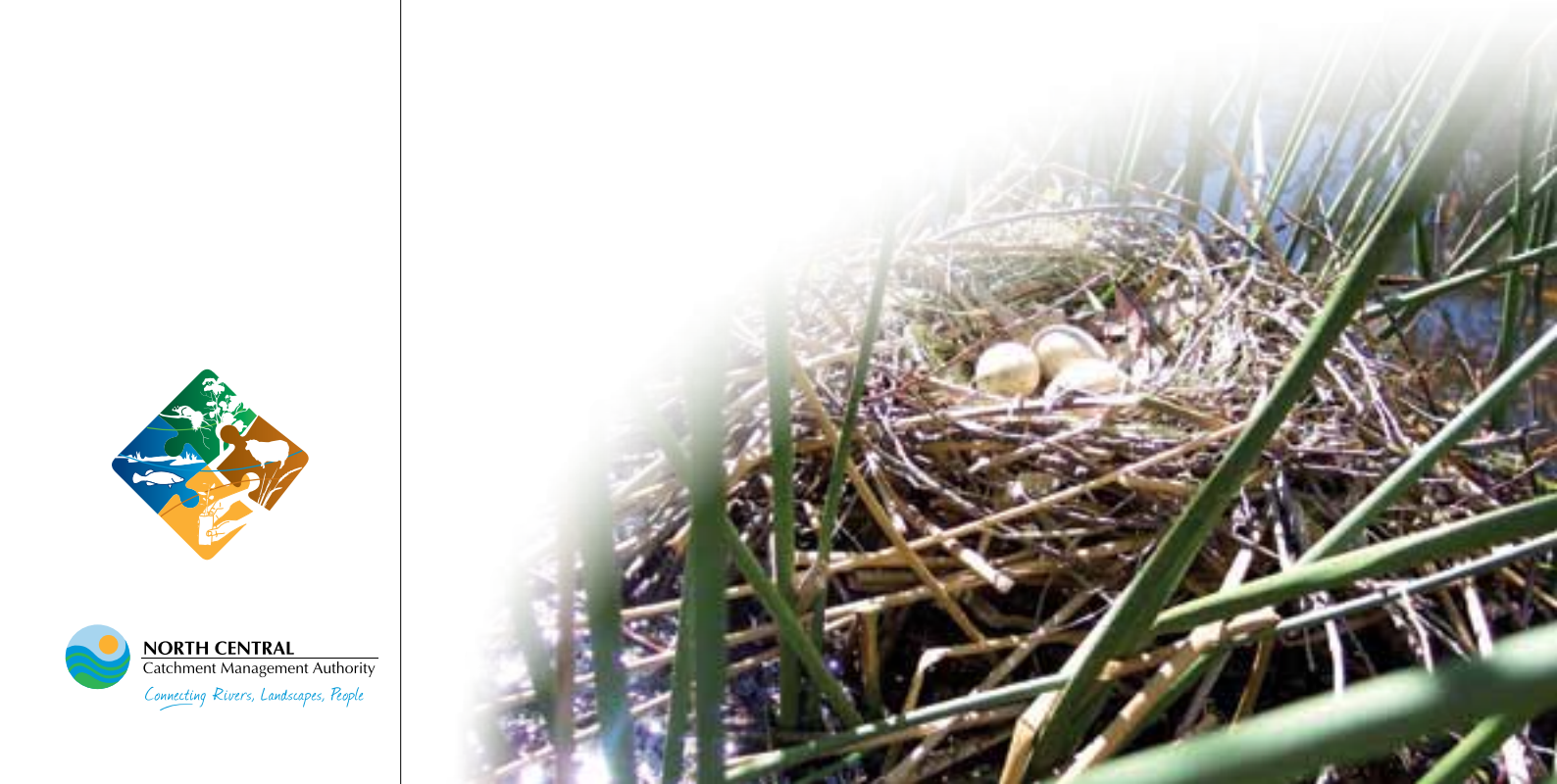
Draft
2012-18

North Central CMA

Regional Catchment Strategy for consultation



NORTH CENTRAL
Catchment Management Authority
Connecting Rivers, Landscapes, People

Acknowledgement of Country

The North Central Catchment Management Authority acknowledges Aboriginal Traditional Owners within the region, their rich culture and spiritual connection to Country. We also recognise and acknowledge the contribution and interest of Aboriginal people and organisations in land and natural resource management.

Document name: Draft 2012-18 North Central CMA Regional Catchment Strategy

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A copy of the draft is also available on www.nccma.vic.gov.au

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Front cover image of Great Egret in flight courtesy of David Kleinert.

Contents

Acronyms

ABC	Actions for Biodiversity Conservation
CAT	Catchment Assessment Tool
CEWH	Commonwealth Environmental Water Holder
CMA	Catchment Management Authority
DPI	Department of Primary Industries
DSE	Department of Sustainability and Environment
EPBC	Environment Protection and Biodiversity Conservation
EVC	Ecological Vegetation Classes
FFG	Flora and Fauna Guarantee
FSS	Farming for Sustainable Soils
GVoAP	Gross value of agricultural production
INFFER	Investment Framework for Environmental Resources
IPA	Invasive plants and animals
ISC	Index of Stream Condition
IWC	Index of Wetland Condition
MER	Monititoring, Evaluation and Reporting
MERI	Monitoring, Evaluation, Reporting and Improvement
NPV	net present value
NRM	Natural Resource Management
NRMC	Natural Resources Management Committee
NVIRP	Northern Victoria Irrigation Renewal Project
PV	Parks Victoria
RCS	Regional Catchment Strategy
RGP	Regional Growth Plans
RSHRW	Regional Strategy for Healthy Rivers and Wetlands
SMART	Specific, Measurable, Achievable, Realistic, Time-bound
SRA	Sustainable Rivers Audit
SWS	Sustainable Water Strategies
VCMC	Victorian Catchment Management Council
VEWH	Victorian Environmental Water Holder
VSHREW	Victorian Strategy for Healthy Rivers Estuaries and Wetlands

Executive Summary

Vision: 'A community active in protecting and enhancing the integrity of its catchment.'

The Draft North Central Regional Catchment Strategy (RCS) provides an opportunity for the community and other stakeholders to provide comment on the long-term vision for natural resource management (NRM) within the North Central Catchment Management Authority (CMA) region. The RCS sets regional priorities for the management of natural assets, sets overall direction for investment and coordination of effort by landholders, partner organisations and the wider community. It provides a framework that supports and encourages participation in protecting and enhancing our environment.

The North Central CMA region has a diversity of natural environments, including the Loddon and Campaspe Rivers, Box-Ironbark forest and woodlands, iconic River Red Gum Forests and Riverine Plain grasslands. These habitats contain significant biodiversity, including many endangered flora and fauna species. The North Central CMA region also supports a diverse and productive agriculture sector consisting of irrigation to the north, cropping, grazing and mixed farming to the west and south.

The North Central RCS vision is ***'A community active in protecting and enhancing the integrity of its catchment.'***

An engaged and active community is critical for the success of the RCS. The health of our catchments will rely on the active involvement of people in the region. People who farm and manage land or live in towns, work, volunteer or go to school all have a role to play in realising the RCS vision.

Dedicated community members are fundamental to natural resource management in the North Central CMA region. We have an incredibly enthusiastic and active community with over 160 Landcare groups carrying out much needed works to restore their local natural assets. The RCS will provide direction for investors to ensure local community groups can continue their important work.

The North Central CMA undertook extensive community and stakeholder consultation to identify the region's significant natural resource assets. These assets have been considered in forming regional priorities for investment. Although not all assets can be priorities for direct investment it is possible to provide other support to community-focused NRM groups, particularly by way of information and developing knowledge and skills to deal with the varied challenges facing the region.

The RCS sets out clear principles and has identified priorities covering community engagement, waterways and floodplains, biodiversity, wetlands, land and soils (Refer Figure 1).

The RCS also sets out a framework for monitoring, evaluating and reporting on the outcomes of the RCS.

The Draft RCS is now out for public consultation. Community members are invited to attend one of ten public forums or to provide feedback on-line.
For information visit **www.nccma.vic.gov.au**

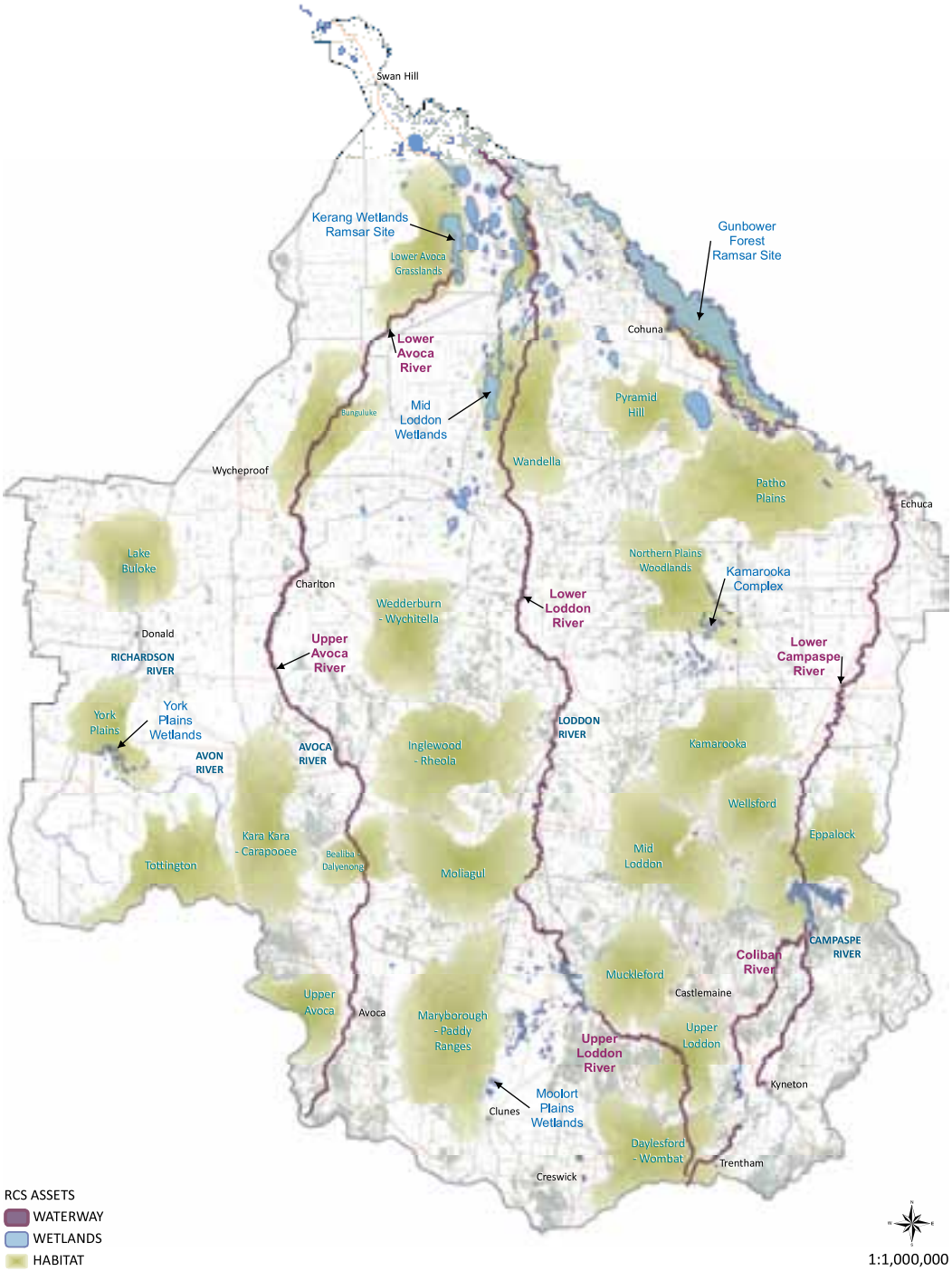


Figure 1: Regional Catchment Asset Priorities Map

Note 1: Land and soil priorities will be determined during the development of a Regional Soils plan.

Note 2: Threatened species are largely incorporated within habitat priorities.

1 Purpose and Scope

Vision: 'A community active in protecting and enhancing the integrity of its catchment.'

1.1 Introduction

The Draft North Central Regional Catchment Strategy (RCS) provides a long-term vision for natural resource management (NRM) within the North Central Catchment Management Authority (CMA) region. The RCS sets regional priorities for the management of natural assets, sets overall direction for investment and coordination of effort by landholders, partner organisations and the wider community. It provides a framework that supports and encourages participation in protecting and enhancing our environment.

The RCS is the primary integrated planning framework for land, water and biodiversity management in the North Central CMA region. It is the overarching strategic framework for action, which is supported by a range of sub-strategies and action plans.

The North Central CMA region has a diversity of natural environments, including the Loddon and Campaspe Rivers, Box-Ironbark forest and woodlands, iconic River Red Gum Forests and Riverine Plain grasslands. These habitats contain significant biodiversity, including many endangered flora and fauna species. The North Central CMA region also supports a diverse and productive agriculture sector consisting of irrigation to the north, cropping, grazing and mixed farming to the west and south.

An engaged and active community is critical for the success of the RCS. The health of our catchments will rely on the active involvement of people in the region. People who farm and manage land or live in towns, work, volunteer or go to school all have a role to play in realising the RCS vision.

An objective of the RCS is to work closely with our partner organisations that work in the NRM field to develop an agreed vision and priorities for our catchment. By working together we strengthen the targeted approach for the priority natural assets in the North Central CMA region.

The RCS provides a framework for effective investment in our region's natural assets. It is an important tool that guides the management and directs strategic investment for our most valued assets - ensuring our natural assets are maintained and enhanced to provide enduring benefit for future generations.

1.2 North Central RCS Objective

The North Central RCS will:

- establish a framework for the integrated and co-ordinated management of catchments to maintain and enhance biodiversity, land and water.
- encourage and support participation of landholders, resource managers and other members of the community in catchment management.

1.3 North Central RCS Vision

'A community active in protecting and enhancing the integrity of its catchment.'

The North Central RCS is underpinned by the following principles:

- Preventing further decline in the condition of our catchments
- Protecting and enhancing the region's highest value ecological assets through targeted investment and community involvement
- Protecting and enhancing the region's highest value agricultural land
- Achieving strong collaboration across government agencies and community
- Achieving community involvement in natural resource management.

1.4 Regional Overview

Our region covers 13% of Victoria and encompasses a diverse range of land types; from the foothill forests of the Great Dividing Range to the riverine plains of the north. The area is bordered by the Great Dividing Range in the south, the Murray River in the north, from the Mount Camel range in the east to the western Avon-Richardson catchment boundary in the Wimmera. The region comprises four major river catchments - the Campaspe, Loddon, Avoca and Avon-Richardson (Figure 2).

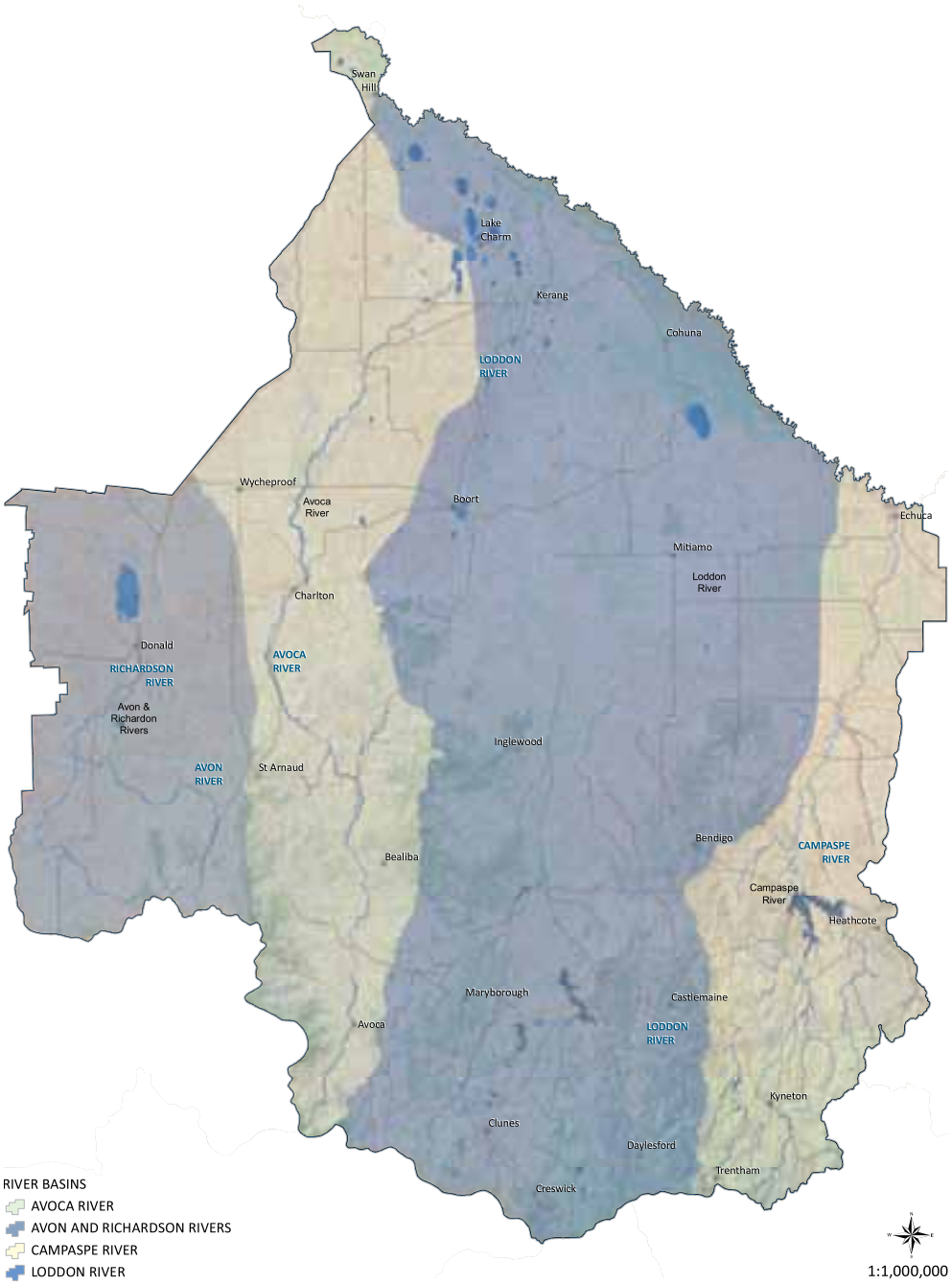


Figure 2 – The four basins of the North Central CMA region

Environmental values

The region supports many significant and important natural assets ranging from internationally recognised wetlands, such as Gunbower Forest, regionally important river systems such as the Loddon and Campaspe Rivers, rare and threatened species such as the McIvor Spider-Orchid, Eltham Copper Butterfly, and the iconic Box-Ironbark forests and woodlands of Central Victoria.

The Campaspe, Loddon, Avoca and Avon-Richardson rivers and their associated floodplains are diverse and complex ecosystems that support a diversity of native flora and fauna. Rivers provide drinking water to many towns, along with supporting substantial rural and agricultural production.

The internationally recognised Gunbower Forest and Kerang Lakes are listed under the Ramsar convention, and are included as bird breeding sites protected under international agreements. Thirty-six natural features in the region are included on the Register of the National Estate.

Photo courtesy of David Kleinert

There are eight bioregions represented across the North Central CMA region. However only 12.7% of the region retains native vegetation cover, with grassy woodlands and native grasslands especially poorly represented.

The North Central CMA region is home to a large number of threatened flora (84) and fauna (79) species. All plants and animals, including threatened species have a range of values, including intrinsic and existence values in addition to their contribution to broader ecological processes. The conservation of biodiversity, and in particular threatened species, is an important part of protecting our natural heritage and maintaining sustainable, productive landscapes (Figure 3).

Climate

The climate of the North Central CMA region is generally Mediterranean with warm dry summers and cool moist winters. There is significant variability in climate across the region with an average annual rainfall in the north-west of 350 mm compared with 1,200 mm in the south-east.

A majority of the world's scientists agree that human activities have resulted in the observed increase in global average temperatures, particularly since the middle of the 20th century (www.climatechange.vic.gov.au). Climate change has the potential to impact on environmental, social and economic assets within the region.

Climate change predictions for the North Central CMA region suggest annual warming of 0.3 to 1.6 ºC by 2030, 10% to 50% increase in the number of hot summer days (over 35ºC), reduction in annual rainfall by up to 15% by 2030 and droughts are likely to become more frequent and longer.

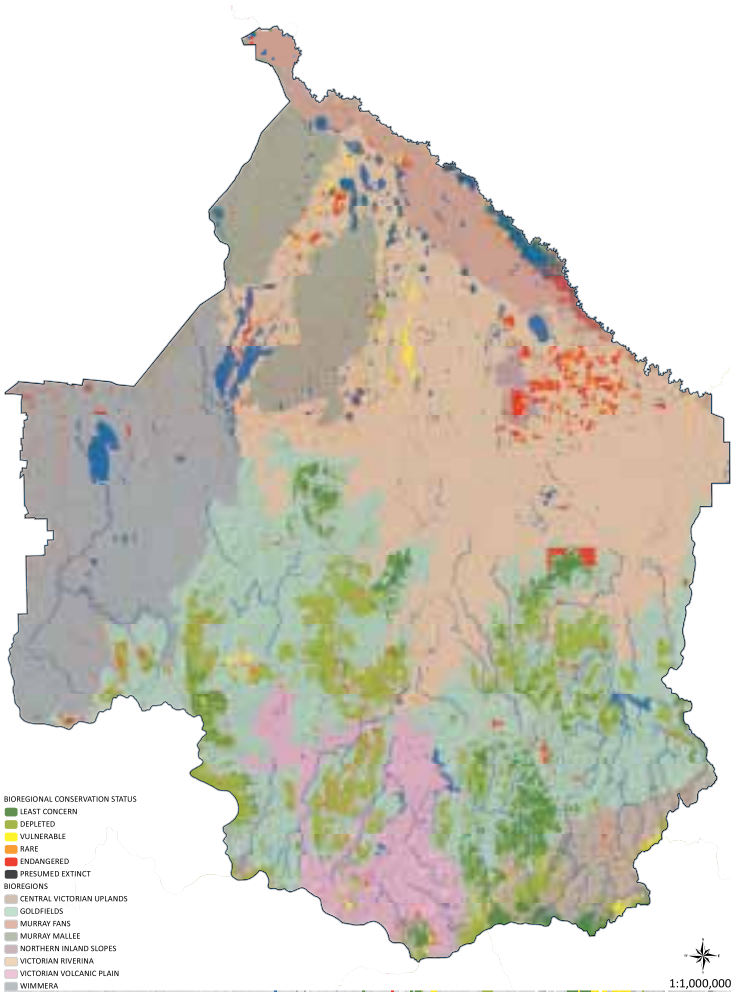


Figure 3: Bioregional Conservation Status

Although the scientific evidence regarding climate change is clear and compelling, many in the community still remain unconvinced or confused about the relationship between long-term trends in climate change (e.g. long-term increase in temperature) versus seasonal climatic variation (floods and droughts) that will continue to occur.

In response to concerns about climate change the Australian Government has released a plan, 'Securing a Clean Energy Future' which includes a number of initiatives including pricing carbon, the Carbon Farming Initiative and the Biodiversity Fund. In addition, the North Central CMA will work with the Victorian Government and partner organisations in considering how to adapt to changes in climate and how to respond to various government climate initiatives.

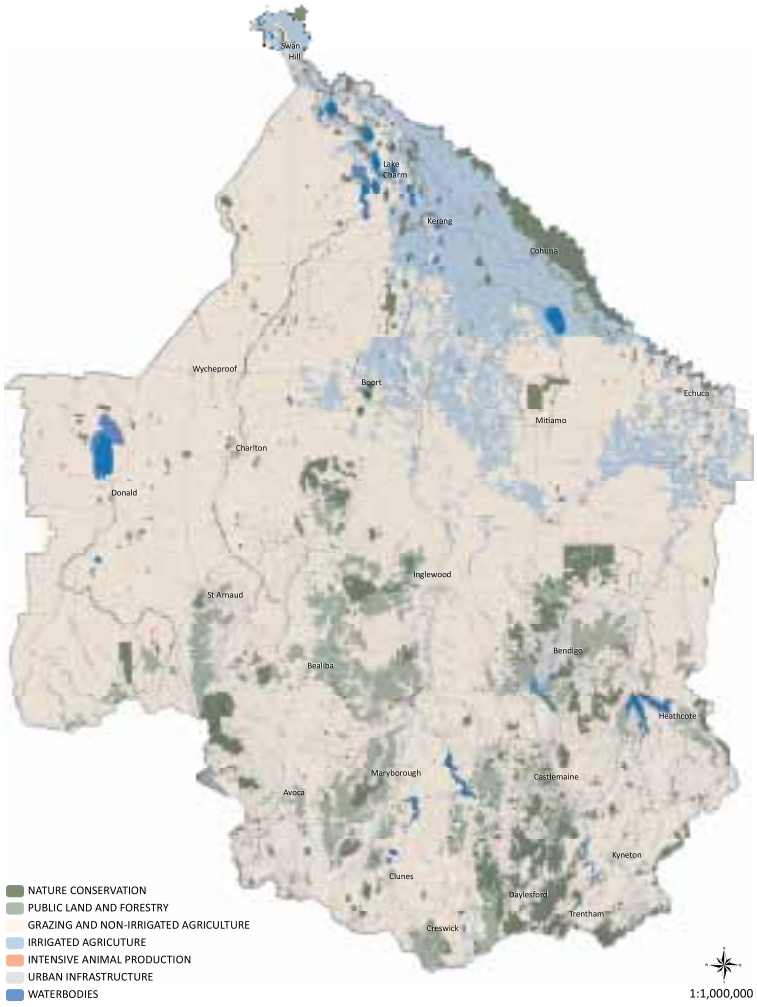


Figure 4: North Central CMA region land use

Economic / Land use

The North Central CMA region is agriculturally diverse with extensive areas of irrigation in the north, productive cropping and mixed farming in the west and cropping and grazing country in the mid and upper catchments (Figure 4). Agricultural uses vary from irrigated dairying, mixed farming and horticulture to dryland grazing and cropping. Rural living is an emerging and expanding land use and intensive animal production enterprises are increasing.
The gross value of agricultural production within the region was approximately $1.43 billion in 2009-10.

Approximately 13% of the region is public land, a substantial portion of which is reserved for recreation and nature conservation. Commercial forestry operations use public land and are concentrated in the foothill forests and softwood plantations in the south of the region.

The North Central CMA region is projected to see significant population growth in townships such as Bendigo, Castlemaine, Kyneton, Echuca and Woodend, particularly along the Calder Freeway Corridor. This growth will bring challenges about how we balance urban growth and environmental protection.

Water resources

The region has substantial groundwater and surface water resources and lies within the Murray-Darling Basin. In the south of the region groundwater is extensively used for irrigation, in addition to mineral springs which support processing industries and tourism. Irrigated agriculture dominates the northern areas of the region whilst urban communities across the region depend on a reliable supply of good quality water for domestic use. The region's major water storages include Cairn Curran, Tullaroop and Laanecoorie Reservoirs on the Loddon River, Lake Eppalock on the Campaspe River and the Upper Coliban storages on the Coliban River.

Cultural

There are many sites of Indigenous importance throughout the region. Eleven Indigenous language groups existed in the area prior to European settlement and those groups have left important physical evidence of their historic activities. Where found, this evidence survives as cultural heritage sites or places and can include axe grinding grooves, burial places and scarred trees. Indigenous groups continue to hold a strong affiliation with the region with major cultural heritage sites including Kow Swamp, Lake Boort, Lake Boga, Mt Kooyoora and Mt Franklin.

The region was once Australia's premier gold mining area and therefore is also rich in non-indigenous cultural heritage. It has 515 features, buildings and places listed on the Register of the National Estate.

The region's historic heritage assets are renowned and well recognised in Victoria and across Australia. They are fundamentally the legacy of Victoria's great international gold rush and they are evident in landscapes, streetscapes, public infrastructure, gardens and amongst a diverse industry base. Agriculture, viticulture, manufacturing, information technology and tourism are all important social and economic drivers that have developed from the region's nineteenth century settlement patterns and land use (Heritage Victoria, 2010).

Catchment Management Authority cross-border cooperation

Although the North Central RCS is focused on the North Central CMA region, there are natural assets and or issues that cross CMA boundaries that will require consideration throughout RCS implementation. For example, Box-Ironbark forests extend through central Victoria crossing the North East, Goulburn Broken and North Central CMAs boundaries and the irrigation modernisation is common to both the North Central and Goulburn Broken CMAs. Strong partnership and collaboration between neighbouring CMAs and Government agencies will be required to ensure a coordinated approach. The North Central CMA is committed to working with neighbouring CMAs and partner agencies in a collaborative approach to dealing with these challenges.

Table 1: Relevant Federal, State and Regional legislation and policy (AustLii, 2012)

Federal	• *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* – Focused on ensuring the preservation and protection for Aboriginal heritage. • *Commonwealth Water Act 2007* – Sets out requirements on how to manage water within the Murray-Darling Basin including developing the Murray-Darling Basin Plan and establishes the Murray-Darling Basin Authority and Commonwealth Environmental Water Holder. • *Environment Protection and Biodiversity Conservation Act 1999* – Provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places.
State	• *Catchment and Land Protection Act 1994* – Sets up a framework for the integrated management and protection of catchments including the requirements for CMAs to develop a Regional Catchment Strategy. • *Water Act 1989* – Outlines the law relating to water in Victoria and provides for integrated management of all elements of the water cycle. • *Flora and Fauna Guarantee Act 1988* – Provides a framework to promote the conservation of Victoria's native flora and fauna. • *Planning and Environment Act 1987* (Victorian Planning Policy Framework; Municipal Strategic Statement – Local Planning Policy Framework) • *Traditional Owner Settlement Act 2010* – Provides a system for negotiating or consulting about activities on Crown land where a Traditional Owner Settlement has been reached.
Regional	• *North Central River Health Strategy 2005* – Sets direction and articulates priorities for the management of waterways within the North Central CMA region. • *Loddon Campaspe Irrigation Region Land and Water Management Plan 2011* – Provides an integrated framework for managing land, water and biodiversity within the North Central CMA region irrigation areas. • *North Central Native Vegetation Plan 2005* – Sets direction and articulates priorities for the management of native vegetation within the North Central CMA region. • *North Central Dryland Management Plan 2008* – Prioritises investment in NRM projects across the dryland area to achieve the highest value NRM outcomes for the community. • *North Central Floodplain Management Strategy 1999* – Sets the long-term direction for Floodplain Management within the North Central CMA region. • *North Central Community Engagement Strategy 2008* – A strategic framework and action plan for engaging the whole north central Victoria community in catchment management issues and natural resource management programs. • *Loddon Mallee Regional Strategic Plans for the Southern Region and Northern Region 2010.* • *Grampians Wimmera Southern Mallee Regional Strategic Plan 2010.* • *Grampians Central Highlands Regional Strategic Plan 2010.*

1.5 Scope and policy context

A RCS is required under the *Catchment and Land Protection Act (1994).* It is the primary planning framework for land, water and biodiversity management in the North Central CMA region. The RCS integrates regional priorities with relevant state and federal legislation and policies regarding NRM. It strives to achieve regional outcomes that will contribute to national NRM targets.

The RCS is aligned with a suite of NRM legislation, policies and strategies at federal, state and regional levels. Appendix 9.1 provides a list of all RCS relevant legislation and policy. Table 1 summarises the most relevant legislation and policy.

1.6 Key RCS Drivers

There are a number of key drivers that have the potential to influence the RCS outcomes. These drivers and the links to the RCS are discussed below.

Regional Growth and changing land tenure and use

The region's population is approximately 240,000 with most people living in larger urban centres. Bendigo is the largest, with several smaller centres exceeding 5,000 people (including Swan Hill, Echuca, Maryborough and Castlemaine). There has been a population shift away from agricultural areas towards provincial towns. 'Rural living' or small hobby farms are increasing whilst there is growth along the commuter 'Calder Freeway Corridor' and along the Murray River. Generally the population of the region is ageing as more young people leave for bigger cities.

Changes in tenure (rural to hobby farm particularly) present opportunities for nature conservation, but challenges in terms of education and liaision with many land owners. Urbanisation sees an increased emphasis on public land biodiversity and ensuring the protection of value natural assets and needs to be recognised in urban growth planning.

Agricultural land use can change dramatically over relatively short periods of time due to climatic conditions and changes in commodity prices, as demonstrated by the increasing cropping seen in the region over the past 10 years. These changes provide various NRM and land management challenges and emphasise the need for an adaptive RCS to respond in order to continue the protection of natural assets, like soil and biodiversity.

The Victorian Government in partnership with local government and key stakeholders is working to streamline and update the planning system. A key part of this work is to consider any improvements to regional planning across Victoria through Regional Strategic Plans and Regional Growth Plans (RGP).

RGPs will define which areas of land can accommodate growth and change and which areas are to be maintained. They will also identify what additional infrastructure will be required to accommodate areas of growth, while responding to each region's strategic aspirations. RGPs will also provide a coordinated state-wide approach to regional planning in Victoria.

The North Central RCS will require strong linkages with all RGPs covering the region (see Table 1). Priority natural assets identified in the RCS can also be considered as part of regional growth planning and ensure planning issues can be considered as part of the long-term protection of our region's natural assets.

Water policy

Over the past decade there have been significant changes to water policy at both a State and Federal Government level. The Northern Region Sustainable Water Strategy (SWS) provides and guides the long-term management of water resources within northern Victoria.

The Murray-Darling Basin Plan is currently being developed and will have a substantial influence on the management of water and likely to drive changes in many aspects including water recovery, land use, irrigation efficiency and environmental water management. These issues are discussed in the relevant 'themed' chapter.

Climate change

The implications of climate change on environmental, economic and social values is difficult to predict given the uncertainty in climate model outcomes, variability in climate and the ability to adapt to these changes. Given the global need to take action, the North Central RCS will focus on how the region can adapt to changes in climate and how best to achieve good environmental outcomes for the region under current and future climate policy and scenarios. Further support and research should be undertaken to provide more certainty regarding these gaps in knowledge.

Carbon sequestration activities driven by climate policy have the potential to significantly enhance or adversely impact on values and services provided by the natural assets of the region.

Action:

Develop a North Central Carbon Action Plan to help guide future carbon sequestration activities within the North Central CMA region.

1.7 RCS Development Process

The RCS was developed with the support of the North Central CMA Board, RCS Steering Committee and the Natural Resources Management Committee (NRMC). Figure 5 illustrates the North Central RCS development process.

1. Review of 2003-2007 RCS

- The 2003-07 RCS was reviewed with a focus on evaluation of performance indicators and community engagement.

2. Identification of Natural Assets

- Community 'natural asset' identification through ten community workshops across the region.
- Government and partner agency natural asset identification.
- RCS catchment assets – Community and agency assets were aggregated to represent significant assets at a scale appropriate for the RCS.

3. Development of theme discussion papers

- Themed discussion papers were developed for Waterway and Floodplains, Biodiversity, Wetlands, Land & Soils, Community Engagement and Empowerment, Indigenous Engagement, MERI (Monitoring, Evaluation, Reporting and Improvement) and Climate Change.
- The discussion papers outline a description of the asset's theme, conditions, and threats and a clear identification of regional priorities.
- The themed discussion papers will form technical supporting documents to the RCS.

4. Asset Prioritisation

- Prioritisation considered asset significance, threat and the technical and socio-economic feasibility [in line with the DSE Asset-Based Approach].
- A detailed Investment Framework for Environmental Resources (INFFER) analysis for priority assets to provide confidence about the feasibility and cost-effectiveness of achieving specific and agreed environmental outcomes (Refer Section 2.3).

5. Targeted consultation of discussion papers

- Themed discussion papers were circulated and reviewed by key stakeholders with feedback into the development of the draft RCS.

6. Development of Draft North Central RCS

- Draft RCS was developed and reviewed by the inter-agency RCS Steering Committee, North Central CMA Board and Natural Resource Management Committee.
- Communication tools were developed (Web site, flyers, i-map and data base, promotional presentation).

7. Draft RCS available for public consultation May/June 2012

- Formal engagement of stakeholders.
- Website, flyers, community meetings.

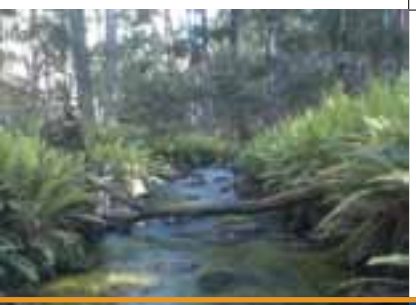
8. Development of final Draft North Central RCS

- Consider and implement comments and feedback.

9. Endorsement from Board/NRMC August 2012

10. 2012-18 North Central RCS presented to Ministers September 2012

Figure 5: North Central RCS development process



2 Strategic Framework

2.1 RCS review

The purpose of the RCS review was to assess the scope, vision, targets, priorities and directions in the 2003-07 North Central RCS and consolidate new knowledge and learning from its development and implementation (NCCMA 2009). The review provides a sound foundation for the development of the 2012-18 North Central RCS.

The objectives of the RCS review were to:

- determine the extent to which the planned activities and actions delivering the 2003-07 North Central RCS were implemented and the extent to which these actions influenced resource condition change
- inform subsequent RCS renewal and implementation.

Process

The RCS review process involved an assessment of the performance against targets and actions. The review sought the advice from relevant NRM practitioners with knowledge of specific targets.

Consultation was targeted to practitioners with a working knowledge of the 2003-07 North Central RCS to ensure maximum learning from the review. Interviews were conducted with selected stakeholders, and others were invited to complete an online survey based on the interview questions. Approximately 50 responses were received.

Broader community perspectives on the development and implementation of the 2003-07 North Central RCS were provided through the Natural Resource Management Committee (NRMC). The NRMC advises the Board on community engagement and investment priorities in the region. The NRMC comprises representatives of the communities within the North Central CMA region.

Key learnings from the RCS Review

The key learnings from the review of the 2003-07 North Central RCS are summarised below in Table 2.

Key recommendations for RCS renewal

The following recommendations were made as part of the 2003-07 North Central RCS review. These recommendations have been considered in developing and renewing the 2012-18 RCS.

Table 2: Key learnings from the review of the 2003-07 North Central RCS

• Low level of ownership of the previous RCS by community, local government and other natural resource management partners.
• The RCS became rapidly out-dated and did not evolve or adapt over the life of the strategy.
• Many of the targets were not SMART (Specific, Measurable, Achievable, Realistic, Time-bound), impacting the implementation, monitoring and evaluation of progress.
• The lack of baseline data and an overall Monitoring, Evaluation and Reporting Framework limited the effectiveness of measuring and demonstrating achievements and progress towards targets.
• Lack of understanding, ownership and acceptance of responsibilities assigned in RCS limited the effectiveness of the implementation effort.
• While the 2003-07 North Central RCS was not considered to be relevant today in its current form, the development and evolution of sub-strategies, action plans and associated planning and implementation processes has ensured that the management of natural resources in this region has matured.

Key recommendations include:

1. **RCS should be a concise, high level, strategic document**
2. **Greater emphasis on partnerships and engagement**
3. **Use an asset-based approach for prioritisation.**
4. **Develop and Implement an effective Monitoring, Evaluation, Reporting and Improvement (MERI) framework**
5. **Ensure best available information and knowledge is used**
6. **Adopt an adaptive management approach to decision making**
7. **Alignment with other planning and strategic processes**

The implementation of 2012-18 North Central RCS should aim to:

- Adopt an adaptive management approach to decision making.
- Support ongoing engagement of RCS partners.
- Implement a clear and robust MERI framework.

The mid-term review of the six year RCS should be supported by the annual review of governance arrangements and progress against agreed performance indicators.

2.2 Asset-based approach

North central Victoria has diverse natural environments and biodiversity. Many of the region's most significant environmental assets face a range of threats such as habitat loss and fragmentation, declining water quality, climate change, invasive plants and animals, and changing land use.

The 2012-18 RCS has adopted an asset-based approach which identifies and describes the region's highest priority natural assets, including those of international, national, state and regional significance.

In the North Central CMA region, we face a challenge in common with many other NRM communities: how to get the best and most needed results from the limited resources available. At the same time, governments and investors that provide these funds wish to be able to decide which projects will deliver the most valuable environmental outcomes, but often lack the information needed to make these decisions.

A solution to this challenge can be to use an asset-based approach; that is, by focusing our efforts on protecting and enhancing environmental assets with the most significant values (ecological, social, cultural and economic), that are under the greatest threat and with high likelihood and feasibility of protection and enhancement.

The asset-based approach in the North Central 2012-18 RCS has been guided by the Department of Sustainability and Environment guidelines 'Applying the Asset-Based Approach for the development of Regional Catchment Strategies'.

The 2012-18 RCS has a significant focus on NRM assets and actions that will involve close collaboration with landholders and the communities associated with these priorities. It is a key objective to encourage and support broader participation of landholders, resource managers and other members of the community in catchment management across the region. Community engagement, education, capacity building, information sharing and programs such as Landcare and Waterwatch are critical in meeting the objectives of the RCS.

The RCS recognises the need to achieve a balance between investing and protecting high value environmental assets versus investing in broader programs enabling the community to build their capacity to sustainably manage our natural environment. Further discussion regarding how the RCS can support communities is discussed in Chapter 3.

2.3 Decision support

The North Central CMA prioritises natural assets on the basis of careful planning, research and community consultation. Decision support tools are used to assist in making sound decisions regarding investment to ensure the wise use of limited funding and resources. The Investment Framework for Environmental Resources (INFFER) is one such tool that the North Central CMA has used during the RCS development and more generally for environmental asset investment decision making. Although INFFER has been used in the development of the RCS, it should be recognised that there will also be other decision support tools and drivers for investment (i.e. irrigation modernisation in the north of the catchment).

INFFER™ is a tool for developing and prioritising projects to address environmental issues such as reduced water quality, biodiversity, environmental pests and land degradation. It is designed to help environmental managers achieve the most valuable environmental outcomes with the available resources. INFFER assists decision makers to assess and rank environmental and natural resource projects, comparing aspects such as value for money, degrees of confidence in technical information and the likelihood of achieving stated goals. INFFER aims to help determine whether the projects will deliver tangible results within budget; whether the tools and technical capacity needed to attain those results will be available to the project; and whether the people who need to come on board to make it happen will be there when the time comes for action.

INFFER:

- Provides a strong basis for preparing business cases for funding
- Highlights the funding required to achieve particular environmental outcomes
- Provides confidence about using public money more cost-effectively through the choice of appropriate delivery mechanisms
- Provides a robust, transparent basis to enable strategic direction setting, debate and discussion about the future of assets in question
- Builds on existing knowledge, integrating biophysical, physical, social and economic factors with institutional political risks and costs to assess the cost-effectiveness of actions
- Helps to highlight and prioritise limitations in current knowledge
- Provides internal logic and consistency, ensuring that actions funded by projects will be sufficient to deliver stated goals
- Reduces bias in decision making by making the assumptions about the process fully transparent.

For further information visit www.inffer.org

2.4 Asset identification and priority setting

The Asset identification and priority setting process is a key component to the RCS development. The process used for asset identification and priority setting is explained below with asset priorities articulated in following chapters of the RCS (see Figure 6).

1. Community Asset Identification

– 10 community meetings were held across the Region seeking community nominations on environmental assets that were most valued by the community. These assets were mapped (where possible) and information regarding values and threats were captured in a database. These assets have been described at various scales such as a specific small patch of vegetation or a small section of river up to an entire forest or river system.

2. Expert Stakeholder Workshops

– Experts, including agency staff with knowledge of environmental assets, attended workshops and added to the list of assets that were most valued within the region.

3. Assets Review

– Many assets were nominated several times with slightly different areas of extent, asset name, values and threats identified. The asset review process aggregated assets together, where appropriate. All asset nominations have been recorded and can be found on the North Central CMA website.

Asset Filtering

– All assets identified were rated for their environmental significance and threat. This rating was used as an initial filter to help understand the importance of the asset. Highly significant assets were then also rated for feasibility of implementation from a technical and socio-economic perspective. This process was consistent with the recommended approach by the DSE asset-based approach.

4. RCS Catchment Assets

– The assets represented in the RCS have been further amalgamated to reflect a scale appropriate for the RCS. In this process many of the notable assets identified at a local scale have been incorporated as part of larger catchment assets. Importantly community information on asset values will inform future actions and investment in catchment assets.

Figure 6: The process used for asset identification

Please note: Although this process does provide direction regarding the highest priority assets for protection, this does not diminish the value of all assets identified through the community driven asset identification process. Assets not deemed to be a priority are rated as 'notable assets' and are listed on the North Central CMA website. All notable assets can also be found on the CMA website along with information obtained from the community and some State Government databases.

2.5 Plans and strategies

The North Central RCS is the overarching Strategy for Land, Water and Biodiversity management in the region. A number of plans and strategies have been developed that provide further detailed information and direction for specific assets.

- North Central River Health Strategy 2005
- Loddon Campaspe Irrigation Region Land and Water Management Plan 2011
- North Central Native Vegetation Plan 2005
- North Central Dryland Management Plan 2008
- North Central Floodplain Management Strategy 1999
- North Central Community Engagement Strategy 2008
- North Central Invasive Plant and Animal Strategy 2010
- North Central Invasive Plant and Animal Plan 2011

3 Community

Vision: An informed, engaged and active community protecting and enhancing the region's natural assets.

3.1 The community and natural resource management

The challenges of protecting and enhancing our natural assets are significant and complex. They can only be addressed with a strong and collaborative approach across both community and government. The health of our catchments will rely on the active involvement of people in the region. People who farm and manage land or live in towns, work, volunteer or go to school all have a role to play in contributing to developing or achieving the RCS vision.

A clear objective of the RCS is to work closely with our community and our partner organisations working in the NRM field to develop an agreed vision and priorities for our region's natural assets. By working together we strengthen a targeted approach for the priority assets in the North Central CMA region.

3.2 An active community

The North Central CMA region is home to many enthusiastic and active community groups and individuals who are working to protect our region's natural assets. Recognition of the current and past work of the community in NRM is important and will provide a springboard to further involve community into the future.

The Landcare movement started in the North Central CMA region over 25 years ago; when in 1986 a group of local farmers from Winjallok formed the first Landcare group. Across the North Central CMA region there are now more than 160 Landcare and community NRM groups, comprising more than 4,000 volunteers (Figure 7). Groups undertake a variety of on-ground activities including revegetation, fencing off waterways, rabbit control, weed control, erosion control, installation of nest boxes and remnant vegetation protection. Groups also undertake a variety of capacity building activities. These include newsletters, bus tours, flora and fauna field days, working bees, community weed and pest animal days, preparing action plans, and training days.

Community programs are run through various government organisations. CMAs, DPI, DSE and PV all involve local communities in the protection and enhancement of our natural environment. These range from programs involving monitoring and education such as Waterwatch, specific asset protection programs (Loddon Stressed River project) through to programs that enable more sustainable farming practices (Farming for Sustainable Soils project) or whole farm planning and on-farm irrigation modernisation through FarmWater.

The RCS aims to continue to encourage and support local communities that are already actively involved in protecting our natural environment and to engage and involve the broader community in meeting the aims of the RCS.

Figure 7 – Local Government and Landcare Groups

3.3 Community engagement and capacity building principles

The main aim of community engagement and capacity building is to achieve an informed and engaged community that continues to manage natural assets sustainably across the region. The RCS aims to set a direction for NRM that is clearly understood and supported by all members of the regional community.

To enable a well engaged and skilled community to meet the NRM challenges facing the region a set of principles has been developed. These community engagement and capacity building principles provide a useful framework for how government and community interact about NRM issues over the next six years.

The RCS community engagement and capacity building principles are:

Ownership – Actively engage and involve the community in NRM planning and implementation.

Valuing local knowledge and skills – Listen to and respect differing community views and incorporate local knowledge and skills into the design, delivery and evaluation of projects.

Integrity and honesty – Seeking genuine engagement, not tokenistic or contrived, with the community in good faith and with good will towards the community. Following through with commitments made to communities and making sure there are sufficient funds to resource commitments.

Clear purpose – Providing clear explanation of the aims of the engagement processes, projects and programs to the community and stakeholders.

Clarity about roles – Clearly defined roles for partners, the community and stakeholders are developed collaboratively.

Concise and effective communication – Making information available in plain English and in a clear, concise, timely manner.

Encourage participation – Promote participation in programs and activities and support on-going community engagement.

Capability and social learning – Encourage community capacity building and self learning.

Building genuine relationships with community and other stakeholders – Strong on-going relationships with community is critical for long-term enduring environmental outcomes.

3.4 Engaging landholders

Many natural assets, including important areas of remnant habitat, are located on private land and managing them generally relies on collaboration with private landholders. Recognising local knowledge and tapping into the wisdom and experience of local networks is important for implementing the RCS.

Landholders within the North Central CMA region will have different values and behaviours relating to managing their land and the value they place on the environment. These different aspects need to be acknowledged and considered when developing plans and strategies and when implementing projects across the region. Understanding the underlying reasons why individuals think and behave will allow more tailored and effective engagement and capacity building approaches leading to better environmental outcomes.

Although much is known about landholders and communities across the North Central CMA region, there are still gaps in our understanding of regional communities and social drivers. A regional social benchmarking study focused on better understanding the social drivers for catchment management would assist in understanding of the values, behaviours and drivers for land and water management and links to environmental protection. This information could be used to assist Government and communities to better understand how landholders behave and think and to tailor approaches to engage and provide opportunities for capacity building.

3.5 Government agency collaboration and partnerships

Many Government agencies and corporations such as catchment management authorities, local Government, Department of Sustainability and Environment, Department of Primary Industries, Parks Victoria, Department of Planning and Community Development, regional development organisations and urban and rural water authorities all play a role in managing our natural assets.

Continued strong collaboration and partnerships will be critical to meet the vision of the RCS 'A community active in protecting and enhancing the integrity of its catchment.' The RCS will need to guide these government agencies on how and where to direct effort and resources in relation to meeting RCS goals and objectives.

The asset based approach used in the RCS (spatially explicit priority assets) will allow a more targeted approach when working with partner organisations. For example, given the North Central CMA region comprises 16 local governments, time and resources can be targeted towards specific assets or issues that may be of interest or be influenced by local government planning and decision making.

It is recognised that stronger linkages are required between the RCS and local Government planning and decision making. Specifically, the North Central CMA will work with relevant local governments to ensure better alignment of RCS objectives with local government planning.

The North Central CMA will also work with other partner organisations throughout the implementation of the RCS to ensure a collaborative and coordinated approach.

3.6 Engaging the general community

The North Central CMA region is home to over 240,000 people with most of the population living in major regional cities and towns such as Bendigo, Castlemaine, Echuca, Kerang, Maryborough and Kyneton. Many in the general community strongly value the natural assets of the region and those identified in the RCS, although their interest in natural assets varies widely across the community.

The focus of the RCS for the general community is one of articulating the key natural assets, threats and priorities for the region and ensuring that Government investment is used wisely and effectively. There is a strong need to ensure the broader community continues to value the natural assets of the region.

3.7 Engaging the Aboriginal community

Aboriginal Heritage

Throughout north central Victoria, the landscape holds the imprint of thousands of generations of Aboriginal people that has created a rich cultural heritage for the region. European settlement had a profound impact on the land, biodiversity and water and has significantly affected Indigenous people.

There are many important places for Aboriginal people across north central Victoria. These areas are important for various reasons including obtaining sustenance, expressing themselves artistically, passing on creation stories and cultural values, engaging in conflict, establishing alliances and social networks, trading goods, celebrating rites of passage and committing the departed to their final resting places.

Underpinning these material aspects of Aboriginal cultural heritage are intangible places where there may be no physical evidence of past cultural activities. These include places of spiritual or ceremonial significance, places where traditional plant or mineral resources occur, or trade and travel routes.

Information about such places may be passed down from one generation to the next or may survive in nineteenth century documents and records.

The area now known as the North Central CMA region is the traditional land of the Dja Dja Wurrung, Barapa Barapa, Wamba Wamba, Yorta Yorta and Taungurung people.

Traditional Owners and 'Country'

Traditional owners often express being born from the land, that they belong to the land or that the land and people exist as one. Aboriginal culture is founded on respect and valuing all that exists in the world. Ancestral spirits are manifested everywhere in plants, animals and ecosystems. The concepts of spirit and identity are at the core of the Aboriginal connection to land. 'Country' can be described as the land, water (ground and surface water), all living things, the atmosphere and subterranean elements like soils and stone. 'Country' has an energy and life force which speaks and hears.

The physical health of 'country', can affect the integrity of Aboriginal heritage. Poor environmental health has a direct impact on community health, a relationship that is well understood by Indigenous people. Prior to settlement, 'country' was managed using a social structure and knowledge system that enabled a sustainable lifestyle over thousands of generations.

Key Policy and Legislation

The Traditional Owner Settlement Act 2010 provides for an out-of-court settlement of native title and delivery of land justice. The Act allows the Victorian Government to make agreements to recognise Traditional Owners and their rights in crown land, in return for withdrawal of native title claims and an agreement not to lodge future claims. Currently within the region there are two settlements in the process of negotiation involving the Dja Dja Wurrung and the Wadi Wadi, Wamba Wamba and Barapa Barapa of north central and north western Victoria. Agreement is likely during the early life of the renewed RCS and will provide both clarity and new opportunities for building relationships and creating employment, particularly for working on country.

Principles for engaging Indigenous People

The North Central CMA has worked closely with the Barapa Barapa and the Dja Dja Wurrung people in setting up works crews that provide opportunities for Aboriginals to work on country, improve the health of the natural environment and protecting cultural heritage. The RCS aims to build on these achievements and seek other opportunities for further strong partnerships.

The following principles are taken from the DSE 'Indigenous Partnership Framework' and will guide indigenous engagement throughout the life of the North Central RCS.

1. **Respect and recognition:**
   Approach all aboriginal issues with the understanding that the region's Traditional Owners and Indigenous Victorians have a continuous connection to Country and they:
   - Have a valuable contribution to make in land, water and natural resource management
   - Can fulfil a uniquely integrated role in land, water and resource management practices
2. **Caring for Country:**
   Actively seek to develop and support opportunities for the region's Traditional Owners and Indigenous people to connect and care for their Country.
3. **Partnership and Capacity Building:**
   Through projects and activities, the North Central CMA and partner organisations will include an Aboriginal consultation component that reflects a meaningful engagement process.

3.8 Discussion

There will be many NRM challenges facing the North Central CMA regional community over the next six years. Engaging the community in these challenges and providing the community with the skills and knowledge to deal with them will be critical for the success of the RCS.

Community engagement and capacity building must be a strong focus of the RCS and should be considered in all aspects of RCS implementation. The principles outlined in this chapter should form the basis of any engagement and capacity building activities undertaken.

A renewed focus on Landcare is required to reinvigorate local groups and provide the necessary support to groups to implement local projects and ensure alignment with RCS and Regional Strategies and action plans. There is a real need to acknowledge, maintain and develop Landcare group capacity to enable continuation of the great work Landcare groups deliver.

Through the asset-based approach, there needs to be a strong recognition that many communities who are outside the RCS priority catchment assets will require support and encouragement. Locally important assets have been nominated and recognised during the development of this RCS.

Support can be offered through encouraging these local groups to apply for other government grant schemes (such as Landcare Grants), providing local groups with information and advice regarding their local environmental assets and how to protect and enhance them, encouraging groups to attend field days and forums to gain a better understanding on how to manage their local areas.

3.9 Regional Actions:

The following actions are proposed:

- Renew the North Central CMA's Regional Community Engagement Plan by 2014
- Renew the Regional Landcare Support Plan by 2013
- Undertake a Region wide social benchmarking study to better understand the values and behaviours of the regional community in relation to the environment by 2015
- Continue to explore opportunities to work with local Indigenous groups, with particular focus on priority RCS catchment assets
- Work with local Indigenous groups to more strongly align RCS with 'Whole of Country' plans
- Ensure strong linkages between the RCS and Regional Growth Plans
- Implement an expanded Environmental Literacy Program based around participatory education programs (e.g. Waterwatch)
- The North Central CMA will work with relevant local governments to ensure better alignment of RCS objectives with local government planning.
- The North Central CMA will also work with other partner organisations throughout the implementation of the RCS to ensure a collaborative and coordinated approach.

3.10 Case studies

Barapa Barapa Crew work on country

Key link to RCS – Strong partnerships between the North Central CMA and the region's Traditional Owner Groups are realising opportunities for Aboriginals to work on country, improve the health of the natural environment and protect cultural heritage.

The Indigenous community has long sought the opportunity to work on country, particularly caring for their country and delivering NRM outcomes. The Kerang and Gunbower Ramsar enhancement projects have provided such opportunity. Coupled with study pathways and increasing employment outcomes, the Wetlands Enhancement Crew has provided role models for young Indigenous men and women, necessary for succession and intergenerational growth.

A specific focus of both the Kerang and Gunbower Ramsar Enhancement projects has been the engagement with Traditional Owners (Barapa Barapa and Yorta Yorta peoples) in the planning and implementation of a broad range of project aspects, including the employment of an Indigenous works crew to deliver works on ground.

The Wetlands Enhancement Crew is made up primarily of individuals with Barapa Barapa and Yorta Yorta descent and has played a major role in cultural heritage assessment, rabbit warren mapping and management, a broad range of weed management activities, fencing, pest animal baiting and importantly liaising with contractors and other NRM professionals to raise awareness of Indigenous cultural heritage including legislative obligations under the *Aboriginal Heritage Act, 2006*.

The crew has been operating for over 2.5 years and throughout that period has involved the employment of seven Indigenous persons. Four of the crew members have now completed a Certificate III in Conservation and Land Management , and a range of other relevant training including, Agricultural Chemicals Users Permit (ACUP), Cultural Heritage training and chainsaw user certifications.

Over the period the crew has been operating, it has gradually taken on larger and more complicated on-ground works. In 2012 the crew, with support from North Central CMA staff, undertook the entire rabbit baiting program around several of the Kerang Ramsar Wetlands, using cutting edge technology and equipment. In previous years, this work had been undertaken by private contractors.

These projects have allowed for greater collaboration between various community members, strengthened the relationships between several Indigenous groups and the Traditional Owners, and provided Indigenous people with an opportunity to reconnect with their ancestral land, identify, protect and ensure their culture is proudly represented to all current and future generations. The permanent employment opportunities have provided crew members with greater financial stability, increased community exposure, additional professional and personal networks enabling a greater sense of individual worth. Flow on benefits to the broader community are generally anecdotal, however it is noted that the community awareness has grown in relation to indigenous people and traditional owners working on country, their unique role in NRM and the benefits to catchment communities.

The success of this project demonstrates a strong commitment across all groups and individuals involved, to work together, discuss and work through issues and gain experience and a better understanding of each other's needs and challenges. The experience gained provides a solid grounding for future continued Indigenous engagement in NRM and strong partnerships and programs for the future.

Waterwatch experience leads to new Landcare Group

Key link to RCS – There is strong agency support for Landcare groups and recognition that Landcare is a vital delivery partner in NRM across the region.

Veronica Palmer's move to Eddington on the Loddon River coincided with the birth of Landcare in the North Central CMA region, some 25 years ago. Veronica's love for the bush and waterways was developed during her childhood in Warrandyte where the natural environment was her playground.

In 2007 Veronica became a volunteer Waterwatch monitor, keeping watch on water quality in the Loddon River, Bet Bet Creek and Deep Creek near where she lives. Her involvement in Waterwatch acted as a springboard to her playing a vital role in co-founding the Eddington Landcare Group in 2009.

It was the unique, but highly degraded, Red Gum Forest near Eddington that really sparked the formation of the Landcare group. Rabbit numbers had exploded during the drought and were causing severe environmental damage, including biodiversity loss and erosion that contributed to the poor health of the Loddon River. With Veronica's assistance, concerned landholders and local community members came together to form the Eddington Landcare Group and to instigate action to help restore the health of the forest.

One of the major successes of the group has been gaining the attention and support of NRM agencies, including the Department of Primary Industries, Goulburn-Murray Water and the North Central CMA, and providing a forum for these agencies to work with the Landcare group to manage threats to the forest.

On-going works include pest plant and animal control, and the restoration of biodiversity using native plant seed. Although early works resulted in some incremental improvement in the health of the forest, it was the 2010 flooding of the forest that provided a significant natural check on the rabbit population.

The group has also been able to support landholders to carry out environmental works. This has complemented the completion of previous large-scale fencing of buffer zones around waterways to restrict stock access and the creation of wildlife corridors on several properties.

Veronica reflects that her involvement in the group has given her great personal benefit and helped strengthen her local community. She praises the passion and motivation of her fellow group members and the wealth of local knowledge they embody.

4 Waterways and Floodplains

Vision: Waterways and floodplains will be managed sustainably to protect and enhance their diversity and ecological function while supporting the uses of the regional community.

4.1 Waterways and Floodplains of the North Central CMA region

Rivers and their associated floodplains support a large array of native flora and fauna - many of which are threatened. They are highly important in the movement and cycling of sediment and nutrients through the landscape, and a significant interface between aquatic and terrestrial systems. Rivers provide safe drinking water for thousands of people, along with water to support rural production. The location of many of our regional towns on or near a waterway has entwined our rivers and floodplains in the lives and histories of our people.

Both surface water and groundwater are highly valued as a consumptive resource. Whilst irrigation accounts for more than 95% of water consumed in the region other uses include mineral spring waters, stock and domestic supplies, town water supplies and fire fighting.

Water is the lifeblood of our rivers and a healthy river requires a variety of flows. Regulation of our river systems has changed the natural flow patterns and caused the health of our river systems to decline. Environmental flow management has become an integral component of improving the health of our regulated river systems.

An intrinsic relationship between Indigenous culture and land has endured for over 40,000 years. The land continues to inform Indigenous identity and community today. Traditionally, Indigenous people have a strong affinity with waterways and water bodies, as a vital source of food, water and camping sites.

Rivers

The North Central CMA region contains four river catchments (see Figure 2)

- Campaspe
- Loddon
- Avoca
- Avon-Richardson

The Campaspe River catchment covers approximately 400,000 ha. The Campaspe River is the major waterway flowing 245 km north to its confluence with the River Murray at Echuca. The Campaspe's major tributary is the Coliban River. Other significant tributaries include the Axe, McIvor, Mount Pleasant, Wild Duck and Pipers creeks.

The Loddon River catchment, home to two-thirds of the region's population, covers approximately 1,500,000 ha and extends approximately 310 km from the Great Dividing Range in the south to the River Murray. Major tributaries include Tullaroop, Bet Bet, Bullock, Bendigo, Serpentine, Gunbower and Pyramid creeks.

The Avoca River catchment covers approximately 1,200,000 ha, though only 690,000 ha lie within the region. The Avoca River is an anabranching river system with the most variable flow of all the Victorian rivers in the Murray-Darling Basin. The river rises near Amphitheatre and eventually terminates in Lake Bael Bael. Major tributaries include Glenlogie, Sugarloaf, Cherry Tree and Strathfillan creeks. In the lower catchment, two ephemeral effluent streams of Lalbert and Tyrell creeks flow west to terminate in Lake Timboran and Lake Tyrell respectively. These lakes and the majority of the creek lengths lie within the Mallee CMA region.

The Avon-Richardson catchment is a land-locked river system covering approximately 330,000 ha. It extends from the Pyrenees foothills near St Arnaud north to the nationally significant Lake Buloke. The catchment has little river regulation to modify or prevent flood flows. The two main waterways in the catchment are the Avon River and the Richardson River.

The River Murray between Echuca and Swan Hill lies on the border of the region, and the interaction between the region and the River Murray is very significant. The River Murray is the single largest source of water in the region for irrigation, while the Loddon, Campaspe and Avoca rivers all contribute water, salt and nutrients to the Murray as well as the exchange of aquatic species (i.e. migratory fish). The River Murray is a waterway of national importance and is integral to the health of the internationally significant Gunbower Forest and Kerang Lakes wetlands.

Floodplains

The region's catchments include areas of flood-prone land, where flooding has historically caused substantial damage to both the natural and built environment. Floods are naturally occurring events. The inherent functions of the floodplains to convey and store floodwater should be recognised and preserved to minimise the deterioration of environmental values and the long-term flood-risk to floodplain production, assets and communities.

More than 5,000 sq km of rural and urban land across the region under public and private ownership is subject to inundation by a 1 in 100 year flood. Ad-hoc works and inappropriate development in the past have significantly impacted on the natural floodplains by changing the flood frequency and flooding patterns, and has caused deterioration in the natural riverine, floodplain and wetland environments. Best practice floodplain management will reduce flood damage, improve the wellbeing of landowners and reduce adverse impacts on the natural environment.

The January 2011 flood event was the largest on record for the majority of river systems in the region inundating an estimated 7,800 square kilometres (25% of the region). Whilst the 2010-11 flood events had devastating impacts on urban and rural communities there have also been significant economic

and environmental benefits, including the filling of the region's water storages and wetlands normally disconnected from the floodplain.

Water Resources

The Region is an integral part of the Murray Darling Basin. Water resources within the region occur as both groundwater and surface water. Major reservoirs include Lake Eppalock, Upper Coliban, Lauriston, Malmsbury, Hepburn Lagoon, Newlyn, Cairn Curran, Tullaroop and Laanecoorie. Major groundwater systems include the Loddon Highlands, Mid Loddon and Lower Campaspe Water Supply protection areas.

4.2 Condition of asset

Index of Stream Condition

Over 3,500 km of waterways in the region have been assessed every five years since 1999 using the Index of Stream Condition (ISC) condition assessment method. In 2004 none of the region's waterway reaches were assessed to be in excellent condition. One reach was in good condition, 43 in moderate condition, 38 in poor and 15 reaches were found to be in very poor condition.

Sustainable Rivers Audit

The Sustainable Rivers Audit (SRA) carried out by the Murray-Darling Basin Authority provides a long-term assessment of the condition and health of the 23 river valleys in the Murray-Darling Basin. The first SRA report is based on data collected in 2004-07 on three environmental themes: fish, macro-invertebrates and hydrology. According to this audit the four river valleys in the region are in very poor overall health. The 2011 SRA report will be based on assessments from five environmental themes - fish, macro-invertebrates, hydrology, vegetation and physical form.

Threats to assets

At a regional scale many management activities impact on the health of waterways and floodplains (see Table 3).

4.3 Policy context

The 2012 Victorian Strategy for Healthy Rivers Estuaries and Wetlands (VSHREW) guides and informs both the North Central 2012-18 RCS and the 2013 North Central Regional Strategy for Healthy Rivers and Wetlands (RSHRW).

The final Murray-Darling Basin Plan will impact on how rivers are managed in the region. The RCS will be reviewed in light of the final Basin Plan.

4.4 Community participation

Community involvement in protecting and enhancing our waterways is critical to meet the objectives of the RCS. Encouraging participation, providing information and developing skills for the community are important aspects of river health and will be a focus of the North Central RCS (See Chapter 3).

Table 3. Impacts of urban and rural activities on waterways and floodplains

Urban	Key impacts of these activities
• Urbanisation • Inappropriate recreation practices • Growth and spread of exotic flora and fauna (both aquatic and terrestrial) • Poor management of urban runoff and stormwater	• Increased catchment erosion, hence sedimentation of the streambed and smothering of biota • Increased input of contaminants such as sediment, salt or nutrient causing deterioration in in-stream habitat • Increased salinity levels • Changed vegetation structure and species composition • Reduced regeneration of native vegetation • Reduced input of organic matter and structural woody habitat to rivers • Reduction or loss of floodplain linkages • Disrupted longitudinal and lateral linkages to waterways • Changed streambed and channel shape • Changes in flow patterns leading to loss of biological cues for aquatic species, reduced linkages, changes to habitat availability and changed geomorphic processes.
Rural	
• Catchment clearing • Poor land management • Grazing and clearing of stream banks • Growth and spread of exotic flora and fauna (both aquatic and terrestrial) • Levees and floodplain development • Structural woody habitat (snag) removal • In-stream barriers for fish passage • Water regulation	

4.5 Regional priority setting

Many waterways assets were identified as part of the Asset identification process run with the community and regional stakeholders. These assets were mapped at various scales from small stretches of river through to entire river systems. Some of these assets have been amalgamated to represent a waterway at a reach scale (approximately 20 to 30 km in length) to match the existing reaches identified in the North Central River Health Strategy.

The reach scale waterway assets were then assessed for value and threat and the socio-economic feasibility to determine priorities (Refer to Chapter 2 Prioritisation process).

The assets represented in the RCS have been further amalgamated to reflect a scale appropriate for the RCS. The priority waterway assets for the RCS are listed below (also see Figure 8).

- Lower Avoca River
- Upper Avoca River
- Lower Campaspe River
- Lower Loddon River
- Upper Loddon River
- Coliban River
- Gunbower Creek

4.6 Discussion

Currently the Victorian Government is finalising the Victorian Strategy for Healthy Rivers, Estuaries and Wetlands. This Strategy will guide the development of the North Central Regional River and Wetlands Strategy due for completion in 2013.

The Basin Plan has the potential to greatly influence the health of the Loddon and Campaspe rivers. Therefore it will be important to ensure good outcomes are achieved for the Loddon and Campaspe rivers as part of the Basin Plan.

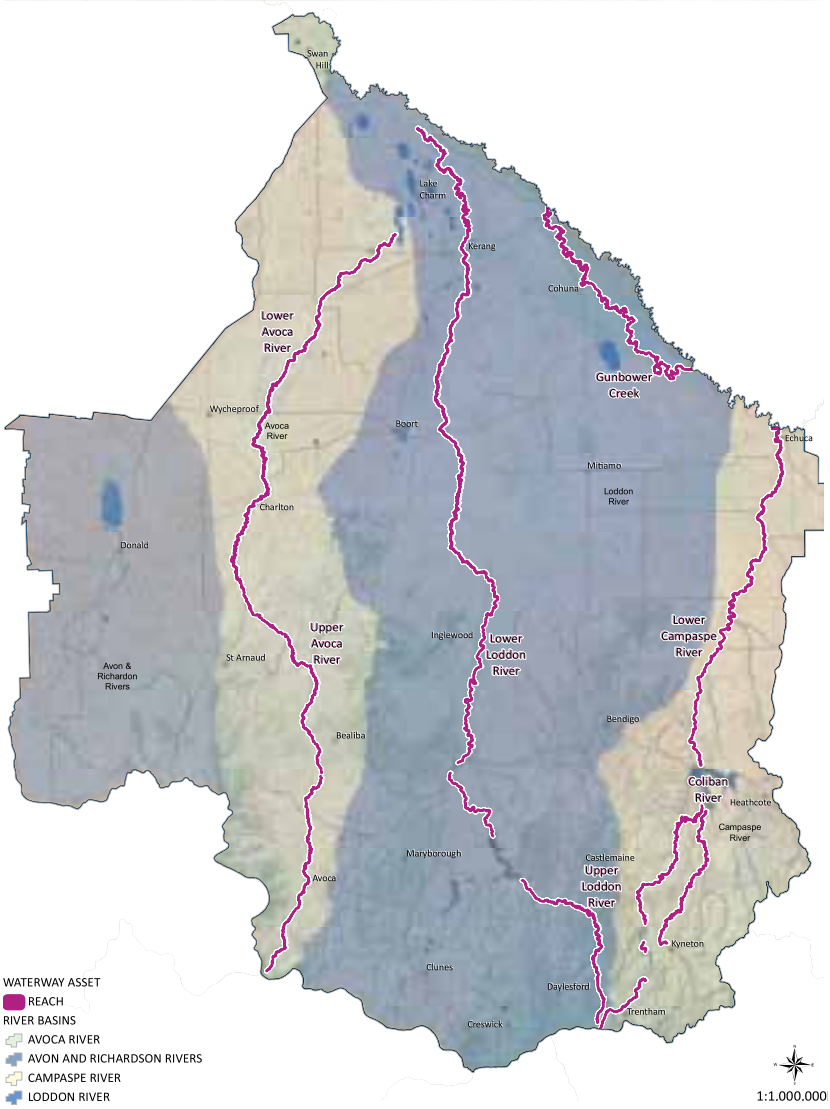


Figure 8 – Priority waterway assets of the North Central CMA region

With more environmental water becoming available, the effective and targeted use of this water to meet environmental objectives is paramount. Strong planning with clear ecological objectives and an adaptive management approach will guide environmental water management within the region. The North Central CMA, in conjunction with DSE, the Victorian Environmental Water Holder (VEWH) and the Commonwealth Environmental Water Holder (CEWH), will work cooperatively to manage environmental water within the region.

The recent unprecedented floods within the region have instigated several flood studies to assist townships in preparing for and mitigating future flooding events.

4.7 Actions and planning required

The following actions will be completed:

- North Central CMA to develop the North Central Rivers and Wetland Strategy by 2013.
- North Central CMA and partner organisations to determine implications of Murray-Darling Basin Plan on region's waterways by 2012.
- North Central CMA to continue to work with DSE, VEWH and CEWH to deliver environmental water to achieve agreed environmental objectives.
- North Central CMA, in partnership with local government, to develop Flood Mitigation Plans for high priority townships with the North Central CMA region.

Table 4: Values and objectives for priority assets

Asset	Values and objectives	
Lower Avoca River	Values	Unregulated river with extremely variable flows, largely intact red gum overstory within floodplain system.
	Threats	Overgrazing, weed invasions and levees
	Aspirational goal	To improve the condition of the Lower Avoca River from poor to moderate (based on Index of Stream Condition) by 2050.
	SMART goal	To improve the condition of the riparian zone of the Lower Avoca River by 2021 with a measured increase of one point in the streamside zone sub-index of the ISC.
	Key Actions	Fencing and grazing management
Upper Avoca River	Values	Unregulated river with extremely variable flows, endangered creek lined grassy woodland with intact overstory.
	Threats	Sedimentation and overgrazing
	Aspirational goal	To improve the condition of the Upper Avoca River from moderate to good (based on Index of Stream Condition) by 2050.
	SMART goal	To improve the condition of the riparian zone of the Upper Avoca River by 2021 with a measured increase of one point in the streamside zone sub-index of the ISC.
	Key Actions	Erosion control, fencing and grazing management
Lower Campaspe River	Values	Key habitat within cleared landscape comprising many threatened flora and fauna.
	Threats	Altered flow regimes, overgrazing and weeds
	Aspirational goal	To improve the condition of the lower Campaspe River from moderate to good (based on Index of Stream Condition) by 2050.
	SMART goal 1	To improve the condition of the riparian zone of the Lower Campaspe River by 2021 with a measured increase of one point in the streamside zone sub-index of the ISC.
	SMART goal 2	To open up 77km for the Lower Campaspe River for fish passage by 2015
	Key Actions	Environmental flows, fencing and grazing management
Lower Loddon River	Values	Key floodplain habitat with linkages to significant wetlands systems.
	Threats	Altered flow regimes, overgrazing and weeds
	Aspirational goal	To improve the condition of the Lower Loddon River from poor/moderate to good (based on Index of Stream Condition) by 2050.
	SMART goals 1:	To improve the condition of the riparian zone of the Lower Loddon River by 2021 with a measured increase of one point in the streamside zone sub-index of the ISC.
	SMART goal 2:	The extent and quality of instream fish habitat at critical sites within the Loddon River will be increased by 50% by 2022
	Key Actions:	Environmental flows, fencing and grazing management
Upper Loddon River	Values	Good condition through Wombat State Forest, highly valued by community
	Threats	Overgrazing and weeds
	Aspirational goal:	To improve the condition of the Upper Loddon River from moderate to good (based on Index of Stream Condition) by 2050.
	SMART goals 1:	To maintain condition of riparian habitat in the Wombat Forest.
	SMART goal 2:	To improve the condition of the riparian zone of the Upper Loddon River by 2021 with a measured increase of one point in the streamside zone sub-index of the ISC.
	Key Actions:	fencing and grazing management, weed control
Coliban River	Values	Largely intact overstory with many threatened flora and fauna species
	Threats	Altered flow regimes, overgrazing and weeds
	Aspirational goal:	To improve the condition of the Coliban River from moderate to good (based on Index of Stream Condition) by 2050.
	SMART goal:	To improve the condition of the riparian zone of the Upper Coliban River by 2021 with a measured increase of two points in the streamside zone sub-index of the ISC.
	Key Actions:	Environmental flow management, fencing and grazing management, weed control
Gunbower Creek	Values	Anabranch of Murray River and linkages to Gunbower Forest.
	Threats	Altered flow regimes, overgrazing and weeds, high nutrients
	Aspirational goal:	To improve the condition of the Gunbower Creek from moderate to good (based on Index of Stream Condition) by 2050.
	Overall Goal:	To improve the condition of the riparian zone of the Gunbower Creek by 2021 with a measured increase of two points in the streamside zone sub-index of the ISC.
	Key Actions:	Environmental flow management, fencing and grazing management, weed control

4.8 Case studies

Key link to RCS – The two case studies have a strong emphasis on community engagement and are contributing to healthy waterways and enduring landscape change.

Photo courtesy of Alan Hines, CFA

The Loddon Stressed River Project

The Loddon Stressed River project is a large-scale project designed to complement the delivery of environmental flows for the Loddon River downstream of Cairn Curran and Tullaroop reservoirs. The project focuses on protecting and rehabilitating riverside (or riparian) areas, community involvement and improving conditions and migration paths for native fish.

The lower reaches of the Loddon are critical vegetation corridors which provide habitat for a range of threatened flora and fauna species. The river also has influence on a number of wetlands including the Ramsar listed Kerang lakes and the Boort wetland system which provides an extensive and diverse waterbird habitat and aquatic refuge. The North Central CMA has invested $10 million of Victorian government funding over nine years to enhance the health of the river and protect its environmental, economic and social values.

Since 2003 the project has involved over 150 landholders and over 600 individuals involved in a wide range of community activities. A major achievement is the progress towards a fully protected streamside zone with over 50% (360 km) of the main stem of the Loddon's river frontage protected by fencing. Other major achievements include extensive revegetation, 200 ha of willow and Tamarix management and the reinstatement of 4 km of in-stream fish habitat.

An actively engaged community involved in river health management is vital. As much of the work was completed on private or licensed public land there is a reliance on landholder participation to achieve project goals. According to a report by Charles Sturt University the project has engaged a much higher proportion of landholders than most NRM programs. Findings also suggest that participants in the project gained a higher awareness of river health issues and were more confident in recommended practices, causing them to implement these practices more readily.

Creswick Flood Mitigation and Urban Drainage Plan

After enduring three separate flooding events during late 2010 and early 2011. Creswick now has a flood mitigation and urban drainage plan that sets out mitigation actions to provide a greater level of protection from future flooding. All preliminary studies have been completed and the plan has been submitted to government for consideration.

The flooding events caused considerable damage to residences, businesses and sporting facilities and significant distress and hardship to the Creswick community. Recognising the need to reduce the risk of future flooding in the town a Flood Mitigation Plan was developed by the North Central CMA in conjunction with the Hepburn Shire Council and the local community.

The proposed Flood Mitigation Plan will protect against a 50 year flood event, which will provide greater protection than a flood the size of the September 2010 and January 2011 events. Works will include increasing the capacity of two bridges, minor channel deepening and levee construction. A walking and bike trail may also be included when the plan undergoes the detailed design and construction phase.

In developing the plan a wide range of options was considered during the pre-feasibility stage before five options were analysed in detail. Indicative cost-benefit ratios were assessed using construction cost estimates and average annual damage.

A community based steering committee was formed to guide the process and ensure strong community input and engagement. A technical working group provided technical support to the steering committee and comprised representatives from various key industry stakeholders.

An intensive community engagement process meant that the Creswick community was aware of the options available and their impacts. A brochure outlining all options considered and highlighting logical reasons for the preferred option was delivered to all Creswick residents in November 2011.

After several public meetings and additional one-on-one consultation for concerned residents there was overall strong community support for the plan. The majority of flood-affected residents who made a submission supported the plan.

5 Biodiversity

Vision: A reversal across the region of the long-term decline in the quality and extent of native vegetation, ecological processes are maintained and enhanced and the present diversity of species and ecological communities and their viability is maintained or improved across each bioregion.

Conservation of biodiversity in the form of native vegetation, significant species and ecological communities is inextricably linked. The North Central CMA region is one of Australia's most highly cleared and fragmented landscapes and while development has resulted in a productive and vibrant regional economy it is now crucial to protect and rebuild biodiversity assets for the future. This chapter recognises the need to integrate NRM actions at scales that will realise tangible outcomes for individual species and key habitat areas whilst also supporting and improving broader ecosystem processes.

Table 5: Extent of native vegetation for each bioregion within the North Central CMA region

Bioregion	Pre-1750 extent (ha)	Current extent (ha)	Proportion remaining (%)
Central Victorian Uplands	139,402	53,882	39
Goldfields	1,001,284	360,645	36
Murray Fans	147,585	28,956	20
Murray Mallee	202,685	13,242	6.5
Northern Inland Slopes	15,004	4,136	28
Victorian Volcanic Plain	162,165	9,471	5.8
Wimmera	424,912	19,628	4.6
Victorian Riverina	908,094	83,494	9.2
North Central CMA region	**3,001,131**	**573, 454**	**19.0**

5.1 Biodiversity of the North Central CMA region

The distinctive habitats of the North Central CMA region reflect the eight different bioregions, each with distinct ecological characteristics (refer Figure 3, Chapter 1). Bioregions reflect underlying environmental features, are related to patterns of land use and can be used to identify the relationship between many natural resource based activities and biodiversity assets.

Native vegetation is important as it provides a range of vital ecosystem goods and services that underpin the health of the land and water, the flora and fauna, and the communities of the North Central CMA region. These include provision of drinking water, cultural heritage, carbon sequestration, timber, fire wood and the health of soils. Biodiversity also provides important spiritual and aesthetic values local and broader landscape scales.

Impact of Ecological Systems Decline

The regeneration of habitat is an ecosystem service maintaining the natural asset that supports biodiversity. Decline of ecological systems in the North Central CMA region has occurred through a reduction in the extent and condition of many ecological communities, increased habitat fragmentation and exposure to a range of threatening processes. The current trajectory is still one of

decline as the impact of past actions (e.g. clearance of native vegetation, overgrazing etc) is yet to be fully realised. For example, woodland bird species extinctions are expected to still occur even if major landscape restoration is achieved over the next 20 years.

The original native vegetation of the region has undergone a dramatic decline in extent and quality since European settlement. Table 5 provides a summary of this depletion at a bioregional level. Each bioregion has fared differently due to patterns of human land use, especially agricultural preferences for gentle landscapes and fertile soils.

With the loss in native vegetation extent and quality since European settlement our minimum aspirational goal is to maintain current extent and condition of remnant habitat. Recent research in box-ironbark landscapes, using a case study approach shows evidence of a reversal in decline leading to an incremental increase in native vegetation extent in the order of 1-4% by 2020. Evidence for change in other bioregional landscapes or vegetation condition in general, is less clear.

Native vegetation is mapped as Ecological Vegetation Classes (EVCs), derived from land system information (e.g. geomorphology, rainfall), vegetation structure, floristic characteristics and other environmental information including aspect, fire frequency and ecological responses to disturbance. At a finer scale than bioregions, EVCs have been shown to be useful surrogates of biodiversity for birds, mammals and trees (but less so for invertebrates and reptiles). In combination with bioregions analysis, the EVC classification system is an important tool for regional strategic planning as it provides valuable information about the level of depletion and threat status of different vegetation types. It can also inform the planning of on-ground vegetation management activities and revegetation.

Conservation status of native vegetation is assigned according to a series of criteria which assess within a bioregion the level of rarity and threat to a given vegetation type, how degraded the remnants are and how secure is the land tenure. This allows a rating of the threat of extinction to be assigned to the EVC. This rating is the EVC's conservation status within the bioregion.

5.2 Threatened species and communities

Native vegetation provides critical habitat for significant species and ecological communities, many of which are rare and/or threatened. The priority native vegetation assets identified in Figure 3, Chapter 1 are associated with a high concentration of threatened flora and fauna – in fact the values of these threatened species are key drivers of the significance and relative priority of these areas.

The North Central CMA region is home to many threatened flora and fauna species, and a number of threatened ecological communities. All plants and animals, including threatened species have a range of values, including intrinsic and existence values in addition to their contribution to broader ecological processes. The conservation of biodiversity, and in particular threatened species, is an important part of protecting our natural heritage and maintaining sustainable, productive landscapes. Threatened species and communities are classified according to their conservation status, which may be applied at a range of scales from national, state to bioregional.

At the national scale the conservation status of species is recognised by the *Environment Protection and Biodiversity Conservation (EPBC) Act, 1999*. At a state-scale species may be listed under the *Flora and Fauna Guarantee (FFG) Act 1988* with conservation status assigned through advisory processes. The North Central CMA region has more than 160 threatened flora and fauna species listed at a national or state level. At the ecological community level there are a number of significant entities that have been recognised by listing using Commonwealth or State processes. For example, White Box-Yellow Box and Blakely's Red-Gum ecological community, which has notable occurrences in the North Central CMA region has been listed by the Commonwealth under the EPBC Act, while Northern Plains Grassland community has been listed under the FFG Act. In general terms threatened ecological communities are considered under the native vegetation and habitat asset theme.

5.3 Condition of biodiversity

The 2007 VCMC Catchment Condition report states for the North Central region … 'The condition of native vegetation in 'largely intact' landscapes is generally good, and the trends are that the condition is stable. However, the condition of native vegetation in 'fragmented' landscapes ranges from moderate to poor, with the trend in many areas still declining, except where specific interventions are being made. This appears to be particularly the case with native grasslands areas, where land use is changing from grazing to cropping, and the Box-Ironbark woodlands in central Victoria which are under pressure from various factors, including human settlement.'

Despite an improvement in the availability and accuracy of data on native vegetation condition over the past ten years it is not possible to provide a definitive statement of either current condition or trend at a regional or bioregional scale for the North Central CMA region.

For spatially explicit assets it is possible to assess vegetation condition and to set measurable goals for condition based on an understanding of benchmark states for particular ecosystems, the nature and extent of specific threats and an assessment of the technical and socio-economic feasibility of a given suite of actions designed to maintain or improve asset quality.

The condition of threatened species and ecological communities is perhaps best understood by consideration of their conservation status (see above). While the Actions for Biodiversity Conservation (ABC) database managed by DSE is able to provide substantial information about on-ground activities that are being undertaken for threatened species from year to year, there is limited information available on the status of populations. Species and communities status is generally therefore determined by modeling action, threats and population or habitat factors that have an impact on population status.

5.4 Threats and their impacts on biodiversity

Loss of habitat through clearing of native vegetation has been, and continues to be, a significant threat to biodiversity across northern Victoria. Additional threats and their impacts are listed in Table 6.

Table 6: Threats and their impacts on biodiversity

Threat	• Clearing for agriculture, urban or other uses • Global warming/rapid climate change • Weed Invasion • Over-grazing by stock, feral animals and native herbivores • Salinity • Soil disturbance • Habitat fragmentation and isolation • Alterations to natural fire regimes • Altered hydrology • Other invasive exotic species e.g. rabbits, hares, goats, pigs • Timber and firewood harvesting practices • Off-site effects of nearby land-uses
Impacts	• Loss of ecological resources • Reduction in species richness and diversity • Decline in habitat quality and condition • Decline in water quality • Loss of landscape function • Decline in soil health • Decline in landscape amenity and intrinsic value

5.5 Regional priority setting

In developing biodiversity priorities for the region a range of data and information sources have been used, including ecological databases, expert opinion from ecologists and those with local knowledge together with modelling and decision support tools. Community knowledge of local assets, including their values, threats and condition has been a key consideration in the development of priorities. Many native vegetation assets were identified as part of the Asset identification process run with the community and regional stakeholders. These assets were mapped at various scales from small patches of bush and remnant vegetation through to large areas of public land. Most of these assets have been amalgamated to form the priority habitat areas shown below (Refer to Figure 9, Table 7). The newly developed DSE tool Natureprint has been used extensively in the identification and refinement of priority habitat areas.

An assessment has been made of the relationship between priority native vegetation assets and threatened flora and fauna in order to determine the degree to which these habitat areas 'capture' priority threatened species assets. This assessment demonstrates strong alignment for significant threatened fauna species (Refer to Appendix 9.3).

As the number of species at risk grows, implementing individual species management programs has become increasingly challenging. While this method is appropriate for some species, approaches that benefit a range of species (both threatened and those that may yet become vulnerable) will be preferred. The traditional approach of conserving species in their current locations and environments must be broadened to better encompass climate adaptation and the maintenance of ecosystems under changed conditions. This can be achieved through programs aimed at achieving broader, landscape-scale outcomes through threat mitigation and the maintenance of ecological and evolutionary processes.

While recognising that all threatened species and communities are significant we have allocated a relative significance to assist with prioritisation and investment planning. A set of criteria were applied to all species identified through community and expert elicitation, Individual taxa were then allocated to categories of exceptional, very high, high and moderate significance. It is important to note that this method recognises that insufficient resources are available to carry out all possible conservation actions for all threatened species and that prioritisation is essential to focus effort on detailed analyses for a priority subset of high significance and high threat species where feasibility of conservation actions is greater. In doing so we recognise that planning and regulatory instruments will be used to assess and protect threatened species in conjunction with survey and monitoring work to improve our knowledge and understanding of condition and trends.

Priority threatened species include the:

McIvor spider Orchid, Robust Greenhood, Southern Shepherd's Purse, Eltham Copper Butterfly, Pink Tailed Worm-lizard, Spiny Rice-flower, Northern Golden Moth Orchids, Bendigo Spider-orchid, Murray Hardyhead, Plains-wanderer, Red-cross Spider-orchid, Ridged Water-milfoil, Turnip Copperburr, Lowly Greenhood, Small Scurf-pea, Golden Sun Moth, Pale Sun Moth, Yan Yean (Swamp) Leek-orchid, Yellow-lip Spider-orchid.
Threatened species of lower priority will also be the focus of conservation actions through targeted actions at the scale of priority native vegetation and habitat areas.

5.6 Policy context

The North Central CMA's 2012-18 RCS is consistent with the Victorian Government's Native Vegetation Management: A Framework for Action (2002) and Australia's Biodiversity Conservation Strategy 2010-2030.

At the regional scale the approach advocated in the North Central Native Vegetation Plan (2005) remains relevant and appropriate for native vegetation and habitat conservation activities in the region. The 2005 Plan identified broad actions that included: protection of existing remnant vegetation, management and enhancement of existing remnants, rebuilding the viability, connectivity and integrity of native vegetation, and community education and awareness.

Threatened species that are listed under State and Federal legislation, such as the FFG and EPBC Acts, are afforded significant protection from actions that may affect their conservation. In this context they must be considered in cases where changes in land-use are considered, for example residential development affecting critical habitat. A key action is therefore to provide quality, up-to-date data on the known or likely occurrence of threatened species to agencies responsible for land and water management planning.

5.7 Community participation

A supportive community is required to achieve the goal of reversing the decline in biodiversity. Hence, community education and building awareness is an integral part of protecting native vegetation, habitat and threatened species. An integrated approach to regional community education between all partners will build understanding and knowledge of biodiversity in ways that enables landholders and broader community to be active participants in conservation activities.

Many important areas of remnant habitat are located on private land and managing them for biodiversity generally relies on collaboration with private landholders. Without their cooperation, the best science-based planning will count for little. Sustained collaboration between landholders, community groups and agencies, with an understanding of their respective knowledge and aspirations has been a feature of native vegetation programs in the region for many years. Recognising local knowledge and tapping into the wisdom and experience of local networks is a key factor underpinning successful habitat conservation initiatives.

5.8 Case study

Connecting Country Project

Connecting Country is a community-based organisation which aims to increase and enhance biodiversity across the Mount Alexander Shire and immediate surrounds.

Since 2009, the project team has been working with the North Central CMA to deliver an innovative landscape restoration project. This project, supported through Caring for our Country and the Victorian Natural Resource Investment Program, is improving Yellow Box Woodlands and habitat for the threatened Brush-tailed Phascogale using a 3-pronged approach.

(1) Hosting educational events on topics relevant to the management of Yellow Box Woodlands; (2) Undertaking scientifically rigorous monitoring for phascogales, birds and vegetation; and (3) Establishing stewardship agreements with landholders and groups over areas of Yellow Box woodland under their management. Each of these involves extensive community involvement, and an effective and efficient team approach to their implementation.

Community engagement has been the key to the success of the project as a whole. Well attended workshops and field days have been held regularly throughout the course of the project, using the technical experts to provide private landholders with the skills to identify and manage environmental features on their properties (e.g. soils, waterways, eucalyptus identification, vegetation mapping).

A series of free evening educational talks during the first two years of the project included topics such as woodland birds, bats, cultural landscapes, fungi and fire. Most talks have attracted more than 50 attendees, with the talk on birds in Newstead attracting over 180 enthusiastic participants.

Other activities supported by Connecting Country include a locally-produced Swift Parrot DVD, nest-box monitoring workshops, a field guide on local plants, the development of local area plans and coordination of a major Family Nature Day event.

The Connecting Country website is also a hub for the dissemination of relevant information, and has more than 160 subscribers, and regularly receives more than 100 'hits' per day. The organisation also hosts a Landcare Facilitator that supports over 30 groups in the area and also employs a project officer to assist a local Landcare network control woody weeds along Barkers Creek.

Largely as a result of the education and monitoring program, approximately 50 landholders and groups signed five-year agreements with Connecting Country to undertake habitat enhancement projects across more than 2500 ha of priority vegetation during the first two years of the project. These projects have led to the delivery of on ground works such protective fencing, grazing regime change, weed control, pest animal control and strategic revegetation. Many more projects are in progress.

For the remainder of this project, Connecting Country will continue working with the North Central CMA to continue to achieve great outcomes for both the local community and for the management of threatened flora and fauna species.

Above: Photos courtesy of Connecting Country

5.9 RCS actions

Future research and knowledge acquisition is required to improve the planning, implementation and evaluation of biodiversity management activities. The areas identified as a focus for the next six years are:

- Better understanding the condition and trend of remnant vegetation across the region and in particular in our priority areas using established monitoring and assessment techniques.
- Improved understanding of the effect of management interventions on vegetation condition and habitat.
- Better understanding the responses of significant flora and fauna to management intervention.

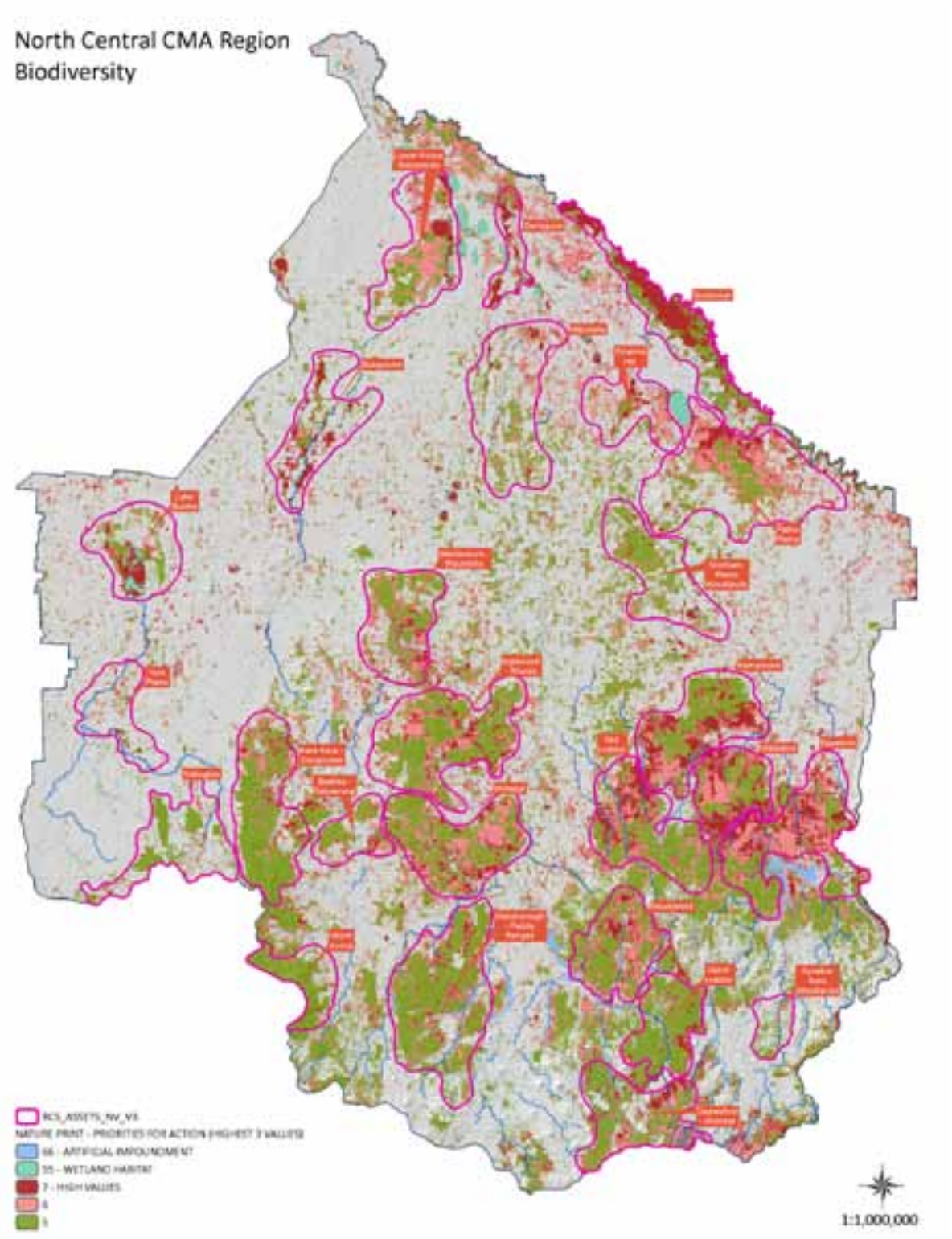


Figure 9: Priority native vegetation and habitat assets for the North Central CMA region

An RCS discussion paper on biodiversity provides additional information about the biodiversity assets of the North Central CMA region and articulates in more detail how priorities were determined.

Table 7a: Priority native vegetation and habitat assets

Asset	Values and objectives	
Lower Avoca Grasslands (VR5), Victorian Riverina Bioregion	Values:	Unique largely intact mosaic of floodplain associated grassland and grassy woodland communities, significant flora and fauna values.
	Threats:	Habitat destruction and fragmentation, overgrazing and weed invasion
	Aspirational goal:	To improve the condition and extent of grassland, grassy woodland and wetland habitat to support viable populations of significant species characteristic of this landscape.
	SMART goal 1.	Maintain at least 80% of current (2012) extent of 'excellent' condition areas of grassland/Woodland and Wetland or 2600ha.
	SMART goal 2.	Restore vegetation condition in 2000ha or 20 % of 'average to good' condition areas of grassland to 'excellent' condition whilst ensuring suitable structure for key fauna species by 2025.
	Key Actions:	Changed grazing regimes, habitat retention, targeted pest plant and animal control
Patho Plains (VR1), Victorian Riverina Bioregion	Values:	Depleted and rare native grassland /grassy woodland communities. Significant threatened flora and fauna.
	Threats:	Habitat destruction and fragmentation, overgrazing and weed invasion
	Aspirational goal:	By 2060 The Patho Plains contains a network of ecologically-connected grasslands supporting functioning ecosystems and viable populations of all grassland species. No species listed as threatened or extinct.
	SMART goal 1.	Maintain the current extent of grasslands and grassy woodlands
	SMART goal 2.	An increase in focal values over 30% of the asset area
	Key Actions:	Changed grazing regimes, habitat retention, targeted pest plant and animal control
Bunguluke (VR4), Victorian Riverina Bioregion	Values:	Significant grasslands, grassy woodlands, threatened flora and fauna
	Threats:	Habitat destruction, overgrazing, pest plants and animals
	Aspirational goal:	To improve the condition and extent of grassland and grassy woodland habitat to support viable populations of significant species characteristic of this landscape.
	SMART goal 1.	Maintain at least 2700 ha or 50% of current (2012) extent of 'excellent' condition areas of grassland and grassy woodlands
	SMART goal 2.	Restore vegetation condition in 2000 ha of 'average to good' condition areas of grassland and grassy woodlands to 'excellent' condition whilst ensuring suitable structure for key fauna species by 2025.
	Key Actions:	Fencing and grazing management, pest plant and animal control
Wedderburn – Wychitella (G4), Goldfields Bioregion	Values:	Endangered Buloke Woodlands, & Box-Gum Grassy Woodlands, significant flora, fauna and cultural values.
	Threats:	Impact of exotic plants and animals, habitat fragmentation, total grazing pressure (introduced and native species)
	Aspirational goal:	To increase total habitat extent and condition to support viable populations of woodland birds and significant flora.
	SMART goal 1.	Maintain the abundance and area of occupancy of woodland birds as measured according to benchmark data from 2000 until at least 2030.
	SMART goal 2.	Habitat extent (between key fragments in Wychitella NCR and major blocks to the south and east) - increase from current extent of 13,128 ha by 1,000 ha across strategically chosen areas by 2020
	Key Actions:	Revegetation, fencing and pest plant and animal control
Bealiba – Dalyenong (G12), Goldfields Bioregion	Values:	High quality Box-Ironbark remnants, drought refuge for fauna, woodland birds
	Threats:	Habitat fragmentation, total grazing pressure, inappropriate fire regimes
	Aspirational goal:	By 2050 create a healthy, well connected and tenure secure woodland habitat matrix providing a permanent core refuge for the Threatened Temperate Woodland bird community and associated flora and fauna
	SMART goal 1.	Establish 500 ha of new woodland habitat natural regeneration of by 2020.
	SMART goal 2.	Maintain the condition of the high value sites on private land
	Key Actions:	Fencing, direct seeding and grazing management for natural regeneration, pest plant and animal control.

Table 7b: Priority native vegetation and habitat assets to be INFFER assessed

Other priority assets still requiring INFFER Assessments during the life of the RCS	Victorian Riverina Bioregion	Pyramid Hill (VR2), Wandella (VR3), Northern Plains Woodlands (VR6)
	Goldfields Bioregion	Kamarooka (G1), Wellsford (G2), Eppalock (G3), Muckleford (G5), Kara Kara – Carapooee (G6), Moliagul (G7), Maryborough – Paddy Ranges (G8), Tottington (G9), Inglewood (G10), Mid Loddon (G11), Upper Loddon (G13)
	Wimmera Bioregion	York Plains (W1)
	Central Victorian Uplands Bioregion	Daylesford – Wombat (CVU1), Upper Avoca (CVU2), Kyneton Areas Woodlands (CVU3)
	Murray Fans Bioregion	Gunbower (MF1), Dartagook (MF2)
	Murray Mallee Bioregion	Lake Buloke (MM1)

6 Land and Soils

Vision: Land and soils are managed within their capability ensuring agricultural productivity and environmental values are enhanced to maintain the integrity of the catchment.

The intent of the North Central RCS is to protect and enhance the productive and ecological function of the region's soils. This is consistent with national and state objectives for sustainable NRM practices.

Healthy soil is a prerequisite for delivering two very important goals throughout the North Central CMA region. These are:

(a) the maintenance and (where possible) enhancement of agricultural production for reasons of food security and regional economic viability; and

(b) optimisation of the range of soil related ecosystem services that influence the quality of natural capital including air, water and biodiversity.

The driving force for achieving sustainable land management recognises global pressures on soils arising out of dramatic increases in climate variability, and exponential growth in world population. It is estimated that food production must increase by 70% by the year 2050 in order to feed a global population that will exceed 9 billion people.

Farmers within the North Central CMA region have a long history of innovation and best practice in relation to land and soil management and continue to invest in soil protection strategies that include, for example, conservation cropping, precision agriculture, rotational grazing, mixed cropping and grazing systems, biological farming as well as irrigation water efficiency projects.

As a matter of priority, farmers in the North Central CMA region must continue to be encouraged and supported to meet the challenge of protecting and enhancing the quality of their soils. Inter-generational equity demands delivery of productive and ecologically natural capital to be enjoyed by all Australians into the future.

6.1 Land and soils of the North Central CMA region

Soils

The soils within the North Central CMA region vary in sympathy with the geological and geomorphic character of the land. Lighter sandier soils are formed on the unconsolidated marine and aeolian sediments of the Murray Basin in the Mallee lands west of Kerang. Red and grey clays (sodosols and vertisols) are formed on the alluvial soils of the Riverine Plains and on the foothills of the Western Uplands. Red and yellow sodic clay soils are the dominant soil types found on the meta-sedimentary rocks on the slopes of the Western Uplands, and red friable earths and grey clays are found on the basaltic plateaus of the upland valleys (Figure 10a).

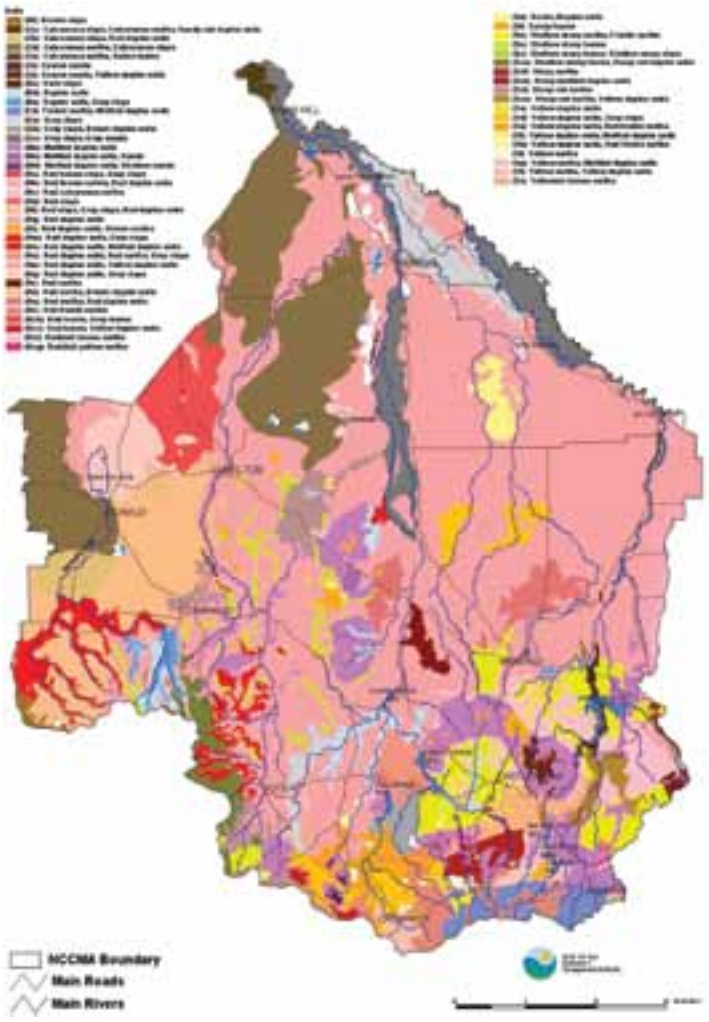


Figure 10a: Soils of the North Central CMA region

Land use

The North Central CMA region covers approximately 13% of Victoria and is 75% privately owned. Regional landscapes provide a rich variety of land and soil types that sustain a diverse range of land uses. Extensive areas of land across the north of the region are irrigated. Productive cropping country is located into the west of the region and cropping and grazing country is found in the mid and upper catchments. Agricultural uses include but are not limited to irrigated dairying, mixed farming, horticulture, dryland grazing and cropping. Rural living is an emerging land use and intensive animal production enterprises are expanding. The gross value of agricultural production within the region was approximately $1.43 billion in 2009/10. (Refer Table 8)

The productive capacity of soil-landscapes in north central Victoria is a very significant factor in considering where and how resources are best invested to achieve soil conservation and land protection outcomes. At the broad scale the North Central CMA region can be divided into six soil-landscape classes that are predominantly linked to various land use types (Table 9).

Table 8: Gross Value of Agricultural Production in North Central CMA region in 2009/10 - $M (source: ABS Data)

	Irrigation	Non-Irrigation	Total
Grain & Fodder	$22.5	$388.8	$411.3
Horticulture	$252.1	$38.3	$290.4
Dairy	$156.1	$23.0	$179.1
Livestock	$69.6	$317.1	$386.7
Other	$3.5	$157.9	$161.4
Total	**$503.8**	**$925.1**	**$1,428.9**

Table 9: Soil Landscapes and Land Use

Soil landscape	Description	Principal Agricultural Land Use
Alluvial Plains of northern Victoria	Alluvial sediments of the Riverine Plains and the Natte Yallock Basin	Mixed cropping and grazing
Victorian Riverine Plains	Mainly red and yellow duplex soils, with red and grey clays that are highly suitable for agriculture.	Irrigated pastures and crops.
Eastern Mallee Plains	Aeolian sands over marine sediments in the semi-arid lands of northern Victoria	Cropping with some grazing
Basaltic plains and scoria cones	Soils formed on Quaternary basalts in the upper catchments	Grazing, cropping and horticulture
Foothills of the Western Uplands	Red sodosols on weathered meta-sedimentary rocks	Mixed cropping and grazing
Hilly terrain of the Western Uplands	Red and yellow sodosols on moderate to steep hilly terrain	Grazing

There is a distinct difference between land use in the irrigation areas and the dryland areas of the region, therefore these have been described separately below. Please refer to Figure 4 in Chapter 1.

6.2 Dryland with North Central Region

The dryland terrain of the North Central CMA region extends from the northern slopes of the Western Uplands through to the foothills and on to the lowlands of the Riverine Plains in the east, and into the Mallee plains in the north west.

The area includes the extensive cereal cropping and grazing lands in the mid to lower catchments of the Campaspe, Loddon, Avoca and Avon-Richardson river basins (Figure 2).

Dryland farming is practised over at least 2 million hectares of the North Central CMA region and accounts for approximately 66% of total land use. Broad-scale mixed cropping and grazing enterprises are the most common land uses, with cropping increasing northward into the Riverine Plains and the lighter Mallee lands of the north west.

The red sodosol is one of the most common soil types found throughout the region, although grey vertisols are also common. The sodosols are delicate soils that are easily damaged and degraded. Shallow sandy loam topsoils rest over sodic dispersive clay subsoils. This combination presents many challenges for farmer's intent upon achieving good soil structure, healthy productive landscapes and sustainable land management. The maintenance of a strong soil structure is a key variable in realising optimum plant-water-vegetation interactions that avoid degrading processes, including dryland salinity and soil erosion.

6.2.1 Threats to Dryland

The loss of topsoil is the greatest threat to the productive and environmental value of the dryland terrain of north central Victoria. The mass of soil lost in most years is well in excess of the mass of food produced. Soil is lost at a far greater rate than it is replenished. The main culprits are wind erosion (particularly in the north), water erosion, and

dryland salinity. These forces, if not overcome, will deplete the natural resource base for future generations.

Soil degradation is not only a threat to agricultural production, it also contributes to sediment accumulation and salt loads in our rivers and streams. The management of the dryland terrain in our catchments is ultimately linked to the condition of our waterways.

Irrespective of whether salinity occurs in dryland or irrigated terrain it is the result of saline groundwater rising within capillary reach of the land surface. Salinity kills all but the most salt tolerant plants and destroys structure. The processes causing salinity vary across the region in accordance with a range of groundwater systems predicated on local geological and geomorphic conditions. Salinity is also moderated by land use, land management and climate. These factors influence the hydrologic balance accounting for the amount of surface water available for groundwater recharge. In most circumstances an increase in groundwater recharge will ultimately produce an increase in saline groundwater discharge (salinity).

The risk of salinity is highest in (a) land that comprises a shallow watertable and high salinity groundwater, and (b) within specific zones of restricted groundwater movement in some groundwater flow systems. Accordingly, the threat of land salinity is greatest within the weathered foothills of the Western Uplands and the dryland and irrigated terrain within the Riverine Plains.

The risk (likelihood) of salinity is driven by rainfall and irrigation. The recent protracted drought (1996-2009) produced a watertable recession in response to reduced rainfall and in this time salinity became of lesser significance. In 2010 and 2011, however, record breaking rainfall and floods reversed groundwater recessions and in most instances groundwater discharge has been re-activated to pre-drought conditions.

Whilst the threat of salinity is real and tangible, the risk is largely unknown and intimately linked to the future climate. If we continue to experience high rainfall, particularly in the winter months, we can expect to see an expansion in salinity. If we return to drought conditions watertable will fall mitigating the threat. However, groundwater is much more strongly buffered than surface water, and accordingly rises and falls will occur over a much longer timeframe. Accordingly, once salinity has occurred the land will need to be carefully managed over long periods if it is to be restored to former productive capacity.

6.2.2 Policy context

The draft Victorian Soil Health Strategy prepared by the Department of Sustainability and Environment (February 2012) and the Australian Government's Caring for our Country Business Plan set out clear policy in relation to managing land and soil. Along with the Victorian Dryland Salinity Statement 2012, Basin Salinity Management Strategy and the North Central Dryland Management Plan provide context to base the future management of land and soil within the North Central CMA region.

6.2.3 Asset priorities

Investment in land protection within the dryland areas of the North Central CMA region is a priority consistent with the discussion above. The following issues and principles will be used to set future priorities for land and soils:

- **Regional dispersed asset:** Soil is dispersed natural capital common to large areas of land. Accordingly, soil protection programs must encourage the adoption of sustainable practices at sub-regional (still quite large) scales.
- **Community-based:** Investment strategies must be community-based and tailored to local biophysical conditions and social domains if they are to be successful. The opportunity to work with cohesive communities that display a strong preparedness to work together is an important consideration.
- **Food security:** Areas of land that contribute most strongly to future food security needs and the delivery of ecosystems services are an important consideration. In this regard the focus is largely on the important mixed cropping and grazing lands of the northern foothills, Riverine Plains and the Mallee Plains of the north west.
- **Ecosystem services:** Soils provide a wide range services beyond the production of food. Soils and the plants they support may act together to prevent sediment loss to streams and river systems, mitigate the mobility of toxic substances, prevent soil erosion, reduce flooding and so on. Consequently, there are many instances where the protection of specific high value local environmental assets will call for local soil protection and land management strategies in surrounding lands.
- **Threat:** Investment programs should consider the potential damage to the resource base that may occur into the future through the continued exposure of soils to traditional land uses, increased climatic variability and production pressures.

Productive capacity accounts for soil type, climate, land use and the extent of the soil-landscape throughout the region. It is a first-pass measure of areas within the North Central CMA region that should be considered high priority in the context of future food security. Consideration of these criteria focuses activity on the mixed cropping and grazing lands of the northern foothills, the Riverine Plains and the Mallee Plains in the north west of the region.

Improved soil management can have a beneficial effect on nearby assets, for example maintaining groundcover to reduce soil erosion and sedimentation/nutrient input to waterways. Land management programs can also target areas that may be important for the downstream protection of natural assets and can provide a strong rationale for public investment.

6.2.4 Community participation

Land protection is achieved at the grass roots level when local farming communities adopt land management practices that afford improvements in soil health. Farmers are most likely to pursue improvements in soil health through participation in local community-based programs cognisant of social demographics and local biophysical circumstances.

If sustainable management is to be achieved local farming communities must be encouraged, supported, educated and rewarded as they assume responsibility for protecting the health of soil, water and vegetation resources within their immediate area.

6.2.5 Implementation and collaboration

Sustainable management of soils across the North Central CMA region will require strong collaboration between landholders and government. Locally focused community-based projects that directly involve local landholders in solving and managing local soil and land management issues are paramount. This community based approach will form a key approach to achieve our RCS land and soil vision of managing land and soils within capability ensuring that agricultural productivity and environmental values are enhanced to maintain the integrity of the catchment.

Implementation of a program of regional community-based land protection across the priority areas within the North Central CMA region commenced in 2009 with the implementation of the 'Farming for Sustainable Soils' (FSS) program. The FSS program is an excellent example of the community-based approach advocated as part of the RCS (Refer to case study).

Farm Plan 21 aims to protect assets from specific threats through targeting delivery of farm planning services in priority landscapes with important environmental, social and economic values across the North Central CMA region. A focus on farm planning allows landholders to better understand the environmental, social and economic values of assets on their properties and in their local communities, as well promote a better understanding of values at a local and regional scale. Farm planning also supports landholders to better understand the threats to assets, and the courses of action that is required to address both the cause of the threats, as well as implement measures to improve the resilience of soil to an increasingly variable climate.

6.2.6 Discussion

Local farming communities within the dryland terrain of the North Central CMA region need ongoing support if soil conservation and sustainable agriculture is to be achieved. There are significant social, economic and biophysical barriers that must be overcome if we are to realise productive systems in balance with environmental needs. For the most part soil protection has to be practised at local levels consistent with local conditions. Local people must accept ownership of the goals and to lead the process in building the community knowledge and experience needed for the widespread adoption of sustainable practices.

The North Central CMA region does not currently have a Soil Health Plan. To ensure a coordinated, collaborative and effective approach to dealing with the future health of our soils and land it is critical that a soil health plan be developed.

The Regional Soil Health Plan will set out a more detailed plan on how to manage soils across the region. The plan will set objectives, priorities, recommended appropriate tools and techniques and clearly outline roles and responsibilities.

6.2.7 Key Regional Dryland Actions

The challenges for the sustainable management of land and soils across the dryland areas of the North Central CMA region are large and diverse. The key regional Dryland actions are:

- North Central CMA, in conjunction with partner organisations, develop a Regional Soil Health Plan by 2014
- Further developing, building and supporting of community-based land protection programs throughout the region
- Encouraging and supporting strong regional ownership of soil health programs that deliver soil, water and vegetation outcomes
- Increase the number of community-based soil protection groups functioning in the dryland terrain of the North Central CMA region to 16 by 2015.
- Establish a comprehensive 'state of the art' geo-database (soils, geology, geomorphology, geophysics) for use by soils groups by 2014.
- Complete a comprehensive 'State of our Soils' technical assessment by 2015.

6.3 Irrigated land within the North Central CMA region

The irrigation of land within the North Central CMA region occurs largely across the Loddon Campaspe Irrigation Region. Although irrigation also occurs along the Loddon and Campaspe Rivers and in the upper Loddon Catchment around Newlyn, Ascot and Waubra where groundwater is used in conjunction with surface water, the intensity of irrigation is greatest in the lower reaches and floodplains of the Campaspe and Loddon rivers.

The Loddon Campaspe Irrigation Region comprises the northern half of the North Central CMA region and covers approximately 714,000 ha of land. The major townships in the region are Swan Hill, Kerang, Cohuna, Echuca, Rochester, Boort and Pyramid Hill. The northern boundary is the Murray River, just east of Echuca, to Tyntynder in the north-west. From Tyntynder, the western boundary passes west of Boort and on to Serpentine in the south. From Serpentine the southern boundary crosses the Campaspe River near Rochester and again joins the Murray River east of Echuca.

The traditional patterns of land use are changing rapidly across the Loddon Campaspe Irrigation Region. There is an increasing area of dryland within the region where water is no longer intensively applied due to irrigation system rationalisation and modernisation and water entitlements being purchased to supply environmental and human consumption needs.

Adapting to a decade long drought and then flood events has and will drive further changes to the established pattern of land use within the region. The reduced water availability, combined with climate variability and fluctuating commodity prices, has given rise to landholders adapting their enterprises to be more resilient and viable and maintaining productivity.

There is also a shift in property management and type. The number of small scale hobby farms is expected to increase in areas within close proximity to larger towns. Agricultural properties are being amalgamated to a magnitude of scale to support family corporations. Such changes are likely to bring their own set of land management challenges.

The aspirational goals for irrigated land are:

- A greater proportion of land in the catchment is matched with, and used, within its capability;
- Achieving sustainable land management by ensuring healthy soils, water and vegetation whilst increasing the net productivity generated from the land; and
- Ensure a culture of sustainable land management practices amongst both private and public land managers throughout the north central catchment.

6.3.1 Risks to Irrigated Land

The primary threats to irrigated land are: climate change, soil salinity, soil sodicity; and invasive pest plants and animals. The major threats to irrigated land are presented in Table 10.

Table 10: Threats to irrigated land

Threat	Impacts
Increasing groundwater table levels	Hypersaline land discharging salt
Salinity impacts to agricultural productivity	Ongoing salinisation of productive land will reduce regional productivity and cause environmental impacts
Climate change resulting in below average rainfall	Unviable farming will cause the abandonment of land
Increased flooding due to altered catchment hydrology	Prolonged inundation of land causing salinisation and waterlogging
Inappropriate drainage management	Increased waterlogging and salinisation of productive land will reduce regional productivity
Inappropriate land use change	Land use does not match land capability causing increased off site environmental impacts and reduced agricultural productivity. Increased prevalence of pest plants and animals across abandoned land.
Increasing areas of sodic soils	Waterlogging of productive land will reduce regional productivity and increase rate of wind and water erosion

6.3.2 Policy context

The management of land and soil across the Loddon Campaspe Irrigation Region is rapidly changing in response to recent droughts, floods and policy change. Climate variability has driven water reform to redress many of the environmental challenges of the past, including a reduction in the irrigated land footprint. Threats to land including salinity and use not matched to capability continue to be a focus of policy outcomes.

In 1988 the Victorian Government's *Salt Action: Joint Action* provided a framework for the development of salinity management plans in the region. In 2001, the Murray-Darling Basin Commission released the *Basin Salinity Management Strategy* to provide accountability for salinity impacts to the River Murray.

In 2004, Victoria began to strategically reform water policy by releasing the Our Water Our Future initiative and so too influenced the management of irrigated land. The Our Water Our Future initiative encompassed the Northern Victoria Irrigation Renewal Project (NVIRP) to drive irrigation modernisation and rationalisation. The Northern Regional Sustainable Water Strategy was also released to guide sustainable water use by all users across northern Victoria.

In an effort to ensure the regional community could meet changing state and national policies, the scope and depth of planning to cover increasing land, water and environmental issues, the Loddon Campaspe Irrigation Region Land and Water Management Plan was developed in 2007 and updated in 2011.

In 2012, the Australian Government will seek to further drive water reform by finalising the Murray-Darling Basin Plan.

Across regional irrigated landscapes, land use and soil health will continue to be heavily influenced by water reform outcomes. Policies relating to water reform will set the context and drive change due to the reliance of increased agricultural productivity on water.

6.3.3 Community context

A high value is placed on encouraging sustainable management of irrigated land by the community across the North Central CMA region. For example, the Loddon Campaspe Irrigation Region community has a strong history of responding positively to the challenges which threaten the health and viability of irrigated land.

There is a continued desire to balance the productive demands placed on irrigated land with the environmental and social values held by the boarder community. During the 1980s, the community worked together to tackle salinity which threatened their livelihood. Following the development of salinity plans, the community was involved in developing land and water management plans during the 1990s and 2000s. These community-driven plans received government endorsement and continue to provide the basis for ongoing public investment in the region.

6.3.4 Priority setting

A sound understanding of the region's assets, threats, risks and critical areas for targeted investment is essential. Using detailed understanding of four biophysical characteristics for sustainably irrigating land – namely soil type, access to drainage, soils salinity and areas subject to inundation – a map has been compiled to inform on-ground activities that will facilitate landscape change (Refer to Figure 10b).

Figure 10b will assist in driving land and water management plan implementation and irrigation system and on-farm modernisation across the Loddon Campaspe Irrigation region. The green areas on the map below provides an indication of where contemporary farming should be encouraged as the land is more capable of sustaining productive irrigated agriculture with minimal environmental impacts. The other areas on the above map illustrate where less intensive irrigation, dryland farming or land use to deliver biodiversity, amenity or carbon sequestration benefits. Overall, the use of the pictorial representation can provide decision makers with a much clearer understanding of the tradeoffs that are required when developing landscape intervention priorities. Table 11 outlines the targets set out in the Loddon Campaspe Irrigation Region Land and Water Management Plan.

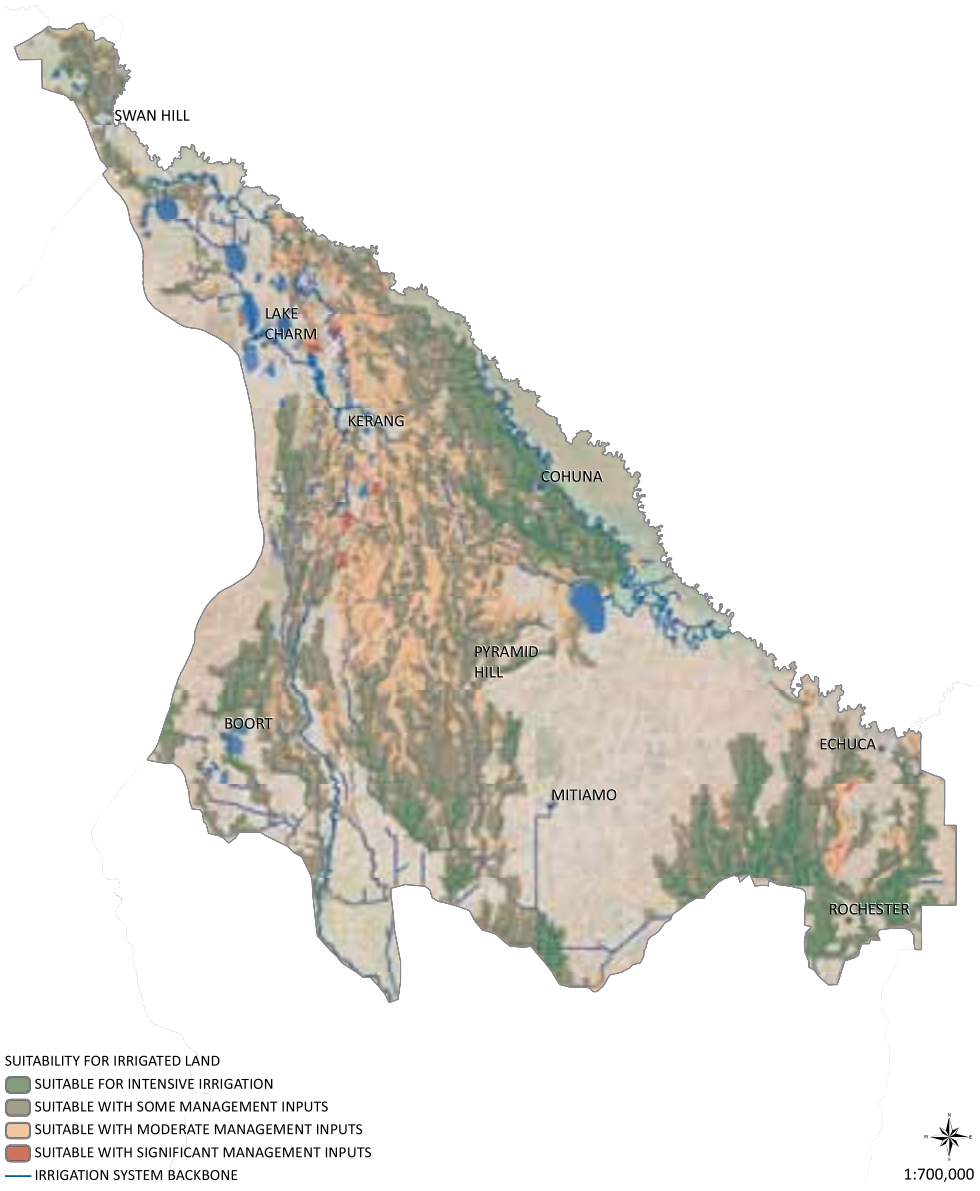


Figure 10b: Suitability for irrigated land in the North Central CMA region

6.3.5 Implementation and collaboration

There has been a very successful track record in implementation of the current land and water management plan and previous salinity management plans over the past 30 years. Strong collaboration between community, government and regional agencies including North Central CMA, DPI, G-MW and DSE have contributed to improved land and water management.

Significant investment in irrigation system and on farm modernisation is currently transforming the irrigation area within the North Central CMA region. Irrigation modernisation is, and will continue to be, a key driver for land and water management plan implementation over the life of the RCS.

Table 11: Irrigated land targets

Threat	Risk	Goal	Target
Inappropriate land use change	Land use does not match land capability causing increased off site environmental impacts and reduced agricultural productivity. Increased prevalence of pest plants and animals across abandoned land.	Implement on-farm works and measures to manage land resources wisely, improve water use efficiency and farm productivity	By 2026, increase the area of land whole farm planned by 72,500 ha.
Climate change resulting in below average rainfall	Unviable farming will cause the abandonment of land		
Increasing groundwater table levels	Hypersaline land discharging salt	Land protected from salinity and waterlogging	By 2026 reduce the area of land affected by waterlogging in the region by 150,000 ha (49,000 ha by improving access to drainage and 97,000 ha by implementing farm works and measures)
Inappropriate drainage management	Increased waterlogging and salinisation of productive land will reduce regional productivity		
Increased flooding due to altered catchment hydrology	Prolonged inundation of land causing salinisation and waterlogging		
Increasing areas of sodic soils	Waterlogging of productive land will reduce regional productivity and increase rate of wind and water erosion		
Salinity impacts to agricultural productivity	Ongoing salinisation of productive land will reduce regional productivity and cause environmental impacts	Land productivity increased while sustainably managing natural resources	By 2026 increase in gross value of agricultural production (GVOA) from the present net present value (NPV) of $370M to $510M.

[1] For a more detailed discussion of the methodology behind Figure 10b see Crossman, Connor, Bryan, Summers & Ginnivan, 2009.

6.3.6 Discussion

Landholders within irrigation areas are adopting more flexible farming systems to manage risks associated with a variable climate, irrigation modernisation and rationalisation, water reform and food security. The North Central CMA, in conjunction with regional partners, will continue to support landholders to maintain sustainable land use by ensuring land use is consistent with the land's capability and limitations.

The implementation of the Loddon Campaspe Irrigation Region Land and Water Management Plan will be the primary mechanism to achieve sustainable land and soil management. There is recognition that changes within irrigated agriculture will continue to be driven by water reform, irrigation modernisation and changing commodity demands.

The implementation of the Basin Plan will influence and shape irrigated agriculture and the management of land within the region. A key priority will be to ensure that the Basin Plan implementation is consistent with the Regional Land and Water Management Plan to ensure sustainable outcomes for the region.

6.3.7 Key Regional Actions for Irrigated Land

The key regional actions for the irrigated land within North Central CMA region are:

- North Central CMA, in conjunction with partner organisations, continues to implement the Loddon Campaspe Irrigation Region Land and Water Management Plan 2011 with a focus on the following goals:
  - Implement on-farm works and measures to manage land resources wisely, improve water use efficiency and farm productivity
  - Land protected from salinity and waterlogging
  - Land productivity increased while sustainably managing natural resources.
- North Central CMA and its partner organisations, aim to ensure that the implementation of the Murray-Darling Basin Plan is consistent with the RCS and Loddon Campaspe Irrigation Region Land and Water Management Plan.

6.4 Case studies

RCS link: The region's soils are important natural assets. The North Central CMA and its partner agencies support farmers to improve their knowledge about soil health and their water use efficiency.

Mid-Loddon Sub-Catchment Management Group

The Mid-Loddon Sub-Catchment Management Group is a community group participating in the North Central CMA-led Farming for Sustainable Soils project. The group is conducting leading on-farm research that is directly assisting farmers to increase soil health and productivity.

Having formed in 1999 the group now covers an area of around 95,000 ha straddling the Loddon River from Maldon to Bridgewater. The main land use is mixed farming comprising grazing sheep for wool production and prime lambs, and cereal cropping. Some oilseeds and legumes are grown, along with Lucerne for grazing and hay production.

The group has conducted trials into biological cropping practices and analysed the use of fertilisers compared with lower input organic soil management practices. A 12-week Integrated Pest Management training course for farmers has also proved successful with spray applications modified for different trial sites.

The group has also responded to reduced growing season rainfall over the past decade and successive crop failures resulting in a high risk of wind erosion and soil damage. Trial results during the drought have confirmed a decline in soil organic matter and carbon levels, demonstrated by poor retention of moisture. These trials have led farmers to adopt new strategies around livestock management and reduced tillage intensity.

The group continues to be involved in establishing a landscape network of vegetation to increase paddock soil, crop, pasture and stock protection and restoring crucial elements of biodiversity to the landscape to optimise the ecosystem services provided by biodiversity, such as nutrient cycling, breaking down wastes, pollinating plants, dispersing seeds and maintaining soil fertility.

Recent above average rainfall, including high summer rainfall, saw farmers face challenging conditions including floods, difficulty harvesting crops, soil compaction and sheep health issues. Throughout this time the group provided important support and direction for its members.

Currently the group is investigating satellite biomass mapping using infrared imagery to produce an index of vegetation. Farmers are using this information to identify specific areas that are underperforming and managing these areas appropriately, reducing wasteful blanket application practices.

The group is also investigating pH mapping assisting farmers to optimise ground cover.

The group is developing and promoting sustainable farming practices that can be easily adopted into current farming enterprises whilst enabling a forum for farmers to meet and exchange knowledge.

FarmWater

Gunbower dairy farmer Harry Rowlands is watering more often but taking less time thanks to the extensive pipe and riser system he installed on his farm in 2011.

When the FarmWater Program approved his application Harry immediately put in 3.5km of pipe and 50 risers along with a pump and motor to service 80% of the family's 113ha main property. He also took the opportunity to upgrade his re-use pump and pump shed.

The Farm Water Program helps irrigators in the southern connected system of the Murray-Darling Basin to modernise their on-farm irrigation infrastructure while returning water savings to the environment.

The Rowlands' farm project saved 248 ML, but as 50% is surrendered, 124 ML was returned to the Australian Government for the environment.

The pumps are on timers so there's no more getting up at all hours to turn them on and off. About 20ML/day of water is now delivered through each riser, significantly more than the 12ML/day delivered via the old channel system. Whereas it used to take up to six hours to get water along the open channels to simply start watering some paddocks now it's about 30 seconds.

Even in the higher paddocks, which used to take a lot longer to water, the water flow is now the same as the other areas. There's less water lying around, Harry is watering faster and the pasture is growing better so there's a lot more feed. And without channels there's now no more spraying and having to run around dealing with cracks and leaks and blocks.

Mr Rowlands said while water savings were a consideration when he applied for the program the main attraction was improved efficiency - both in labour and time.

To date, over $100 million has been secured through the FarmWater. Program for the region's irrigators.

7 Wetlands

Vision: Wetlands will be managed to enhance their environmental function and, where appropriate, provide opportunities for economic, recreational and amenity use

7.1 Wetlands of the North Central Region

Wetlands are classified as '… any area of temporary or permanently waterlogged or inundated land, natural or artificial, with water that is standing or running, ranging from fresh to saline, and where inundation by water influences the biota and ecological processes occurring at any time.'

(Boulton & Brock, 1999)

Wetlands in the North Central CMA region are important for a number of reasons. Wetlands support extensive food chains and rich biodiversity by providing a unique ecosystem within the landscape which can support a range of flora and fauna species (Mitsch & Gosselink, 2007). They are the sources, sinks and transformers of a wide range of chemical, biological and genetic material (Mitsch & Gosselink, 2007). They provide important ecological functions for rivers and floodplains through nutrient and sediment exchange, as well as the dispersal of organic matter and biota. At times they can stabilise water supplies, ameliorating the impacts of floods and drought. They can also clean water passing through them and recharge groundwater supplies (Mitsch & Gosselink, 2007).

Wetlands provide social benefit to local communities as they are a focal point for recreation activities such as swimming, boating, picnicking and duck hunting in some cases. As well as the social aspect that wetlands provide for active and passive recreational activities, they may also have economic benefit to local landholders.

Under current arrangements, some wetlands within the irrigation region provide water for irrigation, stock and domestic use via diversion licences. Other wetlands within the region provide important areas of fertile soils which may be cropped or grazed when the wetland is not holding water. These wetlands are primarily located on private land, and may benefit from targeted wetland management and protection.

Wetlands are also important for indigenous communities within the region. Aboriginal groups were known to have camped near wetlands where they were able to utilise wetland resources including game, plants and stone (Parks Victoria, 2003). Kow Swamp in the north of the region is considered to hold the largest known single population of late Pleistocene humans in the world (Flood, 1999 in Stone & Cupper, 2003). This population occupied the wetland area between 22,000 and 19,000 years ago (Stone & Cupper, 2003).

7.2 Wetlands condition

There are 1,619 wetlands within the North Central CMA region. A total of 84,325ha or 2.8% of the region is covered by these wetlands, and 77% of these wetlands are considered to be of regional, national or international importance including the Gunbower Forest Ramsar Site and the Kerang Wetlands Ramsar Site (North Central CMA, 2007).

The main process contributing to wetland loss and degradation throughout Victoria has been total or partial drainage of wetlands, with the majority of these losses occurring on private land (DNRE, 1997). Another mechanism which has impacted wetland condition through the region has been altered water regimes. This factor has accounted for a significant proportion of wetland change over time (DNRE, 1997).

Since settlement and land development, there have been significant changes to wetlands within the North Central CMA region. The total area of wetlands within the North Central CMA region is considered to have declined by almost 30,000ha between 1788 and 1994, with the largest change in wetland area occurring in freshwater meadows (declining by 34,391ha) and open freshwater (increasing by 14,248ha).

These changes have occurred for a number of reasons, including the following (North Central CMA, 2010):

- Increases of permanent open freshwater wetlands due to the use of these wetlands within the irrigation supply system as storage basins or as outfall points from the irrigation system
- Increases in saline wetlands caused by rising groundwater levels and the requirement for salt disposal basins within the region and a lack of flushing with freshwater
- Declines in freshwater meadows due to the factors outlined above, as well as land clearing, grading and drainage.

In addition, overall changes to wetland distribution through the region has occurred as wetlands have been isolated from the floodplain and converted to agricultural land (North Central CMA, 2010).

7.3 Index of Wetland Condition

The Index of Wetland Condition (IWC) methodology assesses wetland condition based on the *'biological, physical, and chemical components of the wetland ecosystem and their interactions'* (DSE, 2005). One of the IWC aims is to provide a method to monitor wetland extent and condition over a 10-20 year timeframe, with the benchmark condition considered to be the wetland unmodified by human impact associated with European settlement (DSE, 2005).

A number of wetlands within the North Central CMA region received their first condition assessments using the IWC methodology during 2009 and 2010. Seventy-seven wetlands we assessed for characteristics including wetland catchment, physical form, hydrology, water properties, soils and biota. Seven wetlands were considered to be in excellent condition, 25 in good condition, 38 in moderate condition and seven were in poor condition.

Threats to wetlands

At a regional scale many management activities impact on the health of wetlands (see Table 12).

Table 12: Threats to wetlands

Threat	Explanation of threat and impact on wetland
Altered hydrology / changed water regime [1,2]	• Flooding reduced due to river regulation, water diversion, levees and infrastructure impediments (e.g. irrigation channels). • Changes to wetland flora and fauna species that rely on a dry phase of the wetland to complete their lifecycles.
Decreased structural variety [1]	• Decreased structural habitat for fauna species
Soil disturbance [2]	• Soils are important in the functioning of wetlands as they provide a physical substrate for aquatic plants, and habitat for benthic invertebrates and micro-organisms. • Activities such as pugging by livestock and invasive animals, human trampling, driving of vehicles in wetlands and carp mumbling can all cause soil disturbance which can reduce water holding capacity, have negative impacts on the flora and fauna of the wetland and increase turbidity.
Loss of wetland through landforming/ reduced wetland area/altered wetland form [1,2]	• Wetland area and bathymetry are critical components of wetland physical form. Land forming has been particularly prevalent in irrigation areas to promote the efficient use of irrigation water and minimising water ponding. This practice can destroy shallow ephemeral wetlands such as freshwater meadows.
Habitat fragmentation/ reduced wetland connectivity [1,2]	• Native vegetation clearing and isolation of wetlands from the floodplain. Reduction in diversity of species.
Salinity [1,2]	• Water with elevated salt concentrations has the potential to severely degrade wetlands. In general freshwater biota cannot adapt to saline water and recruitment within species can be impacted.
Nutrients [1,2]	• Eutrophication (excessive phytoplankton/algal growth) can occur as a result of excessive nutrient loads from sources including agricultural runoff and sewage disposal. Toxic forms of blue-green algae can cause harm to animals (including humans).
Invasive flora and fauna [1,2]	• Invasive plants and animals (IPA) are considered to be a major cause of degradation to wetland assets within the region (North Central CMA, 2011 – IPA).
	• These species threaten biodiversity by competing for natural resources and the loss of habitat for native species (IPA). They can also displace native species and provide harbour for invasive animals (IPA).
Resource utilisation [1]	Grazing • Inappropriate and excessive grazing can prevent regeneration of wetland plants and may cause damage to soil structure through pugging. Recreation • Excessive and long term use of some wetlands will cause impacts to the diversity of habitat and encourage introduction of exotic weeds.
Regional changes [1]	• The likelihood of climate change impacting wetland flooding frequency within the North Central CMA region is considered high. • Reconfiguration of irrigation systems may adversely impact on wetland watering regimes.

[1] Identified in North Central CMA, 2007

[2] Identified in DSE, 2009

7.4 Policy context

The 2012 Victorian Strategy for Healthy Rivers Estuaries and Wetlands (VSHREW) guides and informs both the North Central 2012-18 RCS and the 2013 North Central Regional Strategy for Healthy Rivers and Wetlands (RSHRW).

The final Murray-Darling Basin Plan will impact on how wetlands are managed in the region with environmental water. The RCS will be reviewed in light of the final Basin Plan.

7.5 Community participation

Community involvement in protecting and enhancing our waterways is critical to meet the objectives of the RCS. Encouraging participation, providing information and developing skills for the community are important aspects of wetland management and will be a focus of the North Central RCS (Refer Chapter 3 Community).

7.6 Regional priority setting

Many wetland assets were identified as part of the Asset identification process run with the community and regional stakeholders. These wetland assets were then assessed for value and threat and the socio/economic feasibility to determine priorities (Refer to Chapter 2 Prioritisation process).

Individual wetland assets have been agglomerated into priority wetland complexes to better define management actions and activities through this process. This means that management responses will be targeted for a number of wetlands within a defined area, which will assist with managing common threats and values within each asset.

The priorities determined are also in alignment with the principles defined in North Central CMA (2007):

- Protect and enhance wetlands listed on the Ramsar, Directory of Important Wetlands or Bioregionally Significant register.
- Protect wetland sites of significance as listed on the Register of the National Estate.
- Protect and enhance wetlands connected to High Value and Representative River Reaches (as defined in the River Health Strategy).
- Protect wetlands with a high environmental value.
- Protect wetland with a high social value.
- Protect wetlands with a high economic value.

The priority wetland assets are listed below and represented in Figure 11 and Table 13:

- Gunbower Forest
- Kerang Ramsar Wetlands
- Central Murray Wetlands
- Mid Loddon Wetlands
- York Plains Wetlands
- Moolort Plains Wetlands
- Kamarooka Wetland Complex

7.7 Discussion

Currently the Victorian Government is finalising the Victorian Strategy for Healthy Rivers, Estuaries and Wetlands. This Strategy will guide the development of the North Central River and Wetlands Strategy due for completion in 2013.

The Basin Plan has the potential to influence the health of the some wetland complexes within the region. Therefore it will be important to ensure good outcomes are achieved for the wetland assets as part of the Basin Plan development.

Wetlands on private land within the North Central CMA region have been identified as high priority assets. As half of the region's wetlands occur on private land, the improvement in condition of high value assets is an integral component to achieving the wetland vision within the North Central CMA region.

With more environmental water becoming available, the effective and targeted use of this water to met environmental objectives is paramount. Strong planning with clear ecological objectives and an adaptive management approach will guide environmental water management within the North Central Region. The North Central CMA in conjunction with the DSE, the Victorian Environmental Water Holder (VEWH) and Commonwealth Environmental Water holder (CEWH) will work cooperatively to manage environmental water within the region.

7.8 Case study

Permanent protection of the York Plains Wetlands

Key link to RCS – Permanent stewardship protection of the York Plains Wetlands is contributing to enduring landscape change.

The York Plains Wetlands - a series of wetlands adjacent to the Avon River – are located west of St Arnaud.

These privately owned wetlands provide important biodiversity and ecosystem services in a largely cleared agricultural landscape and are home to numerous cultural sites. Thanks to investment over the past three years from the Department of Sustainability and Environment (DSE) Natural Resources Division (through the Land Health and Natural Resources Investment Programs) they are now also better protected.

The funding has enabled North Central CMA to work with local landholders to undertake a range of works to protect the wetlands. In the process the project has established a new benchmark for environmental protection projects.

Fences are being constructed to exclude stock and manage grazing in the wetland areas, revegetation is underway to expand areas of habitat and re-establish lost understory, pest plants and animals are being controlled and perennial pastures are being established in the wider landscape to protect the wetlands from rising saline water tables.

Most significantly, seven adjoining landholders have also agreed to covenant more than 400ha of the wetland areas, protecting them in perpetuity.

The project is already seeing results. Floods in 2010/11 have reinvigorated the wetlands with prolific regeneration occurring and wetland species reappearing after the long dry. Thanks to the new levels of protection implemented by the project this regeneration will be secure and the project will deliver enduring landscape change.

7.9 Actions and planning required

The following actions will be completed:

- North Central CMA to develop the North Central Rivers and Wetland Strategy by 2013
- North Central CMA and partner organisations to determine implications of and opportunities from the Murray-Darling Basin Plan on region's wetlands by 2012.
- North Central CMA to continue to work with DSE, VEWH and CEWH to deliver environmental water to achieve agreed environmental objectives for wetlands.
- North Central CMA to complete Index of Wetland Condition assessments and Ecological Vegetation Mapping for all priority wetlands by 2018.

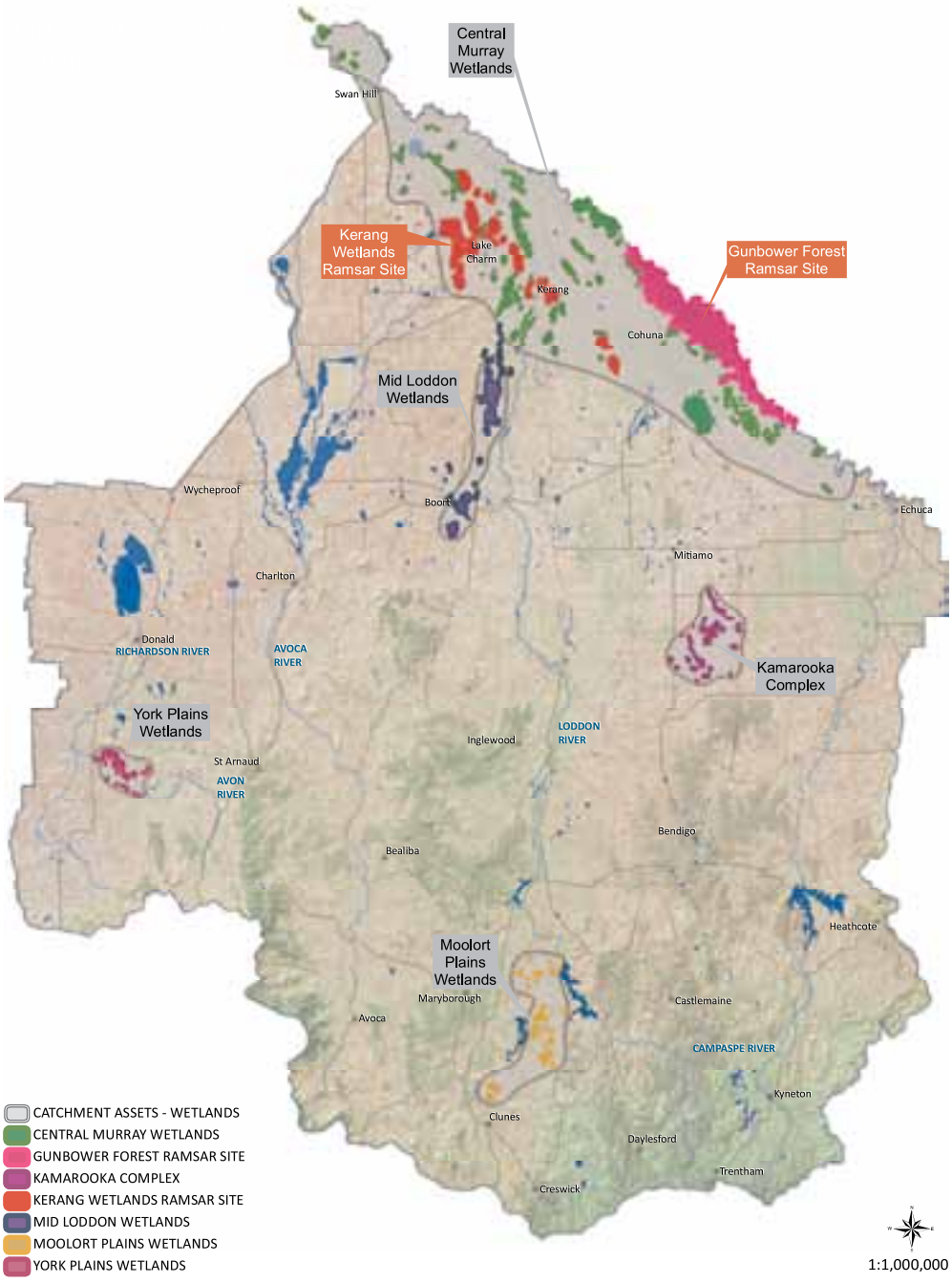


Figure 11: Priority wetland assets in the North Central CMA region

Table 13: Values and objectives for priority assets

Asset	Values and objectives	
Gunbower Forest Ramsar site	Values	Internationally recognised Red Gum / Box wetland system home to significant colonial bird breeding events.
	Threats	Altered flow regimes, weeds
	Aspirational goal	To maintain and improve the ecological charactor of the Gunbower RAMSAR wetlands as a key breeding site for migratory birds.
	SMART goal 1	By 2025 80% of permanent and semi-permanent wetlands within Gunbower Forest are in healthy condition'
	SMART goal 2	Successful breeding of thousands of colonial waterbirds, of a range of species including egrets, cormorants and herons at least 3 years in 10.
	Key Actions	Infrastructure works and measures, environmental flow management, weed control
Avoca Marshes	Values	Part of Kerang Lakes RAMSAR site (Internationally recognised Box wetland system)
	Threats	Pest plants and animals
	Aspirational goal	To increase the ecological condition of the Avoca Marshes by 2050 as measured by Index of Wetland Conditon.
	SMART goal 1	To increase the extent of River Red Gum dominated EVCs by 10% on the bed/fringes of Second and Third marsh through regeneration by 2025.
	Key Actions	Pest plant and animal control
Central Murray Wetlands	Values	Highly depleted wetland types across the region that support significant threatened flora and fauna species.
	Threats	Pest plants and animals, altered flow regimes, salinity
	Aspirational goal	To maintain and improve the ecological condition of eight wetlands within the central Murray floodplain.
	SMART goal 1	To provide a range of habitat types at Hirds Swamp, Johnson's Swamp, Lake Murphy, McDonalds Swamp and Richardsons Lagoon typical of Deep Freshwater Marshes. This will include areas of open water, lignum and emergent aquatic vegetation.
	SMART goal 2	To improve and maintain the extent and condition of riparian vegetation (specifically Black Box community) at Lake Elizabeth and Lake Cullen.
	Key Actions	Environmental flow management, fencing, pest plant and animal control, structural works.
Mid Loddon Wetlands	Values	Regionally valued wetland complexes that support significant threatened flora and fauna species.
	Threats	Pest plants and animals, altered flow regimes, salinity
	Aspirational goal	To maintain and improve the ecological condition of the Mid Loddon wetlands by 2050 as measured by Index of Wetland Conditon.
	SMART goal 1	To increase the species richness of wetland-dependent bird species across the Boort Wetlands to 30 by 2020 and the number of individuals to an average of 1000 - as measured by monthly counts during a wet phase.
	Key Actions	Environmental flow management, fencing, pest plant and animal control, structural works.
York Plains Wetlands	Values	Highly valued wetland complex on private land within the Avon-Richardson catchment
	Threats	Cropping, pest plants and animals
	Aspirational goal	To improve the condition of the York Plains wetlands by 2050 as measured by Index of Wetland Conditon.
	SMART goal 1	To increase the extent of native vegetation from 700 ha to 1,000 ha by 2015.
	SMART goal 2	To increase the average habitat hectare score of remnant vegetation patches across the catchment area by 10% by 2014.
	SMART goal 3	To lower the watertable to a depth of greater than 2 m (except for gross seasonal fluctuations in excessively wet years) over the capture zone (8,400 ha within and immediately surrounding the York Plains, as assessed by CAT modelling) by 2019.
	Key Actions	Fencing, pest plant and animal control,covenants
Moolort Wetlands	Values	Unique wetland complex situated within the Volcanic Plains.
	Threats	Cropping, pest plants and animals
	Aspirational goal	To improve the condition of the Moolort Plains wetlands by 2050 as measured by Index of Wetland Conditon.
	SMART goal 1	To increase the extent of native vegetation surrounding the swamps on private land from 1,034 ha to 1,184 ha by 2015.
	SMART goal 2	To improve the condition of native vegetation in and around the swamp on private land by 10% by 2015 (as measured by the appropriate habitat assessment metric)
	Key Actions	Fencing, pest plant and animal control, revegetation

Please note that targets have been developed for various wetlands that form a part of the overall priorities for the North Central CMA region and these are presented in the Priority assets presented in the RCS.

8 Monitoring, Evaluation, Reporting and Improvement (MERI)

8.1 Introduction

The effective management of Victoria's land, water and biodiversity requires the government and community to have access to reliable information on which to base decisions (DSE 2011).

Monitoring, evaluation reporting and improvement (MERI) are integral components of NRM. MERI is used to better understand the effectiveness of programs and works, the baseline condition and improvement in our natural assets and can also be used to ensure improved accountability for the use of public funds.

8.2 Learning from the past

The 2003-2007 North Central RCS review identified three main factors which had the most significant impact on the implementation and measurement of performance:

- The lack of SMART targets in many cases;
- The lack of a consistent MERI approach; and
- The lack of ongoing engagement in planning, development, implementation and review

8.3 Policy context

DSE has recently released a MER framework 'Monitoring, Evaluation and Reporting Framework for Land, Water and Biodiversity, 2011, Version 3.0'. This framework provides direction for the North Central CMA and will assist in developing consistent MER approaches across the State.

8.4 North Central RCS Monitoring, Evaluation, Reporting and Improvement approach

The objective of the Framework is to establish a set of NRM monitoring, evaluation and reporting principles and standards to improve consistency of regional reporting and enable understanding of the impacts of government policy and investment in land, water and biodiversity. The audience for the Framework is the North Central CMA and its primary delivery partners.

The North Central RCS MERI Framework will:

- Provide clear guidance in the development and implementation of the North Central RCS and the subsequent development and implementation of projects
- Facilitate effective and efficient measurement of outputs, impacts and outcomes from project and program activities
- Support strategic and coordinated adjustment to process, project and program planning and implementation
- Provide a greater understanding and confidence about the NRM outcomes, in particular the relationship between actions and improvements in the state and trend of natural resources in the region.
- Establish a culture of continual improvement and adaptive management across the business
- Outline minimum standards for monitoring, evaluation and reporting
- Ensure alignment and consistency with broader government MERI requirements

8.5 Key aspects of the North Central RCS MERI approach

The North Central RCS MER approach is based on the DSE MER management cycle presented in Figure 9. Program improvement and adaptive management will be a key for the North Central Region to deliver on the RCS vision and targets. Implementation of the MERI framework will establish current performance and provide a strategic and coordinated approach to progress towards established benchmarks.

Implementation of the North Central RCS Management Cycle provides a strong basis to embed adaptive management principles into NRM Programs within the North Central CMA region. The North Central RCS Management Cycle forms the basis for the North Central MERI framework.

The Management Cycle relates to all aspects of the North Central RCS, from planning to implementation, from on-ground works to communication, from activity to project and to program. The diagram reflects an iterative plan, do, reflect and review cycle which requires monitoring and evaluation at each stage to ensure results are as intended and process are continually adjusted as required.

8.6 North Central RCS MERI principles for implementation

The following principles are to be used in implementation the North Central RCS MERI approach:

- The North Central CMA and partner organisations ensure MER approaches are consistent with the North Central RCS MERI approach.
- Strive for all community groups apply the principles when undertaking planning, funding and implementation of NRM works.
- Encourage the application of RCS MERI principles when working with the general community
- Appropriate tools and techniques are developed to support the implementation of the North Central RCS MERI approach
- Encourage results and outcomes from MERI programs are shared with all stakeholders.

8.7 North Central RCS reporting

The North Central CMA will commit to:

1. Submitting an Annual Report to Victorian Government

   Providing a summary of the activities delivered by the North Central CMA throughout the year

2. Undertaking an RCS mid-term review after 3 years.

   This review will assess if any new information has become available and how this may influence the directions set in the RCS.

3. Undertaking major RCS Review after 6 years.

   This will be a major review of the implementation of the RCS and will inform RCS renewal.

Figure 12: DSE MER Management Cycle

Table 14 provides a summary of each phase of the Management cycle and the key components and tools that will enable effective MERI to be implemented throughout the implementation phase of the RCS.

Table 14: Strategy and Planning phases

Program logic	Outlines the anticipated cause-and-effect relationships between program activities, management outcomes and condition.
Key evaluation questions	Pre-determined questions which frame periodic evaluation of policies, programs and projects. The questions should focus on impact, appropriateness, effectiveness, efficiency and legacy.
Targets	Quantitative, temporal and spatial bound, predicted outcomes based on the program logic.
Models and assumptions	Documented relationships between components of the program logic.
Implementation and Monitoring	**Activity delivery** – Delivery of on-ground activities.
	Activity monitoring – Monitoring/surveillance of the quality and persistence of on-ground works.
	Condition Monitoring – Periodic assessment of environmental condition.
Evaluation and Reporting	**Evaluation** – Does the information collected indicate that the targets will be met? Periodic assessment of polices and projects against key evaluation questions.
	Audits – External independent assessment of activity (not outcomes) for accountability.
	Reporting – Communication of annual management delivery.
Management outcomes report	Communication of impacts to the environment based on investment and policy and in context of resource condition.
Make changes	Reflection on what is working and what is not working and the reasons why based on monitoring and reporting. Changes to program direction or arrangements based on reflection on monitoring results and outcome reports

9 Implementation

The North Central RCS provides a long-term vision for natural resource management within the North Central CMA region. The RCS sets regional priorities for the management of natural assets, sets overall direction for investment and coordination of effort by landholders, partner organisations and the wider community.

Continued strong collaboration and partnerships between government and community will be critical to meet the vision of the RCS:

'A community active in protecting and enhancing the integrity of its catchment.'

The North Central RCS implementation will be based on the following principles:

- Community and government working together to achieve the RCS vision and objectives
- A community skilled, knowledgeable and engaged in managing their local environment
- Strong cooperation and collaboration between government agencies
- Robust and feasible targets supported by strong project business cases
- Strong emphasis on Monitoring, Evaluation, Reporting and Improvement

9.1 Implementing the RCS together

The challenges of protecting and enhancing our natural assets are significant and complex. They can only be addressed with a strong and collaborative approach across both community and government. The North Central RCS will:

1. Support the community

Community engagement and capacity building must be a strong focus of the RCS and should be considered in all aspects of RCS implementation. The principles outlined in Chapter 3 should form the basis of any engagement and capacity building activities undertaken.

A renewed focus on Landcare is required to reinvigorate local groups and provide the necessary support to groups to implement local projects and ensure alignment with RCS and Regional Strategies and action plans. There is a real need to acknowledge, maintain and develop Landcare group capacity to enable continuation of the great work Landcare and other community based NRM groups deliver.

Through the asset-based approach, there needs to be a strong recognition that many communities who are outside the RCS priority catchment assets will require support and encouragement. Locally important assets have been nominated and recognised during the development of this RCS. Support can be offered through encouraging these local groups to apply for other government grant schemes (such as Landcare Grants), providing local groups with information and advice regarding their local environmental assets.

2. Encourage strong government collaboration

The North Central CMA is committed to achieving the RCS vision and objectives and will work with Government agencies and Water corporations where relevant and appropriate. Strong collaboration will be maintained and enhanced with neighbouring catchment management authorities, local Governments, Department of Sustainability and Environment, Department of Primary Industries, Parks Victoria, Department of Planning and Community Development, Regional Development Victoria, Regional Development Australia, Coliban Water, Central Highlands Water, Grampians Wimmera Mallee Water and Goulburn-Murray Water. A strong collaborative approach with these organisations will assist in achieving outcomes sought in the RCS.

3. Seek funding to implement the RCS

The RCS will guide government agencies on how and where to direct effort and resources to meet RCS goals and objectives. These will range from specific asset projects through to community participation and capacity building programs.

Many of the RCS catchment assets have already been assessed using Investment Framework For Environmental Resources (INFFER) and are ready for investment. The North Central CMA aims to have all RCS catchment assets INFFER assessed by 2015. This will provide a strong basis for further investment in catchment assets, and if funded will contribute to meeting the RCS vision and objectives.

The North Central CMA in conjunction with government agencies and the community will seek funding to implement strategic projects focused on meeting specific goals outlined in the RCS.

There is also recognition that there are many 'notable assets' that have been identified and valued by the North Central CMA regional community. Some of these assets will be considered through implementation of catchment asset projects (if funded) while other 'notable assets' will require communities to take the lead. These communities will be encouraged to seek funding opportunities through grant schemes such as Landcare and will be supported through opportunities to develop appropriate knowledge and skills.

4. Measuring the success of the RCS

It is important for government and community to understand the effectiveness and extent of RCS implementation. Using the Specific, Measurable, Achievable, Realistic and Time Bound (SMART) targets will assist in measuring the success of the RCS in 2018. A strong emphasis will be placed on implementing the MERI framework outlined in the RCS.

10 Appendices

10.1 Government Policies, Strategies and Legislation relating to Regional Catchment Strategies

Additional Documents

- Regional Forest Agreements
- Park Management Plans
- Forest Management Plans

	Policies and Strategies	Legislation
Federal	• Caring for Our Country Initiative • Clean Energy Future • Proposed Murray-Darling Basin Plan • Commonwealth policy such as the National Strategy for Ecologically Sustainable Development • Australia's Biodiversity Conservation Strategy 2010–2030 (Need to add carbon stuff) • Strategy for Australia's National Reserve System 2009-2030 • The Australian Weeds Strategy (revised 2007) • Australian Pest Animal Strategy 2007 • National Framework for the Management and Monitoring of Australia's Native Vegetation (2001)	• *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* • *Commonwealth Water Act 2007* • *Water Act 2007* • *Environment Protection and Biodiversity Conservation Act 1999* • *Aboriginal and Torres Strait Islander Heritage Act 1994* • *Native Title Act 1993* • *Fisheries Management Act 1991*
State	• Management of Victoria's Ramsar Wetlands Strategic Directions Statement • Victorian Native Vegetation Management Framework 2002 • Victorian Pest Management Framework • Waters of Victoria State Environment Protection Policy (SEPP) • Other groundwater and regional surface water SEPPs. • Invasive Plants and Animal Policy Framework 2010 • Biosecurity Strategy for Victoria 2009 • Victoria's Nature Based Tourism Strategy 2008-2012 • Future Farming Strategy 2008 • Victorian Bushfire Strategy 2008 • Indigenous Partnership Framework 2007-10 • Sustainability Charter for Victoria's State Forests 2006 • Coastal Spaces Landscape Assessment Study 2006 • Native Vegetation Management – A Framework for Action (Revised 2005) • Alpine Resorts Strategic Plan 2004 ('Alpine Resorts 2020 Strategy') • State Environment Protection Policy (Waters of Victoria) 2003 • Victorian River Health Strategy 2002 • Victorian Action Plan for Second Generation Landcare 2002 • Policy for Sustainable Recreation and Tourism on Victoria's Public Land 2002 • Victoria's Salinity Management Framework 2000 • Victorian Flood Management Strategy 1998 • Landscape Setting Types for the Victorian Coast 1998 • Victorian Schemes • Victoria's Biodiversity Strategy 1997 • Dryland Salinity Statement (pending finalisation)	• *Victorian Archaeological and Aboriginal Relics Preservation Act 1972* • *Catchment and Land Protection Act 1994* • *Conservation, Forests and Lands Act 1987* • *Environment Protection Act 1970* • *Flora and Fauna Guarantee Act 1988* • *Planning and Environment Act 1987* (Victorian Planning Policy Framework; Municipal Strategic Statement – Local Planning Policy Framework) • *Victorian Fisheries Act 1995* • *Water Act 1989* • *Climate Change Act 2010* • *Traditional Owner Settlement Act 2010* • *Aboriginal Heritage Act 2006* • *Sustainable Forests (Timber) Act 2004* • *Victorian Environmental Assessment Council Act 2001* • *Parks Victoria Act 1998* • *Alpine Resorts (Management) Act 1997* • *Fisheries Act 1995* • *Murray-Darling Basin Act 1993* • *Heritage Rivers Act 1992* • *Crown Land (Reserves) Act 1978* • *Reference Areas Act 1978* • *National Parks Act 1975* • *Wildlife Act 1975* • *Victorian Conservation Trust Act 1972* • *Forests Act 1958* • *Land Act 1958*
Regional	• North Central River Health Strategy 2005 • Loddon Campaspe Irrigation Region Land and Water Management Plan 2011 • North Central Native Vegetation Plan 2005 • North Central Dryland Management Plan 2008 • North Central Floodplain Management Strategy 1999 • North Central Community Engagement Strategy – 2008 • Loddon Mallee Regional Strategic Plans for the Southern Region and Northern Region. • North Central Invasive Plant and Animal Strategy 2010 • Regional growth strategies, see Table 1, page 8	

Table 15: Policies, stategies and legislaton

10.2 Notable RCS assets

All assets identified through the community and stakeholder forums have been mapped and listed on the North Central CMA website. Visit **www.nccma.vic.gov.au** and follow the links.

10.3 Relationship between native vegetation priorities and significant threatened species

Table 16: Threatened fauna species of the North Central CMA region.

Fauna Species	VR1	VR2	VR3	VR4	VR5	VR6	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13	W1	CVU1	CVU2	MF1	MF2	MM1
Plains Wanderer	■	■	■	■	■																				
Brolga	■	■				■														■					
Bush Stone-curlew	■	■	■			■	■	■	■				■			■		■		■				■	
Grey-crowned Babbler	■	■	■		■	■										■							■	■	
Barking Marsh Frog	■	■																					■	■	
Fat-tailed Dunnart	■	■	■			■				■			■	■	■	■		■							■
Hooded Scaly-foot	■																							■	
Curl Snake	■	■				■																	■		
Broad-shelled Turtle		■	■	■	■													■					■	■	
Golden Perch		■	■	■	■																		■	■	
Intermediate Egret		■	■				■	■	■														■	■	
Carpet Python			■		■																			■	
Diamond Dove			■				■	■	■	■			■	■		■	■	■					■	■	
Blue-billed Duck					■																			■	
Eastern Great Egret			■																	■			■	■	
Freckled Duck			■																	■			■	■	■
Glossy Ibis			■		■																		■	■	
Ground Cuckoo-shrike			■		■																		■	■	
Royal Spoonbill																							■		
Nankeen Night-heron					■																	■			
Striped Legless-lizard						■			■		■			■											
Woodland Blind-snake						■																■			
Swift Parrot							■	■	■	■	■	■	■	■	■	■	■	■	■						
Common Dunnart							■	■								■			■				■		
Barking Owl	■	■					■	■	■		■		■	■			■	■	■			■			
Bibron's Toadlet							■	■	■	■	■	■	■	■		■	■	■	■			■			
Chestnut-rumped Heath-wren							■	■	■		■		■	■		■	■	■	■				■	■	
Little Bittern							■	■					■	■								■			
Speckled Warbler							■	■	■	■	■	■	■	■		■	■	■	■				■		
Painted Honeyeater							■	■	■	■	■	■	■	■		■	■	■	■		■	■			
Brush-tailed Phascogale								■	■		■	■		■			■	■	■						
Olive Legless-lizard										■		■			■			■		■					
Bandy Bandy										■			■			■	■								
Regent Honeyeater									■		■						■								
Square-tailed Kite											■											■			
Common Bent-wing Bat																			■		■				
Powerful Owl											■								■		■	■			
Masked Owl																							■		
White-bellied Sea-eagle																							■	■	
Little Egret																							■	■	

Table 17: Threatened flora species of the North Central CMA region.

Flora Species	VR1	VR2	VR3	VR4	VR5	VR6	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13	W1	CVU1	CVU2	MF1	MF2	MM1
Red Swainson-pea	■					■																			
Buloke Mistletoe	■																			■					
Slender darling-pea	■				■	■												■							■
Chariot Wheels	■	■																		■					■
Silky Swainson-pea	■					■																			
Annual Buttons	■																								
Downy Swainson-pea	■																			■					■
Tough Scurf-pea	■		■																						
Hoary Scurf-pea				■	■																				
Winged Pepper-cress					■																		■		
Sikh's Whiskers							■			■						■									
Small Milkwort							■							■											
Bristly Greenhood							■					■													
Kamarooka Mallee							■			■						■									
Yellow-tongue Daisy							■																		■
Ausfeld's Wattle							■	■	■							■	■								
Whipstick Westringia							■																		
Dainty Phebalium							■			■			■			■									
Velvet Daisy-bush									■	■															
Jericho Wire-grass									■																
Matted Flax-lily											■														
Trailing Hop-bush											■														
Goldfield's Grevillea											■	■		■		■	■								
Late-flowered Flax-lily											■														
Pale Flax-lily											■														
Brilliant Sun-orchid												■		■	■										
Clover Glycine												■							■						
Golden Cowslips												■						■							
Swamp Diuris													■	■	■		■								
Trailing Hop-bush														■											
Scented Bush-pea														■					■						
Purple Diuris														■											
Narrow Goodenia																■									
Fryerstown Grevillea																■									
River Swamp Wallaby-grass																							■		
Branching Groundsel																								■	
Purple Diuris																								■	

Key

Victorian Riverina Bioregion	Patho Plains (VR1), Pyramid Hill (VR2), Wandella (VR3), Bunguluke (VR4), Lower Avoca Grasslands (VR5), Northern Plains Woodlands (VR6)
Goldfields Bioregion	Kamarooka (G1), Wellsford (G2), Eppalock (G3), Wedderburn-Wychitella (G4), Muckleford (G5), Kara Kara - Carapooee (G6), Moliagul (G7), Maryborough - Paddy Ranges (G8), Tottington (G9), Inglewood (G10), Mid Loddon (G11), Bealiba-Dalyenong (G12), Upper Loddon (G13)
Wimmera Bioregion	York Plains (W1)
Central Victorian Uplands Bioregion	Daylesford - Wombat (CVU1), Upper Avoca (CVU2)
Murray Fans Bioregion	Gunbower (MF1), Dartagook (MF2)
Murray Mallee Bioregion	Lake Buloke (MM1)

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www.inffer.org

12 Glossary

Aeolian	Describes material eroded, transported and deposited by wind.
Alluvial	Describes material deposited by, or in transit in, flowing water.
Biodiversity Fund	A federal government fund aimed to support landholders to undertake projects that establish, restore, protect or manage biodiverse carbon stores. The Biodiversity Fund will improve the resilience of Australia's unique species to the impacts of climate change, enhance the environmental outcomes of carbon farming projects, and help landholders protect carbon and biodiversity values on their land.
Bioregional or Conservation Status	A status attributed to areas of native vegetation that rate the level of conservation required from least concerned, depleted, vulnerable, rare, endangered presumed extinct.
Bioregions	Bioregions are large, geographically distinct areas of land with common characteristics such as geology, landform patterns, climate, ecological features and plant and animal communities.
Capacity Building	Capacity building is a conceptual approach to development that focuses on understanding the obstacles that inhibit people, governments, international organizations and non-governmental organizations from realizing their developmental goals while enhancing the abilities that will allow them to achieve measurable and sustainable results.
Carbon Farming forest Initiative	The Carbon Farming Initiative is a carbon offsets scheme established by the Australian Government to provide new economic opportunities for farmers, growers and landholders and help the environment by reducing greenhouse gas emissions. It is a key component of the Australian Governments Clean Energy Future Plan.
Carbon sequestration dioxide.	Removing carbon dioxide form the atmosphere via the uptake and storage of carbon. Planting vegetation is one way of biologically removing carbon
Community Engagement	To consult the community, increase awareness and promote the involvement of community members in a particular event, activity or project.
Duplex soils	A soils in which there is a sharp change in soil texture between the A and B horizons. The soil profile is dominated by the mineral fraction with a texture contrast of 1.5 soil texture groups or greater between the A and B horizons. Horizon boundaries are clear to sharp.
Eutrophication	Eutrophication is the ecosystem response to the addition of artificial or natural substances, such as nitrates and phosphates, through fertilizers or sewage, to an aquatic system.
FarmWater	The FarmWater project is funded by the 'On-Farm Irrigation Efficiency Program', an element of the Australian Government's 'Water for the Future'.
Groundwater	Water beneath the surface held in or moving through saturated layers of soil, sediment or rock.
Indigenous Partnership Framework	The State Governments Indigenous policy to facilitate the full, effective and equitable participation of Traditional Owners and Indigenous people in all aspects of land and natural resource management.
Meta-sedimentary	A sediment or sedimentary rock which shows evidence of metamorphism
NaturePrint	NaturePrint is a mechanism being developed by DSE to integrate and analyse our best state-wide information about biodiversity values, threatening processes and ecosystem function at the landscape scale.
Pleistocene	The geological epoch which lasted from about 2,588,000 to 11,700 years ago, spanning the world's recent period of repeated glaciations.
Quaternary	The Quaternary Period is the most recent of the three periods of the Cenozoic Era in the geologic time scale. It spans from the Neogene Period to the present. The Quaternary includes two geologic epochs: the Pleistocene and Holocene.
Ramsar convention	An international treaty for the conservation and sustainable utilization of wetlands, to stem the progressive encroachment on and loss of wetlands now and in the future, recognizing the fundamental ecological functions of wetlands and their economic, cultural, scientific, and recreational value.
Regional Growth Plans	Regional Growth Plans will provide comprehensive land use and urban planning support to enable the management of expected population growth in key regional centres including Geelong, Ballarat, Bendigo and the Latrobe Valley.
Regional Landcare Support Plan	The plans recognise the issues faced by the groups and volunteers undertaking natural resource management activities and provide a framework for supporting their needs.
Regional Strategic Plans	Regional Strategic Plans will support the continued growth and prosperity of provincial Victoria.
Securing a Clean investment, Energy Future	The Australian Government's initiative for securing a clean energy future. The plan for securing a clean energy future will cut pollution and drive helping to ensure Australia can compete and remain prosperous in the future.
Sodic	A type of soil containing sufficient exchangeable sodium to adversely affect soil stability, plant growth and/or land use.
Sodosols	Sodosols have a sodic subsoil and strong texture contrast between A and B horizons. Widespread throughout the North Central region they frequently occur on the older alluvial plains in the north and on sedimentary hills and rises.
Vertisols	A type of soil in which there is a high content of expansive clay known as montmorillonite that forms deep cracks in drier seasons or years.
Whole of Country Plan	A key strategic planning document that sets direction for and assists in the delivery of cultural outcomes including caring for country and other traditional owner aspirations.

NORTH CENTRAL
Catchment Management Authority
Connecting Rivers, Landscapes, People