of priority locations under sustained pest predator control***.</li> <li>3,450 hectares of revegetation in priority locations for habitat connectivity+.</li> <li>3,450 hectares of revegetation in priority locations for habitat restoration++.</li> <li>730 hectares of priority locations permanently protected on private land+++.</li> </ul>	<ul style="list-style-type: none"> <li>The extent, condition and ecological connectivity of high value terrestrial habitat is enhanced across all Mallee land tenures.</li> <li>The present diversity of Mallee threatened species and communities is protected.</li> </ul>

\*Weed control encompassed ‘transformer’ weeds with a full listing available from the DELWP NaturePrint page online.

\*\* Herbivore control encompasses rabbits, feral goats, kangaroos, deer, and feral pigs.

\*\*\* Pest predator control encompasses foxes and feral cats.

+ Re-establishment of native vegetation

++Supplementary Planting of native vegetation within existing remnants.

+++ Target represents 3% of the of 24,318 ha of under-represented vegetation on private land in the Mallee and is based on advice from TfN re rolling averages of covenanting outcomes over the last twenty years.

<sup>31</sup> Does not include priority locations for targets relating to revegetation within existing remnants (i.e. restoration) or permanent protection on private land (see *Strategic Direction section above for further context*).



## 3.2: WATERWAYS

**Vision: Waterways are healthy, resilient, and being managed for shared benefits.**

*Scope: Rivers, streams, their tributaries, and surrounding riparian land (including the floodplain), and individual wetlands, wetland complexes, and their associated floodplain ecosystems (including groundwater dependent ecosystems and the groundwater flow systems and aquifers they are reliant on)#.*

#Groundwater resources utilised for human use such as irrigation or stock and domestic water supply are addressed in the Land theme. Building community knowledge of, and participation in, waterway management is covered by the Community Capacity for NRM theme; the Cultural and Heritage section outlines the protection of Traditional Owner/First Peoples cultural values.

### 3.2.1: OVERVIEW

The Mallee contains some 1,600 km of rivers/creeks and over 900 wetlands. Many of these waterways have been recognised as nationally and internationally important for the environmental, social, cultural and economic values they provide. This includes one Ramsar site (Hattah-Kulkyne Lakes); one Heritage River (Outlet Creek and Wirrengren Plain section of Wimmera River); and 16 sites listed on the Directory of Important Wetlands, Australia (e.g. Lindsay Island, Belsar Island, Kings Billabong, Lake Tyrrell and Raak Plain).

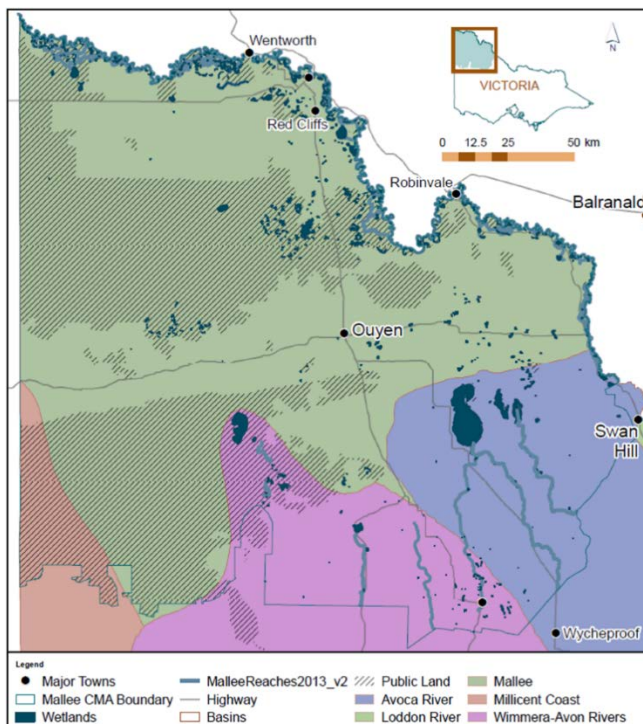


Figure 19: Mallee Waterways and Basin in which they occur.

Mallee rivers and creeks can be divided into three main groups according to the river basin in which they are located; the Mallee, Avoca or Wimmera Basin<sup>32</sup>(Figure 19).

The Mallee Basin contains the Murray River which forms the northern boundary of the region, as well as the boundary between Victoria and New South Wales (NSW). While the main river channel lies in NSW, Victoria is responsible for the management of its southern floodplain from the 1881 winter level water mark. Wallpolla Creek and Lindsay River are the primary anabranch systems, both occurring downstream of Mildura.

In the south, north-flowing intermittent streams of the Wimmera River System, including the Yarriambiack and Outlet Creeks, terminate in a number of ephemeral wetland complexes such as the Wirrengren Plain, Lake Coorong and Lake Lascelles. In the south-east, two effluent streams of the Avoca River system, Tyrrell and Lalbert Creeks, empty into a number of large terminal saline wetlands, including lakes Timboram and Tyrrell.

Dunmuckle Creek represents two separate waterways, a southern section commencing in the Wimmera catchment flows north towards Lascelles; and northern section commencing as a broad shallow area south of Birchip flows north-west, then north-east through Green Lake before joining Tyrrell Creek and entering Lake Tyrrell in the Avoca Basin.

<sup>32</sup> The Mallee also contains a portion of the Millicent Coast Basin, there are however no waterways contained within this Basin in the Mallee CMA region.

Mallee wetlands are diverse and include: riverine wetlands, natural saline wetlands fed by groundwater, shallow depressions in the south of the region filled by local catchment run-off, and artificially maintained wetlands and lakes.

Collectively, our 900 plus wetlands occupy some 50,000 hectares of the landscape; with 84 percent occurring on public land, and the remaining located on freehold land historically used primarily for either dryland farming or irrigated horticulture.

Semi-permanent saline wetlands are the most prevalent wetland type in the Mallee. These wetlands have increased in both number and area since European settlement due to altered hydrological regimes, clearing of native vegetation, changes in surrounding land use, and the use of natural wetlands and low-lying areas for salinity management.

Wetlands associated with the Murray River or its anabranches are primarily seasonal, intermittent or ephemeral wetlands that fill when the Murray River floods, although under natural or pre-regulation conditions some would have been inundated more or less permanently. Most riverine wetlands are freshwater meadows, marshes and permanent open freshwater wetlands, characterised by trees such as River Red Gum and Black Box. Only a few saline wetlands occur along the Murray River, primarily the result of secondary salinisation caused by disposal of saline irrigation drainage water or intrusion of saline groundwater.

Wetlands in the centre and south east of the region are mostly saline systems (salinas and boinkas) that are typically associated with fault line influences and natural groundwater discharge sites. These wetlands are generally semi-permanent and are characterised by salt tolerant flora. Large terminal saline wetlands such as Lake Tyrrell and Timboram are significant features of the region.

In the south-west of the region, wetlands are generally freshwater marshes restricted to the Outlet Creek system within Wyperfeld National Park; although a few saline wetlands do occur northwards of Outlet Creek.

The far south contains almost a quarter of the Mallee's most depleted wetland type, freshwater meadows. Historically these ephemeral wetlands would have been inundated by local catchment runoff, however the hydrology of this area has been significantly altered through the historical development of the area for agriculture.

As defining features of the region, Mallee waterways and floodplains are significant not only for the specialised habitat and environmental values they support; but also for the broader ecosystem, social, cultural and economic services they provide. This includes, refugia and connectivity opportunities within largely cleared landscapes; carbon storage, salt interception, nutrient cycling, and water purification; replenishment of connected groundwater systems to support associated groundwater dependant ecosystems; flood mitigation, water supplies and storage for irrigation, industrial, domestic and stock use; connections to Country; diverse tourism and recreational opportunities; and positive landscape aesthetics.

### 3.2.2 CONDITION & TRENDS

*This section provides an overview on the current condition of waterways in the Mallee. State-wide and regional indicators have been applied to establish a baseline, and where available identify long term trends, from which progress against our medium-term (6 year) and long-term (20-year) outcome targets for waterways can be determined.*

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#### RIVERS

Periodic assessments on the condition of Mallee rivers and streams were previously conducted as part of state-wide Index of Stream Condition (ISC) and Index of Wetland Condition (IWC) monitoring programs.

Condition was measured by the ISC according to five sub-indices (hydrology, physical form, streamside zone, water quality and aquatic life) that contain 23 key indicators, to provide a summary of the extent of change from natural or ideal conditions.

Assessments of river condition using the ISC were first conducted in 1999 and again in 2004 and 2010. In general, this monitoring identified that no major changes occurred to the condition of these waterways over this timeframe. While no general improvement was detected, overall deterioration appears to have been controlled<sup>33</sup>.

This is an encouraging result given the data collected in the third assessment period coincided with the end of the severe Millennium Drought in south-eastern Australia. It is assumed that the targeted threat mitigation actions undertaken in the region over this period played an important role in minimising the impact of the drought and that they should assist with future improvements in condition under favourable climatic conditions.

The most recent (2010) ISC monitoring assessed 73 individual reaches in the region, with four percent of stream length identified as being in moderate condition and the remaining as being in poor (64%) or very poor (32%) condition.

The proportion of reaches with poor scores was directly influenced by the ISC hydrology sub-indices attributing low scores for seasonally regulated flows. The high number of reaches subject to modified flow regimes to meet irrigated agriculture demands is subsequently reflected in overall condition scores.

Streamside vegetation (i.e. woody vegetation within 40 metres of rivers edge) was found to be in good condition for the majority (59%) of reaches, with the remainder in either excellent (1%), moderate (34%) or poor (6%) condition. Low scores were attributed predominantly to narrow, fragmented streamside vegetation, while the moderate and good scores reflected diverse streamside vegetation and the absence of willows.

Physical condition (i.e. bank condition, instream woody habitat, artificial barriers) was assessed as moderate for 67 percent of reaches, remainder ranging from poor (11%) to good (16%) and excellent (6%). The presence of downstream fish barriers in 96 percent of the assessed reaches reduced overall scores for this indicator.

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<sup>33</sup> Department of Environment and Primary Industries (2013), *Index of Stream Condition: The third benchmark of Victorian river condition*

## WETLANDS

The Index of Wetland Condition (IWC) provided a state-wide measure of condition according to six sub-indices (wetland catchment, hydrology, water properties, soils, biota, and physical form) comprised of 16 different measures. Monitoring was designed to allow for the identification of significant changes in wetland condition from a theoretical reference condition (i.e. unmodified by human impacts associated with European settlement).

The IWC was applied in the Mallee between spring 2009 and autumn 2010 following a period of extended drought. Monitoring was conducted on 79 wetlands considered to be of high conservation value and a priority for management. Over half (53 percent) of the assessed wetlands were identified as being in good or excellent condition, 42 percent as being in moderate condition, and only five percent as being in poor or very poor condition.

It is also noted that although a high number of wetlands were assessed as being in good condition, there was significant variation evident in condition at the sub-index level. For example, 89 percent of wetlands were identified as having poor or very poor hydrology condition, while 96 percent had good to excellent physical form<sup>34</sup>.

While the IWC is not currently scheduled to be repeated, it does provide the region with detailed benchmarks in specific indicators of condition, from which future change from natural or ideal conditions can be determined at both the site (i.e. individual wetland) and landscape (i.e. representative wetlands) scale.

Modelling of changes in wetland extent over the past 30 years indicates an overall decrease in the area of wetlands across the region, with the area of seasonal wetlands declining by 23 percent (3,431ha) between 1985 and 2019; and perennial wetlands by 53 percent (88ha) over the same period (Figure 20).

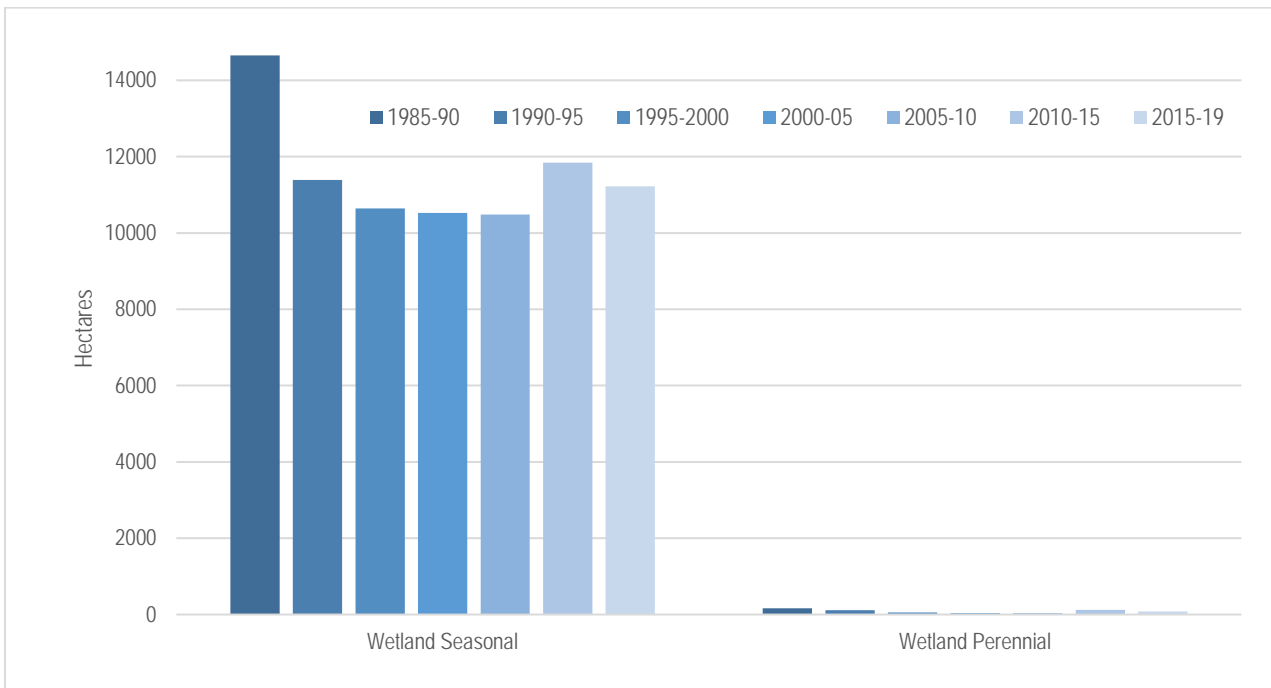


Figure 20: Extent (ha) of Wetland Cover Classes in the Mallee CMA region over time (source: DELWP, Victorian Land Cover Time Series).

<sup>34</sup> Papas, P and Maloney, P (2012): *Victoria's wetlands (2009- 2011): state wide assessments and condition monitoring*.

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## GROUNDWATER

Trend analysis from 2013 to 2021 of 549 regional groundwater bores monitored for water level and salinity has identified no trend for either indicator over the past eight years (i.e. neither rising nor falling)<sup>35</sup>.

Ongoing monitoring of regional groundwater trends allows for the identification of changes in the natural water balance through either extraction (e.g. irrigation), or accelerated recharge and/or discharge processes resulting from land use and land management changes. These changes can directly influence our aquatic, riparian and terrestrial ecosystems through associated variations in aquifer levels, water quality and soil chemistry. This can be especially significant for ecosystems that rely on groundwater to meet all or some of their water requirements (i.e. Groundwater Dependent Ecosystems). In the Mallee this includes wetlands with both fresh and saline groundwater dependency, rivers, and some terrestrial vegetation communities.

*The condition of groundwater utilised for human use such as irrigation or stock and domestic water supply is outlined in the land theme.*

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## MANAGEMENT

The area over which targeted management actions are delivered in the Mallee has also been applied as a long-term indicator of waterway condition. Consideration of site based (point of investment) monitoring of these works enables associated changes in threat incidence/impact and asset condition (where available) to be quantified and applied to broader assessments of the effectiveness of regional efforts to conserve waterway and floodplain values.

Data presented in Table 6 represents works delivered through Mallee CMA programs over the past seven years. It does not however capture the significant areas of threat mitigation actions undertaken annually by stakeholders through other funding initiatives or by individual (e.g. private, volunteer) efforts<sup>36</sup>.

**Table 6: Waterway management actions implemented under Mallee CMA Programs (source: Mallee CMA).**

Actions	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	Total
<b>Structural Works</b>								
Exclusion fencing (km)	26	13	80	25	39	27	49	259
Track rationalisation/repair (km)	70	52	2	4	37	18	0	183
Waterway structure (no.)	18	25	12	9	1	9	0	74
<b>Environmental Works</b>								
Native vegetation (ha)	12	6	6	32	100	6	11	173
Weed control (ha)	5,898	2,687	1,783	8,149	3,310	2,178	3,139	27,144
Pest animal control (ha)	32,646	15,262	8,716	34,748	8,624	5,714	16,986	122,696
Earth works (no.)	5	30	0	18	0	0	0	53
Water regime (no.)	45	58	54	48	48	34	48	290

Ongoing site-based assessments have identified both a reduction in threat processes and associated condition improvements resulting from these works.

For example, significant areas of inundation being achieved through environmental watering actions is having a demonstrable impact on waterway connectivity and both aquatic and riparian habitat condition. This includes the Hattah Lakes and Lindsay-Mulcra-Wallpolla Living Murray Icon Sites, where long-term monitoring (2006 to 2021) has identified

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<sup>35</sup> Mallee CMA (2021), unpublished data.

<sup>36</sup> Addressing this information gap will be required under this RCS to support monitoring and reporting of progress against associated outcome and management targets.

that several measured indicators of environmental condition (i.e. River Red Gum, Black Box, wetland and floodplain vegetation, lignum, fish and waterbirds) continue to improve as a result of water application and associated works programs, with progress against the stated ecological objectives (condition targets) for each of these indicators recorded in 2020-21<sup>37,38</sup>.

Water availability in the form of both rainfall and flooding are key drivers of plant community composition. Responses to flooding indicate while systems benefit from the environmental water deliveries, the timeframes over which this change occurs can vary according to individual communities and metrics. For example, long-term intervention monitoring at Hattah Lakes comparing watered and unwatered sites is reporting a positive response in Black Box health across the watered sites after one environmental watering event, with subsequent events further improving tree health<sup>39</sup> (Figure 21). Inundation of River Red Gum communities for between 50-60 days during spring and early summer was found to improve canopy condition by between 10 and 30 percent<sup>40</sup>.

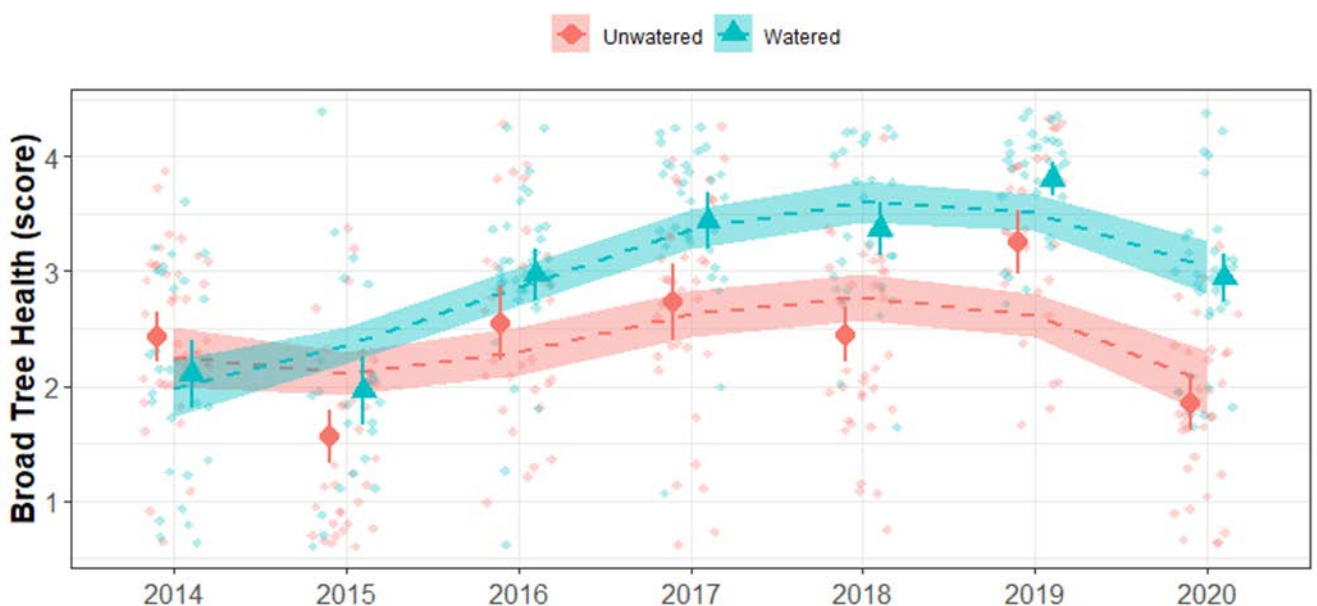


Figure 21: Raw Black Box health data means ( $\pm$  95% confidence interval) for each year sampled at the unwatered (red circles) and the 2014, 2016, 2017-18 and 2019 watered (blue triangles) case study sites. Individual points (jitter) and associated loess smooth lines show trends in the raw data based on watering (unwatered – red; watered – blue) (Moxham et al. 2020).

While the majority of the region’s long-term environmental watering monitoring programs are focused on the The Living Murray (TLM) sites (Hattah and Lindsay-Mulcra-Wallpolla), this evidence base does support the assumption that positive outcomes are also being achieved at other watered sites. Given the scale and scope of environmental watering events delivered across the region over the past decade, it is anticipated the extent of these impacts is also relatively significant outside of the TLM sites.

Targeted threat mitigation works (e.g. invasive plant and animal management) are further securing environmental outcomes achieved by recent environmental watering events, and protecting priority riparian landscapes. Key examples of quantifiable reductions in threat extent include: Long-term rabbit control programs within priority riparian landscapes continuing to maintain numbers below the regional threshold of <1 per spotlight km required to support regeneration

<sup>37</sup> Ecology Australia (2021) The Living Murray Condition Monitoring, Lindsay-Mulcra-Wallpolla 2020-21, Part A (Main Report).

<sup>38</sup> Ecology Australia (2021) The Living Murray Condition Monitoring, Hattah Lakes 2020-21, Part A (Main Report).

<sup>39</sup> Moxham C., et.al. (2020) The Living Murray Hattah Lakes Intervention Monitoring: Impact of Environmental Watering on Black Box health, reproduction and recruitment – Final Report 2020. Arthur Rylah Institute for Environmental Research, Department of Environment, Land, Water and Planning, Heidelberg, Victoria.

<sup>40</sup> Moxham, C. and Gwinn, D. (2021). Hattah Lakes floodplain tree condition: Modelling tree responses to environmental watering. Unpublished Report. Arthur Rylah Institute for Environmental Research, Department of Environment, Land, Water and Planning, Heidelberg, Victoria.



processes<sup>41</sup>; and the diversity of invasive plants at Hattah Lakes being the second lowest recorded over the seven-year monitoring period (2013-20), with targeted works to control invasive species undertaken over an extended period having a high level of success<sup>42</sup>.

Overall, the condition of Mallee waterway's is considered to be stable to improving, with evidence that management actions will have a positive impact in the longer term.

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<sup>41</sup> Parks Victoria (2019). Spotlight Transect Scores - Hattah Area Autumn 2021.

<sup>42</sup> Moxham C., Duncan M., Leivers D. and Farmilo B. (2020) The Living Murray Hattah Lakes Intervention Monitoring

### 3.2.3 PRIORITY DIRECTIONS

*This section outlines the major threats and drivers of change influencing the condition and management of waterways in the Mallee; core management and strategic directions that will guide delivery of our waterway related actions over the next 6-years; and the associated regulatory, policy and planning framework that informed their development.*

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#### MAJOR THREATS AND KEY DRIVERS OF CHANGE

Mallee waterways continue to be threatened by a range of pressures which can directly influence their environmental condition, and therefore their capacity to provide the environmental, social, cultural and economic services we value.

The major threats to our waterways are those that impact on one or more of their core environmental attributes, specifically: habitat, water quality, flows, and connectivity. This includes processes such as altered hydrological regimes, land and water salinisation, erosion, invasive plants and animals, habitat loss and fragmentation, and recreational pressures.

External factors such as climatic conditions (both variability and change) and water availability are also key determinants of both the effectiveness of our management actions and the long-term health of our waterways that will require ongoing attention and adaptive management responses.

Conversely, there are also initiatives that present the region with opportunities to improve how we plan for and deliver waterway management activities in the Mallee. These include participation in emerging carbon markets for riparian and aquatic habitat co-benefits, application of new technology, increased recognition of recreational and amenity values, and increasing self-determined participation and leadership by Traditional Owners.

How we respond to these threat processes and opportunities will play an important role in shaping the future trajectory of waterway health in the Mallee.

*Further detail on the challenges, opportunities and major threats influencing dryland and irrigated agricultural production, and the soil and water resources they are reliant on is provided in Section 1 (The Region – 4: Key Drivers of Change).*

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#### ALIGNED PLANS

Identification of the priority management and strategic directions detailed below has been informed by federal and state legislation, policies and strategies; regional strategies and action plans; and stakeholder priorities. The primary federal, state and regional instruments considered through this process are detailed in Appendix 1.

The Mallee currently has two overarching plans that collate stakeholder strategic directions, priorities and targets for waterways: The Mallee Waterway Strategy (2014-22)<sup>43</sup>; and the Mallee Floodplain Management Strategy (2018-28).

*Waterway related planning frameworks that focus on specific landscapes (i.e. not whole of region) are identified within their associated 'Local Area' (see Section 4). This includes Traditional Owner Country plans, site-based management plans, and individual stakeholder theme and/or landscape-based planning.*

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<sup>43</sup> Review and renewal processes for the Mallee Waterway Strategy commenced in 2022.

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## MANAGEMENT DIRECTIONS

The current condition of Mallee waterways, key drivers influencing this condition, associated planning instruments, and stakeholder priorities have directly informed the development of five key principles to direct our efforts. Specifically, that waterway management programs focus on actions that will collectively support:

- Protection and restoration of aquatic and riparian habitat for increased function and resilience
- Appropriate water regimes and improved connectivity for enhanced environmental, social and cultural benefits
- Water quality benefits and appropriate responses to threatening events (both natural and pollution based)
- Increased amenity and recreational opportunities
- Enhanced mitigation of regional flood risks.

This approach focuses on protecting and improving the key environmental attributes of Mallee waterways on the basis that this will support increased capacity to deliver environmental, social, cultural and economic benefits.

In developing programs to deliver against these principles, the following priorities have been identified to inform how our management actions are planned and implemented:

- Community and government partnerships to support integrated cross tenure delivery
- Landscape scale interventions that reduce key threats and provide whole of system benefits
- Targeted/specialised interventions (where appropriate) that reduce key threats and provide location and/or issue specific benefits
- Maintaining previous investment where appropriate to ensure the ongoing effectiveness of significant works programs
- Applying seasonally adaptive, and where required (e.g. extreme events), responsive approaches
- Climate ready interventions to provide for improved resilience and adaptive capacity
- Recognition of Traditional Owner cultural objectives, knowledge and practice.

*Priority directions for building stakeholder, Traditional Owner and the broader community's participation in and capacity for natural resource management, including waterways, are outlined in Section 3.5 (Community Capacity for NRM).*

*Priority directions for the protection of Traditional Owner/First Peoples cultural values are outlined in Section 3.4 (Culture and Heritage).*

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## STRATEGIC DIRECTIONS

Mallee waterways face a complex suite of threats to their condition. Given the finite resources available to manage our rivers and wetlands, it is not feasible to expect that management actions to address all of these asset x threat interactions across the entire region can be implemented over the life of this RCS. To help ensure we achieve the 'best' results with the resources available, a targeted delivery framework is required.

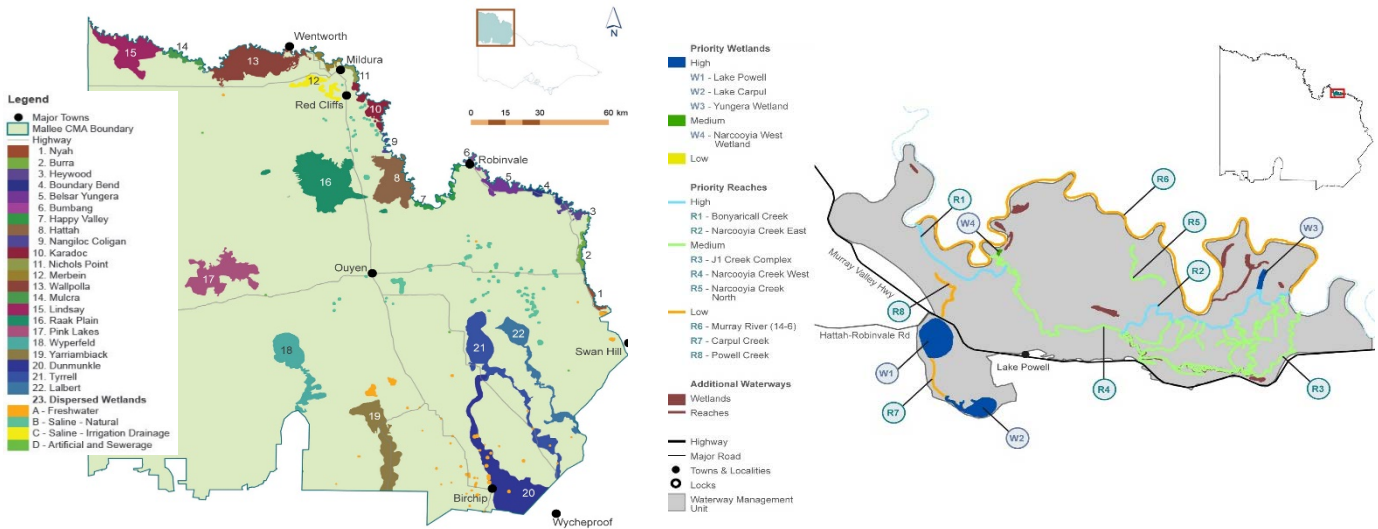
The asset-based approach established by the Mallee Waterway Strategy (MWS) will also be applied by the RCS to identify priority *threat x location interactions* for waterway related actions.

The MWS identified 216 waterways as a priority for management through the application of the following filters:

- Environmental, social, cultural and economic values
- Alignment with region's long-term goals
- Threat severity and risk
- Technical feasibility of available management responses.

The associated value, threat, risk, and feasibility assessment scores for each individual waterway was then used to identify, rank, and categorise (i.e. high, medium, low) 216 waterways as a priority for management.

Under this framework, each of the region’s wetlands and reaches was grouped into 23 waterway management units (WMUs) which recognise their interconnectedness and the commonality of threats impacting on their values (Figure 22) Of these, 22 WMUs are represented by discrete geographic locations and one encompasses the region’s dispersed wetlands assets with four sub-classifications according to type (i.e. freshwater, saline natural, saline irrigation drainage, and artificial supply and sewage).



**Figure 22: a) Waterway Management Units established by the Mallee Waterway Strategy (2014-22); and b) example of waterway prioritisation within a Waterway Management Unit (Belsar Yungera).**

The integrated planning and implementation framework facilitated by these WMU’s allows for strategic planning outcomes and landscape scale/whole of system benefits to be achieved, while applying an asset-based approach (i.e. targeting effort to highest priority waterways). Future works will target high and medium priority waterways in the first instance; with works on low priority waterways subject to funding and, in some cases, further feasibility assessments.

It is important to note that priority waterways and their associated categories developed through this process relate to a waterway’s ranking with regard to future management activities being undertaken to reduce threats to their values. It is not an indication of the importance of each waterway.

To provide for continuous improvement and support adaptive management processes, ongoing application of local expertise, Traditional Owner knowledge, and best available science is also fundamental to the MWS and RCS waterway delivery frameworks.

### 3.2.4 REGIONAL OUTCOMES

*This section outlines the medium-term (6 year) and long-term (20 year) outcome targets that regional stakeholders have collectively set for waterway management across the Mallee.*

Our medium-term outcome targets for waterways have been developed to align with regional planning and reporting frameworks, and demonstrate how the Mallee RCS will contribute to state-wide indicators (Table 7).

Delivery against these targets will be undertaken as part of the RCS’s integrated catchment management (ICM) – landscape-scale approach to NRM. Detail on the specific management actions and targets to be implemented within individual landscapes, and the local stakeholders that will contribute to their delivery is provided in Section 4 (i.e. Local Areas).

**Table 7: Regional outcome targets for waterway management, and the priority directions that will inform their delivery.**

Critical Elements <i>What we need to focus on</i>	Priority Management Directions <i>How our actions will be implemented</i>	Priority Strategic Directions <i>How our actions will be targeted</i>	Medium-Term Outcomes <i>What we will deliver by 2028:</i>	Long-Term Outcomes <i>What success will look like by 2042:</i>
<ul style="list-style-type: none"> <li>• Habitat protection and restoration</li> <li>• Habitat re-establishment</li> <li>• Specialised species/site specific interventions (where required)</li> <li>• Habitat protection and restoration.</li> <li>• Appropriate water regimes and improved connectivity</li> <li>• Water quality.</li> <li>• Amenity and recreational opportunities</li> <li>• Mitigation of regional flood risks.</li> </ul>	<ul style="list-style-type: none"> <li>• Community and government partnerships to support integrated cross tenure delivery</li> <li>• Landscape scale interventions to reduce key threats and provide whole of system benefits</li> <li>• Targeted/specialised interventions (where appropriate) to reduce key threats and provide location and/or issue specific benefits</li> <li>• Maintaining previous investment where appropriate to ensure the ongoing effectiveness of significant works programs</li> <li>• Applying seasonally adaptive, and where required (e.g. extreme events), responsive approaches</li> <li>• Climate ready interventions to provide for improved resilience and adaptive capacity</li> <li>• Recognition of Traditional Owner cultural objectives, knowledge and practice.</li> </ul>	<ul style="list-style-type: none"> <li>• Priority for management identified through:               <ul style="list-style-type: none"> <li>◦ Value, threat, risk, and feasibility assessment scores of individual waterways to categorise as high, medium, low.</li> </ul> </li> <li>• Resources directed to high and medium waterways in the first instance.</li> <li>• Resources directed to low priority waterways where actions:               <ul style="list-style-type: none"> <li>◦ Provide connectivity between priority waterways.</li> <li>◦ Address a serious risk to public infrastructure from waterway processes or reduce risks associated with extreme events.</li> <li>◦ Maintain/strengthen community commitment to improving the condition of local waterways.</li> <li>◦ Required to meet statutory or regulatory obligations.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• 300,000 hectares of riparian land protected or improved by targeted works programs.</li> <li>• 9,850 hectares of priority waterways protected or improved by water regimes delivering against environmental, social and cultural objectives*.</li> <li>• Increased amenity and recreational opportunities provided by regional waterways.</li> <li>• Increased understanding and mitigation of regional flood risks.</li> </ul>	<ul style="list-style-type: none"> <li>• The condition of high value aquatic and riparian habitat is improved.</li> <li>• Appropriate water regimes are restored to priority waterways and connectivity is improved.</li> <li>• Water quality within priority waterways is improved.</li> <li>• Flood risks are reduced and being actively managed.</li> </ul>

\*Target encompasses area of individual waterway only, does not include inundation of associated floodplain.

### 3.3: AGRICULTURAL LAND

*Vision: Agricultural land is managed to optimise productive capacity, while avoiding or minimising environmental impacts.*

*Scope: All parts of the landscape that have been developed for the purpose of dryland and irrigated agricultural production (including the soil and water resources they are reliant on).*

#### 3.3.1 OVERVIEW

Some 62 percent of our region is under agricultural production, with an estimated 2.4 million hectares of dryland farming and a further 88,140 hectares of irrigation development (Figure 23). Natural and built up/urban environments represent the other primary land uses across the region's 3.99 million hectares.

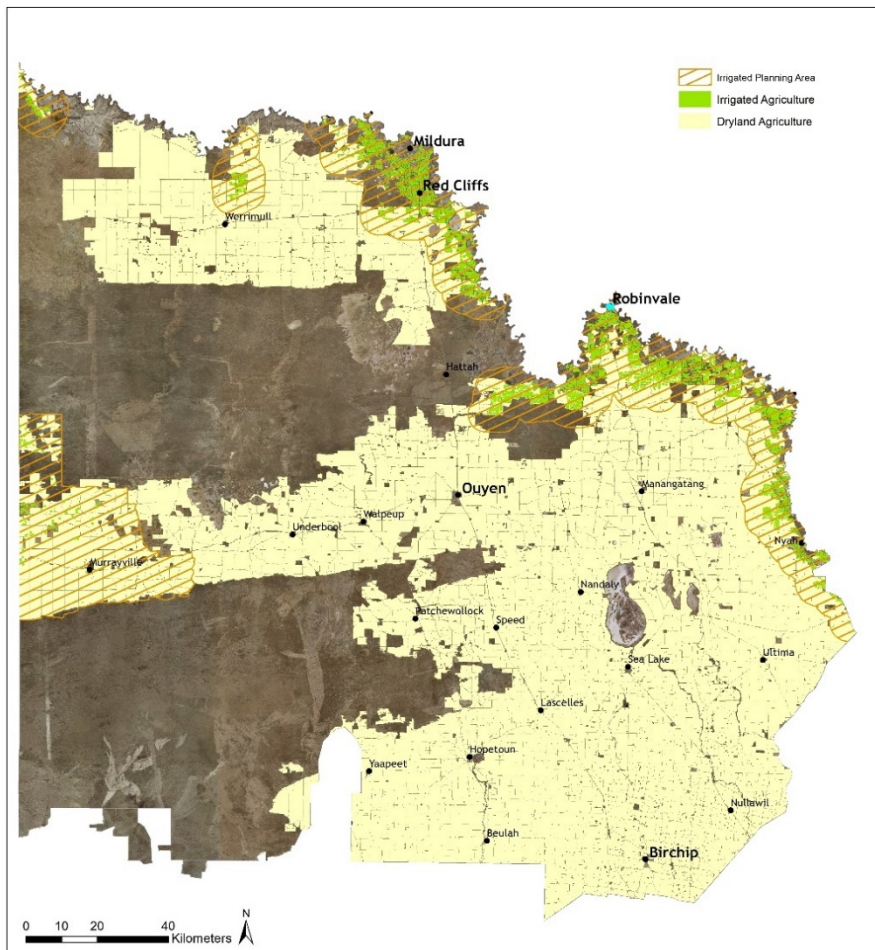


Figure 23: Distribution of dryland and irrigated agriculture.

South Australian border, encompassing private diverters and the pumped irrigation districts of Mildura, Merbein, Red Cliffs, Robinvale and Nyah. The primary crops produced in these areas include almonds, table and wine grapes, and citrus.

A 191,600 hectare groundwater irrigation district also exists centred on the town of Murrayville, with groundwater from the Murray Group Limestone Aquifer the sole source of water for town, stock and domestic, and irrigation supply in the area. Irrigated production encompasses field crops, potatoes and olives.

Dryland agriculture occurs in the northern, central and southern parts of the region and includes the cropping of a wide variety of cereals and pulse crops such as wheat, barley, vetch, chickpeas, lentils and canola. Livestock also forms a part of many farm operations and primarily includes sheep for their wool products and lambs for their quality meat. Cattle and goats are also present in smaller numbers.

These agricultural industries have largely been established where they can be supported by our regional soils. The large blocks of remnant vegetation which remain in the landscape (such as in our parks and reserves) are often represented by their sandy infertile soils, which are unsuitable for agriculture.

Irrigation development reliant on surface water extends adjacent to the Murray River from Nyah to the



### 3.3.2: CONDITION & TRENDS

This section provides an overview on the current condition of agricultural land in the Mallee. State-wide and regional indicators have been applied to establish a baseline, and where available identify long term trends, from which progress against our medium-term (6-year) and long-term outcome targets for agricultural land can be determined.

#### PRODUCTIVITY

The Mallee is recognised nationally and internationally for its agricultural produce. It is a key part of Victoria’s food bowl, producing significant amounts of the state’s grain, fruit and nut crops.

#### Value

Agriculture plays a major role in sustaining the economy of the region, with the gross value of production in 2019-20 being some \$2.43 billion; \$1.34 billion for irrigated crops, \$933 million for dryland crops, and \$149 million for livestock enterprises; contributing 14 percent of total agricultural production value for the state across all industries (Figure 24).

This represents a \$1.24 billion increase in gross production value for the region over the past 10 years. In 2009-10 irrigated crops had a gross value of \$586 million, dryland crops \$544 million, and livestock industries \$60 million; contributing 11.5 percent of the states total agricultural production value<sup>44</sup>.

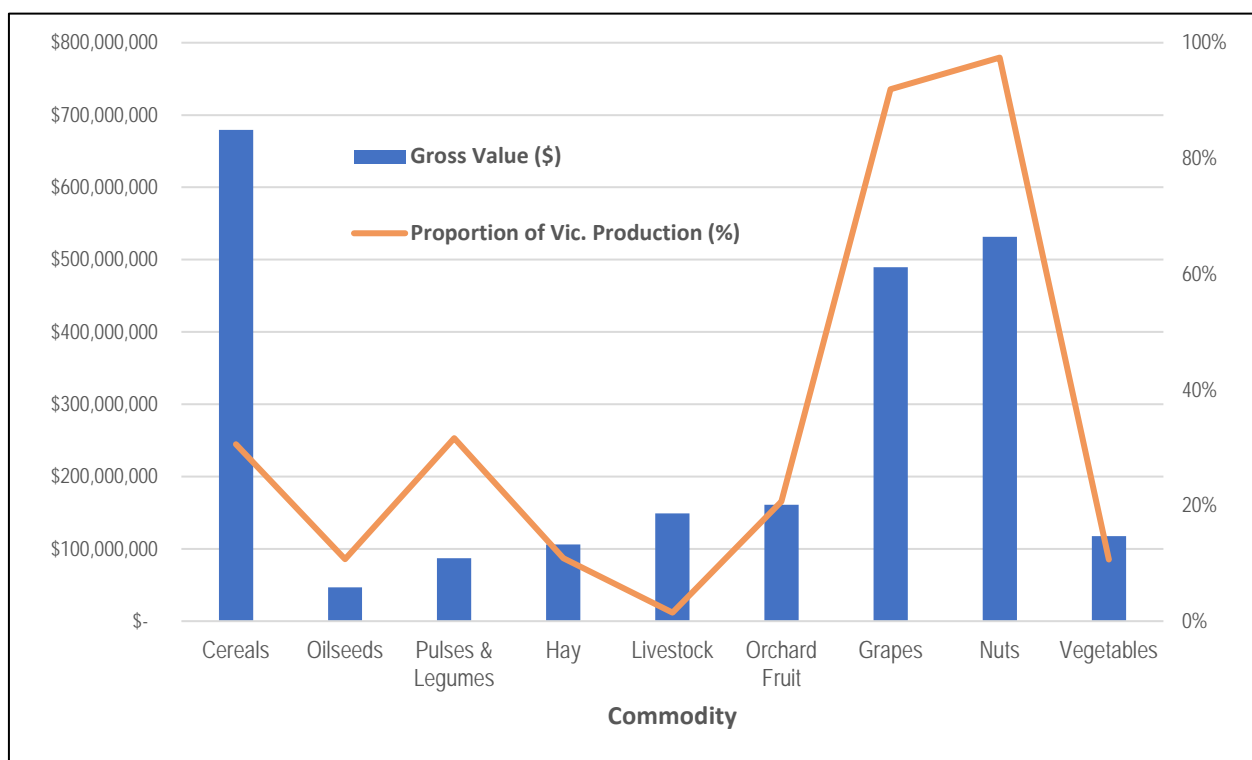


Figure 24: Gross value and proportion of Victorian agricultural commodities produced in the Mallee (Source: ABS - Value of Agricultural Commodities Produced, 2019-20).

<sup>44</sup> Australian Bureau of Statistics: Value of Agricultural Commodities Produced 2009-10.

## Area

While the area of dryland agriculture in the Mallee has remained relatively stable over the past 30 years, with satellite imagery analysis identifying a 2 percent (48,000 hectare) increase between 1987 and 2019<sup>45</sup>; irrigated areas have increased significantly. Between 1997 and 2021 (for which comprehensive irrigation crop data is available) irrigation development reliant on water from the Murray River has increased from 39,470 hectares to 81,355 hectares, representing a more than doubling of the irrigable area. There is a further 6,785 hectares of irrigable land in the Murrayville groundwater irrigation area, a 5,580 hectare increase since 1997 (Figure 25).

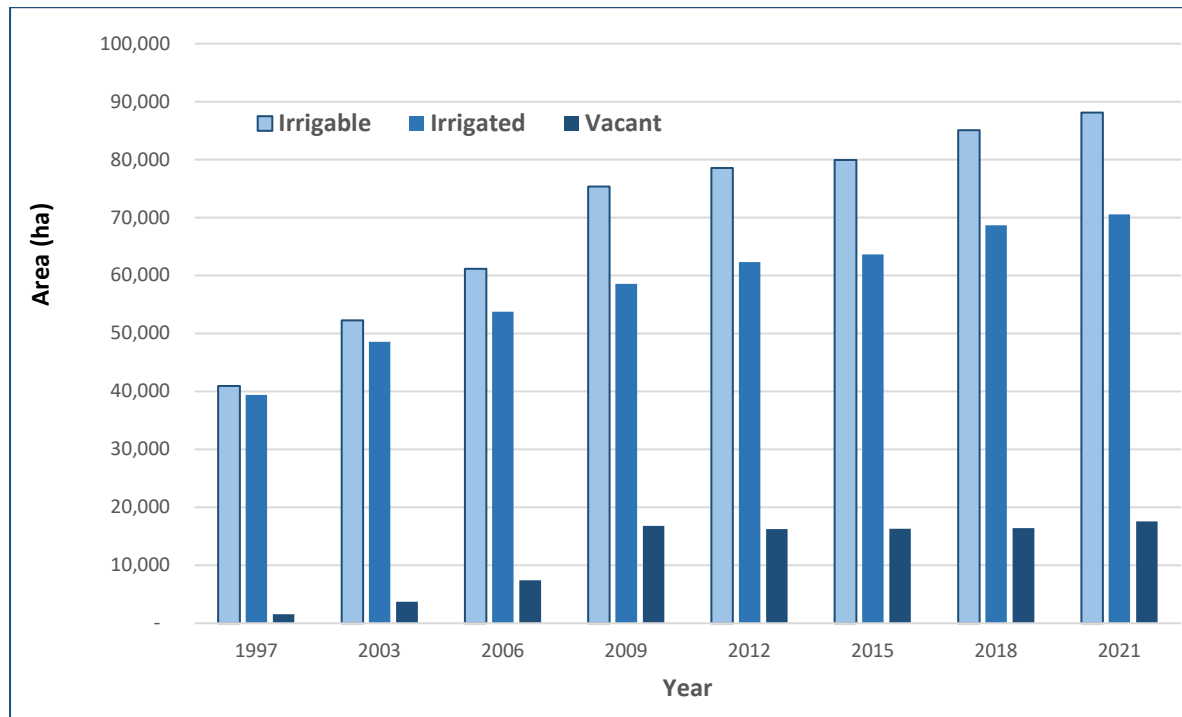
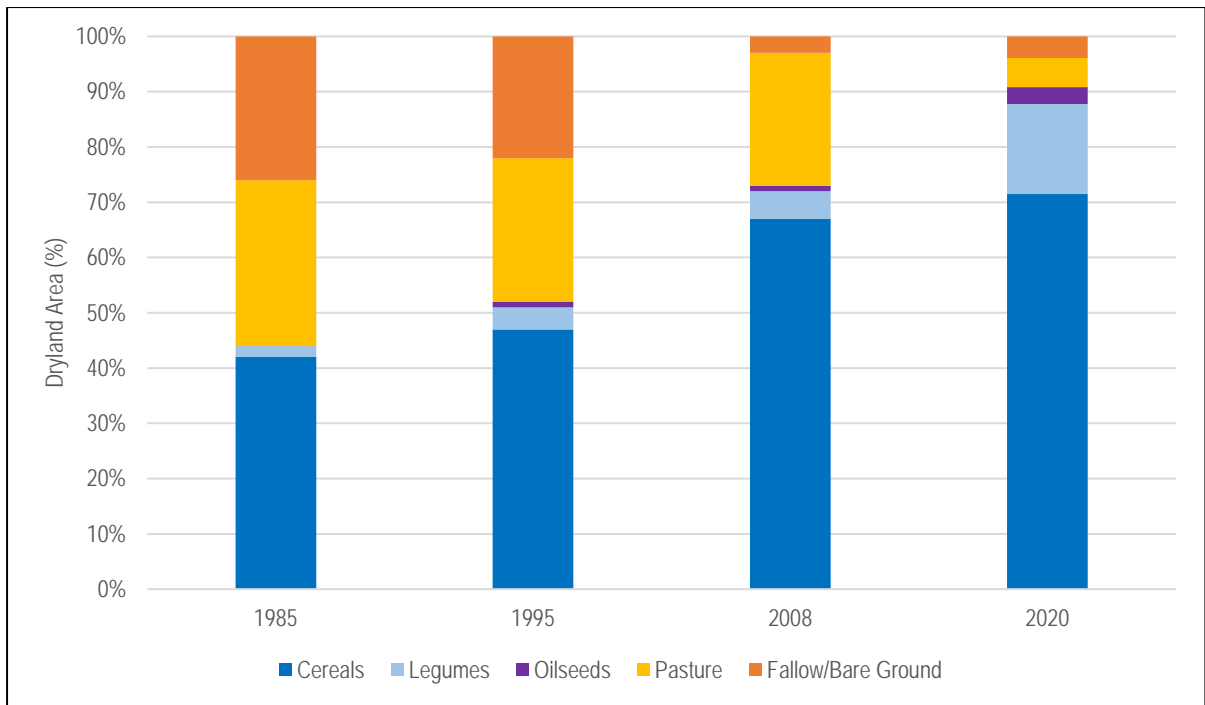


Figure 25: Area of irrigable land irrigated (source: MCMA, unpublished data 2022).

## Crops

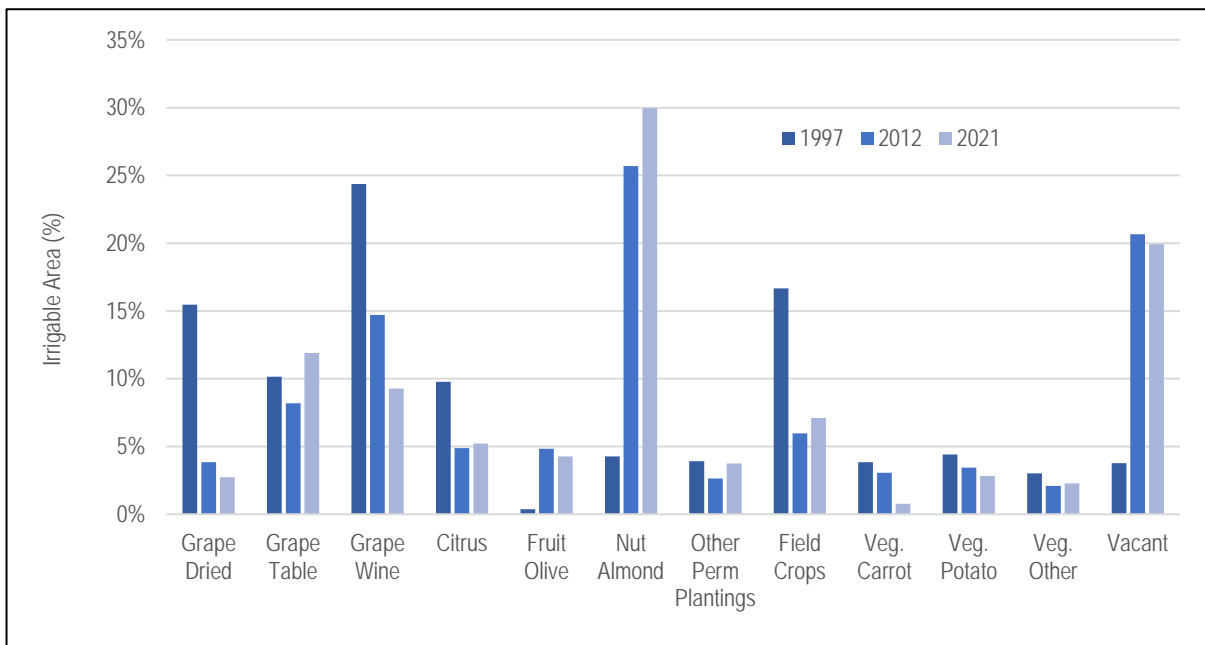
Historically, the Mallee dryland farming system was based on a mixed farming enterprise with cropping paddocks sown to cereals in rotation with pasture/stubble paddocks for grazing livestock, and often in heavier soil types, a third year of long-term fallow to achieve weed and disease control and water storage benefits. Intensification of this system over the past 30 years has seen increased areas being sown to cereals (primarily wheat and barley) and the use of break crops (e.g. legumes) in place of traditional pasture options (Figure 26).

<sup>45</sup> Victorian Landcover Cover Time Series, DELWP 2020.



**Figure 26: Major dryland crops in the Mallee by area (source: Adapted from Mallee Land Management & Soil Erosion Spring Surveys)**

Almonds, 99 percent of which are grown by private diverters, have become the region’s single largest irrigated crop by area and water demand. Within the irrigation districts there has also been a resurgence of table grapes in recent years (Figure 27).



**Figure 27: Major irrigated crops in the Mallee by area (source: MCMA, unpublished data 2022).**

## MANAGEMENT

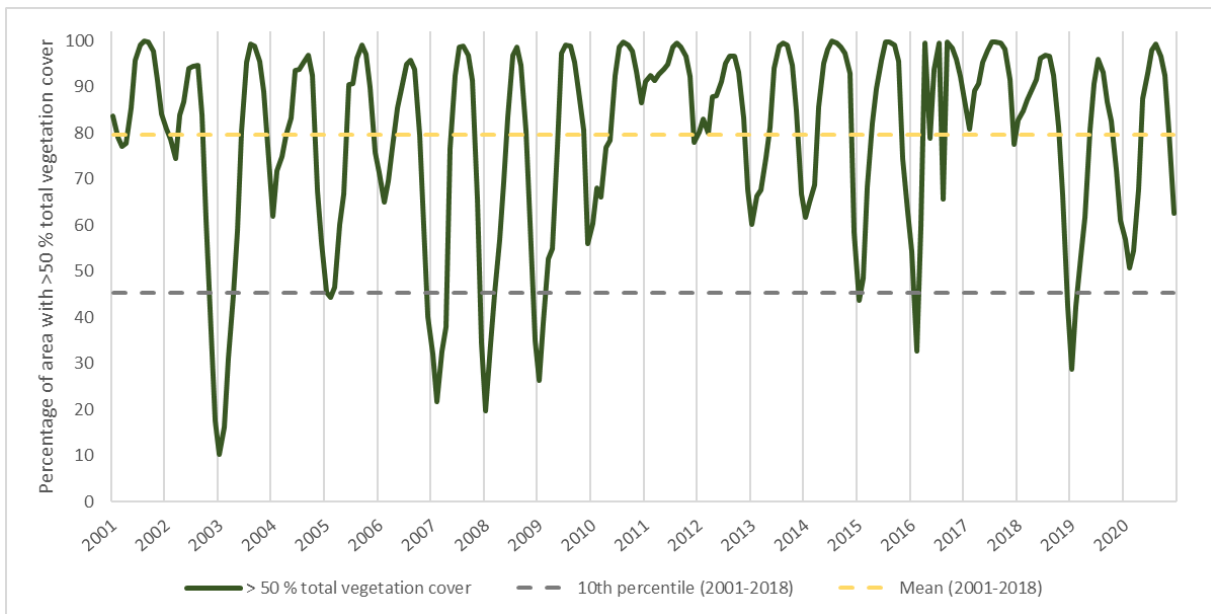
Long term changes in dryland and irrigated agriculture management practices and associated impacts on the soil, and water resources they rely on, have also been applied as condition indicators.

### Soils

Widespread changes in dryland agriculture over the past 30 years have supported increased vegetation cover, soil aggregation and overall soil stability; reducing the risk, incidence and severity of soil erosion events.

The use of conventional fallow, for instance, has been reduced considerably, from between 30 to 50 percent of monitored sites in the 1990's to an average of less than five percent over the past five years. Conversely, the increased use of legumes as break crops can produce more fragile stubbles, which are prone to faster decomposition than cereals and may increase erosion risk.

The total vegetation cover (TVC) threshold for effective protection of soils from wind erosion is 50 percent<sup>46</sup>. Groundcover observations demonstrate that on average, 80 percent of agricultural land in the region exceeded this target between 2001 and 2021; with the 10<sup>th</sup> percentile being 45 percent (Figure 28).



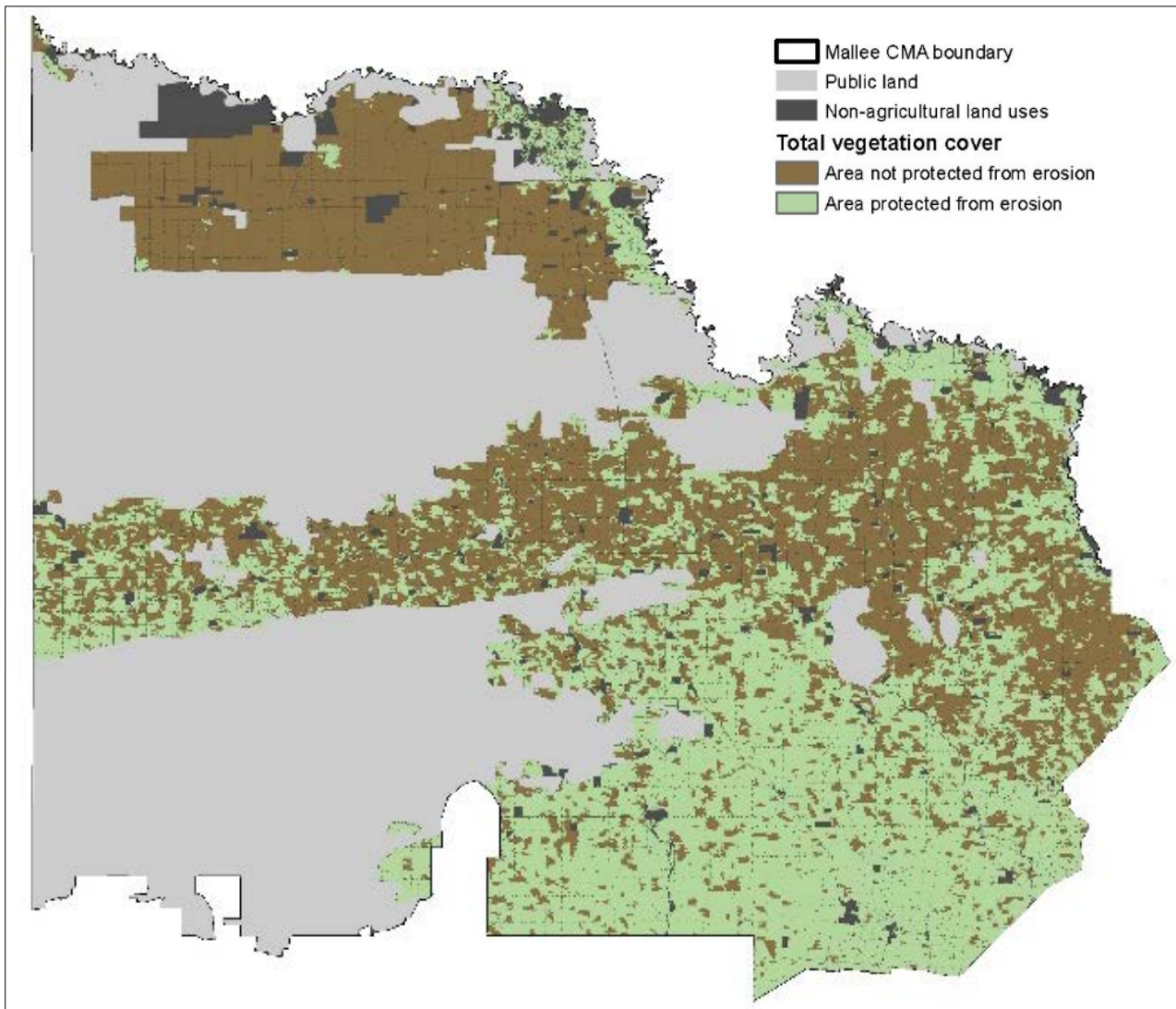
**Figure 28: Percentage of agricultural land protected from wind erosion (>50% TVC) (source: Monitoring wind erosion and land management in the Victorian Mallee – Annual Report 2020, DJPRR 2021).**

Significant variability in groundcover continues to be evident across the region however, with rainfall being a key influencing factor. For example, following their lowest annual total rainfall on record in 2019, less than 10 percent of the northern Mallee achieved the 50 percent groundcover target in February 2020. Erosion risk was also relatively high in the central and southern Mallee which recorded decile 1 and 2 conditions respectively for 2019 (Figure 29).

The region also recorded the most dust activity between July 2019 to April 2020 since monitoring commenced in 2005, with four to eight times more events (depending on location) than in the previous worst year of 2009<sup>47</sup>.

<sup>46</sup> Leys, J.F. (1999). Wind erosion on agricultural land. In A.S. Goudie, I. Livingston, & S. Stokes (Eds.), *Aeolian Environments, Sediments and Landforms* (pp. 143-166). England: John Wiley and Sons

<sup>47</sup> DustWatch Monthly Reports: NSW Office of Environment and Heritage, July 2019 to June 2020.



**Figure 29: Area of agricultural land protected from wind erosion (>50% TVC) during February 2020 (source: Monitoring wind erosion and land management in the Victorian Mallee – Annual Report 2020, DJPRR 2021).**

Organic Carbon (OC) is typically below one percent in Mallee dryland agricultural soils, but varies considerably (generally between 0.2 and 1.7%) across monitored sites according to their underlying soil (i.e. shifts from loam in the north to clay loam/clay soils in the south). A decline in the median OC levels for all land systems has been observed from 2010-2012 baseline assessments and while it is well documented that there is a temporal downward trend in OC levels in Australian cropping soils, OC can also vary with season. Further monitoring is therefore required to determine if observed changes in OC as a soil health indicator is a long term trend or due to short term (seasonal) variation.

## Water

Since water entitlement unbundling in 2007, the amount of water issued for irrigation from the Murray River as an Annual Use Limit (AUL) has increased by 60 percent, from 518 gigalitres AUL in 2007 to 828 gigalitres AUL in 2021 as a result of new irrigation developments and redevelopments. The actual water diverted from the Murray River for irrigation in 2021 however was 514 gigalitres, or 62 percent of AUL<sup>48</sup>.

Improvements in irrigation management over the past 30 years, including a significant reduction in the use of both flood and overhead sprinkler applications, have decreased subsurface drainage flows to the river, to the floodplain and to inland drainage basins. This practice change has also decreased the groundwater mound under the older irrigation areas, decreasing saline groundwater flows to the river and floodplain (Figure 30).

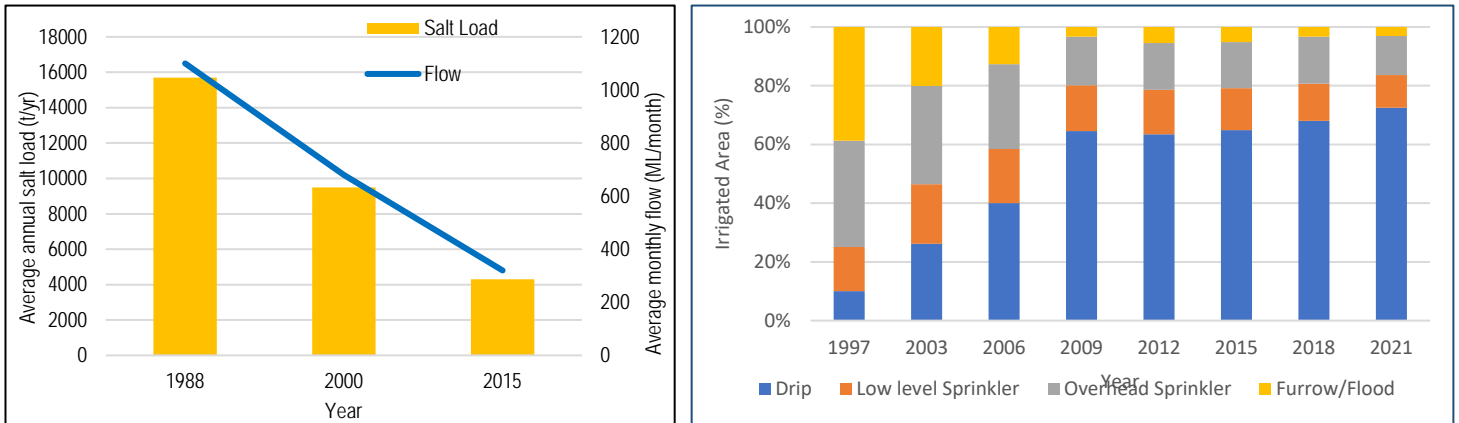


Figure 30: a) Mildura, Merbein and Red Cliffs Irrigation Districts average salt loads and average monthly flows from sub-surface drains (source: DELWP 2019 Victorian Irrigation Drainage Program), and b) Percentage of total irrigated area watered by irrigation method.

Improved irrigation practices have also supported a trend of decreased river salinity from Swan Hill to Lock 6 (Figure 31). A large decrease in salinity is evident in the early 2000s when, during the Millennium Drought, there was reduced irrigation supply and substantial investment in irrigation efficiencies. While spikes in salinity still occur, generally following major floods (i.e. 1993, 1999, 2011 and 2016), the overall trend of reduced salinity has continued.

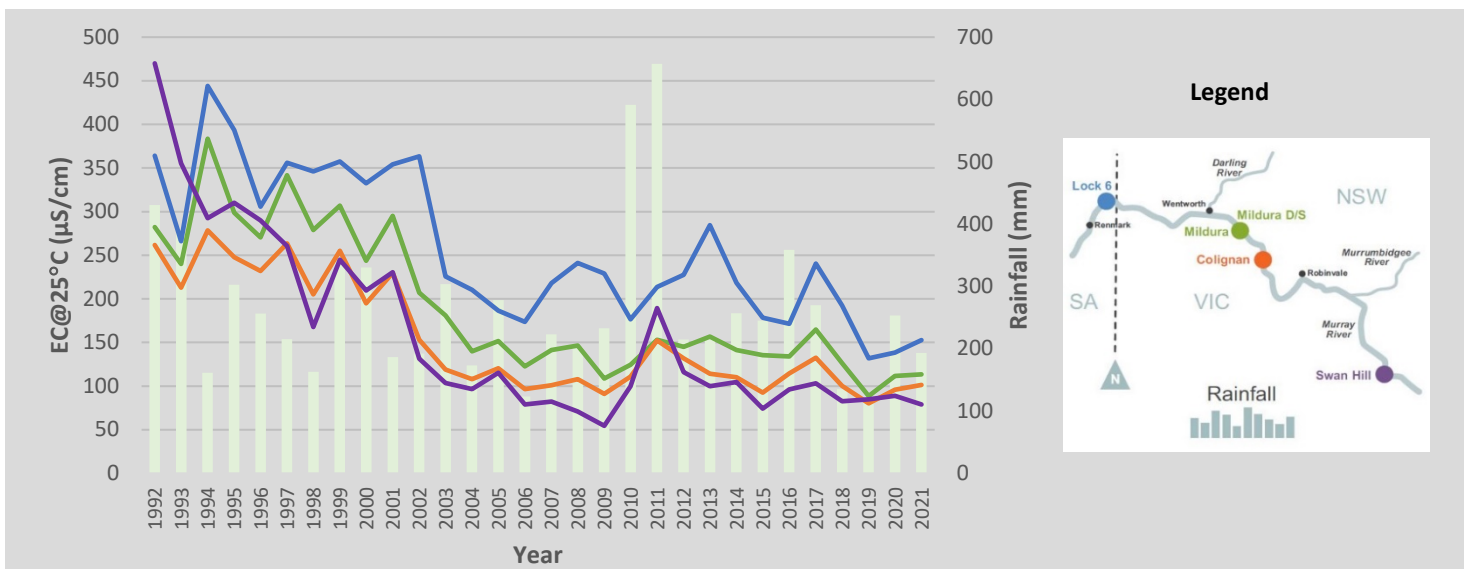


Figure 31: Changes in Murray River salinity impacts over time.

<sup>48</sup> MCMA: Unpublished data. 2021.



Annual calculations of salinity credit consumption through irrigation development is a key regional reporting requirement under both Basin Salinity Management (BSM) 2030 and the Catchment and Land Protection Act 1994. The BSM2030 salinity accountability framework commits partner governments (including Victoria) to maintain agreed salinity levels and ensure their actions that increase river salinity are offset by investing in actions to reduce salinity.

This framework is implemented through the BSM2030 salinity registers, under which the Mallee currently holds a total salinity credit allocation of 23.22 EC. In June 2021, the progressive total of salinity debits in the Mallee was calculated to be 15.25 EC, representing a 7.97 EC credit and ongoing compliance at a regional scale<sup>49</sup>.

In relation to the Murrayville Groundwater Management Area (GMA), current levels of use continue to be within the permissible consumptive volume (PCV) of 11,005 ML/year, as defined by the Minister for Water in July 2017. In 2020-21 the total licence entitlement was 9,755 ML, with 63 percent (6,151 ML) of this volume extracted (Figure 32).

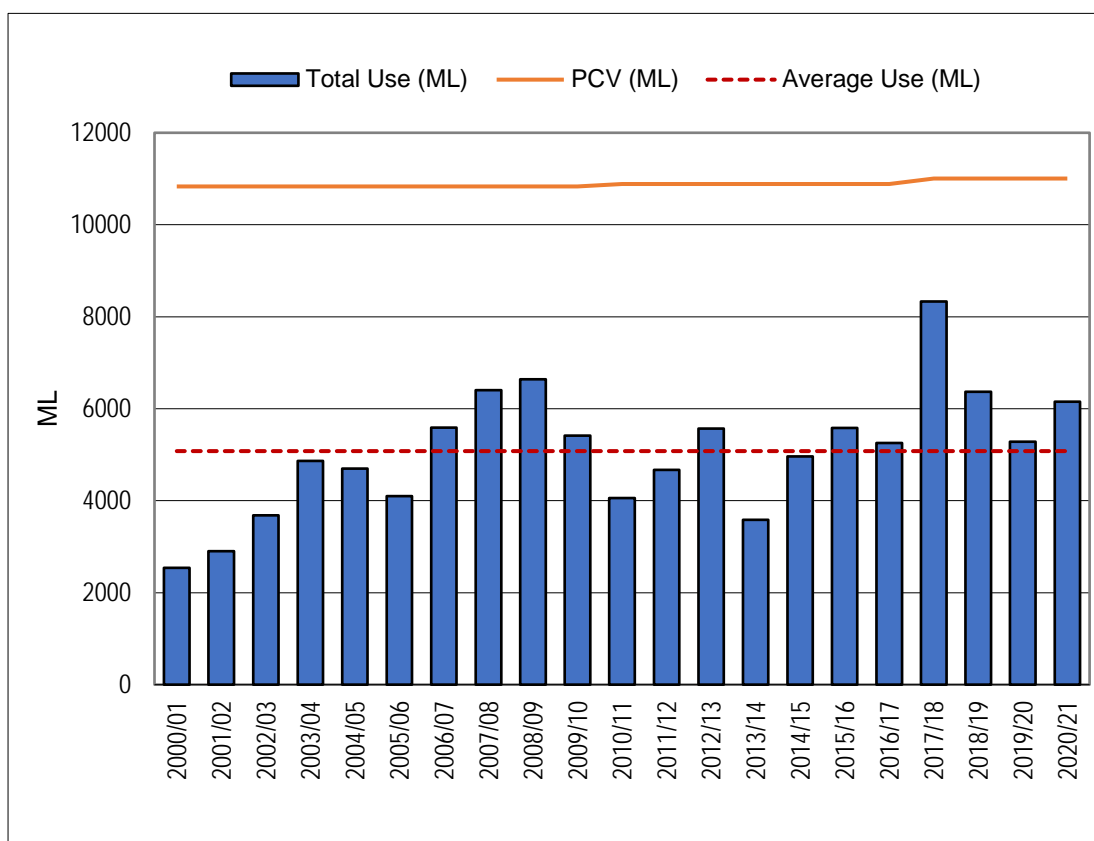


Figure 32: Groundwater usage over time in the Murrayville GMA (source: Murrayville Local Management Plan (Groundwater) Annual Report 2020-21, GWMWater 2021)

The Murrayville GMA Local Management Plan (2017) also establishes a drawdown resource condition threshold of 0.65m per year to ensure this non-renewable groundwater resource is managed as far as practicable for long-term sustainability, with the trigger for management intervention (e.g. restrictions) being two successive years of drawdown greater than the threshold based on a five year rolling average. Monitoring of water levels within five assessment areas indicates that while there are clear seasonal fluctuations in response to pumping, due to the confined nature of the aquifer, water levels continue to demonstrate a recovering trend and the drawdown threshold has not been exceeded for the 2017-21 period. Salinity levels also remain stable across the Murrayville GMA<sup>50</sup>.

<sup>49</sup> BSM2030 Annual Implementation Report 2020-21, MCMA 2021.

<sup>50</sup> GWM Water (2021). Annual Report 2020-21: Murrayville Local Management Plan (Groundwater).

### 3.3.3 PRIORITY DIRECTIONS

*This section outlines the major threats and drivers of change influencing the condition and management of agricultural land in the Mallee; core management and strategic directions that will guide delivery of our actions over the next 6-years; and the associated regulatory, policy and planning framework that informed their development.*

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#### MAJOR THREATS AND KEY DRIVERS OF CHANGE

It is evident that despite the positive changes in land management being applied in the Mallee, the productivity of our dryland and irrigated agricultural lands continue to be vulnerable to a range of processes such as wind erosion, salinity, pests and diseases, which if not managed appropriately have the potential to degrade the soils and water resources they rely on; and to potentially reduce the area available for production into the future.

Land management practices not only have the potential to impact on the productivity of agricultural land, but also on adjacent natural and cultural values. Off-site impacts such as sand drift, salinity, waterlogging, nutrient enrichment, and spray drift can have significant impacts on the health of our native species, waterways and culturally significant sites.

External factors such as climatic conditions (both variability and change), water availability and deliverability, and global markets are also key determinants of both overall productivity and the incidence of off-site impacts that require ongoing attention and adaptive management by our agricultural industries.

Opportunities such as emerging carbon markets, application of new technology, and increased Traditional Owner participation in land and water management may also provide for ongoing improvements in the health of our agricultural landscapes.

*Further detail on the challenges, opportunities and major threats influencing dryland and irrigated agricultural production, and the soil and water resources they are reliant on is provided in Section 1 (The Region – 4: Key Drivers of Change).*

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#### ALIGNED PLANS

Identification of the priority management and strategic directions detailed below has been informed by federal and state legislation, policies and strategies, regional strategies and action plans, and stakeholder priorities. The primary federal, state and regional instruments considered through this process are detailed in Appendix 1.

The Mallee currently has two overarching plans that collate stakeholder strategic directions, priorities and targets for agricultural land: The Victorian Mallee Irrigation Region Land and Water Management Plan (2020-29); and the Mallee Dryland Sustainable Agriculture Strategy (2017-23).

*Planning frameworks that focus on specific locations and/or issues (e.g. Murrayville GMA Local Management Plan) are identified within the associated 'Local Area' (see Section 4).*

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#### MANAGEMENT DIRECTIONS

The current condition of Mallee dryland and irrigated agricultural production, and the soil and water resources they are reliant on; the key drivers influencing this condition; associated planning instruments; and stakeholder priorities have directly informed the development of five key principles to direct our efforts. Specifically, that programs focus on actions which will support dryland farmers and irrigators to:

- Protect and restore agricultural soils for improved productivity, sustainability and resilience
- Improve water-use efficiency, maximising productivity from available water

- Control, and recover from pest, disease and weed impacts
- Reduce the off-site impacts of land and water management practices
- Adapt and respond to change.

In developing programs to deliver against these principles, the following priorities have been identified to inform how our actions are planned and implemented:

- Research, extension and industry partnerships to support effective knowledge transfer
- Supporting innovative approaches to delivery, including the application of new technology
- Diverse, adaptable, and resilient agricultural systems that maximise production potential, minimise risk, and enhance viability – including drought preparedness and climate ready strategies
- Maintaining groundcover above regional thresholds
- Increasing the soil organic carbon stocks of agricultural soils - including collaborations to maximise the potential of emerging carbon markets
- Managing rootzone drainage within required thresholds
- Management options for reclaiming, stabilising and utilising agricultural soils that are severely degraded, and have limited production potential
- Anticipatory and adaptive approaches to pests, disease and weed management – incorporating sound biosecurity practices and cross-tenure collaborations
- Recognition of Traditional Owner cultural values, objectives, knowledge and practice.

*Priority directions for building stakeholder, Traditional Owner and the broader community's participation in and capacity for natural resource management, including agricultural land, are outlined in Section 3.5 (Community Capacity for NRM).*

*Priority directions for the protection of Traditional Owner/First Peoples cultural values are outlined in Section 3.4 (Culture and Heritage).*

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## STRATEGIC DIRECTIONS

Agricultural land in the Mallee is expansive and diverse. Complex interactions with the soil and water resources that support production, the potential for off-site impacts on adjacent natural and cultural values, and the challenges posed by a changing climate all require ongoing consideration and effective management strategies to optimise productivity while minimising impacts.

Given the finite resources available to implement agricultural land related programs, it is not feasible to expect that all *asset x threat interactions* can be addressed over the life of this RCS. To help ensure we achieve the 'best' results with the resources available, a targeted delivery framework is applied.

Priority locations for addressing specific threat processes will be determined according to:

- The likelihood and impact (both current and potential) of the threatening process (i.e. risk)
- The capacity of the available management actions to address the threatening process (i.e. effectiveness)
- The level of resources required to exercise that capacity (i.e. cost: benefit).

It is noted that under most prioritisation frameworks, the value of the asset (i.e. economic, environmental, social, cultural) would also represent a key consideration. For agricultural land there are however no analyses currently available to differentiate *relative value*. As such, it is considered a dispersed asset of equal value for the purpose of this RCS.

Processes undertaken to prioritise and target management actions will therefore rely on spatial assessments of threat likelihood and *impact x intervention* effectiveness. To provide for continuous improvement and support adaptive management processes; ongoing application of local expertise, traditional owner knowledge and best available science is also fundamental to the RCS Agricultural Land targeted delivery framework.

### 3.3.4 REGIONAL OUTCOMES

This section outlines the medium-term (6-year) and long-term (20-year) outcome targets that regional stakeholders have collectively set for agricultural land management across the Mallee.

Our medium-term outcome targets (Table 8) for agricultural land have been developed to align with and demonstrate how the Mallee RCS will contribute to state-wide and regional indicators.

Delivery against these targets will be undertaken as part of the RCS’s integrated catchment management (ICM) – landscape scale approach to NRM. Detail on the specific management actions and targets to be implemented within individual landscapes, and the local stakeholders that will contribute to their delivery is provided in Section 4 (i.e. Local Areas).

**Table 8: Regional Outcome targets for Agricultural Land Management and the priority direction that will inform their delivery.**

Critical Elements <i>What we need to focus on</i>	Priority Management Directions <i>How our actions will be implemented</i>	Priority Strategic Directions <i>How our actions will be targeted</i>	Medium -Term Outcomes <i>What we will deliver by 2028:</i>	Long-Term Outcomes <i>What success will look like by 2042:</i>
<ul style="list-style-type: none"> <li>• Productivity relative to potential.</li> <li>• Soil health,</li> <li>• Water-use efficiency</li> <li>• Pest, disease and weed management.</li> <li>• Adaptive capacity.</li> <li>• Off-site impacts.</li> </ul>	<ul style="list-style-type: none"> <li>• Research, extension and industry partnerships to support effective knowledge transfer</li> <li>• Supporting innovative approaches to delivery, including the application of new technology</li> <li>• Diverse, adaptable, and resilient agricultural systems that maximise production potential, minimise risk, and enhance viability – including drought preparedness and climate ready strategies</li> <li>• Maintaining groundcover above regional thresholds</li> <li>• Increasing the soil organic carbon stocks of agricultural soils - including collaborations to maximise the potential of emerging carbon markets</li> <li>• Managing rootzone drainage within required thresholds</li> <li>• Management options for reclaiming, stabilising and utilising agricultural soils that are severely degraded, and have limited production potential</li> <li>• Anticipatory and adaptive approaches to pests, disease and weed management – incorporating sound biosecurity practices and cross-tenure collaborations</li> <li>• Recognition of Traditional Owner cultural values, objectives, knowledge and practice</li> </ul>	<ul style="list-style-type: none"> <li>• Priority locations identified through:               <ul style="list-style-type: none"> <li>○ The likelihood and impact (both current and potential) of the threatening process (i.e. risk)</li> <li>○ The capacity of the available management actions to address the threatening process (i.e. effectiveness)</li> <li>○ The level of resources required to exercise that capacity (i.e. cost: benefit)</li> </ul> </li> <li>• Ongoing application of local expertise, Traditional Owner knowledge and best available science to support continuous improvement and adaptive management processes.</li> </ul>	<ul style="list-style-type: none"> <li>• Increased application of ‘best practice’ for soil health and productivity improvements</li> <li>• Increased average area of agricultural land exceeding the 50% groundcover target</li> <li>• Increased application of ‘best practice’ for water use efficiency and productivity improvements</li> <li>• Maintain a net salinity credit balance on the BSM2030 salinity registers and remain compliant with obligations under Schedule B of the Murray-Darling Basin Agreement</li> <li>• Maintain groundwater usage in the Murrayville Groundwater Management Area within required thresholds.</li> </ul>	<ul style="list-style-type: none"> <li>• Improved health and productive capacity of agricultural soils.</li> <li>• Improved water-use efficiency for optimal returns from irrigation water use.</li> <li>• Improved water quality.</li> </ul>



## 3.4: CULTURE AND HERITAGE

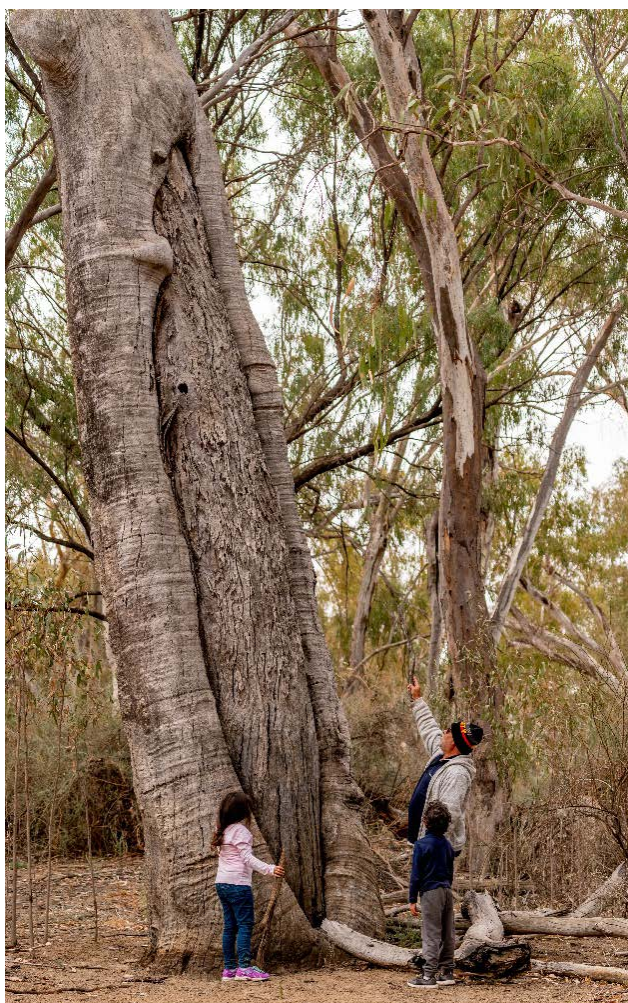
***Vision: Aboriginal culture and heritage is protected and Traditional Owner led practices are embedded in the management and healing of Country.***

*Scope: All tangible and intangible Aboriginal culture and heritage that has recognised cultural, historical or spiritual significance, and Traditional Ecological Knowledge rejuvenation, protection and application in cultural landscapes management.*

### 3.4.1 OVERVIEW

The region's rich and diverse Aboriginal culture and heritage has been formed through the historical and spiritual significance of sites associated with human occupation spanning thousands of years, together with the enduring connection Traditional Owners/First Peoples have with Mallee landscapes.

The oldest dated Aboriginal heritage site in the Mallee region is located at Direl (Lake Tyrrell), with human activity recorded as far back as between 26,600 and 32,000 years ago, although use of the site was possibly as early as 45,000 years ago<sup>51</sup>.



**Figure 33: On-Country connections.**

The first inhabitants of our region were numerous Aboriginal tribes of different language groups, including; Ngintait, Ngarkat, Latji Latji, Nyeri, Wergaia, Wadi, Wemba Wemba, Jari Jari, and Tati Tati. Given the semi-arid climate of the region, ready access to more permanent water has been a major determinant of human habitation, and as such the highest density of identified Aboriginal cultural heritage sites are located around, or close to areas of freshwater sources.

The Murray River and its associated lakes and waterways were important habitation areas for many Aboriginal groups, as the abundance of food, water and shelter allowed for more permanent occupation. The high number of cultural sites throughout the Murray floodplain is unique in Victoria, both for their concentration and diversity; including large numbers of burials, middens and hearth sites. There are also numerous meeting and ceremonial places, scarred trees (Figure 33), and artefact sites located across this landscape.

In the south of the region, freshwater lakes, streams and wetlands were focal points for Traditional Owners. Many lakes were the sites of large gatherings of several family groups that afforded trade and cultural exchanges. Direl (Lake Tyrrell) for example is identified by Traditional Owners as having unique spiritual and social values; with Dreamtime viewed and experienced in both the night sky and its reflections on the lake.

<sup>51</sup> Richards et al. (2007), Box Gully: new evidence for Aboriginal occupation of Australia south of the Murray River prior to the last glacial maximum, *Archeology in Oceania* 42 1-11.

Intangible cultural heritage is integral to these landscapes, including the traditional knowledge, practice and expressions (e.g. biocultural knowledge, ceremonies, language, dance, song, and stories) passed down from generation to generation. Natural elements of the landscape such as landforms, flora and fauna can also have particular significance to Traditional Owners.

The *Aboriginal Heritage Act 2006* provides for the protection of cultural heritage in Victoria, covering both tangible and intangible heritage. The *Aboriginal Heritage Regulations 2018* give effect to the Act, defining 'areas of cultural heritage sensitivity' and 'high impact activities'; and setting out the circumstances in which a Cultural Heritage Management Plan (CHMP) should be prepared.

Traditional Owners, as Registered Aboriginal Parties (RAPs), have cultural heritage responsibilities under the *Aboriginal Heritage Act 2006*. These include the evaluation of CHMPs and decisions about cultural heritage permit applications. There are currently two RAPs who represent the interests of Traditional Owners in their respective Country areas across the Mallee: Barengi Gadjin Land Council Aboriginal Corporation (BGLC) and First People of the Millewa Mallee Aboriginal Corporation (FPMMAC). Provisions are also made for Traditional Owners in non-RAP areas to be engaged in cultural heritage protection and management processes (see Section 1.2 for further detail on the region's Traditional Owners).

For many thousands of years, the Country was managed and cared for by local First Peoples. As custodians of the oldest living culture in the world, Traditional Owners have always understood the responsibility that comes with looking after, and speaking for the Country of their ancestors and future generations. Cultural landscapes are fundamental to Country and the cultural identity of First Peoples. Caring for and healing Country with traditional ecological knowledge and customs built over thousands of years of practice is integral to this connection.

Cultural landscapes encompass both the material and symbolic, including Traditional Owner societies' unique worldview, ontology, history, institutions, practices and the networks of relationships between humans, animals, plants, ancestors, song lines, physical structures, trade routes and other significant cultural connections to Country. Cultural landscapes reflect the management and modification of Country over many thousands of generations to provide maximum benefit to all of the inhabitants of Country, both human and non-human<sup>52</sup>.

Regard for data sovereignty is fundamental to both traditional practice and cultural landscapes. Specifically, that Traditional Owner rights to maintain, control, protect and develop their cultural heritage, traditional knowledge and traditional cultural expressions, as well as their right to maintain, control, protect and develop their intellectual property over these is recognised and meaningfully applied<sup>53</sup>.

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<sup>52</sup> Victorian Traditional Owner Cultural Landscapes Strategy, 2021. Victorian Traditional Owner Corporations.

<sup>53</sup> Kukutai, T. Taylor, J. (Ed.). (2016) Indigenous data sovereignty: toward an agenda. ANU Press.

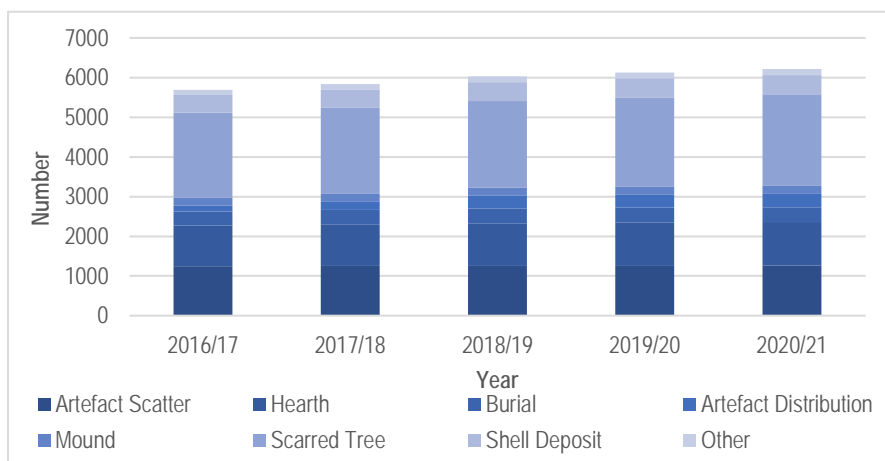


### 3.4.2 CONDITION & TRENDS

This section provides an overview on the current condition of Culture and Heritage in the Mallee. Regional indicators have been applied to establish a baseline, and where available identify long term trends, from which progress against our medium-term (6-year) and long-term outcome targets for Culture and Heritage can be determined.

As no regional-scale baseline information currently exists on the condition of the region’s Culture and Heritage assets, proxy condition indicators have been established using the assumption that being listed on the relevant heritage register affords some level of protection, and similarly, if sites are captured within a Co-management Agreement or a CHMP, the asset is being protected through associated threat mitigation activities.

The Aboriginal Cultural Heritage Register and Information System (ACHRIS) is a central repository for information about cultural heritage. This includes the Victorian Aboriginal Heritage Register which records cultural heritage place registrations, intangible heritage registrations and agreements, and approved CHMPs. Over 39,000 Aboriginal objects and places have been recorded on the register in Victoria to date, and, given these reflect locations where associated surveys have been undertaken. It is likely that this represents only a small proportion of such sites.



There are 4,463 Registered Aboriginal Places in the Mallee, a four percent (189) increase since 2016-17. These Places were comprised of 6,214 individual components in 2020-21, a nine percent (543) increase since 2016-17. Registered components are primarily comprised of Scarred Tree (2,291), Artefact Scatter (1,262), and Hearth (1,094) (Figure 34). There are currently no intangible cultural heritage registrations in the Mallee.

Figure 34: Number of Registered Aboriginal Places components in the Mallee (source: ACHRIS, 2021).

CHMP’s are prepared by a Heritage Advisor, setting out the results of an assessment on the potential impact of a proposed activity on Aboriginal cultural heritage. It outlines measures to be taken before, during and after an activity, in order to manage and protect Aboriginal cultural heritage in the activity area. A CHMP is required when a 'high impact activity' is planned in an area of 'cultural heritage sensitivity', as defined in the Aboriginal Heritage Regulations 2018.

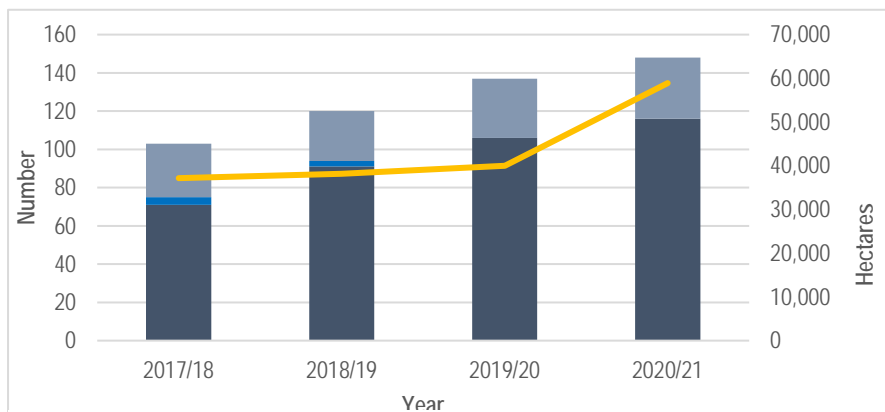


Figure 35: Number and area (ha) of Cultural Heritage Management Plans in the Mallee (source: ACHRIS, 2021).

There are currently 116 CHMPs within the Mallee that have been approved and lodged with First Peoples – State Relations, and a further 32 in preparation. In total, these CHMPs cover 58,900 hectares, a 58 percent (21,734 ha) increase since 2017-18 (Figure 35).

There are currently 116 CHMPs within the Mallee that have been approved and lodged with First Peoples – State Relations, and a further 32 in preparation. In total, these CHMPs cover 58,900 hectares, a 58 percent (21,734 ha) increase since 2017-18 (Figure 35).

### 3.4.3 PRIORITY DIRECTIONS

*This section outlines the major threats and drivers of change influencing the condition and management of Culture and Heritage in the Mallee; core management and strategic directions that will guide delivery of our related actions over the next 6-years; and the associated regulatory, policy and planning framework that informed their development.*

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#### MAJOR THREATS AND KEY DRIVERS OF CHANGE

Aboriginal Culture and Heritage is inextricably connected to natural landscapes, and as such is vulnerable to the same suite of threatening processes. Altered hydrological regimes, for example, may expose sites on floodplains to longer periods of inundation and/or drying. Similarly, soil erosion can have a number of impacts through exposure of burial sites.

Efforts to protect our natural values from key threatening processes can also pose significant risks to cultural sites, particularly where soil disturbance is required (e.g. built infrastructure, invasive species management, and revegetation). Protecting and managing cultural heritage sites (i.e. compliance with the *Aboriginal Heritage Act 2006* and associated Regulations) as an integral component of all land, water and biodiversity management processes is central to addressing this risk.

*Further detail on the challenges, opportunities and major threats influencing the region's natural landscapes, and therefore culture and heritage is provided in Section 1 (The Region – 4: Key Drivers of Change).*

There is a growing recognition of the need to address the loss of traditional knowledge, cultural practice, and social connections resulting from Traditional Owners being disconnected from Country and prevented from pursuing traditional practices. In considering regional approaches to supporting Traditional Owners/First Nations Peoples rights to self-determination and inherent obligations to continually speak for and look after the Country, it is essential that the aspirations and concerns of key stakeholders are identified. Feedback provided at workshops, meetings, and on-Country events with Traditional Owners/First Peoples on how the RCS can support Traditional Owner led management of cultural landscapes included:

- It's important to recognise links between healthy Country and healing and wellbeing for First Nations Peoples, including economic wellbeing
- First Nations communities bring diverse life experiences and connections to these cultural landscapes and special places
- First Nations Peoples manage Country holistically to address multiple values and objectives, healing both Country and culture. It is important that ecosystems and parts of Country (both material and symbolic) are recognised as connected, not separate, cultural landscapes
- The region's natural landscapes are fundamental to Country and the cultural identity of First Peoples. Caring for and healing Country with traditional ecological knowledge and customs built over thousands of years of practice is integral to this connection.

Holistic management of Country as '*cultural landscapes*' was a key point raised throughout consultation processes. Particularly with regard to the way in which the framework applied by this RCS does not support whole-of-landscape connections (i.e. the separation of landscapes into themes, the prioritisation of specific assets over others, and the identification of 'delivery' landscapes (i.e. Local Areas) based primarily on ecological processes/similarities). Exploring how cultural landscapes and values can inform planning and delivery approaches was identified as an opportunity for improvement by some groups.

Overall, increased support for Traditional Owner/First Peoples expertise in caring for and healing Country to provide ongoing ecological benefits and enhanced connections with Country was a priority shared by all groups. Opportunities for the application of traditional ecological knowledge included:

- Re-introducing traditional burning and other cultural healing practices
- Restoring native plant and animal communities
- Protecting species of cultural importance and returning them to the landscape
- Applying restorative farming practices
- Rehabilitating significant cultural sites
- Expanding traditional languages knowledge and use
- Creating educational and interpretive opportunities to share culture.

Integration of Traditional Owner/First Peoples aspirations and priorities into regional delivery models will also contribute to desired outcomes established by the RCS for Community Capacity for NRM, and ultimately support the protection and enhancement of the region's natural landscapes (i.e. Biodiversity and Waterways).

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## ALIGNED PLANS

Identification of the priority management and strategic directions detailed below has been informed by federal and state legislation, policies and strategies; regional strategies and action plans; and stakeholder priorities. The primary federal, state and regional instruments considered through this process are detailed in Appendix 1.

As there is currently no overarching '*whole-of-region*' plan that collates strategic directions, priorities and targets for the protection and application of Culture and Heritage in the Mallee, the following state based strategic frameworks were applied, where appropriate, to help inform our regional approach:

- The Victorian Traditional Owner Cultural Landscapes Strategy (2021) sets out a framework to enable and empower Traditional Owners to lead the planning and management of cultural landscapes according to cultural objectives. This framework was collaboratively designed by, and for, Traditional Owners. It is intended to act as a thematic toolkit that can be adapted to each group's self-determined pathway for healing and caring for Country. The Framework has five Program Components describing 10-year objectives for: restoring the Traditional Owner knowledge system; strengthening Traditional Owner resilience; enabling Traditional Owner cultural landscape planning; embedding Traditional Owner knowledge and practice into policy, planning and management of Country; and enabling Traditional Owners to apply cultural objectives, knowledge and practice in the management of public land
- Pupangarli Marnmarnepu '*Owning Our Future*' Aboriginal Self-Determination Reform Strategy 2020-2025, was developed by DELWP to align with whole-of-government commitments set out in the Victorian Aboriginal Affairs Framework (VAAF) and the VAAF Self-Determination Reform Framework. This guides government and agencies to enable action towards Aboriginal self-determination. From an NRM perspective, this means empowering Traditional Owners to participate and lead, if and how they choose; efforts to manage and heal Country.

*The overall objectives and priorities set out by Traditional Owner Plans (e.g. BGLC's Growing What is Good Country Plan — Voices of the Wotjobaluk Nations and FPMMAC's Country-Culture-People Action Plan) have also informed development of regional priorities and desired outcomes for Culture and Heritage. Specific place and/or activity-based priorities established by these and other Plans (e.g. Victorian Traditional Owner Cultural Fire and Native Foods and Botanicals Strategies) are considered within the associated 'Local Area' (see Section 4).*

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## MANAGEMENT DIRECTIONS

In considering the current condition of Aboriginal Culture and Heritage in the Mallee; key drivers influencing this condition; associated planning instruments; and stakeholder priorities; two key principles to inform our efforts have been identified. Specifically, that regional NRM programs collectively support:

- Protection of Aboriginal culture and heritage, including tangible and intangible heritage
- Traditional Owners to speak for Country through their own self-determined processes, including the incorporation of traditional ecological knowledge in NRM planning and delivery.

In developing programs to deliver against these principles, the following priorities have been identified to inform how our actions are planned and implemented:

- Increasing NRM stakeholder awareness of legal requirements for the protection of cultural heritage (intangible and tangible)
- Including Traditional Owners as decision makers in regional planning and investment processes
- Respecting the value of traditional knowledge, and the right of its custodians to determine if/how it is shared and used
- Supporting assessments and documentation of cultural values (tangible and intangible), and traditional ecological knowledge and practices
- Supporting the development and implementation of Traditional Owner Country Plans, enabling the application of Cultural Landscape based planning approaches, and delivery against identified cultural objectives
- Enabling the application of traditional knowledge through multiple cultural management practices that provide for healing and strengthening Country and Culture. This includes but is not limited to: reintroducing traditional burning practices; restoring native plant and animal communities; protecting species of cultural importance and returning them to the landscape; applying restorative farming practices; rehabilitating significant cultural sites; expanding traditional languages knowledge and use; and creating educational and interpretive opportunities to share culture.

*Priority directions for building Traditional Owner/First Peoples participation in and capacity for NRM, are outlined in Section 3.5 (Community Capacity for NRM). Recognition of Traditional Owner cultural objectives, knowledge and practice is also identified as a priority for Biodiversity, Waterways, and Agricultural Land management (Sections 3.1, 3.2 and 3.3).*

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## STRATEGIC DIRECTIONS

Aboriginal Culture and Heritage is intrinsically linked to natural landscapes across the Mallee region and intersects with all other RCS themes. While these themes utilise a prioritisation framework, where the *value of the asset x the impact of threatening processes* represents a key consideration in targeting delivery, no such analyses of relative value can (or should) be applied to the region's Culture and Heritage.

Given the finite resources available to the region to support Culture and Heritage focused programs, it is not feasible to expect that every identified action can be applied at a whole-of-region scale over the life of this RCS. To help ensure that effort is directed to actions that will ultimately progress the region's desired outcomes and vision for Culture and Heritage, four strategic directions have been established to assist in the prioritisation of regional programs. Specifically, that the proposed actions deliver against one of more of the below priorities:

- Awareness of, and compliance with legal requirements for the protection of cultural heritage (intangible and tangible) is increased
- Opportunities for self-determined participation and leadership by Traditional Owners are advanced
- Traditional Owner led practices are rejuvenated and applied to meet cultural objectives that include social, ecological and economic co-benefits
- Application of Cultural Landscapes within regional planning and management frameworks is supported.

### 3.4.4 REGIONAL OUTCOMES

This section outlines the medium-term (6-year) and long-term (20-year) outcome targets that regional stakeholders have collectively set for agricultural land management across the Mallee.

Medium-term outcome targets (Table 9) for Aboriginal culture and heritage have been developed to align with, and demonstrate how, the Mallee RCS will contribute to regional indicators<sup>54</sup>.

Delivery against these targets will be undertaken as part of the RCS's integrated catchment management (ICM) – landscape-scale approach to NRM. Detail on the specific management actions and targets to be implemented within individual landscapes, and the local stakeholders that will contribute to their delivery is provided in Section 4 (i.e., Local Areas).

**Table 9: Regional Outcome targets for Culture and Heritage Management and the priority direction that will inform their delivery**

Critical Elements <i>What we need to focus on</i>	Priority Management Directions <i>How our actions will be implemented</i>	Priority Strategic Directions <i>How our actions will be targeted</i>	Medium -Term Outcomes <i>What we will deliver by 2028:</i>	Long-Term Outcomes <i>What success will look like by 2042:</i>
<ul style="list-style-type: none"> <li>Increasing NRM stakeholder awareness of legal requirements for the protection of Cultural Heritage (intangible and tangible)</li> <li>Including Traditional Owners as decision makers in regional planning and investment processes</li> <li>Respecting the rights of traditional knowledge custodians to determine if/how it is shared and used</li> <li>Supporting assessments and documentation of cultural values and traditional ecological knowledge and practices</li> <li>Enabling the application of traditional knowledge through multiple cultural management practices that provide for healing and strengthening Country and Culture.</li> </ul>	<ul style="list-style-type: none"> <li>Ensuring the protection of Aboriginal culture and heritage, including tangible and intangible heritage</li> <li>Traditional Owners speaking for Country through their own self-determined processes, including the incorporation of traditional ecological knowledge in NRM planning and delivery.</li> </ul>	<ul style="list-style-type: none"> <li>Actions which increase awareness of, and compliance with legal requirements for the protection of Cultural Heritage (intangible and tangible).</li> <li>Actions which advance opportunities for self-determined participation and leadership by Traditional Owners</li> <li>Actions which support the rejuvenation and application of Traditional Owner led practices to meet cultural objectives; including social, ecological and economic co-benefits</li> <li>Actions which support application of Cultural Landscapes within regional planning and management frameworks.</li> </ul>	<ul style="list-style-type: none"> <li>Increased number of cultural sites recognised, protected and enhanced</li> <li>Increased number of projects that incorporate and deliver on cultural objectives and priorities</li> <li>Increased area subject to Traditional Owner led practices to manage and heal Country.</li> </ul>	<ul style="list-style-type: none"> <li>Traditional Owner led practices are rejuvenated and knowledge protected and applied to meet cultural objectives that include social, ecological and economic co-benefits</li> <li>Cultural landscapes are protected and improved as an integral component of land, water and biodiversity management processes.</li> </ul>

<sup>54</sup> No regional scale baseline information is currently available for two of the three stated medium-term outcome targets (i.e. number of projects that incorporate and deliver on cultural objectives and priorities, and; area subject to Traditional Owner led practices to manage and heal Country). This information gap will be addressed through the RCS MERI Framework, with the establishment and ongoing measurement of associated indicators.

## 3.5: COMMUNITY CAPACITY FOR NRM

***Vision: Connected and resilient communities leading positive change across our natural, cultural and productive landscapes.***

***Scope: The inherent knowledge, skills and motivation that the community has for effective and sustainable natural resource management.***

### 3.5.1 OVERVIEW

Communities of the Mallee are at the heart of the current and future management of our natural, productive and cultural landscapes.

Natural resource management (NRM) is a cooperative endeavour between the community, industry and government, with effective action requiring effective partnerships. To maintain these partnerships and achieve the goals of this RCS, a well-informed community with the skills and confidence to identify, direct and implement change is essential.

Our communities' capacity is defined by their characteristics and resources which, when combined, determine their ability to identify, evaluate and address key issues.

In a natural resources context, community capacity involves the capability of Mallee communities to: work cooperatively; apply economic resources; use networks; and gain knowledge to achieve NRM outcomes. It is dependent not only on the financial, physical and natural resources contained within a community, but also its social resources.



**Figure 36: Birchchip P12 Tree planting at Tchum Lake**

The Mallee has a proud history of the community generating and implementing innovative and complex NRM projects and plans. Examples of the diverse range of groups and individuals involved in NRM in the Mallee includes private land managers, Traditional Owners/First Peoples, Landcare groups, Citizen Science based groups (Figure 36), 'Friends of' groups, community reference and advisory groups, Committees of Management, industry based groups, sporting and other special interest groups, schools, and private businesses.

Traditional Owner groups represent the rights and interests of First Nations' communities in the management of Country through both the actions they undertake and their participation in regional NRM partnerships. Traditional Owner groups in the Mallee include Barengi Gadjin Land Council Aboriginal Corporation (Wotjobaluk, Jaadwa, Jadawadjali, Wergaia and Jupagulk peoples), First People of the Millewa Mallee Aboriginal Corporation (Latji Latji and Ngintait peoples), Wemba Wamba, Wadi Wadi, Tati Tati, Weki Weki, and Nyeri Nyeri. The diversity in Aboriginal representation across the region is also recognised, with input from broader stakeholders and partnership opportunities supported through community-based forums and reference groups.

Landcare groups play a major role in harnessing and promoting the interests of local communities in NRM issues. Each group provides a connection between the individual managers of separate properties and the wider community; increasing awareness of conservation issues, encouraging coordinated effort, and providing access to shared resources.



The region's industry-based groups such as Mallee Sustainable Farming, Birchip Cropping Group, Murray Valley Winegrowers Inc, Almond Board of Australia, Dried Fruits Australia, Australia Table Grape Association, and the Victorian Farmers Federation play an important role in developing and promoting best practice for competitive and sustainable agricultural sectors.

Awareness, connection and participation of individuals in NRM issues within their local environment is promoted and advanced by a wide range of special interest groups such as Sunraysia OzFish, WaterWatch, Friends of Kings Billabong, Mid Murray Field Naturalists, BirdLife Mildura, and the Victorian Malleefowl Recovery Group. These groups play an important role as a means for individuals to become engaged in activities and programs that reflect their particular interests or concerns. They also provide the region with vital sources of knowledge and understanding on specific issues through the local expertise that members hold, and the Citizen Science based monitoring programs that several groups undertake.

The region's private land managers also continue to make significant individual contributions to the condition of our natural and productive landscapes through the implementation of both targeted actions (e.g. revegetation, stock containment, pest plant and animal control), and ongoing adoption of best management practice.

Collectively, the capacity of these groups and individuals represents an essential regional asset; with positive and long-lasting NRM outcomes dependent on an active, willing and capable community.

It is also recognised that while co-operative and community-based approaches to NRM ultimately benefits the condition of our natural, productive and cultural landscapes (and the environmental, social and economic values associated with these); the skills gained and the strengthened social networks achieved through participation also provides for increased community cooperation, mutual respect, sense of place, and education.

### 3.5.2 CONDITION & TRENDS

This section provides an overview on the current condition of Community Capacity for NRM in the Mallee. State-wide and regional indicators have been applied to establish a baseline, and where available identify long term trends, from which progress against our medium-term (6-year) and long-term outcome targets for Community Capacity for NRM can be determined.

Historically, no regional-scale information has existed from which condition assessments of the Victorian Mallee community’s capacity for NRM could be made. This information gap was addressed as part of the Mallee RCS (2013-2019) MERI framework through the development of a Regional Community Capacity Monitoring Tool. This tool provides a measurable and repeatable assessment of the condition of community capacity for NRM at a regional scale. It is based on the Rural Livelihoods Framework, which identifies Community Capacity for NRM as a combination of human, social, natural, physical and financial capital. Scoring criteria have been assigned to each measure identified across the five categories of capital. Based on the data, each measure is scored on a five-point scale, where one indicates ‘low capacity’ and five indicates ‘high capacity’.

The Regional Community Capacity Tool was applied during 2012-13 to collect baseline data from which scores for each of the five capitals were assigned. This assessment indicated that, overall, our community has ‘medium’ levels of capacity for NRM in the region. Re-application of the tool in 2018 identified that at a regional scale, community capacity has remained relatively stable over the six-year period; with a ‘sustainable rural livelihood’ maintained, indicating resilience which is key to both livelihood adaption and the ability of the community to effectively manage the natural resource base for both production and environmental outcomes<sup>55</sup> (Figure 37).

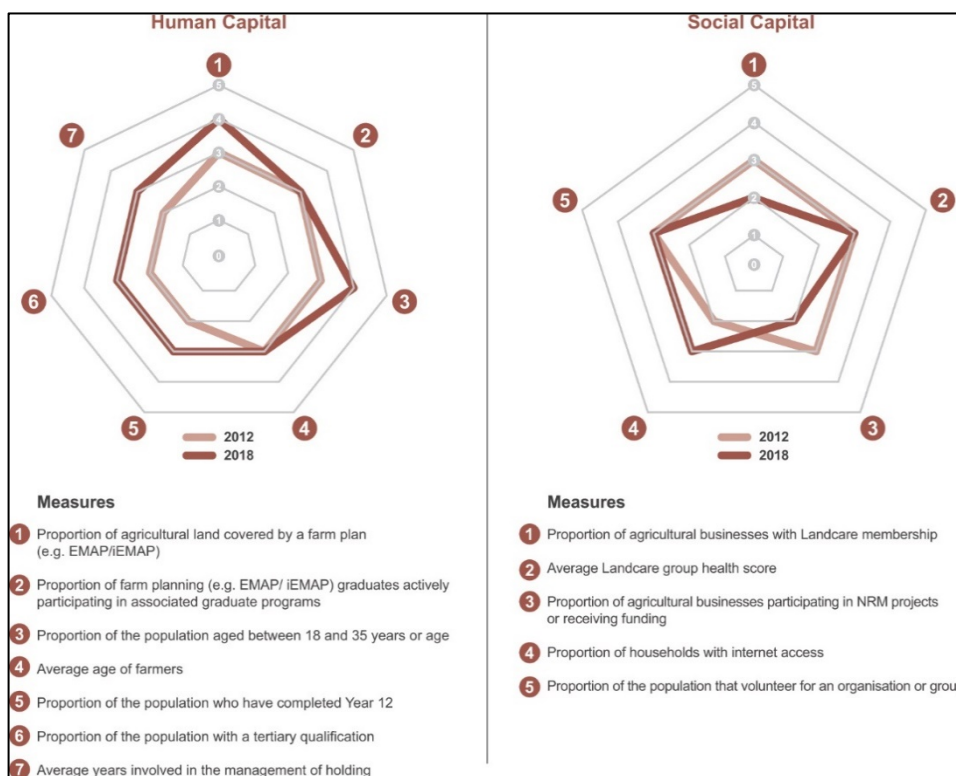


Figure 37: Comparison of Regional Community Capacity Tool results between 2012 and 2018 (where 1 indicates ‘low capacity’ and 5 indicates ‘high capacity’)

Some fluctuations have however occurred at the indicator level. While all indicators of human and financial capital moved in a positive direction, two of the five social capital measures showed a slight decline, specifically, the ‘proportion of agricultural businesses with Landcare membership’ and ‘proportion of agricultural businesses participating in NRM projects or receiving funding’.

Participant evaluation surveys can also be a useful tool to provide assessments on the ‘effectiveness’ of community engagement activities and some measures of community capacity, supporting adaptive management continuous improvement processes.

<sup>55</sup> RMCG (2018) Mallee Regional Community Capacity for NRM: Detailed Condition Report for the Mallee CMA.

For example, Mallee CMA apply a consistent evaluation framework (Targeted Community Capacity for NRM monitoring tool) to all engagement activities to allow data application at a range of scales (e.g. program, landscape, whole of region). Key findings from 2020-21 surveys included<sup>56</sup>:

- Engagement event (e.g. workshops, field days, forums) participants identified ‘learning about a topic’ as their primary motivation for attending (70%), and a further 10 percent as ‘contributing to a discussion’. Survey respondents also reported a 36 percent (average) increase in their awareness of specific NRM issues as a result of participation, and a 19 percent (average) increase in skills to ‘address threat processes’
- Participants in tender and incentive programs delivered over the past five years initially identified ‘addressing priorities within my Farm Plan’ (47%) as the primary reason for seeking support to undertake works. On completion, however, the ‘desire to contribute to the general environmental management of the region’ (39%) was the highest reported motivation. Increased awareness of key threatening processes, and an increase in skills to implement associated mitigation actions were also reported.

### Community Volunteering

Volunteers provide significant contributions to regional NRM efforts, through both formally organised activities and their individual everyday actions. There are currently some 50 volunteer-based groups in the Mallee that support delivery against the objectives of this RCS.

Landcare represents the largest volunteer network in the Mallee, comprising 25 individual groups with some 500 members. The Landcare movement has been instrumental in harnessing and promoting the interests of local communities in NRM since our first group, Millewa-Carwarp, was established in 1989.

Landcare groups complete group health surveys as part of the Victorian Landcare Grants program delivered by Mallee CMA. The survey provides a snapshot of the capacity of the region’s Landcare groups to participate in NRM over time. While there has been variation in average group scores over the eight-year period, ranging from 2.8 in 2017-18 to 5.2 in 2018-19, results generally indicate a ‘moving forward’ to ‘rolling along’ assessment (Table 10).

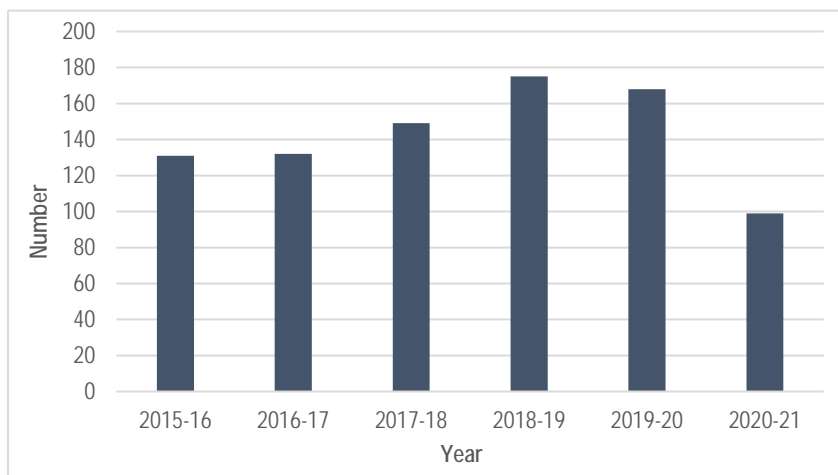
**Table 10: Number of group responses and their respective Landcare Group Health Scores for each year, Mallee Region – data not available for 2016-17 (Source: Victorian Landcare Program: Group Health dataset, 2021).**

Group Health Score	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
1 <i>Just hanging on</i>	1	0	1	4	N/A	1	0	2	1
2 <i>Struggling along</i>	2	5	5	7	N/A	2	5	0	2
3 <i>Moving forward</i>	8	4	8	7	N/A	5	8	6	8
4 <i>Rolling along</i>	5	5	6	7	N/A	5	2	0	5
5 <i>Trail blazer</i>	2	3	0	0	N/A	1	6	4	6
<b>Total responses</b>	<b>18</b>	<b>17</b>	<b>20</b>	<b>25</b>	<b>N/A</b>	<b>14</b>	<b>21</b>	<b>12</b>	<b>20</b>
<b>Average Group Health Score</b>	<b>3.6</b>	<b>4.2</b>	<b>4.0</b>	<b>5.0</b>	<b>N/A</b>	<b>2.8</b>	<b>5.2</b>	<b>4.0</b>	<b>4.0</b>

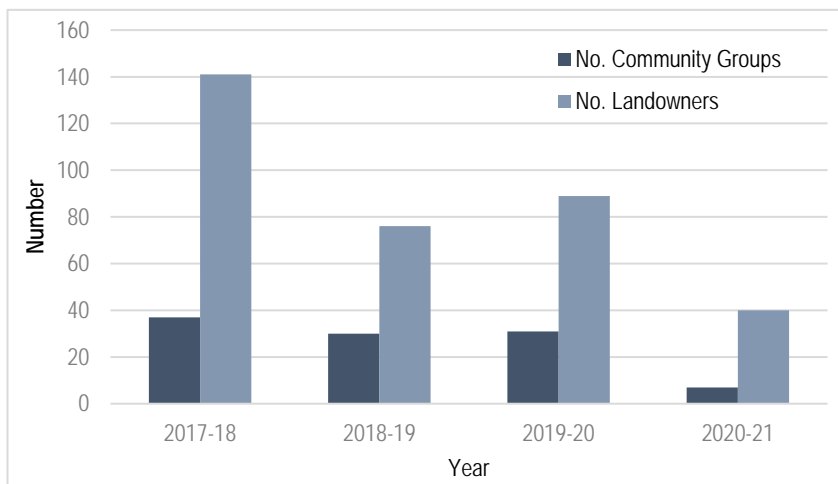
<sup>56</sup> Mallee CMA, unpublished data (2021).

## Partnerships

The number of formal partnerships established and maintained between organisations, Traditional Owners, community-based groups, and individuals contributes to our understanding of the extent to which NRM partners are working collaboratively towards achieving regional outcomes. A partnership is defined as an association of two or more organisations/individuals that has been formalised in writing; including arrangements such as memorandums of understanding, committee/working group terms of reference, and funding terms/conditions.



**Figure 38: Number of formal partnerships established and/or maintained under Mallee CMA Programs (source: Mallee CMA, 2021).**



**Figure 39: Number of grants provided to community based groups and individual landowners under Mallee CMA Programs (source Mallee CMA, 2021)**

private land are subject to public/private cost benefit ratio assessments to determine suitability and associated cost sharing arrangements.

These programs support stewardship outcomes that go beyond basic duty of care; providing environmental, economic, and social benefits at a local scale. They also provide participants with capacity building opportunities through their involvement in associated planning, implementation, and evaluation activities.

Data presented in Figure 38 represents partnerships established and/or maintained to deliver Mallee CMA funded programs over the past six years. It does not however capture the significant collaboration formalised under regional partnership arrangements delivered through other (non-MCMA) funding initiatives<sup>57</sup>.

An important component of these partnership arrangements is supporting the region’s volunteer-based groups and individual land owners to undertake actions that deliver against both regional outcomes and their local priorities, objectives and aspirations.

Figure 39 shows the number of grants provided to community groups and individuals under Mallee CMA managed programs over the past four years<sup>58</sup>.

Delivered through state (e.g. Victorian Landcare Grants, Our Catchments Our Communities) and federal (e.g. Regional Land Partnerships) initiatives; grants have traditionally been utilised for actions such as revegetation, pest plant and animal control, stock exclusion fencing, Citizen Science programs, and irrigation system upgrades. Actions on

<sup>57</sup> Addressing this information gap will be required under this RCS to support monitoring and reporting of progress against associated outcome and management targets

<sup>58</sup> While the number of grants is directly influenced by associated funding initiatives; delivery in 2020-21 was reduced in response to COVID-19 health orders.

### 3.5.3 PRIORITY DIRECTIONS

*This section outlines the major threats and drivers of change influencing the condition and management of Community Capacity for NRM in the Mallee; core management and strategic directions that will guide delivery of our related actions over the next 6-years; and the associated regulatory, policy and planning framework that informed their development.*

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#### MAJOR THREATS AND KEY DRIVERS OF CHANGE

Processes impacting on the Mallee's Community Capacity for NRM are often a result of external drivers such as population dynamics and climate change. The impacts of these processes are wide-ranging and complex, and in many cases are outside the scope of this RCS to directly influence.

Through RCS delivery we can however support Mallee communities to build the capacity required to identify and implement effective management responses to these pressures. This includes recognising opportunities to enhance regional partnership approaches, and to improve how we collaboratively plan for, and deliver NRM.

In identifying future approaches, it is essential that the aspirations and concerns of regional stakeholders be considered, and where possible, incorporated into the priority management actions and desired outcomes set out by this RCS Community Capacity for NRM theme.

Key points and common themes identified by the Mallee community as directly influencing their participation in NRM, as impacting on the effectiveness of their efforts, and as potential opportunities for improvement are outlined below:

- Climate change is widely viewed as a critical issue facing the Mallee. Planning for these expected changes by identifying and implementing climate-ready adaptation options (e.g. providing habitat restoration for biodiversity migration) and improving knowledge to generate greater capacity for individuals and stakeholders to respond to pressures arising from a changing climate should be a priority
- Concern regarding the ability of the region's agricultural systems to respond to climate variability and a changing climate. It is recognised that while there has been widespread change in management practices across both dryland and irrigated agriculture over the past 20 years, further attention and support is required to accelerate the identification and application of practices that are sustainable under all climatic conditions. This includes limits to water availability for irrigators and the impacts of increased drought risk on rural communities
- The growth of urban areas at the expense of rural population continues to present challenges in sourcing the necessary co-investment of time and resources from a diminishing (and ageing) population of rural landholders and community-based NRM groups. There is concern there will be insufficient people on the ground in large parts of the region to help deliver NRM focused activities. It is essential that the capacity of rural communities is recognised at the planning stage, and that adequate support mechanisms are established where necessary. Reducing the administrative load required by government funded initiatives is an area identified by many of our volunteer based groups
- Applying technology to engagement and communication approaches may assist in overcoming participation barriers often experienced by rural communities (i.e. distance and time). It should also be recognised however that while the number of online communities and applications is growing, digital connectivity and literacy can impact the uptake of such technology. Connectivity varies significantly across the region, with many 'black spots' across more remote areas. Enhanced connectivity, together with increased awareness of the efficiencies that new technologies can provide will be important factors in influencing effective application across the Mallee
- Protecting and enhancing the recreational opportunities and connections to nature provided by natural landscapes is important to many communities. Further support is sought for infrastructure that provides for increased activity (e.g. walking, boating), social connections (e.g. community events), and economic opportunities (e.g. tourism)
- Increased understanding of how land managers can participate in emerging carbon markets is required, along with the requirements and impacts (both positive and negative) of associated activities

- While there is general recognition that targeted NRM delivery frameworks are required to identify where ‘best’ results can be achieved with available resources (i.e. *asset value x threat impact x intervention effectiveness* assessments), support is also required for actions that deliver against locally significant and culturally important issues that may not rate highly within whole-of region asset-based approaches.

There is a growing recognition of Traditional Owners’/First Nations Peoples’ self-determination rights and their role in NRM. There is also a commitment among Governments to elevate Traditional Owners’/First Nations Peoples’ role in the policy, planning and management of Country. Feedback provided at workshops, meetings and on-Country events with Traditional Owners/First Peoples on how the RCS can support capacity building outcomes and help advance self-determined participation and leadership in NRM is outlined below:

- Cultural Heritage protection is a really important aspect of integrated catchment management (ICM), but it is just one aspect. First Nations communities’ interests in participation and engagement in ICM and partnerships with CMAs and other organisations across this sector are much broader than just Cultural Heritage protection
- ICM can be a platform for activities that contribute to self-determination and nation-building by First Nations communities
- Partnership-based activities have a direct benefit in themselves in terms of rehabilitating particular places, but these activities also have that broader impact of highlighting the role and responsibilities of First Nations peoples in managing Country, and contributing to health and wellbeing in community
- Two-way learning and ongoing collaboration in planning and management is vital. Bridging knowledge through co-design (understanding and applying Indigenous and scientific knowledge) will help strengthen partnerships between First Nations Peoples, landholders, community groups and other organisations; providing for better outcomes across the region
- Opportunities to reconnect to Country are essential; reconnection can happen in lots of different ways and mean different things to different people. This includes preserving and reviving language.

Integration of stakeholder and Traditional Owner/First Peoples aspirations and priorities into regional delivery models will: assist in effective engagement; better support participants build capacity in NRM; and ultimately facilitate progress towards the region’s desired outcomes for Biodiversity, Waterways, Agricultural Land, and Culture and Heritage.

*Further detail on the challenges, opportunities and major threats influencing Mallee NRM is provided in Section 1 (The Region – 4: Key Drivers of Change).*



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## ALIGNED PLANS

Identification of the priority management and strategic directions detailed below has been informed by: federal and state legislation policies and strategies; regional strategies and action plans; and stakeholder priorities. The primary federal, state and regional instruments considered through this process are detailed in Appendix 1.

There is currently no overarching 'whole-of-region' plan that collates strategic directions, priorities and targets for building Community Capacity for NRM in the Mallee. For the purposes of this RCS, the following state government strategic frameworks were applied, where appropriate, to help inform our regional approach:

- Victorians Volunteering for Nature: Environmental Volunteering Plan 2018; aims to have five million Victorians acting to protect the natural environment by 2037. Key actions to support this outcome and overcome barriers to participation include: making administration easier; building capacity and capability; improving sector collaboration; involving more young people; attracting more diverse volunteers; harnessing technology; partnering with Aboriginal communities; and celebrating and promoting volunteering.
- Our Catchments Our Communities: Building on the Legacy for Better Stewardship; identifies three overarching objectives to deliver against the long-term outcome of 'active catchment stewardship to improve catchment health': strategic directions set by RCS's; delivery of better stewardship; and effective partnerships and improved capacity.
- The guiding principle for Traditional Owner participation and leadership in NRM, is self-determination. This is described in DELWP's Pupangarli Marnmarnepu 'Owning Our Future' Aboriginal Self-Determination Reform Strategy 2020-2025, which aligns with whole-of-government commitments set out in the Victorian Aboriginal Affairs Framework (VAAF) and the VAAF Self-Determination Reform Framework; which guides government and agencies to enable action towards Aboriginal self-determination. From an NRM perspective, this means empowering Traditional Owners to participate and lead, if and how they choose; efforts to manage and heal Country.

*Community Capacity related planning frameworks and priorities that focus on specific landscapes (i.e. not whole of region) are identified within their associated 'Local Area' (see Section 4). This includes Traditional Owner Country plans, individual NRM Groups' plans, and individual theme and or landscape based planning.*

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## MANAGEMENT DIRECTIONS

In considering the current capacity of Mallee communities to participate in effective NRM, key drivers influencing this capacity, associated planning instruments, and stakeholder priorities; eight key principles to direct future actions have been identified. Specifically, that capacity building focused programs collectively support:

- Education programs to increase awareness and appreciation of the Mallee's natural, cultural and productive landscapes; and to encourage actions which contribute to their protection and enhancement
- People to connect with nature, including increased accessibility and amenity for recreational activities
- Traditional Owners/First Peoples to connect and spend time on Country
- Citizen Science programs that engage community and provide targeted data to inform NRM programs
- Responsive and effective stewardship of our natural, cultural and productive landscapes
- Community-based NRM groups and individuals to participate in regional and local scale NRM programs
- Regional and local partnerships that provide for co-operative approaches to NRM planning, delivery and evaluation
- Identification, and where appropriate, development and implementation of effective responses to emerging threats and opportunities.

In developing programs to deliver against these principles, the following priorities have been identified to inform how our actions are planned and implemented:

- The value of traditional knowledge is respected, and the right of its custodians to determine if/how it is shared and used
- Aboriginal culture is supported and celebrated
- The contributions of volunteers are valued and promoted
- Adequate support mechanisms are established as required to enable effective participation by volunteer and Traditional Owner groups
- Understanding of Mallee communities is improved to enable tailored approaches and improved engagement
- Opportunities to deliver against locally significant and culturally important issues that may not directly align with regional investment priorities are provided for
- Approaches that generate greater capacity for all stakeholders to respond to pressures arising from a changing and variable climate are applied.

*Priority directions for the protection of Traditional Owner/First Peoples cultural values are outlined in Section 3.5 (Culture and Heritage).*

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## STRATEGIC DIRECTIONS

The capacity of Mallee communities to effectively participate in, deliver, and lead NRM programs is shaped by a diverse and complex suite of factors, many of which are outside the scope of this RCS to directly influence (e.g. changing demographics, climate change). While biophysical assets utilise a prioritisation framework, where the *value of the asset x the impact of threatening processes* represents a key consideration in targeting delivery; the Community Capacity for NRM asset has no standard analyses to differentiate relative value.

Given the finite resources available to the region to undertake community capacity focused programs, it is not feasible to expect that all identified actions can be applied at a whole-of region and/or stakeholder scale over the life of this RCS. To help ensure that effort is directed to actions that will ultimately progress the region's desired outcomes and vision for community capacity, four strategic directions have been established to assist in the prioritisation of regional programs. Specifically, that the proposed actions deliver against one of more of the below priorities:

- Build the capacity of community groups, Traditional Owners, land owners, and/or individuals to support regional NRM efforts
- Support and respond to the evolving needs of community groups, Traditional Owners, and individuals already participating in NRM
- Facilitate opportunities for broader and more diverse participation in regional NRM efforts
- Advance opportunities for self-determined participation and leadership by Traditional Owners.

### 3.5.4 REGIONAL OUTCOMES

This section outlines the medium-term (6-year) and long-term (20-year) outcome targets that regional stakeholders have collectively set for Community Capacity for NRM across the Mallee.

Our medium-term outcome targets have been developed to align with, and demonstrate how, the Mallee RCS will contribute to state-wide and regional indicators<sup>59</sup>.

Delivery against these targets will be undertaken as part of the RCS's ICM – landscape-scale approach to NRM (Table 11). Detail on the specific management actions and targets to be implemented within individual landscapes, and the local stakeholders that will contribute to their delivery is provided in Section 4 (i.e. Local Areas).

**Table 11: Regional outcome targets for Community Capacity for NRM, and the priority directions that will inform delivery.**

Critical Elements <i>What we need to focus on</i>	Priority Management Directions <i>How our actions will be implemented</i>	Priority Strategic Directions <i>How our actions will be targeted</i>	Medium -Term Outcomes <i>What we will deliver by 2028:</i>	Long-Term Outcomes <i>What success will look like by 2042:</i>
<ul style="list-style-type: none"> <li>Respecting the rights of traditional knowledge custodians to determine if/how it is shared and used</li> <li>Supporting and celebrating Aboriginal culture</li> <li>Valuing and promoting volunteer contributions</li> <li>Ensuring adequate support mechanisms are established as required</li> <li>Tailoring approaches for improved engagement</li> <li>Providing opportunities to deliver against locally significant and culturally important issues</li> <li>Supporting all stakeholders to respond to pressures arising from a changing and variable climate.</li> </ul>	<ul style="list-style-type: none"> <li>Education programs provided to increase awareness and appreciation of the Mallee's natural, cultural and productive landscapes; and to encourage actions which contribute to their protection and enhancement</li> <li>Opportunities provided for people to connect with nature, including increased accessibility and amenity for recreational activities.</li> <li>Opportunities provided for Traditional Owners/First Peoples to connect and spend time on Country</li> <li>Citizen Science programs supported to engage community and provide targeted data to inform NRM programs</li> <li>Responsive and effective stewardship of our natural, cultural and productive landscapes supported</li> <li>Community based NRM groups and individuals supported to participate in regional and local scale NRM programs</li> <li>Regional and local partnerships that provide for co-operative approaches to NRM planning, delivery and evaluation established and maintained</li> <li>Effective responses to emerging threats and opportunities identified, and implemented where appropriate.</li> </ul>	<ul style="list-style-type: none"> <li>Actions which build the capacity of community groups, Traditional Owners, land owners, and/or individuals to support regional NRM efforts</li> <li>Actions which support and respond to the evolving needs of community groups, Traditional Owners, and individuals already participating in NRM</li> <li>Actions which facilitate opportunities for broader and more diverse participation in regional NRM efforts</li> <li>Actions which advance opportunities for self-determined participation and leadership by Traditional Owners.</li> </ul>	<ul style="list-style-type: none"> <li>Increased measures of Community Capacity for NRM (e.g. awareness, knowledge, skills).</li> <li>Average Landcare Group Health scores maintained at 'Moving Forward' or above.</li> <li>Increased number of volunteers supporting regional NRM.</li> <li>Increased number of opportunities for community based groups and individuals to deliver NRM focused actions.</li> <li>Increased number of formal partnerships established and maintained that provide for co-operative and collaborative approaches to NRM planning, delivery and evaluation.</li> <li>Increased number of opportunities for Traditional Owners/First Nations Peoples to reconnect to Country.</li> <li>Increased number of formal partnership agreements between Traditional Owners and key NRM agencies.</li> <li>Increased number of programs that are co-designed and implemented in partnership with, or led by, Traditional Owners.</li> </ul>	<ul style="list-style-type: none"> <li>Increased community capacity for, and participation in efforts to protect and enhance the Mallee's natural, cultural and agricultural landscapes.</li> <li>Increased collaborative efforts to protect and enhance the Mallee's natural, cultural and agricultural landscapes.</li> <li>Traditional Owner self-determined participation and leadership in managing and healing Country.</li> </ul>

<sup>59</sup> No regional scale baseline information is currently available for three of the eight stated medium-term outcome targets (i.e. increased number of opportunities for Traditional Owners/First Nations Peoples to reconnect to Country; increased number of formal partnership agreements between Traditional Owners and key NRM agencies; increased number of programs that are co-designed and implemented in partnership with, or led by, Traditional Owners) at a whole of region scale. This information gap will be addressed through the RCS MERI Framework, with the establishment and ongoing measurement of associated indicators.

# 4: INTEGRATED CATCHMENT MANAGEMENT

## 4.1 LOCAL AREAS

*This section outlines the significant values, key threatening processes, priority management directions, medium-term (6-year) management targets, and potential delivery partnerships/collaborations for each of the region's nine Local Areas.*

The Mallee is a large and diverse region, encompassing the Murray River floodplain and associated waterways, vast dryland cropping areas, and large public reserves. Local Areas provide for this diversity by recognising the different landscapes, asset values, land-uses, climate, and communities influencing NRM across the region; and the different approaches that may be required to effectively manage associated threatening processes.

Each discrete Local Area landscape provides the basis for integrated and targeted action by considering interactions between assets, associated threat processes, and priority management interventions; at a scale that is meaningful to local stakeholders. Sub-management units are also identified for some Local Areas to recognise asset groupings/commonalities within the larger landscape and enable associated planning and delivery processes to be undertaken at the appropriate scale (Figure 40).

These Local Areas provide the foundation for the RCS's integrated, place-based approach to priority and target setting; establishing the basis for co-operative local action, and ongoing discussion with associated stakeholders.

Within this framework, agricultural land (dryland and irrigated) is considered as separately as a dispersed local area, reflecting the similar *asset x threat x intervention interactions* influencing the management of these landscapes at the whole-of-region scale (see Local Area 9 for spatial representation).

Collectively, management targets established for each Local Area will also provide for delivery against the whole-of-region medium-term (6-year) outcome targets identified for our biodiversity, waterway, agricultural land, culture and heritage, and community capacity for NRM assets. Table 12 provides an overview of these interactions, with further detail provided for each Local Area in the following sections. A full list of priority management actions identified for each Local Area to deliver against these targets is provided in Appendix 6.

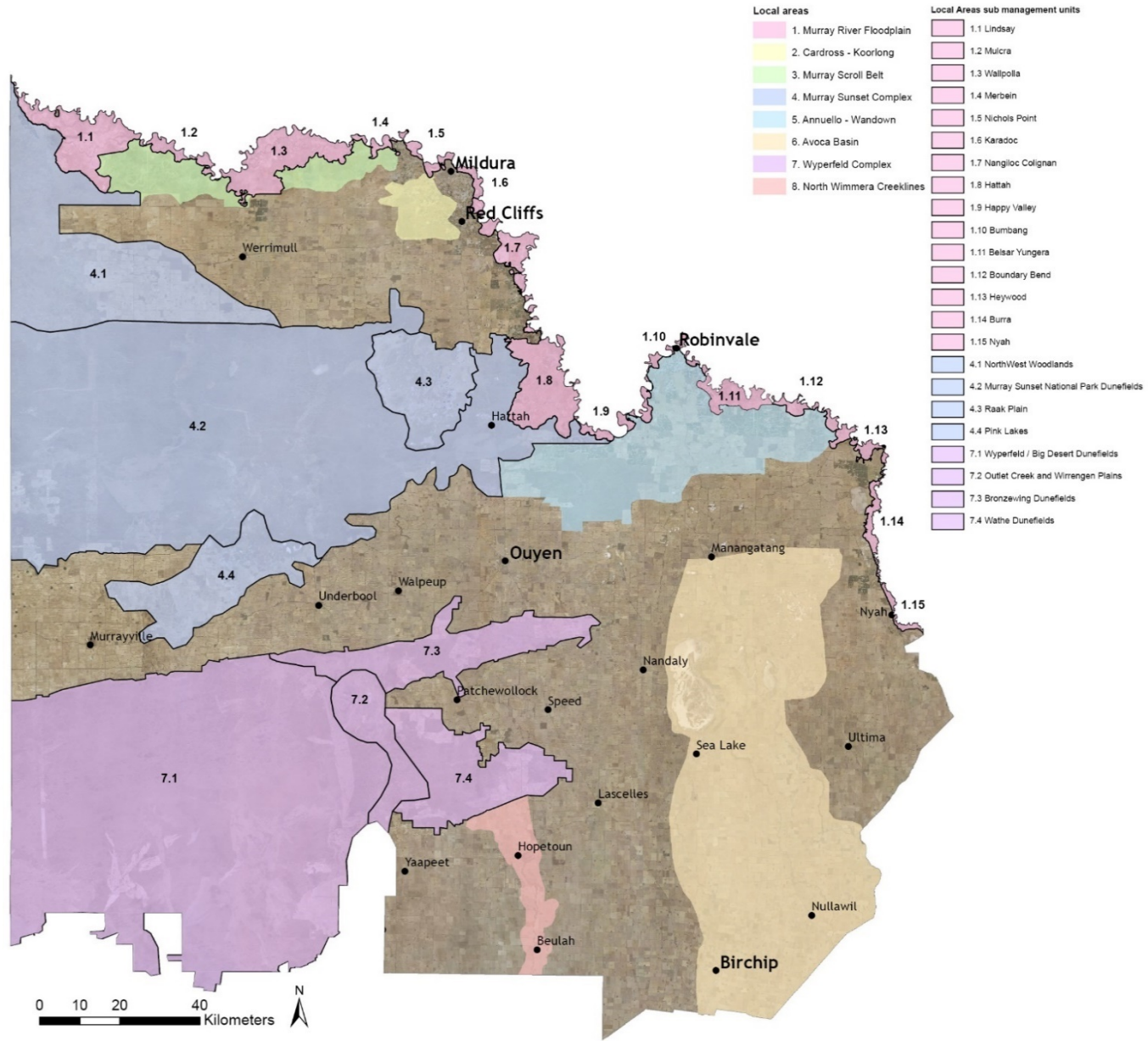


Figure 40: RCS Local Areas and Sub-management Units.



**Table 12: Local Area Contributions to the Region’s desired Outcomes for each RCS Theme.**

Theme	Medium-term Outcome (by 2028)	Local Areas*								
		MRF	C-K	MSB	MSC	A-W	AB	WC	NWC	AL
Biodiversity	269,000 hectares of priority locations under sustained weed control	79,224	12,051	37,878	85,563	7,359	11,346	2,055	451	32,830
	1,660,000 hectares of priority locations under sustained herbivore control	134,001	18,373	48,342	786,116	75,118	34,254	448,911	1,750	114,045
	87,000 hectares of priority locations under sustained pest predator control	60,560	3,516	6,529	5,682	5,414	2,119	1,751		1,702
	3,450 hectares of revegetation in priority locations for habitat restoration	x	x	x	x	x	x	x	x	
	3,450 hectares of revegetation in priority locations for habitat connectivity									x
	730 hectares of priority locations permanently protected	x	x	x	x	x	x	x	x	x
Waterways	300,000 hectares of riparian land is protected or improved by targeted works programs	105,503			64,770		85,046	20,570	24,053	
	9,850 hectares of waterways are protected or improved by appropriate water regimes	8,603	413				66		681	87
	Increased amenity and recreational opportunities provided by regional waterways	x	x				x		x	x
	Increased understanding and mitigation of regional flood risks.	x					x		x	
Land	Increase application of 'best practice' for soil health and productivity improvements.									x
	Increase the average area of agricultural land exceeding the 50% groundcover target.									x
	Increase application of 'best practice' for water use efficiency and productivity improvements									x
	Maintain a net salinity credit balance on the BSM2030 salinity registers and remain compliant with obligations under Schedule B of the Murray-Darling Basin Agreement.									x
	Maintain groundwater usage in the Murrayville Groundwater Management Area within required thresholds.									x

Theme	Medium-term Outcome (by 2028)	Local Areas*								
		MRF	C-K	MSB	MSC	A-W	AB	WC	NWC	AL
Culture & Heritage	Increased number of cultural sites recognised, protected and enhanced	X	X	X	X	X	X	X	X	X
	Increased number of projects that incorporate and deliver on cultural objectives and priorities	X	X	X	X	X	X	X	X	X
	Increased area subject to Traditional Owner led practices to manage and heal Country.	X	X	X	X	X	X	X	X	X
Community Capacity for NRM	Increased measures of Community Capacity for NRM (e.g. awareness, knowledge, skills).	X	X	X	X	X	X	X	X	X
	Average Landcare Group Health scores maintained at 'Moving Forward' or above.	X	X	X	X	X	X	X	X	X
	Increased number of volunteers supporting regional NRM.	X	X	X	X	X	X	X	X	X
	Increased number of opportunities for community based groups and individuals to deliver NRM focused actions.	X	X	X	X	X	X	X	X	X
	Increased number of formal partnerships established and maintained that provide for co-operative and collaborative approaches to NRM planning, delivery and evaluation	X	X	X	X	X	X	X	X	X
	Increased number of opportunities for Traditional Owners/First Nations Peoples to reconnect to Country	X	X	X	X	X	X	X	X	X
	Increased number of formal partnership agreements between Traditional Owners and key NRM agencies	X	X	X	X		X	X	X	
Increased number of programs that are co-designed and implemented in partnership with, or led by, Traditional Owners.	X	X	X	X		X	X	X		

\*Local Area abbreviations: MRF = Murray River Floodplain; C-K = Cardross-Koorlong; MSB = Murray Scroll Belt; MSC = Murray Sunset Complex; A-W = Annuello-Wandown; AB = Avoca Basin; WC = Wyperfeld Complex; NWC = North Wimmera Creeklines; AL = Agricultural Land.

### 4.1.1 MURRAY RIVER FLOODPLAIN

*This 139,062 hectare landscape stretches from the South Australian Border in the west along the Murray River down to Nyah in the east. It is one of the more heavily populated areas in the region, encompassing Merbein, Robinvale, Piangil as well as parts of Mildura, Red Cliffs, Boundary Bend and Nyah.*

The Murray River forms the northern boundary of the Victorian Mallee region and while the river is the statutory responsibility of NSW, Victoria is responsible for the management of its southern floodplain from the 1881 winter level water mark. Within the Mallee this represents some 731 kilometres of Murray River Frontage (Figure 41).

Approximately 72 percent of the landscape is public land, including: Murray-Kulkyne Park, Nyah-Vinifera Park, Kings Billabong Park, parts of Murray Sunset and Hattah-Kulkyne National Parks, and numerous smaller reserves. Agriculture, both irrigated and dryland, represents the other primary land use within the area<sup>60</sup>.

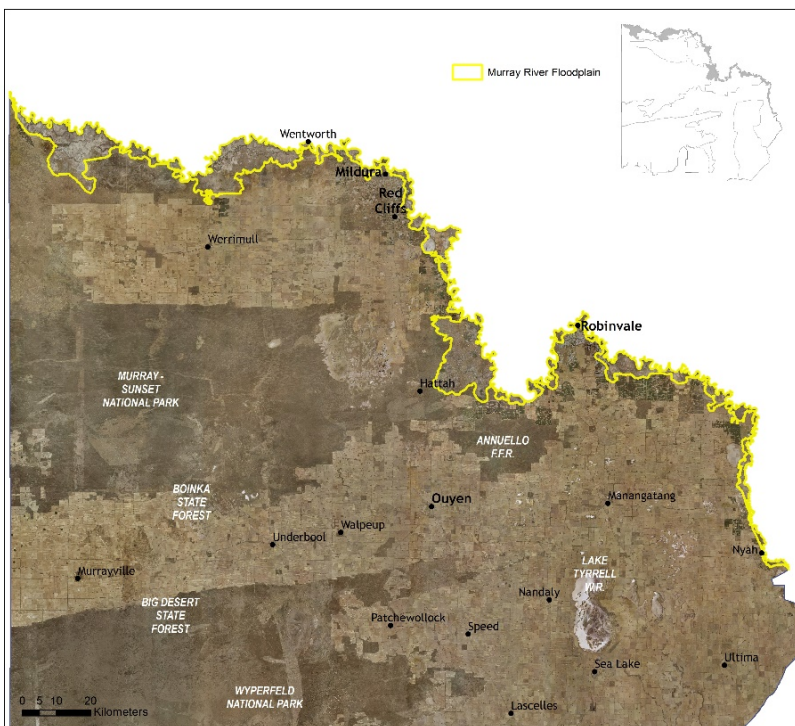


Figure 41: Murray River Floodplain Local Area.

The area is important for the high diversity and quality of riparian and aquatic habitat it provides, supporting significant populations of rare and threatened species.

The Murray River Floodplain Local Area encompasses 15 sub-management units to support targeted planning and delivery processes within the larger landscape where required (see Figure 40). These units align with Waterway Management Units (WMUs) applied by the Mallee Waterway Strategy; providing for monitoring and reporting efficiencies.

Five other Local Areas adjoin the Murray River Floodplain: Murray Sunset Complex in the north west of the region and at Hattah; Murray Scroll Belt between Merbein and the South Australian Border; Cardross-Koorlong near Mildura; Annuello–Wandown in the north east of the region; and Agricultural Land along most of the remaining boundary.

### NATURAL VALUES

Native vegetation has been retained across 92 percent of the landscape. Of this, 25 percent is classified as Endangered (Riverine Chenopod Woodland EVCs) and 42 percent as Vulnerable (primarily Lignum Shrubland (12%), Lignum Swampy Woodland (11%) and Semi-arid Woodland (5%) EVCs).

Vegetation on frontages adjacent to the River is comprised predominantly of River Red Gum communities, with broader floodplain further characterised by Black Box woodlands, lignum shrublands and grasslands. The floodplain area adjoins large, open areas of semi-arid grasslands and chenopod shrublands.

State-wide modelling identifies 112,856 hectares (81% of total area) of habitat occurring within this landscape as being of the highest ecological value to Victoria (top 20%) and therefore a priority for protection and enhancement (see Appendix 7).

Some 15,435 hectares of waterways occur across the area, with 75 wetlands (6,695 ha) and 65 reaches (5,059 ha) identified as a priority for management. Nine of the region's 16 sites listed on the Directory of Important Wetlands Australia (DIWA) are located within this area; Lindsay and Wallpolla Islands, Lake Wallawalla, Kings Billabong Wetlands, Lake Ranfurly, Belsar Island, Heywoods Lake, Hattah Lakes, and Major Mitchell's Lagoon.

<sup>60</sup> See Local Area 9 for further detail on associated agricultural land values and priorities



**Figure 42: Swans nesting on Lake Kramen, one of the 12 lakes included in the Hattah-Kulkyne Lakes Ramsar Site**

Two of the Murray Darling Basin Authority's six Living Murray 'icon' sites, selected for their high ecological value and cultural significance, occur in the area: the Lindsay, Wallpolla and Mulcra Island components of the Chowilla Floodplain; and the Hattah Lakes. The Hattah-Kulkyne Lakes System, a series of perennial and intermittent freshwater lakes fed mainly from the Murray River via Chalka Creek, also includes 12 lakes declared as Wetlands of International Importance under the Ramsar Convention.

Waterways within the area provide critical habitat for many migratory birds listed in international agreements (i.e. JAMBA, CAMBA AND ROKAMBA); and for several fish species included in the Lowland Riverine Fish Community of the Southern Murray-Darling Basin, which is listed as threatened under the FFG Act.

In total, 249 species listed as threatened at a federal and/or state level have been recorded as occurring within this Local Area since 1990; comprising of 56 birds, nine reptiles, five fish, three mammals, one amphibian and 175 plants. Habitat distribution models identify that the area is of particular importance to the conservation of three threatened plant species (Soda Bush, Low Hibiscus and Velvet-Leaf Hibiscus) due to the proportion of their Victorian range (i.e. >50%) contained in this landscape. Habitat within the area also supports species included in the EPBC listed (Endangered) Mallee Bird Community of the Murray Darling Depression Bioregion (e.g. Regent Parrot).

Species identified as having local significance and/or cultural importance include Darling and Garland Lilies, Emu Bushes, Desert Groundsel, Winged Peppergrass, Fat-tailed Dunnart, Carpet Python, Red-naped Snake, Regent Parrot, Barking Owl, Australian Painted Snipe, and Murray Cod<sup>61</sup>.

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## CULTURAL VALUES

The high number of cultural sites throughout the Murray floodplain is unique in Victoria, both for their concentration and diversity. Aboriginal people have inhabited this area for tens of thousands of years on a relatively permanent basis with the landscape rich in both tangible and intangible culture and heritage.

The area has cultural importance to several Traditional Owner groups identifying connections to Country across the landscape. There is one Registered Aboriginal Party, First People of the Millewa Mallee Aboriginal Corporation, that has statutory responsibilities for managing Aboriginal Cultural Heritage on Country in this area, specifically from the South Australian Border to Iraq (see Figure 2).

Integrating Traditional Owner cultural values, practices, knowledge and objectives into the management of the landscape is considered a high priority to facilitate increased participation in local NRM and support the broader process of self-determination.

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## SOCIAL VALUES

Recreation and tourism is an important use of frontages along the length of the Murray River and floodplains; favoured by locals and visitors alike for the numerous river access points and camping spots that provide recreational opportunities such as fishing, canoeing, bird watching and 4WD tracks (Figure 43). Potential impacts such as rubbish dumping, right of unfettered access (e.g. long term impact to river banks), and fire are a concern for natural and cultural values management.

Community interest in conservation in this area is high, with volunteerism and participation in education-based activities facilitated by proximity to the region's larger population centres. Active groups include Landcare (Millewa-Carwarp, Yelta, Cabarita, Robinvale-Annuello, Kooloonong-Natya, Nyah-West, Lindsay Point, Mallee Conservation and Mallee Bushland Care), Mid-Murray Field Naturalists, BirdLife Mildura, Friends of Merbein Common, Mildura 4WD Club, Murray Darling Association, Murray Lower Darling Rivers Indigenous Network, OzFish Sunraysia Chapter, OzFish Euston-Robinvale Chapter, and Sunraysia Bushwalkers Inc.

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<sup>61</sup> A complete list of species identified as a priority for management will be provided in the associated Murray River Floodplain Local Area Action Plan.

## INTEGRATED MANAGEMENT

Management actions that protect and enhance the significant values of this Local Area will provide for integrated, landscape-scale outcomes that also deliver against the whole-of-region medium-term (6-year) outcomes targets identified for our Biodiversity, Waterways, Agricultural Land, Culture and Heritage, and Community Capacity for NRM assets. Table 13 provides an overview of priority management actions and targets to be implemented within the area, and the local stakeholders that will contribute to their delivery (see Appendix 6 for complete list of Priority Management Directions). A separate Murray River Floodplain Local Area Action Plan will provide further detail on stakeholder interests, existing programs/activities, and future investment priorities. The plan will be reviewed annually in consultation with stakeholders to ensure currency and inform ongoing investment/delivery priorities.

**Table 13: Murray River Floodplain ICM priorities and targets.**

<b>Significant Values</b> <i>Why we need to take action:</i>	<b>Major Threats</b> <i>What risks we need to manage:</i>	<b>Priority Management Directions</b> <i>What actions we need to focus on:</i>	<b>Management Targets</b> <i>What we will deliver by 2028:</i>	<b>Delivery Partners</b> <i>Who will be involved:</i>
<ul style="list-style-type: none"> <li>81% of total area (112,856ha) supports habitat of highest ecological value to Victoria (top 20%)</li> <li>67% of native vegetation (86,975ha) has high conservation status</li> <li>Nine sites listed on national Directory of Important Wetlands</li> <li>Two Living Murray 'icon' sites</li> <li>Hattah-Kulkyne Lakes Ramsar Site</li> <li>Critical habitat for migratory waterbirds</li> <li>Supports a large number of threatened species/communities (249 listed species &amp; 2 communities recorded)</li> <li>High cultural importance</li> <li>Significant recreational opportunities</li> </ul>	<ul style="list-style-type: none"> <li>Altered hydrological regimes</li> <li>Constrained regenerative capacity</li> <li>Environmental weed competition</li> <li>Grazing pressure</li> <li>Introduced predators</li> <li>Recreational pressures</li> </ul>	<ul style="list-style-type: none"> <li>Cross tenure herbivore (rabbits, goats, pigs, overabundant kangaroos), predator (foxes, cats), and weed control programs in priority locations to support multiple species/whole of system benefits.</li> <li>Supplementary planting in priority locations to support habitat restoration</li> <li>Targeted/Specialised interventions required for specific species/issue benefits</li> <li>Watering regimes to meet environmental, cultural and social objectives</li> <li>Maintaining and enhancing infrastructure (e.g. visitor facilities, bollards/fencing, roads/trails) to enhance recreation opportunities and reduce associated impacts on natural/cultural values</li> <li>Climate ready interventions to provide for improved resilience and adaptive capacity</li> <li>Reducing risks associated with extreme events.</li> <li>Advancing opportunities for self-determined participation and leadership by Traditional Owners</li> <li>Application of Traditional Owner led practices to meet cultural objectives</li> <li>Application of Cultural Landscapes within regional planning and management frameworks</li> <li>Building the capacity of community groups, Traditional Owners, land owners, and/or individuals to support regional NRM efforts</li> <li>Supporting/responding to the evolving needs of community groups, Traditional Owners, and individuals already participating in NRM</li> <li>Opportunities for broader and more diverse participation in regional NRM efforts</li> </ul>	<ul style="list-style-type: none"> <li>Priority habit protected or improved by:               <ul style="list-style-type: none"> <li>- 79,224 ha sustained weed control*</li> <li>- 134,000 ha sustained herbivore control*</li> <li>- 60,560 ha sustained predator control*</li> <li>- Revegetation within priority habitat</li> <li>- 8,603 ha of appropriate water regimes<sup>#</sup></li> </ul> </li> <li>105,503 ha riparian land protected or improved</li> <li>Increased amenity supporting recreational activities</li> <li>Increased understanding and mitigation of regional flood risks</li> <li>Increased area subject to Traditional Owner led practices</li> <li>Increased number of volunteers supporting regional NRM</li> <li>Increased number of opportunities for community groups and individuals to deliver NRM focused actions</li> <li>Increased number of partnerships that provide for co-operative and collaborative approaches to NRM</li> <li>Increased number of opportunities for Traditional Owners/First Nations Peoples to reconnect to Country</li> <li>Increased number of programs co-designed and implemented in partnership with, or led by, Traditional Owners</li> </ul>	<ul style="list-style-type: none"> <li>DELWP</li> <li>First People of the Millewa Mallee</li> <li>Goulburn-Murray Water</li> <li>Lower Murray Water</li> <li>Mallee CMA</li> <li>NSW Department of Primary Industries and Environment</li> <li>Mildura Rural City Council</li> <li>Parks Victoria</li> <li>Private Land managers</li> <li>Swan Hill Rural City Council</li> <li>BirdLife</li> <li>Landcare / Community NRM Groups</li> <li>Traditional Owners</li> <li>Trust for Nature</li> </ul>

\* Spatial representations of priority locations for weed control, herbivore control and pest predator control within the Local Area are provided in Appendix 5

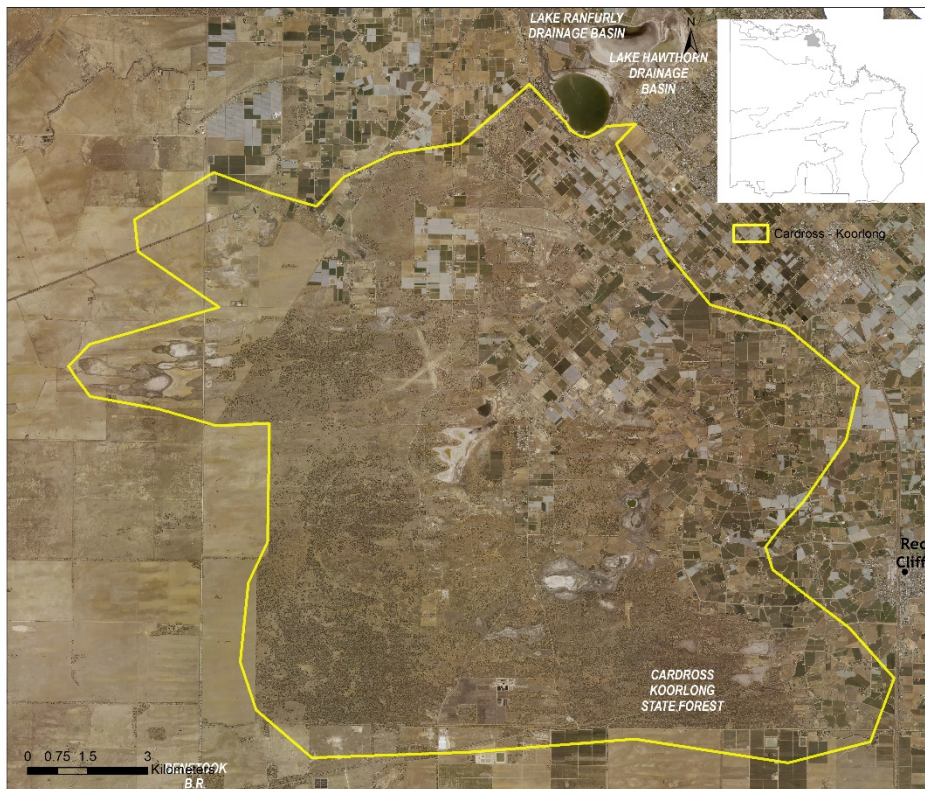
<sup>#</sup> Target encompasses area of individual waterway only, does not include inundation of associated floodplain.



## 4.1.2 CARDROSS-KOORLONG

*This 21,506 hectare landscape includes the Cardross and Koorlong Lakes, Wargan Basins, Koorlong State Forest and several smaller reserves. It is one of the more heavily populated areas in the region, encompassing the Cabarita, Cardross and Koorlong communities; and parts of Merbein South, Mildura, Irymple and Red Cliffs.*

Approximately 47 percent the landscape is public land, with agriculture (mainly irrigated)<sup>62</sup> and built up residential areas representing the other primary land uses within the area (Figure 44). Two other Local Areas adjoin the Cardross-Koorlong Local Area: the Murray River Floodplain to the north; and Agricultural Land along most of the remaining boundary.



**Figure 43: Cardross Koorlong Local Area**

irrigation drainage basins. A consistent supply of water has subsequently transformed the systems into semi-permanent lakes, with both Wargan Basins and Cardross Lakes listed on the national Directory of Important Wetlands due to the habitat they provide for waterbirds (including species listed under international migratory bird agreements) and native fish.

Improved irrigation practices in the last twenty years have however significantly reduced the amount of drainage water entering the Lakes, reducing water levels but increasing salinity levels in these artificial wetlands. As a result, the Lakes now support fewer native fish species but are still one of the last remaining refuges for the Murray hardyhead (Figure 45), a federally listed (Endangered) species which is able to survive and reproduce in saline wetlands.

In total, 57 species listed as threatened at a federal and/or state level have been recorded as occurring within this Local Area since 1990; comprising of 28 birds, two reptiles, two fish and 25 plants. Habitat distribution models identify that in addition to the Murray hardyhead, the area is of particular importance to the conservation of two threatened plant species (Limestone Sida and Dwarf Lantern Flower) due to the proportion of their Victorian range (i.e. >10%) contained in this landscape.

Semi-arid Woodland vegetation communities and the fauna they support are also considered to have high local significance<sup>63</sup>. This encompasses the EPBC listed (Endangered) Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions ecological community.

### NATURAL VALUES

Around 11,000 hectares (50%) of native vegetation has been retained in some form across the landscape. Of this, 94 percent is classified as Vulnerable; consisting primarily of Chenopod Mallee (51%) and Semi-arid Woodland (37%) EVCs.

State-wide modelling identifies 9,600 hectares (45% of total area) of habitat occurring within this area as being of the highest ecological value to Victoria (top 20%) and therefore a priority for protection and enhancement (see Appendix 7).

Some 985 hectares of wetlands occur within the area, of which three sites (Cardross Lakes, Koorlong Lakes and Wargan Basins) are considered a priority for management.

These sites are a series of natural depressions that were altered in the 1930's to facilitate their use as

<sup>62</sup> See Local Area 9 for further detail on associated agricultural land values and priorities

<sup>63</sup> A complete list of species identified as a priority for management will be provided in the associated Cardross-Koorlong Local Area Action Plan.



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## CULTURAL VALUES

This landscape is recognised as having high value to Traditional Owners, with a large number of cultural sites recorded across the Local Area. First People of the Millewa Mallee Aboriginal Corporation has statutory responsibilities for managing Aboriginal Cultural Heritage on Country in this area.

Integrating Traditional Owner cultural values, practices, knowledge and objectives into the management of the landscape is considered a high priority to facilitate increased participation in local NRM and support the broader process of self-determination.

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## SOCIAL VALUES

Both the lakes and larger reserves within this area are popular for day use recreation, with activities including fishing, walking, and bird watching. Koorlong State Forest (Figure 45) in particular, is used by a range of recreational vehicles, with off track impacts and rubbish dumping a concern for natural and cultural values management.

Community interest in conservation in this area is high, with volunteerism and participation in education-based activities facilitated by proximity to the region's larger population centres. Active groups include Cabarita Inc., Millewa-Carwarp Landcare Group, Yelta Landcare Group, Murray Darling Association, Sunraysia Bushwalkers Inc, BirdLife Mildura, Murray Lower Darling Rivers Indigenous Nations, and Sunraysia Ozfish.



Figure 44: Koorlong State Forest.



Figure 45: Murray hardyhead and Cardross Lakes.

## INTEGRATED MANAGEMENT

Management actions that protect and enhance the significant values of this Local Area will provide for integrated, landscape-scale outcomes that also deliver against the whole-of-region medium-term (6-year) outcomes targets identified for our Biodiversity, Waterways, Agricultural Land, Culture and Heritage, and Community Capacity for NRM assets. Table 14 provides an overview of priority management actions and targets to be implemented within the area, and the local stakeholders that will contribute to their delivery (see Appendix 6 for complete list of Priority Management Directions). A separate Cardross-Koorlong Local Area Action Plan will provide further detail on stakeholder interests, existing programs/activities, and future investment priorities. The plan will be reviewed annually in consultation with stakeholders to ensure currency and inform ongoing investment/delivery priorities.

**Table 14: Cardross-Koorlong ICM priorities and targets.**

Significant Values <i>Why we need to take action:</i>	Major Threats <i>What risks we need to manage:</i>	Priority Management Directions <i>What actions we need to focus on:</i>	Management Targets <i>What we will deliver by 2028:</i>	Delivery Partners <i>Who will be involved:</i>
<ul style="list-style-type: none"> <li>45% of total area (9,600ha) supports habitat of highest ecological value to Victoria (top 20%)</li> <li>94% of native vegetation classified as Vulnerable, including 5,476ha of Chenopod Mallee and 4,000ha of Semi-arid Woodland EVCs</li> <li>2 sites listed on national Directory of Important Wetlands</li> <li>Critical habitat for migratory waterbirds and threatened species (e.g. Murray hardyhead, Limestone Sida, Dwarf Lantern Flower)</li> <li>Supports a large number of threatened species/communities (57 listed species &amp; 2 communities recorded)</li> <li>High cultural importance</li> <li>Recreational opportunities</li> </ul>	<ul style="list-style-type: none"> <li>Altered hydrological regimes</li> <li>Constrained regenerative capacity</li> <li>Environmental Weed Competition</li> <li>Grazing Pressure</li> <li>Introduced Predators</li> <li>Recreational pressures</li> </ul>	<ul style="list-style-type: none"> <li>Cross tenure herbivore (rabbits, goats), predator (foxes, cats), and weed control programs in priority locations to support multiple species/whole of system benefits</li> <li>Supplementary planting in priority locations to support habitat restoration</li> <li>Targeted/Specialised interventions required for specific species/issue benefits</li> <li>Watering regimes to meet environmental and social objectives</li> <li>Maintaining and enhancing infrastructure (bollards/fencing, roads/trails) to minimise recreation impacts on natural/cultural values</li> <li>Maintaining and enhancing infrastructure (e.g. visitor facilities, bollards/fencing, roads/trails) to enhance recreation opportunities and reduce associated impacts on natural/cultural values</li> <li>Climate ready interventions to provide for improved resilience and adaptive capacity</li> <li>Advancing opportunities for self-determined participation and leadership by Traditional Owners</li> <li>Application of Traditional Owner led practices to meet cultural objectives</li> <li>Application of Cultural Landscapes within regional planning and management frameworks</li> <li>Building the capacity of community groups, Traditional Owners, land owners, and/or individuals to support regional NRM efforts</li> <li>Supporting/responding to the evolving needs of community groups, Traditional Owners, and individuals already participating in NRM</li> <li>Opportunities for broader and more diverse participation in regional NRM efforts</li> </ul>	<ul style="list-style-type: none"> <li>Priority habit protected or improved by:               <ul style="list-style-type: none"> <li>12,051 ha sustained weed control</li> <li>18,373 ha sustained herbivore control</li> <li>3,516 ha sustained predator control</li> <li>413 ha appropriate water regimes</li> <li>Revegetation within priority habitat</li> </ul> </li> <li>Increased amenity supporting recreational activities</li> <li>Increased area subject to Traditional Owner led practices</li> <li>Increased number of volunteers supporting regional NRM</li> <li>Increased number of opportunities for community groups and individuals to deliver NRM focused actions</li> <li>Increased number of partnerships that provide for co-operative and collaborative approaches to NRM</li> <li>Increased number of opportunities for Traditional Owners/First Nations Peoples to reconnect to Country</li> <li>Increased number of programs co-designed and implemented in partnership with, or led by, Traditional Owners</li> </ul>	<p>DELWP First People of the Millewa-Mallee Lower Murray Water Mallee CMA Mildura Rural City Council Parks Victoria Private Land managers</p> <p>Landcare / Community NRM Groups</p>

\* Spatial representations of priority locations for weed control, herbivore control and pest predator control within the Local Area are provided in Appendix 5.



### 4.1.3 MURRAY SCROLL BELT

*This 50,070 hectare landscape includes small portions of the Murray Sunset National Park (in the east, central and far west parts of the Local Area); and Neds Corner Station, a 30,000 hectare conservation reserve. The majority of the area is sparsely populated.*

Approximately 25 percent of the landscape is public land and 60 percent is managed as a conservation reserve by Trust for Nature<sup>64</sup>. Agriculture, mostly dryland, represents the other primary land use within the area<sup>65</sup>. Three other Local Areas adjoin the Murray Scroll Belt: Murray Sunset Complex in the north west; the Murray River Floodplain directly to the north; and Agricultural Land to the south (Figure 47).

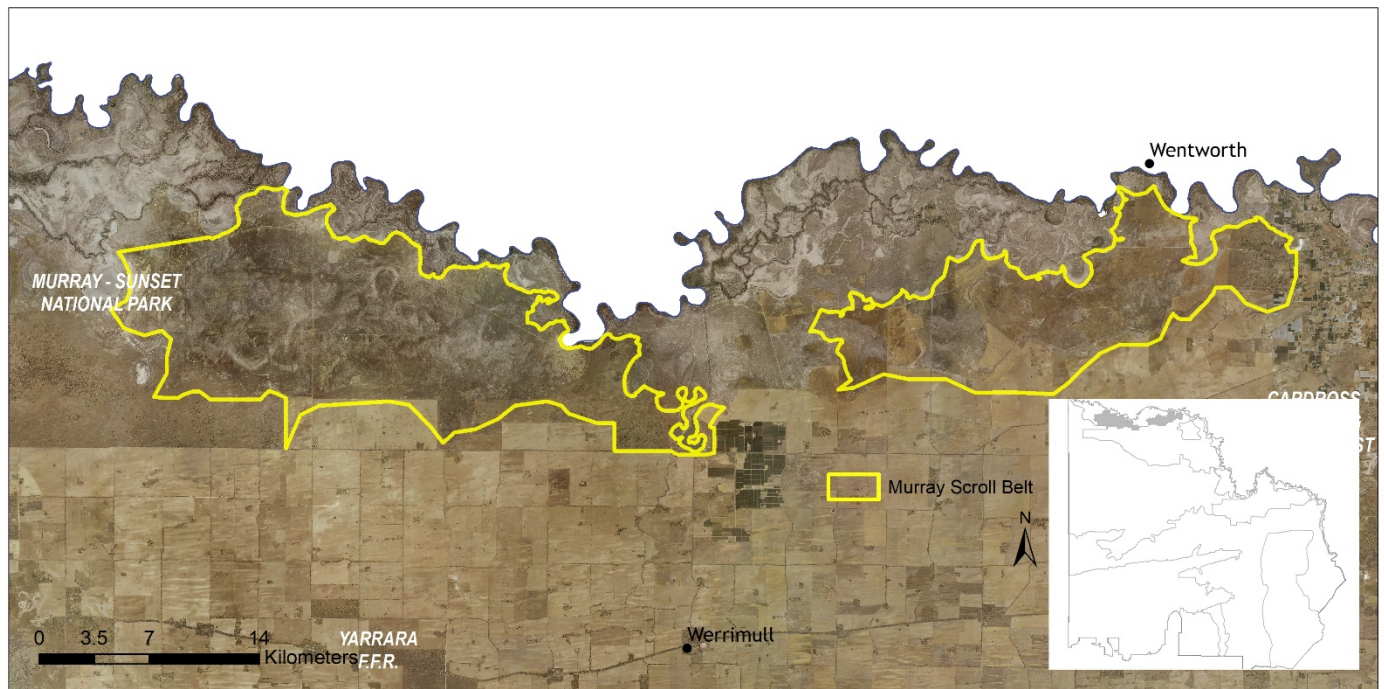


Figure 46: Murray Scroll Belt Local Area.

#### NATURAL VALUES

Around 85 percent (43,000ha) of native vegetation has been retained in some form across the landscape, characterised by Chenopod Shrubland associated with saline soils of the Murray River's flat alluvial terraces. Communities classified as 'depleted' accounts for 92 percent of the vegetation, including Low Chenopod Shrubland (65%) and Semi-arid Chenopod Woodland (26%). There are also small areas of the Vulnerable Chenopod Mallee (5%) and Semi-arid Woodland (2%) EVCs.

State-wide modelling identifies 41,249 hectares (82% of total area) of habitat occurring within this area as being of the highest ecological value to Victoria (top 20%) and therefore a priority for protection and enhancement (see Appendix 7).

In total, 131 species listed as threatened at a federal and/or state level have been recorded as occurring within this Local Area, comprising of 32 birds, nine reptiles, four fish, one mammal, one amphibian and 84 plants. Habitat distribution models identify that the area is of particular importance to the conservation of Red naped Snake, Saltbush Striped Skink, Giles Planigale, and two plant species (Soda Bush and Slender Sunray); due to the proportion of their Victorian range (i.e. >50%) contained in this landscape.

Species identified as having local significance and/or cultural importance include Darling and Garland Lilies, Emu Bushes, Desert Groundsel, Slender Sunray, Purple Swainson-pea, Knead Swainson-pea, Fat-tailed Dunnart, Giles Planigale, Hooded Scaly-foot, Samphire Skink, Mud Adder and Growling Grass Frog<sup>66</sup>.

<sup>64</sup> While most of Neds Corner Station is located in this Murray Scroll Belt Local area, a small area (3,558 ha) overlaps with the Murray Floodplain local area.

<sup>65</sup> See Local Area 9 for further detail on associated agricultural land values and priorities

<sup>66</sup> A complete list of species identified as a priority for management will be provided in the associated Murray Scroll Belt Local Area Action Plan.



Figure 47: Eastern hooded scaly-foot at Neds Corner.

Neds Corner Station is home to almost 1,000 species, including 77 threatened plants, 24 reptiles and more than 120 types of birds. Prior to becoming a conservation reserve, the area was a heavily grazed agriculture property. Since Trust for Nature purchased the property in 2002, an extensive revegetation program has been undertaken.

Significant fauna species that have been recorded at the conservation property include the threatened De Vis' Banded Snake, Hooded Scaly-foot (Figure 48), Growling Grass Frog, Crimsen Chat, and numerous species of microbats. The Large Hard-head Daisy was also discovered at the property, a new species for Victoria.

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### CULTURAL VALUES

This landscape is recognised as having high value to Traditional Owners, with a large number of cultural sites recorded across the Local Area.

First People of the Millewa Mallee Aboriginal Corporation has statutory responsibilities for managing Aboriginal Cultural Heritage on Country in this area.

Integrating Traditional Owner cultural values, practices, knowledge and objectives into the management of the landscape is considered a high priority to facilitate increased participation in local NRM and support the broader process of self-determination.



Figure 48: Spearhead at Neds Corner.

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### SOCIAL VALUES

There are several community-based groups actively involved in NRM across the area, including; Landcare (Millewa Carwarp, Lindsay Point, Mallee Bushland Care), and BirdLife Mildura.

Neds Corner Station is frequently visited by nature lovers and educational groups (schools and universities) and is enabling research of the landscape through archaeological digs and engagement with Traditional Owners to further knowledge and conservation science.

The low height of the shrubland vegetation across much of the landscape makes it particularly susceptible to off-road driving. New tracks establish readily and are slow to rehabilitate.

## INTEGRATED MANAGEMENT

Management actions that protect and enhance the significant values of this Local Area will provide for integrated, landscape-scale outcomes that also deliver against the whole-of-region medium-term (6-year) outcomes targets identified for our Biodiversity, Waterways, Agricultural Land, Culture and Heritage, and Community Capacity for NRM assets. Table 15 provides an overview of priority management actions and targets to be implemented within the area, and the local stakeholders that will contribute to their delivery (see Appendix 6 for complete list of Priority Management Directions). A separate Murray Scroll Belt Local Area Action Plan will provide further detail on stakeholder interests, existing programs/activities, and future investment priorities. The plan will be reviewed annually in consultation with stakeholders to ensure currency and inform ongoing investment/delivery priorities.

**Table 15: Murray Scroll Belt ICM priorities and targets.**

Significant Values <i>Why we need to take action:</i>	Major Threats <i>What risks we need to manage:</i>	Priority Management Directions <i>What actions we need to focus on:</i>	Management Targets <i>What we will deliver by 2028:</i>	Delivery Partners <i>Who will be involved:</i>
<ul style="list-style-type: none"> <li>82% of total area (41,249ha) supports habitat of highest ecological value to Victoria (top 20%)</li> <li>Critical habitat for large number of threatened species, particularly reptiles (131 listed species &amp; 1 community recorded)</li> <li>High cultural importance</li> </ul>	<ul style="list-style-type: none"> <li>Constrained regenerative capacity</li> <li>Environmental weed competition</li> <li>Grazing pressure</li> <li>Introduced predators</li> <li>Recreational pressures</li> </ul>	<ul style="list-style-type: none"> <li>Cross tenure herbivore (rabbits, goats, pigs and overabundant kangaroos), predator (foxes, cats), and weed control programs in priority locations that support multiple species/whole of system benefits</li> <li>Supplementary planting in priority locations to support habitat restoration</li> <li>Targeted/Specialised interventions required for specific species/issue benefits</li> <li>Maintaining and enhancing infrastructure (bollards/fencing, roads/trails) to minimise recreation impacts on natural/cultural values</li> <li>Climate ready interventions to provide for improved resilience and adaptive capacity</li> <li>Advancing opportunities for self-determined participation and leadership by Traditional Owners.</li> <li>Application of Traditional Owner led practices to meet cultural objectives</li> <li>Application of Cultural Landscapes within regional planning and management frameworks</li> <li>Building the capacity of community groups, Traditional Owners, land owners, and/or individuals to support regional NRM efforts</li> <li>Supporting/responding to the evolving needs of community groups, Traditional Owners, and individuals already participating in NRM</li> <li>Opportunities for broader and more diverse participation in regional NRM efforts</li> </ul>	<ul style="list-style-type: none"> <li>Priority habitat protected or improved by:               <ul style="list-style-type: none"> <li>37,878 ha sustained weed control*</li> <li>48,342 ha sustained herbivore control*</li> <li>6,529 ha sustained predator control*</li> </ul> </li> <li>Revegetation within priority habitat</li> <li>Increased area subject to Traditional Owner led practices</li> <li>Increased number of volunteers supporting regional NRM</li> <li>Increased number of opportunities for community groups and individuals to deliver NRM focused actions</li> <li>Increased number of partnerships that provide for co-operative and collaborative approaches to NRM</li> <li>Increased number of opportunities for Traditional Owners/First Nations Peoples to reconnect to Country</li> <li>Increased number of programs co-designed and implemented in partnership with, or led by, Traditional Owners</li> </ul>	<ul style="list-style-type: none"> <li>DELWP</li> <li>First People of the Millewa-Mallee</li> <li>Mallee CMA</li> <li>Mildura Rural City Council</li> <li>Parks Victoria</li> <li>Private Land managers</li> <li>Trust for Nature</li> <li>BirdLife</li> <li>Landcare / Community NRM Groups</li> </ul>

\* Spatial representations of priority locations for weed control, herbivore control and pest predator control within the Local Area are provided in Appendix 5.



#### 4.1.4 MURRAY SUNSET COMPLEX

*This 872,276 hectare landscape encompasses Victoria's second largest National Park (Murray-Sunset - 633,000ha); one of the few remaining semi-arid regions in Australia which has remained relatively unmodified by human activity.*

Approximately 83 percent of the landscape is public land, including: Murray Sunset National Park, Yarrara Flora and Fauna Reserve, most of Hattah Kulkyn National Park, Berrook and Berribee State Forests, and numerous smaller reserves. Agriculture, mostly dryland, represents the other primary land use within the area<sup>67</sup>.

The Murray Sunset Complex Local Area (Figure 50) encompasses four sub-management units to support targeted planning and delivery processes within the larger landscape where required (see Figure 40). These units broadly align conservation assets applied by the Mallee Parks Conservation Action Plan, encompassing Northwest Woodlands (Semi-arid Woodlands), Murray-Sunset Dunefields (Mallee Triodia), Raak Plain (Inland Saline Soak), and Pink Lakes (mixed). They also encompass two Waterway Management Units (WMUs) applied by the Mallee Waterway Strategy: Pink Lakes and Raak Plain.

Four other Local Areas adjoin the Murray Sunset Complex: Murray River Floodplain in the north west of the region and at Hattah; Murray Scroll Belt in the north west; Annuello–Wandown in the north east of the region; and Agricultural Land along most of the remaining boundary.

#### NATURAL VALUES



Figure 49: Murray Sunset Complex Local Area

Around 85 percent (747,055ha) of native vegetation has been retained across the landscape, with a significant proportion (91%) found on public land. Some 27 percent of the vegetation occurring within the area is classified as Vulnerable, consisting primarily of Woorinen Mallee (16%), Semi-arid Woodland (9%) and Chenopod Mallee (5%) EVCs.

This includes three EPBC listed ecological communities: the Endangered Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions; and the Critically Endangered Plains Mallee Box Woodlands of the Murray Darling Depression and Riverina Bioregions, and Natural Grasslands of the Murray Valley Plains.

Yarrara Flora and Fauna Reserve, Meringur and Mallanbool Reserves collectively contain the largest remnants of Belah Woodlands in Victoria.

The largely intact habitat provided by the overall Murray Sunset Complex landscape also provides important links to Hattah-Kulkyn Lakes and Annuello Flora and Fauna Reserve.

State-wide modelling identifies 365,582 hectares (42% of total area) of habitat occurring within this area as being of the highest ecological value to Victoria (top 20%) and therefore a priority for protection and enhancement (see Appendix 7).

There are 4,300 hectares of saline wetlands systems located within the Pink Lakes and Raak Plain sub-management units. The Pink Lakes System represents an outstanding example of a boinka landform (one of only four found in north western Victoria) and is listed on the national Directory of Important Wetlands. The area is frequented by migratory bird species listed in international migratory bird agreements between Australia and Japan (JAMBA), China (CAMBA) and South Korea (ROKAMBA).

<sup>67</sup> See Local Area 9 for further detail on associated agricultural land values and priorities



Raak Plain, the largest (~400 square kilometres) and most active natural groundwater discharge in Victoria, is also listed in the Directory of Important Wetlands. The system of saline lakes and gypseous saltmarsh plains surrounded by dunes and ridges is of high conservation value owing to the diversity of vegetation communities and the presence of rare plant species.



Figure 50: Murray Sunset National Park

In total, 164 species listed as threatened at a federal and/or state level have been recorded as occurring within this Local Area since 1990; comprising 37 birds, seven reptiles, two fish, three mammals and 155 plants. Habitat distribution models identify that the area is of particular importance to the conservation of the Black-eared Miner, Mallee Emu-wren, Beaked Gecko, and several threatened plant species (e.g. Buttercup Pennywort) due to the proportion of their Victorian range (i.e. >50%) contained in this landscape.

Habitat within the area is also critical to the persistence of the EPBC listed (Endangered) Mallee Bird Community of the Murray Darling Depression Bioregion.

Species identified as having local significance and/or cultural importance include Semi-arid Woodlands, Buloke Woodlands, Mallee Ningui, Desert Skink, Mallee Worm Lizard, White-browed Treecreeper, and the Threatened Mallee Bird Community (Mallee Emu-wren, Black-eared Miner, Red-lored Whistler, Striated Grasswren, Regent Parrot, Malleefowl)<sup>68</sup>.

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## CULTURAL VALUES

This landscape is recognised as having high value to Traditional Owners, with a large number of cultural sites recorded. First People of the Millewa Mallee Aboriginal Corporation has statutory responsibilities for managing Aboriginal Cultural Heritage on Country across the northern sections of the area (see Figure 2).

Integrating Traditional Owner cultural values, practices, knowledge and objectives into the management of the landscape is considered a high priority to facilitate increased participation in local NRM and support the broader process of self-determination.

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## SOCIAL VALUES

This Local Area's parks and reserves are popular for day use recreation, with activities including 4WD tracks, camping bushwalking and bird watching. Off-road trailbike riding and 4WD is a concern for natural and cultural values management.

Millewa-Carwarp, Lindsay Point, Mallee, Murrayville and Weeah Landcare Groups, BirdLife Mildura, Mildura 4WD Club, Murray Darling Association, Murray Lower Darling Rivers Indigenous Network, Victorian Malleefowl recovery Group (VMRG) and Sunraysia Bushwalkers Inc. represent the key community based NRM groups active across parts of the landscape.

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<sup>68</sup> A complete list of species identified as a priority for management will be provided in the associated Murray River Floodplain Local Area Action Plan.

## INTEGRATED MANAGEMENT

Management actions that protect and enhance the significant values of this Local Area will provide for integrated, landscape-scale outcomes that also deliver against the whole-of-region medium-term (6-year) outcomes targets identified for our Biodiversity, Waterways, Agricultural Land, Culture and Heritage, and Community Capacity for NRM assets. Table 16 provides an overview of priority management actions and targets to be implemented within the area, and the local stakeholders that will contribute to their delivery (see Appendix 6 for complete list of Priority Management Directions). A separate Murray Sunset Complex Action Plan will provide further detail on stakeholder interests, existing programs/activities, and future investment priorities. The plan will be reviewed annually in consultation with stakeholders to ensure currency and inform ongoing investment/delivery priorities.

**Table 16: Murray Sunset Complex ICM priorities and targets.**

Significant Values <i>Why we need to take action:</i>	Major Threats <i>What risks we need to manage:</i>	Priority Management Directions <i>What actions we need to focus on:</i>	Management Targets <i>What we will deliver by 2028:</i>	Delivery Partners <i>Who will be involved:</i>
<ul style="list-style-type: none"> <li>42% of total area (365,582ha) supports habitat of highest ecological value to Victoria (top 20%)</li> <li>27% of native vegetation has high conservation status – including 3 EPBC listed communities</li> <li>2 sites listed on national Directory of Important Wetlands</li> <li>Supports migratory waterbirds</li> <li>Critical habitat for Mallee dependent species – including EPBC listed Threatened Mallee Bird Community</li> <li>Supports a large number of threatened species (164 listed species recorded)</li> <li>High cultural importance</li> <li>Significant recreational opportunities</li> </ul>	<ul style="list-style-type: none"> <li>Constrained regenerative capacity</li> <li>Environmental Weed Competition</li> <li>Grazing Pressure</li> <li>Inappropriate fire regimes</li> <li>Introduced Predators</li> <li>Land-use Change (habitat loss &amp; fragmentation)</li> <li>Recreational pressures</li> </ul>	<ul style="list-style-type: none"> <li>Cross tenure herbivore (rabbits, goats, pigs, overabundant kangaroos), predator (foxes, cats), and weed control programs in priority locations that support multiple species/whole of system benefits</li> <li>Supplementary planting in priority locations to support habitat restoration</li> <li>Targeted/Specialised interventions required for specific species/issue benefits</li> <li>Maintaining and enhancing infrastructure (e.g. visitor facilities, bollards/fencing, roads/trails) to enhance recreation opportunities and reduce associated impacts on natural/cultural values</li> <li>Climate ready interventions to provide for improved resilience and adaptive capacity</li> <li>Advancing opportunities for self-determined participation and leadership by Traditional Owners.</li> <li>Application of Traditional Owner led practices to meet cultural objectives</li> <li>Application of Cultural Landscapes within regional planning and management frameworks</li> <li>Building the capacity of community groups, Traditional Owners, land owners, and/or individuals to support regional NRM efforts</li> <li>Supporting/responding to the evolving needs of community groups, Traditional Owners, and individuals already participating in NRM</li> </ul>	<ul style="list-style-type: none"> <li>Priority habitat protected or improved by:               <ul style="list-style-type: none"> <li>85,563 ha sustained weed control*</li> <li>786,116 ha sustained herbivore control*</li> <li>5,682 ha sustained predator control*</li> <li>Revegetation within priority habitat</li> </ul> </li> <li>64,770 ha riparian land protected or improved</li> <li>Increased amenity supporting recreational activities</li> <li>Increased area subject to Traditional Owner led practices</li> <li>Increased number of opportunities for community groups and individuals to deliver NRM focused actions</li> <li>Increased number of partnerships that provide for co-operative and collaborative approaches to NRM</li> <li>Increased number of opportunities for Traditional Owners/First Nations Peoples to reconnect to Country</li> <li>Increased number of programs co-designed and implemented in partnership with, or led by, Traditional Owners</li> </ul>	DELWP First People of the Millewa-Mallee Mildura Rural City Council Parks Victoria Private Land Managers BirdLife Landcare / Community NRM Groups Mallee CMA Trust for Nature

\* Spatial representations of priority locations for weed control, herbivore control and pest predator control within the Local Area are provided in Appendix 5.

## 4.1.5 ANNUELLO-WANDOWN

*This 152,858 hectare landscape includes Annuello, Wandown and Menzies Flora and Fauna Reserves, providing an important biolink between Murray-Sunset National Park and Hattah-Kulkyne National Park.*

Approximately 31 percent of the landscape is public land, with significant areas of agriculture (dryland and irrigation) occurring across the area<sup>69</sup>. Two other Local Areas adjoin Annuello-Wandown: Murray Sunset Complex at Hattah; the Murray River Floodplain along the northern boundary; and Agricultural Land to the south (Figure 52).

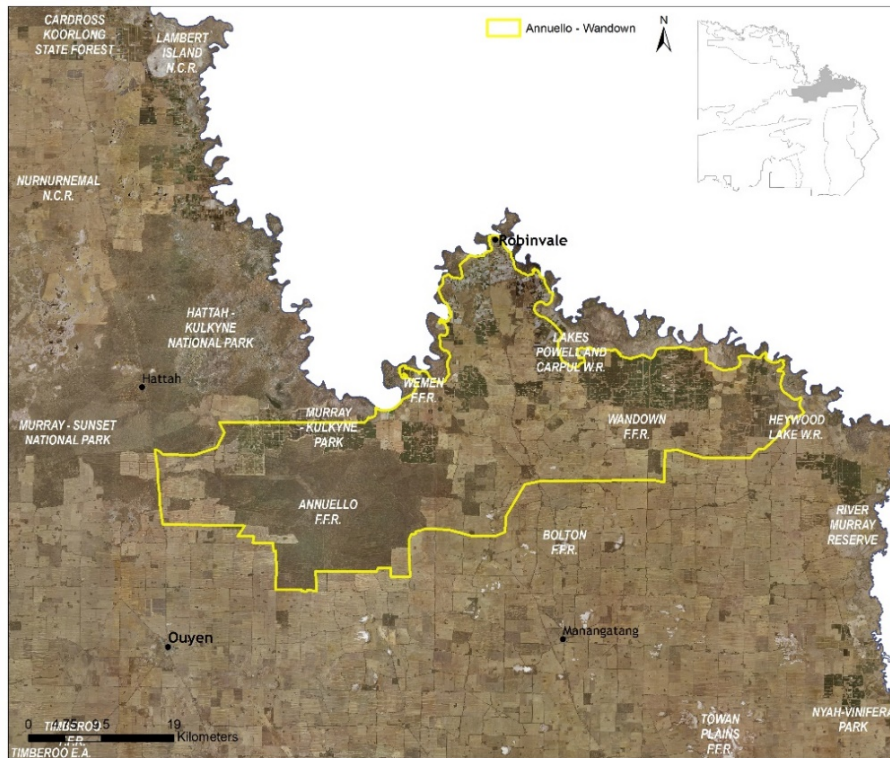


Figure 51: Annuello-Wandown Local Area

In total, 41 species listed as threatened at a federal and/or state level have been recorded as occurring within this Local Area since 1990; comprising 15 birds, one reptile, and 25 plants. Habitat distribution models identify that the area is important to the conservation of several species included in the EPBC listed (Endangered) Mallee Bird Community (i.e. Mallee Emu-wren, Black-eared Miner, Red-lored Whistler, and Striated Grasswren).

Species identified as having local significance and/or cultural importance include, South-eastern Long-eared Bat, Mallee Ningui, Desert Skink, Mallee Worm Lizard, and the Threatened Mallee Bird Community<sup>70</sup>.

### CULTURAL VALUES

This landscape is recognised as having high value to Traditional Owners, with a large number of cultural sites recorded. The area has cultural importance to several Traditional Owner groups identifying connections to Country across the landscape.

### SOCIAL VALUES

This area is favoured for bushwalking, wildflowers and photography. This area includes some significant roadside vegetation and is an important survey site for the Victorian Malleefowl Recovery Group and has been identified by BirdLife International for its importance as a bird area for both the Malleefowl (Figure 53) and Regent Parrot. Recreational pressure is relatively low but includes littering, track proliferation, firewood collection, soil compaction and site erosion. The nature of the impacts is typically localised around a particular site and is highly dependent on the accessibility, popularity and sensitivity of the site along with the level of management the location receives.

### NATURAL VALUES

Around 38 percent (58,983ha) of native vegetation has been retained in some form across the landscape, with the Annuello Flora and Fauna Reserve encompassing nearly 43,000 hectares. Overall, 13 percent of the vegetation occurring with the area is classified as Vulnerable, consisting primarily of Chenopod Mallee (5%), Semi-arid Woodland (3%) and Semi-arid Parilla Woodland (3%) EVCs.

This includes small areas of the EPBC listed (Endangered) Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions ecological community.

State-wide modelling identifies 9,350 hectares (6% of total area) of habitat occurring within this area as being of the highest ecological value to Victoria (top 20%) and therefore a priority for protection and enhancement (see Appendix 7).

<sup>69</sup> See Local Area 9 for further detail on associated agricultural land values and priorities

<sup>70</sup> A complete list of species identified as a priority for management will be provided in the associated Murray River Floodplain Local Area Action Plan.



Community interest in conservation in this area is high, with volunteerism and participation in education based activities facilitated by proximity to the region's larger population centres. Active groups include Landcare (Robinvale and Annuello, Manangatang, Kooloonong-Natya, and Mallee), BirdLife Mildura, Victorian Malleefowl Recovery Group (VMRG), Sunraysia Bushwalkers Inc, and the Mildura 4WD Club.



**Figure 52: Malleefowl**



**Figure 53: Belah Pine at Moss Tank Flora and Fauna Reserve.**

## INTEGRATED MANAGEMENT

Management actions that protect and enhance the significant values of this Local Area will provide for integrated, landscape-scale outcomes that also deliver against the whole-of-region medium-term (6-year) outcomes targets identified for our Biodiversity, Waterways, Agricultural Land, Culture and Heritage, and Community Capacity for NRM assets. Table 17 provides an overview of priority management actions and targets to be implemented within the area, and the local stakeholders that will contribute to their delivery (see Appendix 6 for complete list of Priority Management Directions). A separate Annuello-Wandown Local Area Action Plan will provide further detail on stakeholder interests, existing programs/activities, and future investment priorities. The plan will be reviewed annually in consultation with stakeholders to ensure currency and inform ongoing investment/delivery priorities.

**Table 17: Annuello-Wandown ICM priorities and targets.**

Significant Values <i>Why we need to take action:</i>	Major Threats <i>What risks we need to manage:</i>	Priority Management Directions <i>What actions we need to focus on:</i>	Management Targets <i>What we will deliver by 2028:</i>	Delivery Partners <i>Who will be involved:</i>
<ul style="list-style-type: none"> <li>• 6% of total area (9,350ha) supports habitat of highest ecological value to Victoria (top 20%)</li> <li>• 13% of native vegetation has high conservation status – including EPBC listed Buloke Woodlands</li> <li>• Important habitat for Mallee dependent species – including EPBC listed Threatened Mallee Bird Community</li> <li>• Supports a number of threatened species (41 listed species recorded)</li> <li>• High cultural importance</li> <li>• Recreational opportunities</li> </ul>	<ul style="list-style-type: none"> <li>• Constrained regenerative capacity</li> <li>• Environmental Weed Competition</li> <li>• Grazing Pressure</li> <li>• Inappropriate fire regimes</li> <li>• Introduced Predators</li> <li>• Land-use Change (habitat loss &amp; fragmentation)</li> <li>• Recreational pressures</li> </ul>	<ul style="list-style-type: none"> <li>• Cross tenure herbivore (rabbits, goats, pigs, overabundant kangaroos), predator (foxes, cats), and weed control programs in priority locations that support multiple species/whole of system benefits</li> <li>• Supplementary planting in priority locations to support habitat restoration</li> <li>• Targeted/Specialised interventions required for specific species/issue benefits</li> <li>• Climate ready interventions to provide for improved resilience and adaptive capacity</li> <li>• Advancing opportunities for self-determined participation and leadership by Traditional Owners.</li> <li>• Application of Traditional Owner led practices to meet cultural objectives</li> <li>• Building the capacity of community groups, Traditional Owners, land owners, and/or individuals to support regional NRM efforts</li> <li>• Supporting/responding to the evolving needs of community groups, Traditional Owners, and individuals already participating in NRM</li> </ul>	<ul style="list-style-type: none"> <li>• Priority habitat protected or improved by: <ul style="list-style-type: none"> <li>- 7,359 ha sustained weed control*</li> <li>- 75,118 ha sustained herbivore* control*</li> <li>- 5,414 ha sustained predator control</li> </ul> </li> <li>- Revegetation within priority habitat</li> <li>• Increased area subject to Traditional Owner led practices</li> <li>• Increased number of opportunities for community groups and individuals to deliver NRM focused actions</li> <li>• Increased number of partnerships that provide for co-operative and collaborative approaches to NRM</li> <li>• Increased number of opportunities for Traditional Owners/First Nations Peoples to reconnect to Country</li> </ul>	<ul style="list-style-type: none"> <li>DELWP</li> <li>Mildura Rural City Council</li> <li>Parks Victoria</li> <li>Private Land managers</li> <li>Swan Hill Rural City Council</li> <li>BirdLife</li> <li>Landcare / Community NRM Groups</li> <li>Mallee CMA</li> <li>National Malleefowl Recovery Team</li> <li>Traditional Owners Trust for Nature</li> </ul>

\* Spatial representations of priority locations for weed control, herbivore control, and pest predator control within the Local Area are provided in Appendix 5.

## 4.1.6 AVOCA BASIN

*This 430,397 hectare landscape stretches from the southern boundary of the Mallee region extending into the Avoca Basin Terminal Lakes System and Creeklines. It includes the regional townships of Sea Lake and Birchip.*

Approximately eight percent of the landscape is public land, with dryland cropping being the primary land use<sup>71</sup>. Agricultural Land is the only other Local Areas adjoining this landscape, with North Central CMA to the south (Figure 55).

### NATURAL VALUES

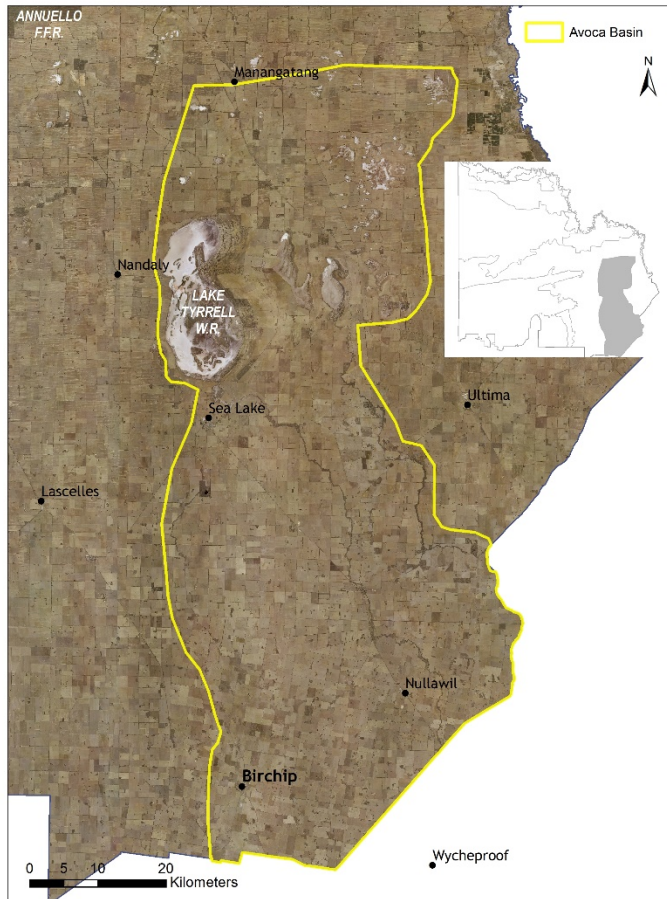


Figure 54: Avoca Basin Local Area

It is listed in the National Directory of Important Wetlands for its geomorphological significance as an ancient salina system dating back some 120,000 years. A number of bird species named in migratory bird agreements (JAMBA, CAMBA and ROKAMBA) have also been observed on the Lake.

The Tyrrell and Lalbert Creeks are north flowing ephemeral distributaries of the Avoca River. Tyrrell Creek terminates in Direl (Lake Tyrrell) while Lalbert Creek terminates in Lake Timboram. Both the channel and the floodplain systems of Tyrrell and Lalbert Creeks are listed in the Directory of Important Wetlands as part of the Bulunguluke Wetlands and Lake Lalbert systems that lie outside Mallee regional boundary.

A sequence of small wetlands and wetland complexes also stretch in a discontinuous band northward from Birchip to Sea Lake, the largest of which include Lake Tchum North and South, Lake Marlbed and Green Lake.

Around 15 percent (65,000ha) of native vegetation has been retained across the landscape, with some 27 percent classified as Vulnerable; consisting primarily of Woorinen Mallee (10%), Semi-arid Woodland (7%), Lignum Swampy Woodland (4%) and Semi-arid Chenopod Woodland (3%). A further 26 percent of the vegetation is classified as Endangered, consisting primarily of Ridged Plains Mallee (17%) and Plains Savannah (7%).

This includes three EPBC listed ecological communities, the Endangered Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions; and the Critically Endangered Plains Mallee Box Woodlands of the Murray Darling Depression and Riverina Bioregions and the Natural Grasslands of the Murray Valley Plains.

Agricultural development across the area has meant that these communities are now primarily fragmented remnants distributed along roadsides, small public reserves and numerous patches on private land.

State-wide modelling identifies 46,000 hectares (11% of total area) of habitat occurring within this area as being of the highest ecological value to Victoria (top 20%) and therefore a priority for protection and enhancement (see Appendix 7).

Some 26,227 hectares of waterways occur across the area, with six wetlands (17,502 ha) and three reaches (514 ha) identified as a priority for management.

Direl (Lake Tyrrell) is Victoria's largest salt lake and the largest saline groundwater discharge lake in the Murray-Darling Basin.

<sup>71</sup> See Local Area 9 for further detail on associated agricultural land values and priorities





Figure 55: Murray Darling Carpet Python.

In total, 89 species listed as threatened at a federal and/or state level have been recorded as occurring within this Local Area since 1990; comprising 21 birds, two reptiles, and 66 plants. Habitat distribution models identify that the area is of particular importance to the conservation of the Black-eared Miner, Mallee Emu-wren, Beaked Gecko, the Lined Earless Dragon, Sapphire Skink, and several threatened plant species (e.g. Angler Saltbush, Quambatook Mallee, Orange Darling-pea) due to the proportion of their Victorian range (i.e. >10%) contained in this landscape.

Species identified as having local significance and/or cultural importance include: Chariot Wheels, Buloke Woodlands, Needlewood Hakeas, Camel Bush, Plains-wanderer, Brown Tree Creeper, Bush-stone Curlew, Carpet Python (Figure 56), and Growling Grass Frog<sup>72</sup>.

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## CULTURAL VALUES

This landscape is recognised as having high value to Traditional Owners, with a large number of cultural sites recorded. The area has cultural importance to several Traditional Owner groups identifying connections to Country across the landscape.

There is one Registered Aboriginal Party, Barengi Gadjin Land Council Aboriginal Corporation, that has statutory responsibilities for managing Aboriginal Cultural Heritage on Country in this landscape; specifically, the eastern fringe of the Local Area.

Integrating Traditional Owner cultural values, practices, knowledge and objectives into the management of the landscape is considered a high priority to facilitate increased participation in local NRM and support the broader process of self-determination.

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## SOCIAL VALUES

The lakes and larger reserves within this area are popular for day use recreation, with activities including community recreation opportunity and aesthetic beauty. Direl (Lake Tyrrell) is also a popular tourism destination for national and international visitors. Off track impacts and rubbish dumping are an ongoing concern for natural and cultural values management within more sensitive areas of this Local Area.

Community interest in conservation in this area is high, with active groups including Landcare (Manangatang, Kooloonong-Natya, Nyah-West, Sea Lake, Waitchie, Berriwillock, Birchip, Culgoa, Lalbert, Nullawil, Ultima and Woomelang/Lascelles groups), Mid-Murray Field Naturalists, Birchip & District Fishing Club, Tchum Lake South Committee of Management, and Advance Sea Lake Inc.

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<sup>72</sup> A complete list of species identified as a priority for management will be provided in the associated Murray River Floodplain Local Area Action Plan.

## INTEGRATED MANAGEMENT

Management actions that protect and enhance the significant values of this Local Area will provide for integrated, landscape-scale outcomes that also deliver against the whole-of-region medium-term (6-year) outcomes targets identified for our Biodiversity, Waterways, Agricultural Land, Culture and Heritage, and Community Capacity for NRM assets. Table 18 provides an overview of priority management actions and targets to be implemented within the area, and the local stakeholders that will contribute to their delivery (see Appendix 6 for complete list of Priority Management Directions). A separate Avoca Basin Action Plan will provide further detail on stakeholder interests, existing programs/activities, and future investment priorities. The plan will be reviewed annually in consultation with stakeholders to ensure currency and inform ongoing investment/delivery priorities.

**Table 18: Avoca Basin ICM priorities and targets.**

Significant Values <i>Why we need to take action:</i>	Major Threats <i>What risks we need to manage:</i>	Priority Management Directions <i>What actions we need to focus on:</i>	Management Targets <i>What we will deliver by 2028:</i>	Delivery Partners <i>Who will be involved:</i>
<ul style="list-style-type: none"> <li>• 11% of total area (46,000ha) supports habitat of highest ecological value to Victoria (top 20%)</li> <li>• 53% of native vegetation has high conservation status – including 3 EPBC listed communities</li> <li>• 3 sites listed on national Directory of Important Wetlands</li> <li>• Supports migratory waterbirds</li> <li>• Important habitat for a large number of threatened species (89 listed species recorded)</li> <li>• High cultural importance</li> <li>• Significant recreational opportunities</li> </ul>	<ul style="list-style-type: none"> <li>• Altered Hydrological Regimes</li> <li>• Constrained regenerative capacity</li> <li>• Environmental Weed Competition</li> <li>• Grazing Pressure</li> <li>• Inappropriate fire regimes</li> <li>• Introduced Predators</li> <li>• Land-use Change (habitat loss &amp; fragmentation)</li> <li>• Recreational pressures</li> </ul>	<ul style="list-style-type: none"> <li>• Cross tenure herbivore (rabbits, goats, pigs, overabundant kangaroos), predator (foxes, cats), and weed control programs in priority locations to support multiple species/whole of system benefits</li> <li>• Supplementary planting in priority locations to support habitat restoration</li> <li>• Watering regimes to meet environmental, cultural and social objectives</li> <li>• Targeted/Specialised interventions required for specific species/issue benefits</li> <li>• Maintaining and enhancing infrastructure (e.g. visitor facilities, bollards/fencing, roads/trails) to enhance recreation opportunities and reduce associated impacts on natural/cultural values.</li> <li>• Climate ready interventions to provide for improved resilience and adaptive capacity</li> <li>• Reducing risks associated with extreme events.</li> <li>• Advancing opportunities for self-determined participation and leadership by Traditional Owners</li> <li>• Application of Traditional Owner led practices to meet cultural objectives</li> <li>• Application of Cultural Landscapes within regional planning and management frameworks</li> <li>• Building the capacity of community groups, Traditional Owners, land owners, and/or individuals to support regional NRM efforts</li> <li>• Supporting/responding to the evolving needs of community groups, Traditional Owners, and individuals already participating in NRM</li> </ul>	<ul style="list-style-type: none"> <li>• Priority habit protected or improved by:               <ul style="list-style-type: none"> <li>- 11,346 ha sustained weed control*</li> <li>- 34,254 ha herbivore control*</li> <li>- 2,119 ha sustained predator control*</li> </ul> </li> <li>• Revegetation within priority habitat</li> <li>• 66ha appropriate water regimes</li> <li>• 85,046 ha riparian land protected/improved</li> <li>• Increased amenity supporting recreational activities</li> <li>• Increased understanding and mitigation of regional flood risks</li> <li>• Increased area subject to Traditional Owner led practices</li> <li>• Increased number of volunteers supporting regional NRM</li> <li>• Increased number of opportunities for community groups and individuals to deliver NRM focused actions</li> <li>• Increased number of partnerships that provide for co-operative and collaborative approaches to NRM</li> <li>• Increased number of opportunities for Traditional Owners/First Nations Peoples to reconnect to Country</li> <li>• Increased number of programs co-designed and implemented in partnership with, or led by, Traditional Owners</li> </ul>	<ul style="list-style-type: none"> <li>Barengi Gadjin Land Council</li> <li>Buloke Shire Council</li> <li>DELWP</li> <li>GWM Water</li> <li>Parks Victoria</li> <li>Private Land Managers</li> <li>Swan Hill Rural City Council</li> <li>Landcare / Community NRM Groups</li> <li>Mallee CMA</li> <li>Traditional Owners Trust for Nature</li> </ul>

\* Spatial representations of priority locations for weed control, herbivore control, and pest predator control re-establishment within the Local Area are provided in Appendix 5

## 4.1.7 WYPERFELD COMPLEX

*This 762,748 hectare landscape includes Wyperfeld National Park, Big Desert Wilderness Park and Big Desert State Forest. Collectively these areas form the largest remnant of uncleared native vegetation in the agricultural areas of south-eastern Australia. The Big Desert Wilderness Park is the largest of Victoria's 22 wilderness areas, while the Big Desert State Forest is the largest of Victoria's State Forest areas.*

Approximately 92 percent of the landscape is public land, with dryland agriculture representing the other primary land use within the area<sup>73</sup>.

The Wyperfeld Complex Local Area (Figure 57) encompasses four sub-management units to support targeted planning and delivery processes within the larger landscape where required (see Figure 40). These units broadly align with conservation assets applied by the Mallee Parks Conservation Action Plan, encompassing Wyperfeld/Big Desert Dunefields (Heathlands), Outlet Creek and Wirrengren Plains (Semi-arid Woodland), Bronzewing Dunefields (Mallee Triodia), and Wathe Dunefields (Mallee Triodia). The Outlet Creek and Wirrengren Plains sub-management units also align with the 'Wyperfeld' Waterway Management Units (WMUs) applied by the Mallee Waterway Strategy.

Two other Local Areas adjoin the Wyperfeld Complex: North Wimmera Creeklines in the south; and Agricultural Land along most of the remaining boundary.

### NATURAL VALUES

Around 93 percent (712,569ha) of native vegetation has been retained across the landscape. Overall, the vegetation occurring within the area classified as Vulnerable (3%), or Endangered (0.4%) is relatively low. The most common vegetation types across this area include: Ridged Plains Mallee, Parilla Mallee, Intermittent Swampy Woodland/Riverine Grassy Woodland Complex, Salt Paperbark Woodland/Samphire Shrubland Mosaic, Woorinen Mallee and Semi-arid Woodland.

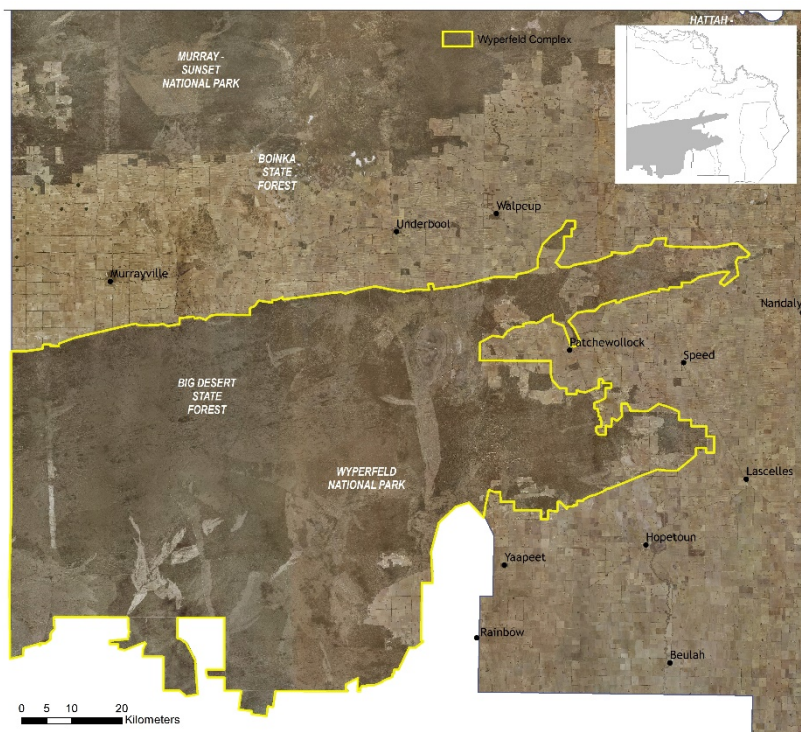


Figure 56: Wyperfeld Complex Local Area

It does however include three EPBC listed ecological communities, the Endangered Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions, and the Critically Endangered: Plains Mallee Box Woodlands of the Murray Darling Depression and Riverina Bioregions, and the Natural Grasslands of the Murray Valley Plains.

State-wide modelling identifies 291,975 hectares (38% of total area) of habitat occurring within this area as being of the highest ecological value to Victoria (top 20%) and therefore a priority for protection and enhancement (see Appendix 7).

Some 5,473 hectares of ephemeral waterways occur within the Outlet Creek-Wirrengren Plain sub-management unit area, with two wetlands (4,573ha) and one reach (131ha) identified as a priority for management.

This encompasses a relatively small (67 km) section of Outlet Creek, a north flowing intermittent stream of the Wimmera River. Outlet Creek is

<sup>73</sup> See Local Area 9 for further detail on associated agricultural land values and priorities



generally dry, filled by overflowing floodwaters from Lake Albacutya (located in the Wimmera region). Wimmera River's listing as a Victorian Heritage River includes the Outlet Creek section.

Wetlands linked to and derived from Outlet Creek are included in the Wimmera River's listing in the National Directory of Important Wetlands due to the relative uniqueness of the land locked drainage system, and significant ecology it supports for rare and threatened species. The 5,000 hectare Wirrengren Plain, representing the last lake into which the Wimmera River Flows, was last flooded in 1874.



Figure 57: Red-lored Whistler: credit Tom Hunt.

In total, 104 species listed as threatened at a federal and/or state level have been recorded as occurring within this Local Area since 1990; comprising of 29 birds, seven reptiles, two mammals, one insect and 65 plants.

Habitat distribution models identify that the area is of particular importance to the conservation of two listed plant species (Shining Spyridum and Azure Sun-orchid) and four reptiles (Mallee Worm Lizard, Masters' Snake, Rosenberg's Goanna, and the Heath Skink) due to the proportion of their Victorian range (i.e. >50%) contained in this landscape.

The area is also important to the conservation of several species included in the EPBC listed (Endangered) Mallee Bird Community; including, Malleefowl, Black-eared Miner, Western Whipbird, Mallee Emu-wren, and Red-lored Whistler.

Species identified as having local significance and/or cultural importance include Buloke Woodlands, Semi-arid Woodlands, Mallee Worm Lizard, Major Mitchell's Cockatoo, and the Mallee Bird community.

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## CULTURAL VALUES

This landscape is recognised as having high value to Traditional Owners, with a large number of cultural sites recorded across the landscape. Barengi Gadjin Land Council (BGLC) has statutory responsibilities for managing Aboriginal Cultural Heritage on Country across this Landscape. BGLC also participate in the management of some parks and reserves occurring in this landscape, under a Co-operative Management Agreement with the State.

Integrating Traditional Owner cultural values, practices, knowledge and objectives into the management of the landscape is considered a high priority to facilitate increased participation in local NRM and support the broader process of self-determination.

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## SOCIAL VALUES

The parks within this Local Area are popular for self-sufficient 4WD touring and camping with extensive track networks and camp sites providing unique remote travel experiences. Recreational pressure can contribute to impacts including littering, track proliferation, firewood collection, soil compaction and site erosion, a concern for natural and cultural values management. However, these impacts are relatively low in this Local Area and depend on the accessibility, popularity and sensitivity of the site.

Active community-based groups in the area include Landcare (Hopetoun, Rainbow and District, Mallee and Weeah groups), Friends of Wyperfeld, Mildura 4WD Club, Murray Darling Association, Victorian Malleefowl Recovery Group and Sunraysia Bushwalkers Inc.

## INTEGRATED MANAGEMENT

Management actions that protect and enhance the significant values of this Local Area will provide for integrated, landscape-scale outcomes that also deliver against the whole-of-region medium-term (6-year) outcomes targets identified for our Biodiversity, Waterways, Agricultural Land, Culture and Heritage, and Community Capacity for NRM assets. Table 19 provides an overview of priority management actions and targets to be implemented within the area, and the local stakeholders that will contribute to their delivery (see Appendix 6 for complete list of Priority Management Directions). A separate Wyperfeld Complex Local Area Action Plan will provide further detail on stakeholder interests, existing programs/activities, and future investment priorities. The plan will be reviewed annually in consultation with stakeholders to ensure currency and inform ongoing investment/delivery priorities.

**Table 19: Wyperfeld Complex ICM priorities and targets.**

Significant Values <i>Why we need to take action:</i>	Major Threats <i>What risks we need to manage:</i>	Priority Management Directions <i>What actions we need to focus on:</i>	Management Targets <i>What we will deliver by 2028:</i>	Delivery Partners <i>Who will be involved:</i>
<ul style="list-style-type: none"> <li>• 38% of total area (291,975ha) supports habitat of highest ecological value to Victoria (top 20%)</li> <li>• Supports 4 EPBC listed communities (3 flora &amp; 1 fauna)</li> <li>• One site listed under the Victorian Heritage Rivers (Outlet Creek to Wirrengren Plain)</li> <li>• Supports a large number of threatened species (104 listed species recorded)</li> <li>• High cultural importance</li> <li>• Significant recreational opportunities</li> </ul>	<ul style="list-style-type: none"> <li>• Altered Hydrological Regimes</li> <li>• Constrained regenerative capacity</li> <li>• Environmental Weed Competition</li> <li>• Grazing Pressure</li> <li>• Inappropriate fire regimes</li> <li>• Introduced Predators</li> <li>• Land-use Change (habitat loss &amp; fragmentation)</li> <li>• Recreational pressures</li> </ul>	<ul style="list-style-type: none"> <li>• Cross tenure herbivore (rabbits, goats, pigs, overabundant kangaroos), predator (foxes, cats), and weed control programs in priority locations to support multiple species/whole of system benefits</li> <li>• Supplementary planting in priority locations to support habitat restoration</li> <li>• Targeted/Specialised interventions required for specific species/issue benefits</li> <li>• Maintaining and enhancing infrastructure (e.g. visitor facilities, bollards/fencing, roads/trails) to enhance recreation opportunities and reduce associated impacts on natural/cultural values</li> <li>• Climate ready interventions to provide for improved resilience and adaptive capacity</li> <li>• Advancing opportunities for self-determined participation and leadership by Traditional Owners</li> <li>• Application of Traditional Owner led practices to meet cultural objectives</li> <li>• Application of Cultural Landscapes within regional planning and management frameworks</li> <li>• Building the capacity of community groups, Traditional Owners, land owners, and/or individuals to support regional NRM efforts</li> <li>• Supporting/responding to the evolving needs of community groups, Traditional Owners, and individuals already participating in NRM</li> </ul>	<ul style="list-style-type: none"> <li>• Priority habit protected or improved by:               <ul style="list-style-type: none"> <li>- 2,055 ha sustained weed control</li> <li>- 448,911 ha sustained herbivore control</li> <li>- 1,751 ha sustained predator control</li> <li>- Revegetation within priority habitat</li> </ul> </li> <li>• 20,570 ha riparian land protected or improved</li> <li>• Increased amenity supporting recreational activities</li> <li>• Increased area subject to Traditional Owner led practices</li> <li>• Increased number of opportunities for community groups and individuals to deliver NRM focused actions</li> <li>• Increased number of partnerships that provide for co-operative and collaborative approaches to NRM</li> <li>• Increased number of opportunities for Traditional Owners/First Nations Peoples to reconnect to Country</li> <li>• Increased number of programs co-designed and implemented in partnership with, or led by, Traditional Owners</li> </ul>	<ul style="list-style-type: none"> <li>Barengi Gadjin Land Council</li> <li>DELWP</li> <li>Hindmarsh Shire Council</li> <li>Mildura Rural City Council</li> <li>Parks Victoria</li> <li>West Wimmera Shire Council</li> <li>Yarriambiack Shire Council</li> <li>BirdLife</li> <li>Landcare / Community NRM Groups</li> <li>Mallee CMA</li> </ul>

\* Spatial representations of priority locations for weed control, herbivore control, and pest predator control within the Local Area are provided in Appendix 5.



#### 4.1.8 NORTH WIMMERA CREEKLINES

*This 35,108 hectare landscape encompasses Yarriambiack Creek, Coorong and Lascelles Lakes, and small woodland and grassland remnants. It includes the regional townships of Hopetoun and Beulah.*

Approximately six percent of the landscape is public land, with dryland cropping being the primary land use<sup>74</sup>. Two other Local Areas adjoin the North Wimmera Creeklines: Wyperfeld Complex in the north; and Agricultural Land along most of the remaining boundary (Figure 59). It also borders the Wimmera region to the south.

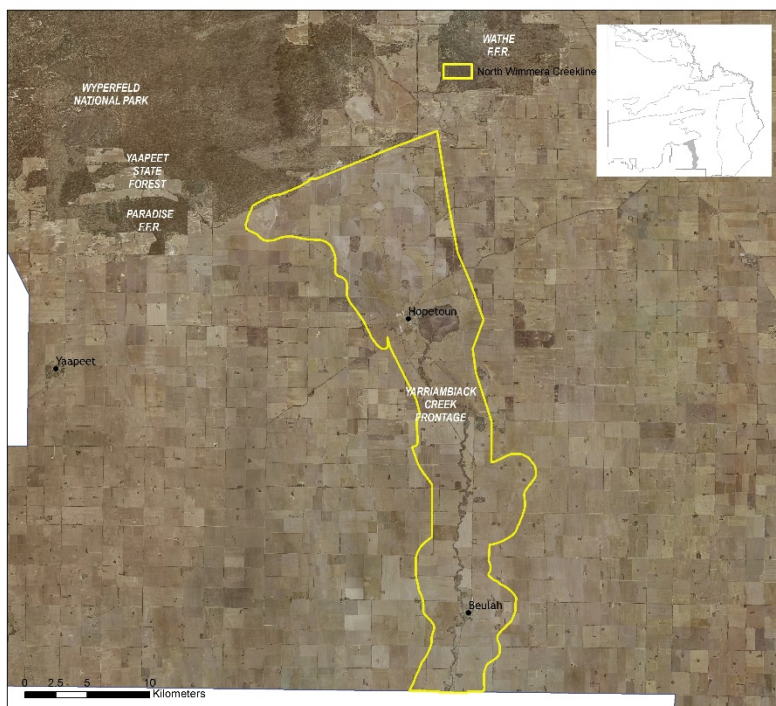


Figure 58: North Wimmera Creeklines Local Area

#### NATURAL VALUES

Around 11 percent (3,805ha) of native vegetation has been retained in some form across the landscape. Overall, some 22 percent of the vegetation occurring within the area is classified as Vulnerable, consisting primarily of Lignum Swampy Woodland (19%) and Woorinen Mallee (2%) EVCs. A further 23 percent is classified as Endangered, encompassing Ridged Plains Mallee (8%), Plains Savannah (7%), Parilla Mallee (4%) and Plains Woodland EVCs.

This includes three EPBC listed ecological communities, the Endangered Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions; and the

Critically Endangered Plains Mallee Box Woodlands of the Murray Darling Depression and Riverina Bioregions and Natural Grasslands of the Murray Valley Plains.

Agricultural development across the area has meant that these communities are now primarily fragmented remnants distributed along roadsides, small public reserves and isolated patches on private land.

State-wide modelling identifies 1,752 hectares (5% of total area) of habitat occurring within this area as being of the highest ecological value to Victoria (top 20%) and therefore a priority for protection and enhancement (see Appendix 7).

Some 1,056 hectares of waterways occur within the area, with one reach (170 ha) and three wetlands (737 ha) identified as a priority for management. This encompasses a relatively small (43 km) section of Yarriambiack Creek, a north flowing intermittent stream of the Wimmera River that terminates in Lake Coorong and Lake Lascelles, east of Hopetoun. Apart from small amounts of local run-off, flows in the creek are dependant on run-off upstream in the Wimmera River catchment and water supplied through the Wimmera Mallee Pipeline.

In total, 17 species listed as threatened at a federal and/or state level have been recorded as occurring within this Local Area since 1990; comprising nine birds, one amphibian and seven plants. Habitat distribution models

<sup>74</sup> See Local Area 9 for further detail on associated agricultural land values and priorities

identify that the area is of particular importance to the conservation of Blue-billed Duck, Ruddy Turnstone, Red Knot, Regent Parrot and Eastern Great Egret.

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### **CULTURAL VALUES**

Yarriambiack Creek is recognised as having a long history of occupation and use by Aboriginal people, with a number of cultural sites heritage sites identified across the landscape. Barengi Gadjin Land Council has statutory responsibilities for managing Aboriginal Cultural Heritage on Country in this area.

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### **SOCIAL VALUES**

This creek system is not only a source of water for these communities, it's also a significant recreational resource and aesthetic feature with the Yarriambiack Creek frontage and the Lakes Reserve making up the only significant areas of public land in this area (Figure 60). Due to the close proximity of waterways they are popular for day use recreation, and camping.

Active groups include the Beulah and Hopetoun Landcare Groups, Friends of Yarriambiack Creek, Lake Lascelles/Coorong Committee of Management, and Murray Darling Association.



**Figure 59: Yarriambiack Creek and Beulah Weir Pool.**

## INTEGRATED MANAGEMENT

Management actions that protect and enhance the significant values of this Local Area will provide for integrated, landscape-scale outcomes that also deliver against the whole-of-region medium-term (6-year) outcomes targets identified for our Biodiversity, Waterway, Agricultural Land, Culture and Heritage, and Community Capacity for NRM assets. Table 20 provides an overview of priority management actions and targets to be implemented within the area, and the local stakeholders that will contribute to their delivery (see Appendix 6 for complete list of Priority Management Directions). A separate North Wimmera Creeklines Local Area Action Plan will provide further detail on stakeholder interests, existing programs/activities, and future investment priorities. The plan will be reviewed annually in consultation with stakeholders to ensure currency and inform ongoing investment/delivery priorities.

**Table 20: North Wimmera Creeklines ICM priorities and targets.**

Significant Values <i>Why we need to take action:</i>	Major Threats <i>What risks we need to manage:</i>	Priority Management Directions <i>What actions we need to focus on:</i>	Management Targets <i>What we will deliver by 2028:</i>	Delivery Partners <i>Who will be involved:</i>
<ul style="list-style-type: none"> <li>• 5% of total area (1,7250ha) supports habitat of highest ecological value to Victoria (top 20%)</li> <li>• 11% of area has high conservation status – including three EPBC listed communities</li> <li>• Important habitat for several threatened species (17 listed species recorded)</li> <li>• Yarriambiack Creek provides an important wildlife corridor</li> <li>• High cultural importance</li> <li>• Significant recreational opportunities</li> </ul>	<ul style="list-style-type: none"> <li>• Altered Hydrological Regimes</li> <li>• Constrained regenerative capacity</li> <li>• Environmental Weed Competition</li> <li>• Grazing Pressure</li> <li>• Land-use Change (habitat loss &amp; fragmentation)</li> <li>• Recreational pressures</li> </ul>	<ul style="list-style-type: none"> <li>• Cross tenure herbivore (rabbits, goats, pigs, overabundant kangaroos), and weed control programs in priority locations that support landscape/multiple species benefits</li> <li>• Supplementary planting in priority locations to support habitat restoration</li> <li>• Watering regimes to meet environmental, cultural and social objectives</li> <li>• Maintaining and enhancing infrastructure (e.g. visitor facilities, bollards/fencing, roads/trails) to enhance recreation opportunities and reduce associated impacts on natural/cultural values</li> <li>• Reducing risks associated with extreme events.</li> <li>• Targeted/Specialised interventions required for specific species/issue benefits</li> <li>• Climate ready interventions to provide for improved resilience and adaptive capacity</li> <li>• Advancing opportunities for self-determined participation and leadership by Traditional Owners.</li> <li>• Application of Traditional Owner led practices to meet cultural objectives</li> <li>• Building the capacity of community groups, Traditional Owners, land owners, and/or individuals to support regional NRM efforts</li> <li>• Supporting/responding to the evolving needs of community groups, Traditional Owners, and individuals already participating in NRM</li> </ul>	<ul style="list-style-type: none"> <li>• Priority habit protected or improved by:               <ul style="list-style-type: none"> <li>- 451 ha sustained weed control*</li> <li>- 1,750 ha sustained herbivore control*</li> <li>- 680 ha appropriate water regimes</li> <li>- revegetation within priority habitat</li> </ul> </li> <li>• 24,053 ha riparian land protected or improved</li> <li>• Increased amenity supporting recreational activities.</li> <li>• Increased understanding and mitigation of regional flood risks.</li> <li>• Increased area subject to Traditional Owner led practices</li> <li>• Increased number of opportunities for community groups and individuals to deliver NRM focused actions.</li> <li>• Increased number of partnerships that provide for co-operative and collaborative approaches to NRM</li> <li>• Increased number of opportunities for Traditional Owners/First Nations Peoples to reconnect to Country</li> </ul>	<ul style="list-style-type: none"> <li>Barengi Gadjin Land Council</li> <li>DELWP</li> <li>GWM Water</li> <li>Yarriambiack Shire Council</li> <li>Parks Victoria</li> <li>Private Land managers</li> <li>Landcare / Community NRM Groups</li> <li>Mallee CMA</li> </ul>

\* Spatial representations of priority locations for weed control, herbivore control, pest predator control and revegetation re-establishment within the Local Area are provided in Appendix 5.



## 4.1.9 AGRICULTURAL LAND

*This 2.4 million hectare landscape encompasses all land developed for dryland and irrigated agriculture and the region's biodiversity, waterways, cultural heritage and community assets not covered by the previous eight Local Areas.*

The Agriculture Land Local Area encompasses extensive areas of dryland cropping and grazing; irrigation along the Murray River corridor from Nyah to the South Australian Border; and a groundwater irrigation district centred on the town of Murrayville. These productive landscapes also support significant natural, cultural and social values across the region.

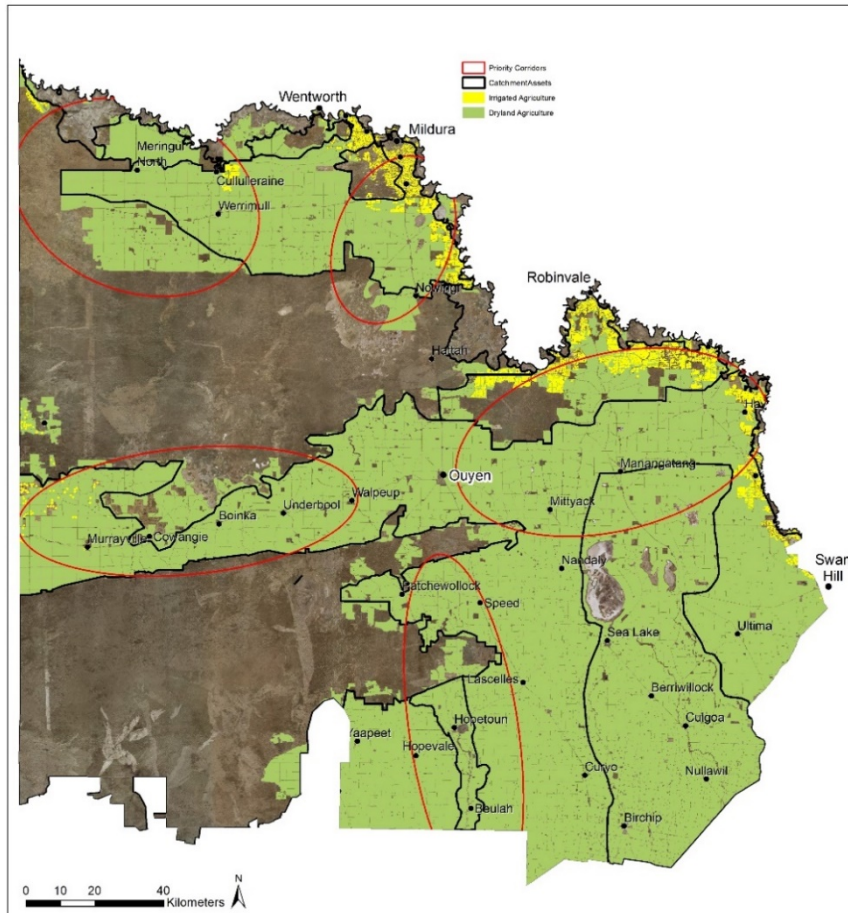


Figure 60: Agricultural Land and Priority Corridors Local Area.

The area encompasses three sub-management units to support targeted planning and delivery processes within the larger landscape where required; Dryland Agricultural, Irrigated Agriculture, and Priority Corridors (Figure 61).

The Priority bio-link corridors represent the most effective locations to enhance linkages between the region's significant ecological landscapes (i.e. Local Assets), providing a framework to target delivery of revegetation works that are aiming to improve connectivity across fragmented landscapes.

As a dispersed landscape, the Agricultural Land area adjoins and interacts with each of the region's eight discrete Local Areas.

### ECONOMIC VALUES

Agriculture plays a major role in sustaining the economy of the region, with the gross value of production in 2019-20 being some \$2.43 billion; \$1.34 billion for irrigated crops, \$933 million for dryland crops, and \$149 million for livestock enterprises.

### NATURAL VALUES

Clearing of Mallee vegetation for agricultural production across this landscape has resulted in a mosaic of scattered patches of remnant vegetation. The 107,074 hectares of native vegetation that does remain in small reserves, on private land, and along the roadsides and rail reserves dissecting the region does however provide significant habitat value. They are of particular importance for the threatened flora they contain and for the connectivity opportunities they provide to our region's fauna.

Of this remaining vegetation, 55 percent is classified as Vulnerable; encompassing Woorinen Mallee (26%), Semi-arid Woodland (15%) and Chenopod Mallee (13%) EVCs. A further 21 percent is classified as Endangered, consisting primarily of Ridged Plains Mallee (10%), Parilla Mallee (6%) and Plains Savannah (3%) EVCs.

This vegetation represents a large proportion of the distribution of three EPBC listed ecological communities and the fauna they support: the Endangered Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions; the Critically Endangered Plains Mallee Box Woodlands of the Murray Darling Depression and Riverina Bioregions; and the Critically Endangered Natural Grasslands of the Murray Valley Plains.

The area also contains a number of dispersed wetlands. These are mostly saline systems (salinas and boinkas) in the centre and south-east of the region, associated with natural groundwater discharge sites. They are generally semi-permanent and characterised by salt tolerant flora.

In the south, there are numerous ephemeral wetlands that would have historically been inundated by local catchment run-off. With significant changes to the hydrology of the region through agricultural development (e.g. clearing and cultivation) they were dependant on water from a domestic channel system. And subsequently, following pipeline establishment they now rely on connections to receive water allocations.

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## CULTURAL VALUES

This landscape is recognised as having high value to Traditional Owners, with numerous cultural sites recorded. The area has cultural importance to several Traditional Owner groups identifying connections to Country across the landscape.

Two Registered Aboriginal Parties, Barengi Gadjin Land Council and First People of the Millewa Mallee has statutory responsibilities for managing Aboriginal Cultural Heritage on Country across parts of the Local Area (see Figure 2).

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## SOCIAL VALUES

Some 62 percent of the Mallee is private land, with individual landholders being primarily responsible for its management. There are currently 1,599 rural land holdings across both the dryland and irrigation industries. Agriculture is also the main industry sector covering approximately 19 percent of those employed in the region and is central to many of the Mallee’s small regional communities.

Industry groups such as Dried Fruits Australia, Citrus Australia Limited, Australian Table Grapes Association, Murray Valley Winegrowers, Almond Board Australia, Mallee Sustainable Farming, Birchip Cropping Group and the Victorian Farmers Federation are all active in the region. All the Landcare groups in the region also have an interest in NRM which encompasses both natural and productive landscapes.

Many waterways and larger reserves occurring across the area are popular recreation sites.



Figure 61: Irrigated agriculture



Figure 62: Dryland agriculture



## INTEGRATED MANAGEMENT

Management actions that protect and enhance the significant values of this Local Area will provide for integrated, landscape-scale outcomes that also deliver against the whole-of-region medium-term (6-year) outcomes targets identified for our Biodiversity, Waterways, Agricultural Land, Culture and Heritage, and Community Capacity for NRM assets. Table 21 provides an overview of priority management actions and targets to be implemented within the area, and the local stakeholders that will contribute to their delivery (see Appendix 6 for complete list of Priority Management Directions). A separate Agricultural Land Local Area Action Plan will provide further detail on stakeholder interests, existing programs/activities, and future investment priorities. The plan will be reviewed annually in consultation with stakeholders to ensure currency and inform ongoing investment/delivery priorities.

**Table 21: Agricultural Land ICM priorities and targets.**

Significant Values <i>Why we need to take action:</i>	Major Threats <i>What risks we need to manage:</i>	Priority Management Directions <i>What actions we need to focus on:</i>	Management Targets <i>What we will deliver by 2028:</i>	Delivery Partners <i>Who will be involved:</i>
<ul style="list-style-type: none"> <li>• Agriculture is the region's primary industry and employer</li> <li>• Native vegetation remnants significant for the underrepresented species/communities they contain and the connectivity they provide – including 3 EPBC listed communities</li> <li>• Dispersed waterways represent habitat refuges for many native species</li> <li>• Cultural importance</li> <li>• Recreational opportunities</li> </ul>	<ul style="list-style-type: none"> <li>• Agricultural Pests and Diseases</li> <li>• Altered Hydrological Regimes</li> <li>• Environmental Weed Competition</li> <li>• Grazing Pressure</li> <li>• Inappropriate fire regimes</li> <li>• Introduced Predators</li> <li>• Land and Water Salinisation</li> <li>• Land-use Change (habitat loss &amp; fragmentation)</li> <li>• Recreational pressures</li> <li>• Soil Health Decline</li> <li>• Wind Erosion</li> <li>• Water Quality</li> </ul>	<ul style="list-style-type: none"> <li>• Research, extension and industry partnerships to support effective knowledge transfer</li> <li>• Innovative approaches to delivery</li> <li>• Diverse, adaptable, and resilient agricultural systems that maximise production potential, minimise risk, and enhance viability – including drought preparedness and climate ready strategies</li> <li>• Maintaining groundcover above regional thresholds.</li> <li>• Increasing the soil organic carbon stocks of agricultural soils</li> <li>• Managing rootzone drainage within required thresholds</li> <li>• Reclaiming, stabilising and utilising agricultural soils that are severely degraded, and have limited production potential</li> <li>• Anticipatory and adaptive approaches to pests, disease and weed management</li> <li>• Cross tenure herbivore (rabbits, goats, pigs, overabundant kangaroos), predator (foxes, cats), and weed control programs in priority locations that support multiple species/whole of system benefits.</li> <li>• Re-establishment of native vegetation to support habitat connectivity</li> <li>• Application of Traditional Owner led practices to meet cultural objectives</li> <li>• Building the capacity of community groups, Traditional Owners, land owners, and/or individuals to support regional NRM efforts</li> <li>• Supporting/responding to the evolving needs of community groups, Traditional Owners, and individuals already participating in NRM</li> </ul>	<ul style="list-style-type: none"> <li>• Increased application of 'best practice' for soil health and productivity improvements</li> <li>• Average area of agricultural land exceeding 50% groundcover target increased</li> <li>• Increased application of 'best practice' for water use efficiency and productivity improvements</li> <li>• Net salinity credit balance on the BSM2030 salinity registers maintained</li> <li>• Groundwater usage in the Murrayville Groundwater Management Area maintained within required thresholds.</li> <li>• Priority habit protected or improved by: <ul style="list-style-type: none"> <li>- 32,830 ha sustained weed control*</li> <li>- 114,045 ha sustained herbivore control*</li> <li>- 1,702 ha sustained predator control*</li> <li>- 3,450 ha revegetation within priority locations*</li> <li>- 87 ha appropriate water regimes</li> </ul> </li> <li>• 730 hectares of priority locations permanently protected on private land</li> <li>• Increased number of opportunities for community groups and individuals to deliver NRM focused actions</li> <li>• Increased number of partnerships that provide for co-operative and collaborative approaches to NRM</li> <li>• Increased number of programs co-designed and implemented in partnership with, or led by, Traditional Owners</li> </ul>	<ul style="list-style-type: none"> <li>Buloke Shire Council</li> <li>DELWP</li> <li>Goulburn Murray Water</li> <li>GWM Water</li> <li>Lower Murray Water</li> <li>Mildura Rural City Council</li> <li>Parks Victoria</li> <li>Private Land Managers</li> <li>Swan Hill Rural City Council</li> <li>Yarriambiack Shire Council</li> <li>Agriculture Victoria</li> <li>Greening Australia</li> <li>Industry – Farmer Groups</li> <li>Landcare / Community</li> <li>NRM Groups</li> <li>Mallee CMA</li> <li>Traditional Owners</li> <li>Trust for Nature</li> </ul>

\* Spatial representations of priority locations for weed control, herbivore control, pest predator control and revegetation re-establishment within the Local Area are provided in Appendix 5

# 5: APPENDICES

## APPENDIX 1: PLANNING INSTRUMENTS INFORMING REGIONAL AND LANDSCAPE SCALE NRM IN THE MALLEE

### 1.1 REGIONAL SCALE PLANNING INSTRUMENTS

The key federal, state and regional instruments considered in the development of priority management and strategic directions for the Biodiversity, Waterways, Agricultural Land, Culture and Heritage and Community Capacity for NRM themes are listed in Table A1 below.

**Table A1: Regional, state and federal planning instruments informing Biodiversity, Waterway, Agricultural Land, Culture and Heritage, and Community Capacity for NRM management at the whole of region x theme scale.**

Instrument	RCS Theme				
	Biodiversity	Waterways	Agricultural Land	Culture and Heritage	Community Capacity for NRM
<b>Regional</b>					
Loddon Mallee Climate Ready Plan 2022					
Loddon Mallee North Regional Growth Plan (2014)					
Loddon Mallee Regional Strategic Plan (2015)					
Mallee Dryland Sustainable Agriculture Strategy (2017-23)					
Mallee Floodplain Management Strategy (2018-28)					
Victorian Mallee Irrigation Region Land and Water Management Plan (2020-29)					
Mallee Natural Resource Management Plan for Climate Change (2016)					
Mallee Regional Catchment Strategy (2013-19)					
Mallee Regional Landcare Support Strategy (2013-18)					
Mallee Waterway Strategy (2014-22)					
<b>State</b>					
Aboriginal Heritage Act 2006 & 2016 Amendment					
Aboriginal Heritage Regulations 2018					
Aboriginal Participation Guidelines for Victorian CMA's (2016)					
Catchment and Land Protection Act 1994					
Climate Change Act 2017					
Community Engagement and Partnerships Framework for Victoria's CMA's (2017)					
Flora and Fauna Guarantee Act 1988.					
Integrated Water Management Framework for Victoria (2017)					
Landcare Victoria Strategic Plan (2021-2024)					
Natural Environment Climate Change Adaptation Action Plan (2022-2026)					
Northern Region Sustainable Water Strategy (2009)					
Our Catchments, Our Communities: Building on the Legacy for Better Stewardship 2021					
Planning and Environment Act 1987					
Primary Production Climate Change Adaptation Action Plan (2022-26)					
Pupangarli Marnmarnepu 'Owning our Future' Aboriginal Self-Determination Reform Strategy (2020-2025)					
Rivers and Riparian Action Plan (2020-24)					
Strong, Innovative, Sustainable: A new strategy for agriculture in Victoria (2020)					
State Environment Protection Policy (Waters)					

Instrument	RCS Theme				
	Biodiversity	Waterways	Agricultural Land	Culture and Heritage	Community Capacity for NRM
Traditional Owner objectives and outcomes: Compilation of contributions to Victoria's water resource plans (2019)					
Traditional Owner Settlement Act 2010					
Trust for Nature – Conservation Plan for Private Land (2013)					
Victorian Aboriginal Affairs Framework (2018-23)					
Victorian Aboriginal Heritage Council Strategic Plan (2017-21)					
Victoria's Environment – Biodiversity 2037					
Victorian Floodplain Management Strategy (2016)					
Victorian Irrigation Drainage Program – Strategic Directions (2021-2024)					
Victorian Rural Drainage Strategy (2018-23)					
Victorian State of the Environment Report (2018)					
Victorian Traditional Owner Cultural Landscapes Strategy (2021)					
Victorian Waterway Management Strategy (2013)					
Victorians Volunteering for Nature: Environmental Volunteering Plan (2018)					
Victoria's State of the Parks – Fourth edition (2018)					
Water Act 1989					
Water for Victoria (2016)					
Western Region Sustainable Water Strategy (2011)					
<b>Federal</b>					
Australian Government's Drought Response, Resilience and Preparedness Plan (2020-24)					
Australian Heritage Study, Commonwealth of Australia (2015)					
Australian Pest Animal Strategy (2017-2027)					
Australian Weed Strategy (2017-2027)					
Australia's Strategy for Nature (2019-2030)					
Basin Salinity Management (BSM) 2030					
Environment Protection and Biodiversity Conservation Act 1999.					
GRDC Strategic Plan (2005-25)					
National Agreement of Closing the Gap					
National Climate Resilience and Adaptation Strategy (2021-25)					
National Farmers Federation 2030 Roadmap (2018)					
National Soil Strategy (2021) and Commonwealth Interim Action Plan (2021)					
Native Title Act 1993					
Native Title Legislation Amendment Act 2021					
Threatened Species Strategy (2021-2031)					
Threatened Species Action Plan (2021-2026) – <i>incorporating 100 Priority Species &amp; 20 Priority Places.</i>					
Victoria's North and Murray Water Resource Plan (2020)					

Instrument	RCS Theme				
	Biodiversity	Waterways	Agricultural Land	Culture and Heritage	Community Capacity for NRM
Wimmera-Mallee (Groundwater) Water Resource Plan (2019)					
Wimmera-Mallee (Surface Water) Water Resource Plan (2019)					



## 1.2 LANDSCAPE SCALE PLANNING INSTRUMENTS

The key local instruments considered in the development of priority management actions for each Local Area are listed in Table A2 below.

**Table A2: Local planning instruments informing Local Area management at the landscape scale.**

Instrument	Local Area								
	1: MRF	2:C-K	3: MSB	4: MSC	5: A-W	6: AB	7:WC	8: NWC	9: AL
Barengi Gadjin Land Council Country Plan: Growing what is Good (2016)									
Biodiversity Response Planning – Focus Landscape Factsheets (2020)									
Buloke Shire Council Climate Action Plan									
Buloke Shire Council Community Plans, encompassing 6 communities									
Conservation Action Plan for Parks and Reserves Managed by Parks Victoria. River Red Gum (2019)									
Conservation Action Plan for Parks and Reserves Managed by Parks Victoria. Mallee (2019)									
Direl (Lake Tyrrell) Cultural Landscape Conservation Management Plan									
Environmental Water Management Plans – 30 individual plans encompassing priority Waterways									
First People of the Millewa-Mallee Aboriginal Corporation Action Plan (2020)									
Hattah-Kulkyne Lakes Ramsar Site Ecological Character Description (2011) and Interim Management Plan (2021)									
Lower Murray Water Reconciliation Action Plan (2019-20)									
Mallee Indigenous Participation Plan 2020-23									
Mallee CMA Reconciliation Action Plan 2017-19									
Mildura Rural City Council Community Plans, encompassing 13 communities									
Mildura Rural City Council Environmental Education Plan (2020-2024)									
Mildura Rural City Council Invasive Plants and Animals Plan (2020-24)									
Mildura Rural City Council Native Vegetation Plan (2020-24)									
Mildura Rural City Council Reconciliation Action Plan (2017-2020)									
Murrayville Groundwater Management Area Local Management Plan (2017)									
Swan Hill Rural City Council Aboriginal Community Partnership Strategy (2017-21)									
Swan Hill Rural City Council Community Plans, encompassing 6 communities									
Yarriambiack Shire Council Community Action Plans encompassing 3 communities									
Victorian Traditional Owner Cultural Fire Strategy (2018)									
Victorian Traditional Owner Native Foods and Botanicals Strategy (2018)									
Victorian Traditional Owner Game Management Strategy									

## APPENDIX 2: STAKEHOLDER ENGAGEMENT

A summary of the stakeholder forums/audiences and representatives engaged to date is provided in Table A3.

**Table A3: Stakeholder forums and representatives engaged to inform development of this Draft RCS.**

Forum/Audience	Representation
Mallee CMA Board	<ul style="list-style-type: none"> <li>• Eight ministerially appointed community members</li> </ul>
Mallee Regional Catchment Strategy Steering Committee	<ul style="list-style-type: none"> <li>• Buloke Shire Council</li> <li>• Department of Environment, Land, Water and Planning</li> <li>• GWM Water</li> <li>• Lower Murray Water</li> <li>• Mallee CMA</li> <li>• Mildura Rural City Council</li> <li>• Parks Victoria</li> <li>• Swan Hill Rural City Council</li> <li>• Yarriambiack Shire Council</li> </ul>
Registered Aboriginal Parties	<ul style="list-style-type: none"> <li>• Barengi Gadjin Land Council Aboriginal Corporation<sup>75</sup></li> <li>• First People of the Millewa Mallee Aboriginal Corporation</li> </ul>
Mallee Aboriginal Reference Group	<ul style="list-style-type: none"> <li>• Aboriginal Elders</li> <li>• Traditional Owner Representatives</li> </ul>
Mallee Land and Water Advisory Committee	<ul style="list-style-type: none"> <li>• Seven Mallee community members</li> </ul>
Traditional Owner Groups and other Indigenous Stakeholders	<ul style="list-style-type: none"> <li>• Wemba Wamba, Wadi Wadi, Tati Tati, Weki Weki, and Nyeri Nyeri</li> </ul>
Victorian Mallee Irrigation Region Land and Water Management Plan Implementation Committee	<ul style="list-style-type: none"> <li>• Agriculture Victoria</li> <li>• Department of Environment, Land, Water and Planning</li> <li>• Goulburn Murray Water</li> <li>• GWM Water</li> <li>• Lower Murray Water</li> <li>• Mallee CMA</li> </ul>
Mallee Biodiversity & Water Catchment Partnership Committee	<ul style="list-style-type: none"> <li>• Agriculture Victoria</li> <li>• Buloke Shire Council</li> <li>• Department of Environment, Land, Water and Planning</li> <li>• GWM Water</li> <li>• Lower Murray Water</li> <li>• Mallee CMA</li> <li>• Mildura Rural City Council</li> <li>• Parks Victoria</li> <li>• Regional Landcare</li> <li>• Swan Hill Rural City Council</li> <li>• Trust for Nature</li> <li>• Yarriambiack Shire Council</li> </ul>
Mallee Sustainable Agriculture Catchment Partnership Committee	<ul style="list-style-type: none"> <li>• Agriculture Victoria</li> <li>• Birchip Cropping Group</li> <li>• Mallee CMA</li> <li>• Mallee Sustainable Farming</li> <li>• Private Agribusiness</li> <li>• Regional Landcare</li> </ul>
Biodiversity Response Planning (DELWP)	<ul style="list-style-type: none"> <li>• Agriculture Victoria</li> <li>• Department of Environment, Land, Water and Planning</li> <li>• First People of the Millewa Mallee Aboriginal Corporation</li> <li>• Mallee CMA</li> <li>• Mildura Rural City Council</li> <li>• Parks Victoria</li> <li>• Swan Hill Rural City Council</li> <li>• Trust for Nature</li> </ul>

<sup>75</sup> BGLC workshops were undertaken in partnership with the three other CMA regions (Wimmera, North Central and Glenelg Hopkins) located in the RAP area.

## APPENDIX 3: STATEWIDE OUTCOMES FRAMEWORK

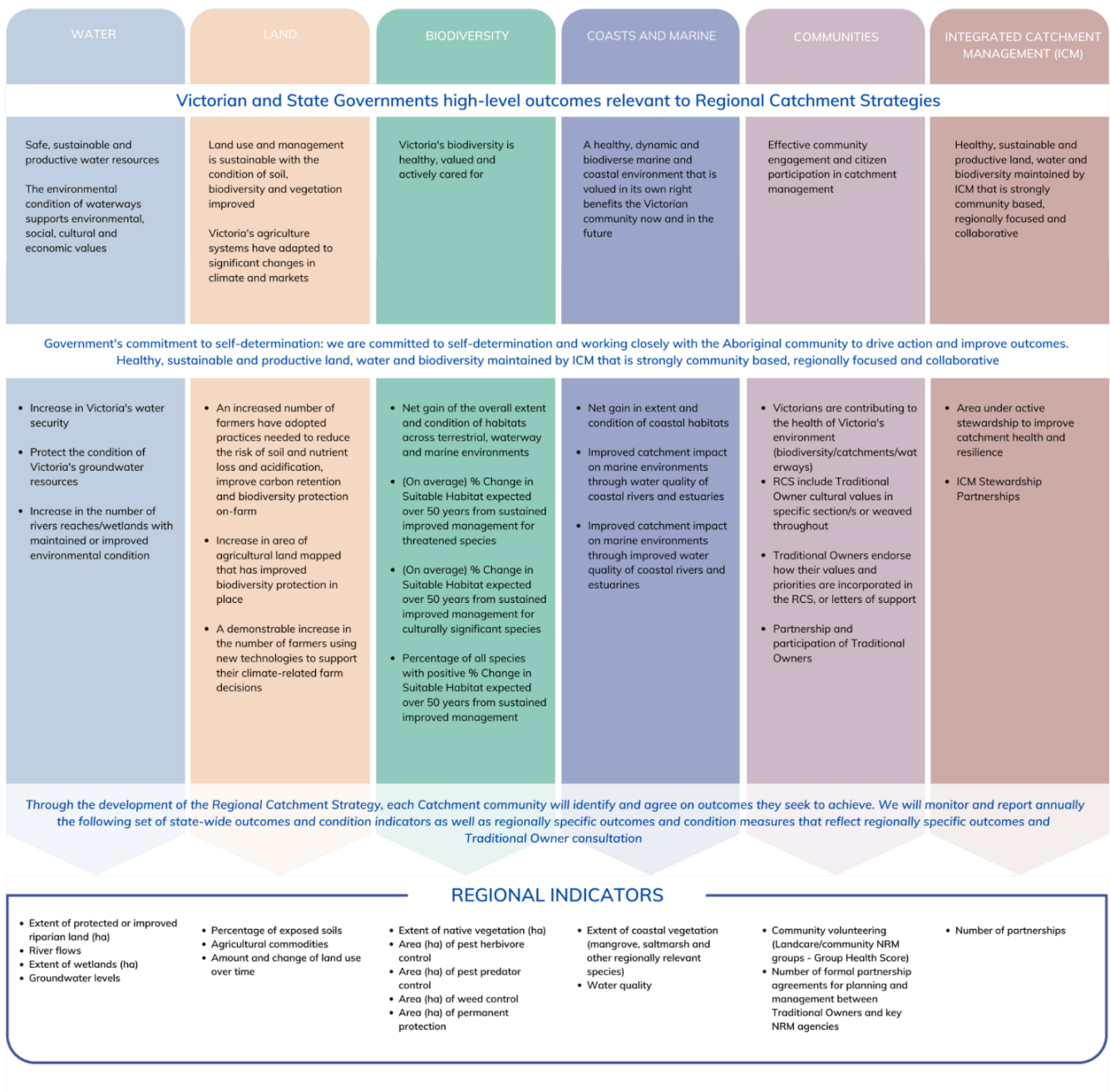


Figure A1: Statewide outcomes framework applied to each of the ten Victorian Regional Catchment Strategies.

## APPENDIX 4: THREATENED SPECIES AND ECOLOGICAL COMMUNITIES

*The 2022-2028 Regional Catchment Strategy (RCS) considers threatened species and ecological communities under the Biodiversity theme.*

Within this theme, those species and communities which are listed as threatened at either a Federal (under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)) or State (under the *Flora and Fauna Guarantee Act 1988* (FFG Act)) are considered to be a priority for future management actions. Each of the Victorian Mallee flora and fauna species and communities currently listed in these instruments is detailed below<sup>76</sup>.

### **Federal Listing**

The EPBC Act is the Australian Government's central piece of legislation for the protection of the environment the conservation of biodiversity and the promotion of the ecologically sustainable use of natural resources. The EPBC Act provides for the identification and listing of flora and fauna species, ecological communities and native migratory species as nationally threatened.

Listed flora and fauna species are categorised as: extinct, extinct in the wild, critically endangered, endangered, vulnerable, or conservation dependent (see: <https://www.environment.gov.au/cgi-bin/sprat/public/publicthreatenedlist.pl> for full listing). Listed ecological communities are categorised as critically endangered, endangered or vulnerable.

The Mallee CMA area contains ten flora species, 22 fauna species, five Vegetation Communities and one Fauna Community which are listed under the EPBC Act (Tables A4-A6).

### **State Listing**

The FFG Act is the key piece of Victorian legislation for the conservation of threatened species and communities and for the management of potentially threatening processes. It provides for the listing of threatened taxa (genera, species, subspecies, and varieties) and threatened communities of flora and fauna and potentially threatening processes.

Recent changes to the FFG Act used the common assessment method to remove duplication of species lists by establishing a single comprehensive list of threatened flora and fauna species known as the FFG Act Threatened List. Previous Advisory Lists have now been revoked. Further information on these changes can be found at <https://www.environment.vic.gov.au/conserving-threatened-species/threatened-list>.

The Mallee CMA area contains 277 flora species, 93 fauna species, five Flora Communities and two Fauna Communities which are listed under the FFG Act (Tables A4-A6).

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<sup>76</sup> Species lists for Tables A4-A5 were generated from Victorian Biodiversity Atlas from 1990 onwards <https://www.environment.vic.gov.au/biodiversity/victorian-biodiversity-atlas>. Species lists for Table A6 were determined from the updated (2021) Flora and Fauna Guarantee Act 1988 threatened species list retrieved from <https://www.environment.vic.gov.au/conserving-threatened-species/threatened-list> and the Protected Matters search tool website (limited to MCMA boundary) <https://www.awe.gov.au/environment/epbc/protected-matters-search-tool>

**Table A4: Flora species listed under the FFG Act and EPBC Act.**

Common Name	Scientific Name	FFG Status	EPBC Status
Australian Broomrape	<i>Orobanche cernua</i> var. <i>australiana</i>	Endangered	
Baldoo	<i>Atriplex lindleyi</i> subsp. <i>conduplicata</i>	Vulnerable	
Bear's-ear	<i>Cymbonotus lawsonianus</i>	Endangered	
Bignonia Emu-bush	<i>Eremophila bignoniiflora</i>	Endangered	
Billabong Daisy	<i>Brachyscome gracilis</i> subsp. <i>robusta</i>	Critically Endangered	
Black-fruit Daisy	<i>Brachyscome melanocarpa</i> subsp. <i>melanocarpa</i>	Critically Endangered	
Blue Burr-daisy	<i>Calotis cuneifolia</i>	Endangered	
Blue Mallee	<i>Eucalyptus polybractea</i>	Endangered	
Blue-bush Daisy	<i>Cratystylis conocephala</i>	Critically Endangered	
Blue-leaf Mallee	<i>Eucalyptus cyanophylla</i>	Vulnerable	
Bramble Wattle	<i>Acacia victoriae</i> subsp. <i>victoriae</i>	Endangered	
Branched Everlasting	<i>Coronidium adenophorum</i>	Endangered	
Branching Groundsel	<i>Senecio cunninghamii</i> var. <i>cunninghamii</i>	Endangered	
Bristly Love-grass	<i>Eragrostis setifolia</i>	Endangered	
Bristly Sea-heath	<i>Frankenia serpyllifolia</i>	Vulnerable	
Broom Milkwort	<i>Comesperma scoparium</i>	Endangered	
Brown Beetle-grass	<i>Diplachne fusca</i> subsp. <i>fusca</i>	Endangered	
Buloke	<i>Allocasuarina luehmannii</i>	Vulnerable	
Buloke Mistletoe	<i>Amyema linophylla</i> subsp. <i>orientalis</i>	Critically Endangered	
Burr-daisy	<i>Calotis cymbacantha</i>	Endangered	
Bush Minuria	<i>Minuria cunninghamii</i>	Vulnerable	
Button Rush	<i>Cyperus leptocarpus</i>	Endangered	
Cane Grass	<i>Eragrostis australasica</i>	Critically Endangered	
Chariot Wheels	<i>Maireana cheelii</i>	Endangered	Vulnerable
Club Spear-grass	<i>Austrostipa nullanulla</i>	Endangered	
Club-hair New Holland Daisy	<i>Vittadinia condyloides</i>	Endangered	
Coast Hollyhock	<i>Malva preissiana</i> s.s. ( <i>white-flowered coastal form</i> )	Endangered	
Common White Sunray	<i>Rhodanthe floribunda</i>	Endangered	
Compact Sneezeweed	<i>Centipeda crateriformis</i> subsp. <i>compacta</i>	Endangered	
Coral Saltbush	<i>Atriplex papillata</i>	Vulnerable	
Cotton Sneezeweed	<i>Centipeda nidiformis</i>	Endangered	
Cup Velleia (Cup Goodenia)	<i>Goodenia connata</i>	Endangered	
Darling Lily	<i>Crinum flaccidum</i>	Endangered	
Deniliquin Box	<i>Eucalyptus X oxypoma</i>	Endangered	
Dense Bush-pea	<i>Pultenaea densifolia</i>	Vulnerable	
Desert Bindweed	<i>Convolvulus clementii</i>	Endangered	
Desert Greenhood	<i>Pterostylis xerophila</i>	Critically Endangered	Vulnerable
Desert Groundsel	<i>Senecio lanibracteus</i>	Vulnerable	
Desert Jasmine	<i>Jasminum didymum</i> subsp. <i>lineare</i>	Endangered	
Desert Lantern	<i>Abutilon otocarpum</i>	Endangered	
Desert Rice-flower	<i>Pimelea simplex</i> subsp. <i>simplex</i>	Endangered	
Desert Rose Mallow	<i>Radyera farragei</i>	Critically Endangered	
Desert Sneezeweed	<i>Centipeda thespidioides</i> s.s.	Endangered	
Desert Spurge	<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	Critically Endangered	
Desert Styphelia	<i>Styphelia exarrhena</i>	Endangered	
Doubah	<i>Marsdenia australis</i>	Endangered	
Downs Nutgrass	<i>Cyperus bifax</i>	Critically Endangered	
Downy Swainson-pea	<i>Swainsona swainsonioides</i>	Endangered	
Dwarf Bitter-cress	<i>Rorippa eustylis</i>	Endangered	



Common Name	Scientific Name	FFG Status	EPBC Status
Dwarf Brooklime	<i>Gratiola pumilo</i>	Endangered	
Dwarf Cup-flower	<i>Gnephosis tenuissima</i>	Endangered	
Dwarf Flat-sedge	<i>Cyperus pygmaeus</i>	Endangered	
Dwarf Lantern-flower	<i>Abutilon fraseri</i>	Endangered	
Dwarf Myall	<i>Acacia ancistrophylla</i> var. <i>lissophylla</i>	Endangered	
Dwarf Old-man Saltbush	<i>Atriplex nummularia</i> subsp. <i>omissa</i>	Endangered	
Dwarf Swainson-pea	<i>Swainsona phacoides</i>	Endangered	
Eastern Great Egret	<i>Ardea alba modesta</i> (originally listed as <i>Ardea alba</i> )	Vulnerable	
Erect Peppergrass	<i>Lepidium pseudopapillosum</i>	Critically Endangered	Vulnerable
Fine-hairy Spear-grass	<i>Austrostipa puberula</i>	Endangered	
Finger Grass	<i>Dactyloctenium radulans</i>	Vulnerable	
Finger-leaved Daisy	<i>Brachyscome exilis</i>	Endangered	
Flat Spike-sedge	<i>Eleocharis plana</i>	Critically Endangered	
Fleshy Groundsel	<i>Senecio gregorii</i>	Endangered	
Fleshy Minuria	<i>Kippistia suaedifolia</i>	Endangered	
Fragrant Saltbush	<i>Rhagodia parabolica</i>	Vulnerable	
Frosted Goosefoot	<i>Chenopodium desertorum</i> subsp. <i>desertorum</i>	Endangered	
Frosted Goosefoot	<i>Chenopodium desertorum</i> subsp. <i>rectum</i>	Endangered	
Fuzzy New Holland Daisy	<i>Vittadinia cuneata</i> var. <i>hirsuta</i>	Endangered	
Fuzzy New Holland Daisy	<i>Vittadinia cuneata</i> var. <i>morrisii</i>	Endangered	
Garland Lily	<i>Calostemma purpureum</i> s.s.	Vulnerable	
Giant Honey-myrtle	<i>Melaleuca armillaris</i> subsp. <i>armillaris</i>	Endangered	
Giant New Holland Daisy	<i>Vittadinia megacephala</i>	Endangered	
Glandular Phebalium	<i>Phebalium glandulosum</i> subsp. <i>macrocalyx</i>	Critically Endangered	
Glistening Dock	<i>Rumex crystallinus</i> s.s.	Endangered	
Goat Head	<i>Malacocera tricornis</i>	Vulnerable	
Golden Sour-bush	<i>Choretrum glomeratum</i> var. <i>chrysanthum</i>	Endangered	
Grampians Rustyhood	<i>Pterostylis planulata</i> s.s.	Endangered	
Grassland Bindweed	<i>Convolvulus graminetinus</i>	Endangered	
Grassland Goodenia	<i>Goodenia arguta</i>	Endangered	
Green Copperburr	<i>Sclerolaena decurrens</i>	Endangered	
Green-leaf Mallee	<i>Eucalyptus phenax</i> subsp. <i>phenax</i>	Endangered	
Grey Podolepis	<i>Podolepis aristata</i> subsp. <i>affinis</i>	Endangered	
Grey Scurf-pea	<i>Cullen discolor</i>	Endangered	
Grey Wrinklewort	<i>Rutidosis helichrysoides</i> subsp. <i>helichrysoides</i>	Critically Endangered	
Hairy Darling-pea	<i>Swainsona greyana</i>	Critically Endangered	
Hairy Tails	<i>Ptilotus erubescens</i>	Critically Endangered	
Half-bearded Spear-grass	<i>Austrostipa hemipogon</i>	Vulnerable	
Hardhead	<i>Aythya australis</i>	Vulnerable	
Heathy Bluebush	<i>Maireana oppositifolia</i>	Endangered	
Hoary Scurf-pea	<i>Cullen cinereum</i>	Endangered	
Hoary Sea-heath	<i>Frankenia crispa</i>	Endangered	
Hooded Scaly-foot	<i>Pygopus schraderi</i>	Critically Endangered	
Horned Hop-bush	<i>Dodonaea hexandra</i>	Endangered	
Inland Daisy	<i>Brachyscome trachycarpa</i>	Critically Endangered	
Jerry Water-fire	<i>Bergia ammannioides</i>	Endangered	
Jerry-jerry	<i>Ammannia multiflora</i>	Endangered	
Knead Swainson-pea	<i>Swainsona reticulata</i>	Endangered	
Knotted Poa	<i>Poa drummondiana</i>	Endangered	
Lagoon Nightshade	<i>Solanum lacunarium</i>	Endangered	
Lagoon Sneezeweed	<i>Centipeda crateriformis</i> subsp. <i>crateriformis</i>	Endangered	

Common Name	Scientific Name	FFG Status	EPBC Status
Lagoon Spurge	<i>Phyllanthus lacunarius</i>	Endangered	
Large Rustyhood	<i>Pterostylis maxima</i>	Critically Endangered	
Large-flower Amaranth	<i>Amaranthus grandiflorus</i>	Endangered	
Lax Flat-sedge	<i>Cyperus flaccidus</i>	Endangered	
Leafy Sea-heath	<i>Frankenia foliosa</i>	Vulnerable	
Lime Daisy-bush	<i>Olearia calcarea</i>	Endangered	
Limestone Sida	<i>Sida spodochroma</i>	Endangered	
Long Eryngium	<i>Eryngium paludosum</i>	Endangered	
Long Tails	<i>Ptilotus polystachyus</i>	Endangered	
Low Hibiscus	<i>Hibiscus brachysiphonius</i>	Critically Endangered	
Lowan Phebalium	<i>Phebalium lowanense</i>	Not Listed in Vic.	Vulnerable
Mallee Annual-bluebell	<i>Wahlenbergia tumidifruca</i>	Endangered	
Mallee Cucumber	<i>Austrobryonia micrantha</i>	Endangered	
Mallee Golden Wattle	<i>Acacia notabilis</i>	Endangered	
Mallee Hemichroa	<i>Surreya diandra</i>	Critically Endangered	
Mallee Pellitory	<i>Parietaria cardiostegia</i>	Endangered	
Mallee Pigface	<i>Carpobrotus aff. rossii (N.W. Victoria)</i>	Critically Endangered	
Mallee Trachymene	<i>Trachymene thysanocarpa</i>	Vulnerable	
Mallee Tussock-grass	<i>Poa lowanensis</i>	Endangered	
Mallow-leaf Lantern-flower	<i>Abutilon malvifolium</i>	Critically Endangered	
Marsh Saltbush	<i>Atriplex paludosa subsp. paludosa</i>	Endangered	
Milkwort Sunray	<i>Rhodanthe polygalifolia</i>	Endangered	
Narrow-leaf Emu-bush	<i>Eremophila sturtii</i>	Critically Endangered	
Native Madder	<i>Synaptantha tillaeacea var. tillaeacea</i>	Critically Endangered	
Native Scurf-pea	<i>Cullen australasicum</i>	Critically Endangered	
Nealie	<i>Acacia loderi</i>	Critically Endangered	
Needle Grass	<i>Triraphis mollis</i>	Endangered	
Needle Wattle	<i>Acacia havilandiorum</i>	Critically Endangered	
Nodding Baeckea	<i>Euryomyrtus ramosissima subsp. prostrata</i>	Endangered	
Nodding Beard-heath	<i>Styphelia woodsii</i>	Endangered	
Northern Sandalwood	<i>Santalum lanceolatum</i>	Critically Endangered	
Orange Darling-pea	<i>Swainsona stipularis</i>	Critically Endangered	
Pale Myoporum	<i>Myoporum brevipes</i>	Critically Endangered	
Pale Plover-daisy	<i>Leiocarpa leptolepis</i>	Endangered	
Pearl Bluebush	<i>Maireana sedifolia</i>	Endangered	
Pin Sida	<i>Sida fibulifera</i>	Endangered	
Plains Billy-buttons	<i>Craspedia haplorrhiza</i>	Endangered	
Pointed Saltbush	<i>Atriplex acutibractea subsp. acutibractea</i>	Endangered	
Pointed Saltbush	<i>Atriplex acutibractea subsp. karoniensis</i>	Endangered	
Pop Saltbush	<i>Atriplex holocarpa</i>	Endangered	
Poverty Bush	<i>Sclerolaena intricata</i>	Endangered	
Prickly Bottlebrush	<i>Callistemon brachyandrus</i>	Endangered	
Prickly Cudweed	<i>Stuartina hamata</i>	Endangered	
Prickly Spear-grass	<i>Austrostipa pilata</i>	Critically Endangered	
Purple Love-grass	<i>Eragrostis lacunaria</i>	Endangered	
Purple Pentatope	<i>Rhyncharrhena linearis</i>	Endangered	
Purple Swainson-pea	<i>Swainsona purpurea</i>	Endangered	
Purple Wire-grass	<i>Aristida personata</i>	Critically Endangered	
Rabbit-ears Twin-leaf	<i>Roepera compressa</i>	Endangered	
Red Microcybe	<i>Microcybe multiflora subsp. multiflora</i>	Endangered	
Red Spinach	<i>Trianthema triquetrum</i>	Critically Endangered	

Common Name	Scientific Name	FFG Status	EPBC Status
Ridged Water-milfoil	<i>Myriophyllum porcatum</i>	Critically Endangered	Vulnerable
Rigid Spider-orchid	<i>Caladenia tensa</i>	Not Listed in Vic.	Endangered
Riverina Bitter-cress	<i>Cardamine moirensis</i>	Endangered	
Riverina Groundsel	<i>Senecio productus subsp. productus</i>	Endangered	
Riverine Flax-lily	<i>Dianella porracea</i>	Critically Endangered	
Rock Daisy	<i>Brachyscome petrophila</i>	Endangered	
Rough Heliotrope	<i>Heliotropium asperrimum</i>	Endangered	
Rough-nut Stackhousia	<i>Stackhousia aspericocca subsp. 1</i>	Not Listed in Vic.	Vulnerable
Round Templetonia	<i>Templetonia egena</i>	Endangered	
Ruby Glasswort	<i>Tecticornia moniliformis</i>	Endangered	
Rye Beetle-grass	<i>Tripogonella loliformis</i>	Endangered	
Salt Copperburr	<i>Sclerolaena ventricosa</i>	Endangered	
Salt Paperbark	<i>Melaleuca halmaturorum</i>	Endangered	
Sand Lily	<i>Corynotheca licrota</i>	Endangered	
Sand Sida	<i>Sida ammophila</i>	Endangered	
Sandhill Leek-orchid	<i>Prasophyllum rousei</i>	Endangered	
Sandhill Spurge	<i>Phyllanthus lacunellus</i>	Endangered	
Sarcozona	<i>Sarcozona praecox</i>	Endangered	
Satin Daisy-bush	<i>Olearia minor</i>	Endangered	
Scaly Mantle	<i>Eriochlamys squamata</i>	Endangered	
Scaly Poa	<i>Poa fax</i>	Endangered	
Scarlet Spiderling	<i>Boerhavia coccinea</i>	Critically Endangered	
Scrambling Twin-leaf	<i>Roepera angustifolia</i>	Endangered	
Shining Glasswort	<i>Tecticornia nitida</i>	Endangered	
Showy Lawrenca	<i>Lawrenca berthae</i>	Endangered	
Sikh's Whiskers	<i>Pterostylis boormanii</i>	Endangered	
Silky Glycine	<i>Glycine canescens</i>	Critically Endangered	
Silky Parrot-pea	<i>Dillwynia uncinata</i>	Vulnerable	
Silky Swainson-pea	<i>Swainsona sericea</i>	Endangered	
Silky Umbrella-grass	<i>Digitaria ammophila</i>	Endangered	
Silver Bindweed	<i>Convolvulus crispifolius</i>	Vulnerable	
Silver Cassia	<i>Senna artemisioides subsp. artemisioides</i>	Critically Endangered	
Silver Saltbush	<i>Atriplex rhagodioides</i>	Endangered	
Silver Tails	<i>Ptilotus obovatus</i>	Critically Endangered	
Silvery Emu-bush	<i>Eremophila scoparia</i>	Endangered	
Skeleton Fan-flower	<i>Scaevola depauperata</i>	Endangered	
Slender Club-sedge	<i>Isolepis congrua</i>	Endangered	
Slender Cup-flower	<i>Gnephosis drummondii</i>	Endangered	
Slender Daisy-bush	<i>Olearia passerinoides subsp. passerinoides</i>	Vulnerable	
Slender Darling-pea	<i>Swainsona murrayana</i>	Endangered	Vulnerable
Slender Love-grass	<i>Eragrostis exigua</i>	Endangered	
Slender Phyllota	<i>Phyllota remota</i>	Endangered	
Slender Sunray	<i>Rhodanthe stricta</i>	Endangered	
Slender Water-ribbons	<i>Cycnogeton dubium</i>	Endangered	
Slit-wing Bluebush	<i>Maireana georgei</i>	Critically Endangered	
Small Burr-grass	<i>Tragus australianus</i>	Endangered	
Small Elachanth	<i>Elachanthus pusillus</i>	Endangered	
Small Monkey-flower	<i>Elacholoma prostrata</i>	Endangered	
Small Nut-heads	<i>Haegiela tatei</i>	Critically Endangered	
Small Podolepis	<i>Podolepis muelleri</i>	Critically Endangered	
Small Pop Saltbush	<i>Atriplex spongiosa</i>	Critically Endangered	

Common Name	Scientific Name	FFG Status	EPBC Status
Small Water-fire	<i>Bergia trimera</i>	Endangered	
Small-flower Mud-mat	<i>Glossostigma cleistanthum</i>	Endangered	
Small-flower Tobacco	<i>Nicotiana goodspeedii</i>	Endangered	
Small-leaf Sea-heath	<i>Frankenia sessilis</i>	Endangered	
Small-leaf Swainson-pea	<i>Swainsona microphylla</i>	Endangered	
Smooth Elachanth	<i>Elachanthus glaber</i>	Endangered	
Smooth Minuria	<i>Minuria integerrima</i>	Vulnerable	
Smooth Raspwort	<i>Haloragis acutangula f. acutangula</i>	Endangered	
Soda Bush	<i>Neobassia proceriflora</i>	Critically Endangered	
Spear-fruit Copperburr	<i>Sclerolaena patentiscuspis</i>	Vulnerable	
Spear-grass	<i>Austrostipa trichophylla</i>	Endangered	
Spiked Daisy-bush	<i>Olearia subspicata</i>	Endangered	
Spiked Pigweed	<i>Dysphania simulans</i>	Critically Endangered	
Spiny Goosefoot	<i>Rhagodia ulicina</i>	Endangered	
Spiny Lignum	<i>Duma horrida subsp. horrida</i>	Critically Endangered	
Spiny-fruit Saltbush	<i>Atriplex spinibractea</i>	Endangered	
Spoon-leaf Mud-mat	<i>Glossostigma diandrum</i>	Endangered	
Spotted Emu-bush	<i>Eremophila maculata subsp. maculata</i>	Critically Endangered	
Spreading Angianthus	<i>Angianthus brachypappus</i>	Endangered	
Spreading Cress	<i>Phlegmatospermum eremaeum</i>	Vulnerable	
Spreading Emu-bush	<i>Eremophila divaricata subsp. divaricata</i>	Vulnerable	
Spreading Saltbush	<i>Atriplex limbata</i>	Endangered	
Spreading Scurf-pea	<i>Cullen patens</i>	Endangered	
Squat Picris	<i>Picris squarrosa</i>	Endangered	
Streaked Wattle	<i>Acacia lineata</i>	Endangered	
Striate Spike-sedge	<i>Eleocharis obicis</i>	Not Listed in Vic.	Vulnerable
Swamp Sheoak	<i>Casuarina obesa</i>	Critically Endangered	
Sweet Fenugreek	<i>Trigonella suavissima</i>	Endangered	
Tall Kerosene Grass	<i>Aristida holathera var. holathera</i>	Endangered	
Tall Nut-heads	<i>Ethulopsis cunninghamii</i>	Endangered	
Tall Sneezeweed	<i>Centipeda pleiocephala</i>	Endangered	
Three-nerve Wattle	<i>Acacia trineura</i>	Critically Endangered	
Toothed Groundsel	<i>Senecio platylepis</i>	Endangered	
Toothed Raspwort	<i>Haloragis odontocarpa f. octoforma</i>	Critically Endangered	
Toothed Raspwort	<i>Haloragis odontocarpa f. rugosa</i>	Critically Endangered	
Tough Scurf-pea	<i>Cullen tenax</i>	Endangered	
Trailing Commersonia	<i>Androcalva tatei</i>	Critically Endangered	
Trident Spyridium	<i>Stenanthemum notiale subsp. notiale</i>	Endangered	
Tucker's Spear-grass	<i>Austrostipa tuckeri</i>	Extinct	
Tufted Bog-sedge	<i>Schoenus racemosus</i>	Endangered	
Turnip Copperburr	<i>Sclerolaena napiformis</i>	Threatened	Endangered
Twiggy Emu-bush	<i>Eremophila polyclada</i>	Critically Endangered	
Twiggy Sida	<i>Sida intricata</i>	Endangered	
Twin-flower Saltbush	<i>Dissocarpus biflorus var. biflorus</i>	Critically Endangered	
Twining Purslane	<i>Calandrinia volubilis</i>	Vulnerable	
Twin-leaf Bedstraw	<i>Asperula gemella</i>	Endangered	
Twin-leaf Emu-bush	<i>Eremophila oppositifolia subsp. oppositifolia</i>	Endangered	
Two-spined Copperburr	<i>Sclerolaena uniflora</i>	Endangered	
Umbrella Wattle	<i>Acacia oswaldii</i>	Critically Endangered	
Upright Adder's-tongue	<i>Ophioglossum polyphyllum</i>	Endangered	
Upright Spider-orchid	<i>Caladenia stricta</i>	Endangered	

Common Name	Scientific Name	FFG Status	EPBC Status
Veined Peppergrass	<i>Lepidium phlebopetalum</i>	Endangered	
Velvet Thread-petal	<i>Stenopetalum velutinum</i>	Critically Endangered	
Wait-a-while	<i>Acacia colletioides</i>	Endangered	
Wallaby-bush	<i>Beyeria lasiocarpa</i>	Vulnerable	
Warty New Holland Daisy	<i>Vittadinia pustulata</i>	Critically Endangered	
Waterbush	<i>Myoporum montanum</i>	Endangered	
Western Bitter-cress	<i>Cardamine lineariloba</i>	Endangered	
Western Leek-orchid	<i>Prasophyllum sp. aff. occidentale C</i>	Endangered	
Western New Holland Daisy	<i>Vittadinia blackii</i>	Endangered	
Whirrakee Wattle	<i>Acacia williamsonii</i>	Vulnerable	
Whiteseed Glasswort	<i>Tecticornia pterygosperma subsp. pterygosperma</i>	Endangered	
Wilga	<i>Geijera parviflora</i>	Critically Endangered	
Williamson's Rice-flower	<i>Pimelea williamsonii</i>	Endangered	
Wimmera Woodruff	<i>Asperula wimmerana</i>	Endangered	
Winged New Holland Daisy	<i>Vittadinia pterochaeta</i>	Endangered	
Winged Peppergrass	<i>Lepidium monoplacoides</i>	Endangered	Endangered
Wingwort	<i>Ceratogyne obionoides</i>	Endangered	
Wires-and-wool	<i>Lemooria burkittii</i>	Critically Endangered	
Wiry Glasswort	<i>Tecticornia lylei</i>	Endangered	
Woolly Cloak-fern	<i>Cheilanthes lasiophylla</i>	Endangered	
Woolly Copperburr	<i>Sclerolaena lanicuspis</i>	Endangered	
Woolly Minuria	<i>Minuria denticulata</i>	Endangered	
Woolly Plover-daisy	<i>Leiocarpa tomentosa</i>	Endangered	
Woolly Scurf-pea	<i>Cullen pallidum</i>	Endangered	
Woolly Yellow-heads	<i>Trichanthodium skirrophorum</i>	Vulnerable	
Yakka Grass	<i>Sporobolus caroli</i>	Endangered	
Yarran	<i>Acacia melvillei</i>	Critically Endangered	
Yarran Wattle	<i>Acacia homalophylla</i>	Critically Endangered	
Yarriambiack Mallee-box	<i>Eucalyptus yarriambiack</i>	Critically Endangered	
Yellow Burr-daisy	<i>Calotis lappulacea</i>	Vulnerable	
Yellow Garland-lily	<i>Calostemma luteum</i>	Endangered	
Yellow Microcybe	<i>Microcybe pauciflora subsp. pauciflora</i>	Critically Endangered	
Yellow Pea-bush	<i>Sesbania cannabina var. cannabina</i>	Critically Endangered	
Yellow Swainson-pea	<i>Swainsona pyrophila</i>	Not Listed in Vic.	Vulnerable



Table A5: Fauna species listed under the FFG Act and EPBC Act.

Common Name	Scientific Name	FFG Status	EPBC Status
<b>Amphibian</b>			
Growling Grass Frog	<i>Litoria raniformis</i>	Vulnerable	Vulnerable
<b>Birds</b>			
Apostlebird	<i>Struthidea cinerea</i>	Vulnerable	
Australasian Bittern	<i>Botaurus poiciloptilus</i>	Critically Endangered	Endangered
Australasian Shoveler	<i>Spatula rhynchotis</i>	Vulnerable	
Australian Bustard	<i>Ardeotis australis</i>	Critically Endangered	
Australian Gull-billed Tern	<i>Gelochelidon macrotarsa</i>	Endangered	
Barking Owl	<i>Ninox connivens</i>	Critically Endangered	
Bar-tailed Godwit	<i>Limosa lapponica</i>	Vulnerable	Vulnerable
Black Falcon	<i>Falco subniger</i>	Critically Endangered	
Black-eared Miner	<i>Manorina melanotis</i>	Critically Endangered	Endangered
Black-tailed Godwit	<i>Limosa limosa</i>	Critically Endangered	
Blue-billed Duck	<i>Oxyura australis</i>	Vulnerable	
Brolga	<i>Antigone rubicunda</i>	Endangered	
Bush Stone-curlew	<i>Burhinus grallarius</i>	Critically Endangered	
Caspian Tern	<i>Hydroprogne caspia</i>	Vulnerable	
Common Greenshank	<i>Tringa nebularia</i>	Endangered	
Common Sandpiper	<i>Actitis hypoleucos</i>	Vulnerable	
Crested Bellbird	<i>Oreoica gutturalis</i>	Endangered	
Curlew Sandpiper	<i>Calidris ferruginea</i>	Critically Endangered	Critically Endangered
Diamond Dove	<i>Geopelia cuneata</i>	Vulnerable	
Diamond Firetail	<i>Stagonopleura guttata</i>	Vulnerable	
Elegant Parrot	<i>Neophema elegans</i>	Vulnerable	
Freckled Duck	<i>Stictonetta naevosa</i>	Endangered	
Great Knot	<i>Calidris tenuirostris</i>	Critically Endangered	
Grey Falcon	<i>Falco hypoleucos</i>	Vulnerable	Vulnerable
Grey Goshawk	<i>Accipiter novaehollandiae</i>	Endangered	
Grey-crowned Babbler	<i>Pomatostomus temporalis</i>	Vulnerable	
Grey-fronted Honeyeater	<i>Ptilotula plumula</i>	Endangered	
Ground Cuckoo-shrike	<i>Coracina maxima</i>	Endangered	
Hardhead	<i>Aythya australis</i>	Vulnerable	
Hooded Robin	<i>Melanodryas cucullata</i>	Vulnerable	
Inland Dotterel	<i>Peltohyas australis</i>	Vulnerable	
Lewin's Rail	<i>Lewinia pectoralis</i>	Vulnerable	
Little Eagle	<i>Hieraaetus morphnoides</i>	Vulnerable	
Little Egret	<i>Egretta garzetta nigripes</i>	Endangered	
Magpie Goose	<i>Anseranas semipalmata</i>	Vulnerable	
Major Mitchell's Cockatoo	<i>Lophochroa leadbeateri</i>	Critically Endangered	
Mallee Emu-wren	<i>Stipiturus mallee</i>	Endangered	Endangered
Malleefowl	<i>Leipoa ocellata</i>	Vulnerable	Vulnerable
Marsh Sandpiper	<i>Tringa stagnatilis</i>	Endangered	
Musk Duck	<i>Biziura lobata</i>	Vulnerable	
Painted Honeyeater	<i>Grantiella picta</i>	Vulnerable	Vulnerable
Plains-wanderer	<i>Pedionomus torquatus</i>	Critically Endangered	Critically Endangered
Plumed Egret	<i>Ardea intermedia plumifera</i> (originally listed as <i>Ardea intermedia</i> )	Critically Endangered	
Purple-gaped Honeyeater	<i>Lichenostomus cratitius</i>	Vulnerable	
Red-chested Button-quail	<i>Turnix pyrrhothorax</i>	Endangered	
Red-lored Whistler	<i>Pachycephala rufogularis</i>	Vulnerable	Vulnerable
Red-tailed Black-Cockatoo (south-eastern)	<i>Calyptorhynchus banksii graptogyne</i>	Endangered	Endangered
Redthroat	<i>Pyrrholaemus brunneus</i>	Endangered	
Regent Parrot	<i>Polytelis anthopeplus monarchoides</i>	Vulnerable	Vulnerable
Ruddy Turnstone	<i>Arenaria interpres</i>	Endangered	
Scarlet-chested Parrot	<i>Neophema splendida</i>	Endangered	
Slender-billed Thornbill (Lowan Mallee)	<i>Acanthiza iredalei hedleyi</i>	Endangered	
Square-tailed Kite	<i>Lophoictinia isura</i>	Vulnerable	
Superb Parrot	<i>Polytelis swainsonii</i>	Endangered	Vulnerable
Swift Parrot	<i>Lathamus discolor</i>	Critically Endangered	Critically Endangered
Whimbrel	<i>Numenius phaeopus</i>	Endangered	

Common Name	Scientific Name	FFG Status	EPBC Status
White-bellied Sea-Eagle	<i>Haliaeetus leucogaster</i>	Endangered	
White-browed Treecreeper	<i>Climacteris affinis</i>	Endangered	
White-throated Needletail	<i>Hirundapus caudacutus</i>	Vulnerable	Vulnerable
<b>Crustacean</b>			
Hairy Burrowing Crayfish	<i>Engaeus sericatus</i>	Vulnerable	
<b>Fish</b>			
Freshwater Catfish	<i>Tandanus tandanus</i>	Endangered	
Murray Cod	<i>Maccullochella peelii</i>	Endangered	Vulnerable
Murray Hardyhead	<i>Craterocephalus fluviatilis</i>	Critically Endangered	Endangered
Murray-Darling Rainbowfish	<i>Melanotaenia fluviatilis</i>	Endangered	
Silver Perch	<i>Bidyanus bidyanus</i>	Endangered	Critically Endangered
Southern Purple-spotted Gudgeon	<i>Mogurnda adspersa</i>	Critically Endangered	
<b>Insects</b>			
Bitterbush Blue Butterfly	<i>Theclinessthes albocinctus</i>	Endangered	
Large Yellow-spotted Cicada	<i>Marteena rubricincta</i>	Critically Endangered	
Orange Sun Moth	<i>Synemon nais</i>	Endangered	
Reddish-orange Sun Moth	<i>Synemon jcaria</i>	Endangered	
Small Orange-spotted Sun Moth	<i>Synemon discalis</i>	Endangered	
<b>Mammals</b>			
Common Dunnart	<i>Sminthopsis murina murina</i>	Vulnerable	
Dingo	<i>Canis lupus dingo</i>	Vulnerable	
Gile's Planigale	<i>Planigale gilesi</i>	Vulnerable	
South-eastern Long-eared Bat	<i>Nyctophilus corbeni</i>	Endangered	Vulnerable
Spot-tailed Quoll	<i>Dasyurus maculatus maculatus</i>	Endangered	Endangered
<b>Reptiles</b>			
Bandy Bandy	<i>Vermicella annulata</i>	Endangered	
Beaked Gecko	<i>Rhynchoedura ornata</i>	Endangered	
Bearded Dragon	<i>Pogona barbata</i>	Vulnerable	
Broad-shelled Turtle	<i>Chelodina expansa</i>	Endangered	
Carpet Python	<i>Morelia spilota metcalfei</i> (originally listed as <i>Morelia spilota</i> )	Endangered	
De Vis' Banded Snake	<i>Denisonia devisi</i>	Critically Endangered	
Dwarf Burrowing Skink	<i>Lerista timida</i> (originally listed as <i>Lerista muelleri</i> )	Endangered	
Heath Skink	<i>Liopholis multiscutata</i>	Critically Endangered	
Lace Monitor	<i>Varanus varius</i>	Endangered	
Lined Earless Dragon	<i>Tympanocryptis petersi</i>	Endangered	
Mallee Worm-Lizard	<i>Aprasia aurita</i>	Endangered	
Masters' Snake	<i>Drysdalia mastersii</i>	Critically Endangered	
Millewa Skink	<i>Hemiergis millewae</i>	Endangered	
Murray River Turtle	<i>Emydura macquarii</i>	Critically Endangered	
Port Lincoln Snake	<i>Parasuta spectabilis</i>	Endangered	
Red-naped Snake	<i>Furina diadema</i>	Endangered	
Rosenberg's Goanna	<i>Varanus rosenbergi</i>	Critically Endangered	
Saltbush Striped Skink	<i>Ctenotus olympicus</i>	Critically Endangered	

**Table A6: Ecological communities listed under the FFG Act and EPBC Act.**

Ecological community name	FFG Listed	Conservation category (EPBC)
<b>Flora communities</b>		
Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions <sup>77</sup>		Endangered
- Semi-arid Herbaceous Pine – Buloke Woodland Community	Y	
- Semi-arid Northwest Plains Buloke Grassy Woodlands Community	Y	
- Semi-arid Herbaceous Pine Woodland Community	Y	
- Semi-arid Shrubby Pine – Buloke Woodland Community	Y	
- Grey Box – Buloke Grassy Woodland Community	Y	
Grey Box ( <i>Eucalyptus microcarpa</i> ) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	N	Endangered
Natural Grasslands of the Murray Valley Plains	N	Critically Endangered
Plains Mallee Box Woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions	N	Critically Endangered
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	N	Critically Endangered
<b>Fauna communities</b>		
Lowland Riverine Fish Community of the Southern Murray-Darling Basin	Y	
Mallee Bird Community <sup>78</sup>	Y	Endangered

<sup>77</sup> The EPBC listed Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions encompasses five FFG listed woodland communities (Source: <https://www.awe.gov.au/environment/biodiversity/threatened/assessments/buloke-woodlands>).

<sup>78</sup> EPBC listed as *Mallee Bird Community of the Murray Darling Depression Bioregion*, and by the FFG as *Victorian Mallee Bird Community*.

## APPENDIX 5: PRIORITY LOCATIONS FOR BIODIVERSITY MANAGEMENT ACTIONS

Priority locations for the delivery of sustained weed, herbivore, and predator control, and revegetation re-establishment management actions (as shown in the Figures A2-A5 below) were identified through application of the DELWP Strategic Management Prospectus spatial tool and stakeholder consultation. Whole of region medium-term (6-year) outcome targets and spatial representation of associated Local Areas boundaries are also shown.

### 5A: Weed Control

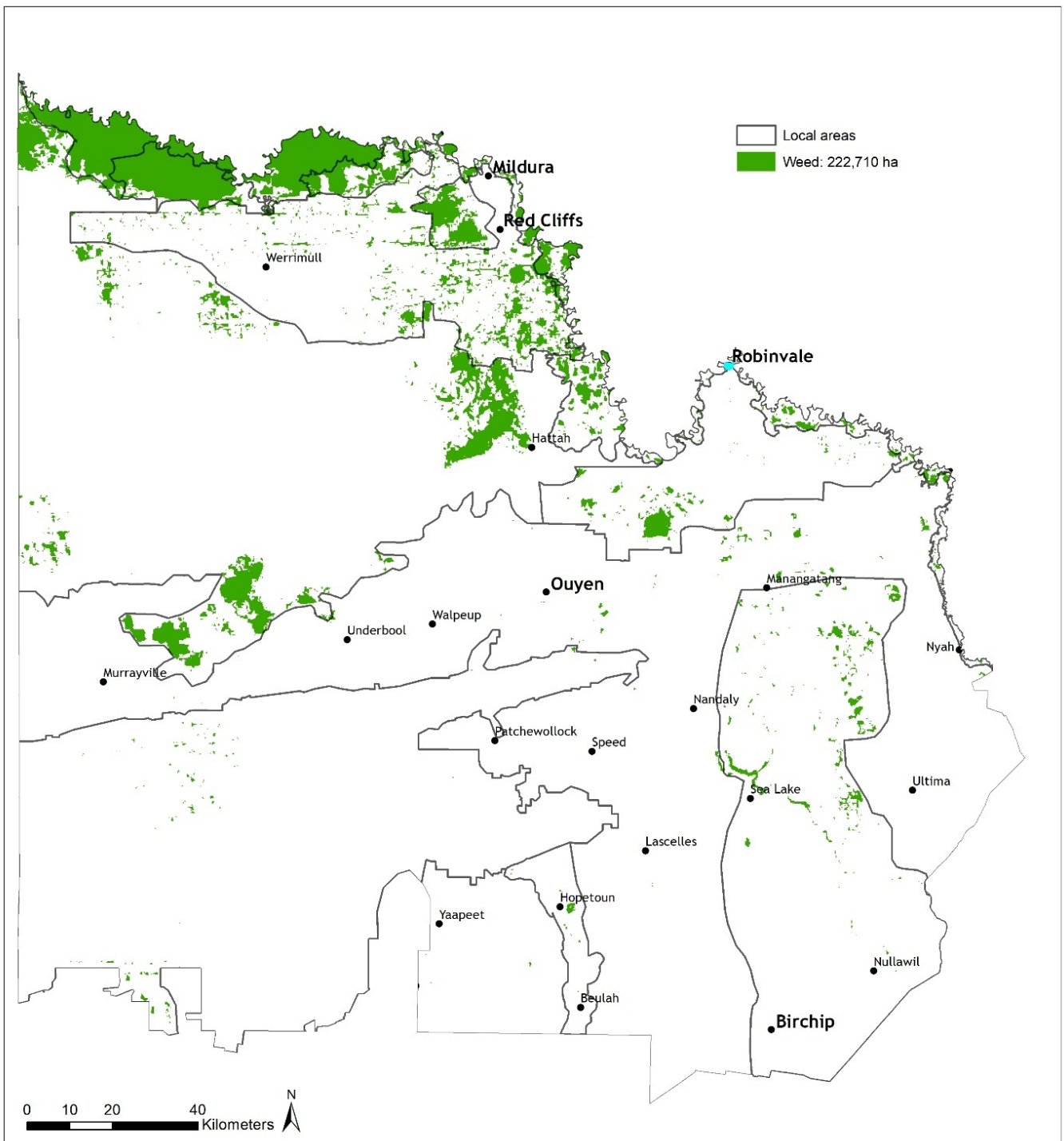


Figure A2: Priority locations, regional targets and local area boundaries for sustained weed control, focusing on transformer weeds.

5B: Herbivore Control

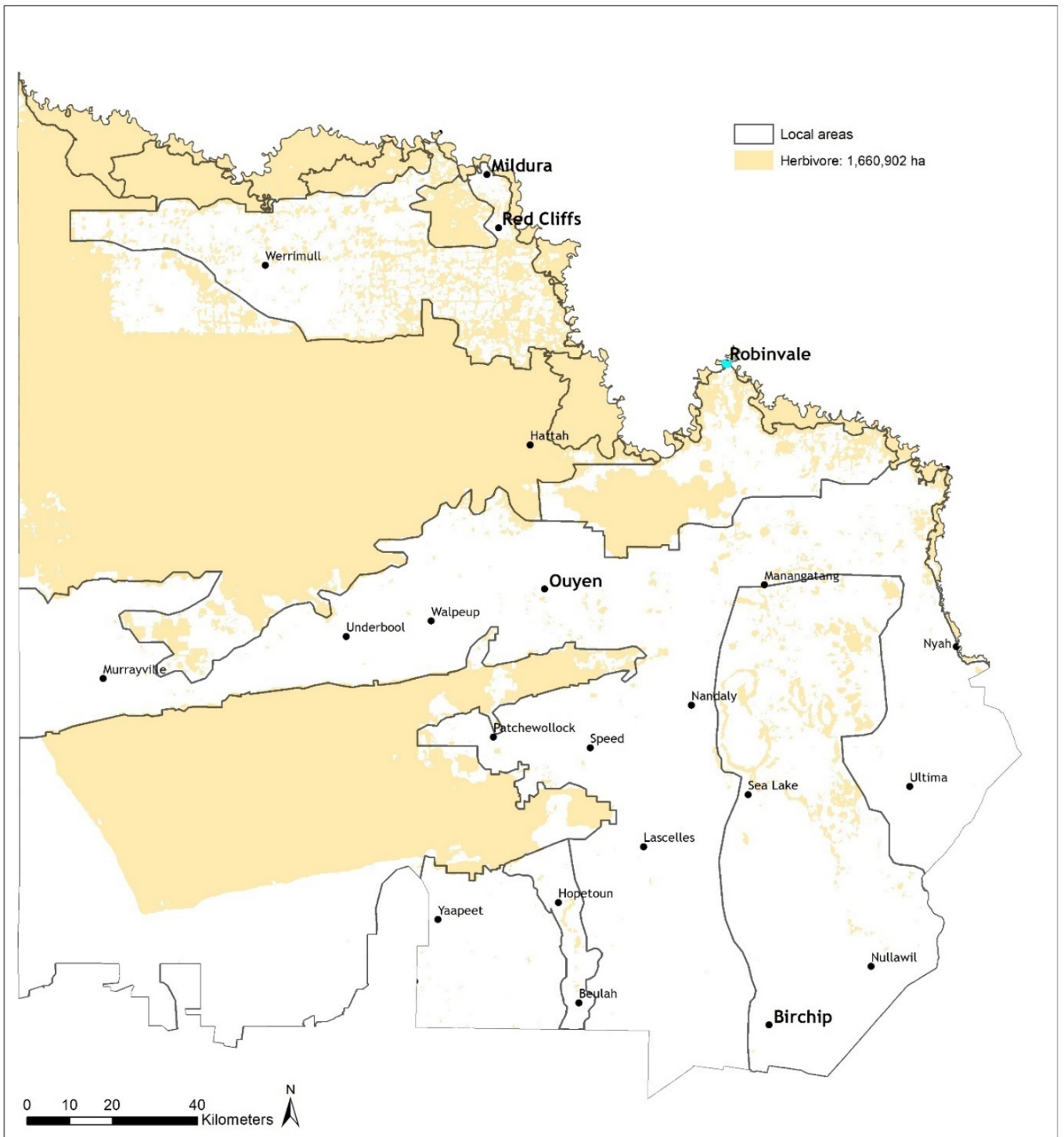


Figure A3: Priority locations, regional targets and local area boundaries for sustained herbivore control, encompassing rabbits, feral goats, kangaroos, deer and feral pigs.



5C: Predator Control

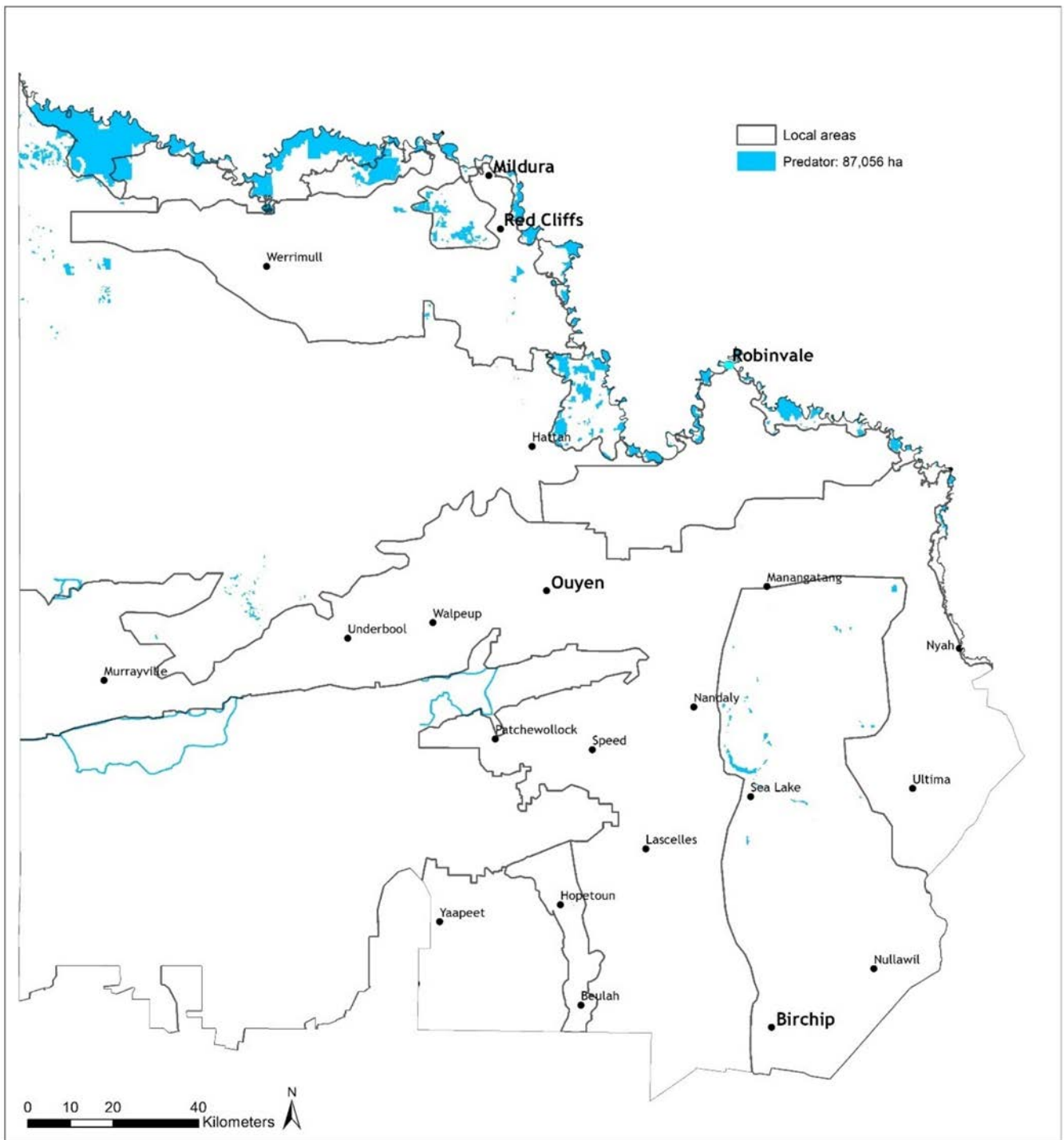


Figure A4: Priority locations, regional targets and local area boundaries for sustained pest predator, encompassing foxes and feral cats.

5D: Revegetation (Re-establishment)

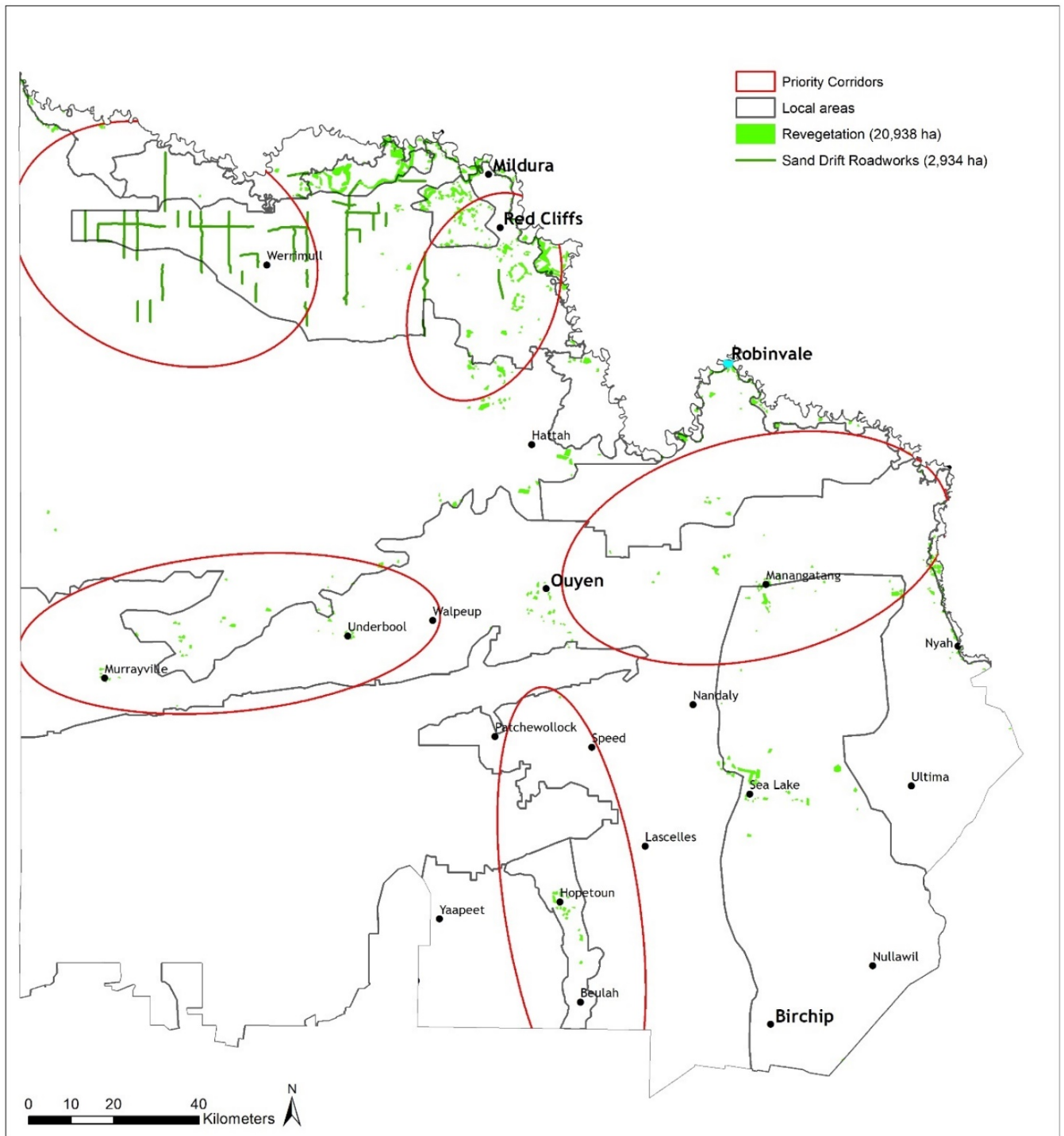


Figure A5: Priority locations, local area boundaries and priority corridors (bio-links) for the re-establishment of native vegetation (note that the total area of priority locations identified through SMP for delivery against Biodiversity 2037 20-year targets are represented on the maps. Identification of specific areas to deliver actions over the life of the RCS (i.e. 3,450 ha outcome target) will be determined at a landscape scale in consultation with local stakeholders. The regional outcome target for 3,450 ha of revegetation within existing remnants does not apply this SMP data).

## APPENDIX 6: PRIORITY MANAGEMENT DIRECTIONS FOR EACH LOCAL AREA

**Table A7: Priority Management Directions for each Local Area to deliver against the whole-of-region medium-term (6-year) outcome targets identified for our biodiversity, waterway, agricultural land, culture and heritage, and community capacity for NRM assets.**

Theme	Priority Management Directions <i>What actions we need to focus on:</i>	Local Areas								
		MRF	C-K	MSB	MSC	A-W	AB	WC	NWC	AL
Biodiversity	Community and government partnerships to support integrated cross tenure delivery	X	X	X	X	X	X	X	X	X
	Landscape scale interventions to reduce threats – multiple species benefits	X	X	X	X	X	X	X	X	X
	Targeted/specialised interventions (where appropriate) to reduce threats – single species benefits	X	X	X	X	X	X	X	X	
	Climate ready interventions to provide for improved resilience and adaptive capacity	X	X	X	X	X	X	X	X	X
	Collaborations to maximise the potential of carbon plantings to deliver biodiversity co-benefits	X	X	X	X	X	X	X	X	X
	Recognition of Traditional Owner cultural objectives, knowledge and practice	X	X	X	X	X	X	X	X	X
Waterways	Community and government partnerships to support integrated cross tenure delivery	X	X	X	X	X	X	X	X	X
	Landscape scale interventions that reduce key threats and provide whole of system benefits	X	X	X	X	X	X	X	X	X
	Targeted/specialised interventions (where appropriate) that reduce key threats and provide location and/or issue specific benefits	X	X	X	X	X	X	X	X	
	Maintaining previous investment where appropriate to ensure the ongoing effectiveness of significant works programs	X	X		X		X	X	X	X
	Applying seasonally adaptive, and where required (e.g. extreme events), responsive approaches	X	X		X	X		X		X
	Climate ready interventions to provide for improved resilience and adaptive capacity	X	X	X	X	X	X	X	X	X
Recognition of Traditional Owner cultural objectives, knowledge and practice	X	X	X	X	X	X	X	X	X	
Agricultural Land	Research, extension and industry partnerships to support effective knowledge transfer									X
	Supporting innovative approaches to delivery, including the application of new technology									X
	Diverse, adaptable, and resilient agricultural systems that maximise production potential, minimise risk, and enhance viability – including drought preparedness and climate ready strategies									X
	Maintaining groundcover above regional thresholds									X
	Increasing the soil organic carbon stocks of agricultural soils - including collaborations to maximise the potential of emerging carbon markets									X
	Managing rootzone drainage within required thresholds									X
	Management options for reclaiming, stabilising and utilising agricultural soils that are severely degraded, and have limited production potential									X
	Anticipatory and adaptive approaches to pests, disease and weed management – incorporating sound biosecurity practices and cross-tenure collaborations									X
	Recognition of Traditional Owner cultural values, objectives, knowledge and practice									X
Culture & Heritage	Ensuring the protection of Aboriginal culture and heritage, including tangible and intangible heritage	X	X	X	X	X	X	X	X	X
	Traditional Owners speaking for Country through their own self-determined processes, including the incorporation of traditional ecological knowledge in NRM planning and delivery	X	X	X	X	X	X	X	X	X

Theme	Priority Management Directions	Local Areas								
	<i>What actions we need to focus on:</i>	MRF	C-K	MSB	MSC	A-W	AB	WC	NWC	AL
Community Capacity for NRM	Education programs provided to increase awareness and appreciation of the Mallee's natural, cultural and productive landscapes; and to encourage actions which contribute to their protection and enhancement	X	X	X	X	X	X	X	X	X
	Opportunities provided for people to connect with nature, including increased accessibility and amenity for recreational activities	X	X	X	X	X	X	X	X	X
	Opportunities provided for Traditional Owners/First Peoples to connect and spend time on Country	X	X	X	X	X	X	X	X	
	Citizen Science programs supported that engage community and provide targeted data to inform NRM programs	X	X	X	X	X	X	X	X	
	Responsive and effective stewardship of our natural, cultural and productive landscapes supported	X	X	X	X	X	X	X	X	X
	Community based NRM groups and individuals supported to participate in regional and local scale NRM programs	X	X	X	X	X	X	X	X	X
	Regional and local partnerships that provide for co-operative approaches to NRM planning, delivery and evaluation established and maintained	X	X	X	X	X	X	X	X	X
	Effective responses to emerging threats and opportunities identified, and implemented where appropriate	X	X	X	X	X	X	X	X	X



## APPENDIX 7: STRATEGIC BIODIVERSITY VALUES FOR LOCAL AREAS

The relative importance of natural values within each of the region's nine Local Areas was identified through application of the DELWP Strategic Biodiversity Values spatial dataset. The data combines biodiversity values with connectivity and fragmentation information to show the relative value of landscapes across Victoria.

This data is then ranked into 20 percent increments to provide a strategic view of the ranked contribution of a location for the conservation of Victoria's biodiversity. A higher strategic biodiversity value score indicates a location that contains more, and less common biodiversity values relative to other locations with a lower score.

Figure A6 shows habitat identified as being of the highest ecological value to Victoria (i.e. top 20%) for each Local Area and Figure A7 illustrates all relative rankings for the region.

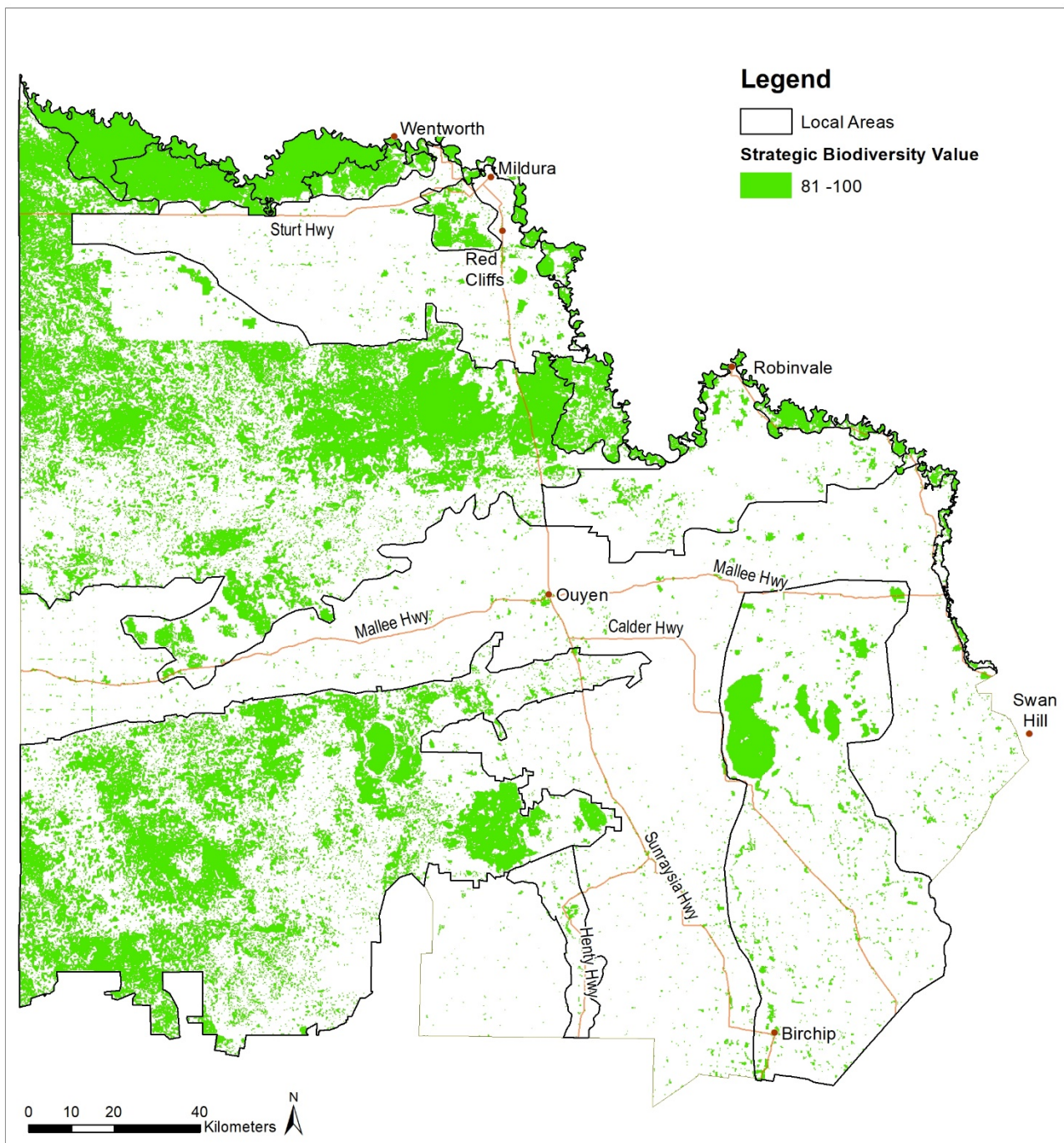


Figure A6: Locations with highest (top 20%) strategic biodiversity value scores (source: NaturePrint v4- DELWP)



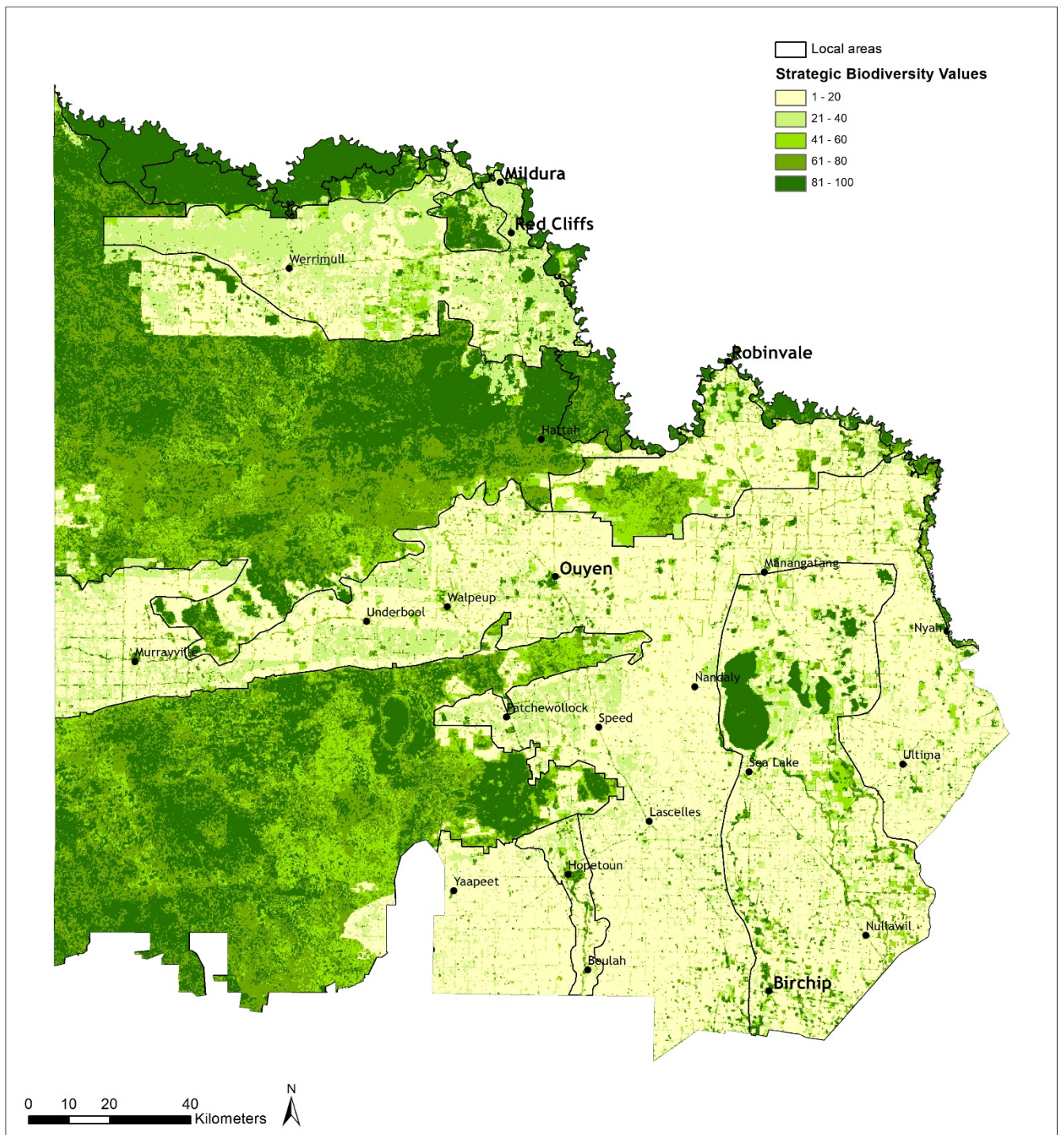


Figure A7: All Strategic Biodiversity Values (source: NaturePrint v4– DELWP).



