Conservation Action Planning

June 2016 Summary

Mid North Agricultural Districts

A Collaborative, Landscape-scale Planning Approach to
Biodiversity Conservation in the Mid North Agricultural Districts,
South Australia.

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Northern and Yorke Natural Resources Management Board

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Acknowledgements

Participants of the Mid North Agricultural Districts Conservation Action Planning (CAP) process for technical input and provision of local knowledge (refer Appendix 4).

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Abbreviations

CAP	Conservation Action Planning
GA	Greening Australia
DEWNR	Department of Environment, Water and Natural Resources
NY NRM	Northern and Yorke Natural Resources Management Board
IBRA	Interim Biogeographic Regionalisation of Australia

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1. Background

1.1. Introduction

This document summarises the progress of the **Mid North Agricultural Districts** Conservation Action Planning (CAP) process to the 30th June 2016. The process commenced in October 2011 and the planning team (refer Appendix 4) has met regularly to develop the conservation plan for the region. The 1st iteration CAP was summarised in June 2012 and this document contains refinements made since this time. Significant changes were made in 2016 including a redrafting of the boundary to remove the Upper Yorke Peninsula region, as well as merging two assets.

The initial planning workshop was held at Auburn in late 2011 and involved 30 participants from twelve organisations. The workshop introduced participants to the CAP process and facilitated a general discussion on conservation activities in the region. The main outcomes of the workshop were the formation of the planning team, the definition of a project boundary, a listing of the existing biodiversity projects and the identification of key conservation assets.

Planning meetings have continued to be held regularly with more than 60 participants from more than 15 organisations (refer Appendix 4) participating in the process. The workshops focus on viability assessments, threat ranking and the development of conservation objectives and strategies for the identified conservation assets.

Outcomes of the CAP process to date include:

- Production of annual CAP summary documents
- Production of scoping reports for
    - Climate change
    - Inland saline wetlands
    - Sustainable grazing in grassy ecosystems
- Mid-North Rivers program funded to improve the condition of the Wakefield and Light Rivers (2013-ongoing)
- Pygmy Bluetongue Lizard sustainable grazing project to improve habitat needs (2012-13)
- Kapunda to Burra Landscape Program to improve habitat needs for Woodland Birds (2014-ongoing)
- Habitat Restoration for Threatened Species in the Mid North of South Australia (Clare Valley 20 Million Trees project)(2016-ongoing)

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1.1.1. Conservation Action Planning (CAP)

The planning process for the Mid North Agricultural Districts uses the Conservation Action Planning (CAP) framework developed by the US-based conservation group The Nature Conservancy www.nature.org as its basis. This framework is widely used in the development of international conservation projects and is becoming more widely adopted in Australia for planning large scale conservation projects with multiple stakeholders. One of the underpinning goals of CAP planning is to move conservation projects from the site scale (10's or 100's of hectares) to the conservation and preservation of functional landscapes (100,000's hectares) which are able to sustain biodiversity at an eco-regional scale (Low 2003).

The CAP process typically involves a series of conservation planning workshops with 5-10 participants from multiple organisations. The process is facilitated by a trained CAP coach and uses a standard step-by-step methodology (refer Low 2003) and supporting software (i.e. CAP Excel workbook or Miradi) to guide participants through the development of a 1st iteration landscape conservation plan.

Whilst built on solid scientific principles, the approach recognises that there are often large gaps in ecological knowledge and data sets and hence a strong on-going adaptive management ethic is implied throughout the process. It also recognises that a large amount of knowledge exists with local conservation practitioners and therefore incorporates local practitioner input into the planning process.

The major steps in the process, as outlined in this document, are:

- an analysis of the regional context in which conservation is to occur;
- the identification of conservation assets and nested assets (i.e. ecosystems, communities, species);
- an analysis of the viability (i.e. health) of the conservation assets and the key threats;
- the development of measurable objectives to achieve the long-term conservation of the assets;
- the development of strategies, action steps and key programs to achieve the conservation objectives;
- the development of a monitoring and evaluation program and adaptive management framework.

1. Background

1.2 Regional Planning Context

1.2.1 Northern and Yorke Natural Resources Management (NRM) Board Region

The Northern and Yorke Natural Resources Management (NRM) region extends from the northern Adelaide plains in the south to the Southern Flinders Ranges in the north, and includes the whole of the Yorke Peninsula. In total the NRM region covers over 3 million hectares and supports a population of approximately 95,000 people (Northern and Yorke NRM Board 2009).

For conservation action planning purposes, the region has been divided into four sub-regions based primarily on ecological characteristics (refer Map 1). The four sub-regions are:

- Southern Flinders Ranges (Living Flinders Project Area)
- Mid North Agricultural Districts
- Yorke Peninsula (Naturally Yorke) (further divided into the Upper and Southern YP landscapes)

1.2.2 Existing Biodiversity Conservation Programs and Organisations

The Mid North Agricultural Districts CAP is a sub-regional planning process which complements existing regional plans and strategies (refer Appendix 3 for Northern and Yorke NRM regional goals). It also contributes to national and state biodiversity programs and funding priorities (refer Table 1 below).

The principle organisations involved in biodiversity conservation in the region are the Northern and Yorke Natural Resources Management Board and the State Government Department of Environment, Water and Natural Resources. These two organisations underwent a merger in 2010/2011 and now function primarily as one organisation.

Other contributors to biodiversity conservation in the region include the 11 District Councils (of the original CAP region boundary), Rural Solutions of South Australia and a number of non-government organisations (Nature Conservation Society of South Australia, Greening Australia, Trees for Life, Threatened Plant Action Group, Ag Excellence Alliance, Native Orchid Society of SA) and local landholder groups (e.g. Mid North Grasslands Working Group).

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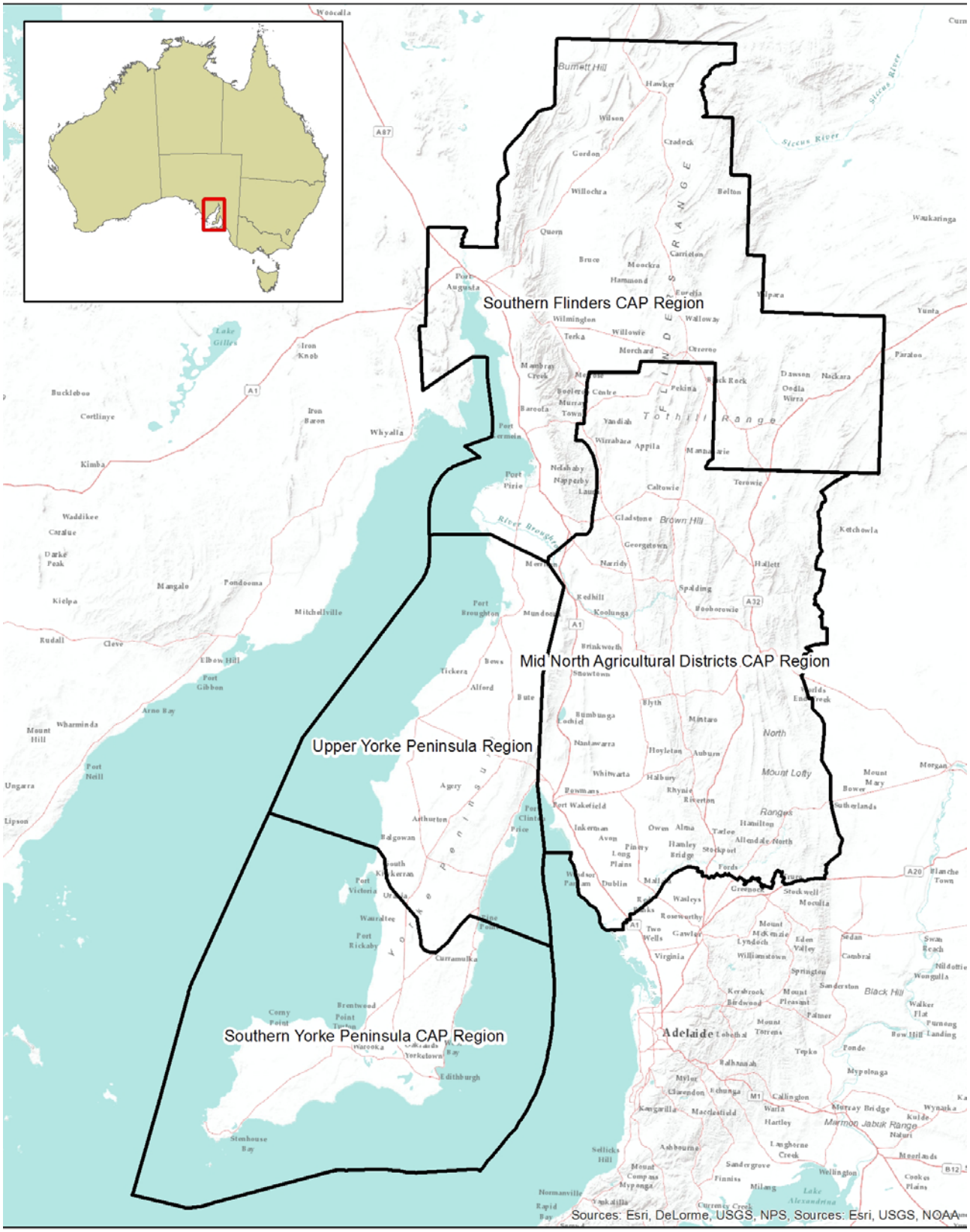
Table 1: Existing Biodiversity Programs and Legislative Frameworks

National	State (SA)	Regional (N&Y NRM)	National and State Legislation
• 20 Million Trees Program • National Water Initiative • National Strategy for the Conservation of Australia's Biological Diversity • Australian Government Climate Change Policies	• State Strategic Plan • Tackling Climate Change • State Natural Resources Management Plan • No Species Loss	• Northern and Yorke NRM Plan • Northern and Yorke Biodiversity Plan • DEWNR Biodiversity Strategy • Threatened Species Recovery Plans	• Environment Protection and Biodiversity Conservation Act 1999 (National) • National Parks and Wildlife Act 1972 (SA) • Native Vegetation Act 1991 (SA) • Natural Resources Management Act 2004 (SA) • Development Act 1993 (SA) • Coast Protection Act 1972 (SA)

1. Background

Map 1: CAP Sub-Regions of the Northern and Yorke NRM Region



Conservation Action Planning (CAP) Sub-regions of the Northern and Yorke NRM Region

CAP Sub-region Boundary

0 5 10 20 30 40 50
Kilometers

N

Note: All boundaries are considered 'soft'. Planning and project implementation will work across boundaries. Data supplied by the Department for Environment, Water and Natural Resources SA.

1. Background

1.3 The Mid North Agricultural Districts Project Area

1.3.1 Location and Extent

The Mid North Agricultural Districts project area is part of the Natural Resources Northern and Yorke (NRNY) region and is one of four conservation action planning sub-regions within the NRM boundary (refer to Map 1). The Mid North Agricultural Districts CAP covers approximately 1.6 million hectares from the Light River in the south to near the townships of Port Pirie and Booleroo in the north (refer to Map 2).

1.3.2 Regional Landforms

Regional landforms across the Mid North Agricultural Districts are diverse, ranging from the low lying saline wetlands near Snowtown and Whitwarta, to the plains around Owen, to the distinct north-south ranges from Gawler to Orroroo. The region includes around 100 kilometres low energy coastline including parts of the upper St. Vincent Gulf and Spencer Gulf.

1.3.3 Climate and Rainfall

The area is subject to typical Mediterranean climatic conditions with mild wet winters and hot dry summers. Annual average rainfall varies across the region ranging from approximately 600 mm at Clare, 500 mm at Jamestown, 400mm at Crystal Brook and between 350-400m at Burra. In the far east of the region average annual rainfall drops to approximately 300 mm (N&Y NRM, 2008).

1.3.4 Aboriginal History

The project area is the traditional country of several aboriginal groups including the Narungga, the Ngadjuri, the Kaurna and the Nukunu. Aboriginal people developed a complex cultural relationship with the environment and these groups still have a strong connection with their land.

1.3.5 European Land Use History

Following European settlement of Adelaide in 1836 the northern Adelaide Plains were colonised rapidly as agricultural production (predominantly sheep and grain) expanded along the fertile soils. Grazing rights were established across unsurveyed land throughout much of the district which resulted in many small settlements. These pastoral concerns drove population expansion until the discovery of copper in the 1840's and 1850's. Copper mining rapidly increased local settlement in the region, especially Burra and Kapunda, whilst encouraging an increase in transport infrastructure (Road, Rail, Sea Port) which facilitated further settlement and intensive agriculture throughout the region.

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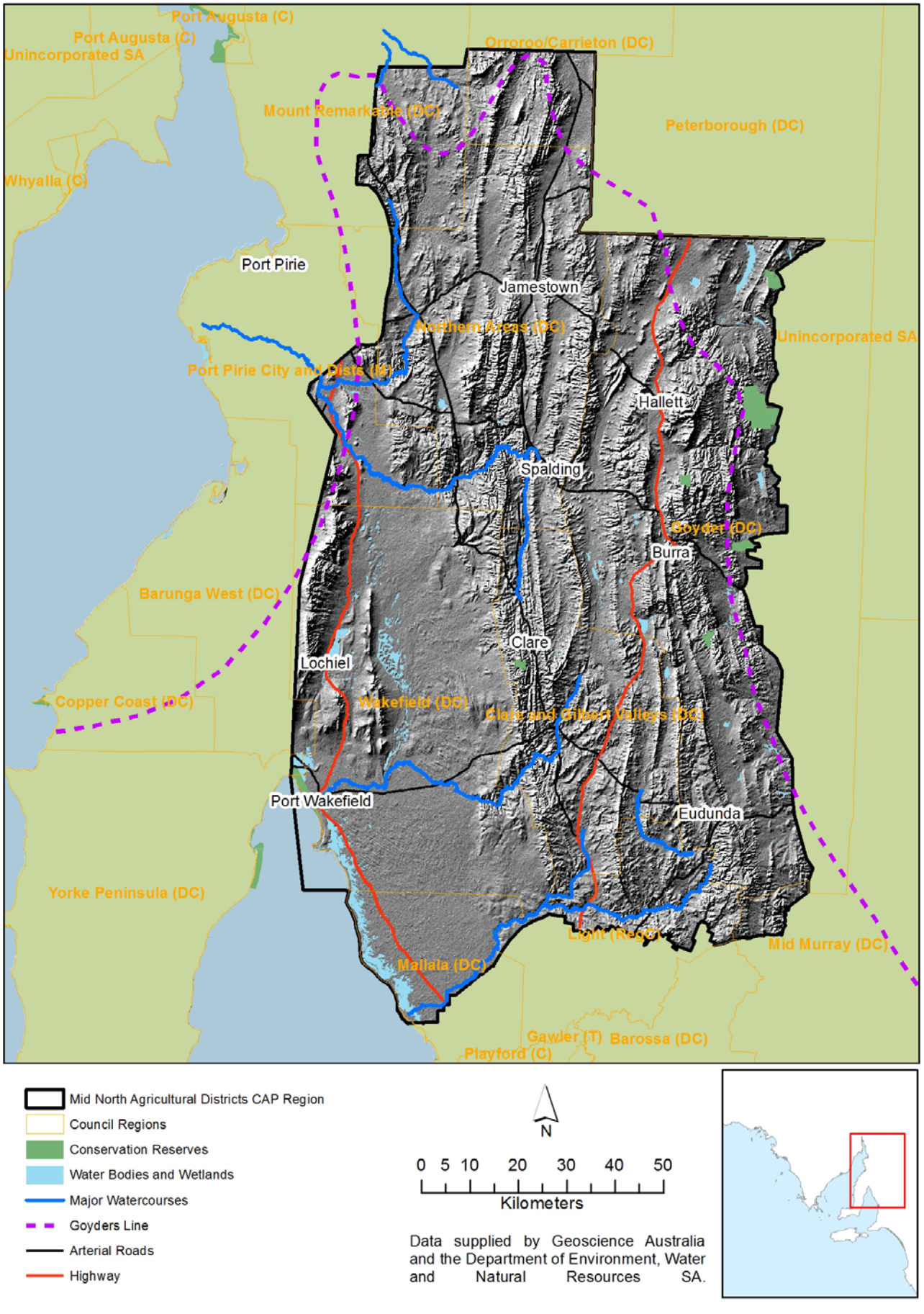
1. Background

Map 2: Mid North Agricultural Districts CAP Project Boundary



1.3.6 Native Vegetation

The coastal strip of the Mid North Agricultural Districts is dominated by large areas of samphire and chenopod vegetation with mangroves (*Avicennia marina*) occurring in sheltered inter-tidal areas. Interspersed with these areas along the coast are low dunes dominated by shrubs such as Coastal Daisy-bush (*Olearia axillaris*) and wattles (*Acacia ligulata, A. cupularis*).

River Red Gum (*Eucalyptus camaldulensis*) woodlands occur along the majority of rivers and creeks in the region. Other common wetland vegetation includes Lignum (*Muehlenbeckia florulenta*), Broughton Willow (*Acacia salicina*) and Common Reed (*Phragmites australis*). On terminal saline lake systems, salt-tolerant species such as samphire and Nitre bush (*Nitraria billardierei*) occur.

Mallee is the common vegetation type in the semi-arid areas in the east and west of the region. Typical over-storey tree species include Yorrell (*Eucalyptus gracilis*), Gilja (*E. brachycalyx*), Red Mallee (*E. oleosa*) and Beaked Red Mallee (*E. socialis*). In the far east of the region mallee vegetation is interspersed with arid communities dominated by Bluebush (*Maireana sedifolia*, *M. pyramidata*) and Black Oak (*Casuarina pauper*).

Temperate grassy woodlands and grasslands occur on higher rainfall ranges and valleys in east of the region. Common grassy woodlands include Drooping Sheoak (*Allocasuarina verticillata*), Blue Gum (*Eucalyptus leucoxylon*) and the nationally endangered Peppermint Box (*E. odorata*) grassy woodlands. In other higher rainfall areas, woodlands with a more shrub dominated understorey occur. Common temperate grasslands include Spear-grass (*Austrostipa spp*.), Wallaby Grass (*Austrodanthonia spp*.) and the nationally endangered Iron-grass (*Lomandra* spp.) grasslands.

Flora Species Conservation Status
Spatial database records managed by DEWNR show 132 plant species of national or state conservation significance within the project area (refer Appendix 1). 21 of these are listed as nationally threatened and 131 are considered rare, vulnerable or endangered at the state level.

Nationally threatened flora species include a number of orchid species (e.g. *Caladenia* spp*., Prasophyllum* sp*., Pterostylis* spp*.)*, 3 wattle species (*Acacia spilleriana, A. glandulicarpa, A. menzelii*), 2 Hop-bushes (*Dodonaea procumbens*, *D*. *subglandulifera*), 3 Daisies (*Olearia pannosa* ssp. *pannosa, Snecio macrocarpus, S. megaglossus*), Bead Samphire (*Tecticornia flabelliformis*), Slender Bell-fruit (*Codonocarpus pyramidalis*) and Osbourne's Eyebright (*Euphrasia collina* ssp. *osbornii*). Spiny Everlasting (*Acanthocladium dockeri*) and Spalding Blown-grass (*Lachnagrostis limitanea*) are listed as critically endangered and endangered respectively and are highly restricted in distribution and endemic to the region.

1.3.7 Fauna

Fauna Species Conservation Status
Spatial database records managed by DEWNR show 100 fauna species of national or state conservation significance within the project area (refer Appendix 1). 23 of these are listed as nationally threatened and 96 are considered Rare, Vulnerable or Endangered at the state level.

Nationally threatened fauna species of note include the nationally Endangered Pygmy Bluetongue Lizard (*Tiliqua adelaidensis*), nationally Vulnerable Plains-wanderer (*Pedionomus torquatus*) and Flinders Worm-lizard (*Aprasia pseudopulchella*). Fauna species recorded as Threatened at the state level include the Diamond Firetail (*Stagonopleura guttata*) and Fairy Tern (*Sterna nereis*).

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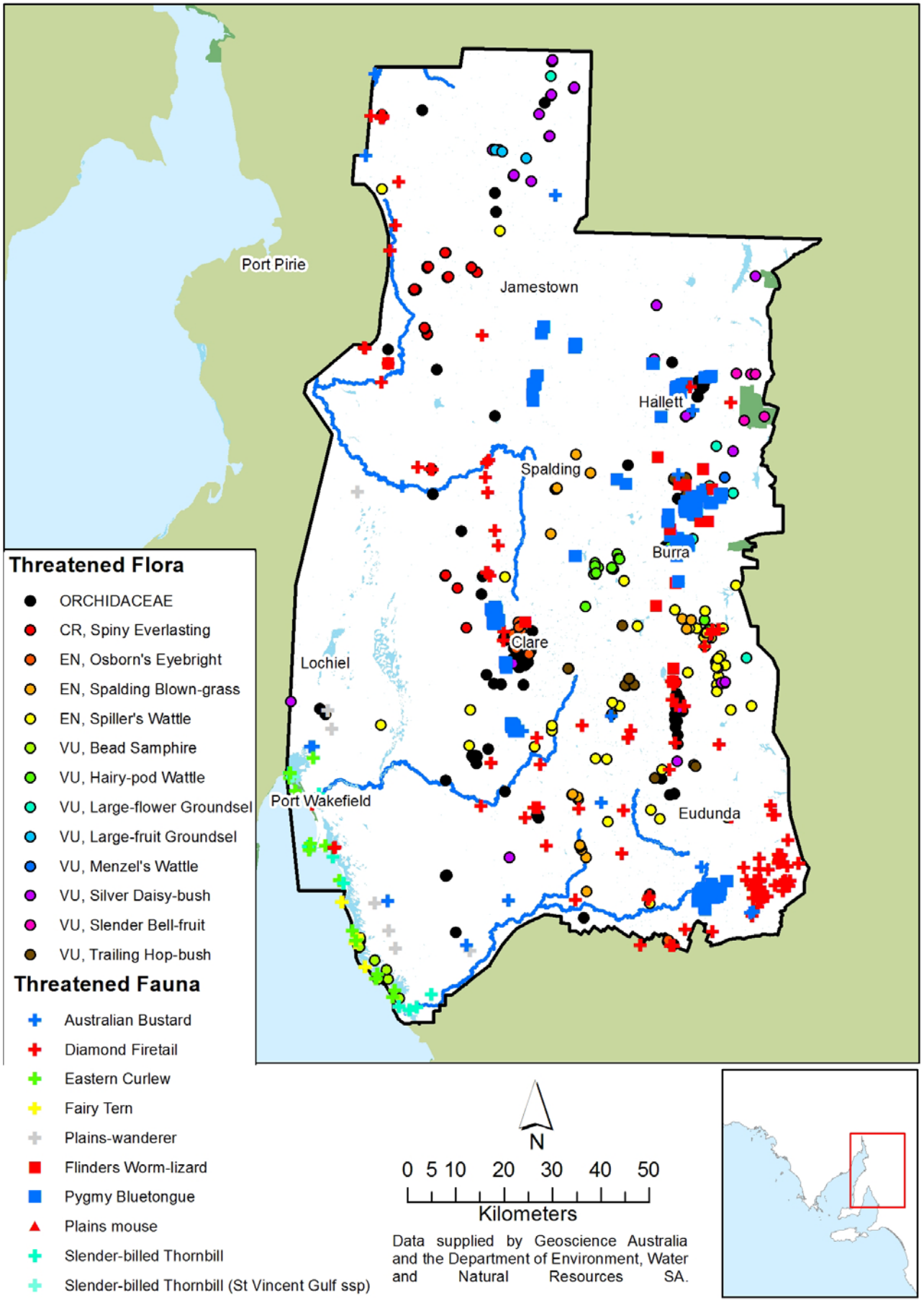
1. Background

Map 3: Selected Threatened Species: Mid North Agricultural Districts region



1. Background

1.4 Social Context

1.4.1 Population

The Mid North Agricultural Districts CAP region encompasses the main population centres of Clare, Jamestown, Crystal Brook and Burra and many other smaller settlements. Clare is the largest town in terms of population with around 3,300 people, followed by Jamestown with around 1,700 and Burra with around 1,400.

The resident population of the Mid North Agricultural Districts CAP region is difficult to determine due to local government boundary not aligning with the CAP boundary. However, the population is estimated to be approximately 50,000 people based on the Bureau of Statistics 2006 census data from table 2 below.

Table 2: Selected Demographic Statistics from the 2006 Census and Regional Population Growth www.abs.gov.au

Location (LGA)	Population 2006	Labour Force 2006	Farming Labour Force 2006	% Involved Farming	Population 2001	Population change 2001-2006
Clare and Gilbert Valleys	8,143	4,104	762	19.2 %	8,072	0.9 %
Goyder	4,185	1,914	503	27.5 %	4,224	- 0.9 %
Light	12,359	6,273	513	8.5 %	10,150	21.7 %
Mallala	7,900	3,774	156	4.3 %	7,073	11.7 %
Port Pirie	17,142	6,857	246	4.0 %	17,057	0.5 %
Wakefield	6,372	2,802	560	20.8 %	6,264	1.7 %

1.4.2 Landholdings

Rural landholdings in the Mid North Agricultural Districts are generally of small to moderate size with increasing subdivision of land for lifestyle blocks around Clare.

A key landholder in the region is the Minister for Environment and Conservation (Department of Environment, Water and Natural Resources). In total, eleven conservation parks cover in approximately 10,000 hectares of land in the region (refer table 3 below).

Table 3: Conservation Reserves in Mid North Agricultural Districts

Conservation Reserve	Area (Hectares)
Spring Gully Conservation Park	396
Clinton Conservation Park	1,915
Pandappa Conservation Park	1,051
Martindale Hall Conservation Park	19
Mokota Conservation Park	465
Caroona Creek Conservation Park	4,536
Hopkins Creek Conservation Park	515
Red Banks Conservation Park	1,030

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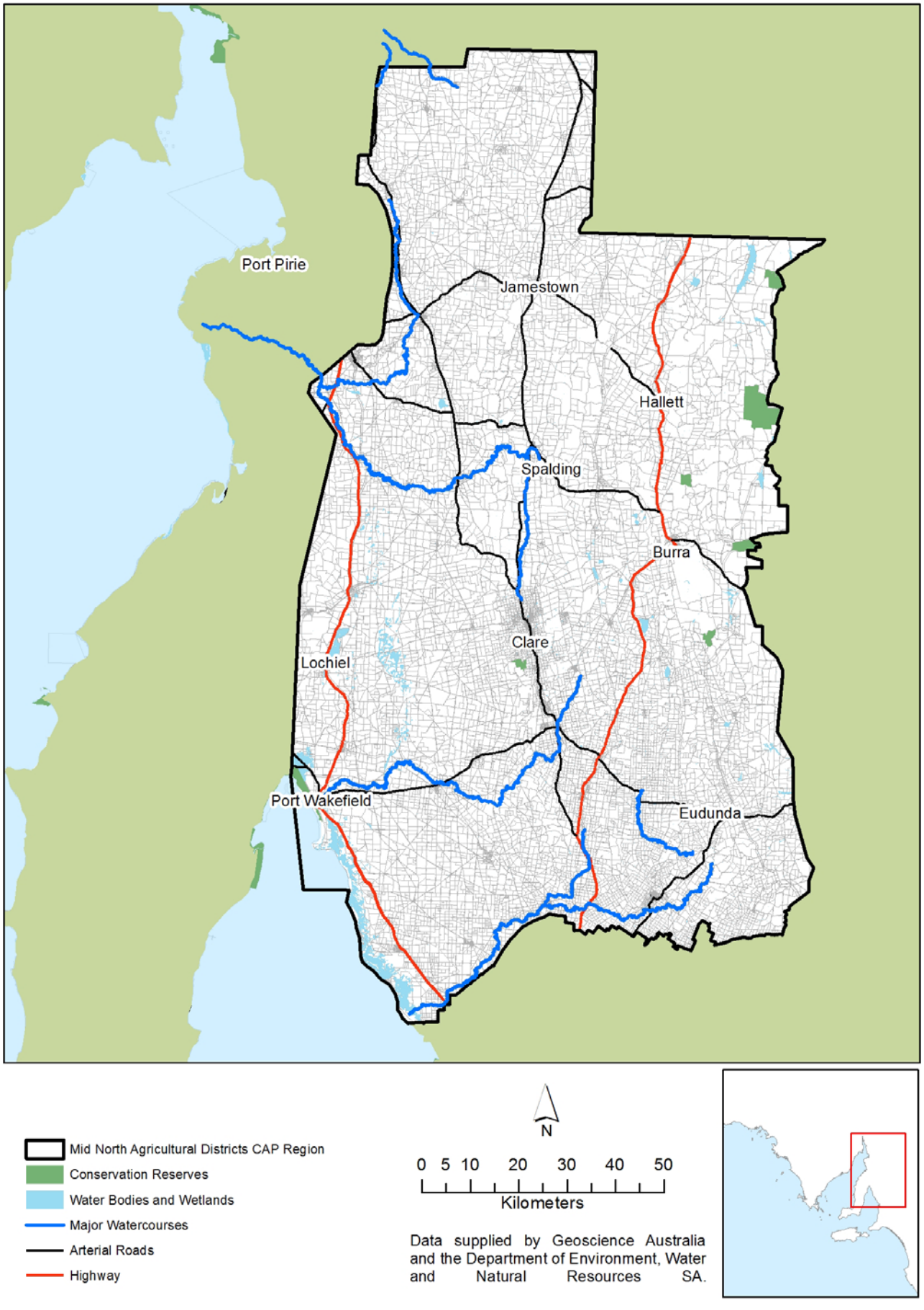
1. Background

Map 4: Property boundaries in the Mid North Agricultural Districts



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2. Identification of Conservation Assets

2.1. Methodology for Identifying Conservation Assets

The first step in the conservation action planning process involves the identification of a small number of focal conservation assets (i.e. ecosystems, communities or species) that collectively represent the biodiversity of a region. The explicit assumption within this process is that by conserving representative examples of broad-scale communities and ecosystems, the majority of species will also be conserved. The list of focal conservation assets therefore need not be long and exhaustive; rather, it should be short and representative. In general, the CAP methodology recommends that no more than eight conservation assets are selected to be the focus of a landscape conservation program.

The asset selection process begins by identifying the coarse-scale ecosystems and communities for conservation. The issue of whether to lump individual ecosystems and communities together or split into individual conservation assets is often a difficult one. In general, ecosystems and communities are lumped together if they:

- co-occur across the landscape;
- share similar ecological processes;
- share similar threats.

The next step is to screen for species and communities occurring at smaller scales that are not well "nested" within the broader set of ecosystems or communities; that is, those species and communities whose conservation requirements are not met through the conservation of the coarse-scale assets (as suggested by Noss et al. 1999; Margules and Pressey 2000; MacNally et al. 2002). This approach is known as the coarse filter – fine filter approach (Groves 2003). Examples of species often not captured by coarse-scale assets include:

- rare, threatened and endemic species;
- species with highly disjunct (spatially separate) populations or restricted distributions;
- keystone or highly interactive species (those that have a disproportionate influence on the structure and ecological function of the community);
- wide-ranging species.

Species and communities that fall into the above categories may be captured by threatened species recovery programs or may need to be considered as separate conservation assets.

Source: Adapted from Low (2003)

2.2. Conservation Assets of the Mid North Agricultural Districts

Eleven key conservation assets have been identified for the Mid North Agricultural Districts (refer below). Each conservation asset is associated with numerous nested assets (i.e. plant communities, species assemblages, individual species) which are likely to be a focus of conservation efforts and help to further define the asset. Map 5 shows the locations and distributions of the assets and Map 4 displays distribution of associated threatened species.

1. Coastal Mangroves and Samphire
2. Low Coastal Dunes and Cliffs
3. Rivers, Creeks and Waterholes
4. Inland Terminal Wetlands / Salt Lakes
5. Native Temperate Grasslands
6. Temperate Grassy Woodlands
7. Temperate Woodlands with shrubby or heath understorey
8. Western Relictual Mallee
9. Eastern Mallee and Transitional Country
10. Large, Declining Raptor Species
11. Endemic, Nationally Threatened Flora - Spiny Daisy and Spalding Blown Grass

2. Identification of Conservation Assets

2.2.1 Coastal Mangroves and Samphire

Coastal mangroves and samphire occur in low energy, inter-tidal areas of the Upper Spencer Gulf and Gulf St Vincent. These areas are considered nationally important bird areas by Bird Life Australia and are listed as wetlands of national significance. Important locations include Point Jarrold and Clinton Conservation Park and near the coastal township of Port Wakefield. Coastal mangroves and samphire provide important habitat for shorebirds, crustaceans, fish breeding and the nationally vulnerable Bead Samphire (*Tecticornia flabelliformis*). N.B. since the 2016 boundary redraw this asset has been significantly reduced from previous extent and is expected to be managed through strategies developed by the Yorke Peninsula CAP.

Nested Assets		AUS	SA
PLANT COMMUNITY	Mangrove (*Avicennia marina*) Low forest		
PLANT COMMUNITY	Samphire and chenopod shrublands		
KEY HABITAT AREAS	Intertidal zone (tidal flats)		
ECOLOGICAL FUNCTION	Important shorebird, fish breeding and nursery area		
SHOREBIRDS, WADERS & SEABIRDS	Fairy Tern (*Sterna nereis*) e.g. Eastern Curlew, Thornbill, Sandpipers		E
BIRDS ASSOCIATED WITH CHENOPOD SHRUBLAND	e.g. Rock Parrot, Elegant Parrot, Blue winged Parrot		
INVERTEBRATES	Crabs, Crustaceans, Molluscs and Bi-valves		
THREATENED FLORA	Bead Samphire (*Tecticornia flabelliformis*).	VU	V
KEY LOCATIONS	Proof Range, Clinton CP, Pt Wakefield & estuary, Pt Jarrold. Important Bird Areas (Birds Australia) & Wetlands of National Significance – Gulf St Vincent		

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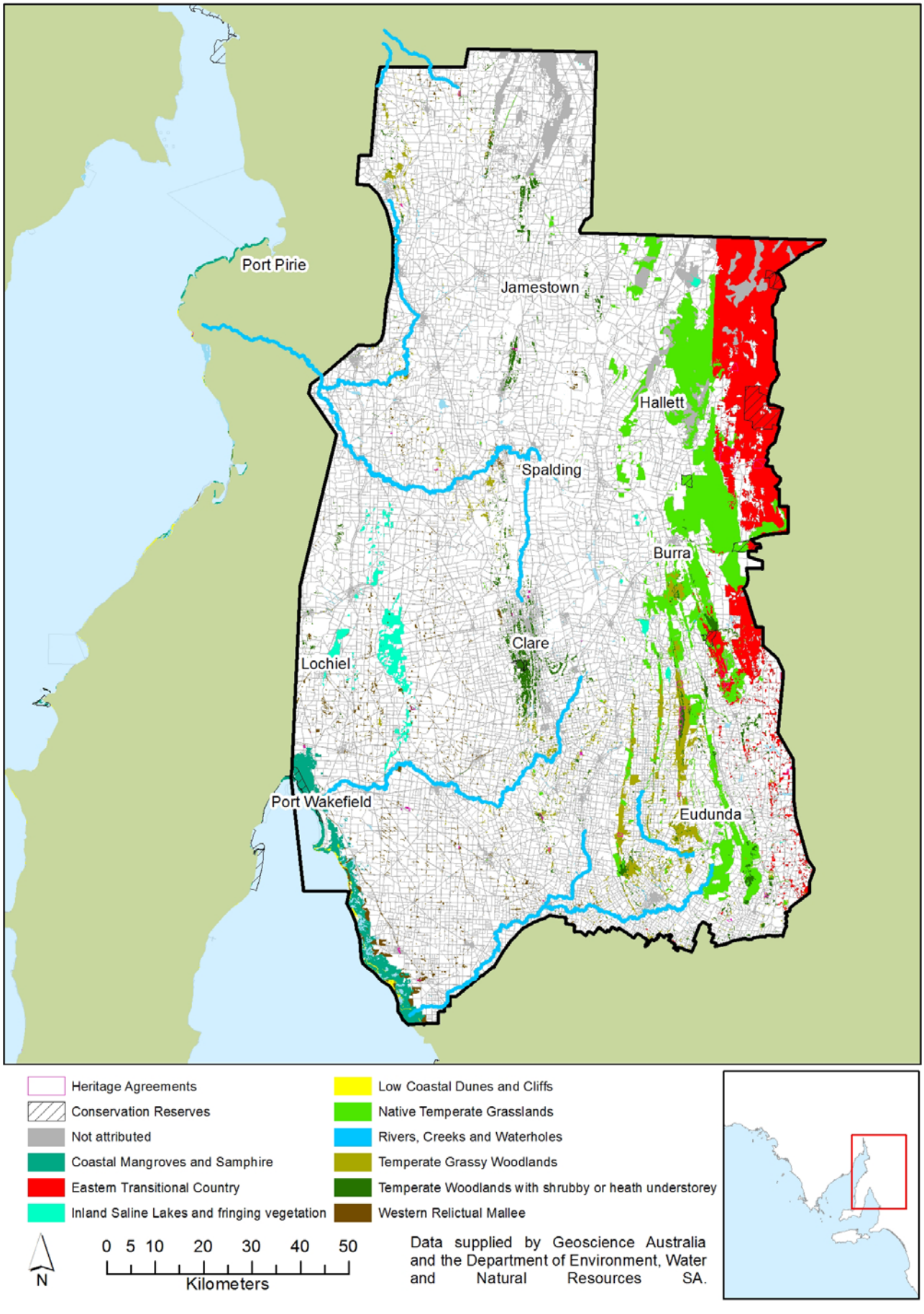
2.2.2 Low Coastal Dunes and Sandy Beaches

Low coastal dunes, cliffs and sandy beaches occur in narrow linear strips along the Mid North coastline and are dominated by common coastal plants such as Coast Daisy-bush (*Olearia axillaris*) and wattles (*Acacia ligulata, A. cupularis*). Important locations include Cape Elizabeth, Tiddy Widdy Beach, Pine Point and The Dunes. Coastal dunes and sandy beaches provide important habitat for shorebirds and reptiles, and low coastal cliffs provide nesting and roosting habitat for small raptors. On the western coastline, important habitat is provided for the state vulnerable Hooded Plover (*Thinornis rubricollis*). N.B. since the 2016 boundary redraw this asset has been significantly reduced from previous extent and is expected to be managed through strategies developed by the Yorke Peninsula CAP.

Nested Assets		AUS	SA
PLANT COMMUNITY	Coastal Dune Shrublands (*Olearia axillaris, Acacia ligulata, A. cupularis*)		
KEY HABITAT AREAS	Sandy beaches, low dunes and intertidal zone (sand flats)		
KEY HABITAT AREAS	Low energy coastal cliffs & rocky shorelines		
KEY HABITAT AREAS	Freshwater soaks in coastal dunes		
THREATENED BIRDS	Hooded Plover (*Thinornis rubricollis*)		V
THREATENED FLORA	Regionally threatened flora (e.g. *Scaevola angustata, Lepidosperma gladiatum, Myoporum parvifolium*)		
BIRD ASSEMBLAGE	Shorebirds and seabirds		
ASSEMBLAGE	Sea Lion Haul Out Areas Marine Turtles		
BIRD ASSEMBLAGE	Small Raptors		
KEY LOCATIONS			

2. Identification of Conservation Assets

Map 5: Conservation Assets of the Mid North Agricultural Districts CAP region



2. Identification of Conservation Assets

2.2.3 Rivers, Creeks and Waterholes

Ephemeral rivers and creeks occur through the region with the exception of the northern Yorke Peninsula. The main river catchments include the Broughton, Wakefield and Light, and the smaller creeks and tributaries of the far eastern ranges. River Red Gum (*Eucalyptus camaldulensis*) woodlands are the dominant riparian vegetation association, with Broughton Willow (*Acacia salicina*) woodlands and Lignum (*Muehlenbeckia florulenta*) shrublands also present along some water courses. Important habitat is provided for waterbirds, fish, frogs, and aquatic invertebrates. Bats, Brushtail Possums and woodland birds also occur within the riparian woodlands.

Nested Assets		AUS	SA
PLANT COMMUNITY	Red Gum (*Eucalyptus camaldulensis*) Woodlands		
PLANT COMMUNITY	Broughton Willow (*Acacia salicina*) woodlands		
PLANT COMMUNITY	Aquatic vegetation (*Phragmites, Typha, Schoenoplectus, Cyperus, Carex*)		
PLANT COMMUNITY	Lignum (*Muehlenbeckia florulenta*) shrublands		
PLANT COMMUNITY	Short-leaf Honey-myrtle (*Melaleuca brevifolia*) shrublands		
MAMMAL ASSEMBLAGE	Bats, Brushtail Possums, Water Rats?		
BIRD ASSEMBLAGE	Water birds (Herons, Ducks, Cormorants, Reed Warbler), Woodland Birds, Raptors		
FISH ASSEMBLAGE	Blue spot Goby, Mountain Galaxia, Tandanus Catfish, Hardyhead, Congolli, Mullet		
FROG ASSEMBLAGE	Common Froglet, Eastern Banjo Frog, Spotted Grass Frog, Brown Tree Frog, Painted Frog, Bibrons Toadlet		
INVERTEBRATES	Yabbies, insects, larvae, worms, crustaceans (240 species recorded)		
	Turtles / tortoises		
THREATENED FLORA	Spalding Blown Grass (*Lachnagrostis limitanea*)	EN	E
KEY HABITAT AREAS	Permanent waterholes, base-flow, freshwater springs, gorges, cliffs, rocky outcrops		
KEY LOCATIONS	Broughton, Wakefield, Light Rivers and Tributaries. Eastern Ranges creeks inc. Burra Catchment		

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2.2.4 Inland Terminal Wetlands / Saline Lakes

Inland terminal wetlands and saline lakes are found throughout the mid north agricultural districts region, with 7 distinct permanently wet systems identified; Bumbunga and Diamond Lakes, the Boucaut System, Porter, Apoinga and Hiles Lagoons. These wetlands and lakes are important sites for many bird species (resident and migratory) as well as supporting an array of invertebrates. The assemblage of species between any two years and any two areas is highly variable. Fringing vegetation includes low shrublands of Samphire (*Sarcocornia* spp. And *Tecticornia* spp.), Nitre Bush (*Nitraria billardierei*) and/or Chenopods (*Atriplex* spp. and *Maireana* spp.)

Nested Assets		AUS	SA
PLANT COMMUNITY	Samphire (*Sarcocornia* spp. and *Tecticornia* spp.) Low Shrublands		
PLANT COMMUNITY	Nitrebush (*Nitraria billardierei*), Saltbush (*Atriplex* spp.) and Bluebush (*Maireana* spp.) Shrublands		
PLANT COMMUNITY	Reeds , Rushes and Lignum (associated with freshwater springs)		
THREATENED FLORA	Creeping Boobialla (*Myoporum parvifolium*), Rough-beard Grass (*Echinopogon ovatus*), Small Nut-heads (*Haegiela tatei*) Hoary Rush (*Juncus radula*)		 R V
FISH ASSEMBLAGE	TBC		
INVERTEBRATES	Native Brine Shrimp (*Parartemia* spp.) and Yabbies (*Cherax destructor*)		
THREATENED FAUNA	Banded Stilt (*Cladorhynchus leucocephalus*) Blue-billed Duck (*Oxyura australis*), Blue Bonnet (*Northiella haematogaster*) Magpie Goose (*Anseranas semipalmata*) Yellow-throated Miner (*Manorina flavigula*)	 ssp	V ssp E ssp
BIRD ASSEMBLAGE	Water birds and migratory waders (Swan, Avocet, Geese, Swamp Hen, Stilt, Ducks, Ibis) Shrubland species (Chat, Thornbill, Wren, Robin)		
REPTILE ASSEMBLAGE	Shinglebacks and Skinks		
GEOGRAPHIC FEATURES	Freshwater Springs, Salt Lakes (Diamond Lakes, Bumbunga Lakes, Boucaut System),		

and KEY LOCATIONS	Fresher Lakes (Porters Lagoon, Apoinga Lagoon, Hiles Lagoon)		

2. Identification of Conservation Assets

2.2.5 Temperate Native Grasslands

Temperate native grasslands were once a dominant vegetation association in the region but are now mainly confined to non-arable hills and ranges in the east. The grasslands are dominated by Iron-grass (*Lomandra spp*.), Spear-grass (*Austrostipa spp*.), Wallaby-grass (*Austrodanthonia spp*.), Kangaroo grass (*Themeda triandra*), Spinifex (*Triodia spp*.) and sedges. These areas support a number of threatened ecological communities and species including the nationally endangered Iron-grass Grasslands (*Lomandra spp*.) and Pygmy Blue-tongue Lizard (*Tiliqua adelaidensis)*.

Nested Assets		AUS	SA
PLANT COMMUNITY	Iron-grass (*Lomandra spp*.) Grasslands	EN	
PLANT COMMUNITY	Wallaby-grass, Spear-grass Grasslands, Kangaroo Grass Grasslands		
PLANT COMMUNITY	Black-grass (*Gahnia lanigera*), *Lepidosperma viscidum* Sedgelands		
PLANT COMMUNITY	Spinifex (*Triodia spp*.) hummock grassland		
MAMMAL ASSEMBLAGE	Western Grey Kangaroo, Euro, Echidna, Dunnarts		
BIRD ASSEMBLAGE	Raptors (Back-shouldered Kite, Black Falcon, Swamp Harrier), Common Grassland Birds (Richards Pipit, Curlew, Quail, Songlarks)		
REPTILE ASSEMBLAGE	Skinks, Worm-lizard, Whip Snakes		
INVERTEBRATES	White spot Sedge Skipper, Spiders		
THREATENED BIRDS	Plains-wanderer (*Pedionomus torquatus*) Australian Bustard (*Ardeotis australis*)	VU	E V
THREATENED REPTILES	Pygmy Blue-tongue Lizard (*Tiliqua adelaidensis)*	EN	E
THREATENED PLANTS	Trailing Hop-bush (*Dodonaea procumbens*) Small Scurf-pea (*Cullen parvum*), Behr's Swainson-pea (*Swainsona behriana*)	VU	V V
KEY LOCATIONS	Eudunda to Peterborough, Burra Hills Range (west of Barrier Highway), Mokota CP, Gumbowie, East of Tarlee, Pekina, Hummocks, Eudunda, MEC Stewardship properties		

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2.2.6 Temperate Grassy Woodlands

Temperate grassy woodlands occur in ranges of moderate to higher rainfall in the east of the region. Dominant overstorey tree species include Drooping Sheoak (*Allocasuarina verticillata*), Peppermint Box (*Eucalyptus odorata*), Blue Gum (*Eucalyptus leucoxylon*) and Grey Box (E*ucalyptus microcarpa*). The open understorey is dominated by grasses, sedges, herbs and small chenopods with scattered shrubs such Sweet Bursaria (*Bursaria spinosa*) also present. These areas support declining woodland bird species, nationally threatened plants s and the nationally endangered Peppermint Box Grassy woodlands.

Nested Assets		AUS	SA
PLANT COMMUNITY	Peppermint Box (*Eucalyptus odorata*) Grassy Woodlands	EN	
PLANT COMMUNITY	Drooping Sheoak (*Allocasuarina verticillata*) Grassy Woodlands		
PLANT COMMUNITY	Blue Gum (*Eucalyptus leucoxylon*) Grassy Woodlands		
PLANT COMMUNITY	Mallee Box (*Eucalyptus porosa*), Native Pine (*Callitris gracilis*) Grassy woodland		
PLANT COMMUNITY	Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands		
PLANT COMMUNITY	Broad-leaf Box (*Eucalyptus behriana*) Grassy Woodlands		
MAMMAL ASSEMBLAGE	Brushtail Possums, Western Grey Kangaroos, Bats, Antechinus, Common Dunnart		
BIRD ASSEMBLAGE	Woodland birds (Diamond Firetails, Brown Treecreeper, White Wing Choughs, Apostle Birds, Owls), Raptors (Wedge-tailed Eagles, Peregrine Falcons)		
REPTILE ASSEMBLAGE	Geckos, Skinks, Goulds Sand Goanna		
THREATENED FLORA	White Beauty Spider-orchid (*Caladenia argocalla*) Osborn's Eyebright (*Euphrasia collina ssp. osrbornii*) Silver Daisy Bush (*Olearia pannosa*) Large-flower Groundsel (*Senecio megaglossus*)	EN EN VU VU	E E V E
KEY HABITAT FEATURES	Mosaic of remnant paddock trees, open agricultural lands, grassy woodlands and associated shrublands		
KEY LOCATIONS	Auburn, Spring Gully CP, Hallet, Tarcowie, Tarlee, Clare, Caroona Creek, Kapunda, Road Reserves,		

	Disused Rail corridors, H.As, Council Reserves, MEC stewardship properties

2. Identification of Conservation Assets

2.2.7 Temperate Woodlands with a Shrubby or Heath Understorey

Temperate woodlands with a shrubby or heath understorey are restricted to moderate to higher rainfall ranges in the east of the region. These woodlands are dominated by similar overstorey tree species as grassy woodlands, with the exception of Long-leaf Box (*Eucalyptus macrorhyncha*) which occurs almost entirely with a heath dominated understorey. Common understorey plants include Rock Grass-tree (*Xanthorrhoea quadrangulata*), Myrtle Wattle (*Acacia myrtifolia*) and Native Cherry (*Exocarpos cupressiformis*). These areas provide important habitat for woodland birds such as the Eastern Spinebill, Crested Shrike-tit and Wrens.

Nested Assets		AUS	SA
PLANT COMMUNITY	Blue Gum (*Eucalyptus leucoxylon*) Shrubby Woodland		
PLANT COMMUNITY	Drooping Sheoak (*Allocasuarina verticillata*) Shrubby Woodland		
PLANT COMMUNITY	Long-leaf Box (*Eucalyptus goniocalyx*) Heathy Woodland		
PLANT COMMUNITY	Red Stringybark (*Eucalyptus macrorhyncha*) Heathy Woodland		
PLANT COMMUNITY	Peppermint Box (*Eucalyptus odorata*) Shrubby Woodlands		
PLANT COMMUNITY	Mallee Box (*Eucalyptus porosa*) Shrubby Woodlands		
PLANT COMMUNITY	Sub-alpine Snow Gum Woodlands & Orchids - Mt Bryan		
MAMMAL ASSEMBLAGE	Brushtail Possums, Bats, Kangaroos, Echidnas, Dunnarts		
BIRD ASSEMBLAGE	Heathy Woodland Birds (Bassing Thrush, Crested Shrike-tit, Wrens, Eastern Spinebill, Owls), Raptors (Sparrow hawk, Goshawk)		
REPTILE ASSEMBLAGE	Lace Monitors, Rosenberg Goannas, Geckos		
THREATENED FLORA	Orchids Silver Daisy Bush (*Olearia pannosa*)	 VU	 V
KEY LOCATIONS	Clare, Spring Gully, Tothill Ranges, Mount Bryan		

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2.2.8 Western Relictual Mallee

Western relictual mallee is the heavily fragmented vegetation found over the plains and low hills to the west of the Clare Ranges. This community has been preferentially cleared for agriculture leaving few large remnants. Roadsides, railway lines and stock routes preserve most of the extant vegetation, with Clements Gap Conservation Park being the largest protected site. Common vegetation associations include Ridge-fruited Mallee (*Eucalyptus incrassata*) on sandy soils, Yorrell (*Eucalyptus gracilis*) and Red Mallee (E. oleosa) mallee associated with limestone and Mallee Box (*Eucalyptus porosa*) and Native Pine (*Callitris gracilis*) Mallee Woodland on more fertile soils or higher rainfall areas.

Nested Assets		AUS	SA
PLANT COMMUNITY	Ridge-fruited Mallee (*Eucalyptus incrassata*) shrubby sand mallee		
PLANT COMMUNITY	Yorrell (*Eucalyptus gracilis*) and Red Mallee (*E. oleosa*) mallee with an open understorey		
PLANT COMMUNITY	Mallee Box (*Eucalyptus porosa*) and Native Pine (*Callitris gracilis*) Mallee Woodland		
MAMMAL ASSEMBLAGE	Bats, Short-beaked Echidna (*Tachyglossus aculeatus*) and Southern Hairy Nosed Wombats (*Lasiorhinus latifrons*)		
BIRD ASSEMBLAGE	Declining Woodland Birds (Hooded Robins, Jacky Winters, Brush Bronzewing Pigeon and Ringneck Parrots		
REPTILE ASSEMBLAGE	Sand (Gould's) Goanna		
INVERTEBRATES	Native Bees		
THREATENED FLORA	14 Endangered Orchids Resin Wattle (*Acacia rhetinocarpa*) Hop Bush (*Dodonaea subglandulifera*) Silver Daisy-bush (*Olearia pannosa* ssp. *pannosa*) Glandular Phebalium (*Phebalium glandulosum*)	 V E V	 V E V E
KEY LOCATIONS	Defence Lands (Port Wakefield Proof and Experimental Range), Hummocks, Middle Range – Nantawarra.		

KEY LOCATIONS	Roadsides, Railway lines, Travelling Stock Routes and Cemeteries

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2. Identification of Conservation Assets

2.2.9 Eastern Mallee and Transitional Country

The eastern mallee and transitional country occupies the eastern edge of the Mid North Agricultural Districts region, including highly elevated ranges and expansive arid plains. The country is characterised by arid vegetation communities including Pearl Bluebush (*Maireana sedifolia*) Low Shrublands, Black Oak (*Casuarina pauper*) Woodlands, False Sandalwood (*Myoporum platycarpum*) Woodlands and temperate Mallee Woodlands. Prior to 2016 this asset was split to distinguish the Mallee woodlands, however, in light of future climate change driven transition of these vegetation associations these two assets were merged to be viewed as a continuum of a single asset.

These systems are generally intact (not fragmented) and are subject to grazing. These areas provide important habitat for reptiles, woodland birds and raptors, and support nationally threatened plant species such as Large-flower Groundsel (*Senecio megaglossus*) and Silver Daisy-bush (*Olearia pannosa*). Important areas include Caroona Creek, Pandappa and Red Banks Conservation Parks, Halelujah Hills, Worlds End, and Hopkins and Burra Creeks.

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Nested Assets		AUS	SA
PLANT COMMUNITY	Arid Communities: Pearl Bluebush (*Maireana sedifolia*) Shrubland, Black Oak (*Casuarina pauper*) Woodland, False Sandalwood (*Myoporum platycarpum*) Woodland		
PLANT COMMUNITY	Fringing Vegetation Communities (Mallee and Grasslands)		
PLANT COMMUNITY	River Red Gum (*Eucalyptus camaldulensis*) along watercourses and washouts		
PLANT COMMUNITY	Yorrell (*Eucalyptus gracilis*), Red Mallee (*E. oleosa*) mallee		
PLANT COMMUNITY	Gilja (*Eucalyptus brachycalyx*), Beaked Red Mallee (*E. socialis*), White Mallee (*E. dumosa*) mallee		
PLANT COMMUNITY	Peppermint Box (*Eucalyptus odorata*) mallee form Mallee Box (*Eucalyptus porosa*) mallee form		
THREATENED FLORA	Hairy-pod Wattle (Acacia glandulicaropa), Large-flower Groundsel (*Senecio megaglossus*) White Beauty Spider Orchid (*Caladenia argocalla*), Slender Bell-fruit (*Codonocarpus pyramidalis*), *Dodonaea subglandulifera* Silver Daisy-bush (*Olearia pannosa*) Mt. Bryan Greenhood (*Pterostylis descpectans*)	VU EN VU	E E V E
MAMMAL ASSEMBLAGE	Common Brushtail Possums (*Trichosurus vulpecula*, SA:R) Southern Hairy-nosed Wombats (*Lasiorhinus latifrons*), Short-beaked Echidnas (Tachyglossus aculeatus), Bats, Red Kangaroo (*Macropus rufus*), Euro (*Macropus robustus*), Bolam's Mouse (*Pseudomys bolami*), Fat-tailed Dunnart (*Sminthopsis crassicaudata*), Common Dunnart (*Sminthopsis murina*).		
BIRD ASSEMBLAGE	Raptors (Wedge-tailed Eagle (*Aquila audax*), Kites, Little Eagle (*Hieraaetus morphnoides*), Falcons), Ground nesting / dwelling birds (Australian Bustard (*Ardeotis australis,* SA:V), Plains Wanderer (*Pedionomus torquatus*, AUS: VU, SA:V), Quails) and White-winged Chough (*Corcorax melanorhamphos,* SA:R), Major Mitchells Cockatoo(*Cacatua leadbeateri*, SA:R) and Rainbow Bee-eaters (*Merops ornatus*, SA:R), (Declining Birds: Diamond Firetail, Hooded Robin, Brown Treecreeper, Choughs)		
REPTILE ASSEMBLAGE	Skinks, Goannas, Carpet Python (*Morelia spilota*)		
KEY LOCATIONS	Hills / Ranges, Gorges, Valleys, Creeks, Flood-out Zones (extending 15km onto arid plains). Caroona, Halelujah Hills, Worlds End, Pandappa, Red Banks, Hopkins & Burra Creeks, Sugar Loaf Hill		

2. Identification of Conservation Assets

2.2.10 Large Raptor Species (Declining/Threatened)

Large raptors (Wedge-tailed Eagle (*Aquila audax*), Little Eagle (*Hieraaetus morphnoides*) in the Mid North Agricultural District have been impacted by extended periods of persecution associated with the belief that they prey extensively on lambs, resulting in severe declines in population. These species are also impacted by nest disturbance during breeding periods resulting in low levels of fledging success and further population decline.

Nested Assets		AUS	SA
BIRD SPECIES	Wedge-tailed Eagle (*Aquila audax*)		
BIRD SPECIES	Little Eagle (*Hieraaetus morphnoides*)		
BIRD SPECIES	Whistling Kite (*Haliastur sphenurus)*		
KEY LOCATIONS	Ridge tops, gorges, large paddock trees, coastal cliffs, eastern mallee and transitional country		

2.2.11 Endemic, Nationally Threatened Flora

Two locally endemic nationally threatened species, Spiny Everlasting (*Acanthocladium dockeri*) and Spalding Blown-grass (*Lachnagrostis limitanea*), have been grouped together as an asset as their ongoing survival in the wild is heavily reliant on active conservation management. Both species are known from only a handful of extant wild populations, mostly road and rail reserves, but each have been subject to translocation plantings in the region.

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Nested Assets		AUS	SA
FLORA SPECIES	Spiny Everlasting (*Acanthocladium dockeri*)	X	E
FLORA SPECIES	Spalding Blown-grass (*Lachnagrostis limitanea*)	E	E
KEY LOCATIONS	Roadsides, Road Reserves, Rail Reserves		

3. Viability of Conservation Assets

3.1. Methodology for Assessing the Viability of Conservation Assets

The second step in the conservation action planning process is an assessment of the viability (or overall health) of the conservation assets. This is a four step process.

Step 1 Identification of a small number (3 - 5) of key ecological attributes for each conservation asset.
Key ecological attributes represent the critical factors required for the long term viability of the conservation assets. These factors relate to the size, condition and landscape context of the assets and include attributes such as hydrological regimes, fire regimes, water quality, vegetation condition, fauna diversity, total remnant area and the size and configuration of patches (refer table 3).

Step 2 Identification of appropriate monitoring indicators for each key ecological attribute.
Indicators are easily measurable factors closely related to the status of the key ecological attributes. For example, the frequency, duration and timing of flood events may be an appropriate monitoring indicator for hydrological regimes. Similarly, the presence or absence of a particular habitat-sensitive species may be an appropriate indicator for species diversity or habitat condition (refer table 6).

Step 3 Development of criteria for rating the current status of each indicator.
The development of criteria for rating the status of each indicator is an iterative process that typically starts as a simplified qualitative assessment (e.g. lots, some, few) and is progressively developed into more refined, numeric value ranges (e.g. 1,000 megalitres of water for 3 months during late spring).

Step 4 Ranking the current status of each indicator to determine the overall viability of the conservation assets.
The final step in assessing the viability of the conservation assets is to rank the current status of each indicator based on the criteria for poor, fair, good and very good (described below). These individual ratings are rolled up in the Conservation Action Planning software to provide an assessment of the overall viability for each asset (refer table 4).

POOR - allowing the factor to remain in this condition for an extended period of time will make restoration or preventing extirpation practically impossible.
FAIR – the factor is outside its range of acceptable variation and requires human intervention. If unchecked, the target will be vulnerable to serious degradation.
GOOD – the factor is functioning within its range of acceptable variation; it may require some human intervention.
VERY GOOD – the factor is functioning at an ecologically desirable status, and requires little human intervention.

Source: adapted from Low (2003)

3.2. Viability of the Conservation Assets on the Mid North Agricultural Districts

The overall viability of the conservation assets, as assessed by the planning team, is displayed in Table 5. Viability was determined by identifying and rating the current status of the key ecological attributes of each conservation asset based on considerations of size, condition and landscape context (refer Table 4). These assessments were supported by existing monitoring data for some key ecological attributes and in other cases were based purely on local expert opinion. The absence of quantitative data for assessing the viability of many key ecological attributes highlights a gap in the existing biodiversity monitoring program and an area for future development (refer section 7).

Table 5 shows that **coastal mangrove and samphire communities** were the only conservation asset assessed to be of good overall viability. The remainder of the conservation assets were assessed to be of fair overall viability with the exception of grassy ecosystems (grasslands and grassy woodlands) and low coastal dunes and cliffs which were assessed to be poor.

3. Viability of Conservation Assets

Table 4: Key Ecological Attributes of the Conservation Assets

Conservation Asset	Landscape Context Key Ecological Attributes	Condition Key Ecological Attributes	Size Key Ecological Attributes
1. Coastal Mangroves and Samphire	● connectivity to adjacent vegetation communities ● hydrological regime	● fauna diversity / abundance ● flora diversity / composition ● water quality	● total area remaining
2. Low Coastal Dunes and Cliffs	● **connectivity to adjacent vegetation communities** ● **dune / cliff formation**	● fauna diversity / abundance ● flora diversity / composition	● **total area remaining**
3. Rivers, Creeks & waterholes	● **connectivity to adjacent vegetation communities** ● aquatic connectivity ● hydrological regime	● bank stability/ structure ● frog diversity / abundance ● **fish diversity / abundance** ● macro-invertebrate health ● aquatic vegetation condition ● riparian vegetation condition ● **in stream habitat complexity** ● water quality	
4. Inland Wetlands / Salt Lakes	● **connectivity to adjacent vegetation communities** ● hydrological regime	● **fauna diversity / abundance** ● **flora diversity / composition** ● soil / salt crust (cynobact mats) ● water quality	
5. Native Temperate Grasslands	● connectivity among communities and ecosystems	● **flora diversity / composition** ● soil crust / inter-tussock spaces	● **total area remaining**
6. Temperate Grassy Woodlands	● **connectivity among communities and ecosystems**	● fauna diversity / abundance ● flora diversity / composition ● key habitat components (tree hollows, rocks, fallen timber)	● **total area remaining**
7. Temperate Woodlands with shrubby or heathy understorey	● connectivity among communities and ecosystems	● fauna diversity / abundance ● flora diversity / composition ● key habitat components (tree hollows, rocks, fallen timber)	● total area remaining
8. Western Relictual Mallee	● **connectivity among communities and ecosystems**	● fauna diversity / abundance ● flora diversity / composition ● key habitat components	● **total area remaining**
9. Eastern Mallee and Transitional Country*	● connectivity among communities and ecosystems	● fauna diversity / abundance ● **flora diversity / composition** ● key habitat components ● soil crust / cover	● total area remaining
10. Declining Raptor Species	● Availability of Food Sources ● Availability of Nesting Sites	● Health of Population and Genetic Diversity	● Number of Breeding Pairs ● Population size ● Reproduction Success

Note: Status of Key Ecological Attributes - **Poor**, **Fair**, **Good**
* Interim scores from merged assets

Table 5: Viability Ratings of the Conservation Assets

	Conservation Asset	Landscape Context	Condition	Size	Overall Viability
1	Coastal Mangroves and Samphire	Fair	Good	Good	**Good**
2	Low Coastal Dunes and Cliffs	Poor	Fair	Poor	**Poor**
3	Rivers, creeks & waterholes	Fair	Poor	-	**Fair**
4	Inland Terminal Wetlands / Salt Lakes	Poor	Fair	-	**Fair**
5	Native Temperate Grasslands	Fair	Poor	Poor	**Poor**
6	Temperate Grassy Woodlands	Poor	Fair	Poor	**Poor**
7	Temperate Woodlands with shrubby or heath understorey	Fair	Fair	Fair	**Fair**
8	Western Relictual Mallee	Poor	Fair	Poor	**Poor**
9	Eastern Mallee and Transitional Country	Good	Poor	Good	**Fair**
10	Large Declining Raptor Species	Fair	Good	Fair	**Fair**
Overall Landscape Viability					**Fair**

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4. Threats to Conservation Assets

4.1. Methodology for Assessing Threats

The third step in the conservation action planning process involves the identification of high priority threats to the conservation assets. This is a two step process.

The first step involves an assessment of the severity of the key stresses to the conservation assets. Stresses are inversely related to the key ecological attributes (refer section 3) and may include altered fire regimes, altered hydrological regimes, altered species diversity, reduced water quality, habitat fragmentation, etc. Stresses are ranked from very high to low based on:

● **severity of damage where it occurs** i.e. what level of damage can reasonably be expected within 10 years under current circumstances (Very High - destroys or eliminates the conservation asset, High - seriously degrades, Medium - moderately degrades, Low - slightly impairs);
● **scope of the damage** i.e. what is the geographic scope of impact on the conservation asset that can be reasonably expected within 10 years under current circumstances (Very High - very widespread, High - widespread, Medium - localised, Low - very localised).

The second step in the process involves the identification and ranking of the source of stresses (i.e. the direct threats). For example, the source of stress for reduced species diversity may be total grazing pressure or the source of stress for altered hydrological regimes may be river extraction. Sources of stress are ranked from very high to low based on:

● **contribution of the source to the stress** i.e. expected contribution of the source, acting alone, to the full expression of the stress under current circumstances (i.e. Very High - very large contributor, High - large contributor, Medium - moderate contributor, Low - small contributor).
● **irreversibility of the stress caused by the source** (Very High - not reversible, High - reversible, but not practically affordable, Medium - reversible with reasonable commitment of resources, Low - easily reversible at low cost).

Once the stresses and sources are ranked according to the above criteria, a summary rating for each threat is generated by the Conservation Action Planning (CAP) software. This results in the threats summary table (refer table 5) that allocates a ranking for each threat from very high to low, both in terms of the threat to the individual conservation assets and to the collective impact of the threat across the landscape.

Source: adapted from (Low 2003)

4.2. Threats to the Conservation Assets in the Mid North Agricultural Districts

The key threats to the conservation assets of the Mid North Agricultural Districts, as assessed by participants in the CAP workshops, are displayed in Table 6. The table shows that inappropriate stock grazing, environmental weeds, loss of adjacent vegetation buffers, habitat loss and fragmentation, feral herbivores and the potential impacts of climate change impacts were assessed as the highest ranked threats to the conservation assets across the region. The most highly threatened assets were assessed to be **rivers, creeks and waterholes** and **low coastal dunes and cliffs**.

4. Threats to Conservation Assets

Table 6: Medium to High Ranked Threats to the Conservation Assets

Threats Across Targets	Coastal Mangroves & Samphire	Low Coastal Dunes and Cliffs	Rivers, Creeks & waterhole	Inland Wetlands / Saline Lakes	Temperate Native Grasslands	Temperate Grassy Woodlands	Woodlands - shrubby or heath u/storey	Western Relictual Mallee	Eastern Mallee and Transitional Country*	Large Declining Raptors	Overall Threat Rank
Climate Change (seasonal variation, sea level rise)	Very High	Very High	Very High		High	High	Med	Med	High		Very High
Inappropriate stock grazing and access	Low	Med	High	High	High	High	Med	Med	High		High
Environmental Weeds	Low	Med	High	Low	High	High	Med	High	High		High
Introduced Herbivores (rabbits, deer, goats, mice)		Med	Med	High	Med	Med	Med	High	High		High
Feral Carnivores (fox, cat, rats)	Med	High	Low	High	Med	Med	Low	Med	High	Low	High
Loss of adjacent native vegetation	Med	High	High	High			Med				High
Habitat Fragmentation (from historical clearance)		High			Med	High		High	Low	Low	High
Infrastructure development (windfarms, roads, mining)					High	Med		Low	Med	High	High
Unmanaged Recreational access (off-road 4WDs, people, camps)	Med	High	Med	Med		Low		Low	Low	Med	Med
Housing & township expansion (inc industry)	Med	High				Med	Low		Low		Med
Introduced fish (Trout, Goldfish, Mosquito Fish, Brine Shrimp)			High	Low							Med
Water harvesting & extraction (dams, reservoirs, etc)			High						Low		Med
Physical barriers for species migration (weirs, roads)			High								Med
Adjacent agricultural practices (spray drift, nutrients, run-off, pastures)	Low	Med	Med	Med	Low		Low	Med			Med
Mining (salt, gypsum)	Med	Low		Med							Med
Inappropriate Road/Rail Reserve Management					Med			Med			Med
Marina development	Med	Med									Med
Threat Status for Targets and Project	High	Very High	Very High	High	High	High	Med	High	High	Med	Very High

*Interim scores from merged assets.

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5. Setting Conservation Objectives

5.1. Methodology for Setting Conservation Objectives

The fourth step in the conservation action planning process involves setting measurable objectives that, if achieved, would ensure the long term conservation of the assets. In particular, objectives are developed in line with the S.M.A.R.T principles (i.e. specific, measurable, attainable, realistic and time-bound) and are aimed at addressing high priority threats or achieving improvements in size, condition and landscape context attributes. Some useful considerations for setting conservation objectives relating to size, condition and landscape context are described below:

Size: Species-area curves provide useful guidelines for setting goals relating to the amount of habitat required for conservation. A variety of studies indicate that, as a general rule, retaining 30-40 percent of pre-European extent will conserve 80-90 percent of species associated with a particular habitat type (Dobson 1996, Nachlinger et al. 2001). As a general rule, a minimum 30-40 percent area target may be applied for conservation assets that have not been subject to broad scale clearance. For highly depleted or restricted conservation assets this may be raised to 50 percent.

Condition: Condition attributes such as flora and fauna diversity / composition and water quality are often poorly recorded at the landscape scale but are integral to the concept of functional landscapes. Maintaining ecological integrity over long time periods requires condition attributes functioning within their natural range of variation over specified geographical areas and time periods. Historical condition benchmarks (i.e. pre-European), when available, provide a useful reference point for goal setting; however, caution should be applied due to the likely influence of climate change (Harris et al. 2006) and historical degradation (e.g. salinity). In some regions, benchmark conditions may be referenced to regional condition monitoring manuals (e.g. NCSSA Bushland Condition Monitoring)

Landscape Context: The spatial distribution of habitat "patches" and key disturbance events such as fire and hydrological regimes are critical to conservation at the landscape scale. Much of the theory relating to the spatial distribution of habitat is underpinned by metapopulation theory in which independent species populations may eventually go extinct due to the incremental impacts of wildfire, weeds, predation and population dynamics. The protection and management of existing populations, habitats and refugia, together with the restoration of terrestrial and aquatic processes is therefore critical to landscape conservation. Factors for goal setting relating to the spatial distribution of patches include the size, shape, number and distance between patches. Goals for fire and hydrological regimes should consider the timing, frequency, duration and extent.

5.2. Conservation Objectives for the Mid North Agricultural Districts

Based on the threat assessment for the medium and high ranked threats to the conservation assets of the Mid North Agricultural Districts (refer Table 6), 12 conservation objectives have been developed. Three additional foundational objectives are also presented below. Foundational objectives underpin the development and successful implementation of landscape-scale projects and address funding, community engagement and knowledge gaps.

5. Setting Conservation Objectives

FOUNDATIONAL OBJECTIVES

Objective 0.1: From 2012, attract sufficient annual funding and resources for the successful implementation of the Mid North Agricultural Districts conservation project.

Objective 0.2: By 2017, consolidate organisational partnerships and community support and participation in the Mid North Agricultural Districts conservation project.

Objective 0.3: By 2020, secure key ecological knowledge and fill data gaps to support the implementation of the Mid North Agricultural Districts conservation project.

COASTAL ASSETS

Objective 1: By 2020, maintain or enhance connectivity between high priority coastal habitats and terrestrial vegetation communities and adequately buffer priority coastal sites (threatened species, etc.) from incompatible land management practices and predicted sea-level rise.

RIVERS, CREEKS AND WATERHOLES ASSETS

Objective 2: By 2020, improve the long term viability of regionally significant, water-dependent ecosystems.

Objective 3: By 2030, critical threats to high priority river reaches are strategically managed and abated across all catchments to maintain and improve condition.

Objective 4: By 2030, maintain viable populations and suitable habitat for native fish species (Common Galaxias, Blue Spot Goby) in priority sub catchments (TBD).

GRASSY ECOSYSTEMS ASSETS

Objective 5: By 2030, improve native vegetation to 'good' across at least 15,000 hectares of native grasslands and grassy woodlands in priority areas.

Objective 6: By 2030, maintain and improve populations and diversity of priority native woodland birds (Apostlebird, Black -chinned Honeyeater, Brown Treecreeper, Crested Shrike-tit, Diamond Firetail, Hooded Robin, Jacky Winter, Painted Button-quail, Restless Flycatcher, Scarlet Robin, White-winged Chough).

Objective 7: By 2030, the impacts of climate change are mitigated by managing priority corridors for habitat connectivity, conservation genetics, and when necessary, assisted colonisation of species that are still unable to shift their ranges.

EASTERN MALLEE AND TRANSITIONAL COUNTRY ASSETS

Objective 8: By 2030, achieve 'good' vegetation condition (structure and function) across XX,000 hectares of high priority Eastern Transitional Country.

WESTERN RELICTUAL MALLEE ASSET

Objective 9: By 2030, maintain and improve viable populations of native flora and fauna associated with western relictual mallee in priority areas (i.e. where viable populations exist or other services are provided – connection, etc.)

INLAND SALINE LAKE ASSET

Objective 10: By 2030, maintain and improve the local ecosystem functions of inland saline lakes and provide a stepping stone for migratory/non-resident birds.

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5. Setting Conservation Objectives

LARGE RAPTOR SPECIES ASSET

Objective 11: By 2030, Maintain and improve aerial top predator populations and the important dispersal corridors through the region (i.e. ranges).

Objective 11a: By 2030, achieve appropriate distribution and long term sustainable populations of large raptor species (Wedge-tail Eagles, Little Eagle, Whistling Kites) across the Mid North landscape.

REGIONAL SCALE

Objective 12: By 2020, eradication (i.e. removal & on-going follow up) of outlying occurrences of priority environmental weeds and on-going reduction of core infestations to protect high value habitat (high quality areas, threatened species and communities) and prevent further spread.

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6. Conservation Strategies and Actions

6.1. Methodology for Developing and Prioritising Conservation Strategies

The fifth step in the conservation action planning process involves the identification of effective strategies and action steps to achieve the conservation objectives developed in Section 5. This is a three step process.

Step 1 Conduct a thorough situation analysis of the key factors related to the conservation objectives.
This includes consideration of the causal factors underlying particular threats and potential hurdles for enhancing the condition of conservation assets (e.g. social, cultural, economic and individual motivations). This can help pinpoint opportunities for intervention and guide decisions about which delivery mechanisms are best employed to achieve the conservation objectives (e.g. direct landholder targeting, use of volunteers or contractors, market based instruments, education programs, and legislative or policy changes).

Step 2 Brainstorm conservation strategies and action steps.
Conservation strategies and action steps are the broad courses of action required to achieve the conservation objectives. There are essentially three "pathways" for strategy development that should be considered for threat abatement objectives. These include:

- direct protection or management of land or water;
- influencing a key decision maker;
- addressing a key underlying factor.

Once the major strategies are identified, they may be broken down into smaller, more detailed action steps.

Step 3 Prioritise conservation strategies and action steps according to a cost-benefit and feasibility analysis.
Useful considerations for prioritising strategies and action steps include the relative conservation value of the asset (e.g. nationally threatened habitat type), its level of threat, the contribution of the strategy to meeting the conservation objective, the duration of the benefit achieved and the potential leverage of the action (e.g. high profile site that provides a catalyst for further action). Feasibility of implementation should also be considered including the total cost and time required to implement the strategy, the ease of land access and the degree to which a lead individual / institution exists to implement the strategy. It may be useful to initially prioritise a small number of conservation strategies that provide a mix of high benefit and high feasibility (i.e. low hanging fruit) actions. In particular the high feasibility actions ensures that the project can get some early 'runs on the board' to leverage investment into the more complex and costly strategies.

Use of Conceptual Models

Conceptual models are increasingly being used for strategy development in conservation planning. A conceptual model is a visual method (diagram) of representing a set of causal relationships between factors that are believed to impact on one or more of the conservation assets. A good model should explicitly link the conservation assets to the direct threats impacting them, the factors (i.e. indirect threats) influencing the direct threats, and the strategic activities proposed to mitigate those factors (WWF 2005).

The Miradi software program (www.miradi.org) can be used to develop conceptual models and fully supports the Conservation Action Planning (CAP) process. The software was developed by the Conservation Measures Partnership, a consortium of international NGO's (with major contributors including The Nature Conservancy and World Wide Fund for Nature) seeking to develop a common language and approach to the design, management and monitoring of conservation programs. It is recommended that conservation projects that have applied the CAP process investigate the use of the Miradi software program and conceptual models during the strategy development process.

6.2. Conservation Strategies and Action Steps for the Mid North Agricultural Districts

The following section presents the conservation strategies and action steps developed by participants in the CAP workshops to achieve the 3 foundational objectives and 11 conservation objectives identified in Section 5. A preliminary prioritisation process has been applied to the Mid North Agricultural Districts CAP. However, following redrafting of the objectives and strategies in 2016 this will need to be repeated.

6. Conservation Strategies and Actions

FOUNDATIONAL OBJECTIVES

Objective 0.1: **From 2012, attract sufficient annual funding and resources for the successful implementation of the Mid North Agricultural Districts conservation project.**

Strategy: Investment and Fund Raising
Priority: NOT ASSESSED

Objective 0.2: **By 2017, consolidate organisational partnerships and community support and participation in the Mid North Agricultural Districts conservation project.**

Strategy: Community Engagement and Organisational Partnerships
Priority: NOT ASSESSED

Objective 0.3: **By 2020, secure key ecological knowledge and fill data gaps to support the implementation of the Mid North Agricultural Districts conservation project.**

Strategy: Knowledge, Research and Monitoring
Priority: NOT ASSESSED

COASTAL ASSETS

Objective 1: **By 2020, maintain or enhance connectivity between high priority coastal habitats and terrestrial vegetation communities and adequately buffer priority coastal sites (threatened species, etc.) from incompatible land management practices and predicted sea-level rise.**

Strategy 1.1: Coastal Linkages and Revegetation Buffers to Conserve High Value Habitat
Priority: TBC

Strategy 1.2: Improved Planning and Approval Process for Developments (marinas, townships, industry, mines) in Sensitive Coastal Areas
Priority: MEDIUM

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RIVERS, CREEKS AND WATERHOLES ASSETS

Objective 2: **By 2020, improve the long term viability of regionally significant, water-dependent ecosystems.**

Strategy 2.1: Enhancement of Hydrological Regimes for Water-dependent Ecosystems in Priority Sub-catchments of the Broughton, Wakefield and Light River catchments and Eastern Ranges Creeks
Priority: HIGH

Objective 3: **By 2030, critical threats to high priority river reaches are strategically managed and abated across all catchments to maintain and improve condition.**

Strategy 3.1: Enhancement of high priority river reaches and associated wetlands by effectively managing stock grazing and weeds and establishment of revegetation buffers.
Priority: VERY HIGH

Strategy 3.2: Appropriate Feral Carnivore (Foxes and Cats) Control to Conserve Critical Weight Range Mammals and Ground-dwelling Fauna.

Priority: VERY HIGH
Strategy 3.3: Landscape-scale Rabbit Control to Improve Vegetation Condition in Priority Areas
Priority: HIGH

Objective 4: **By 2030, maintain viable populations and suitable habitat for native fish species (Common Galaxias, Blue Spot Goby) in priority sub catchments (TBD).**

Strategy 4.1: Enhancement of In-stream Habitat and Native Fish/Fauna Populations in Key River Reaches through the Control of Introduced Fish and Restoration of Instream Habitat (rocks, snags, etc.).
Priority: MEDIUM

GRASSY ECOSYSTEMS ASSETS

Objective 5: **By 2030, improve native vegetation to 'good' across at least 15,000 hectares of native grasslands and grassy woodlands in priority areas.**

Strategy 5.1: Sustainable Stock Grazing Regimes to Restore Native Grasslands and Grassy Woodlands
Priority: VERY HIGH

Strategy 5.2: Landscape-scale Rabbit Control to Improve Vegetation Condition in Priority Areas
Priority: HIGH

Objective 6: **By 2030, maintain and improve populations and diversity of priority native woodland birds (Apostlebird, Black -chinned Honeyeater, Brown Treecreeper, Crested Shrike-tit, Diamond Firetail, Hooded Robin, Jacky Winter, Painted Button-quail, Restless Flycatcher, Scarlet Robin, White-winged Chough).**

Strategy 6.1: Strategic Restoration of Grassy Woodland Buffers & Linkages for Declining Woodland Birds
Priority: VERY HIGH

Strategy 6.2: New Developments and Associated Clearance of Grassy Ecosystems (e.g. For Roads, Residential Development, Mines, Wind Farms) are Restricted to Environmentally Appropriate Designs and Locations.
Priority: MEDIUM

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Objective 7: **By 2030, the impacts of climate change are mitigated by managing priority corridors for habitat connectivity, conservation genetics, and when necessary, assisted colonisation of species that are still unable to shift their ranges.**

Strategy 7.1: Manage corridors for appropriate structural diversity which are resilient to the impacts of climate change.
Priority: TBC

Strategy 7.2: Assisted migration of species which are unable to effectively shift their ranges without intervention.
Priority: TBC

EASTERN MALLEE AND TRANSITIONAL COUNTRY ASSETS

Objective 8: **By 2030, achieve 'good' vegetation condition (structure and function) across XX,000 hectares of high priority Eastern Mallee and Transitional Country.**

Strategy 8.1: Integrated Landscape-scale Management of Total Grazing Pressure (Deer, Goats, Kangaroos, Rabbits and Stock) Foundational Work
Priority: VERY HIGH

Strategy 8.2: Coordinated Goat Control to Conserve High Priority Areas of Eastern Mallee and Transitional Country
Priority: VERY HIGH

Strategy 8.3: Management of Stock Grazing to Conserve High Priority Areas of Eastern Mallee and Transitional Country
Priority: VERY HIGH

Strategy 8.4: Management of Overabundant Kangaroos (Euros, Western Grey Kangaroos and Red Kangaroos) in High Priority Areas of Eastern Mallee and Transitional Country
Priority: HIGH

Strategy 8.5: Landscape-scale Rabbit Control to Improve Vegetation Condition in Priority Areas
Priority: HIGH

WESTERN RELICTUAL MALLEE ASSET

Objective 9: **By 2030, maintain and improve viable populations of native flora and fauna associated with western relictual mallee in priority areas (i.e. where viable populations exist or other services are provided – connection, etc.)**

Strategy 9.1: Vegetation Buffers and Linkages to Protect High Priority Western Relictual Mallee Sites
Priority: MEDIUM

Strategy 9.2: Appropriate Feral Carnivore (Foxes and Cats) Control to Conserve Critical Weight Range Mammals and Ground-dwelling Fauna
Priority: VERY HIGH

Strategy 9.3: Landscape-scale Rabbit Control to Improve Vegetation Condition in Priority Areas
Priority: HIGH

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INLAND SALINE LAKE ASSET

Objective 10: **By 2030, maintain and improve the local ecosystem functions of inland saline lakes and provide a stepping stone for migratory/non-resident birds.**

Strategy 10.1: Vegetation Buffers and Stock Management to Improve Condition and Extent of Fringing Vegetation of High Priority Inland Saline Wetlands
Priority: HIGH

Strategy 10.2: Appropriate Feral Carnivore (Foxes and Cats) Control to Conserve Critical Weight Range Mammals and Ground-dwelling Fauna
Priority: VERY HIGH

Strategy 10.3: Landscape-scale Rabbit Control to Improve Vegetation Condition in Priority Areas
Priority: HIGH

LARGE RAPTOR SPECIES ASSET

Objective 11: **By 2030, Maintain and improve aerial top predator populations and the important dispersal corridors through the region (i.e. ranges).**

Objective 11a: **By 2030, achieve appropriate distribution and long term sustainable populations of large raptor species (Wedge-tail Eagles, Little Eagle, Whistling Kites) across the Mid North landscape.**

Strategy 11.1: Implement Actions to Mitigate Infrastructure (Windfarms) Impacts on Large Raptor Species
Priority: MEDIUM

Strategy 11.2: Mitigate Persecution and Disturbance of Large Raptor Species
Priority: MEDIUM

Strategy 11.3: Mitigate Off-target Damage and Cater for Large Raptor Food Requirements during Pest Control Programs
Priority: MEDIUM

REGIONAL SCALE

Objective 12: **By 2020, eradication (i.e. removal & on-going follow up) of outlying occurrences of priority environmental weeds and on-going reduction of core infestations to protect high value habitat (high quality areas, threatened species and communities) and prevent further spread.**

Strategy 12.1: Strategic, Landscape-scale Environmental Weed Control to Conserve High Value Habitat
Priority: VERY HIGH

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6. Conservation Strategies and Actions

6.3. FOUNDATIONAL PROGRAM - OBJECTIVES AND STRATEGIC ACTIONS

Objective 0.1: From 2012, attract sufficient annual funding and resources for the successful implementation of the Mid North Agricultural Districts conservation project.

Strategy: **Investment and Fund Raising**
Priority: NOT ASSESSED
Action Steps:
1. Ongoing submissions of funding applications for priority projects through traditional NRM sources
2. Development of an investment prospectus and individual project briefs
3. Development of a promotional DVD to support investment prospectus
4. Project Launch with DVD and investment prospectus to promote awareness and investment
5. Engagement with corporates and the philanthropic sector to secure investment for projects
6. Carbon offset viability assessment to determine the feasibility of attracting carbon investment

Objective 0.2: By 2017, consolidate organisational partnerships and community support and participation in the Mid North Agricultural Districts conservation project.

Strategy: **Community Engagement and Organisational Partnerships**
Priority: NOT ASSESSED
Action Steps:
1. Community workshops, presentations, landholder visits and community group development
2. Landholder mapping, contacts database and targeted engagement in priority areas
3. Development of project name, branding and promotional material
4. Development of project website
5. Newsletter and media articles to keep community and partner organisations informed of activities
6. Signage (site, roadside, etc.) for high profile sites to promote awareness
7. Partnership agreement (e.g. MOU, governance arrangements, funds management) between lead organisations
8. Engagement of other key project partners
9. Engagement with indigenous community leaders and indigenous land managers

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Objective 0.3: By 2020, secure key ecological knowledge and fill data gaps to support the implementation of the Mid North Agricultural Districts conservation project.

Strategy: **Knowledge, Research and Monitoring**
Priority: NOT ASSESSED
Action Steps:
1. Ongoing conservation action planning and prioritisation process (CAP, LAF, INFER)
2. Collation of historical monitoring data, production state of environment report and development of an effective landscape monitoring framework
3. Resource condition assessments of conservation assets including bushland condition, woodland birds, shorebirds, threatened species populations and threatening processes
4. Establishment of monitoring sites to evaluate the effectiveness of proposed conservation actions (before, after, control sites)
5. Habitat condition and improved threat (weeds, grazing) mapping across the region
6. Research population dynamics, distributions and trends for key nested flora and fauna species

6. Conservation Strategies and Actions

6.4. CONSERVATION OBJECTIVES AND PRIORITISED STRATEGIC ACTIONS

COASTAL ASSETS

Objective 1: *By 2020, maintain or enhance connectivity between high priority coastal habitats and terrestrial vegetation communities and adequately buffer priority coastal sites (threatened species, etc.) from incompatible land management practices and predicted sea-level rise.*

Strategy 1.1: **Coastal Linkages and Revegetation Buffers to Conserve High Value Habitat**

Priority: **TBC (in light of boundary redraw)**

Action steps:

1. Review existing literature and programs relating to coastal buffer and linkage areas (e.g. N&Y Coastal Assessment Report), predicted sea-level rise modelling, and key fauna and flora species and habitats. Also review existing land-use data to determine likely detrimental impacts along the coast (e.g. coastal erosion)

2. Identify and map priority linkage zones where enhanced connectivity can feasibly be achieved from (& between) coastal ecosystems to inland vegetation and which fauna and flora species would benefit (e.g. wombat populations, buffering Clinton CP linked to South Hummocks, coastal zone to the Broughton River). Integrate prioritisation of coastal linkage areas with buffering of incompatible land use areas, coastal recreational management sites, and mangrove and samphire retreat areas based on predicted sea-level rise.

3. Collect baseline condition data at priority sites (vegetation condition, fauna populations)

4. Identify and engage key landholders in priority areas to understand their attitudes and potential barriers / needs to be involved in a coastal linkages and buffers project

5. Identify public reserves and other available lands potentially compatible with revegetation / regeneration

6. Identify large remnants and existing revegetation sites (e.g. Proof Range revegetation) as benchmark communities to guide revegetation design (combined with pre-European vegetation mapping) and as the building blocks for connectivity and buffering

7. Develop best-practice revegetation guidelines for buffers and linkages considering appropriate density and structure of revegetation, appropriateness of threatened species within revegetation mix and width and shape for effective coastal buffers and linkages.

8. Undertake carbon analysis of the landscape to identify opportunities for investment through Carbon Farming Initiative and Clean Energy Futures Program

9. Undertake local seed collection, seed bank management and nursery development to support revegetation

10. On-going, specialist extension support for private landholders in priority areas to develop and implement site-based revegetation plans

11. Provision of appropriate financial incentives (and resources) for private landholders in priority areas to undertake revegetation and encourage regeneration.

12. Purchase, long term lease or stewardship of highest priority locations to undertake large-scale linkages and buffers revegetation activities

13. Coordinate integrated pest plant and animal control program in priority buffer and linkage zones

14. On-going monitoring and evaluation of revegetation sites and coastal habitats and fauna populations. Adjust strategy as required.

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Strategy 1.2: **Improved Planning and Approval Process for Developments (marinas, townships, industry, mines) in Sensitive Coastal Areas**

Priority: **MEDIUM**

Action steps:

1. Review relevant legislation (Development Act, Coast Protection Act, Aboriginal Heritage Act, Fisheries Act, EPBC Act, Native Vegetation Act), regional development plans and local and state processes for development planning approvals and the key decision makers (i.e. Local Government, Planning SA, Development Board). Also gain understanding of underlying factors driving coastal development (economy driving demand). Lobby for changes to the relevant legislation, approvals process and regional development plan to improve environmental protection for highly sensitive areas of the coast and minimise impact of incremental developments.

2. Identify and map highly sensitive ecological areas of the coast not suitable for further development (i.e. 'no go' areas considering marine values, sea-level rise risk assessment and coastal assessment report), and identify other areas considered suitable for development (e.g. around current population nodes)

3. Secure permanent protection for highly sensitive ecological areas of the coast not suitable for further development through land purchase, permanent covenant or establishment of coastal reserve.

4. Identify appropriate guidelines for coastal development in suitable areas (locations, set back limits, minimum allotment size, landscaping, managing run-off and effluent, types of development)

5. Community education and awareness program re cumulative impact of developments (increased traffic, boating, etc.) on ecologically sensitive areas of the coast and recommended guidelines for future developments

6. Provide detailed information to, and lobby, planning approval decision makers (e.g. local / state government) re proposed no-go development zones and other areas considered suitable for development and recommended guidelines (setback limits, minimum allotment size, etc.)

7. Improve capacity of Local Government to undertake ecological assessments and informed development decisions and identify mechanisms to address the threat of litigation and incursion of legal costs if a developer challenges a decision not to allow a development

8. Ongoing monitoring and evaluation of the suitability of coastal developments. Adjust strategy as required.

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6. Conservation Strategies and Actions

RIVERS, CREEKS AND WATERHOLES ASSETS

Objective 2: By 2020, improve the long term viability of regionally significant, water-dependent ecosystems.

Strategy 2.1: **Enhancement of Hydrological Regimes for Water-dependent Ecosystems in Priority Sub-catchments of the Broughton, Wakefield and Light River catchments and Eastern Ranges Creeks.**

Priority: **HIGH**

Action steps:

1. Review existing reports and programs relating to the restoration of hydrological regimes for regionally significant water-dependent ecosystems, management of water affecting activities and climate change modelling (refer David Dean reports). Identify successful approaches, barriers and key knowledge gaps. Support additional research required.

2. Identify regionally significant water-dependent ecosystems within priority sub-catchments that require an improvement in hydrological regimes for their long term viability

3. Identify current hydrological regime (flow stations, groundwater) and desired regimes in priority sub-catchments to determine the level and timing of returns required (i.e. the gap) to sustain water-dependent ecosystems

4. Identify current level of water extraction / harvesting in priority sub-catchments and the relative contribution of different water-affecting activities (e.g. bores, groundwater pumping, farm dams, vineyard irrigation, river extraction for troughs, land management - contour banking / no-til farming).

5. Identify and assess the effectiveness and feasibility of different options for achieving the desired hydrological regimes in priority sub-catchments (e.g. reservoir release, low flow bypass on dams, decommissioning of unused dam, fixing leaking bores, instream retention of natural flows by increasing habitat complexity, wetland construction, water-use efficiency programs)

6. Prioritise sub-catchments where the restoration of hydrological regimes is feasibility and the level of environmental significance of water dependent ecosystems is high

7. Community education and awareness of the importance of water-dependent ecosystems and the need for improving hydrological regimes in priority sub-catchments.

8. Identify and engage key stakeholders (SA Water, irrigators, famers, industry) involved in water extraction and harvesting to understand attitudes and potential barriers to management options for restoring of hydrological regimes in priority sub-catchments.

9. Engage and work with major reservoirs (SA Water) in the region to investigate the feasibility and methodology for water releases of identified volumes and timing to restore hydrological flows in priority sub-catchments

10. Declaration of new prescribed areas for priority sub-catchments containing regionally significant, water-dependent ecosystems including the development of water allocation plans, cap and trade system and potential buy-back of water licences

11. Engage and encourage Local Government to incorporate hydrological flow consideration into their storm-water and flood mitigation plans and to tighten approval process new bores and dams in priority sub-catchments

12. Water use efficiency education and financial incentives program for landholders in priority sub-catchments including decommissioning unused farm dams, repairing leaking bores, desalinisation of saline bores, development of best-practice water use guidelines for water affecting activities, incentives for improved infrastructure and adoption of more sustainable farming systems.

13. Funding for instream on-ground works to support longer retention of natural flows in priority sub-catchments, where appropriate, by increasing habitat complexity (rocks, snags) and wetland construction

14. On-going monitoring of hydrological regimes (groundwater depth, flow stations) and health of regionally significant water dependent ecosystems in priority sub-catchments. Adjust strategy as required.

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6. Conservation Strategies and Actions

Objective 3: *By 2030, critical threats to high priority river reaches are strategically managed and abated across all catchments to maintain and improve condition.*

Strategy 3.1: **Enhancement of High Priority River Reaches and Associated Wetlands by Effectively Managing Stock Grazing and Weeds and Establishment of Revegetation Buffers.**

Priority: **VERY HIGH**

Action steps:

1. Review existing river management plans and mapping of high priority river reaches in the Light, Wakefield and Broughton River Catchments. Identify knowledge gaps and secure additional information required to refine and update mapping of priority areas.

2. Identify and map the highest priority areas across all three river catchments using spatial prioritisation tools and an analysis of key ecological attributes (e.g. riparian vegetation condition, instream habitat, water quality, landscape context, presence of threatened species and permanent pools). Integrate spatial prioritisation process with selection of sites for restoring of native fish habitat and hydrological regimes in priority sub-catchments.

3. Baseline condition assessment of highest priority sites (BCM, AusRivAS methodology) to monitor changes in condition over time and to aid advanced prioritisation

4. Identify and document best practice methodologies for riparian restoration including stock grazing management (e.g. crash grazing at set times, solar pumps for new water points, riparian fencing), environmental weed control and revegetation of riparian buffers

5. Identify and target key landholders of priority river reaches to understand attitudes, barriers and needs to adopt best-practice riparian management and willingness to work with adjacent landholders. For unwilling landholders determine required incentives to encourage adoption. Use landholder willingness as a secondary layer to prioritise focal river reach areas.

6. Identify priority areas that are under the care and control of Local government and in crown land reserves for initial weed control and revegetation of riparian areas

7. Provide on-going, specialist, extension support for private landholders to develop river management plans. Where possible, develop collaborative landholder groups and multi-property river management plans.

8. Community education, awareness and training workshops to raise awareness of high priority river reaches and best-practice techniques for restoration

9. Financial incentives (fixed rate, competitive tender, stewardship) for private landholders to implement river management plans (e.g. water-point relocation, fencing, solar pumps, weed control, revegetation) supported by signed NRM land management agreements (under the NRM Act).

10. Engage and financially support volunteer groups, NGOs (e.g. Bush for Life, TPAG) and commercial contractors to undertake weed control in priority river reaches, particularly threatened species locations

11. Identify key upstream source of threats impacting high priority river reaches and engage landholders and fund commercial contractors to undertake control works

11. Public acquisition, long term lease / stewardship or covenanting of highest priority river reaches

12. On-going monitoring and evaluation of the condition of priority river reaches. Adjust strategy as required.

Strategy 3.2: **Appropriate Feral Carnivore (Foxes and Cats) Control to Conserve Critical Weight Range Mammals and Ground-dwelling Fauna**

Priority: **VERY HIGH**

Action steps:

1. Collect baseline data, both on public and private land, on ground-dwelling fauna.

2. Collect baseline data on distribution and density of foxes and cats in the landscape.

3. Determine relative impact of fox and cat predation on viability of fauna populations versus other attributes (e.g. seasonal conditions, habitat condition). Also assess relative impact of foxes versus cats on fauna.

4. Determine desired distribution and population size of ground dwelling fauna.

5. Identification of priority areas for feral carnivore control and key land managers to engage.

6. Engage landholders in priority areas to understand their attitudes to feral carnivore control and conservation of ground dwelling fauna populations.

7. Identify appropriate methodology and required level of fox / cat control to achieve viable populations of ground dwelling fauna (include budgets, priority sites and techniques).

8. Undertake integrated, large-scale fox and cat control program (including provision of baits) both on public and private lands with increased effort during critical periods (e.g. presence of young).

9. Identify effective cat control techniques including lobbying for legislative change to allow baiting and compulsory cat registration.

10. On-going monitoring and evaluation of ground dwelling fauna populations and adjust control effort as required.

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Strategy 3.3: **Landscape-scale Rabbit Control to Improve Vegetation Condition in Priority Areas**

Priority: **HIGH**

Action steps:

1. Review existing literature, strategies and programs relating to best-practice rabbit control. Link in with other rabbit control programs.

2. Identify priority areas for rabbit control based on understanding of high impact areas, biodiversity values, ability of land to recover and likely landholder willingness.

3. Engage landholders in priority areas to understand their attitudes to and motivations for rabbit control.

4. Develop collaborative landholder groups to plan rabbit control across neighbouring properties.

5. Determine baseline condition of priority control areas and appropriate monitoring methodology to determine level of rabbit browse and overall numbers.

6. Document control mechanisms, incentives, land management agreements and costed implementation plan.

7. Community education and awareness of the negative impact of rabbits on productivity and biodiversity.

8. Provide financial incentives and physical support for coordinated, collaborative, on-ground rabbit control with neighbouring landholders in priority areas (including coordinated rabbit warren ripping and baiting).

9. On-going monitoring and evaluation of the vegetation and soil condition of rabbit control areas. On-going assessment of effectiveness of strategy and adjust as required.

Objective 4: *By 2030, maintain viable populations and suitable habitat for native fish species (Common Galaxias, Blue Spot Goby) in priority sub catchments (TBD).*

Strategy 4.1: **Enhancement of In-stream Habitat and Native Fish/Fauna Populations in Key River Reaches through the Control of Introduced Fish and Restoration of Instream Habitat (rocks, snags, etc.).**

Priority: **MEDIUM**

Action steps:

1. Research to improve understanding of what native fish species should occur, and did (pre-European), in rivers, creeks and waterholes

2. Native fish surveys to accurately determine current species, populations and key habitat areas of native fish remaining in rivers, creeks and waterholes (engage Michael Hammer)

3. Identify key drivers / threatening processes that have led to native fish decline and ability to mitigate (e.g. altered flows, migration barriers, loss of instream habitat, abundance of introduced fish and tortoises?)

4. River surveys to identify new potential habitat areas for native fish reintroductions that could be feasibly protected from key threats (upstream weeds, reinvasion of introduced fish)

5. Identify options for 1) controlling introduced fish species currently in rivers, and 2) preventing future releases of fish (change policy relating to stocking farm dams, release of pet shop fish, recreational release of trout, callup, red fin, and carp)

6. Investigate requirements and barriers to successful native fish reintroduction projects

7. Determine target (viable) population numbers and locations for priority native fish species

8. Develop *Native fish Conservation and Reintroduction Plan* for the Mid North rivers, creeks and waterholes

9. Community education and awareness of plight of native fish and the impact of key threats (release of introduced fish, need to maintain healthy riparian habitat with snags, rocks, fallen timber, stock removal, etc)

10. Full cost funding to control introduced fish, restore instream habitat complexity and remove migration barriers, where appropriate, in key habitat areas for native fish populations (note: link native fish habitat restoration areas to priority areas for restoring environmental flows and protecting high value river reaches from stock, weeds and grazing)

11. Where feasible, native fish reintroductions into areas of suitable / restored habitat

12. On-going monitoring of native fish populations at key sites and adjust strategy as required

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6. Conservation Strategies and Actions

GRASSY ECOSYSTEMS ASSETS

Objective 5: *By 2030, improve native vegetation to 'good' across at least 15,000 hectares of native grasslands and grassy woodlands in priority areas.*

Strategy 5.1: **Sustainable Stock Grazing Regimes to Restore Native Grasslands and Grassy Woodlands**

Priority: **VERY HIGH**

Action steps:

1. Improved mapping of high value grasslands and grassy woodland areas including the distribution of threatened ecological communities and species to spatially define the project area. As part of this process, develop an agreed definition of a 'native grassland'.

2. Identify key properties in the project area (i.e. subject to stock grazing) and key land managers to engage.

3. Determine baseline condition of grassy ecosystems (including fauna and flora populations) in the project area, and different condition states (grazed versus lightly grazed and ungrazed areas). Identify benchmark reference sites that are considered as in 'good' condition.

4. Review existing literature and programs relating to sustainable stock grazing regimes in grassy ecosystems and identify essential components / barriers to adoption (e.g. RSSA native grasslands strategy, Mid-North Grasslands Working Group projects)

5. Develop and document regionally-specific, sustainable stock grazing methodology that is suited to local conditions and condition classes (note: most existing programs are in higher rainfall grazing systems)

6. Engage Native Vegetation Council to investigate approval required to change stock grazing regime in grassy ecosystems and streamline process to allow for easy landholder adoption

7. Understand land managers attitudes and any potential barriers to changing stock grazing regimes (e.g. training required, infrastructure costs, time) and understand current grazing regimes implemented.

8. Improve community awareness and education of the economic / ecological value of sustainable stock grazing regimes in grassy ecosystems (e.g. teach grazing training in local schools and in tertiary courses, raise internal awareness within DEWNR and NRM Board including prioritisation of N&Y NRM goals to reflect this)

9. Develop and run practical landholder training courses in sustainable stock grazing in grassy ecosystems highlighting benefits of incorporating productivity with biodiversity. Utilise existing demonstration sites.

10. Provide on-going, specialist, grazing extension support for landholders and targeted groups in priority areas to adopt sustainable stock grazing regimes. Develop farmer-to-farmer extension support (through paid local champions) to support and expand local implementation.

11. Develop and run a 'Train the trainer' course for new extension staff to increase number of people able to support landholders in sustainable stock grazing in grassy ecosystems

12. Provide financial incentives (fixed rate or competitive tender) to landholders for infrastructure required to adopt new grazing regime (fencing, water points)

13. Develop and implement a long term grassy ecosystems monitoring system that assess both change in biodiversity condition and grazing productivity value (i.e. develop a results-based system). As part of this system, develop practical monitoring approaches for famers and promote on-ground achievements.

14. On-going site monitoring (including vegetation condition, productivity and habitat e.g. bird surveys) and evaluation of project sites and uptake of farmers. Adjust strategy as required.

Strategy 5.2: **Landscape-scale Rabbit Control to Improve Vegetation Condition in Priority Areas**

Priority: **HIGH**

Action steps:

1. Review existing literature, strategies and programs relating to best-practice rabbit control. Link in with other rabbit control programs.

2. Identify priority areas for rabbit control based on understanding of high impact areas, biodiversity values, ability of land to recover and likely landholder willingness.

3. Engage landholders in priority areas to understand their attitudes to and motivations for rabbit control.

4. Develop collaborative landholder groups to plan rabbit control across neighbouring properties.

5. Determine baseline condition of priority control areas and appropriate monitoring methodology to determine level of rabbit browse and overall numbers.

6. Document control mechanisms, incentives, land management agreements and costed implementation plan.

7. Community education and awareness of the negative impact of rabbits on productivity and biodiversity.

8. Provide financial incentives and physical support for coordinated, collaborative, on-ground rabbit control with neighbouring landholders in priority areas (including coordinated rabbit warren ripping and baiting).

9. On-going monitoring and evaluation of the vegetation and soil condition of rabbit control areas. On-going assessment of effectiveness of strategy and adjust as required.

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6. Conservation Strategies and Actions

***Objective 6*:** By 2030, maintain and improve populations and diversity of priority native woodland birds (Apostlebird, Black -chinned Honeyeater, Brown Treecreeper, Crested Shrike-tit, Diamond Firetail, Hooded Robin, Jacky Winter, Painted Button-quail, Restless Flycatcher, Scarlet Robin, White-winged Chough.).

***Strategy 6.1*:** **Strategic Restoration of Grassy Woodland Buffers & Linkages for Declining Woodland Birds**

Priority: **VERY HIGH**

Action steps:

1. Review existing literature and programs focussed on grassy woodland reconstruction for declining woodland birds (e.g. N&Y declining bird monitoring in grassy ecosystems, Victorian grassy groundcover project, Mount Lofty Ranges woodland bird monitoring, Mount Lofty grassy woodlands Biodiversity Fund project).

2. Identify baseline condition of grassy woodland patches and declining woodland bird species (i.e. distribution, abundance, trends)

3. Undertake priority area mapping of where and how much (hectares) grassy woodland reconstruction is required in the landscape to conserve declining woodland bird species (look at examples of similar work in other regions including consideration of scattered tree cover and complimentary land uses). Integrate priority grassy woodland reconstruction area into sustainable grazing in grassy ecosystems project area.

4. Raise community awareness of the ecological importance of grassy woodlands and the benefits of integrating native vegetation into farming systems. Alleviate community concerns relating to the risks of increased native vegetation cover in the landscape (i.e. fire, pest plants and animals) and promote the marketing benefits of environmental programs to local industry (i.e. Clean Green Image).

5. Identify and document best-practice methodologies for reconstruction of grassy woodlands for woodland bird habitat including site prioritisation and overall budget.

6. Identify and engage key land holders in priority area to understand attitudes, potential barriers and incentives required to support large scale habitat reconstruction.

7. Identify public reserves, roadsides and other available lands potentially compatible with initial revegetation activities

8. Undertake carbon analysis of the landscape to identify opportunities for investment through Carbon Farming Initiative, Clean Energy Futures Program and Native Vegetation Council Significant Environmental Benefit Grant.

9. Undertake local seed collection, seed bank management and nursery development to support revegetation

10. On-going, specialist extension support for private landholders in priority areas to develop and implement site-based revegetation plans

11. Provide financial incentives (i.e. fixed rate, competitive tender or full cost funding) for private landholders in priority areas to undertake revegetation as per site-based plans

12. Purchase, long term lease or stewardship of highest priority locations to undertake large-scale linkages and buffers revegetation activities

13. Promote complimentary farming systems, including integration of native vegetation cover, in priority areas to support connectivity for declining woodland birds

14. Coordinate integrated pest plant and animal control program in priority grassy woodland zone

15. On-going monitoring and evaluation of revegetation sites, grassy woodland patches and declining bird populations. Adjust strategy as required.

Notes:

1. Priority areas identified as Clare to Tothill Ranges and Yacka to Crystal Brook.

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Strategy 6.2: **New Developments and Associated Clearance of Grassy Ecosystems (e.g. For Roads, Residential Development, Mines, Wind Farms) are Restricted to Environmentally Appropriate Designs and Locations.**

Priority: **MEDIUM**

Action steps:

1. Review relevant legislation and development approvals process relating to windfarm developments including the State Government's new windfarm development guidelines. Investigate and use the full power of the EPBC Act, Development Act, Native Vegetation Act, etc. to prevent windfarms in ecological sensitive areas (e.g. Pygmy Blue-tongue/raptor habitat, Peppermint Box Woodland, Iron Grass Grasslands) including use of mechanisms to formally recognise the cumulative impacts of windfarms as a threatening process to EPBC listed communities and species. Identify changes required to legislation and approvals process to achieve stronger environmental protection and lobby key stakeholders (local / state Government) to adopt these changes.

2. Identify and map regionally significant ecological areas (communities and species) not suitable for further windfarm development. Identify and map existing, proposed and potential new windfarm development zones. Overlay the two maps to determine potential geographical areas of consensus and conflict (for resolution).

3. Community education and awareness campaign of highly sensitive ecological areas and species impacted by windfarm development

4. Secure long term protection for regionally significant ecological areas that are likely to be the focus of future windfarm developments through land purchases, permanent covenant and / or stewardship payments

5. Engage all key stakeholders to gain consensus of where new wind farms should be located by lobbying for a moratorium on new developments while detailed information is provided to planning approval decision makers (e.g. local / state government) and windfarm developers. Identify proposed 'no-go' windfarm areas to protect highly sensitive ecological assets, and other areas considered suitable for development

6. Engage windfarm developers to develop and fund collaborative project proposals to minimise the impact of existing windfarms developments in highly sensitive ecological areas (e.g. grassland conservation & restoration projects, monitoring / protection of raptors and Pygmy Blue-Tongue Lizards) and to support the recovery of similar habitats outside of windfarm development zones. Funding potentially provided directly through windfarm companies or the Native Vegetation Council Significant Environmental Benefits fund.

7. Ongoing monitoring and evaluation of the impact of wind farm developments on grassy ecosystems ecological communities and raptor populations. Adjust strategy as required.

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6. Conservation Strategies and Actions

Objective 7: *By 2030, the impacts of climate change are mitigated by managing priority corridors for habitat connectivity, conservation genetics, and when necessary, assisted colonisation of species that are still unable to shift their ranges.*

Strategy 7.1: **Manage corridors for appropriate structural diversity which are resilient to the impacts of climate change.**

Priority: **TBC**

Action steps:

1. Identify the species for which the corridor(s) will function – i.e. those species and/or communities which most need a climate change retreat corridor.

2. Identify and map priority corridor(s) and/or stepping stones that will provide adequate connectivity.

3. Identify 'appropriate' structural diversity for the corridor(s) which will facilitate the establishment in, and movement though, the landscape.

4. Identify and trial methods for maintaining appropriate structural diversity which is resilient to climate change.

a) Identify key structural species which are locally native and which have a large north-south natural range which may provide genetic material which is more arid adapted.

b) Research non-local species which may provide structural and ecosystem services and which are resilient to climate change impacts. Including assessment for potential weediness.

5. Commence revegetation program at appropriate scale. Monitor the sites for success, including effectiveness for establishment of appropriate structure and other unforeseen outcomes.

6. Implement suitable grazing systems within the corridor(s) which facilitate the establishment of suitable structural diversity and which does not inhibit the effective recruitment of species moving through the corridor.

7. Maintain or implement a suitable weed management program which removes weeds which have an undesirable effect on structure. Consider the impact of retaining weed species which provide beneficial structural services.

8. Explore the feasibility of acquisition of conservation reserves, or private conservation land within the corridor(s) to effectively achieve the above steps.

9. Maintain and/or implement monitoring programs within the corridor(s) to detect species movement.

Strategy 7.2: **Assisted migration of species which are unable to effectively shift their ranges without intervention.**

Priority: **TBC**

Action steps:

1. Identify species which are unable to effectively shift their current range and which will be significantly adversely impacted by climate change (directly or indirectly).

2. Identify barriers to the effective translocation of species to more suitable long term habitats.

3. Identify methods to overcome barriers to effective translocation.

4. Determine the cost of effectively implementing a translocation program for each of the species

5. Prioritise species based on findings of above to determine the most cost effective approach to translocation efforts.

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6. Conservation Strategies and Actions

EASTERN MALLEE AND TRANSITIONAL COUNTRY ASSETS

Objective 8: *By 2030, achieve 'good' vegetation condition (structure and function) across XX,000 hectares of high priority Eastern Mallee and Transitional Country*

Strategy 8.1: **Integrated Landscape-scale Management of Total Grazing Pressure (Deer, Goats, Kangaroos, Rabbits and Stock) Foundational Work**

Priority: **VERY HIGH**

Action steps:

1. Research and collate previous work (literature, studies, trials, strategies, etc.) conducted in comparable environments.

2. Determine the impacts of each herbivore species (i.e. exclusion plots). Use these exclusion plots as demonstration sites for landholders about the impacts of each species.

3. Determine sustainable levels of grazing (carrying capacity of Total Grazing Pressure (TGP)

4. Determine effective/efficient way(s) to manage to carrying capacity.

3. Identify key land managers and understand their attitudes to feral herbivore control and stock management in the Eastern Country.

4. Develop and implement education and training programs on total grazing pressure for landholders.

5. Develop networks between adjoining landholders to facilitate collaborative projects.

6. Explore the potential effectiveness of an incentives/market based instrument for control programs in the Eastern Country.

7. Ensure resources for best practice control are available, e.g. goat yards, bait layers, etc.

8. Establish a monitoring and evaluation protocols/program which includes before/after/control/impact principals for priority areas (flora and fauna), browsing impact, soil condition, total numbers and ability of land to recover from different condition classes.

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Strategy 8.2: **Coordinated Goat Control to Conserve High Priority Areas of Eastern Mallee and Transitional Country**

Priority: **VERY HIGH**

Action steps:

1. Review existing literature, strategies and programs relating to goat control. Link in with existing cross-border goat control projects and understand successful approaches and lessons learnt.

2. Identify priority areas and total hectares for goat control based on understanding of high impact areas, key fauna and flora species, landscape connectivity, ability of land to recover and likely landholder willingness.

3. Identify and target landholders in priority areas to understand their attitudes towards goat control and any potential barriers to involvement (i.e. goats viewed as economic resource, lack of willingness to control, freehold and perpetual lease country versus pastoral leases). For unwilling landholders, determine what incentives / mechanisms would encourage them to be involved.

4. Where possible, support the development of collaborative landholder groups in priority areas to plan goat control across neighbouring properties.

5. Determine baseline condition of priority areas (i.e. vegetation / fauna condition) and appropriate monitoring methodology to determine level of goat browse and overall goat numbers

6. Document proposed goat control mechanisms, incentives, land management agreements and budgeted implementation plan (aim of greater than 60% annual reduction of goat numbers)

7. Community education and raise awareness of the negative impact of goats on productivity and biodiversity. Support research into the long term financial benefits of increased stocking rates through on-going goat control.

8. Provide financial and physical support for coordinated, collaborative, on-ground goat control with neighbouring private landholders in priority areas (including coordinated ground-based mustering of goats – not letting small goats go, supply of goat yards, supply of helicopter with aerial shoots and mustering support, establish Judas goat with collar, removal of unused water points, use of sporting shooters)

9. Land purchase, covenanting (or long term stewardship) and de-stocking in priority areas where collaborative on-ground control by private landholders is not achievable.

10. Lobby for changes to goat policy and legislation including investigating the impact of recognising goats as live stock (i.e. become the responsibility of the landholder) or develop legislative requirement for landholders to control goat numbers

11. On-going monitoring and evaluation of condition of priority areas (vegetation, fauna), browsing impact of goats and total numbers (assess impact of goats versus stock on vegetation condition and ability of land to recover from different condition classes – establishment of exclusion plots). On-going assessment of effectiveness of strategy and adjust as required.

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Strategy 8.3: **Management of Stock Grazing to Conserve High Priority Areas of Eastern Mallee and Transitional Country**

Priority: **VERY HIGH**

Action steps:

1. Identify suitable grazing practices for the Eastern Country. Refer to previous studies, strategies and programs.

2. Support research into the long term financial benefits of sustainable grazing stocking rates.

3. Establish demonstration sites and trials to increase the community's exposure to best practice sustainable grazing in the area.

4. Develop and disseminate best practice educational materials referring to points 1 and 2 above to raise awareness of the negative impact of overgrazing on productivity and biodiversity.

5. Identify and target landholders in priority areas to understand their attitudes towards modified grazing management and any potential barriers to involvement (i.e. additional cost to install and maintain fencing, water availability, freehold and perpetual lease country versus pastoral leases). For unwilling landholders, determine what incentives / mechanisms would encourage them to be involved.

6. Provide financial and/or physical support for land managers to adapt to best practice grazing management (e.g. decrease paddock size, increase paddock numbers, disperse watering points and allow for rest periods).

7. Land purchase or covenanting (or long term stewardship) in priority areas where changing grazing management by private landholders is not achievable.

8. On-going monitoring and evaluation of condition of priority areas (flora, fauna). On-going assessment of effectiveness of strategy and adjust as required.

Strategy 8.4: **Management of Overabundant Kangaroos (Euros, Western Grey Kangaroos and Red Kangaroos) in High Priority Areas of Eastern Mallee and Transitional Country**

Priority: **HIGH**

Action steps:

1. Support research by the DEWNR Abundant Species unit into Kangaroo abundance and impacts.

2. Identify priority areas, total hectares and total numbers for kangaroo control based on understanding of highly impact areas, key fauna and flora species, landscape connectivity, ability of land to recover and likely landholder willingness.

3. Support the existing kangaroo industry harvests and facilitate the take of kangaroos in priority areas as opposed to most efficient locations.

4. Identify key land managers and understand their attitudes to Kangaroo control in the Eastern Country.

5. Develop networks between adjoining landholders to facilitate collaborative projects. Encourage landholders to take up destruction permits in priority areas.

6. Explore the potential feasibility of an incentive/market design for control programs.

7. Provide financial incentives for landholders to reduce kangaroo numbers in priority areas through destruction permits and controlling water points (e.g. fencing dams, turning off troughs, etc.).

8. On-going monitoring and evaluation of condition of priority areas (flora, fauna), browsing impact of kangaroos and total numbers (assess impact of kangaroos versus stock on vegetation condition and ability of land to recover from different condition classes – establishment of exclusion plots). On-going assessment of effectiveness of strategy and adjust as required.

Strategy 8.5: **Landscape-scale Rabbit Control to Improve Vegetation Condition in Priority Areas**

Priority: **HIGH**

Action steps:

1. Review existing literature, strategies and programs relating to best-practice rabbit control. Link in with other rabbit control programs.

2. Identify priority areas for rabbit control based on understanding of high impact areas, biodiversity values, ability of land to recover and likely landholder willingness.

3. Engage landholders in priority areas to understand their attitudes to and motivations for rabbit control.

4. Develop collaborative landholder groups to plan rabbit control across neighbouring properties.

5. Determine baseline condition of priority control areas and appropriate monitoring methodology to determine level of rabbit browse and overall numbers.

6. Document control mechanisms, incentives, land management agreements and costed implementation plan.

7. Community education and awareness of the negative impact of rabbits on productivity and biodiversity.

8. Provide financial incentives and physical support for coordinated, collaborative, on-ground rabbit control with neighbouring landholders in priority areas (including coordinated rabbit warren ripping and baiting).

9. On-going monitoring and evaluation of the vegetation and soil condition of rabbit control areas. On-going assessment of effectiveness of strategy and adjust as required.

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6. Conservation Strategies and Actions

WESTERN RELICTUAL MALLEE ASSET

Objective 9: *By 2030, maintain and improve viable populations of native flora and fauna associated with western relictual mallee in priority areas (i.e. where viable populations exist or other services are provided – connection, etc.)*

Strategy 9.1: **Vegetation Buffers and Linkages to Protect High Priority Western Relictual Mallee Sites**

Priority: **MEDIUM**

Action steps:

1. Collate existing information on roadside vegetation mapping, condition and threatened species.
2. Refer to existing roadside mapping of mallee condition and width to aid prioritisation.
3. Complete additional baseline surveys of mallee sites to aid prioritisation.
4. Identify any habitat sensitive declining fauna species left in remaining Western Relictual Mallee sites (e.g. Landscape Assessment Framework).
5. Identify all threatened flora locations within Western Relictual Mallee sites and prioritise between species.
6. Identify habitat needs (patch, size, shape, connectivity) for declining flora.
7. Identify best locations for possible buffers and linkages using spatial prioritisation.
8. Identify landholder attitudes towards protecting remnants through surveys.
9. Establish education programs about the agricultural benefits of remnant and revegetated mallee through improved native bee pollination.
10. Identify current roadside vegetation management practices and areas for improvement, including within the Department of Planning, Transport and Infrastructure.
11. Identify the impact new fire breaks and fence lines have on remnant vegetation (clearance) and establish education program to minimise or mitigate impacts.
12. Implement targeted weed control and rabbit control programs across the region to reduce pressures on native vegetation.
13. Explore fire management as an option to assist the recovery of some fire responsive flora species.
14. Establish a monitoring program which includes before/after/control/impact principals to ensure adaptive management.

Strategy 9.2: **Appropriate Feral Carnivore (Foxes and Cats) Control to Conserve Critical Weight Range Mammals and Ground-dwelling Fauna**

Priority: **VERY HIGH**

Action steps:

1. Collect baseline data, both on public and private land, on ground-dwelling fauna.
2. Collect baseline data on distribution and density of foxes and cats in the landscape.
3. Determine relative impact of fox and cat predation on viability of fauna populations versus other attributes (e.g. seasonal conditions, habitat condition). Also assess relative impact of foxes versus cats on fauna.
4. Determine desired distribution and population size of ground dwelling fauna.
5. Identification of priority areas for feral carnivore control and key land managers to engage.
6. Engage landholders in priority areas to understand their attitudes to feral carnivore control and conservation of ground dwelling fauna populations.
7. Identify appropriate methodology and required level of fox / cat control to achieve viable populations of ground dwelling fauna (include budgets, priority sites and techniques).
8. Undertake integrated, large-scale fox and cat control program (including provision of baits) both on public and private lands with increased effort during critical periods (e.g. presence of young).
9. Identify effective cat control techniques including lobbying for legislative change to allow baiting and compulsory cat registration.
10. On-going monitoring and evaluation of ground dwelling fauna populations and adjust control effort as required.

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Strategy 9.3: **Landscape-scale Rabbit Control to Improve Vegetation Condition in Priority Areas**

Priority: **HIGH**

Action steps:

1. Review existing literature, strategies and programs relating to best-practice rabbit control. Link in with other rabbit control programs.

2. Identify priority areas for rabbit control based on understanding of high impact areas, biodiversity values, ability of land to recover and likely landholder willingness.

3. Engage landholders in priority areas to understand their attitudes to and motivations for rabbit control.

4. Develop collaborative landholder groups to plan rabbit control across neighbouring properties.

5. Determine baseline condition of priority control areas and appropriate monitoring methodology to determine level of rabbit browse and overall numbers.

6. Document control mechanisms, incentives, land management agreements and costed implementation plan.

7. Community education and awareness of the negative impact of rabbits on productivity and biodiversity.

8. Provide financial incentives and physical support for coordinated, collaborative, on-ground rabbit control with neighbouring landholders in priority areas (including coordinated rabbit warren ripping and baiting).

9. On-going monitoring and evaluation of the vegetation and soil condition of rabbit control areas. On-going assessment of effectiveness of strategy and adjust as required.

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6. Conservation Strategies and Actions

INLAND SALINE LAKE ASSET

Objective 10: *By 2030, maintain and improve the local ecosystem functions of inland saline lakes and provide a stepping stone for migratory/non-resident birds.*

Strategy 10.1: **Vegetation Buffers and Stock Management to Improve Condition and Extent of Fringing Vegetation of High Priority Inland Saline Wetlands**

Priority: **HIGH**

Action steps:

1. Complete a baseline inventory/survey of flora, fauna and hydrology of inlands saline wetlands.
2. Identify flora and fauna (including invertebrates) that rely on the inland saline lakes and associated samphire.
3. Determine the role of the Inland Saline Lakes in the broader landscape (e.g. refugia, stopover, etc.).
4. Determine high priority systems/locations based on inventory/survey.
5. Identify the original vegetation composition.
6. Determine what revegetation/rehabilitation is realistic within current salinity levels.
7. Collate information on comparable system's management and research.
8. Determine vegetation restoration and maintenance techniques, including grazing management practices. Explore the potential of using chenopod species beneficial to agriculture, especially in low conservation value areas.
9. Identify a suitable buffer width for Inland Saline Lakes.
10. Investigate state and transition modelling to these systems.
11. Survey community to determine attitudes, uses and local knowledge of the systems.
12. Implement community awareness and education program to raise awareness of the Inland Saline Lakes' importance and reduce barriers to implementing rehabilitation program
13. Implement on-ground actions for key activities including fencing, revegetation and rehabilitation.
14. Establish a monitoring program which includes before/after/control/impact principals to ensure adaptive management.

Strategy 10.2: **Appropriate Feral Carnivore (Foxes and Cats) Control to Conserve Critical Weight Range Mammals and Ground-dwelling Fauna**

Priority: **VERY HIGH**

Action steps:

1. Collect baseline data, both on public and private land, on ground-dwelling fauna.
2. Collect baseline data on distribution and density of foxes and cats in the landscape.
3. Determine relative impact of fox and cat predation on viability of fauna populations versus other attributes (e.g. seasonal conditions, habitat condition). Also assess relative impact of foxes versus cats on fauna.
4. Determine desired distribution and population size of ground dwelling fauna.
5. Identification of priority areas for feral carnivore control and key land managers to engage.
6. Engage landholders in priority areas to understand their attitudes to feral carnivore control and conservation of ground dwelling fauna populations.
7. Identify appropriate methodology and required level of fox / cat control to achieve viable populations of ground dwelling fauna (include budgets, priority sites and techniques).
8. Undertake integrated, large-scale fox and cat control program (including provision of baits) both on public and private lands with increased effort during critical periods (e.g. presence of young).
9. Identify effective cat control techniques including lobbying for legislative change to allow baiting and compulsory cat registration.
10. On-going monitoring and evaluation of ground dwelling fauna populations and adjust control effort as required.

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Strategy 10.3: **Landscape-scale Rabbit Control to Improve Vegetation Condition in Priority Areas**

Priority: **HIGH**

Action steps:

1. Review existing literature, strategies and programs relating to best-practice rabbit control. Link in with other rabbit control programs.

2. Identify priority areas for rabbit control based on understanding of high impact areas, biodiversity values, ability of land to recover and likely landholder willingness.

3. Engage landholders in priority areas to understand their attitudes to and motivations for rabbit control.

4. Develop collaborative landholder groups to plan rabbit control across neighbouring properties.

5. Determine baseline condition of priority control areas and appropriate monitoring methodology to determine level of rabbit browse and overall numbers.

6. Document control mechanisms, incentives, land management agreements and costed implementation plan.

7. Community education and awareness of the negative impact of rabbits on productivity and biodiversity.

8. Provide financial incentives and physical support for coordinated, collaborative, on-ground rabbit control with neighbouring landholders in priority areas (including coordinated rabbit warren ripping and baiting).

9. On-going monitoring and evaluation of the vegetation and soil condition of rabbit control areas. On-going assessment of effectiveness of strategy and adjust as required.

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6. Conservation Strategies and Actions

LARGE RAPTOR SPECIES ASSET

Objective 11: *By 2030, Maintain and improve aerial top predator populations and the important dispersal corridors through the region (i.e. ranges).*

Sub-objective 11a: *By 2030, achieve appropriate distribution and long term sustainable populations of large raptor species (Wedge-tail Eagles, Little Eagle, Whistling Kites) across the Mid North landscape.*

Strategy 11.1: **Implement Actions to Mitigate Infrastructure (Windfarms) Impacts on Large Raptor Species**
Priority: **MEDIUM**
Action steps:
1. Provide information to windfarm developers on impacts on Raptors to guide locations
2. Raise awareness about potential impact during planning phase (local and state government processes) of potential developments.
3. Build best practice information into approval framework for new infrastructure developments to minimise impact on raptors.
4. Seek investment from Wind Farm developers for Raptor conservation and long term studies (need to clearly quantify impact) and potential long term remediation of sites.
5. Encourage sharing of knowledge between all different parties (wind farm developers, conservationists, farmers).
6. Education and training for existing windfarm site managers with raptor populations to avoid disturbance during breeding season.
7. Investigate other options for improving raptor habitat on existing windfarm sites.

Strategy 11.2: **Mitigate Persecution and Disturbance of Large Raptor Species**
Priority: **MEDIUM**
Action steps:
1. Survey landholders to understand attitudes to raptors and develop pragmatic approaches to protecting lambs and conserving raptors.
2. Education and awareness program of impacts during breeding season (Living with Raptors, local landholder workshops) and increase education and awareness activities about the value of raptors.
3. Identification of existing tracks / access that potentially have impacts during breeding seasons for management. Potential closure of tracks and access during breeding seasons (implement habitat protection zones within reserves). Relocation of coastal trails away from raptor nesting sites (and no fly zones).
4. Investigations to demonstrate to landholders that raptors do not take a lot of healthy live lambs (or at least not a lot of them). Identify ways of providing alternative food source (other than lambs).
5. Increase prosecution efforts.

Strategy 11.3: **Mitigate Off-target Damage and Cater for Large Raptor Food Requirements during Pest Control Programs**
Priority: **MEDIUM**
Action steps:
1. Whenever projects are developed assess / monitor impacts around key breeding areas to quantify the impact and determine its significance.
2. Look at existing studies and supporting best practice recommendations for low impact baiting. Research the tolerance (LD50) of raptors to bait.
3. Determine methodology/guidelines to control rabbit populations but maintain viable food sources for raptors.
4. Increase education and awareness of low impact / best practice baiting.
5. Seek to change bait labels to emphasise / highlight off target impacts.
6. Encourage and financially support the use of appropriate baits that do not have an impact.

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6. Conservation Strategies and Actions

REGIONAL SCALE

Objective 12: *By 2020, eradication (i.e. removal & on-going follow up) of outlying occurrences of priority environmental weeds and on-going reduction of core infestations to protect high value habitat (high quality areas, threatened species and communities) and prevent further spread.*

Strategy 12.1: **Strategic, Landscape-scale Environmental Weed Control to Conserve High Value Habitat**

Priority: **VERY HIGH**

Action steps:

1. Collation of all existing weed location data to support central mapping of environmental weed infestations including outlying occurrences and newly emerging / red alert weed populations for rapid response

2. Improve existing weed mapping systems used by Authorised Officers to be interactive and incorporate input from broader community network and NRM staff (i.e. weed spotting program) to allow early detection of emerging red-alert weeds and new occurrences for rapid response

3. Review existing literature for regional weed prioritisation processes and identification of best-practice control techniques (including biology, vectors, bio-control and new innovations). Refer state-wide and N&Y regional weed prioritisation process and N&Y coastal assessment report.

4. Identification of priority weed species threatening high value habitats including the development of priority weeds list for different ecosystem types (e.g. coastal – African Boxthorn, Acacia cyclops, Pyp Grass, etc.)

5. Develop a landscape-scale, strategic weed control plan to protect high value habitats in the Mid North (including site prioritisation, budgets and outlying occurrences for potential eradication).

6. Provide mechanisms to improve integration and communication between all existing weed control programs (Authorised Officers, TFL, TPAG, Local Government, Community Groups, DEWNR)

7. Provide community education, resource materials and training workshops in weed identification (e.g. regional weed id guide), best-practice control techniques (including off-target impact) and community reporting / mapping of priority weed locations (i.e. develop weed spotting program)

8. On-going, landholder extension support for control of high priority environmental weeds on private lands (note: identify ways to alleviate concern of enforcement by Authorised Officers if landholders ask for support)

9. Provide financial incentives for private landholders to control priority weeds in key areas 'above duty of care'

10. Engage and financially support appropriately-skilled volunteer community groups and NGOs (TPAG, TFL, Bush for Life, BEST, CVA) to undertake weed control on high priority, environmentally sensitive sites

11. Fund commercial contractors, Authorised Officers and Local Government staff to undertake weed control on highest priority, high public-benefit sites

12. Develop rapid response capacity within NRM, DEWNR and Local Government to quickly control new outbreaks and emerging red-alert weeds

13. Lobby for changes to environmental weed policy and legislation including 1) strengthening NRM Act to support more rapid enforcement of weed control and willingness to enforce Act, 2) listing of other priority environmental weeds on the Declared / Proclaimed Weeds list, 3) gaining 'Off-label' approval for herbicide use, 4) changes to the taxation system to recognise weed control expense as a tax deduction, 5) a campaign to ensure local nurseries do not sell environmental weeds, 6) lobbying for long term funding for weed control projects (not one year, once-off funding)

14. On-going monitoring and evaluation of priority weed species distribution, density and impact on high value habitat. Adjust strategy as required.

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7. Monitoring and Evaluation

7.1. Methodology for Developing a Monitoring Program

The final step in the conservation action planning process is an ongoing one which involves the development and implementation of a rigorous monitoring, evaluation and adaptive management program. This serves a number of important functions including:

- determining whether the strategies and actions are achieving the conservation objectives;
- showing trends in the condition of conservation assets and the levels of threat;
- demonstrating the effectiveness and efficiency of investment into the conservation program;
- linking local conservation outcomes with other programs to describe the local-global biodiversity outlook

In particular two types of monitoring and evaluation are identified in the conservation action planning framework. This includes monitoring and evaluation for 1) strategy effectiveness, and 2) resource condition (i.e. asset condition and / or level of threat). The latter is analogous to a medical "check-up", where the doctor measures indicators such as blood pressure to provide early warning signs of systemic problems. Ideally, a monitoring and evaluation program should include both components.

Appropriate Level of Resourcing for Monitoring and Evaluation

Many researchers and conservation practitioners agree that a monitoring effort of 10-20% of the total program budget is an appropriate level of resourcing. However the level of resources allocated to monitoring should vary in proportion to the level of uncertainty surrounding an assumption that action A will lead to the conservation goal B. Higher levels of uncertainty may necessitate greater monitoring effort (i.e. replicated experiments and trials) to test a particular conservation theory.

Use of Results chains

Results chains are a relatively recent tool to assist conservation planners test assumptions that an action will achieve a desired objective. Results chains are broadly based on principles of logical framework analysis (developed in the 1960's) and are supported by Miradi software (www.miradi.org). By identifying interim results or milestones along a trajectory towards the delivery of an outcome, results chains make implicit assumptions about the expected results of activities explicit. This process typically results in more rigorous strategy development by the project team. Once a sequence of outputs and outcomes are represented as a results chain diagram, it is relatively easy to visualise and identify monitoring indicators and milestones along the way to a conservation goal.

The Miradi program has not yet been applied to the Mid North Agricultural Districts CAP, but future strategy development and monitoring may make use of this software.

7.2. Monitoring Indicators for the Mid North Agricultural Districts

An effective monitoring program for the Mid North Agricultural Districts should achieve two major outcomes:

1) RESOURCE CONDITION MONITORING
- provide quantitative data to confirm or revise the **current status** of the key ecological attributes and overall viability of the conservation assets & / or the current status of the key threats;
- establish baseline data to monitor **future changes** in the status of the key ecological attributes and overall viability of the conservation assets &/ or status of the key threats;

2) STRATEGY EFFECTIVENESS MONITORING
- provide quantitative data to assess the effectiveness of the conservation strategies and action steps and identify areas for refinement.

Monitoring indicators should be closely associated to the status of the key ecological attributes and address landscape context, condition and size attributes of the conservation assets (refer Table 4). A monitoring program should also make use of any existing monitoring data so as to ensure resources are used efficiently. This may involve creating links with other organisations that have complimentary aims or legislative requirements to undertake environmental monitoring. For additional detail regarding historical monitoring programs in the region refer to ***Overview of Biodiversity Monitoring in the Northern & Yorke NRM Region (Milne & McGregor 2011).***

7. Monitoring and Evaluation

Table 7: Monitoring Indicators for Key Ecological Attributes (KEA) of the Conservation Assets

	LANDSCAPE CONTEXT KEA				CONDITION KEA			SIZE KEA
Conservation Asset	**Dune Formation / Tidal Deposition**	**Hydro -logical Regimes**	**Connectivity**	**Patch Size, shape & Configuration**	**Water Quality**	**Flora Species / Habitat Condition**	**Fauna Species**	**Total area**
Coastal Mangroves and Samphire		Percentage of area subject to natural tidal inundation	Percentage of coast buffered by adequate vegetation buffers		Levels of pollutants and nutrients at key storm water run-off areas	Flora species diversity & composition (BCM sites)	Trends in 'habitat / threat sensitive' fauna (Shorebirds)	Total hectares remaining (% of pre-European cover
Low Coastal Dunes and Cliffs	1. Barriers to natural dune formation processes 2. Presence of excessive erosion (dune blow outs)		Percentage of coast buffered by adequate vegetation buffers			Flora Species diversity & composition (BCM sites)	Trends in 'habitat / threat sensitive' fauna (Hooded Plovers, Shorebirds, Raptors)	Total hectares remaining (% of pre-European cover
Rivers, creeks & waterholes		1. Flooding regime (frequency, volume, timing) 2.Groundwater depth & levels of recharge	Percentage of wetlands buffered by adequate vegetation buffers		Percentage of rivers within expected salinity, pH and nutrient range	Flora species diversity & composition (BCM sites)	Trends in 'habitat / threat sensitive' fauna (water birds, waders, invertebrates, frogs)	
Inland Terminal Wetlands / Saline Lakes		Timing, duration, frequency and extent (including water depth variation) of inundation of flood events	Percentage of total area adequately buffered by terrestrial native vegetation communities		Percentage within acceptable water quality range for healthy / functioning saline wetlands (salinity, turbidity, nutrients, etc.)	1. Flora species diversity & composition (BCM sites) 2. Level of intactness of soil / salt crust within saline wetlands.	1. Micro / macro-invertebrate species diversity and abundance (e.g. brine shrimp, etc.) 2. Presence / trends in 'salt shrubland' bird species (wrens, chats, thornbills). 3. Presence / trends in waders and water birds during flood events.	
Native Temperate Grasslands				Average patch size, shape configuration and distance apart to other patches		Flora species diversity & composition (BCM sites)	Trends in 'habitat / threat sensitive' fauna (declining bird species, Pygmy Blue-tongue)	Total hectares remaining (% of pre-European cover
Temperate Grassy Woodlands				Average patch size, shape configuration and distance apart to other patches		Flora species diversity & composition (BCM sites)	Trends in 'habitat / threat sensitive' fauna (declining bird species)	Total hectares remaining (% of pre-European cover
Temperate Woodlands with shrubby or heath understorey				Average patch size, shape configuration and distance apart to other patches		Flora species diversity & composition (BCM sites)	Trends in 'habitat / threat sensitive' fauna (declining bird species)	Total hectares remaining (% of pre-European cover
Western Relictual Mallee				Average patch size, shape configuration and distance apart to other patches		Flora species diversity & composition (BCM sites)	Trends in 'habitat / threat sensitive' fauna (declining bird species)	Total hectares remaining (% of pre-European cover
Eastern Mallee and Transitional Country*				Average patch size, shape configuration and distance apart to other patches		Flora species diversity & composition (BCM sites)	Trends in 'habitat / threat sensitive' fauna (declining bird species)	Total hectares remaining (% of pre-European cover
Large Declining / Threatened Raptor Species	Abundance of food sources available in the landscape.	Abundance of secured nesting sites available (free from disturbance) across the landscape.			Condition of population.	Number of breeding pairs.	Inspection of nesting success (number of young surviving to fledging state)	Total population of large raptor species (regular surveys).

* Interim indicators following merging of assets

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Appendix 1: Flora Species of State and National Conservation Significance (Source: DEWNR Spatial Database)

Number of records	SPECIES	COMMON NAME	National	South Australia
3	Acacia genistifolia	Broom Wattle		E
28	Acacia glandulicarpa	Hairy-pod Wattle	VU	E
1	Acacia menzelii	Menzel's Wattle	VU	V
6	Acacia montana	Mallee Wattle		R
1	Acacia pendula	Weeping Myall		V
2	Acacia rhigiophylla	Dagger-leaf Wattle		R
61	Acacia spilleriana	Spiller's Wattle	EN	E
4	Acacia trineura	Three-nerve Wattle		E
91	Acanthocladium dockeri	Spiny Everlasting	CR	E
2	Amphibromus archeri	Pointed Swamp Wallaby-grass		R
2	Anogramma leptophylla	Annual Fern		R
4	Aristida australis	(blank)		R
5	Asperula syrticola	Southern Flinders Woodruff		R
1	Atriplex australasica	(blank)		R
5	Austrodanthonia laevis	Smooth Wallaby-grass		R
18	Austrodanthonia tenuior	Short-awn Wallaby-grass		R
38	Austrostipa breviglumis	Cane Spear-grass		R
1	Austrostipa densiflora	Fox-tail Spear-grass		R
91	Austrostipa gibbosa	Swollen Spear-grass		R
3	Austrostipa multispiculis	Many-flowered Spear-grass		R
3	Austrostipa petraea	Flinders Range Spear-grass		R
33	Austrostipa pilata	Prickly Spear-grass		V
3	Austrostipa tenuifolia	(blank)		R
15	Bothriochloa macra	Red-leg Grass		R
13	Brachyscome ciliaris var. subintegrifolia	(blank)		R
121	Caladenia argocalla	White Beauty Spider-orchid	EN	E
1	Caladenia behrii	Pink-lip Spider-orchid	EN	E
11	Caladenia gladiolata	Bayonet Spider-orchid	EN	E
2	Caladenia macroclavia	Large-club Spider-orchid	EN	E
2	Caladenia stellata	Star Spider-orchid		R
18	Caladenia tensa	Inland Green-comb Spider-orchid	EN	(blank)
4	Centrolepis cephaloformis ssp. cephaloformis	Cushion Centrolepis		R
1	Centrolepis glabra	Smooth Centrolepis		R
5	Choretrum chrysanthum	Yellow-flower Sour-bush		R
8	Codonocarpus pyramidalis	Slender Bell-fruit	VU	E
7	Crassula peduncularis	Purple Crassula		R
1	Crassula sieberiana	Sieber's Crassula		E
105	Cryptandra campanulata	Long-flower Cryptandra		R
35	Cullen parvum	Small Scurf-pea		V

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14	Danthonia carphoides var. carphoides (NC)	Short Wallaby-grass		R
11	Daviesia benthamii ssp. humilis	Mallee Bitter-pea		R
16	Dianella longifolia var. grandis	Pale Flax-lily		R
21	Diuris behrii	Behr's Cowslip Orchid		V
43	Dodonaea procumbens	Trailing Hop-bush	VU	V
16	Dodonaea subglandulifera	(blank)	EN	E
6	Echinopogon ovatus	Rough-beard Grass		R
4	Elatine gratioloides	Waterwort		R
40	Eragrostis infecunda	Barren Cane-grass		R
9	Eremophila subfloccosa ssp. glandulosa	Green-flower Emubush		R
101	Eryngium ovinum	Blue Devil		V
2	Eryngium vesiculosum	Prostrate Blue Devil		R
11	Eucalyptus albens	White Box		R
16	Eucalyptus behriana	Broad-leaf Box		R
1	Eucalyptus bicostata	Southern Blue Gum		V
1	Eucalyptus calycogona ssp. spaffordii	Spafford's Square-fruit Mallee		R
60	Eucalyptus macrorhyncha ssp. macrorhyncha	Red Stringybark		R
3	Eucalyptus percostata	Ribbed White Mallee		R
2	Eucalyptus viridis ssp. viridis	Green Mallee		R
24	Euphrasia collina ssp. osbornii	Osborn's Eyebright	EN	E
10	Festuca benthamiana	Bentham's Fescue		R
1	Frankenia cupularis	(blank)		R
1	Geijera parviflora	Wilga		R
5	Goodenia heteromera	Spreading Goodenia		R
5	Haegiela tatei	Small Nut-heads		R
2	Helichrysum rutidolepis	Pale Everlasting		E
2	Hovea purpurea	Tall Hovea		R
2	Isoetes drummondii ssp. drummondii	Plain Quillwort		R
1	Juncus australis	Austral Rush		R
1	Juncus homalocaulis	Wiry Rush		V
11	Juncus radula	Hoary Rush		V
53	Lachnagrostis limitanea	Spalding Blown-grass	EN	E
21	Lachnagrostis robusta	Tall Blown-grass		R
1	Leiocarpa pluriseta	(blank)		R
8	Lepidium pseudotasmanicum	Shade Peppercress		V
1	Leptinella reptans	Creeping Cotula		R
12	Leptorhynchos elongatus	Lanky Buttons		R
4	Leptorhynchos orientalis	Eastern Annual Buttons		R
14	Logania saxatilis	Rock Logania		R
3	Maireana decalvans	Black Cotton-bush		E

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87	Maireana excavata	Bottle Fissure-plant		V
43	Maireana rohrlachii	Rohrlach's Bluebush		R
13	Mentha satureioides	Native Pennyroyal		R
1	Montia australasica	White Purslane		R
1	Myoporum parvifolium	Creeping Boobialla		R
1	Myriophyllum glomeratum	Clustered Milfoil		E
1	Myriophyllum integrifolium	Tiny Milfoil		R
36	Olearia pannosa ssp. pannosa	Silver Daisy-bush	VU	V
1	Olearia passerinoides ssp. glutescens	Sticky Daisy-bush		R
7	Olearia picridifolia	Rasp Daisy-bush		R
1	Orobanche cernua var. australiana	Australian Broomrape		R
1	Ozothamnus scaber	Rough Bush-everlasting		V
7	Phebalium glandulosum ssp. glandulosum	Glandular Phebalium		E
11	Philotheca angustifolia ssp. angustifolia	Narrow-leaf Wax-flower		R
43	Philotheca verrucosa	Bendigo Wax-flower		V
1	Phlegmatospermum eremaeum	Spreading Cress		R
10	Poa drummondiana	Knotted Poa		R
4	Poa fax	Scaly Poa		R
12	Podolepis jaceoides	Showy Copper-wire Daisy		R
3	Podolepis muelleri	Button Podolepis		V
4	Prasophyllum pallidum	Pale Leek-orchid	VU	R
1	Prasophyllum pruinosum	Plum Leek-orchid	EN	V
2	Pratia concolor	Poison Pratia		R
1	Pterostylis curta	Blunt Greenhood		R
355	Pterostylis despectans	Mt Bryan Greenhood	EN	E
26	Pterostylis lepida	Halbury Rustyhood	EN	E
86	Ptilotus erubescens	Hairy-tails		R
103	Pultenaea kraehenbuehlii	Tothill Bush-pea		R
1	Pycnosorus chrysanthes	(blank)		E
18	Pycnosorus globosus	Drumsticks		V
14	Rhodanthe anthemoides	Chamomile Everlasting		E
25	Rumex dumosus	Wiry Dock		R
12	Rumex dumosus var. (NC)	Wiry Dock		R
1	Schoenus latelaminatus	Medusa Bog-rush		V
2	Sclerolaena muricata var. villosa	Five-spine Bindyi		R
6	Senecio macrocarpus	Large-fruit Groundsel	VU	V
6	Senecio megaglossus	Large-flower Groundsel	VU	E
1	Solanum eremophilum	Rare Nightshade		R

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59	Swainsona behriana	Behr's Swainson-pea		V
2	Swainsona fuscoviridis	Dark Green Swainson-pea		R
17	Swainsona procumbens	Broughton Pea		V
1	Swainsona sericea	Silky Swainson-pea		E
2	Swainsona fuscoviridis	Dark Green Swainson-pea		R
17	Swainsona procumbens	Broughton Pea		V
1	Swainsona sericea	Silky Swainson-pea		E
40	Tecticornia flabelliformis	Bead Samphire	VU	V
5	Thelymitra aristata	Great Sun-orchid		E
1	Thelymitra carnea	Small Pink Sun-orchid		R
14	Thelymitra grandiflora	Great Sun-orchid		R
2	Thelymitra holmesii	Blue Star Sun-orchid		V
1	Thelymitra peniculata	Blue Star Sun-orchid		V
15	Thysanotus tenellus	Grassy Fringe-lily		R
1	Triglochin minutissima	Tiny Arrowgrass		R
2	Veronica decorosa	Showy Speedwell		R
11	Wurmbea latifolia ssp. latifolia	Broad-leaf Nancy		V
2	Zostera muelleri ssp. mucronata	Garweed		R

Total records	Total species	National	State	Total families
2,435	132	1 Critically Endangered 11 Endangered 9 Vulnerable	25 Endangered 26 Vulnerable 80 Rare	37

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Appendix 2: Fauna Species of State and National Conservation Significance (Source: DEWNR Spatial Database)

Number of records	SPECIES	COMMON NAME	National	South Australia
30	Acanthiza iredalei	Slender-billed Thornbill	ssp	ssp
3	Acanthiza iredalei rosinae	Slender-billed Thornbill (St Vincent Gulf ssp)		V
13	Actitis hypoleucos	Common Sandpiper		R
25	Anas rhynchotis	Australasian Shoveler		R
4	Anhinga novaehollandiae	Australasian Darter		R
1	Anseranas semipalmata	Magpie Goose		E
1	Antechinus flavipes	Yellow-footed Antechinus		V
42	Aprasia pseudopulchella	Flinders Worm-lizard	VU	(blank)
1	Arctocephalus pusillus	Australian Fur Seal (Brown Fur Seal)		R
9	Ardea ibis	Cattle Egret		R
2	Ardea intermedia	Intermediate Egret		R
23	Ardeotis australis	Australian Bustard		V
72	Arenaria interpres	Ruddy Turnstone		R
1	Balaenoptera physalus	Fin Whale	VU	V
1	Berardius arnuxii	Arnoux's Beaked Whale		R
1	Bettongia lesueur	Burrowing Bettong	EX	E
12	Biziura lobata	Musk Duck		R
5	Botaurus poiciloptilus	Australasian Bittern	EN	V
8	Burhinus grallarius	Bush Stonecurlew		R
1	Calidris melanotos	Pectoral Sandpiper		R
17	Calidris tenuirostris	Great Knot		R
16	Charadrius leschenaultii	Greater Sand Plover		R
19	Charadrius mongolus	Lesser Sand Plover		R
2	Chelonia mydas	Green Turtle	VU	V
5	Cinclosoma castanotum	Chestnut Quailthrush		ssp
46	Cladorhynchus leucocephalus	Banded Stilt		V
1	Coracina papuensis	White-bellied Cuckooshrike		R
1046	Corcorax melanoramphos	White-winged Chough		R
7	Coturnix ypsilophora	Brown Quail		V
1	Dasyurus viverrinus	Eastern Quoll		E
1	Diomedea exulans	Wandering Albatross	ssp	V
18	Egretta garzetta	Little Egret		R
1	Elanus scriptus	Letter-winged Kite		R
1	Emydura macquarii	Macquarie Tortoise		V
1	Eubalaena australis	Southern Right Whale	EN	V
1	Excalfactoria chinensis	King Quail		E
1	Falco hypoleucos	Grey Falcon		R
114	Falco peregrinus	Peregrine Falcon		R
59	Falcunculus frontatus	Crested Shriketit		R
1	Gerygone olivacea	White-throated Gerygone		R

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3	Glossopsitta pusilla	Little Lorikeet		E
6	Grus rubicunda	Brolga		V
5	Haematopus fuliginosus	Sooty Oystercatcher		R
11	Haematopus longirostris	Australian Pied Oystercatcher		R
1	Haliaeetus leucogaster	White-bellied Sea-Eagle		E
2	Hamirostra melanosternon	Black-breasted Buzzard		R
1	Isoodon auratus	Golden Bandicoot	VU	E
1	Kogia breviceps	Pygmy Sperm Whale		R
1	Leporillus apicalis	Lesser Stick-nest Rat	EX	E
3	Lichenostomus cratitius	Purple-gaped Honeyeater		ssp
69	Limosa lapponica	Bar-tailed Godwit		R
11	Limosa limosa	Black-tailed Godwit		R
1	Megaptera novaeangliae	Humpback Whale	VU	V
443	Melanodryas cucullata	Hooded Robin		ssp
11	Melithreptus gularis	Black-chinned Honeyeater		ssp
286	Microeca fascinans	Jacky Winter		ssp
3	Morelia spilota	Carpet Python		R
1	Myiagra cyanoleuca	Satin Flycatcher		E
58	Myiagra inquieta	Restless Flycatcher		R
13	Neophema chrysostoma	Blue-winged Parrot		V
118	Neophema elegans	Elegant Parrot		R
21	Neophema petrophila	Rock Parrot		R
2	Neophoca cinerea	Australian Sea Lion	VU	V
138	Northiella haematogaster	Bluebonnet		ssp
2	Notechis ater ater	Krefft's Tiger Snake	VU	(blank)
3	Notechis scutatus	Eastern Tiger Snake	ssp	(blank)
3	Notomys longicaudatus	Long-tailed Hopping-mouse	EX	E
55	Numenius madagascariensis	Eastern Curlew		V
12	Numenius phaeopus	Whimbrel		R
1	Oriolus sagittatus	Olive-backed Oriole		ssp
15	Oxyura australis	Blue-billed Duck		R
13	Pachycephala inornata	Gilbert's Whistler		R
1	Pandion haliaetus	Osprey		E
9	Pedionomus torquatus	Plains-wanderer	VU	E
2	Perameles bougainville fasciata	Western Barred Bandicoot (mainland)	EX	(blank)
75	Petroica boodang	Scarlet Robin		ssp
3	Petroica phoenicea	Flame Robin		V
1	Phascogale calura	Red-tailed Phascogale	EN	E
10	Plectorhyncha lanceolata	Striped Honeyeater		R
1	Plegadis falcinellus	Glossy Ibis		R
12	Pluvialis fulva	Pacific Golden Plover		R
3	Podiceps cristatus	Great Crested Grebe		R
22	Porzana tabuensis	Spotless Crake		R

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3	Pseudomys australis	Plains mouse	VU	V
3	Pseudomys gouldii	Gould's Mouse	EX	E
17	Pseudophryne bibronii	Brown Toadlet		R
3	Pseudorca crassidens	False Killer Whale		R
2	Rostratula australis	Australian Painted Snipe	VU	V
796	Stagonopleura guttata	Diamond Firetail		V
20	Sternula nereis	Fairy Tern	VU	E
6	Stictonetta naevosa	Freckled Duck		V
194	Strepera versicolor	Grey Currawong		ssp
1532	Tiliqua adelaidensis	Pygmy Bluetongue	EN	E
38	Trichosurus vulpecula	Common Brushtail Possum		R
6	Tringa brevipes	Grey-tailed Tattler		R
1	Turnix pyrrhothorax	Red-chested Buttonquail		R
40	Turnix varius	Painted Buttonquail		R
1	Varanus varius	Lace Monitor		R
1	Vermicella annulata	Common Bandy Bandy		R
6	Xenus cinereus	Terek Sandpiper		R

Total records	Total species	National	State	Total families
5,734	100	5 Extinct 0 Critically Endangered 4 Endangered 11 Vulnerable 3 species groups rated for conservation	16 Endangered 21 Vulnerable 49 Rare 10 species groups rated for conservation	1 AMPHIBIA 71 AVES N/A OSTEICHTHYES (Fish) 19 MAMMALS (includes marine) 9 REPTILIA

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Appendix 3: Northern and Yorke Natural Resources Management Board Goals

COASTAL, ESTUARINE AND MARINE ECOSYSTEMS
By 2030, there is no reduction in the extent, and a steady improvement in the condition, of coastal, estuarine and marine ecosystems, compared to 2008.
By 2015, there is no decline in the extent or condition of mangrove forests
By 2030, water quality is maintained to meet levels set for aquatic ecosystems in the Environment Protection (Water Quality) Policy.
By 2030, a 10% reduction in the pollutant load of discharges from licensed point source pollution sites.
By 2015, a 50% reduction in the pollutant load of sewage and stormwater discharged into the marine environment
By 2015, Stormwater and Flood Mitigation Plans are implemented for regional cities and major towns.
By 2015, local Development Plans incorporate principles to protect water quality, as presented in the Regulations and Policies of the NRM Plan.
By 2030, the extent and diversity of coastal landscapes is maintained and their condition improved compared to 2008.
By 2030, there is no decline in the conservation value of the 35 coastal areas of highest conservation priority.
By 2030, an improvement in the conservation value of an additional 14 areas, currently classed as "priority coastal cells".
By 2015, the condition of at least 4, out of 14, "priority coastal cells" is improved to high conservation totals.
By 2015, there is no further decline in the conservation value of the remaining coastal areas.
By 2015, there is an overall reduction in the threats to coastal ecosystems and landscapes from vegetation clearance, weeds and uncontrolled access by stock, vehicles and pedestrians
By 2015, coastal management guidelines are adopted for vegetation management and public access
By 2015, local Development Plans incorporate principles to protect coast, as presented in the Regs & Polices of the NRM Plan**.**
WATER AND FRESHWATER ECOSYSTEMS
By 2030, the amount of surface and groundwater available is maintained within the bounds of historical variations and does not deviate significantly from seasonal climatic drivers.
By 2030, fluctuations in groundwater levels, pressures and seasonal spring and baseflows will be maintained within the limits previously observed in the region, for comparable climatic conditions.
By 2030, flow regimes in priority river catchments do not deviate significantly from previously observed seasonal and inter-annual variations for comparable climatic conditions.
By 2015, a revised Water Allocation Plan, compliant with National Water Initiative guidelines, is in place for the Clare region.
By 2015, the Baroota area has an approved Water Allocation Plan in place.
By 2015, the management of water resources is regulated by a series of defined Water Affecting Activities.
By 2030, water quality is maintained, within climatic limitations and natural conditions, within levels set for aquatic ecosystems in the Environment Protection (Water Quality) Policy.
By 2030, mean nutrient levels in watercourses are maintained below Environment Protection Policy (Water Quality) guidelines for aquatic ecosystems.
By 2030, fluctuations in salinity levels in surface water and groundwaters exhibit trends that reflect climatic and seasonal influence and do not exceed levels recorded prior to 2008.
By 2015, Stormwater and Flood Mitigation Plans are implemented for regional cities and major towns.
By 2015, local Development Plans incorporate principles to protect water quality, as presented in the Regulations and Policies of the NRM Plan.
By 2015, salinity management plans are implemented in high priority catchments.
By 2030, core refuge areas are protected by a 20% reduction in the extent of priority degrading watercourse management issues.
By 2015, the length of watercourses unaffected by priority degrading management issues is increased by 5%, with a focus on protecting core refuge areas.
By 2015, River Management Plans are reviewed for the Light, Wakefield and Broughton Rivers

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TERRESTRIAL ECOSYSTEMS
By 2030, maintain the condition of the region's 1,200,000 ha of remnant native vegetation, and improve the condition of 15% from 2008 levels.
By 2015, increase in the area of remnant vegetation protected under legal and voluntary conservation agreements from 75,000 ha to 85,000 ha, with priority given to high conservation value remnants
By 2015, undertake active management on 100,000 ha of the region's remnant vegetation to improve condition compared with 2008.
By 2015, sustainable grazing guidelines have been developed with industry for native pastures to ensure grassy ecosystems are not degraded and to facilitate their recovery
By 2030, there has been no loss of ecologically significant species or communities, and the viability and conservation status of these species has been improved from 2008 levels.
By 2015, the status of Nationally, State and regionally listed species and ecological communities is maintained or improved from 2008 levels.
By 2015, threatened species protection plans will be developed and implemented for threatened species of local priority.
By 2030, there is an increase in ecological connectivity within and between landscapes from 2008.
By 2015, the ecological connectivity of at least three priority landscapes (Flinders-Olary, Tothill Ranges, Southern Yorke Peninsula) is increased, compared to 2008.
By 2015, increase the area of native vegetation by 5,000 ha, with a focus on increasing the functionality of remnant vegetation and the protection of erosion prone areas such as coastal dunes.
By 2015, management plans are implemented for areas of Category A and B roadside vegetation significance
By 2030, inland and estuarine water-dependent ecosystems are maintained or improved in condition from 2008 levels.
By 2015, the condition of at least 600 ha of water dependent ecosystems is improved compared to 2008.
By 2015, the extent of watercourse, wetland and other water dependent ecosystems does not decline from 2008 levels.
By 2015, at least 25% of areas classified as "important riverine habitat" are protected and actively managed.
By 2015, at least 25% of areas classified as "good native watercourse vegetation" are protected and actively managed.
By 2015, Water Allocation Plans provide water to meet the needs of the environment.
PEST PLANTS AND ANIMALS
By 2030, there is a net reduction in the impact caused by pest plants and animals on the environment, primary production and the community.
By 2030, the distribution and abundance of introduced pest plants has not increased compared with 2008.
By 2030, the distribution and abundance of pest animals has not increased compared with 2008.
By 2015, pest risk assessment and management plans are operational for priority pest plants and animals
By 2015, 50% of priority areas are managed to control feral animals.
By 2015, 90% of roadsides are managed with effective weed control programs
By 2030, no new significant introduced pest species have become established.
By 2015, biosecurity and incursion response plans are operational for priority pest plants and animals.

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Appendix 4: Participants of the Mid North Agricultural Districts Conservation Action Planning Process

Member	Organisation	Position / Expertise
David Sloper	DEWNR	Natural Resource Management Officer
Jennifer Munro	DEWNR	Water Officer
Brooke Kerin	DEWNR	NRM Officer
Andy Sharp	DEWNR	Conservation Programs Manager
Anne Jenkins	DEWNR	
Jean Turner	DEWNR	Regional Ecologist
Julia Alessio	DEWNR	
Ian Falkenberg	DEWNR	Program Manager, District Ranger
Doug Bickerton	DEWNR	Threatened Flora
John Peet	DEWNR	Monitoring and Evaluation
Jarrod White	DEWNR	Planning
Wendy Cliff	DEWNR	Ranger
Dan Rogers	DEWNR	Ecologist
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Danielle Calabro	DEWNR	
Grant Roberts	DEWNR	
Carly Dillon	DEWNR	
Sam Everingham	DEWNR	
Sarah Lance	DEWNR	
Nicola Barnes	DEWNR	
Kate Graham	DEWNR	
Tony Fox	DEWNR	
Denni Russell	DEWNR	
Bonnie Maynard	DEWNR	
Deb Allen	Coastcare	Coastal projects
Erica Rees	Trees For Life	Threatened Flora
Harvey Neil	Landholder	
Heidi Hodge	Rural Solutions	
Michael Richards	Ag Excellence Alliance	Landcare Officer
Tim Jury	Threatened Plant Action Group	Threatened Flora
Sonya Croft	Nature Conservation Society SA	
Andy Nicholls	SA Murray Darling Basin NRM	
Ann Hallett	NRM Group	
Kerry Ward	Landholder, NRM Group	
Eric Sommerville	N&Y NRM Board	
Ben Browne	NRM Group	
Jill Wilsdon	NRM Group	
Ian Radford	NRM Group	
Claudia Smith	NRM Group	
Leonie Kerley	NRM Group, District Council of Barunga West	
Jo Gebhardt	Landholder	
Neil Smith	Local Landholder, YP NRM Group	Farming, Local Environmental Knowledge
Millie Nicholls	Landholder	Farming, Grassy ecosystems expertise
David Potter	Nursery	
John Smyth	Landholder	
Todd Berkinshaw	Greening Austraila	Conservation Planner
James McGregor	Greening Australia	Vegetation Consultant
Anne Brown	Greening Australia	Biodiversity Officer, Regional Manager

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Mary-Anne Young	Rural Solutions	Grassy ecosystems expertise
John Pitt	Rural Solutions SA	Principle Consultant
Tricia Curtis	Conservation Volunteers Australia	
Holly Cowan	Wakefield Regional Council	Community Development Officer
Nicki de Preu	Nature Conservation Society of SA	
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Nick Nicholls	Lochiel Progress Association	Farming, Local Environmental Knowledge
Fiona Morgan	Landholder	
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Appendix 5: Key Knowledge Gaps (from Workshop 2/3/15 and CAP Actions)

Potential research partnerships, research questions and work experience/intern level information of benefit to progressing the CAP.

- What is the effectiveness of linear roadside connectivity
    - Which variables are most important (width, length, structure)
    - Implications of structural variation for fauna assemblages
- What are the agricultural productivity benefits for conservation projects
- Pre-European vegetation association mapping
- Long term datasets – monitoring and interpretation
- What are the off-target damage of horehound/artichoke control
- Raptor prey preferences – can we develop a dataset to refute lamb take
- Use of drones for surveying wildlife populations – surveying raptors (WTEs) nesting locations and success (productivity)
- What are the impacts of specific interventions?
    - Rabbit control = what are foxes / cats eating? Etc.
- Results chains – assumptions correct and what perverse outcomes etc. have we missed?
- Pilot studies – technologies
- Kangaroo management – extending boundaries – what are the implications? Run a small scale trial
- Ground and surface water quality (salinity) trends – impacts on stock, what are the causes?
- What grazing strategy is optimal for biodiversity (MNGWG partially explored)
- Mistletoe – what is the best management strategy? Is it a response to lack of understorey (i.e. mistletoe bird perching increased frequency on trees)
- What are appropriate fire regimes?
- Biological Surveys – distribution and response to environmental change
    - Reptiles
    - Fungi
    - Lichen
    - Invertebrates
    - Aquatic
    - Bats
- Waterwatch data analysis and interpretation.
- Biological control agents – releases of biological controls and follow up monitoring of old releases
- Germination of hard to grow species – Myoporum playcarpum, Astroloma humifusum, Bursaria spinosa, Themeda triandra (dormancy).
- Weed control methodologies – Rose, Cactus/
- Historical vegetation maps – lignum, native pine, sheoak, etc, how extensive were they historically (do we need to know this or is it irrelevant given today's situation)/
- Are wombats moving into the region, is this new colonisation or recolonising old habitat.
- Genetic and/or botanic survey of local eucalyptus variations to determine taxonomy.
- Is there a leaf hopper impacting Xanthorrhoea?
- Review existing literature and programs relating to coastal buffer and linkage areas (e.g. N&Y Coastal Assessment Report), predicted sea-level rise modelling, and key fauna and flora species and habitats. Also review existing land-use data to determine likely detrimental impacts along the coast (e.g. coastal erosion)
- Develop best-practice revegetation guidelines for buffers and linkages considering appropriate density and structure of revegetation, appropriateness of threatened species within revegetation mix and width and shape for effective coastal buffers and linkages.
- Undertake carbon analysis of the landscape to identify opportunities for investment through Carbon Farming Initiative and Clean Energy Futures Program.
- Review existing reports and programs relating to the restoration of hydrological regimes for regionally significant water-dependent ecosystems, management of water affecting activities and climate change modelling (refer David Dean reports). Identify successful approaches, barriers and key knowledge gaps. Support additional research required.
- Identify current level of water extraction / harvesting in priority sub-catchments and the relative contribution of different water-affecting activities (e.g. bores, groundwater pumping, farm dams, vineyard irrigation, river extraction for troughs, land management - contour banking / no-til farming).
- Identify and assess the effectiveness and feasibility of different options for achieving the desired hydrological regimes in priority sub-catchments (e.g. reservoir release, low flow bypass on dams, decommissioning of unused dam, fixing leaking bores, instream retention of natural flows by increasing habitat complexity, wetland construction, water-use efficiency programs).
- Identify and document best practice methodologies for riparian restoration including stock grazing management (e.g. crash grazing at set times, solar pumps for new water points, riparian fencing), environmental weed control and revegetation of riparian buffers.

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- Research to improve understanding of what native fish species should occur, and did (pre-European), in rivers, creeks and waterholes.
- Identify options for 1) controlling introduced fish species currently in rivers, and 2) preventing future releases of fish (change policy relating to stocking farm dams, release of pet shop fish, recreational release of trout, callup, red fin, and carp).
- Investigate requirements and barriers to successful native fish reintroduction projects.
- Develop an agreed definition of a 'native grassland'.
- Review existing literature and programs focussed on grassy woodland reconstruction for declining woodland birds (e.g. N&Y declining bird monitoring in grassy ecosystems, Victorian grassy groundcover project, Mount Lofty Ranges woodland bird monitoring, Mount Lofty grassy woodlands Biodiversity Fund project).
- Review existing literature for regional weed prioritisation processes and identification of best-practice control techniques (including biology, vectors, bio-control and new innovations). Refer state-wide and N&Y regional weed prioritisation process and N&Y coastal assessment report.
- Research and collate previous work (literature, studies, trials, strategies, etc.) on total grazing pressure conducted in comparable environments (Eastern Mallee and Transitional country).
- Determine the impacts of each herbivore species (i.e. exclusion plots). Use these exclusion plots as demonstration sites for landholders about the impacts of each species.
- Identify suitable grazing practices for the Eastern Country. Refer to previous studies, strategies and programs.
- Research into the long term financial benefits of sustainable grazing stocking rates.
- Develop best practice educational materials for sustainable grazing in Eastern Mallee and Transitional Country.
- Complete a baseline inventory/survey of flora, fauna and hydrology of inlands saline wetlands.
- Review existing literature, strategies and programs relating to best-practice rabbit control. Link in with other rabbit control programs.
- Collate existing climate change reports, plans and modelling relevant to the Yorke Peninsula (e.g. Central Local Government climate change report) and identify baseline and historical climate monitoring information.

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