Strategic Plan

for the Eyre Peninsula Natural Resources Management Region - 2017-2027

Government of South Australia

Natural Resources Eyre Peninsula

Australian Government

Acknowledgment of country

The Barngarla, Nauo, Wirangu, Kokatha and Mirning people are the traditional custodians of Eyre Peninsula and have been for thousands of years. The Eyre Peninsula Natural Resources Management Board acknowledges and respects the traditional owners of Eyre Peninsula. We acknowledge elders past and present, and we respect the relationship Aboriginal peoples have to country.

The Eyre Peninsula Natural Resources Management Board is committed to supporting traditional owners, Aboriginal people and Aboriginal organisations' involvement in the management of land, sea and water. This includes recognising the relationship between Aboriginal culture and natural resources, and incorporating Aboriginal knowledge of natural resources into decision making.

Acknowledgments

Thank you to the people and organisations that helped develop this strategic plan. It is greatly appreciated, and the Eyre Peninsula Natural Resources Management Board looks forward to continuing conversations and embarking upon the required actions.

A special thank you to the Australian Government for their generous funding, which made the development of the plan possible.

The Eyre Peninsula Natural Resources Management Board would like to thank the ongoing efforts of the community, volunteers, landholders and businesses who care for and maintain our beautiful Region.

Contents

Foreword

On behalf of the Eyre Peninsula Natural Resources Management Board (the Board), I am delighted to present our new regional natural resources management plan. This plan builds upon our 2009 plan, and our vision remains the same -

Natural resources managed to support ecological sustainability, vibrant communities and thriving enterprises in a changing climate.

This provides an enduring direction for the Eyre Peninsula, and I look forward to working with you to achieve it.

The regional NRM plan includes the strategic plan and business plan. The strategic plan sets the direction for businesses, organisations, communities and landholders to work together for NRM outcomes over the next ten years. The business plan outlines three years of investment in the Board's programs and projects.

The Board used a participatory approach to develop the regional NRM plan, which allowed us to listen to and discuss with local communities, organisations and businesses about the places and issues of importance. This approach has built our shared understanding, broadened our perspectives and allowed us to capture a fair representation of the region's interests and values. For those of you who offered your thoughts, I am greatly appreciative of the time and consideration. It does not end there though, as it is merely the beginning of a conversation that the Board wants to continue with you. Continuing this conversation will lead us to collectively putting our words into actions as natural resources management is a shared responsibility and we all have a role to play.

You will notice that the strategic plan is centred on the triple bottom line - focusing on our outdoor lifestyles, our productive livelihoods, and our beautiful landscapes that we call home. Integrating and balancing these interests will remain at the forefront of the Board's decision making.

The strategic plan is descriptive rather than prescriptive, and it provides the strategic direction to overcome the challenges ahead. This approach is attempting to lay the foundations for future projects and partnerships that will benefit the Region in the short and long term. We hope that the strategic plan evokes conversations about progressing the required actions, and I look forward to discussing this with you.

I would like to finish by acknowledging the individuals, communities, organisations and businesses that continue to contribute to the Eyre Peninsula and natural resources management. Your efforts are greatly appreciated, and I look forward to working with you to shape our future.

Diana Laube

Presiding Member of the Eyre Peninsula Natural Resources Management Board

Minister's Endorsement

I, Honourable Ian Hunter MLC, Minister for Sustainability, Environment and Conservation, after taking into account and in accordance with the requirements of Section 81 of the Natural Resources Management Act 2004, hereby approve the Strategic Plan for the Eyre Regional Natural Resources Management Region 2017-2027.

Hon Ian Hunter

Minister for Sustainability, Environment and Conservation

Date: May 1 2017

Executive summary

The strategic plan sets the direction for the Eyre Peninsula's community and stakeholders to collectively manage natural resources over the next ten years. Figure 1 outlines the plan's vision and goals.

Community engagement underpinned the preparation of the strategic plan, where activities were undertaken to identify what is valued on the Eyre Peninsula, and identify the opportunities to maintain these values. This identified that the land, the sea and water are all deeply valued by the community as they underpin their identity and wellbeing. It was also identified that ecosystem condition and the viability of our industries are reliant on natural resources management, and we must collectively manage them for the Region's prosperity.

A subregional planning approach was also applied to prepare the strategic plan, where efforts were directed to understand the subtleties of the Eyre Peninsula. This approach described the different landscapes and seascapes, lifestyles and livelihoods that exist across the Eyre Peninsula; and identified the key challenges and opportunities for each subregion (see Appendix A for details).

Vision

Natural Resources managed to support ecological sustainability, vibrant communities and thriving enterprises in a changing climate

Goals

1. Sustainable management and use of land, sea and water

by

A. Working with landholders and industries to sustainably use and manage natural resources

B. Facilitating sustainable commercial and recreational use of the coast and parks

2. Healthy and resilient land, sea and water ecosystems

by

C. Improving understanding and conservation of biodiversity and ecosystems in a changing climate

D. Supporting management of land, sea and water to maintain or improve condition

3. Active participation in natural resource management

by

E. Supporting communities and individuals to monitor and conserve natural resources in a changing climate

F. Supporting traditional owners and Aboriginal communities to care for country

Figure 1 – Vision and goals for the regional NRM plan

Introduction

The strategic plan sets the ten year direction for natural resources management (NRM) for the Eyre Peninsula Natural Resources Management Region (the Region). It has been prepared on behalf the Eyre Peninsula Natural Resources Management Board (the Board) and under the requirements of Section 75 of the Natural Resources Management Act 2004 (NRM Act). At an overarching level, the strategic plan aims to progress the objects of the NRM Act including supporting ecological sustainable development of the Region (see Appendix C for further details).

The strategic plan has been specifically designed as a collective plan for the Eyre Peninsula's organisations, businesses, and landholders. This is because NRM is a shared responsibility, and everyone is critical to the success of NRM.

Natural resources defined under the NRM Act include: soil, water resources, geological features, landscapes, ecosystems, native vegetation, native animals, and other native organisms. Careful and ongoing management of natural resources is required for the wellbeing of our communities, industries and biodiversity.

The involvement of the Region's community has and will continue to be central to implementing NRM. The community's contribution is broad and diverse, and it includes on ground action, information sharing through community networks, working in partnership with the Board to develop and deliver projects, and participation in decision making such as the preparation of this plan. By continuing to work together we can manage our natural resources for the benefit of natural environment, and for current and future generations.

Figure 3 Summary of engagement activities undertaken.

Structure of the plan and supporting documents

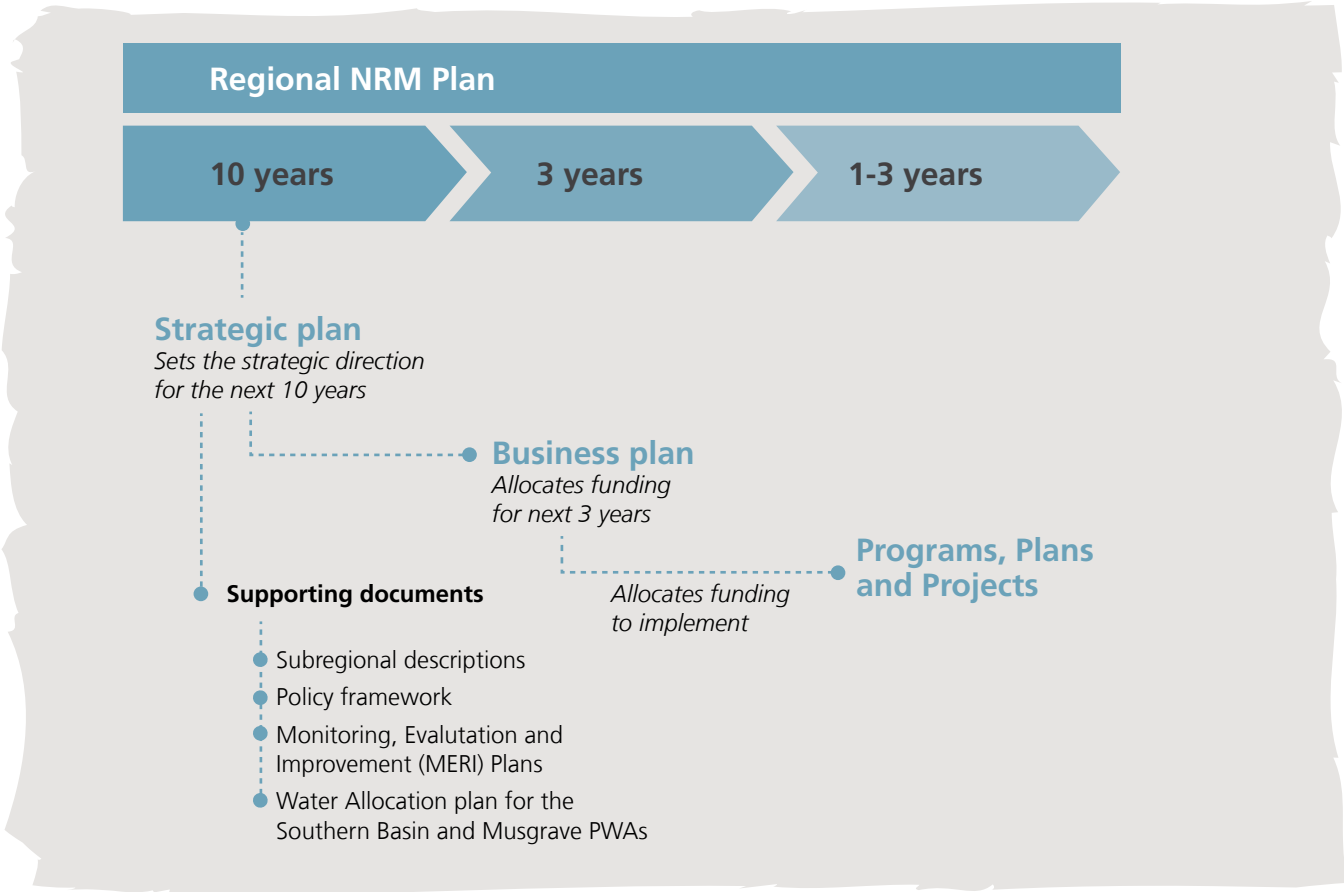
The structure of the strategic plan includes three sections and three appendices. The contents of each of these parts includes:

- **Understanding the Region** describes the regional context by summarising the Region's livelihoods, lifestyles, landscapes and seascapes.
- **Past, present and future** summarises the Region's history, present condition of natural resources and outlines future drivers including climate change projections.
- **Strategic direction** sets the vision and goals for NRM on the Eyre Peninsula over the next ten years. The section includes required actions to progress the goals.
- Appendix A – **Subregional descriptions** provide context about the different features and communities that exist across the Region, and identifies key NRM challenges and opportunities.
- Appendix B – the **Policy framework** specifies policies for land management, pest animal and plant control and water affecting activities. These policies form the basis in which the Board will exercise some of their powers under the NRM Act.
- Appendix C – **Governance** provides details about the roles and responsibilities involved in NRM. The appendix further includes an overview of related legislation, policy and strategies of NRM.

In addition to the strategic plan, the following documents form part of the regional NRM plan:

- **Business plan** details the Board's programs, planned expenditure and revenue over a three year period. It also includes details of how the regional NRM levy is calculated.
- **Monitoring, Evaluation, Reporting and Improvement (MERI) plan** sets out arrangements to assess the success of the regional NRM plan and detect change in natural resources.
- **Water allocation plan for the Southern Basins and Musgrave Prescribed Wells Areas** sets out arrangements for water sharing between the environment and water licensees.

These documents are available on the Natural Resources Eyre Peninsula's website. Please note the MERI Plan was in preparation at time of writing, yet it will be published on the website when available.



Approach to prepare the plan

The strategic plan was prepared using four key approaches, which include: community engagement, subregional planning, prioritisation and policy development. Details about these approaches are discussed below.

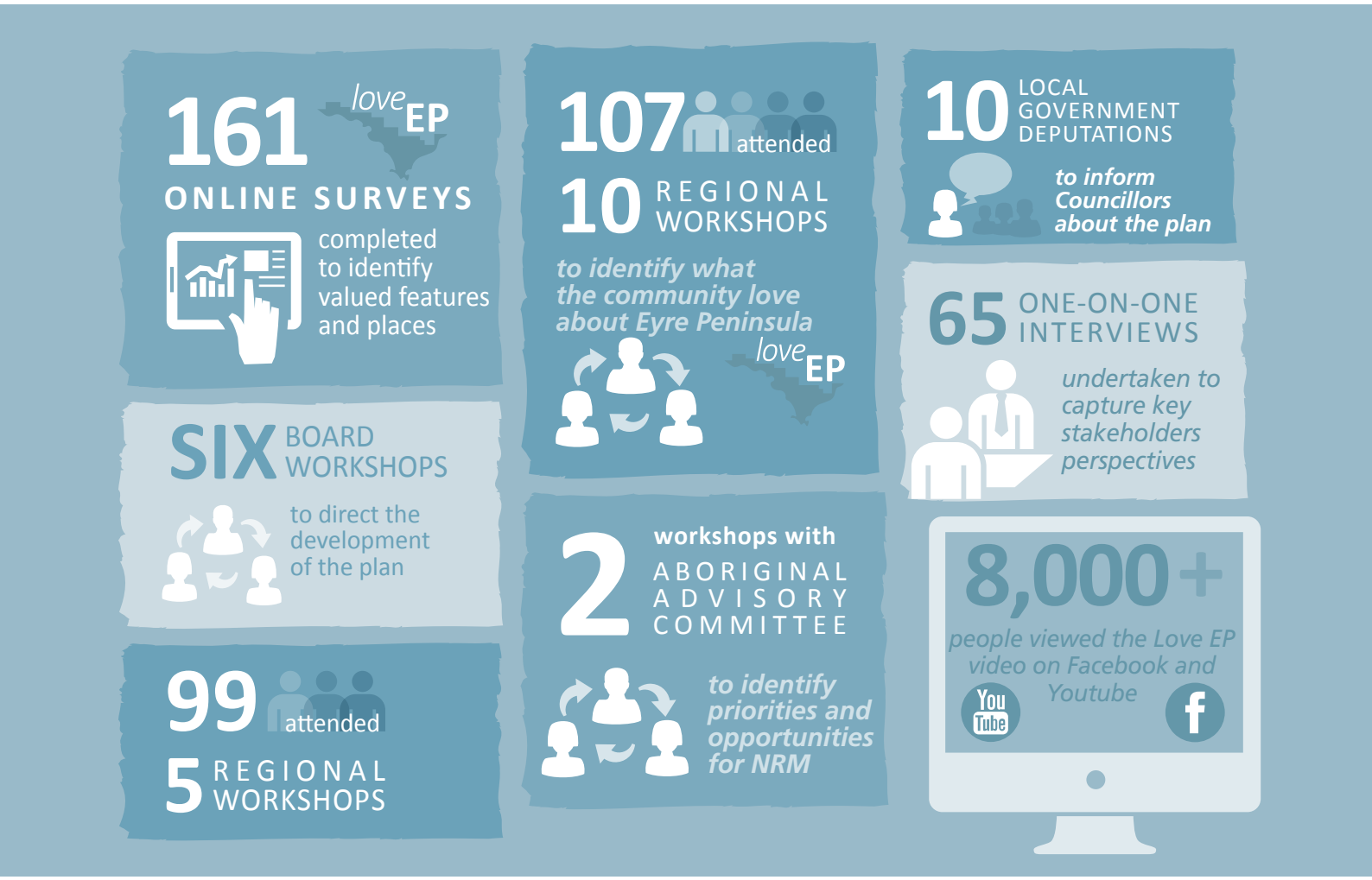
A participatory approach was undertaken to prepare the plan (see Figure 3 for engagement activities undertaken). These activities focused on developing an understanding of what the community value on the Eyre Peninsula, and identifying opportunities to protect and enhance these valued features. This focus on values was decided as research and practice shows that when values are identified and reflected in planning processes, meaningful action is more likely to occur. Part of this included producing a short film called 'Love EP – there's nowhere else I want to be', which showcases the valued features of the Eyre Peninsula. Quotes from the film and engagement activities have been included throughout the plan.

Subregional planning was chosen as an approach to recognise the subtleties across the Region's landscapes and communities.

The Region's five subregions are based on areas of similar landscape and land uses (see Figure 5 for map). A description was then developed for each subregion, which identified the valued landscapes, livelihoods and lifestyles (see Appendix A for details). Additional community engagement activities were undertaken to refine the subregional descriptions, and identify the challenges facing the subregion, and opportunities to address these challenges.

The opportunities collected from all community engagement activities were collated for a prioritisation process. This process involved the Board prioritising the opportunities via a multiple criteria analysis. The results of this assessment informed the development of the goals and underpinning actions. See Strategic direction section for details.

Policies for pest animal and plant control, land management and water affecting activities were updated from the previous regional NRM plan. Policy updates were amended to assist address current NRM challenges. See Appendix B for details of policy framework.



Understanding the region

The Eyre Peninsula Natural Resources Management Region (the Region) covers approximately 8 percent of South Australia, covering an area of 80,000 square kilometres. It extends from Whyalla in the east, along the Gawler Ranges in the north, to the edge of the Nullarbor Plain in the west. The Region includes 2,355 kilometres of coastline spanning from the upper Spencer Gulf to the Great Australian Bight. It further includes 182 offshore islands and surrounding marine environments. See Figure 4 for a map of the Region's land and marine uses, and administrative boundaries; and see Figure 5 for a map of the subregions and biophysical aspects of the Region.

The following subsections outline the regional context by briefly describing the Eyre Peninsula's landscapes and seascapes, livelihoods and lifestyles. Please refer to Appendix A for more detailed accounts of the subregion's livelihoods, lifestyles, landscapes and seascapes.

Quick stats for the Eyre Peninsula NRM region

Population:
Approximately 58,000

Major centres (population):
Whyalla (21,700)
Port Lincoln (16,000)
Ceduna (2,300)

Traditional Owners:
Barngarla, Nauo, Wirangu, Kokatha and Mirning nations

Total area:
Approximately 80,000 square kilometres

Land area:
Approximately 51,000 square kilometres

Local Governments:
City of Whyalla
City of Port Lincoln
District Council of Lower Eyre Peninsula
District Council of Tumby Bay
District Council of Ceduna
District Council of Streaky Bay
District Council of Elliston
Wudinna District Council
District Council of Cleve
District Council of Kimba
District Council of Franklin Harbour.

Out of council area:
Approximately 6,750 square kilometres (13% of land area)

Main land uses (% of land area):
Cropping and grazing (80%)
conservation (17%)

Main industries:
Agriculture, manufacturing and mining, fishing and aquaculture, retail, health and community services and tourism.

Gross regional product 2013-14 (% state value):
Grain $366 million (24%)
Iron and steel $132 million (46%)
Aquaculture $81 million (80%)

Annual rainfall:
250 – 560 mm

Highest elevation:
Caralue Bluff at 486 metres above sea level

Coastline length:
2,355 kilometres (excludes islands)
182 islands

Figure 4 – Land and marine uses, and administrative boundaries of the Eyre Peninsula Natural Resources Management Region

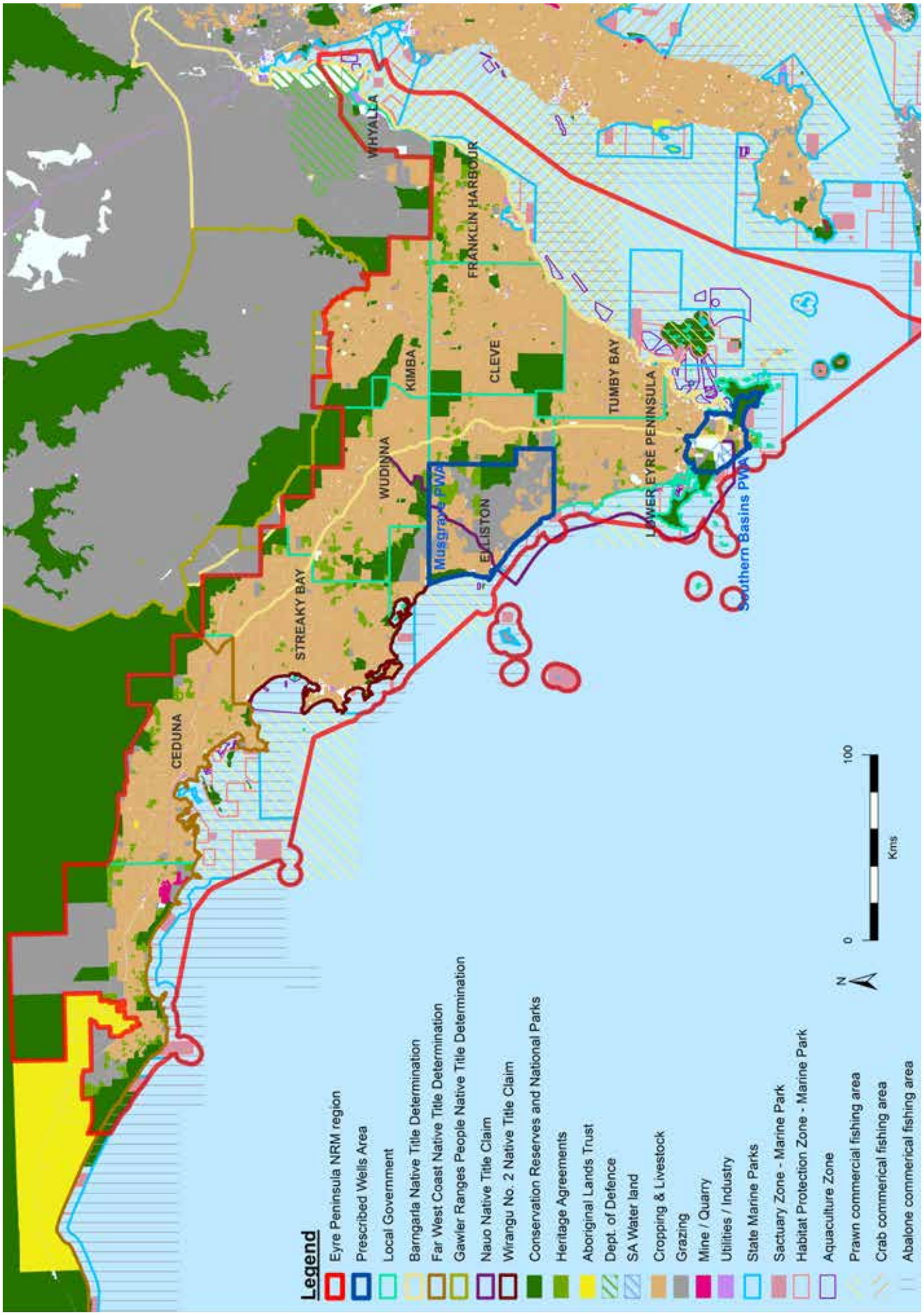
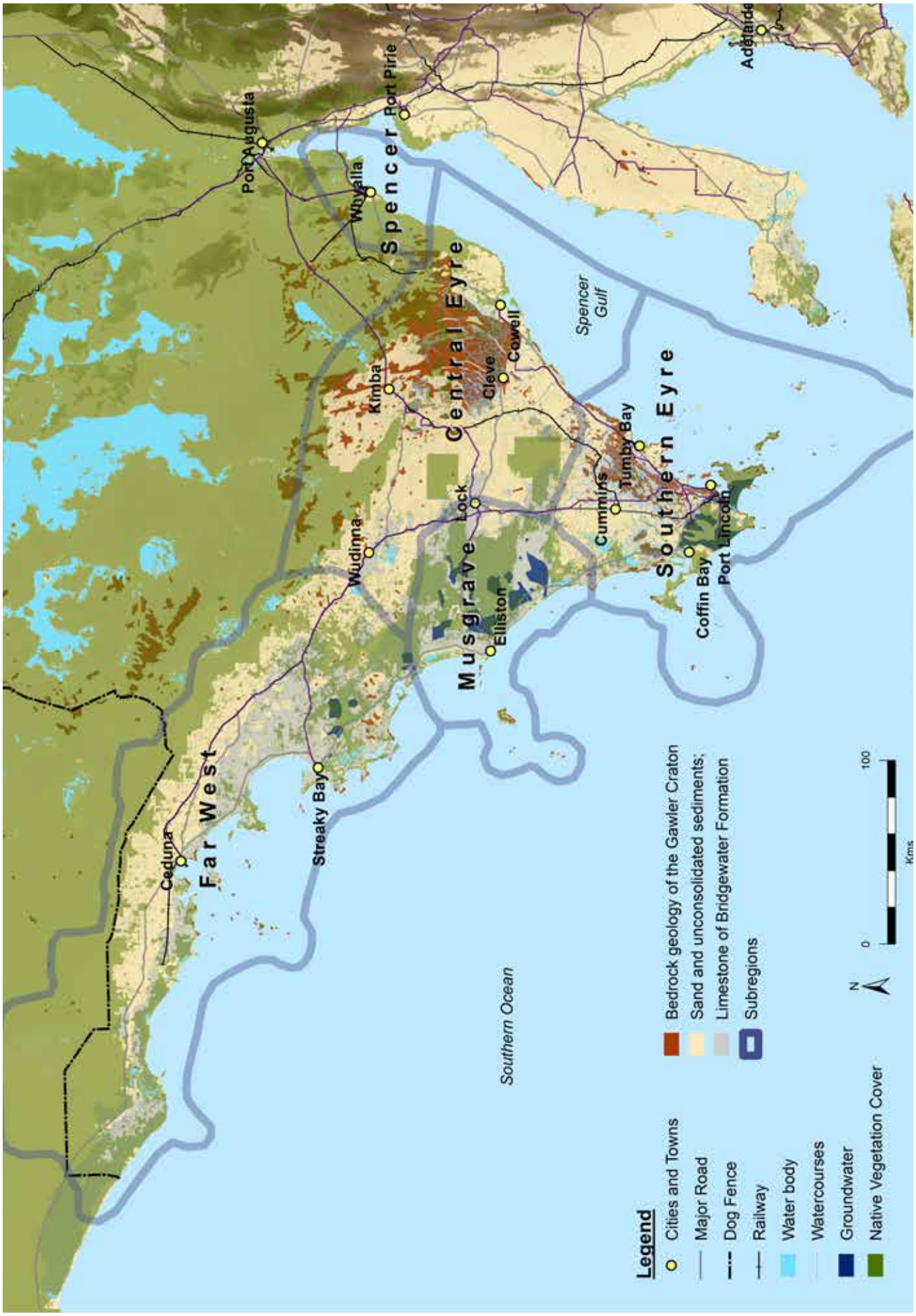


Figure 5 – Subregions and biophysical aspects of the Eyre Peninsula Natural Resources Management Region



Landscapes and seascapes

Remnant native vegetation atop Marble Range, looking west across the entrance to Coffin Bay and Coffin Bay National Park sand dunes beyond.

The Eyre Peninsula has a diversity of land and sea environments that provide habitat for many endemic plants and animals. The Region forms an ecotone of Australia, where the continent's south-eastern and south-western bioregions join to create a unique regional biodiversity. Conservation is a major land use where over 100 conservation parks and over 650 heritage agreements exists. The land and sea also underpin the Region's productive industries and communities' identity.

The Region's coast and marine systems are diverse and impressive, and they include ten of the State's Marine Parks. On the west coast, the Southern Ocean provides a high energy system with big swells and strong winds. The rugged west coast joins the Great Australian Bight, with a coastline of limestone cliffs up to 100 metres high, undulating sand dunes, rocky headlands and islands, and sheltered bays. Marine life is influenced by the Flinders current that moves ocean waters west during summer months; and the Leeuwin current that moves water east during winter months[1]. Marine food webs are dependent upon the nutrient rich upwelling associated with the Flinders current.

On the east coast, the Spencer Gulf is an inverse estuary where waters move in a clockwise direction, entering from the south-western side and exiting at the south-eastern side[2]. The Spencer Gulf has a range of habitats including seagrass meadows, sandy seafloors, reefs, samphire and mangroves. Coastal Temperate Saltmarshes (e.g. samphire) habitats are now listed as threatened ecological community under the *Environmental Protection and Biodiversity Conservation Act 1999*. Spencer Gulf's habitats support commercial species including western king prawns, tuna, abalone, mussel and kingfish; along with a diversity of marine life including sharks, whales and sea lions[3]. Over 60 islands exist in the Spencer Gulf, ranging from small granite outcrops to human occupied islands such as Thistle and Boston Islands. Offshore islands are rich with terrestrial and marine biodiversity.

The Region's geology, landform and associated land use has influenced the grouping of the five subregions used for developing this strategic plan (Figure 5). A summary of the subregions' landscapes and land uses are outlined below.

The most western portion of the Region has been described in this plan as the Far West subregion. It is characterized by undulating sand dunes and limestone areas. There is large area of calcareous sands that has been cleared for a cropping and grazing. This area is boarded to the north by the Dog Fence, and a large corridor of remnant mallee woodland with open grassy or shrubby understorey. The subregion has nationally important wetlands of

Davenport Creek, Streaky Bay, Baird Bay and Point Labatt[4]. The most western point of the subregion is the head of the Great Australian Bight.

The central western coast of the Region has been described as the Musgrave subregion. It is characterized by shallow and outcropping limestone country that is used predominantly for grazing. The limestone stores groundwater associated with the Musgrave Prescribed Wells Areas. This groundwater is used for potable water supply, horticulture, stock and domestic; and supports red gum woodlands and wetlands such as Lake Newland, which are habitat for migratory birds. The area is further characterized by large areas of remnant vegetation including mallee heath, shrub lands, and tussock grasslands. The area once included large areas of Sheoak grassy woodlands however grazing pressure, fire and rabbits have all contributed to its demise.

The northern eastern pocket of the Region has been described as the Spencer subregion, and it is characterized by an arid environment of Myall plains with a blue bush understorey on red calcareous soils. Previous land uses were predominantly pastoral stations, however many pastoral stations have now been acquired by the Cultana Army Defence Training Centre. The subregion includes parts of the Middleback Ranges, which are an area of geological outcrops associated with the Galwer Craton. Many of the outcrops are iron rich, and several have been mined for iron ore and later steel manufacturing. The subregion includes the Region's largest urban and industrial centre of Whyalla.

The large agricultural expanses of eastern and central Eyre has been described as Central Eyre subregion, where land use is predominately for broad scale cropping and grazing. The landscape contrasts between undulating sand dunes and steep hills associated with outcrops of the Gawler Craton. The outcropping geology is highly complex with metamorphic rocks and numerous fault lines, which allows for a diversity of soils and plant species. Remnant vegetation is highly fragmented, yet large patches remain in conservation parks and heritage agreement areas. Ephemeral watercourses are located throughout the hills, however many are saline to highly saline from both naturally occurring processes and dryland salinity. Franklin Harbour and Arno Bay provide important mangrove and samphire habitats, and they support oyster and kingfish aquaculture production respectively.

The southern portion of the Region is described as Southern Eyre subregion, and it is characterised by steep hills along the eastern and western margins, which is infilled by limestone or floodplains. The landscape has been highly modified with over 70% of the area cleared for cropping and grazing. The hills are associated with the outcropping geology of the Gawler Craton, and remnant vegetation in these areas provides a wide variety of habitats with high species richness and endemic plants. The hills also have a number of ephemeral watercourses that discharge into the Spencer Gulf or Coffin Bay. Within the central and western extents there are a number of saline and ephemeral wetlands that receive flows from watercourses and/or groundwater. Areas of limestone often store groundwater, and the Region's major water source is located within the Uley Basin of the Southern Basins Prescribed Wells Area. Coffin Bay and Lincoln National Parks are situated on the south-western and southern-eastern extents of the subregion.

" I think the sense of space is what really captures me. The arid landscape is something that has a majesty about it. The red earth, the dry earth, I can get in the car and head into the distance and somehow it clears your mind."

Joanne Marshall, resident - Whyalla

"We love our country, we love our land, we try to improve our soil structure because we believe that if we have a healthy soil and healthy environment then we are going to grow healthy food. Our challenge is to leave it in better condition for the future generations."

Andrea Hannemann, farmer – Cleve

Oyster production, Eyre Peninsula. Photo: SA Oyster Growers Association.

Livelihoods

Natural resources underpin the Region's livelihoods, where agriculture and seafood industries provide significant employment and economic returns.

Nearly 80% of Eyre Peninsula's land area is used for agricultural production of cropping and grazing[5]. This area produces approximately 40% of South Australia's wheat exports and over 20% of barley exports[6]. Grazing enterprises are predominantly wool and lamb, and some beef cattle.

The Region's seafood industries are recognised internationally for their quality, and they account for approximately 80% of South Australia's seafood exports[7] Main fisheries include king prawns, marine scale fish, abalone, giant crab, rock lobster and sardines. Aquaculture production includes oysters, southern bluefin tuna, abalone, sub-tidal mussels and king-fish. Prawn fisheries predominantly trawl the Spencer Gulf and Venus Bay. Oysters are grown in Franklin Harbour, Coffin Bay, Smoky Bay and Denial Bay. Tuna and king fish aquaculture is within the Spencer Gulf.

The tourism industry is growing on the Eyre Peninsula, and much of this is driven by the Region's landscapes and seascapes. Popular activities and destinations include: shark cage diving around Neptune Island, recreational fishing, surfing along the west coast, snorkelling to see the giant cuttlefish at Lowly Peninsula, swimming with Australian sea lions at Baird Bay and camping and exploring in the National Parks of Coffin Bay, Lincoln and Gawler Ranges.

Mining is an important regional industry, and Iron Knob and surrounding iron ore deposits have driven industrial development and manufacturing in Whyalla. The gypsum and mineral sands are an important employer for the Far West Coast, and graphite has fluctuated as an employer for Southern Eyre.

Grain export occurs from the deep water ports and bulk handling silos of Port Lincoln and Thevenard. Transport of grain to the ports is via the Tod, Lincoln, Flinders and Eyre highways; and the Port Lincoln-Thevenard and Cummins-Kimba rail networks. The transport and export industries of primary products are significant employers for the Region.

The deep water ports at Whyalla and Port Bonython export iron ore and petroleum products respectively.

The Region's rural town and cities have a range of health, education and shopping services and facilities. These sectors are major employers for the Region.

"You can come around a corner and there's a wide expanse of beach and there's not a soul to be seen and not a footprint on it. The next corner you go round and there's a rocky cove and there'll be a sea lion playing around in the water, and the next one there'll be a pod of dolphins catching waves"

Alan Payne - Tour operator - Baird Bay

"As a photographer, the thing I love about Eyre Peninsula is the vast space we have to play with. An open environment, untouched, pristine. You've got the place to yourself. You can go somewhere and it feels like it's yours. EP is magic. I love it."

Robert Lang - photographer – Coomunga

Lifestyles

The Eyre Peninsula is home to approximately 58,000 people, where more than 60% live in the two cities of Whyalla and Port Lincoln. The remaining population is widely dispersed across a large geographical area.

The lifestyles and identity of the Eyre Peninsula community are intrinsically linked to the land and sea. Most people have their favourite spots where they go to unwind and have a sense of place. For some it's their farm, while for others it is a secluded beach or an adventure in the scrub.

The community relish the quiet and relaxed lifestyle of a remote Region, where there is plenty of wide open space to explore nature and enjoy the fresh air. This is particularly important for raising kids and community wellbeing.

For many people the Region's coastline forms an incredibly important part of their identity, where they are drawn to its vastness and beauty. Many spent their childhood playing along the scenic shores and discovering the diversity of marine life. Recreational fishing is a way of life for many locals, and they are out exploring the sea and nearby islands whenever they can.

Surfing, diving, yachting and paddle boarding are all popular activities to enjoy the sea.

There is a strong connection to country and the sea for both Aboriginal and European descendants. The Region's Aboriginal nations of Barngarla, Nauo, Wirangu, Kokatha, and Mirning have their culture and stories deeply ingrained in 'munda' (land) and 'wanna' (sea).

Farming provide many European descendants with a strong connection to the land, and many identify with being a caretaker of the land, recognizing the need for both production and conservation. There is also very strong connection to the sea, and many people find themselves most content out at sea.

There is a strong community spirit on the Eyre Peninsula, and this is evident in the high volunteering rates. Across the Region, one in four people volunteer, and in some areas such as Kimba it's as high as one in two people volunteer[8].

Sport, art and religion are all important points for maintaining community connections and wellbeing.

Past, present and future

Planning for the future requires an understanding of past events and their influences on the present condition of natural resources, along with consideration of future drivers.

This section summarises the Eyre Peninsula's past via a regional timeline (see Figure 6); summarises the present condition and trends of natural resources (Table 1); and identifies the future drivers (see Figure 7).

The past

The Eyre Peninsula has been in the care of the Barngarla, Nauo, Wirangu, Kokatha and Mirning nations for thousands of years. The arrival of Europeans in the nineteenth century led to many violent clashes, and later forced migration and assimilation policies. Collectively these impacts interfered with Aboriginal connection to country, which gradually eroded Aboriginal management and cultural practices. However, concerted efforts are being made by traditional owners to reinforce connection to country by reviving language and protecting cultural sites of significance. In addition, native title claims have been successfully determined to enable native title holders to negotiate with government about a range of matters, including co-management of national and conservation parks.

The arrival of Europeans and the introduction of trade has greatly influenced the Region's marine ecosystems and food chains. The whaling and sealing industry of early nineteenth century is an example of an industry that over-harvested itself into collapse in the pursuit of trade. Unfortunately this lesson has been repeated with other seafood industries such as native oysters. In recent decades, fisheries management has considerably improved its sustainability. The tuna industry is an example of where an industry has evolved from wild catch into aquaculture. This new harvest practice has reduced pressure on tuna stocks and added export value.

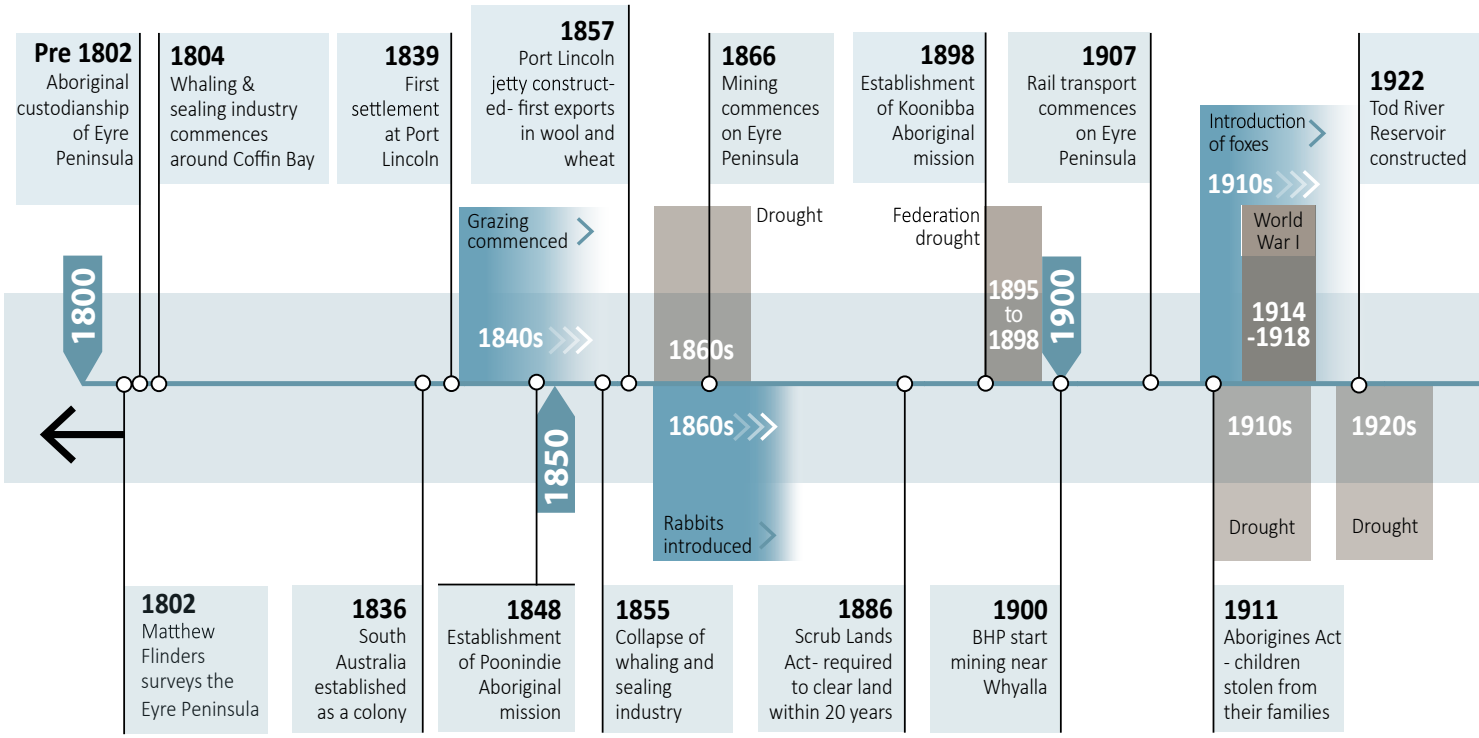


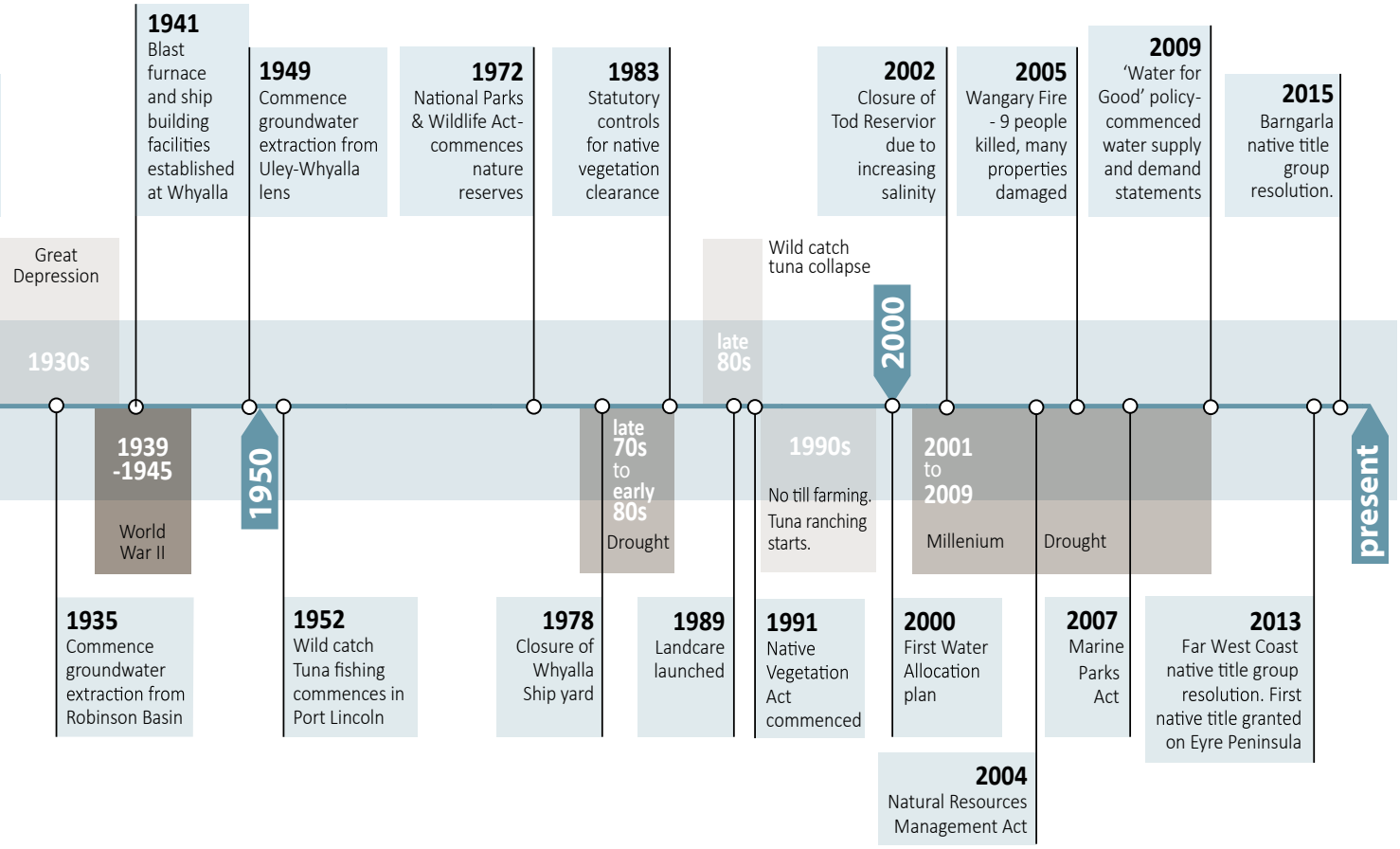
Figure 6 – Timeline of the Eyre Peninsula

Wool, as Australia's major export from the 1850s until 1950s, drove the Region's and State's economic development. This included the development of many settlements and infrastructure across the Region. Major infrastructure included the building of ports from 1857, and construction of the Tod Reservoir in 1922 and water pipeline. This infrastructure supported farms and towns prosper throughout the Region. Grazing has however modified the landscape, consuming large areas of palatable native vegetation and competing with native fauna for food and shelter.

Water infrastructure development has played a pivotal role in the development of the Region, where new water supplies have been continually added to supply growing demands particularly during the major droughts and stock booms of the 1950s and 1970s. Water resources have however been degraded as a consequence of development, and the most notable is the Tod River Reservoir which was forced offline in 2002 due to increasing dryland salinity in the catchment.

The Scrubs Land Act 1886 enabled broad scale land clearance and later cropping enterprises. Cropping has continually advanced in export output through technology and farming practice improvements, and remains the major economic driver for the Region. Extensive land clearance and cropping has however caused significant soil erosion. Improved farming practices of no-till and stubble retention have now greatly reduced soil erosion.

The combination of agricultural development and the introduction of pest animals and plants have left an ongoing legacy on the Region's landscapes and ecosystems. Where 55% of native vegetation has been cleared, and native fauna has been decimated by pests. Particularly mammals where 13 of the 33 species (40%) of terrestrial mammals other than bats have become extinct and another three species are now reduced to precarious colonies on one or two offshore islands[9]. These impacts have the original ecosystem's ability to self-regulate, and creating "novel ecosystems" where their function is greatly influenced by pests and land practices.



Present condition and trends of Natural Resources

Table 1 overleaf shows the present state, condition and trends of the Region's natural resources, along with the data confidence and source.

As indicated in the previous subsection and table, the condition of natural resources' have been degraded as a consequence of development. Recent interventions have however been able to stabilize or reverse trends in condition, and some notable examples include:

- No-till farming has improved condition of soil cover, and greatly reduced wind erosion.
- Prescription and water allocation planning have stabilized groundwater levels in Southern Basins and Musgrave Prescribed Wells Areas.
- Enforcement of the Native Vegetation Act 1991 has halted land clearances of remnant vegetation.

There are however three natural resources indicators that are in poor condition and a declining trend, and these include: soil acidity; aquatic riparian ecosystems; and threatened native species and ecosystems. There is need to address these declining trends and poor conditions over the next ten years. Reversing these trends is not simple and will require concerted and innovative efforts over the longer term. Each of the indicators that are in a poor and declining condition are featured in the goals of the Strategic direction section.

Limited data or absence of a long-term monitoring program restricts the ability to determine the condition trends for native vegetation, marine ecosystems of seagrass, mangroves and samphire. The Board and the Department of Environment, Water and Natural Resources have developed a regional scale biodiversity monitoring program, which is to assess native vegetation condition via the bushland condition monitoring approach, and assess native fauna condition via woodland bird surveys. A network of citizen scientists have opportunities to assist with woodland bird monitoring. The Environmental Protection Agency is to assess seagrass condition trends via aquatic ecosystem condition reporting, however at the time of writing there was not sufficient data to determine trends. There is currently no proposal to monitor trends in mangrove and samphire conditions, yet it is a priority research gap to address.

Table 1 – Present state, condition and trends of Natural Resources[10]

Natural Resource	State	Condition*	Trend	Data confidence*	Data source
Groundwater – prescribed wells areas	Dynamic groundwater levels and salinity that fluctuate with periods of low and high rainfall.	Good	Stable#	Very good	Groundwater status reports by the DEWNR
Riparian aquatic ecosystems	Highly modified ecosystem with elevated levels of nutrients, salinity and turbidity.	Poor to Fair	Declining	Very good	Aquatic ecosystem condition reports by the Environmental Protection Authority
Soil cover – erosion risk	Soil cover improving due to improved farming practices of no-till and stubble retention.	Good	Improving	Excellent	Erosion Protection Field surveys by DEWNR
Soil acidity	Soil acidification is increasing due to high fertilizer use, low lime application and continuous cropping.	Poor	Declining	Fair	Lime sales analysis by DEWNR
Native vegetation condition	Native vegetation has been degraded from past clearance and development, grazing and pests.	Fair	Unknown	Good	Biodiversity Condition Monitoring by the Nature Conservation Society of SA and DEWNR
Threatened native species and ecological communities	Native species and ecological communities are impacted by fragmented habitat, pests, altered hydrology, inappropriate fire regimes, development and recreational impacts.	Poor	Declining	Excellent	Biological Databases of South Australia by DEWNR; and the listed threatened species and ecological communities by the Department of Environment
Marine ecosystems – seagrass	Seagrass communities near populated areas degraded by stormwater, treated sewage, agricultural runoff, aquaculture and industrial discharge.	Good	Unknown	Good	Aquatic ecosystem condition reports by the Environmental Protection Authority
Marine ecosystems – mangrove and samphire	Mangroves and salt marsh have been degraded by land clearance, coastal development, tidal and drainage barriers, water quality and recreational impacts.	Good	Unknown	Fair	Analysis of Coastal Protection Board's Geographic Information System data by DEWNR
Fish stocks	Modified marine food webs from commercial and recreational fishers.	Fair	Stable	Excellent	Fish stock reports by Primary Industries and Regions South Australia

Condition and data confidence ratings rank from: excellent, very good, good, fair and poor.
 # Trend is subject to climate influences.

The hooded plover leg banding program, measuring threatened species recovery and impacts on coastal environments. Photo Trevor Cox.

Future drivers

The Region will continue to be influenced by a range of drivers that originate from different spatial scales (Figure 7). Many of these drivers are increasingly interconnected through globalisation, and as consequence drivers will influence one another. For example international markets continually influence agricultural viability profitability, while grain production at local and regional scales influence commodity prices.

The range of drivers along with their increasing interconnectedness mean much of the future is uncertain and there is a need to continually adapt to the emerging conditions. Outlined below are some of the likely future drivers that may influence NRM on the Eyre Peninsula.

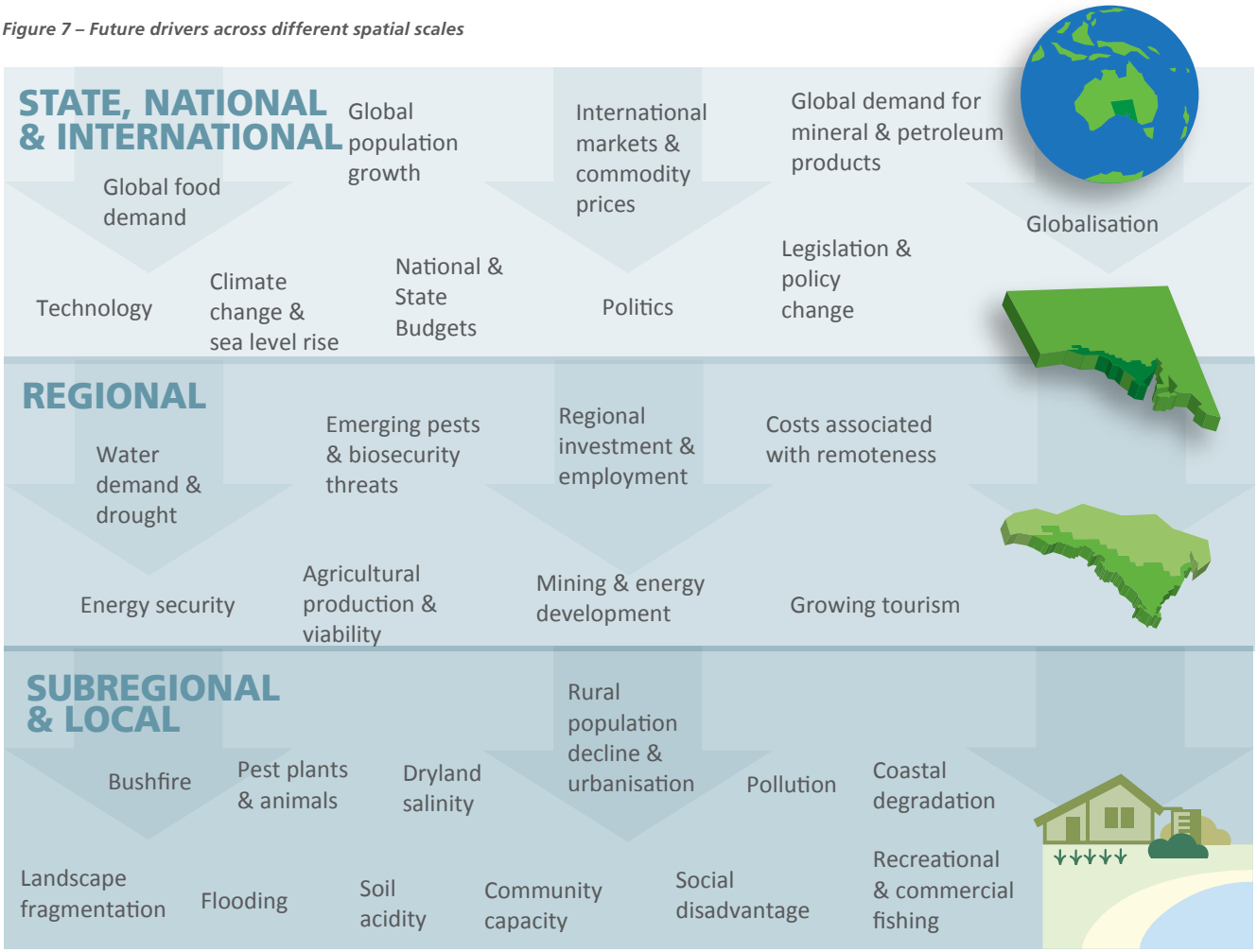
The driver of advancing farming technology along with the economic driver of reducing farming margins may lead to further farm amalgamations. This may increase farm profitability, yet may lead to declines in rural population due to farmers buying out neighbouring properties. Should this eventuate it has implications for NRM as fewer people are available to control pests, and protect native biodiversity such as revegetation and fencing.

The driver of drought along with any future population or industry growth has the potential to make water demand greater than Region's available supply. This could initiate the independent planning process that is associated with the water demand and supply statement, and result in the construction of new water infrastructure to meet demand.

Tourism is a growing industry, and many coastal towns such as Coffin Bay, Tumby Bay, Cowell, Elliston and Streaky Bay experience population spikes during the summer. This has economic opportunities for the Region, yet also requires investment in infrastructure and facilities to cope with increased visitation and avoid coastal degradation.

In recent years, many of the Region's District Councils have experienced slow or negative population growth, whereas the urban area surrounding Port Lincoln has experienced positive growth which is projected to continue Table 1 – Present state, condition and trends of Natural Resources[11]. Should the trend of increasing urbanisation and declining rural communities continue, there would be demise of rural towns as well as smaller workforce

Figure 7 – Future drivers across different spatial scales



and volunteers to conduct NRM. Halting this decline is likely to require investment in new industries and/or improved agricultural profitability from increasing global food demand. Investment may eventuate from large scale mining projects that are currently undertaking investigations or approval processes. Most notably is the Iron Road project near Warramboo, which has potential to greatly increase economic output and employment opportunities for the Region.

Climate change is a particularly strong driver, and the latest research indicates the Region's climate is projected to be hotter and drier; while the seas are to be higher, warmer and more acidic. More detailed projections and emissions scenarios are outlined in Box 1. These projections mean there are foreseeable impacts including:

- Reduction in soil moisture that risks crop yields and pasture growth;
- Changes to the distribution and abundance of native and pest plants and animals, which may contribute to biodiversity decline and impact agricultural productivity;
- Reduction in recharge to groundwater resources, which increases competition for all available water between environmental and human use;
- Increased severity and frequency of fires, which risks loss of life, property and infrastructure, and loss of habitat and species;
- Permanent inundation of low lying coastal areas, which risks loss of property and infrastructure, and the loss of coastal habitats with samphire ecosystems the most vulnerable;
- Increased occurrences of coastal erosion and flooding from storm surge, which risks damaging coastal infrastructure and degrading coastal habitats; and
- Changes to the distribution and abundance of marine ecosystems and commercial fish species, which may impact fish reproductive cycles, reduce marine biodiversity, and reduce the viability of seafood industries.

Efforts will need to be continually applied at local, subregional and regional scales to adapt to emerging impacts. While efforts are urgently required by all scales to continually reduce greenhouse gas emissions in an attempt to avoid impacts associated with a high emissions scenario. (See Box 2 for climate change adaption and mitigation actions).

Box 1: Projections of climate change impacts for the Eyre Peninsula[12]

Air temperatures

Under an intermediate emissions scenario, the temperature is projected to increase by between 1 and 2° C by 2100. Under a high emissions scenario, warming of between 2.6 and 4° C is projected. The frequency of hot days, maximum temperatures and the duration of heatwaves are projected to substantially increase.

Rainfall

Reductions in winter rainfall of up to 25% by 2100 are projected for the intermediate emissions scenario, with reductions up to 45% for the high emissions scenario. The intensity of extreme rainfall events and storms is projected to increase.

Fire weather

An increase in the number of days of severe fire danger due to the projected increase in maximum temperatures and reduced rainfall.

Sea

By 2100 sea level is projected to rise between 0.28 and 0.63 m above the 1986-2005 levels for the intermediate emissions scenario; and between 0.39 to 0.83 m for the high emissions scenario. Storm surges will increase the effects of these sea level rises. Sea surface temperature has been increasing in recent decades and is projected to increase between 1.5 and 3.5o C by 2100 under a high emissions scenario. Ocean acidity will continue to increase as carbon gas emissions are absorbed by the seas.

Box 2: Responding to climate change

What is South Australia doing to respond to climate change?

The South Australian government is committed to reducing the State's greenhouse gas emissions and assisting regions and communities to build resilience and adapt to climate change. In November 2015 South Australia's Climate Change Strategy 2015-2050 was released. This strategy describes initiatives to meet the State's target of net zero emissions by 2050, maximise a low carbon economy, and establish Adelaide as the world's first carbon neutral city.

How are we responding to climate change on the eyre peninsula?

At a regional level, the focus is on adapting to climate change. In 2010, the Eyre Peninsula Climate Change Integrated Agreement (EPICCA) was established between the Eyre Peninsula Natural Resource Management Board, Regional Development Australia Whyalla and Eyre Peninsula, the Eyre Peninsula Local Government Association and the South Australian Government. In 2014, EPICCA prepared a Regional Climate Change Adaptation Plan. This Plan summarises the potential impacts of climate change and describes how key sectors could respond to the future impacts.

What you can do to help

Every individual needs to continually reduce their greenhouse emissions to avoid extreme impacts of climate change. The following simple actions can help address climate change, while also benefiting you, the planet, and your community. Recommended actions include:

- Drive less, and walk and ride your bike more
- Modify your diet by eating local and seasonal food, and eating more vegetables and less meat
- Plant and maintain a garden of local native plants, vegetables and fruit trees
- Install, or connect, to renewable energy for your house and/or business, and buy energy efficient appliances and lighting
- Retrofit your house and/or business to reduce the need for heating and cooling. Insulation, double glazed windows, draught stoppers and shade devices can all assist this
- Avoid buying consumer products that have short life spans or poorly made as they have high embodied energy and are ultimately destined for landfill
- Help protect and regenerate a local nature reserve or community garden

Strategic direction

The following section sets the direction for Natural Resources Management for the Eyre Peninsula by outlining the vision and goals.

The vision has been retained from the previous regional NRM plan as it provides enduring direction for the Region.

The goals provide the basis for commencing new projects and partnerships. Overleaf, discusses the importance of each goal and outlines required actions to progress the goals. Limited detail is provided about who, where and how future initiatives will proceed, as this is to be developed as projects and partnerships emerge.

The goals are aligned with the objects of the NRM Act (see Appendix C).

The method to assess the achievement of goals will be outlined in the monitoring, evaluation, reporting and improvement plan. This assessment is to be conducted after ten years of the Plan's operation, and reviews will be periodically undertaken to determine progress.

Vision

Natural Resources managed to support ecological sustainability, vibrant communities and thriving enterprises in a changing climate

Goals

1. Sustainable management and use of land, sea and water	2. Healthy and resilient land, sea and water ecosystems	3. Active participation in natural resource management
by	*by*	*by*
A. Working with landholders and industries to sustainably use and manage natural resources	*C. Improving understanding and conservation of biodiversity and ecosystems in a changing climate*	*E. Supporting communities and individuals to monitor and conserve natural resources in a changing climate*
B. Facilitating sustainable commercial and recreational use of the coast and parks	*D. Supporting management of land, sea and water to maintain or improve condition*	*F. Supporting traditional owners and Aboriginal communities to care for country*

Figure 8 – Vision and goals for the regional NRM plan

Goal 1: Sustainable management and use of land, sea and water

Why important

The Region's natural resources dependent industries of agriculture, fishing, aquaculture, mining and steel manufacturing are fundamental to maintaining the Region's viability and wellbeing. Collectively these industries provide the major employment base for the Region's communities. It is critical that the Board works in partnership with these industries to use and manage natural resources sustainably.

Specific efforts are required to support landholders as they manage over 80% percentage of the landscape, where cropping and grazing are the main land uses. There is need to support landholders to continuously improve agricultural practices in the face of ongoing and emerging challenges, including soil constraints, reducing farming margins, farmer wellbeing, pest impacts and climate change. There is also need to support landholders to take advantage of emerging opportunities including technology advances and feeding the global population.

There is also need to support and manage the Region's emerging tourism market, which is primarily driven by nature based attractions of the coastline, sea and parks. Increasing visitor pressure from tourists and locals risk degrading their condition, and if not appropriately managed would spoil visitor experiences and damage the Region's tourism market. There is a need to proactively manage visitation and recreational use to ensure these destinations' remain attractive and in excellent condition.

A Working with landholders and industries to sustainably use and manage natural resources

Required actions

A1. Support extension officers and agronomists to facilitate practice change and promote sustainable agriculture practices. This includes information sharing with farming groups and agricultural bureaus

A2. Support research and development at Minnipa Agricultural Centre or similar to develop broad scale practices that improve soil profile, increase organic matter and sequester carbon

A3. Promote practices that prepare landholders to be drought ready, and promote practices that build soil health, and address the causes of soil acidity, soil erosion, dryland salinity and soil structure decline

A4. Partner with seafood industry on mutually beneficial projects including water quality monitoring and works, habitat protection, and marine debris reduction and clean-up

A5. Promote holistic marine management that considers the interactions of the terrestrial environment with the marine biodiversity, seafood industries and recreational users

A6. Partner with mining and civil construction industries to maximise biodiversity outcomes from significant environment benefits associated with native vegetation clearance

A7. Implement and review the Southern Basins and Musgrave Prescribed Wells Areas water allocation plan

A8. Support the development and utilisations of water efficiency measures and alternative water supply infrastructure

A9. Partner with agricultural industry to reduce water quality impacts and manage dryland salinity

B Facilitating sustainable commercial and recreational use of the coast and parks

Required actions

B1. Support local and regional partners implement the Off-Road Vehicle Strategy, including investigations for designating areas for biodiversity protection and recreational use

B2. Facilitate the development of tourism infrastructure, facilities, information and signage to enable sustainable access and use of the coast and parks

B3. Support on-ground works to protect and enhance coastal and park condition including track rationalization, fencing, erosion control, access tracks, revegetation and pest control

B4. Raise awareness about coast and marine conservation including education about human impacts

B5. Partner with tourism industry and the Department of Environment, Water and Natural Resources to facilitate the sustainable growth of nature based tourism

Goal 2: Healthy and resilient land, sea and water ecosystems

Why important

Healthy functioning ecosystems and natural resources are fundamental to sustaining life and the Region's livelihoods. An indicator of ecosystem health is their ability to provide the ecosystem services, which includes: pollination, nutrient cycling, natural pest control, soil formation, water purification, flood regulation, genetic diversity and many more. For these ecosystem services to flourish, ecosystems need a diversity of species and habitats, however many of the Region's ecosystems have been highly modified by land clearance, altered hydrology, altered fire regimes, introduced species. Collectively these impacts have decreased diversity, and if left unabated, has potential to lead to simplified ecosystems that provide limited ecosystem services. This simplification is continually aided by 'novel ecosystems', where ecosystems' self-regulation capacity is constrained due to past impacts. This results in pests and some native species expanding to overabundant populations, while other species and ecological communities demise to threatened or extinct status. Many ecosystems are on the trajectory to a simplified state, and there is an urgent need to reverse these trajectories, and restore ecosystem services. Focusing on habitat protection and restoration, and addressing threats are critical actions to increase ecosystem resilience.

To support these conservation actions requires an ongoing dedication to monitoring natural resources condition, evaluating actions, and building new knowledge about ecosystem complexity. Improving these aspects will assist in the design of effective interventions and collecting learnings.

C Improving understanding and conservation of biodiversity and ecosystems in a changing climate

Required actions

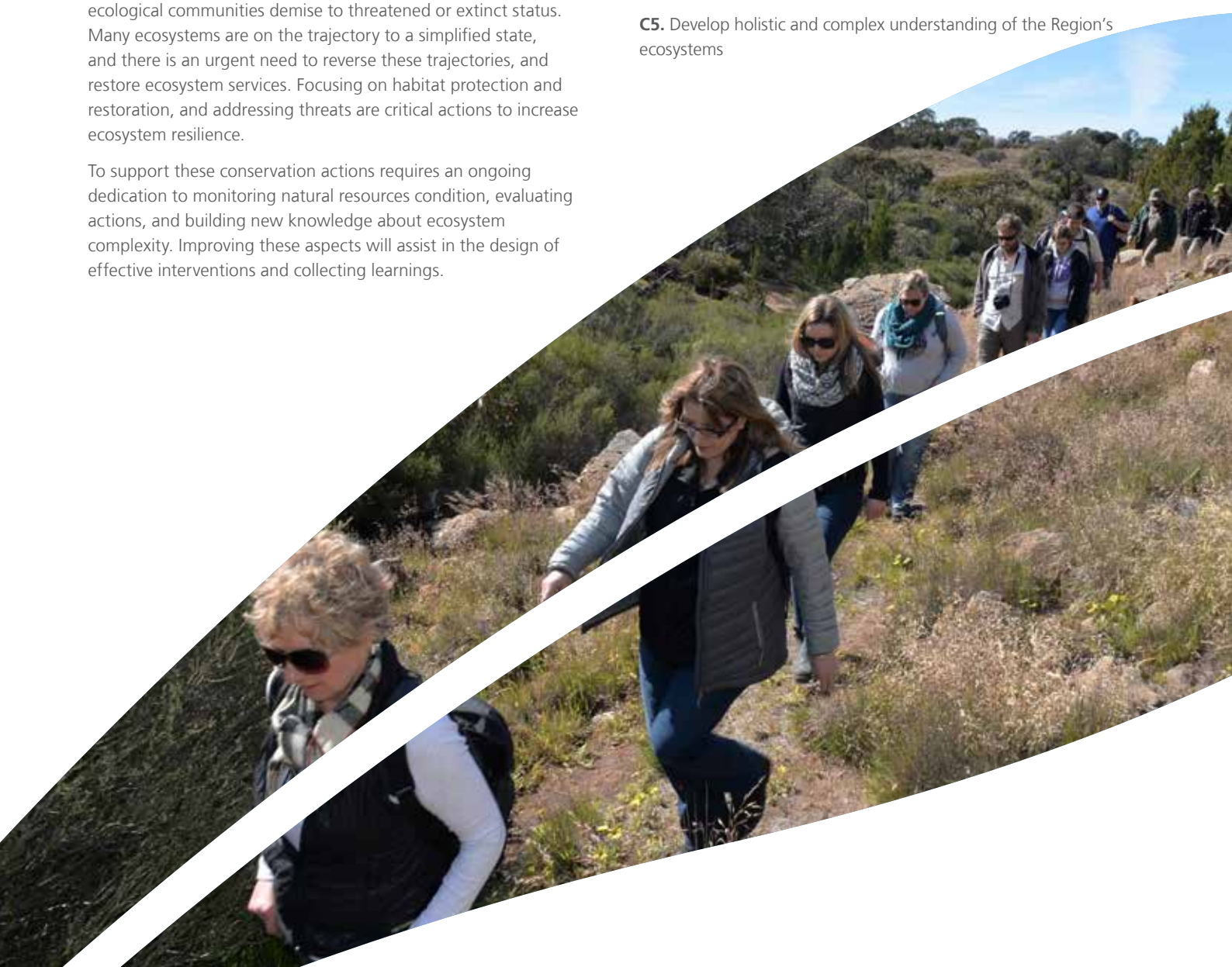
C1. Monitor and evaluate natural resources management actions, and their effect on natural resources' condition and trends

C2. Address information gaps and/or improve data collection method(s) for monitoring condition of natural resources identified in Table 1, including addressing the information gap of mangrove and samphire condition and trends

C3. Increase participation in citizen science initiatives that assist understand trend and condition of natural resources

C4. Support research to address priority knowledge and information gaps (identified in Box 3)

C5. Develop holistic and complex understanding of the Region's ecosystems



D Supporting management of land, sea and water to maintain or improve condition

Required actions

D1. Protect and restore coast and marine habitats, particularly for priority areas identified in the Coastal Action Plan and Marine Parks' plans

D2. Protect and restore remnant terrestrial habitats and establish biodiversity corridors that link habitats. Priority areas include WildEyre and Eyre Hills (see Figure 9)

D3. Facilitate whole of catchment management planning and supporting works to restore riparian and wetland ecosystems, and reduce water quality impacts

D4. Develop and implement integrated pest management strategies that address the impacts and causes of pest persistence or incursion. Particular attention is required for overabundant herbivores, feral predators, woody weeds and new pest incursions such as buffel grass

D5. Develop and implement strategies and plans to protect threatened species and ecological communities, including implementing threatened species recovery plans

D6. Promote the adoption of restorative farming practices that build soil life and diversity, and maximise ecosystem services

D7. Partner with Local Government to undertake urban stormwater planning and implementation focusing on water sensitive urban design that reduces water quality impacts

Box 3: Research priorities for the Eyre Peninsula NRM Region

RP 1. Undertake high resolution digital elevation mapping of the Region's coastline and modelling to determine sea level rise and storm surge impacts

RP 2. Investigate the food web dynamics of terrestrial native biodiversity, and pest plants and animals

RP 3. Investigate means for integrated management of over-abundant herbivores and predators

RP 4. Investigate food web dynamics of seafood industries and marine biodiversity, including a focus on interactions between terrestrial inputs and the littoral zone

RP 5. Investigate adaptation capacity of native biodiversity and habitat to climate change and sea level rise impacts

RP 6. Investigate required fire regimes to support biodiversity outcomes

RP 7. Investigate environmental water requirements of groundwater dependent ecosystems, and/or sustainable diversion limits for priority surface water catchments

RP 8. Investigate and apply methods of preventing new infestations, and restricting the spread and impact of existing environmental pest plants and animals

RP 9. Investigate broad scale methods to improve soil health and soil microbial diversity

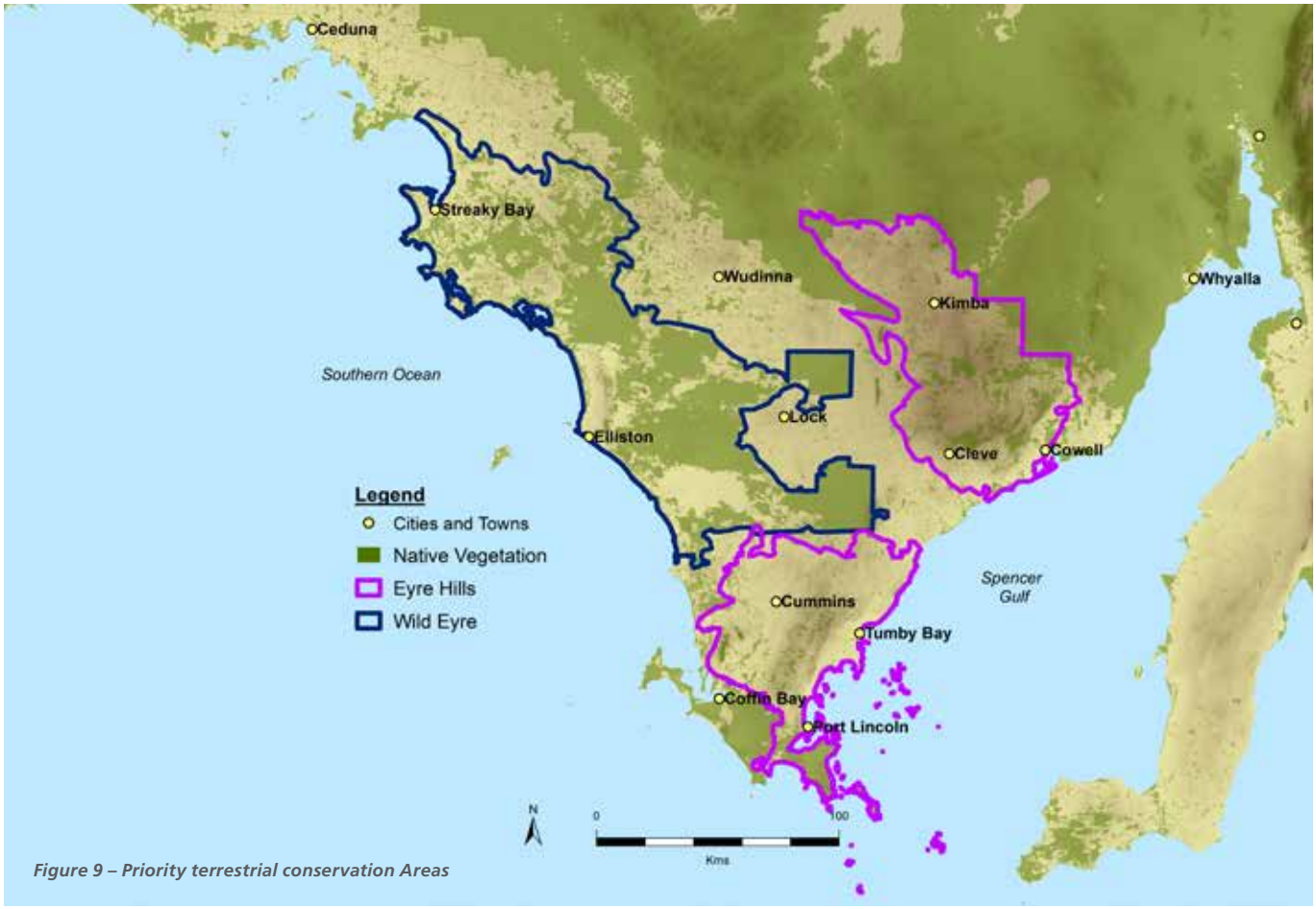


Figure 9 – Priority terrestrial conservation Areas

Goal 3: Active participation in natural resource management

Why important

Natural resources management is a shared responsibility, and all of the Region's communities, organisations, businesses and individuals have a role to play. To do it effectively requires a strong, knowledgeable, capable and committed workforce. To support this requires an ongoing dedication to build skills and knowledge, as well as ongoing communication and networking.

Specific efforts are required to work with traditional owners and Aboriginal communities. This includes supporting traditional owners and Aboriginal communities to manage their traditional lands; and creating career pathways for Aboriginal people. These actions will assist with reconciliation between Aboriginal and non-aboriginal people, while assisting Aboriginal people to have a strong culture and connection to country.

E Supporting communities and individuals to monitor and conserve natural resources in a changing climate

Required actions

E1. Undertake education and networking initiatives that share learnings about NRM issues and build knowledge and relationships between community and NRM stakeholders

E2. Support volunteers and community groups to undertake NRM activities

E3. Partner with schools and/or support initiatives that encourage children to access and learn about nature

E4. Partner with Local Government and/or schools to increase sustainability of urban communities

E5. Support projects that assist the community to prepare for and adapt to climate change impacts

E6. Facilitate community and stakeholder involvement in NRM decision making

E7. Monitor and evaluate trends in community capacity to manage natural resources

F Supporting traditional owners and Aboriginal communities to care for country

Required actions

F1. Facilitate Aboriginal involvement in NRM decision making

F2. Support native title groups in co-managing public land, including supporting the Far West Traditional Owners Group implement the Healthy Country Plan

F3. Support traditional owners, Recognised Aboriginal Representative Bodies, Aboriginal Regional Authorities and Aboriginal communities manage natural resources and record sites of Aboriginal cultural significance

F4. Provide training and career pathways into NRM related employment

F5. Support awareness raising activities about Aboriginal cultural knowledge and law

Regional priorities

The comprehensive engagement process undertaken to prepare this Plan identified a range of opportunities to address challenges that are not within the scope of the Board under the NRM Act. These opportunities are however Regional Priorities, as they support our livelihoods and lifestyles. The Board will support processes that drive these Regional priorities, however it will not take the lead role. Key Regional Priorities include:

1. Develop a low carbon economy and increase renewable energy generation
2. Support bushfire prevention, preparation, response and recovery
3. Develop a regional governance model to efficiently and effectively deliver regional outcomes
4. Economic diversification including value adding to primary production, exports, crop diversification and development of new mineral industries.

Appendix A
Subregional descriptions

To support planning of a large and diverse area, the Region was divided into five smaller subregions based on areas of similar landscapes, land uses and communities (see Figure 10). The subregional boundaries are intended to be "fuzzy", and they are not fixed boundaries. Instead they are used to guide thinking and planning.

Five subregional descriptions are presented in the following subsections. Each subregional description includes the values, landscapes and seascapes, livelihoods and lifestyles of the subregion. It further identifies key NRM challenges and opportunities. Page references include:

Figure 10 - Subregions of the Eyre Peninsula NRM region

Spencer

The Spencer subregion extends west from the Spencer Gulf just south of Blanche Harbour to the foothills of the Middleback Ranges, south to the Munyaroo Conservation Park. The subregion includes all of the Whyalla City Council's area.

Quick stats

Population:

Approximately 22,100 (2011 Census)

Major towns (approximate population):

Whyalla (21,700), Point Lowly (300)

Traditional Owners:

Barngarla

Local Governments:

City of Whyalla

Land Area:

1,120 square kilometres

Main land uses (% of land area):

Dryland grazing (50% of land area)
Defence training area (35%)
Conservation (7%)

Main industries:

Manufacturing
healthcare and social assistance
retail trade
mineral and petroleum exports

Annual Rainfall:

250 - 280 mm

Elevation:

Sea level to 250 metres AHD

Coastline length:

180 kilometres

Number of Islands:

0

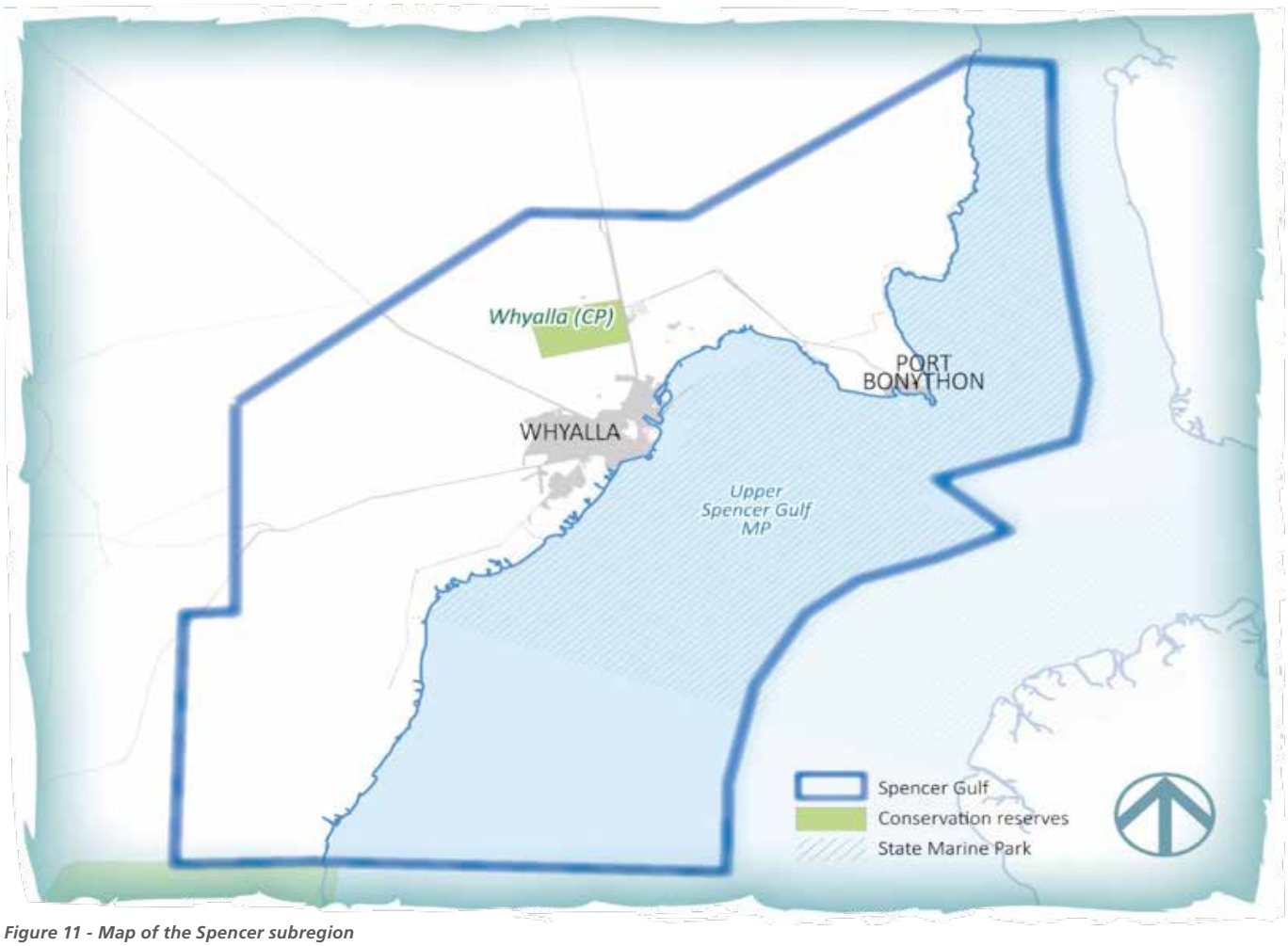


Figure 11 - Map of the Spencer subregion

What's valued in the Spencer subregion

The coast and the Upper Spencer Gulf are highly valued by the community, with the northern coastline valued for "its peace and tranquillity, beautiful scenery and safe, sandy beaches". Many people remember playing and exploring the majestic coast and beaches during their childhood and now enjoy taking their holidays there. The lighthouse and cottages at Point Lowly are valued for their scenic and historic value and are popular visitor attractions. The shingle stranded beach ridges that run along Fitzgerald Bay is particularly unique and valued for its cultural and geological significance.

"The northern coastline is something different. With the pebble beaches, mangroves, clear waters and backdrop of the Flinders Ranges, it's unique and very special."

Many Spencer locals and visitors enjoy the waters of Spencer Gulf to fish for snapper or crabs, wind-surf, sail or swim. The rich marine biodiversity is particularly valued as many enjoy diving with the giant cuttlefish or spotting dolphins. The community is increasingly aware of the critical importance of local temperate samphire and mangrove habitats to sustain the area's unique marine biodiversity.

The biodiversity and cultural significance of the arid landscape is another important part of the Spencer subregion. In particular Wild Dog Hill has cultural significance for the Barngarla people; and is valued as an accessible and protected area with important western Myall plant communities. The scenery and peacefulness are other cherished parts of the arid landscape.

The Spencer community value their arid landscapes, and Munyaroo Conservation Park, Ironside Hill and Middleback Ranges all important places. Ironside Hill is valued for its physical divide between the arid bluebush landscape and the mallee landscape. The Middleback Ranges have ecological and cultural importance, as well as historical significance due to the development of the mining industry at Iron Knob, which drove the development of Whyalla's steel works and former ship building.

The Spencer community recognise the need for and value of natural resource management. They recognise their role as custodians of the land and the sea and the need to protect them for future generations. They acknowledge the need to find a balance between economic, social and environment values and specifically recognise the reliance of urban communities on natural resources for food and water. The Spencer community values the diversity of Eyre Peninsula and particularly respects and understands the Spencer subregion's unique environment.

"Wild Dog Hill juts out of a fairly flat landscape. It's magical in its colour, spiritual connection and peacefulness and has fantastic panoramic views."

Cuttlefish

Landscapes and seascapes

Spencer includes a coastline of 180 kilometres and a land area of approximately 1,120 square kilometres. Spencer experiences a semi-arid climate, with average annual rainfall between 250 and 280 mm per year and average monthly rainfall similar across the year[13]. Winter rains result from cold fronts from the Southern Ocean, whereas summer rains are often associated with monsoonal low pressure systems that can bring heavy rainfalls[14]. The subregion experiences very high evaporation of around 2500 mm per year, which far exceeds annual rainfal[15].

The landscape north-west of Whyalla is dominated by the stony tablelands of the Arcoona Plateau. The Douglas Hills (Douglas Uplands) run along the coast near the northern boundary within the Defence Cultana Training Area. The stony hills and plains in this area are covered with a sparse shrubland of Bluebush (*Maireana sedifolia*) with scattered areas of Western Myall (Acacia papyrocarpa) and Black Oak (*Casuarina pauper*) woodland. The highest points in the Spencer subregion (around 250m AHD) occur near the northern boundary of the Eyre Peninsula NRM Region.

Further south toward Whyalla and inland of False Bay, a large area of Yorrell (*Eucalptus gracilis*) forms a transition zone between the hills and plains. Toward Whyalla, the land is flatter and Hummock Hill although only about 30m high, provides a landmark topographic feature. South of Whyalla, the land is flatter, rising gradually from the coast with predominantly red clay soils. Across this area, shrubland dominated by Bluebush (*M. sedifolia*) and Bladder Saltbush (*Atriplex vesicaria*) and Western Myall (*Acacia papyrocarpa*) woodland are widespread[16]. The land is predominantly used for grazing on the saltbush plains.

The Whyalla Conservation Park is the only Conservation Park in the subregion and covers about 2,000 ha about 7km north of Whyalla. The Park contains large areas of Western Myall (*Acacia papyrocarpa*) woodland that provides habitat for numerous bird species. The Mt Laura Conservation Reserve covers about 1,800 ha directly south of the Whyalla Conservation Park.

A significant feature of the Upper Spencer coast is the large extent of mangroves, along nearly half of the coast line[17]. The mangroves (*Avicennia marina*) and seagrass meadows provide important nursery areas for commercial and recreational fish and crustaceans. Coastal wetlands exist along most of the coast south of Whyalla, vegetated with sparse samphire (*Tecticornia sp.*).

Fauna	Flora	Vegetation communities
Humpback Whale (*Megaptera novaeangliae*)	Sandalwood (*Santalum spicatum*) and Dagger-leaf Wattle (*Acacia rhigiophylla*)	Temperate coastal saltmarsh (*Frankenia pauciflora*, *Tecticornia* sp., *Puccinellia stricta*, *Wilsonia humilis*, *Disphyma crassifolium*, *Atriplex semibaccata*, *Triglochin striata*, *Tecticorniwa indica*)
Southern Right Whale (*Eubalaena australis*)	Dagger-leaf Wattle (*Acacia rhigiophylla*)	Western myall low woodland (*Acacia papyrocarpa over Atriplex vesicaria ssp. Maireana sedifolia, Enchylaena tomentosa var. tomentosa, Rhagodia ulicina low shrubs*)
Mallee Fowl (*Leipoa ocellata*)	Seagrass (*Thalassia testudinum, Syringodium filiforme, Halodule wrightii, Halophila johnsonii, Halophila decipiens, Halophila engelmanni, Ruppia maritima*)	
Slender-billed Thornbill (*western ssp*) (*Acanthiza iredalei iredalei*)		

Table 2 – Selected fauna, flora and vegetation communities of conservation significance

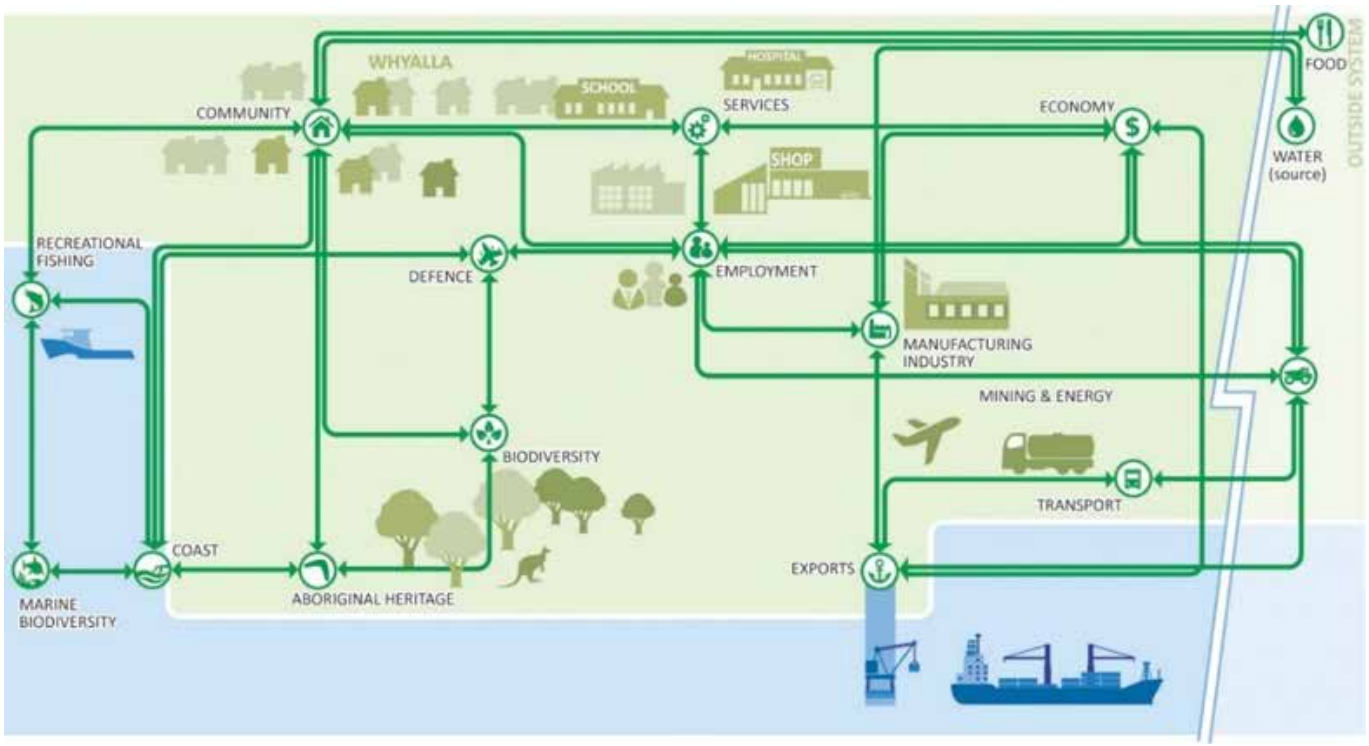


Figure 12 – Interconnections of the Spencer subregion

Along the northern coast and particularly near Fitzgerald Bay, Douglas Point, Stony Point and Black Point, shingle beach deposits of pebbles and cobbles have formed flat topped ridges about 3 to 5 m above current sea level. This shingle stranded beach dune is an important and rare geological feature.

The Upper Spencer Gulf Marine Park extends from Cowleds Landing north to the top of the Gulf. The area is recognised as a Wetland of National Importance, containing mangroves, samphire, tidal flats and marine habitats that provide nesting and feeding sites for local and migratory shorebirds[18]. A significant feature of the Marine Park is the subtidal reef area off the coast of Point Lowly. This is the location of the annual spawning of Giant Australian Cuttlefish (*Sepia apama*), the only known dense spawning aggregation of cuttlefish in the world[20].

There are no permanent watercourses in the Spencer subregion however there are several ephemeral creeks that drain the hills areas to the north of Port Bonython and west of Whyalla. Runoff from the Middleback Ranges west of Whyalla drains toward Whyalla. A drain has been constructed around the Whyalla township to prevent overland flow toward the town, discharging to the samphire flats south of the town . Large floods were experienced in this catchment in 1921, 1946, 1974 and 1979[21]. Ephemeral creeks run off the Douglas Hills north of Port Bonython. Groundwater in Upper Spencer is generally too saline for stock water and of too low yields for extraction for other purposes[22].

Nearly 85% of the subregion's area is covered by native vegetation[23]. About 55% of this is on government land, mostly within the Defence Cultana Training Area. There is a relatively low terrestrial biodiversity, and a low number of species of conservation significance. Selected species of conservation significance are shown in Table 2.

Soil type largely influences vegetation cover in the Upper Spencer subregion. Calcareous and siliceous sandy dunes occur along most of the coast south of Whyalla. Further inland, calcareous loams are also found[24]. The subregion's calcareous soils generally have low water holding capacity and poor nutrient levels, making them only suitable for grazing.

Livelihoods

Nearly half of all employment in the subregion occurs in three sectors: manufacturing (22% of residents), health care and social assistance (13%) and retail trade (11%)[25]. Much of this employment is centred in Whyalla however many Whyalla residents travel outside the Council area for employment in the mining sector.

Mining and associated manufacturing is a key contributor to the subregion's employment and economy. Mining iron ore has been an important source of employment and State revenue since the early 1900s, when BHP started mining operations at Iron Knob. There are now additional ore bodies mined at Iron Baron and Iron Duke, that although located outside the subregion provide an important contribution to the livelihood of the subregion's community. The subregion also contains two sand mines, two quarries and the Whyalla salt pans. Manufacturing has provided an important economic and employment base throughout Whyalla's history. Notably the Whyalla steelworks converts locally sourced iron ore into steel products including structural steel and railway sleepers and rails.

Outside the city, land use is predominantly under pastoral lease or used by the Department of Defence for the Cultana Training Area. Cultana is now the largest Defence training area in Australia, with a total area of 2,300 square kilometres[26].

Whyalla steel works

Commercial wild fisheries are an important industry in the subregion. Whilst not employing a large number of Spencer residents, the wild catch industries including prawns, blue crab, and scalefish contribute to the regional economy and are important contributors to the State's commercial fishing industry. The Spencer Gulf Prawn Fishery is one of the more valuable fisheries in Australia[25], and its viability relies on the nursery habitat provided by the subregion's mangroves and tidal flats.

Major transport infrastructure includes ports, road, airport and rail. The Lincoln Highway connects Whyalla to southern Eyre Peninsula, and is considered the gateway to the Eyre Peninsula. Whyalla's airport supports a range of industries and particularly the mining sector that has a fly-in-fly-out employment base. The Whyalla port is privately owned and operated, and exports steel products and iron ore mined at Iron Knob, Iron Duke and Iron Baron. The Port Bonython deep-water port is used to store, process and export liquid petroleum gas and petroleum products.

Tourism is an important contributor to the local economy, with visitors enjoying activities including recreational and charter fishing, sightseeing cruises, diving/snorkelling with cuttlefish, boating, beach walking, bird watching and water sports.

Lifestyles

The Spencer subregion is the traditional land of the Barngarla Aboriginal people. Numerous sites of cultural significance exist along the coast, including fish traps and campsites. Inland, many of the hills and major topographic features notable on the flat landscape have significance. The Barngarla people have been recognised as the Traditional owners of the Region including the marine areas of the Gulf.

Whyalla is the main urban centre of the subregion and a key centre for the broader Eyre Peninsula. A small settlement is located at Point Lowly and a number of shack settlements are located at Douglas Point, Fitzgerald Bay, False Bay and Cowleds Landing.

Spencer is home to around 22,100 people, over 98% of whom live in the Whyalla township[28]. The subregion includes all of the City of Whyalla Local Government area. The population of the City of Whyalla grew by 3% from 2006 to 2011, however this followed over a decade of slow or negative growth. Future population changes will be largely influenced by the future viability of the steel industry.

The age distribution of the population of Spencer mirrors that of the broader Eyre Region, with around a third aged under 25 years, just over half aged between 25 and 64 years, and around 15% aged 65 years and over[29]. Around 4% of people in Spencer identify as having Aboriginal or Torres Strait Islander heritage, similar to the average across all of Eyre Peninsula.

Spencer residents enjoy a range of land and water based sports and recreational activities including football, netball, soccer, cricket and tennis as well as fishing, boating and bushwalking. These activities provide opportunities for community connection. The accessibility of the northern beaches provide opportunities for locals and tourists to enjoy fishing, camping, 4WD adventures and walking.

Active community groups include Friends of Parks and native plant groups. Both groups provide support for the protection and enhancement of the subregion's biodiversity.

Urban Natural Resource Management in Whyalla

Urban and industrial development have highly modified the environment of Whyalla. Undertaking urban NRM can improve the condition of the environment and wellbeing of the community. The following actions can assist contribute to a healthy Whyalla:

- creating green spaces and community gardens for community wellbeing
- holding community events that enjoy and care for the environment
- Planting native species to create habitat
- undertaking stormwater management including water sensitive urban design and watercourse rehabilitation
- coastal protection and access management and
- pollution prevention programs.

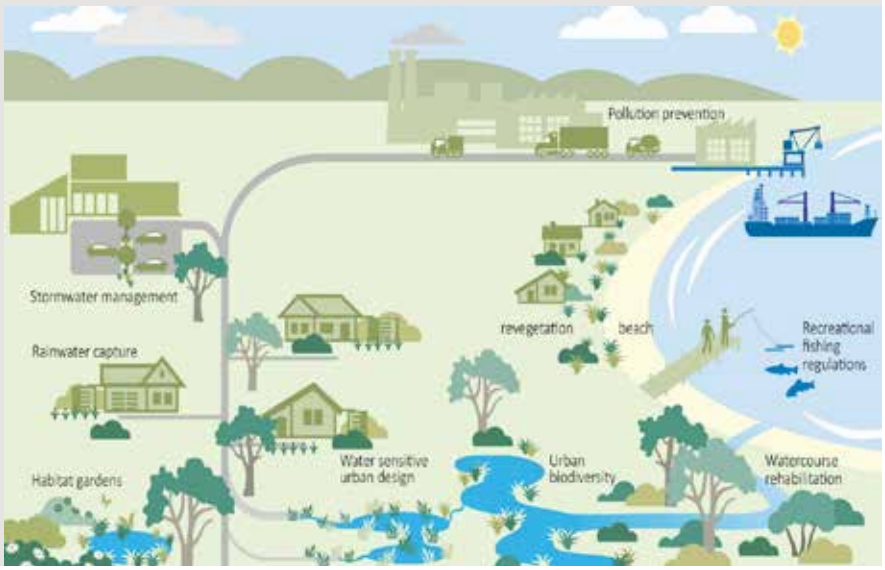


Figure 13 – Urban NRM in Whyalla

Systems understanding

Spencer is a complex system of connections and interactions between people, industries and natural resources. These connections and interactions mean that when one feature is impacted, flow on effects will be experienced by other features in the system. Developing this understanding can help identify the factors that make the system resilient or vulnerable to change. The Spencer system is conceptually depicted in Figure 12.

Key features of the system include manufacturing industry and the city of Whyalla which are the hubs for the subregion's services, employment, and transport and community interactions. Community's connection to the coast reflects the high recreation and amenity value of the Spencer Gulf.

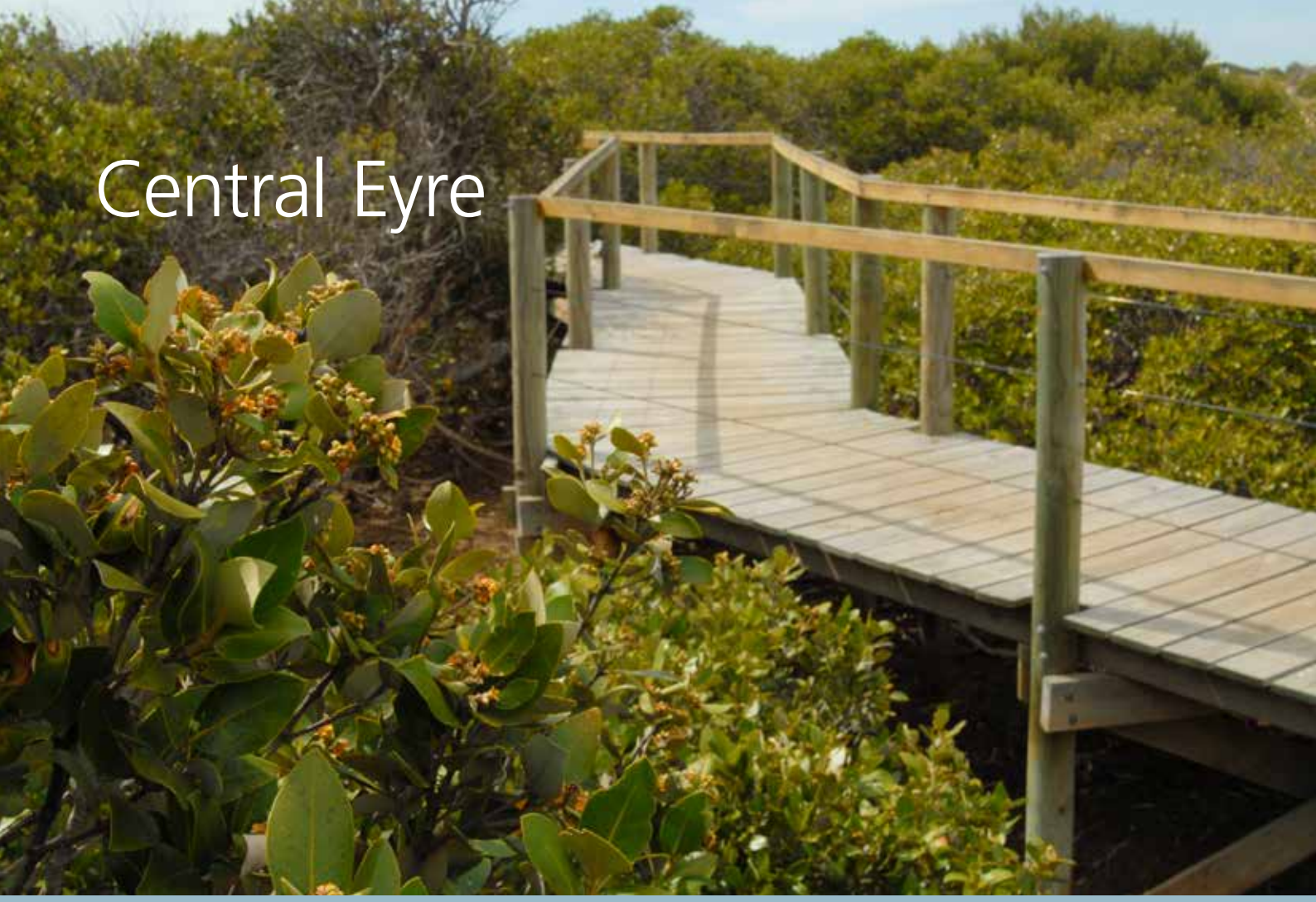
Key NRM challenges and opportunities

A range of opportunities were identified by the community and stakeholders to address the key challenges facing natural resources in the Spencer subregion. Table 3 identifies key NRM challenges and opportunities to address them.

An example of key challenge is the urban liveability and the community's growing disconnect with the local environment. Opportunities to address this challenge are depicted in Figure 13.

Challenges	Opportunities to address challenges
Urban liveability and a growing social disconnect with nature	E1. Undertake education and networking initiatives that share learnings about NRM issues and build knowledge and relationships between community and NRM stakeholders E2. Support volunteers and community groups to undertake NRM activities E3. Partner with schools and/or support initiatives that encourage children to access and learn about nature E4. Partner with Local Government and/or schools to increase sustainability of urban communities C3. Increase participation in citizen science initiatives that assist understand trend and condition of natural resources
Coast and marine degradation	B1. Support local and regional partners implement the Off-Road Vehicle Strategy, including investigations for designating areas for biodiversity protection and recreational use B3. Support on-ground works to protect and enhance coastal and park condition including track rationalization, fencing, erosion control, access tracks, revegetation and pest control B4. Raise awareness about coast and marine conservation including education about human impacts A4. Partner with seafood industry on mutually beneficial projects including water quality monitoring and works, habitat protection, and marine debris reduction and clean-up D7. Partner with Local Government to undertake urban stormwater planning and implementation focusing on water sensitive urban design that reduces water quality impacts
Limited economic diversity	B2. Facilitate the development of tourism infrastructure, facilities, information and signage to enable sustainable access and use of the coast and parks B5. Partner with tourism industry and the Department of Environment, Water and Natural Resources to facilitate the sustainable growth of nature based tourism
Declining biodiversity	D1. Protect and restore coast and marine habitats, particularly for priority areas identified in the Coastal Action Plan and Marine Parks' plans D2. Protect and restore remnant terrestrial habitats and establish biodiversity corridors that link habitats D4. Develop and implement integrated pest management strategies that address the impacts and causes of pest persistence or incursion. Particular attention is required for overabundant herbivores, feral predators, woody weeds and new pest incursions such as buffel grass D5. Develop and implement strategies and plans to protect threatened species and ecological communities, includes implementing threatened species recovery plans C1. Monitor and evaluate natural resources management actions, and their effect on natural resources' condition and trends C3. Increase participation in citizen science initiatives that assist understand trend and condition of natural resources
Aboriginal involvement in NRM	F2. Support Native Title groups in co-managing public land F3. Support traditional owners, Recognised Aboriginal Representative Bodies, Aboriginal Regional Authorities and Aboriginal communities manage natural resources and record sites of Aboriginal cultural significance F4. Provide training and career pathways into NRM related employment F5. Support awareness raising activities about Aboriginal cultural knowledge and law

Table 3 – Key NRM Challenges and opportunities for Spencer subregion



Central Eyre

The Central Eyre subregion extends from Munyaroo Conservation Park inland toward the Gawler Ranges until Minnipa in the west, and then south-west to Ungarra and Lipson. It includes large area of the mid Spencer Gulf.

Quick stats

Population:

Approximately 5,250

Towns (population):

Cowell (940),
Cleve (750), Kimba (670),
Wudinna (560), Lock (430)

Traditional Owners:

Barngarla
Nauo and Wirangu nations

Local Governments:

Wudinna District Council
District Council of Cleve
District Council of Kimba
District Council of Franklin Harbour
District Council of Tumby Bay

Land Area:

Approximately 21,100 square kilometres

Main land uses (% of land area):

Cropping (65%)
Conservation (18%)

Main industries:

Agriculture
Health care
Aquaculture
Transport

Annual Rainfall:

270 - 400 mm

Highest Elevation:

Caralue Bluff (486m AHD)

Coastline length:

280 kilometres (excludes islands)

Number of Islands:

4

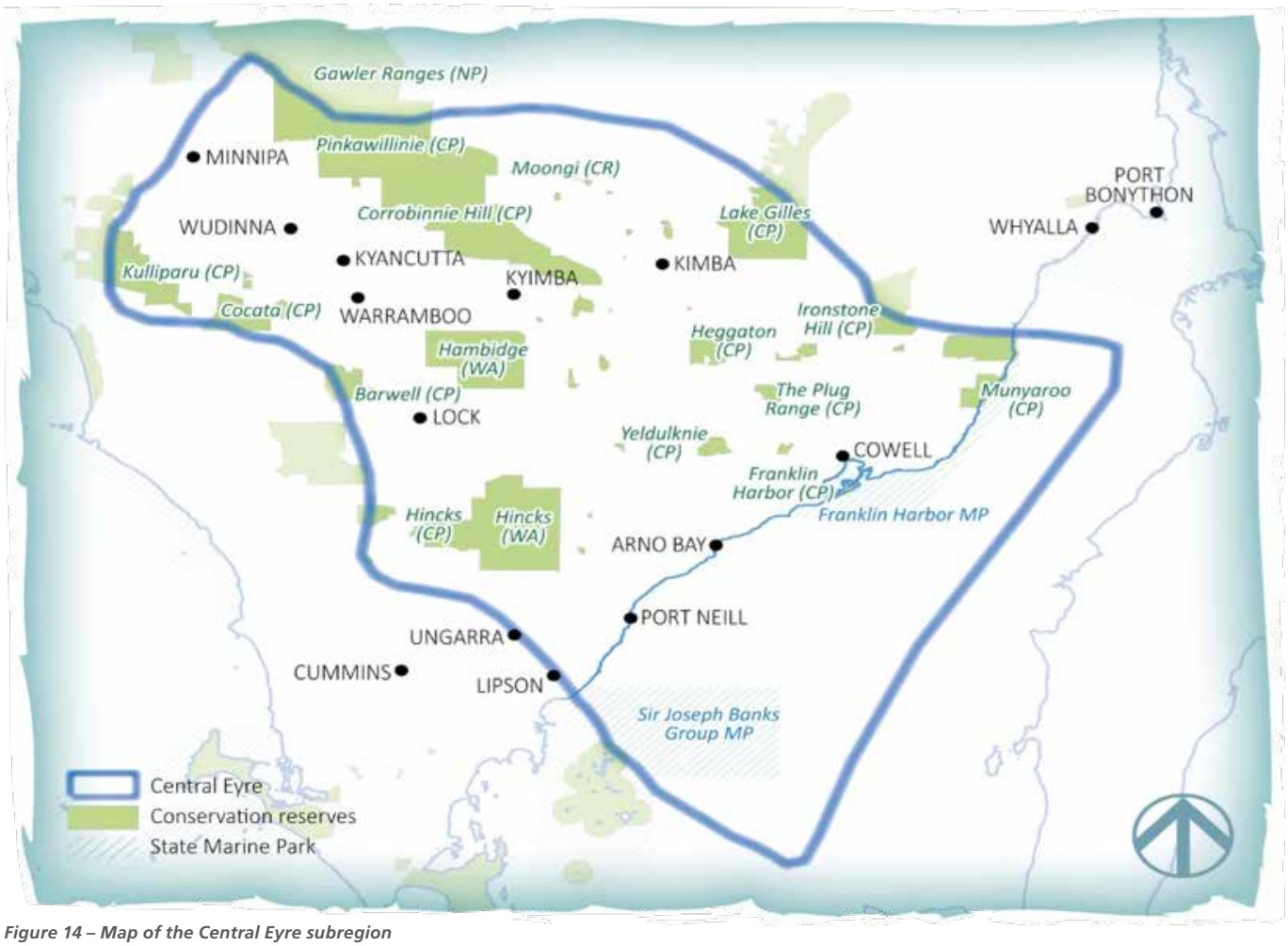


Figure 14 – Map of the Central Eyre subregion

What's valued in Central Eyre

Central Eyre is about work, play and home to its community. Natural resources and local landscapes are fundamental to livelihoods and lifestyles. Agriculture is the main livelihood for Central Eyre, and many farmers take great pride in growing food and looking after their land. The strong community spirit among the farming community creates optimism and people believe they can overcome most challenges they are faced. The family farm is the most cherished landscape for many of the farming community, as it provides them with their livelihood, lifestyle and identity. Many farmers enjoy the beauty of their own farms with rolling hills and outcropping rocks valued as well as the space and sense of freedom.

"Our community is strong. If there is something to be done, we can do it – nothing scares us."

The coast is another important contributor to Central Eyre's identity. Port Neil, Redbanks, Lucky Bay, Franklin Harbour and Arno Bay are some of the most popular coastal areas. The beaches are valued for their scenic beauty, tranquillity, fishing and recreation opportunities. The community at Arno Bay are particularly proud of the boardwalk they built, that allows access to the estuary for people to enjoy the environment without damaging it.

Central Eyre's wide open landscapes, parks, scrub and geology are highly valued for their wilderness, wildlife and picturesque views. The community appreciate both their local environments on their farms or in their towns, as well as Conservation Parks and Wilderness areas including Hincks, Hambidge, Yeldulknie and Carappee Hill. The solitude and recreation opportunities in these areas are particularly valued. The Gawler Ranges National Park in the northern part of Central Eyre is a popular place to camp and explore. Yellow-footed rock wallabies, waterfalls, the Organ Pipes and Pondanna Outstation are some of the cherished features of the park.

"Our farm is our life. We see it as our future, and an important part of our family history"

Geological features including granite outcrops and inselbergs have Aboriginal heritage, biodiversity and amenity values. Yarwondutta, Pildappa and Tcharkulda Rocks (near Minnipa), Mount Wudinna, and Polda Rock are visible landscape features and popular visitor destinations.

The communities of Central Eyre are well connected and have a strong connection to the land and the sea. They are aware of the need to protect the subregion's natural resources now and for future generations. They value the freedom, wide open spaces and fresh air that Central Eyre provides, and want to preserve these. They also want to create a sustainable future for their communities and future generations with many believing working with children is fundamental to this. Building and sharing knowledge is also critical for a sustainable future.

Arno Bay boardwalk

Landscapes and seascapes

Central Eyre comprises a land area of about 20,100 square kilometres and 7,700 square kilometres of the waters of Spencer Gulf. There are 4 islands offshore including Lipson Island and the Franklin Harbour Islands, and two marine parks of Franklin Harbour and Sir Joseph Banks Group.

Central Eyre experiences a Mediterranean climate with cooler wet winters and warm to hot dry summers. Average rainfall ranges from around 270 mm per year near Wudinna to just over 400 mm per year near Cleve[30]. Across the subregion, nearly 60% of rainfall falls between May and September, providing ideal conditions for cropping in most years.

The soils of Central Eyre are diverse and in the Cleve Hills area, shallow loams over rock are common. Between Cleve and Port Neil, the soils are sandier with areas of calcareous loam. Inland, calcareous soils and siliceous sands are widespread. Around Kimba and Buckleboo, large areas of loams over clay support cereal crops[31]. In the Eastern Cleve Hills area, dryland groundwater-driven salinity is a major issue[32].

In the western half of the subregion, the central landscape is gently undulating with parallel dune systems. Quartzite ranges and granite outcrops including Darke Peak (450 m) rise above the surrounding area. Along the western boundary adjacent to the Musgrave and Southern Eyre subregions, large areas of mallee are dominated by Coastal White Mallee (*Eucalyptus diversifolia*) in the north and Yalata Mallee *(E. yalatensis*) and Gilja (*E. brachycalyx*) in the south.

Across the centre, much of the mallee that dominated the area has been cleared for agriculture, with remnant vegetation located in the Pinkawillinie Conservation Park, and Hincks and Hambidge Wilderness Protection Areas. In these parks, Ridge-fruited Mallee (*Eucalyptus incrassata*) is the dominant vegetation community. The granite outcrops of Caralue Bluff (486 m) and Carapee Hill (490 m) south-west of Kimba are prominent in the otherwise flat agricultural landscape.

Close to Cowell and Spencer Gulf, the Minbrie Range with its highest point at Mount Olinthus (447m) rises from the coastal plain inland of Franklin Harbour. Woodland of Broombush *(Melaleuca uncinata*), Southern Cypress Pine (*Callitris gracilis*) and Drooping Sheoak (*Allocasuarina verticillata*) are found on shallow soils on the ranges. In the east, large areas of Yorrell (*Eucalyptus gracilis*) are found on the undulating parallel dune systems that run north-west to south-east[33].

Between Munyaroo Conservation Park and Lucky Bay, most of the coast has sand-shellgrit beaches with shelly beach ridges and coastal wetlands and shrublands inland. Sandy beaches comprise most of the coast between Franklin Harbour and Port Neill. South of Port Neill the coast is rockier with small pockets of sandy beach[34].

The Franklin Harbour Marine Park covers about 635 km^2 extending from Munyaroo Conservation Park south to Point Gibbon. The Park protects areas of mangroves, saltmarsh and tidal flats that provide habitat and nursery areas for many recreational and commercial fish species such as King George whiting, southern sea garfish, blue crabs and western king prawns[35]. On the mudflats at the entrance to Franklin Harbour, rare stromatolites (mineral formations made by blue-green algae) are found. Offshore, within the Franklin Harbour Marine Park, are dense seagrass meadows and unique, large colonies of stony coral. The lower marine section of the subregion is part of the Sir Joseph Banks Group Marine Park which also includes seagrass meadows and deep water habitats[36].

Franklin Harbour is classified as a tide dominated estuary and is also listed as a coastal wetland of national significance in the Directory of Important Wetlands in Australia. Other estuaries along the Central Eyre coast include Salt Creek, Dutton River, Driver River, Arno Bay and Yabmana Creek.

Whilst there are few watercourses through the inland areas of Central Eyre, a number of ephemeral creeks drain from the Cleve Hills toward Franklin Harbour and the coast. Salt Creek has the largest catchment area of all watercourses on Eyre Peninsula (about 2,000 km2). The condition of several of the creeks was assessed in 2010 by the Environment Protection Authority classified all as being in poor or very poor condition, largely due to the degraded condition of riparian vegetation and the high salinities. Although most streams were probably naturally saline, they have been further salinised as a result of native vegetation clearance[37].

Central Eyre is generally characterized by porous sandy soils, low rainfall and saline groundwater which make it a naturally water scarce area. Potable water supply comes via long-distance water pipelines from either the River Murray or the Southern Basins Prescribed Wells Area.

Through inland areas of Central Eyre particularly around Wudinna, there are a number of salt lake systems including Lake Yaninee, Lake Wannamana and Lake Warramboo. The fringes of these lakes are vegetated with low shrub communities dominated by samphire (*Tecticornia halocnemoides*) and Bladder Saltbush (*Atriplex vesicaria ssp.*).

Just over 30% of the subregion contains native vegetation[38]. About 40% of this is protected within the Conservation Parks, Reserves and Wilderness Protection Areas. Just over 10% (80,000 ha) is protected through Heritage Agreements, the majority of this adjoins protected reserve. The remaining 50% (330,000 ha) of native vegetation is located on private land or road reserves.

Central Eyre contains 27 Conservation Parks, 9 Conservation Reserves and 2 Wilderness Protection Areas, totalling about 14% of the total land area. Pinkawillinie Conservation Park, the Hincks and Hambidge Wilderness Protection Areas and Munyaroo Conservation Park contain large areas of mallee woodland that provide important habitat for the nationally vulnerable Mallee Fowl (*Leipoa ocellata*).

Central Eyre has a high diversity of flora and fauna. Around 60% of flora and 50% of fauna species of conservation significance occurring across Eyre Peninsula are found within the Central Eyre[39]. In particular, the northern-eastern part (e.g. Eyre Hills) contains a wide variety of habitats, high species richness and high number of endemic plants. As a result this area has been identified as a high priority area for conservation[40]. Species and communities of conservation significance are show in Table 4.

Livelihoods

The Central Eyre landscapes and seascapes support many of the industries and businesses that sustain the communities' livelihoods.

Just over 65% of the Central Eyre subregion is used for dryland cropping[41]. Cropping including wheat, barley, oats, canola and legumes are grown. Central Eyre on average produces about 50% of the Eyre Peninsula wheat crop, about 20% of South Australia's total production[42]. Nearly 40% of employment in the subregion is in agriculture. Other major employment sectors include transport, retail trade and services associated with townships including health care and social assistance and education[43].

About 5% of employment in Central Eyre is currently in mining however this is expected to grow in coming years. Current mines and quarries in the subregion include the Desert Rose granite mine near Wudinna, Cowell jade mine, Port Neill sand mine and the Bayley Plain gypsum mine east of Lock. The Centrex Wilgerup iron ore mine has been approved but not yet commenced production. In addition, mining operations at Bungalow, Campoona and Warramboo are currently at feasibility stage or waiting approval.

Commercial wild fisheries are an important industry in the subregion. Wild catch including prawns, blue crab, sardines, abalone and scale fish from Spencer Gulf contribute to the regional economy and are important contributors to the State's commercial fishing industry. The Spencer Gulf Prawn Fishery that relies on the subregion's mangroves and tidal flats for nursery habitat, is one of the more valuable fisheries in Australia[44]. Aquaculture industries in the subregion include Pacific oyster farms in Franklin Harbour and King Fish hatchery at Arno Bay.

Tourism is an important contributor to the local economy. In coastal areas, visitors enjoy activities including recreational fishing, boating, beach walking, bird watching and water sports. Inland, visitors enjoy camping, four wheel driving and nature-based activities.

Fauna	Flora	Vegetation communities
Sandhill Dunnart *(Sminthopsis psammophila)*	Jumping-jack Wattle *(Acacia enterocarpa)*	Darke Peak *(Eucalyptus cretata)* mallee woodland
Southern Right Whale *(Eubalaena australis)*	Chalky Wattle (*Acacia cretacea*)	Mixed mallee woodland of Cummins Mallee *(Eucalyptus peninsularis)*, White mallee *(E. dumosa)* and Square-fruited mallee *(E. calycogona)*
Mallee Fowl *(Leipoa ocellata)*	Bead Samphire (*Halosarcia flabelliformis*)	Eyre Peninsula Blue Gum *(Eucalyptus Petiolaris)*
Fairy Tern *(Sternula nereis)*	Mount Olinthus Greenhood (*Pterostylis 'Mt Olinthus' syn. Oligochaetochilus sp. 'Mt Olinthus*)	Temperate coastal saltmarsh / samphire *(Frankenia pauciflora, Tecticornia sp., Puccinellia stricta, Wilsonia humilis, Disphyma crassifolium, Atriplex semibaccata, Triglochin striata, Tecticornia indica)*
Stony Coral	Seagrass *(Thalassia testudinum, Syringodium filiforme, Halodule wrightii, Halophila johnsonii, Halophila decipiens, Halophila engelmanni, Ruppia maritima)*	
Australian Sealion *(Neophoca cinerea)*		
Leafy Sea Dragon *(Phycodurus eques)*		

Table 4 – Selected fauna, flora and vegetation communities of conservation significance

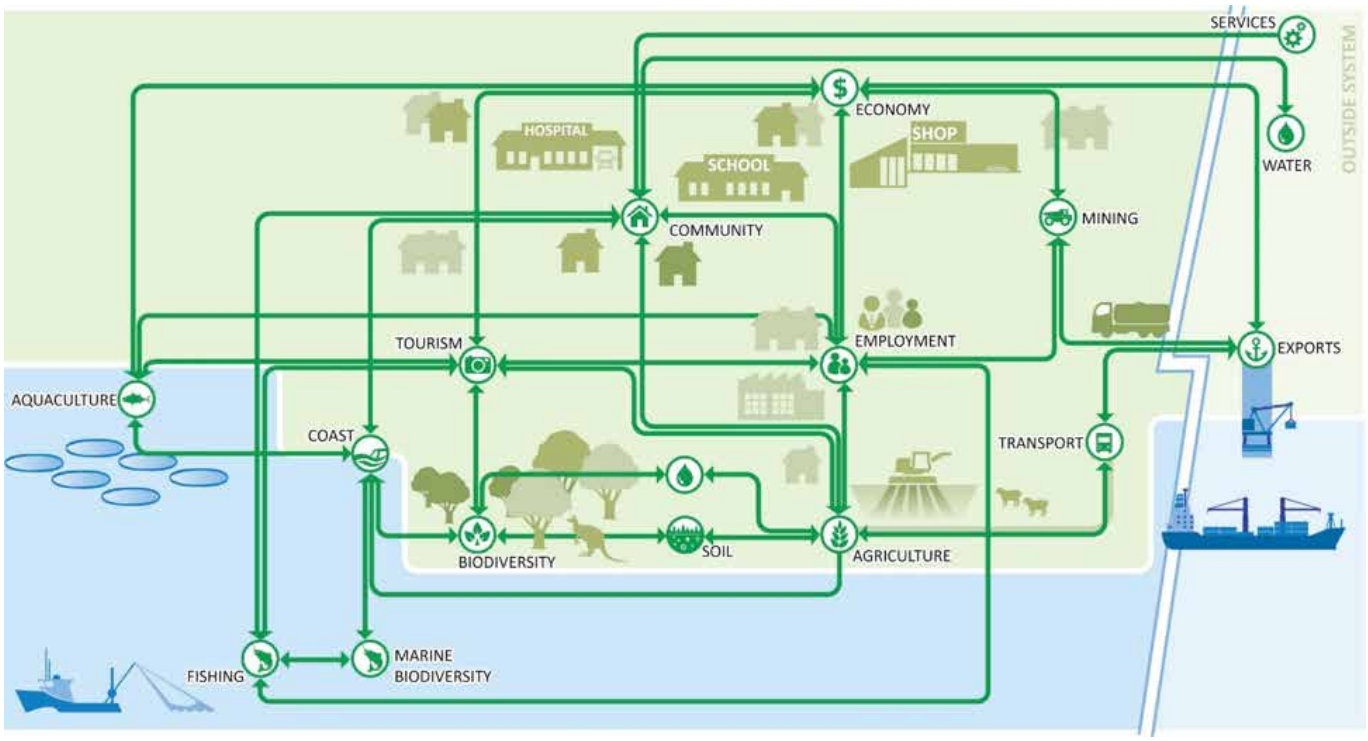


Figure 15 – Interconnections of the Central Eyre subregion

Lifestyles

Central Eyre is home to around 5,250 people[45] roughly spread equally across the District Councils of Wudinna, Cleve, Kimba and Franklin Harbour. Each of the Councils has a total population of between 1,000 and 2,000 residents. The subregion also includes portions of the District Councils of Elliston and Tumby Bay. The main townships of Central Eyre include Cowell, Cleve, Lock, Port Neill, Kimba, Kyancutta and Wudinna.

The population of the subregion has been declining in recent years. From 1998 to 2011, the populations of the Cleve, Kimba and Wudinna Council areas declined by 9%, 13% and 19% respectively. Only the District Council of Franklin Harbour has experienced growth, with a small increase of 3% between 1998 and 2011[46].

The age distribution of the population of Central Eyre mirrors that of the broader Eyre Region, with around 30% aged under 25 years, just over half aged between 25 and 64 years, and around 18% aged 65 years and over[47].

About 1% of people in Central Eyre identify as having Aboriginal or Torres Strait Islander heritage[48]. This is lower than the average for all of Eyre Peninsula (4%). Most of the Central Eyre is the traditional land of the Barngarla Traditional Owners Group.

An important indicator of community connection is volunteering rates. Volunteering rates are very high in Central Eyre at around 45%. The highest rate of volunteering occurs in the Kimba council area, with 1 in 2 people volunteering.

Central Eyre residents enjoy a range of land and water based sports and recreational activities including football, netball, cricket and tennis as well as fishing, boating and bushwalking. These activities provide opportunities for community connections to be established and maintained.

Systems understanding

Central Eyre is a complex system of connections and interactions between people, industries and natural resources. These connections and interactions mean that when one feature is impacted, flow on effects will be experienced by other features in the system. Developing this understanding can help identify the factors that make the system resilient or vulnerable to change. The Southern Eyre system is conceptually depicted in Figure 15 , where the arrows represent the connections between the system's features.

The key feature of the system is agriculture, as it has many connections with other valued features. Maintaining agriculture and its connections to other features is integral to the viability of the Central Eyre subregion. Without viable agriculture to support the population, community groups, social fabric, service provision and the regional economy will be at risk.

Planning for the future of Central Eyre requires acknowledging that change will occur and considering how change might influence the future. Some changes create opportunities that can lead to positive outcomes that will improve the future of Central Eyre, for example improvement in agricultural technologies may lead to increased productivity. Some changes create challenges that if left unabated may result in an adverse outcomes for the subregions' natural resources.

Technology, research and innovation are driving agriculture to produce higher yields using lower inputs in a more sustainable way. Minimum or no till cropping, crop rotations, GPS guided machinery, and improved grain breeding programs have contributed to improving the agricultural industry. Soil salinity and acidification currently affect agricultural productivity in some areas of Central Eyre and may increase further in the future.

Key NRM challenges and opportunities

A range of opportunities were identified by the community and stakeholders to address the key challenges facing natural resources in the Central Eyre subregion. Table 5, identifies key NRM challenges and opportunities to address them.

Carappee Hill

Challenges	Opportunities to address challenges
Agricultural viability	A1. Support extension officers and agronomists to facilitate practice change and promote sustainable agriculture practices, this includes information sharing with farming groups and agricultural bureaus A3. Promote practices that prepare landholders to be drought ready, and promote practices that build soil health, and address the causes of soil acidity, soil erosion, dryland salinity and soil structure decline A8. Support the development and utilisations of water efficiency measures and alternative water supply infrastructure including sheeted catchments D6. Promote the adoption of restorative farming practices that build soil life and diversity, and maximise ecosystem services
Limited economic diversity	B2. Facilitate the development of tourism infrastructure, facilities, information and signage to enable sustainable access and use of the coast and parks B5. Partner with tourism industry and the Department of Environment, Water and Natural Resources to facilitate the sustainable growth of nature based tourism
Coast and marine degradation	B1. Support local and regional partners implement the Off-Road Vehicle Strategy, including investigations for designating areas for biodiversity protection and recreational use B3. Support on-ground works to protect and enhance coastal and park condition including track rationalization, fencing, erosion control, access tracks, revegetation and pest control B4. Raise awareness about coast and marine conservation including education about human impacts A4. Partner with seafood industry on mutually beneficial projects including water quality monitoring and works, habitat protection, and marine debris reduction and clean-up
Declining biodiversity	D1. Protect and restore coast and marine habitats, particularly for priority areas identified in the Coastal Action Plan and Marine Parks' plans D2. Protect and restore remnant terrestrial habitats and establish biodiversity corridors that link habitats. Priority areas include WildEyre and Eyre Hills (see Figure 9) D3. Facilitate whole of catchment management planning and supporting works to restore riparian and wetland ecosystems, and reduce water quality impacts D4. Develop and implement integrated pest management strategies that address the impacts and causes of pest persistence or incursion. Particular attention is required for overabundant herbivores, feral predators, woody weeds and new pest incursions such as buffel grass D5. Develop and implement strategies and plans to protect threatened species and ecological communities, includes implementing threatened species recovery plans C1. Monitor and evaluate natural resources management actions, and their effect on natural resources' condition and trends C3. Increase participation in citizen science initiatives that assist understand trend and condition of natural resources
Aboriginal involvement in NRM	F2. Support native title groups in co-managing public land F3. Support traditional owners, Recognised Aboriginal Representative Bodies, Aboriginal Regional Authorities and Aboriginal communities manage natural resources and record sites of Aboriginal cultural significance F4. Provide training and career pathways into NRM related employment F5. Support awareness raising activities about Aboriginal cultural knowledge and law

Table 5 – Key NRM Challenges and opportunities for the Central Eyre subregion

Southern Eyre

Southern Eyre comprises a land area of around 6,500 square kilometres, along with a large marine area. The southern boundary extends east from Spencer Gulf to the Southern Ocean, while the northern boundary extends along the agricultural plains north of Cummins.

Quick stats

Population:

Approximately 23,500

Major towns (population):

Port Lincoln (16,000)
Tumby Bay (1,474)
Cummins (719)
Coffin Bay (615)

Traditional Owners:

Barngarla
Nauo nations

Local Governments:

Port Lincoln City Council
District Council of Lower Eyre Peninsula
District Council of Tumby Bay

Land Area:

Approximately 6,500 square kilometres

Main land uses (% of land area):

Cropping and grazing (63%)
Conservation (34%)

Main industries:

Fishing
Aquaculture
Agriculture
retail trade
health and community service
tourism
construction
mining

Annual Rainfall:

340 – 560 mm

Highest elevation:

Marble Range (436 metres AHD)

Coastline length:

710 kilometres (excludes islands)

Number of Islands:

113

Figure 16 – Map of the Southern Eyre subregion

What's valued in Southern Eyre

The Southern Eyre community is intrinsically linked to the natural environment with its identity ingrained in the "great outdoors". Many people have their own favourite spot where they go to unwind and feel a sense of place. For some it is their own patch, for others it is a secluded beach or an adventure in the bush.

The coast is incredibly important to the community. Many people remember playing and exploring around the scenic shores and bays during their childhood. The coast is also valued for its Aboriginal heritage and there are numerous sites of Aboriginal cultural heritage including fish traps and middens.

Coffin Bay and Lincoln National Parks are important and accessible destinations for locals and tourists to enjoy camping, 4WD adventures and walking. The pristine environment at Memory Cove and Coffin Bay's remoteness and wildness provide a sense of adventure and place.

"Sir Joseph Banks Group are magic parts of the world. They have an abundance of marine and birdlife and are a wonderful place to stop and enjoy with friends"

Life on Southern Eyre is also about the sea as it is where people work and play. Tuna, prawns, abalone, rock lobster and mussels are exported around the world from the waters of Southern Eyre. Recreational fishing is a way of life for many locals. Surfing, diving, yachting and paddle boarding are other popular recreational activities. The sea entices many to explaw, and the nearby islands are particular attractions.

Water is an extremely precious yet scarce resource in Southern Eyre. The Uley South groundwater basin is valued for its ability to sustain land use and productivity for the region's towns and industries as well as for their ability to support freshwater soaks and wetlands

Farming provides a strong connection to the land, and some landholders of Southern Eyre are now 3rd, 4th or 5th generation farmers. Many farmers identify with being a caretaker of the land and while the productive side of farming is vital, farmers also recognise the value of the bush.

Integral to all these values are the people, with connections and the friendliness of small country towns particularly cherished. The community have a long history of working together and they believe "community is the key". Many are aware that natural resources underpin their existence and that it is a collective responsibility to manage them.

"I love the farming community as they're easy to work with and very practical"

Landscapes and seascapes

Southern Eyre includes a coastline of 710 kilometres and a land area of approximately 6,500 square kilometres. There are 113 islands within the subregion's marine areas of the Southern Ocean and the Spencer Gulf.

Southern Eyre experiences a Mediterranean climate with cool moist winters and warm to hot dry summers. Summer rainfall is similar across the subregion, while winter rainfall is almost double in southern inland areas such as Big Swamp and Wanilla Forest Reserve, compared to the coast[49].

Soil type largely influences land use in Southern Eyre, where shallow soil over calcrete and deep sands between Coffin Bay and Port Lincoln is predominately used for conservation or SA Water reserve. Cropping is undertaken on ironstone soils and hard red-brown loam over clay (duplex) soils, which are present throughout the centre of the subregion[50]. Ironstone soils have a higher risk of soil acidification as they are inherently acidic[51], while deeper soils over clay have a lower risk of acidification yet are at risk of soil structure decline[52]. Dryland salinity is associated with watercourses and floodplains of the subregion.

The landscape of the southern east coast of Southern Eyre is dominated by the Koppio Hills which extend between Port Lincoln and Tumby Bay. A large proportion of native vegetation in this area has been cleared for cropping however there are numerous patches of low open woodland dominated by Sugar Gum (*Eucalyptus cladocalyx*). Along the numerous watercourses and swamp areas, sedges and rushes are common. On the Jessieu Peninsula south of Port Lincoln, mallee woodland is dominated by Coastal White Mallee (*E. diversifolia*) or Port Lincoln Mallee (*E. conglobata*). This area although subject to disturbances since European settlement, including fire and grazing, is now protected within the Lincoln National Park.

Across the southern part of Eyre Peninsula between Port Lincoln and Coffin Bay, extensive dune systems, wetlands and lagoons are vegetated with low mixed shrubland dominated by Coast Beard-heath (*Leucopogon parviflorus*). Inland, Coastal White Mallee (*E. diversifolia*) is widespread, growing across undulating landscapes where sandy soils cover limestone.

The Marble Range extends along the west coast encompassing the subregion's highest point of 436 m. North of the Range and between Lake Malata and Lake Greenly, native vegetation includes mallee woodland dominated by Coastal White Mallee (*E. diversifolia*) or Mallee box *(E. porosa*). Across the inland part of Southern Eyre, extensive clearing for cropping has occurred. Mallee woodland within road reserves supports the only native vegetation across much of this area.

"Thistle Island has diverse landscapes with amazing scenery and a wide variety of plants and animals that are no longer abundant on the mainland."

Southern Eyre's coastal landscapes are diverse, featuring sandy beaches, limestone cliffs up to 100 metres high, rocky headlands and undulating sand dunes particularly around Coffin Bay. There are 113 offshore islands in the subregion including Thistle Island, Wedge Island, the Sir Joseph Banks Group and Greenly Island. Offshore habitats include seagrass meadows, sandy seafloors and reefs, where up-wellings of nutrient-rich marine waters support commercial fish species and marine biodiversity. The Sir Joseph Banks Group, Gambier Islands Group, Thorny Passage and Neptune Islands Marine Parks protect marine biodiversity.

The Tod River is the Eyre Peninsula's only permanent watercourse, discharging to Spencer Gulf near Louth Bay. Smaller creeks traverse the subregion, primarily north of the Flinders Highway. These creeks generally do not flow in warmer months due to low summer rainfall, high evaporation rates, and the small and steep nature of creek catchments.

Potable water is supplied to Southern Eyre from the groundwater lenses within the Southern Basins Prescribed Wells Area (PWA). These lenses are predominantly recharged via rainfall, and some recharge from surface water run-off from the Little Swamp and Big Swamp catchments. The Uley South Basin provides 97% of water extracted from the PWA[53]. The associated Water Allocation Plan provides a framework for the protection and sustainable use of these groundwater resources.

There are over 700 wetlands identified in the subregion, providing important habitats for local and migratory birds. Wetland condition varies from moderate to degraded[54]. Major wetlands include Lake Malata, Lake Greenly, Big Swamp, Coffin Bay Coastal Wetlands, Lake Newland, Pillie Lake, Sleaford Mere and the Tod River Wetlands.

"Lincoln National Park is an easy getaway where there's always a secluded place to camp with my family… it's where I go to retreat back to nature."

Just over 30% of the subregion's land area contains remnant native vegetation, and 40% of this on Government land. 28,000 ha of native vegetation is protected through Heritage Agreements and the remaining 47% of remnant native vegetation is on private land or road reserves. Ten percent of the subregion's land area is within National Parks and Wildlife Reserves, including the Lincoln and Coffin Bay National Parks, and Sleaford Mere Conservation Park.

Southern Eyre has a high diversity of flora and fauna. Around 70% of flora and fauna species of conservation significance occurring across Eyre Peninsula are found within the Southern Eyre subregion[55]. The subregion contains a high variety of habitats, high species richness and high number of endemic plants. As a result much of Southern Eyre has been identified as the highest priority conservation area[56]. Iconic species and communities of conservation significance are show in Table 6.

Livelihoods

Agriculture comprises 63% of the land area of Southern Eyre. Cropping is the major agricultural land use, with crops including wheat, barley, oats, canola and pulses grown in rotation. Southern Eyre produces about 25% of the Eyre Peninsula's wheat crop, and nearly 50% of the barley crop[57]. This equates to about 10% of South Australia's total production for each commodity. Grain storage and bulk handling facilities support exports from the Port Lincoln deep water port. Transport of grain to the port relies on the rail lines of Port Lincoln – Thevenard and Cummins-Kimba and the Tod, Lincoln and Flinders highways.

Southern Eyre's seafood industries are major employers, and their produce is recognised internationally for its quality. Wild catches from the Spencer Gulf and the Southern Ocean include prawns, abalone, giant crab, rock lobster, sardines, and marine scale fish. Spencer Gulf also supports a range of aquaculture productions including southern bluefin tuna, kingfish, abalone and sub-tidal mussels. Intertidal oysters are a key industry for Coffin Bay and land based abalone are farmed at Point Boston.

Southern Eyre's tourism industry centres on the subregion's natural resources. Tourists from across Australia and the world are attracted to activities including diving with sharks, sea lions and tuna, fishing boat charters, national park adventures, beach visits and enjoying the fresh seafood. Coffin Bay is a popular destination and the town's population swells over summer months.

Mining employs two percent of the subregion's workforce both locally and with a number of residents working at mines in other areas of Australia[58]. Mining was first undertaken in Southern Eyre as early as 1849 when copper was produced from several small mines near Tumby Bay. Graphite mining has recently recommenced at the Uley graphite mine and a number of small quarries produce gypsum, lime sand, calcrete and quartz. In recent years, further exploration has seen developing mineral projects including the Kookaburra Gully and Fusion graphite mines, and iron ore mines in the Koppio Hills and at Gum Flat.

Lifestyles

Southern Eyre is the traditional land of the Barngarla and Nauo Aboriginal peoples. Around 4% of people in Southern Eyre identify as having Aboriginal and Torres Strait heritage, and this proportion is slightly higher within Port Lincoln. A number of registered Aboriginal Heritage sites exist along the Southern Eyre coast including near Coffin Bay, Port Lincoln and Louth Bay, as well as inland at Wanilla. In 2015, the Barngarla people were recognised as the traditional owners of the eastern half of Southern Eyre including the offshore islands of the Sir Joseph Banks Group. The Nauo people have an active Native Title Claim across the western half of the subregion and recognition is yet to be determined.

Southern Eyre is home to approximately 21,000 people, more than 65% of whom live in Port Lincoln. Collectively around 2,800 people live in the townships of Tumby Bay, Cummins and Coffin Bay; while the remaining 4,000 live in rural areas[59]. Coastal towns such as Coffin Bay experience significant visitor population increases during the summer.

Local Governments within the subregion are the City of Port Lincoln, the District Council of Lower Eyre Peninsula, and the District Council of Tumby Bay. Southern Eyre has seen a population growth of 5% from 2006 to 2011, with the highest growth in the Lower Eyre Peninsula council area which includes the areas fringing Port Lincoln and the Coffin Bay township[60]. This growth is projected to continue to 2026[61].

The age distribution of Southern Eyre mirrors that of the broader Eyre Peninsula NRM Region, where just over 50% are aged between 25 and 64 years, and approximately 15% are 65 years and over. Approximately 33% are under 25 years, of which 15% are aged between 5 to 14 years old[62].

Sport is a focal point for community interactions, and football, netball, hockey, tennis and cricket are popular. Attending church is another major point of interaction. Participating in community groups is a further point of interaction, with one in three people volunteering regularly[63].

Fauna	Flora	Vegetation communities
Brush-tailed Bettong *(Bettongia penicillata ogilbyi)*	Jumping-jack Wattle *(Acacia enterocarpa)*	Drooping Sheoak *(Allocasuarina verticillata)* grassy low woodland
Eyre Peninsula Southern Emu wren *(Stipiturus malachurus parimeda)*	Fat-leaved Wattle *(Acacia pinguifolia),*	*Eyre Peninsula Blue Gum* (*Eucalyptus petiolaris*)
Yellow-tailed Black Cockatoo *(Calyptorhynchus funereus)*	Whibley Wattle *(Acacia whibleyana)*	Mallee communities of Broad-leaf box / Peppermint box / White mallee (*Eucalyptus behriana +/- E. odorata +/- E. dumosa*)
Hooded Plover (Thinornis rubricollis rubricollis)	Silver Daisy-bush *(Olearia pannosa ssp. Pannosa)*	Temperate coastal saltmarsh *(Suaeda australis, Sarcocornia quinqueflora, Frankenia pauciflora, Tecticornia sp., Puccinellia stricta, Wilsonia humilis, Disphyma crassifolium, Atriplex semibaccata, Triglochin striata)*
Australian Sea Lion *(Neophoca cinerea*),	Silver Candles *(Pleuropappus phyllocalymmeus)*	
Southern Right Whale *(Eubalaena australis)*	Seagrass *(Thalassia testudinum, Syringodium filiforme, Halodule wrightii, Halophila johnsonii, Halophila decipiens, Halophila engelmanni, Ruppia maritima)*	
Leafy Sea Dragon *(Phycodurus eques)*		

Table 6 - Selected fauna, flora and vegetation communities of conservation significance

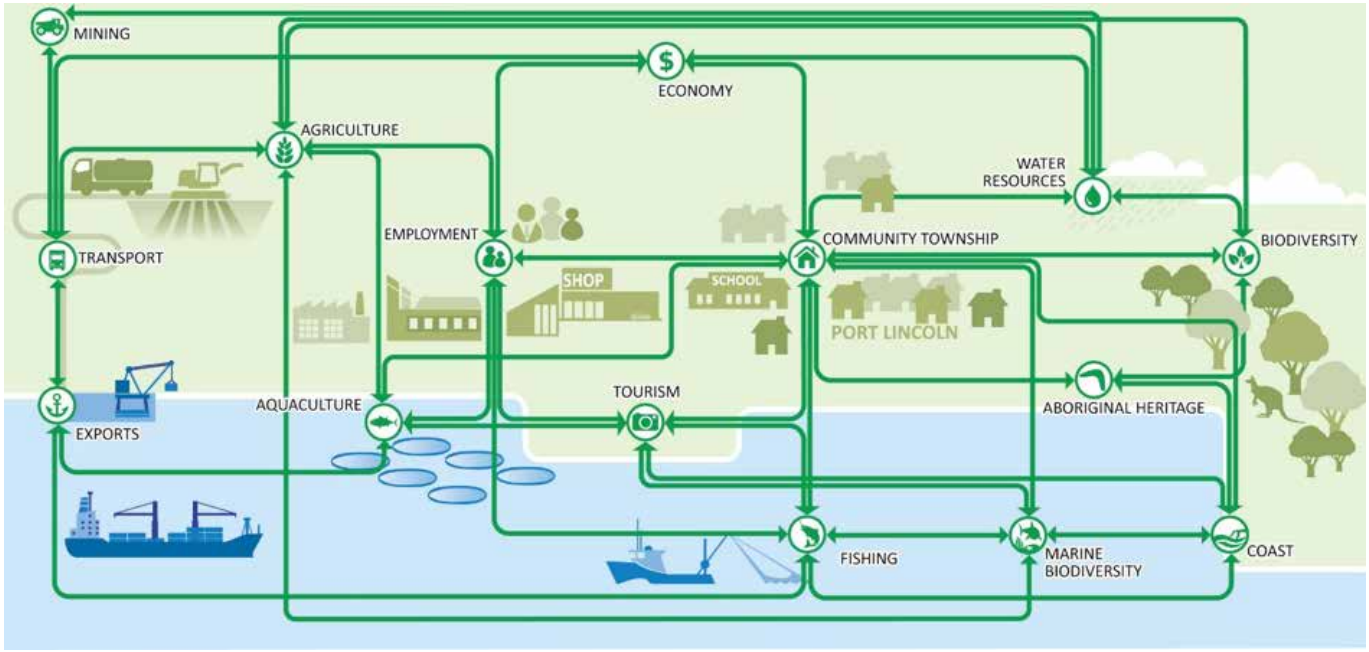


Figure 17 – Interconnections of the Southern Eyre subregion

Water Cycle Management in Southern Eyre

Managing the water cycle holistically is integral for Southern Eyre and the Region, and there are three key management aspects including:

- Water sharing between consumptive use and environment, which requires the water demands of the Region's community and industry to be balanced with the needs of groundwater dependent ecosystems. This balance is annually adjusted based on available water levels, and the method for this is contained in the Water Allocation Plan for Southern Basins and Musgrave Prescribed Wells Areas.
- Water security as the Region's limited available potable water supply may be challenged by future drought, or industry or population growth. Annual monitoring of water security situation is undertaken via the Eyre Peninsula Demand and Supply Statement, however ongoing efforts are required by households, farms and businesses to adopt water efficiency measures and implement alternative water supply. These efforts will delay construction of expensive new water supply infrastructure.
- Reduced water quality impacts from urban and agricultural land uses on riparian, wetland and marine habitats. Agricultural land requires a whole of catchment management approach that reduces nutrient and sediment loads to Coffin Bay and Spencer Gulf, while reducing the diversity of pollutants from urban land requires a water sensitive urban design approach to stormwater management.

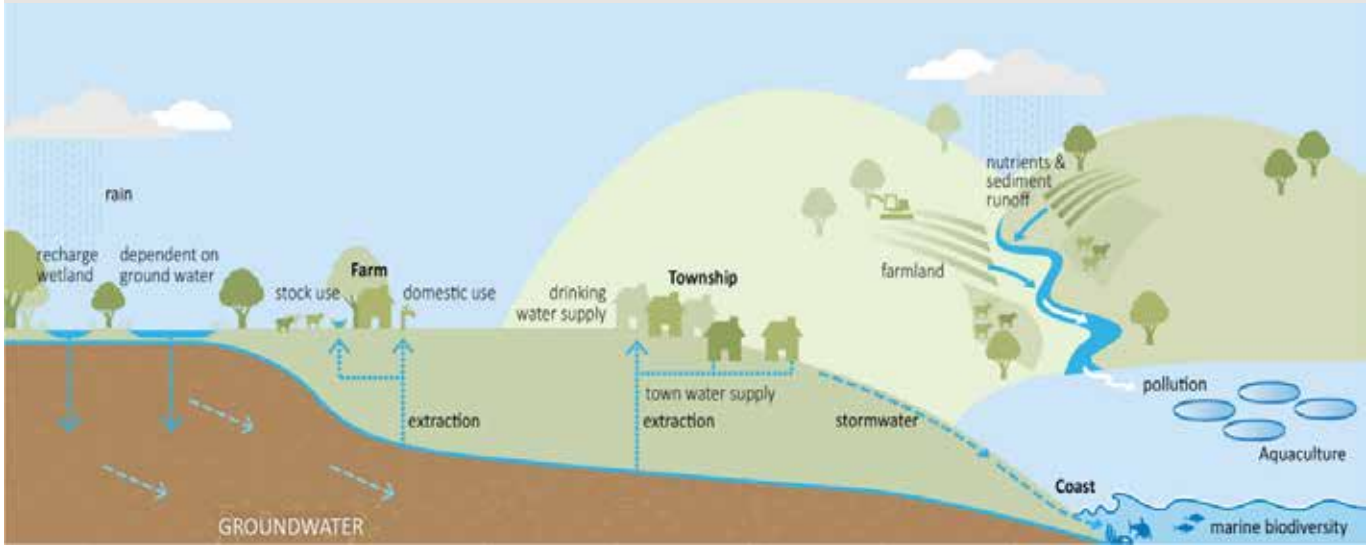


Figure 18 – Water cycle management for Southern Eyre

Systems understanding

Southern Eyre is a complex system of connections and interactions between people, industries and natural resources. These connections and interactions mean that when one feature is impacted, flow on effects will be experienced by other features in the system. Developing this understanding can help identify the factors that make the system resilient or vulnerable to change. The Southern Eyre system is conceptually depicted in Figure 17 , where the arrows represent the connections between the system's features.

Key features of the system include water resources, agriculture, seafood industries, tourism and the city of Port Lincoln. The city provides the hub of the subregion's services, transport, employment, and community interactions. A number of connections in the system are integral to the viability of the Southern Eyre. The connection of water resources to the town and agriculture, is critical for maintaining economic prosperity and social wellbeing of the subregion and region. Managing the water cycle is a critical challenge for Southern Eyre (see Figure 18). An equally important part of this water cycle is the influence of land based activities of agriculture and urban development on coast and marine biodiversity, aquaculture and fishing. These relationships reflects the impacts of land based pollution on water quality for marine biodiversity and seafood industries.

Key NRM challenges and opportunities

A range of opportunities were identified by the community and stakeholders to address the key challenges facing natural resources in the Southern Eyre subregion. Table 7 identifies key NRM challenges and opportunities to address them.

Challenges	Opportunities to address challenges
Agricultural viability	A1. Support extension officers and agronomists to facilitate practice change and promote sustainable agriculture practices, this includes information sharing with farming groups and agricultural bureaus A3. Promote practices that prepare landholders to be drought ready, and promote practices that build soil health, and address the causes of soil acidity, soil erosion, dryland salinity and soil structure decline A8. Support the development and utilisations of water efficiency measures and alternative water supply infrastructure including sheeted catchments A9. Partner with agricultural industry to reduce water quality impacts and manage dryland salinity D6. Promote the adoption of restorative farming practices that build soil life and diversity, and maximise ecosystem services
Declining biodiversity	D1. Protect and restore coast and marine habitats, particularly for priority areas identified in the Coastal Action Plan and Marine Parks' plans D2. Protect and restore remnant terrestrial habitats and establish biodiversity corridors that link habitats. Priority areas include Eyre Hills D3. Facilitate whole of catchment management planning and supporting works to restore riparian and wetland ecosystems, and reduce water quality impacts D4. Develop and implement integrated pest management strategies that address the impacts and causes of pest persistence or incursion. Particular attention is required for overabundant herbivores, feral predators, woody weeds and new pest incursions such as buffel grass D5. Develop and implement strategies and plans to protect threatened species and ecological communities, includes implementing threatened species recovery plans C1. Monitor and evaluate natural resources management actions, and their effect on natural resources' condition and trends C3. Increase participation in citizen science initiatives that assist understand trend and condition of natural resources
Coast and marine degradation	B1. Support local and regional partners implement the Off-Road Vehicle Strategy, including investigations for designating areas for biodiversity protection and recreational use B2. Facilitate the development of tourism infrastructure, facilities, information and signage to enable sustainable access and use of the coast and parks B3. Support on-ground works to protect and enhance coastal and park condition including track rationalization, fencing, erosion control, access tracks, revegetation and pest control B4. Raise awareness about coast and marine conservation including education about human impacts A4. Partner with seafood industry on mutually beneficial projects including water quality monitoring and works, habitat protection, and marine debris reduction and clean-up D7. Partner with Local Government to undertake urban stormwater planning and implementation focusing on water sensitive urban design that reduces water quality impacts
Aboriginal involvement in NRM	F2. Support native title groups in co-managing public land F3. Support traditional owners, Recognised Aboriginal Representative Bodies, Aboriginal Regional Authorities and Aboriginal communities manage natural resources and record sites of Aboriginal cultural significance F4. Provide training and career pathways into NRM related employment F5. Support awareness raising activities about Aboriginal cultural knowledge and law

Table 7 – Key NRM Challenges and opportunities for the Southern Eyre subregion

Musgrave

The Musgrave subregion extends from Mount Camel Beach in the north inland to the Tod Highway, and then south to Lock and then west across to Lake Hamilton in the south. It includes the Southern Ocean including the Investigator Group, Flinders Island and Pearson Isles.

Quick stats

Population:

Approximately 1,050

Major towns (population):

Elliston (300)
Lock (340)

Traditional Owners:

Barngarla nation
Nauo nation

Local Governments:

District Council of Elliston
District Council of Lower Eyre Peninsula
Wudinna District Council

Land Area:

Approximately 5,600 square kilometres

Main land uses (% of land area):

Grazing (30% of total land area)
Conservation (20% of land area)
Cropping (18% of land area)

Main industries:

Agriculture
Health care
Education

Annual Rainfall:

380 - 430 mm

Highest elevation:

Mount Wedge (249 metres AHD)

Coastline length:

130 kilometres (excludes islands)

Number of Islands:

12

Figure 19 – Map of the Musgrave subregion

What's valued in Musgrave

The landscapes and natural resources of the Musgrave subregion are integral to the community's livelihoods and lifestyles.

"Sheringa Beach is unique, rugged and beautiful. It's where the sea meets the desert".

The coast is enjoyed by locals and visitors for its beautiful landscapes, open space and clean environment. Many local residents particularly value the solitude, remoteness and scenic beauty of places including Sheringa Beach, Talia Caves, Point Drummond, Kiana, Pearson Island, Walkers Rocks and Elliston. Surfing, camping, diving and fishing are popular in the clean waters.

The Elliston township is valued for its character, history, tranquillity and amenity. The town has a strong arts culture with numerous murals and the sculptures along the spectacular Great Ocean Tourist Drive.

The Musgrave sub-region valued landscapes include large patches of remnant bush and big farms. Native vegetation is valued by many in the farming community and many recognise its contribution to ecosystem services, and provides habitat for birds and reptiles. The benefits of native grasses are recognised for their biodiversity value as well as their ability to use for stock feed during drought.

"Pearson Island is a spectacular unspoilt island with abundant and curious wildlife".

The Conservation Parks of Bascombe Well and Kulliparu are valued by locals and visitors who enjoy observing the rich bird life and range of wildflowers including rare orchids. Ucontitchie Hill and its unique geology is a distinctive feature and tourist attraction.

Groundwater and wetlands are valued features of the Musgrave sub-region's ecological and economic function. Large wetlands like Lake Newland and Lake Hamilton support abundant bird life, particularly during wet periods. These lakes are dependent upon the groundwater of the Musgrave Prescribed Wells Area.

Most of the community relies on freshwater from the Polda, Sheringa and Bramfield groundwater basins for stock and domestic, town supplies and small areas of irrigation. These basins also support valued groundwater dependent ecosystems including red gums.

The Musgrave sub-region has a great and connected small community. They understand that successful natural resource management requires people working together and creating networks.

"NRM is about people and the community taking responsibility for their patch, and doing things to maintain or improve it".

Landscapes and seascapes

The Musgrave subregion comprises a land area of around 5,600 square kilometres, extending from Mount Camel Beach in the north, inland to the Tod Highway, to Lock and Lake Hamilton in the south. It extends west to the Southern Ocean to the Investigator Group including Flinders Island and Pearson Isles.

Musgrave experiences a Mediterranean climate with cool wet winters and hot dry summers. Rainfall is winter dominant and average annual rainfall ranges from about 380 – 440 mm, with higher rainfall recorded in the southern coastal parts of the subregion[64].

The majority of soils across inland areas of the Musgrave subregion are classified as shallow sandy loam on calcrete that predominantly support grazing or conservation. Around Lock calcareous loams are widespread, and cropping is undertaken. Closer to the coast, carbonate sands and calcareous sandy loams support areas of cropping[65].

The central Musgrave landscape comprises undulating to hilly plains on calcrete with Mount Wedge (249m) the highest point in the subregion. Through most of the inland areas, the large areas of remnant mallee woodlands are dominated by Mallee Box (*Eucalyptus porosa*) and Coastal White Mallee (*Eucalyptus diversifolia*). In the north and east around Lock, sand ridges run north-west to south-east. Most native vegetation has been cleared around Lock for cropping however in the northern areas, large patches of mallee remain.

Large areas of native grassland dominated by Spear-grass (*Austrostpia sp.*) replaced by introduced pasture species across much of the rest of Eyre Peninsula, remain in the Musgrave subregion, providing habitat for a diversity of invertebrates and birds . These grasslands are more commonly found on shallow sandy loams on calcrete through the centre of the subregion.

Along the coast, in dune areas and around Lake Newland and the coastal lakes, the most common vegetation communities include Samphire (*Tecticornia spp. and Sarcocornia spp*) and shrublands dominated by Coast daisy (*Olearia axillaris*) and Grey saltbush (*Atriplex cinerea*).

Just over 10% of the subregion's land area is within National Parks and Wildlife Reserves, including Lake Newland, Bascombe Well, Barwell and Cocata Conservation Parks. Off shore conservation areas include the Waldegrave Islands Conservation Park and Investigator Group Wilderness Area. Much of the coast south of Elliston and around the islands is protected within the Investigator Marine Park.

Musgrave's coastal landscapes are dominated by sandy beaches along the coast north of Cape Finniss along Anxious Bay, and cliffs up to 80 m high south of Elliston. The offshore islands have similar coast, with steep rocky cliffs around most of East Island and along the east coast of Flinders Island. The granite islands of the Investigator Group and Cap Island have steep cliffs along most of their coastlines. Behind the sandy Anxious Bay beach, a wide dune system extends to Lake Newland within the Lake Newland Conservation Park. Offshore habitats include seagrass meadows, sandy seafloors and reefs, where nutrient-rich marine waters support commercial fisheries, Australian sea lions, white sharks and Long nose fur seals[67].

There are no permanent surface watercourses and few defined drainage lines. Minor watercourses drain runoff from the hills east of Lake Newland, around Mount Wedge and toward the coast south of Elliston.

A significant feature of Musgrave are the fresh groundwater lenses protected within the Musgrave Prescribed Wells Area (PWA) which covers most of the Musgrave subregion. The larger lenses include Talia, Polda, Bramfield, Kappawanta and Sheringa A and B. The Bramfield lens has provided the majority of water extracted under licence from the PWA in recent years since extraction from Polda was restricted as a result of falling water levels[68]. SA Water extracts the majority of water from the PWA for public water supply to Elliston. The associated Water Allocation Plan provides a framework for the protection and sustainable use of these groundwater resources.

Musgrave includes numerous coastal and inland salt lakes including Lake Hamilton, Round Lake, Sheringa Lagoon and Lake Newland. Lake Hamilton and Lake Newland are listed in the Directory of Important Wetlands in Australia and provide habitat for numerous water and shore birds including migratory waders protected under national treaties[69].

Nearly 60% (320,000 ha) of the Musgrave subregion's land area contains remnant native vegetation. This is a very high proportion compared to other agricultural areas of South Australia and can be attributed to the shallow, calcareous soils that limit agricultural productivity[70]. Only about 20% of this native vegetation is protected within formal conservation reserves, with about 15% included in Heritage Agreement mostly adjoining conservation parks[71]. The area contains some of the largest intact areas of bushland in South Australia. The WildEyre conservation project which covers most of the subregion, is linking some of these habitats. The subregion contains a moderate diversity of flora and fauna compared to other subregions on Eyre Peninsula. Iconic species and communities of conservation significance are shown in Table 8.

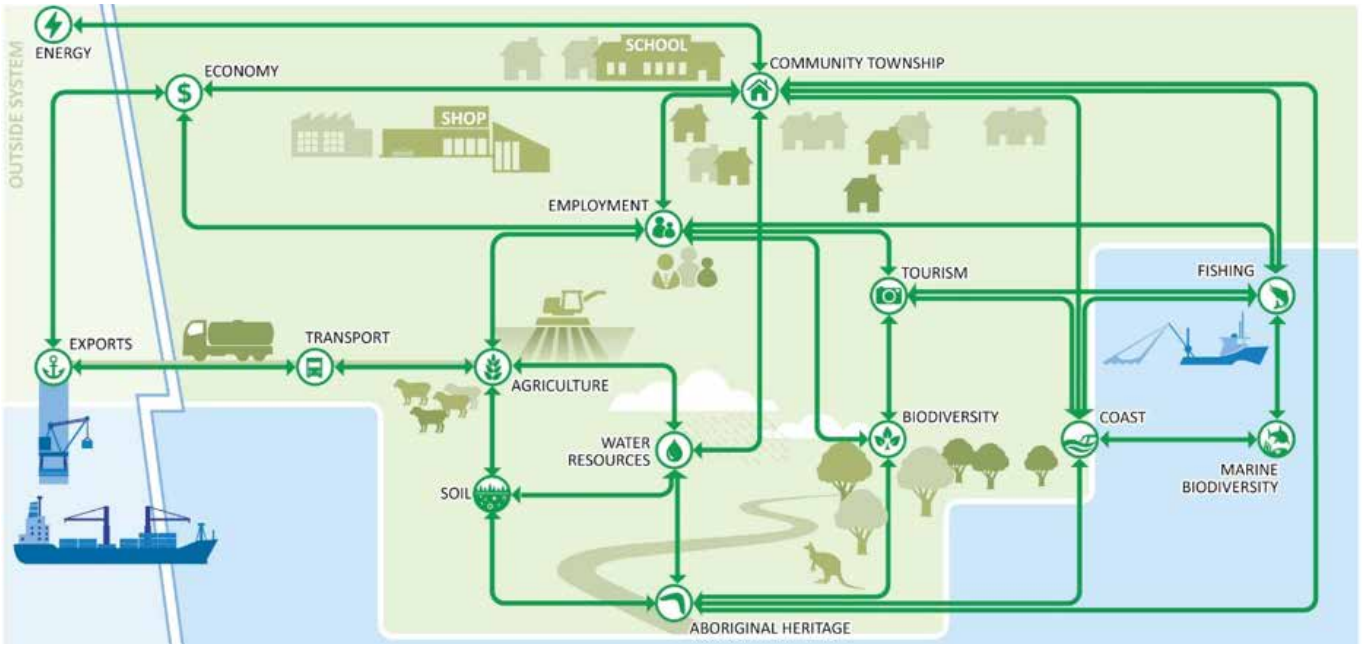


Figure 20 – Interconnections of the Musgrave subregion

Livelihoods

The Musgrave landscapes and seascapes support the industries and businesses that sustain the communities' livelihoods.

Grazing is the main agricultural land use in the Musgrave subregion, with sheep and cattle feeding on areas of both natural and modified pastures. There are some areas of cropping north of Elliston and around Lock where soils are deeper with higher loam content.

Commercial wild fisheries in the subregion include the Western Zone Abalone Fishery, the Northern Rock Lobster Fishery and the Marine Scale fish Fishery. Large numbers of fishing vessels use the islands and bays around Elliston for overnight anchorage. Export of fish to interstate and overseas markets occurs from outside the subregion, from Port Lincoln and Thevenard (Ceduna). Farming of abalone occurs near Elliston.

Transport infrastructure includes the Flinders Highway which runs along the west coast, and the Tod Highway which runs along the eastern edge of the subregion, adjacent to the Port Lincoln – Thevenard rail line. This transport infrastructure supports market access for agricultural and seafood commodities as well as local tourism and business.

Nearly 40% of all employment in Musgrave is in agriculture, with about 10% employment in both health care and aquaculture[72]. The majority of employment outside agriculture occurs in Elliston where retail and educational activities are located.

The beaches and coastline of the Musgrave subregion are popular tourist destinations. Outdoor activities of fishing, surfing, swimming and four wheel driving are popular tourist activities.

Lifestyles

Elliston and Lock are the main town centres in Musgrave. The majority of the Musgrave subregion is within the District Council of Elliston, with very small and sparsely populated areas in the District Council of Lower Eyre Peninsula and Wudinna District Council. The population of the District Council of Elliston has seen a population decline of 13% from 1998 to 2011[73].

The age distribution of the population of Musgrave mirrors that of the broader Eyre Region, with nearly a third aged under 25 years, just over half aged between 25 and 64 years, and 15% aged 65 years and over. The largest age group is the 45 to 54 group, which is nearly 20% of the total population[74].

About 2% of people in Musgrave identify as having Aboriginal or Torres Strait Islander heritage[75]. This is lower than the average for all of Eyre Peninsula (4%). Musgrave is the traditional land of the Wirangu and Nauo Aboriginal people.

An important indicator of community connection is volunteering rates. Volunteering rates are very high in Musgrave at nearly 45%. Sport provides opportunities for community connectedness with many residents participating in football, netball and golf. Recreational fishing is also popular.

Fauna	Flora	Vegetation communities
Australian Fur Seal (Arctocephalus pusillus)	*West Coast Mintbush (Prostanthera calycina)*	Drooping Sheoak (Allocasuarina verticillata) Grassy Low Woodland
Black-footed Rock-wallaby (Pearson Island subspecies) (Petrogale lateralis pearsoni).	*Yellow Swainson-pea (Swainsona pyrophila)*	*Cummins Mallee (Eucalyptus penninsularis) +/- White Mallee (E. dumosa) Mallee*
Mallee Fowl (Leipoa ocellata)	*Metallic Sun-orchid (Thelymitra epipactoides).*	Cutting Grass (*Gahnia filum*) Sedgeland
Yellow-Tailed Black Cockatoo (Calyptorhynchus funereus)		

Table 8 – Selected fauna, flora and vegetation communities of conservation significance

Systems understanding

Musgrave is a complex system of connections and interactions between people, industries and natural resources. These connections and interactions mean that when one feature is impacted, flow on effects will be experienced by other features in the system. Developing this understanding can help identify the factors that make the system resilient or vulnerable to change. The Musgrave system is conceptually depicted in Figure 20, where the arrows represent the connections between the system's features.

Key features of the system include water resources, agriculture and the coast. A number of connections in the system are integral to the viability of the Musgrave subregion. For example, the connections between the community, tourism and the coast reflects the importance of the coast for social wellbeing and employment.

The connections between water resources, biodiversity and agricultural is integral for sustaining livelihoods and landscapes' groundwater dependent ecosystems.

Key NRM challenges and opportunities

A range of opportunities were identified by the community and stakeholders to address the key challenges facing natural resources in the Musgrave subregion. Table 9 identifies key NRM challenges and opportunities to address them.

Challenges	Opportunities to address challenges
Agricultural viability	A1. Support extension officers and agronomists to facilitate practice change and promote sustainable agriculture practices, this includes information sharing with farming groups and agricultural bureaus
	A3. Promote practices that prepare landholders to be drought ready, and promote practices that build soil health, and address the causes of soil erosion, dryland salinity and soil structure decline
	A8. Support the development and utilisations of water efficiency measures and alternative water supply infrastructure including sheeted catchments
	D6. Promote the adoption of restorative farming practices that build soil life and diversity, and maximise ecosystem services
Declining biodiversity	D1. Protect and restore coast and marine habitats, particularly for priority areas identified in the Coastal Action Plan and Marine Parks' plans
	D2. Protect and restore remnant terrestrial habitats and establish biodiversity corridors that link habitats. Priority areas include WildEyre
	D4. Develop and implement integrated pest management strategies that address the impacts and causes of pest persistence or incursion. Particular attention is required for overabundant herbivores, feral predators, woody weeds and new pest incursions such as buffel grass
	D5. Develop and implement strategies and plans to protect threatened species and ecological communities, includes implementing threatened species recovery plans
	C1. Monitor and evaluate natural resources management actions, and their effect on natural resources' condition and trends
	C3. Increase participation in citizen science initiatives that assist understand trend and condition of natural resources
Coast and marine degradation	B1. Support local and regional partners implement the Off-Road Vehicle Strategy, including investigations for designating areas for biodiversity protection and recreational use
	B2. Facilitate the development of tourism infrastructure, facilities, information and signage to enable sustainable access and use of the coast and parks
	B3. Support on-ground works to protect and enhance coastal and park condition including track rationalization, fencing, erosion control, access tracks, revegetation and pest control
	B4. Raise awareness about coast and marine conservation including education about human impacts
	A4. Partner with seafood industry on mutually beneficial projects including water quality monitoring and works, habitat protection, and marine debris reduction and clean-up
Aboriginal involvement in NRM	F2. Support native title groups in co-managing public land
	F3. Support traditional owners, Recognised Aboriginal Representative Bodies, Aboriginal Regional Authorities and Aboriginal communities manage natural resources and record sites of Aboriginal cultural significance
	F4. Provide training and career pathways into NRM related employment
	F5. Support awareness raising activities about Aboriginal cultural knowledge and law

Table 9 – Key NRM Challenges and opportunities for the Musgrave subregion

Far West

The Far West includes a large marine area extending along the Great Australian Bight to beyond the Nuyts Archipelago, nearly 80km offshore. The land area extents from Wahgunyah Conservation Reserve in the West to Minnipa in the east, and south to Venus Bay.

Quick stats

Population:

Approximately 6,270 (2011)

Major towns (population):

Ceduna (approx. pop 2,290)
Streaky Bay (approx. pop 1,000)
Minnipa (350)
Venus Bay (320)
Smoky Bay (195

Traditional Owners:

Mirning nation
Wirangu nation
Kokatha nation

Local Governments:

District Council of Ceduna
District Council of Streaky Bay

Land Area:

Approximately 22,200 square kilometres

Main land uses (% of land area):

Dryland agriculture (cropping and grazing) (52% of total land area)
Conservation (46%)

Main industries:

Agriculture
Aquaculture
Fishing,
Health care
Social assistance
Retail trade

Annual Rainfall:

270 - 380 mm

Highest elevation:

Tcharkuldu Hill (215 metres AHD)

Coastline length:

1083 kilometres (excludes islands)

Number of Islands:

53

Figure 21 – Map of Far West subregion

What's valued in Far West

The beautiful, clean beaches, rocky cliffs, great fishing and remoteness of the Far West are highly valued by the local community and visitors to the area. Favourite coastal areas include Fowlers Bay, Bunda Cliffs, Davenport Creek, Nuyts Archipelago, Smoky Bay, Streaky Bay and Sceale Bay. The pristine, white beaches at Fowlers Bay are loved by locals and visitors. From near Fowlers Bay and the Bunda Cliffs, many visit to catch a glimpse of whales in the Great Australian Bight. Great fishing and spectacular scenery can be found at Tuckamore, and Cactus Beach is a popular surfing destination.

The diversity of the coast around Streaky Bay is highly valued with granite pools, mangroves, crystal clear waters, sandy beaches and cliffs contributing to the area's appeal. The sea lion and dolphin tours at Baird Bay as well as abundant birdlife and great fishing attract locals and visitors.

"The magnetism of Smooth Pool draws me into a deep stillness which is overlaid with gratitude to be close to such beauty".

Offshore, Nuyts Archipelago including St. Peters Island is valued for its wildlife and wilderness. The diverse marine life found in nearby waters make it a popular destination for recreational and commercial fishers. The arid landscapes of the Far West are integral to the community's identity.

The tyranny of distance is felt by many in the community who value the remoteness of the region but sometimes struggle to access services and facilities available in more populated areas.

Broad scale cropping and grazing is undertaken across large areas of the Far West. Many farmers have long family connections to their properties and take pride in looking after their land. The distinct seasons are valued for the impact they have on the landscape and biodiversity.

"In spring, everythinglooks great after the early rains. Quandongs on trees and flowers coming."

The contrasting landscape between coast, plains and scrub are valued in the Far West. Large areas of scrub through the dune country of Yellabina Regional Reserve, and the conservation parks of Yumbarra and Pureba are valued for their wilderness. They further have deep Aboriginal cultural significance, and are popular recreational and tourist destinations. The local community are proud of the working together to protect some of these areas.

The Far West community is aware that Natural Resource Management is about the bigger picture of how humans interact with the natural environment over the longer term including considering the needs of future generations. They recognise the need to find a balance between conserving the natural environment and developing it for human needs. Achieving this will require all of the community to work together to improve the environment and the community.

Landscapes and seascapes

The Far West comprises a land area of around 21,900 square kilometres, with a large marine area extending along the Great Australian Bight to beyond Nuyts Archipelago, nearly 80 km offshore.

Far West experiences a semi-arid to arid climate. Rain falls predominantly in winter, and summers are hot and dry. Rainfall is highest in southern coastal areas around Streaky Bay and Port Kenny where annual rainfall ranges from 345 to 380 mm, decreasing inland toward Wirrulla (290 mm per year) and west toward Penong (320 mm per year)[76].

Soil type and rainfall influence land use in the Far West. Between Penong and Poochera, calcareous, sandy loam soils support cropping. West of Penong, soils are similar however rainfall limits agricultural production. South of Poochera toward the Venus Bay, soils are similar but shallower and there is less cropping[77].

The landscape of the western part of the Far West along the Nullarbor Plain comprises low limestone dune ridges that support mallee woodland dominated by Yorrell (*Eucalyptus gracilis*) and Red Mallee (*Eucalyptus oleosa*). Close to the coast, the sandy beaches are backed by low shrubland of Nitre bush (*Nitraria billardierei*) and Bladder Saltbush (*Atriplex vesicaria*) that grow on deep sands. The semi-arid climate in this area is too dry to support field crops.

Across the centre of the Far West subregion from Bookabie to Minnipa, the undulating plains have been cleared for cropping. Prior to clearance, mallee dominated by Red Mallee (*Eucalyptus oleosa*) and Gilga (*Eucalyptus brachycalyx*) were the dominant vegetation type. Dune fields run north-west to south-east in the north and the east. Elevation increases moving east toward the Gawler Ranges, with the subregion's highest point of 215 m occurring about 3km east of Minnipa.

North of Bookabie, there has been little clearance of native vegetation. East to the NRM Regional boundary mallee woodland dominated by Red Mallee (*Eucalyptus oleosa*) is found across the low dunes. Moving north, the landscape is undulating with some sand dunes vegetated by low woodland of Western Myall (*Acacia papyrcarpa*). Further north toward the Yellabinna Regional Reserve, low shrubland dominated by Bladder Saltbush (*Atriplex vesicaria)* is found on the generally flat landscape, scattered with small shallow depressions.

Nearly 20% of the subregion's land area is within National Parks and Wildlife Reserves, the largest areas being part of Yellabinna Regional Reserve and Pureba Conservation Park. Conservation areas extend off the coast including the eastern end of the Great Australian Bight Marine National Park and Nuyts Archipelago Wilderness Area.

Since December 2013, the Yumbarra Co-management Board has been responsible for the control and management of the Yumbarra Conservation Park and provided advice on the management of a number of other parks. Co-management enables Department of Environment, Water and Natural Resources to work in partnership with Aboriginal; groups to cooperatively manage parks, recognising the connection between people, place and country.

The Far West's coastal landscapes are diverse, featuring sandy beaches, rocky cliffs and headlands and protected bays. Areas of mangroves provide fish nursery habitat in the protected bays at Tourville Bay as well as near Smoky Bay and Streaky Bay. Dune systems exist behind about one third of sandy beaches both along the bays and along the Bight. Offshore habitats include seagrass meadows, sandy seafloors and rocky reefs, where nutrient-rich marine waters support commercial fish species, sharks, whales and sea lions .

A large area of the marine environment from offshore of Cape Adieu to Smoky Bay is protected within the Nuyts Archipelago Marine Park. This Marine Park is the largest in the South Australian Marine Park network and protects a range of habitats from coastal estuaries, cliffs and reefs to mangroves. Offshore and mangrove habitats include seagrass meadows, sandy seafloors and reefs, where marine waters support commercial fish species, sharks, whales and sea lions. The West Coast Bays Marine Park includes Sceale, Venus and Baird Bays and protects mainland and island breeding colonies of the conservation rated Australian sea lion (*Neophoca cinerea*).

There are no permanent surface watercourses and few defined drainage lines. Minor watercourses drain runoff from the Nundroo Range and near Calca. Several salt lake systems are found including within the Calpatanna Waterhole Conservation Park, Lake Yaninee south of Minnipa, Lake Macdonnell and near the eastern boundary of the NRM Region within the Gawler Ranges Conservation Reserve.

A number of fresh groundwater lenses have been identified across the Far West subregion. Several lenses are used to supply potable water to towns not connected to the SA Water distribution network including Penong, Port Kenny and Venus Bay. Streaky Bay relied on the Robinson Lens located south-east of the town, for potable supply however increasing salinity of the Robinson lens required the town to be connected to the SA Water network to allow supply from the Tod-Ceduna supply network.

Along the Far West coast, there are numerous wetland systems including Davenport Creek, Streaky Bay (including Acraman Creek), Point Labatt and Baird Bay which are listed in the Directory of Important Wetlands in Australia. Migratory shorebirds use coastal and marine wetlands at Laura Bay, Seagull Lake (between Venus Bay and Streaky Bay), Venus Bay, Tourville Bay, Scale Bay and Murat Bay[79].

Far West has a moderate diversity of flora and fauna, with more biodiverse areas around the Ceduna coastal area. The subregion has a relatively low number of endemic plants (found only in the subregion) and a lower number of flora species of conservation significance than other subregions. Iconic species and communities of conservation significance are show in Table 10. About 55% (1,200,000 ha) of the subregion's land area contains remnant native vegetation. Just over 30% of this native vegetation is protected within Conservation Parks and Regional Reserves. About 130,000 ha (11%) of native vegetation is protected through Heritage Agreements in the subregion.

Livelihoods

The Far West landscapes and seascapes support the industries and businesses that sustain the communities' livelihoods.

Cropping is the main agricultural land use in Far West, mostly occurring west of Penong where rainfall is higher. Crops including wheat, barley, oats and pulses are grown in rotation. Far West produces on average about 20% of the Eyre Peninsula wheat crop, which is about 10% of South Australia's total production[80]. Sheep grazing occurs south of Streaky Bay and north of Bookabie.

Commercial wild fisheries and aquaculture are key industries in the subregion. Farming of Pacific oysters has been undertaken for nearly 30 years and Denial and Smoky Bay are two of the largest producing areas in South Australia significantly contributing to local employment and the economy. Commercial wild catch fisheries export prawns, rock lobster, scalefish and abalone.

The Far West relies heavily on transport infrastructure that supports market access for agricultural, mineral and seafood commodities as well as local tourism and business. Key infrastructure includes the Eyre and Flinders Highways, Ceduna Airport, Port of Thevenard and rail lines from Thevenard to Port Lincoln and Penong.

Mains water is supplied to Ceduna, Streaky Bay, Smoky Bay and Minnipa via the Tod-Ceduna pipeline from groundwater basins in the south of Eyre Peninsula. Penong, Port Kenny and Venus Bay townships rely on groundwater and rain water tanks for water supply.

Across the subregion, about 15% of employment is in agriculture, 12% in the health care and social assistance sector and 10% in retail trade. The majority of employment in the health care sector occurs in Ceduna which is a major centre for health and community services. About 5% of employment is in aquaculture[81].

The Far West's tourism industry centres on the natural coastal environment. Whale watching, recreational fishing and boat charters, diving with sea lions, and beach visits are popular tourist activities. Food-related tourism is increasing with visitors from Australia and overseas learning about and enjoying local seafood.

Mining is a key industry in the Far West. The Lake MacDonnell gypsum mine is Australia's largest gypsum mine and exports from Thevenard. A number of smaller mines and quarries produce gypsum, calcrete and sand. Developing mineral projects include the Poochera kaolin mine and Tripitaka mineral sands north of Penong. Three percent of the subregion's employment is currently in mining but is expected to grow in coming years[82].

Lifestyles

Ceduna, located on the coast almost in the middle of the subregion, is the main urban centre of the subregion. Other larger townships are located at Streaky Bay, Port Kenny, Minnipa, Poochera and Penong.

Far West is home to around 6,270 people, nearly 90% of whom live within the District Council of Ceduna and the District Council of Streaky Bay. The western end of the subregion is outside Council boundaries and about 250 people live in this area. In the south of the subregion most of the remaining population reside within the townships of Port Kenny and Venus Bay (District Council of Elliston) and Minnipa (Wudinna District Council)[83].

The population of the District Council of Ceduna has seen a small decline in population in recent years of about 2% from 1998 to 2011. Population projections for the Council area expect a small increase to 2026. The District Council of Streaky Bay has seen an increase in population from 1998 to 2011 of 7%. This was above projected rates of population change which project a small decline in population of about 2% to 2026 [84].

The age distribution of the Far West is similar overall to that of the broader Eyre region around a third aged under 25 years, just over half aged between 25 and 64 years, and around 15% aged 65 years and over. Within this subregional distribution, there are some age groups that show particular differences. The population of 5 to 14 year olds is lower in the Far West than across all of the region, and there is a greater proportion of older residents aged over 65 in the Far West [85].

Fauna	Flora	Vegetation communities
Brush-tailed Bettong *(Bettongia penicillata ogilbyi)*	Club Spear-grass *(Austrostipa nullanulla)*	Drooping Sheoak (*Allocasuarina verticiallata*) grassy low woodland
Southern Brown Bandicoot *(Isoodon obesulus obesulus)*	Bead Samphire *(Halosarcia flabelliformis)*	*Smooth Cutting Grass (Gahnia filum) sedgeland*
Humpback Whale *(Megaptera novaeangliae)*	Silver Candles *(Pleuropappus phyllocalymmeus)*	
Southern Right Whale *(Eubalaena australis)*	West Coast Mintbush *(Prostanthera calycina).*	
Australian sea lion (*Neophoca cinerea*)	Seagrass *(Thalassia testudinum, Syringodium filiforme, Halodule wrightii, Halophila johnsonii, Halophila decipiens, Halophila engelmanni, Ruppia maritima)*	
Mallee Fowl *(Leipoa ocellata)*		

Table 10 – Selected fauna, flora and vegetation communities of conservation significance

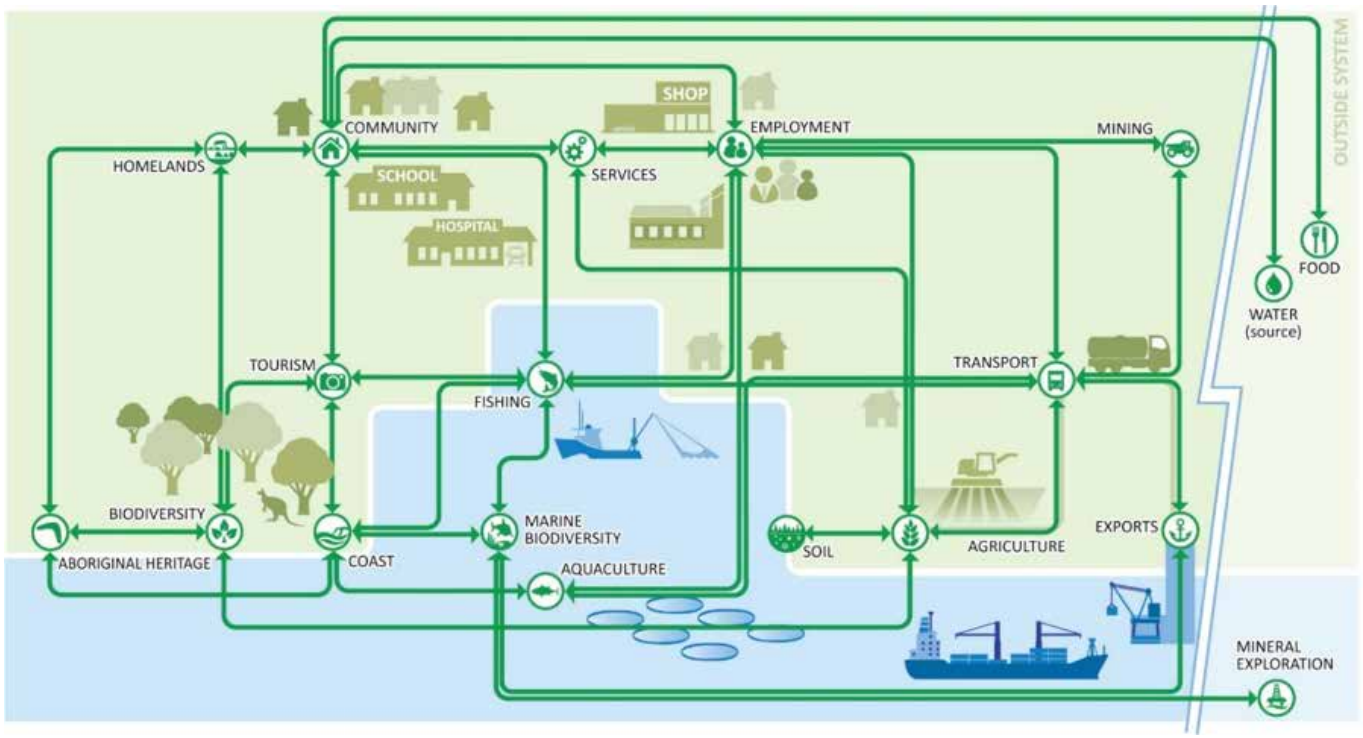


Figure 22 – Interconnections of the Far West subregion

Over 25% of the population for the District Council of Ceduna identify as having Aboriginal or Torres Strait Islander heritage. This is the highest of any Local Government area in South Australia, and well above the region total of 4%. Only 1% of the population of the District Council of Streaky Bay identify as having Aboriginal or Torres Strait Islander heritage. The Far West comprises areas of the traditional land of the Mirning, Wirangu and Kokatha Aboriginal people. A number of registered and reported Aboriginal Heritage sites exist along the Far West coast and there are likely to be many other unrecorded sites.

In 2013, the Far West Coast Native Title Claim determined that native title exists for this area which extends from south of Smoky Bay west to the State border. The Barngarla people were recognised as the Traditional Owners of the area from Minnipa to Wirrulla in 2015. The Wirangu No 2 Native Title Claim covers the area south of Venus Bay.

North and west of Ceduna, a number of Aboriginal Homeland communities have been established, maintaining Aboriginal communities' connection with country. Adjoining the region to the west is the Yalata Indigenous Protected Area where there is an agreement with the Australian Government to manage the country for biodiversity and cultural conservation.

Recreational fishing is a way of life for many locals in the Far West, where casting off the beach or their boats forms a vital part of their identity and wellbeing. Surfing, diving and other water sports are also popular recreational activities.

Volunteering rates provide an important indicator of community connection. Volunteering rates are slightly lower in the District Council of Ceduna than across most of Eyre Peninsula (28%) and higher in the Streaky Bay Council at 37%. Sport provides opportunities for community connectedness with many residents participating in football, netball, tennis, cricket and golf.

Systems understanding

The Far West is a complex system of connections and interactions between people, industries and natural resources. These connections and interactions mean that when one feature is impacted, flow on effects will be experienced by other features in the system. Developing this understanding can help identify the factors that make the system resilient or vulnerable to change. The Far West system is conceptually depicted in Figure 22, where the arrows represent the connections between the system's features.

Key features of the system include agriculture, seafood industries and the coast. A number of connections in the system are integral to the viability of the Far West subregion. This includes the connection between transport and export industries and the productive industries of agriculture, fishing, aquaculture and mining, who are reliant on road and rail networks to export products. The reliance on the food and water from outside the subregion is reflected in the arrow between food, water and the community.

Key features are the coast and marine biodiversity as it underpins tourism, biodiversity, seafood industries and the community's lifestyles. It was identified that coastal degradation is a challenge facing the subregion. Figure 23 depicts the factors affecting coastal degradation.

Coastal degradation is increasingly impacting beaches in the Far West. Beaches and dunes are naturally fragile to wind erosion and high swells, however increasing visitors are leading to increased erosion of beaches and dunes. Visitation is also disturbing coastal biodiversity such as shorebirds and increasing litter on the coastline. Shorebird nesting is further disturbed by dogs off leashes, and roaming foxes.

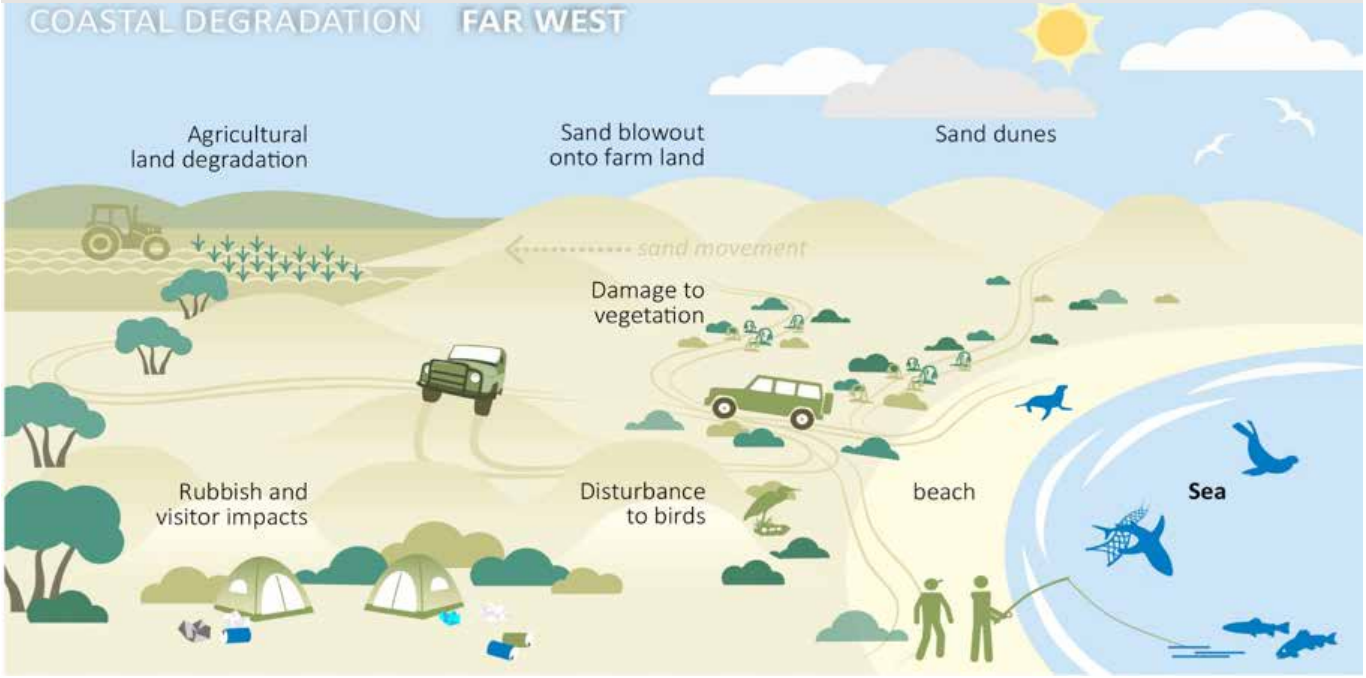


Figure 23 – Coastal Degradation

Key NRM challenges and cpportunities

NRM is integral to sustaining the livelihoods and lifestyle of the people of Far West who rely on the subregion's natural resources for employment, recreation and wellbeing. A range of opportunities were identified by the community and stakeholders to address the key challenges facing natural resources in the Far West subregion. Table 11, identifies key NRM challenges and opportunities to address them.

Challenges	Opportunities to address challenges
Agricultural viability	A1. Support extension officers and agronomists to facilitate practice change and promote sustainable agriculture practices, this includes information sharing with farming groups and agricultural bureaus
	A3. Promote practices that prepare landholders to be drought ready, and promote practices that build soil health, and address the causes of soil erosion, dryland salinity and soil structure decline
	A8. Support the development and utilisations of water efficiency measures and alternative water supply infrastructure including sheeted catchments
	D6. Promote the adoption of restorative farming practices that build soil life and diversity, and maximise ecosystem services
Declining biodiversity	D1. Protect and restore coast and marine habitats, particularly for priority areas identified in the Coastal Action Plan and Marine Parks' plans
	D2. Protect and restore remnant terrestrial habitats and establish biodiversity corridors that link habitats. Priority areas include
	D4. Develop and implement integrated pest management strategies that address the impacts and causes of pest persistence or incursion. Particular attention is required for overabundant herbivores, feral predators, woody weeds and new pest incursions such as buffel grass
	D5. Develop and implement strategies and plans to protect threatened species and ecological communities, includes implementing threatened species recovery plans
	C1. Monitor and evaluate natural resources management actions, and their effect on natural resources' condition and trends
	C3. Increase participation in citizen science initiatives that assist understand trend and condition of natural resources
Coast and marine degradation	B1. Support local and regional partners implement the Off-Road Vehicle Strategy, including investigations for designating areas for biodiversity protection and recreational use
	B2. Facilitate the development of tourism infrastructure, facilities, information and signage to enable sustainable access and use of the coast and parks
	B3. Support on-ground works to protect and enhance coastal and park condition including track rationalization, fencing, erosion control, access tracks, revegetation and pest control
	B4. Raise awareness about coast and marine conservation including education about human impacts
	A4. Partner with seafood industry on mutually beneficial projects including water quality monitoring and works, habitat protection, and marine debris reduction and clean-up
Aboriginal involvement in NRM	F2. Support native title groups in co-managing public land, including supporting the Far West Traditional Owners Group implement the Healthy Country Plan
	F3. Support traditional owners, Recognised Aboriginal Representative Bodies, Aboriginal Regional Authorities and Aboriginal communities manage natural resources and record sites of Aboriginal cultural significance
	F4. Provide training and career pathways into NRM related employment
	F5. Support awareness raising activities about Aboriginal cultural knowledge and law

Table 11 – Key NRM Challenges and opportunities for the Far West subregion

Appendix B: The Policy Framework

The Policy Framework outlines the matters that the Board will consider when exercising its powers under the Natural Resources Management Act 2004. It includes the following policies and page references:

Pest plant and animal control policy

Controlling existing pest species while minimizing the risk of new pest threats are critical for reducing impacts to agricultural productivity, biodiversity and human health. The policy outlines an individual's responsibilities for pest animal and plant control under the Natural Resources Management Act 2004 (NRM Act). The policy also identifies the priority pest animals and plants for the Eyre Peninsula Natural Resources Management Region (the Region), and nominates a level of control for pest management. The Policy further outlines the principles the Eyre Peninsula Natural Resources Management Board (the Board) will consider when issuing or refusing permits for the movement, sale and possession of a declared pest animal or plant.

An individual's responsibilities for pest animal and plant control

Chapter 8 of the NRM Act sets out the requirements for the control of pest animal and plants in South Australia. Under Section 174 of the NRM Act, the Minister may declare a class of animal or plant that requires specific control within the State or specific area of the State.

Once a pest animal or plant is declared, the type of controls that may be prescribed for the Region or State include:

- Prevent the movement of a declared animal or plant as per Section 175 of the NRM Act;
- Prevent the possession of a declared animal or plant as per Section 176 of the NRM Act;
- Prevent the sale of a declared animal or plant, and prevent the sale of a product containing a declared plant or animal as per Section 177 of the NRM Act;
- Prevent the sale of a contaminated item(s) containing a declared plant or animal as per Section 178 of the NRM Act;
- Prevent the release of a declared animal or plant as per Section 179 of the NRM Act;
- A requirement to notify the regional NRM Board of the presence of a declared animal or plant as per Section 180 of the NRM Act;
- A requirement to control a declared animal or plant in accordance with the instruction of an authorised officer as per Section 181 of the NRM Act; and
- A requirement to destroy or control a declared animal or plant as per Section 182 of the NRM Act.

It is the individual's responsibility to comply with these statutory requirements as they apply to a declared pest species. Failure to comply with these provisions may involve penalties. Please visit the Biosecurity SA website (www.pir.sa.gov.au/biosecurity) for the latest information on declared pest animal and plants, and which statutory requirements apply for the Region. Regional information is also contained on the Natural Resources Eyre Peninsula's website.

A compliance intervention may become necessary when an individual is unwilling to destroy or control a declared pest animal or plant, and is in breach of subsections 182(1),(2) or (3) of the NRM Act. In these instances the following order of actions will be implemented:

1. The Board or delegate to pursue the individual to implement voluntary action to destroy or control the pest species of concern.
2. The Board or delegate requests the individual to implement an action plan under section 183 of the NRM Act.

Control of priority pest animals and plants

To guide pest control across a large geographical area with limited resources, a risk assessment was undertaken by staff of the Department of Environment, Water and Natural Resources to determine the Region's priority pest animal and plant species (Table 13). This risk assessment was guided by the South Australian Weed Risk Management Guide , which involves:

- An assessment of the relative risk of pest species;
- As assessment of the feasibility for the pest's control; and then
- Assigns a level of pest control based on the pest's assessment scores (Please refer to Table 12 to understand level of pest control).

It is important to note that the risk assessment was conducted at a regional level using a generalised land use, however there are instances when a pest species pose a greater or lesser risk for a local area and/or specific land use. There is also the potential that the relative pest risk and/or the feasibility of control will change in the future from what was assigned in Table 13. For both these instances the required level of pest control may be escalated or downgraded. To accommodate future change and/or local and land use considerations, the Pest Management Plans available on the Natural Resources Eyre Peninsula's website will be used as latest information for required level of pest control within the Region. To avoid any doubt, the Pest Management Plans take precedence over information contained in Table 13.

Box 4 - Pest control on road reserves

Under subsection 182(7) of the NRM Act, the Board is responsible for destroying or controlling declared pest animals and plants on road reserves within the Region. In addition, the Board may recover costs for pest control on road reserves from each adjoining landholder as per Section 185 of the NRM Act.

To maintain an adequate level of pest control across the Region's vast network of road reserves while limiting potential financial impacts on adjoining landholders, the Board will focus pest control on species with the greatest potential to spread and cause adverse impacts. To guide this, the following principles apply:

1. Pest species that are identified as 'eradicate' or 'destroy' in Table 13 or within a Pest Management Plan, will be destroyed by a delegate of the Board if pest species are located within a road reserve.
2. Pest species that are identified as 'contain' or 'protect sites' in Table 13 or within a Pest Management Plan, will be controlled by a delegate of the Board if pest species are located within a road reserve.
3. Pest species that are identified as 'manage', 'monitor' or 'limited action' in Table 13 or within a Pest Management Plan, will be controlled when there is evidence of a significant increase in the pest's distribution or the pest is causing adverse impacts as a result of the road reserve infestation.

It is important to note that the recovery of pest control costs will be considered on case by case basis.

Table 12 – Controls for priority pests

Category	Aim	Controls
Alert	to prevent new pest species of significant threat from arriving and establishing in the Region	a) Prevent entry into Region and prevent the movement, sale and possession of pest species b) Ongoing surveillance for incursions of new pest species c) Report incursions of alert species to enable early eradication. For the latest information of alert species visit the Biosecurity SA website d) Conduct awareness raising activities to enable early detection
Eradicate	to remove the pest animal and plant species from the Region	a) Detailed surveillance and mapping to locate all distributions b) Destroy all pest plant infestations including seed banks, or destroy all pest animal populations including juveniles c) Prevent entry into Region and prevent the movement, sale and possession of pest species d) Remove all cultivated plants and prevent plantings e) Monitor progress towards eradication
Destroy	to significantly reduce the extent of the pest animal and plant species in the Region.	a) Detailed surveillance and mapping to locate all distributions b) Destroy all populations, aiming for local eradication where feasible c) Prevent entry into Region and prevent the movement, sale and possession of pest species d) Consider quarantine provisions and prevent plantings e) Monitor progress towards reduction
Contain	to prevent the ongoing spread of the pest animal and plant species in the Region	a) Detailed surveillance and mapping to locate all distributions b) Enforce control of all populations, aiming for a significant reduction in pest density. c) Prevent entry, movement, sale and possession of pest species unless under permit conditions d) Monitor change in current distribution.
Protect sites	to prevent spread of the pest species to key assets of high economic, environmental and/or social value	a) Locate distributions and assess the pest's ability to migrate to key assets in the Region. b) Enforce control of populations in close proximity to key assets, aiming for a significant reduction in pest density c) Prevent entry, movement, sale and possession unless under permit conditions d) Monitor change in current distribution within and in close proximity to key assets
Manage	to reduce the overall economic, environmental and/or social impacts of the pest animal and plant species through targeted management	a) Research and develop integrated pest animal management (IPM) packages for the species, including chemical and biological control where feasible b) Promote Integrated Pest Management packages to landholders c) Monitor decrease in pest animal and plant impacts with improved management d) Identify key sites/assets in the region and provide adequate resources to manage the pest animal and plant species
Monitor	to detect any significant changes in the pest risk	a) Monitor the spread of the species and review any perceived changes in pest risk
Limited action	take no action unless local pest spreads to a land use where the pest is a higher priority.	a) Undertake control measures if required for the benefit of other land uses at risk b) Provide limited advice to land holders

*Table 13 - Risk matrix for priority pest animals and plants for the Eyre Peninsula NRM region**

Feasibility of control

Relative pest risk	High	Medium	Low
High (ALERT)	**Eradicate** Buffel grass (*Cenchrus ciliaris and Cenchrus pennisetiformis*) Dingo (*Canis lupus dingo*) – south of dog fence	**Contain** Bridal veil (*Asparagus declinatus*) Cutleaf mignonette (*Reseda lutea*) Creeping knapweed (*Rhaponticum repens*) Bifora (*Bifora testiculata*) Field bindweed (*Convolvulus arvensis*) Weeping white broom (*Retama monosperma and Retama raetam*) Goat (*Capra hircus*) Red Deer (*Cervus elaphus*) Gazania (*Gazania spp.*)	**Manage** African boxthorn (*Lycium ferocissimum*) Aleppo pine (*Pinus halepensis*) Silverleaf nightshade (*Solanum elaeagnifolium*) - broad acre Bridal creeper (*Asparagus asparagoides*) African lovegrass (*Eragrostis curvula*) Fox (*Vulpes vulpes*) Rabbit (*Oryctolagus cuniculus*) House mouse (*Rattus norvegicus*) Feral cat (*Felis catus*)
Medium	**Destroy** Asparagus fern (*Asparagus scandens*) Khaki weed (*Alternanthera pungens*)	**Protect Sites** Boneseed (*Chrysanthemoides monilifera*) Prickly pear (*Opuntia spp.*) Silverleaf Nightshade (*Solanum elaeagnifolium*) – isolated patch Innocent weed (*Cenchrus spinifex and Cenchrus longispinus*) – isolated patch Italian buckthorn (*Rhamnus alaternus*) Fallow Deer (*Dama dama*) Fountain grass (*Cenchrus setaceus*) Carrion Flower (*Orbea variegata*) Polygala (*Polygala myrtifolia*)	Common starling (*Sturnus vulgaris*)
Low	**Monitor** Salvation jane (*Echium plantagineum*) Horehound (*Marrubium vulgare*) Wilding olive (*Olea europaea*) Cape tulip (*Moraea flaccida and Moraea miniata*)	**Limited Action** Caltrop (*Tribulus terrestris*) Blackberry (*Rubus fruticosus sp.*) Lincoln weed (*Diplotaxis tenuifolia*) Three corner jack (*Emex australis*)	Western coast wattle (*Acacia cyclops*) Blanket weed (*Verbascum thapsus*) Soursob (*Oxalis pes-caprae*) Arabian camel (*Camelus dromedaries*)

For the latest assessment of priority pests please see Pest Management Plans on the Natural Resources Eyre Peninsula's website.

Permits for the movement, sale or possession of a pest animal or plant

The Board as a relevant authority under the NRM Act for pest animal and plant control, may issue a permit to allow the sale, important to the Region, or road transport of a Category 3 declared animal(s) or plant(s) as per subsection 188(1) of the NRM Act. The Board can also make recommendations to the Chief Officer on the issuing of permits for the sale, import or road transport of a Category 1 or 2 declared plants, or for the sale, movement or keeping of a declared animal.

In these instances the Board will consider the following principles for issuing or refusing a permit:

1. A permit is unlikely to be granted for the proposed movement, sale or possession of a pest animal or plant if:
    a. identified as an alert pest species on the Biosecurity SA website; or
    b. dentified as 'eradicate' or 'destroy' within Table 13 or a Pest Management Plan.
2. Subject to Principle 2, a permit is likely to be granted for the proposed movement, sale or possession of a pest animal or plant identified as 'contain' or 'protect' within Table 13 or a Pest Management Plan.
3. A permit application for pest animal and plant identified as 'contain' or 'protect' within Table 13 or Pest Management Plan must demonstrate to the satisfaction of the Board or delegate that it will not increase the distribution or abundance of a pest animal(s) or plant(s) beyond what is proposed in the application.
4. A permit application for the possession of a pest animal(s) or plant(s) must:
    a. detail the management practice(s) to prevent impact(s) to the property where the possession of a pest animal(s) or plant(s) is proposed to be located; and
    b. demonstrate no impact to surrounding properties.
5. A permit application for the movement of a pest animal(s) or plant(s) must:
    a. detail how the pest species is to be transported; and
    b. demonstrate how the pest species is to be enclosed to prevent any spread or escape.
6. A permit application for the sale of a pest animal or plant must include an agreement between the vendor and purchaser in how the pest animal(s) or plant(s) is to be controlled once the sale is finalized.
7. The applicant may be required to prepare and provide a risk management plan to the satisfaction of the Board or delegate.
8. The risk management plan must assess and address the risks involved with the movement, sale or possession of a pest animal or plant,
9. The risk management plan may require the inclusion of monitoring arrangements for the applicant to undertake.
10. The Board or delegate may request the applicant to resubmit the risk management plan if risks or monitoring arrangements are inadequately addressed.
11. The Board may refuse a permit application if the applicant fails to address principles within this section.
12. The Board may specify conditions on the permit as per section 188(3) of NRM Act.
13. For the purposes of this section, the Pest Management Plans take precedence over information contained in Table 13 if there is any discrepancy.

Land management policy

The land management policy provides guidance to landholders in regard to the Board's approach to exercising its powers under Chapter 6 of the *Natural Resources Management Act 2004 (NRM Act)*. It further outlines the regional context and identifies high risk areas for land management.

Regional context

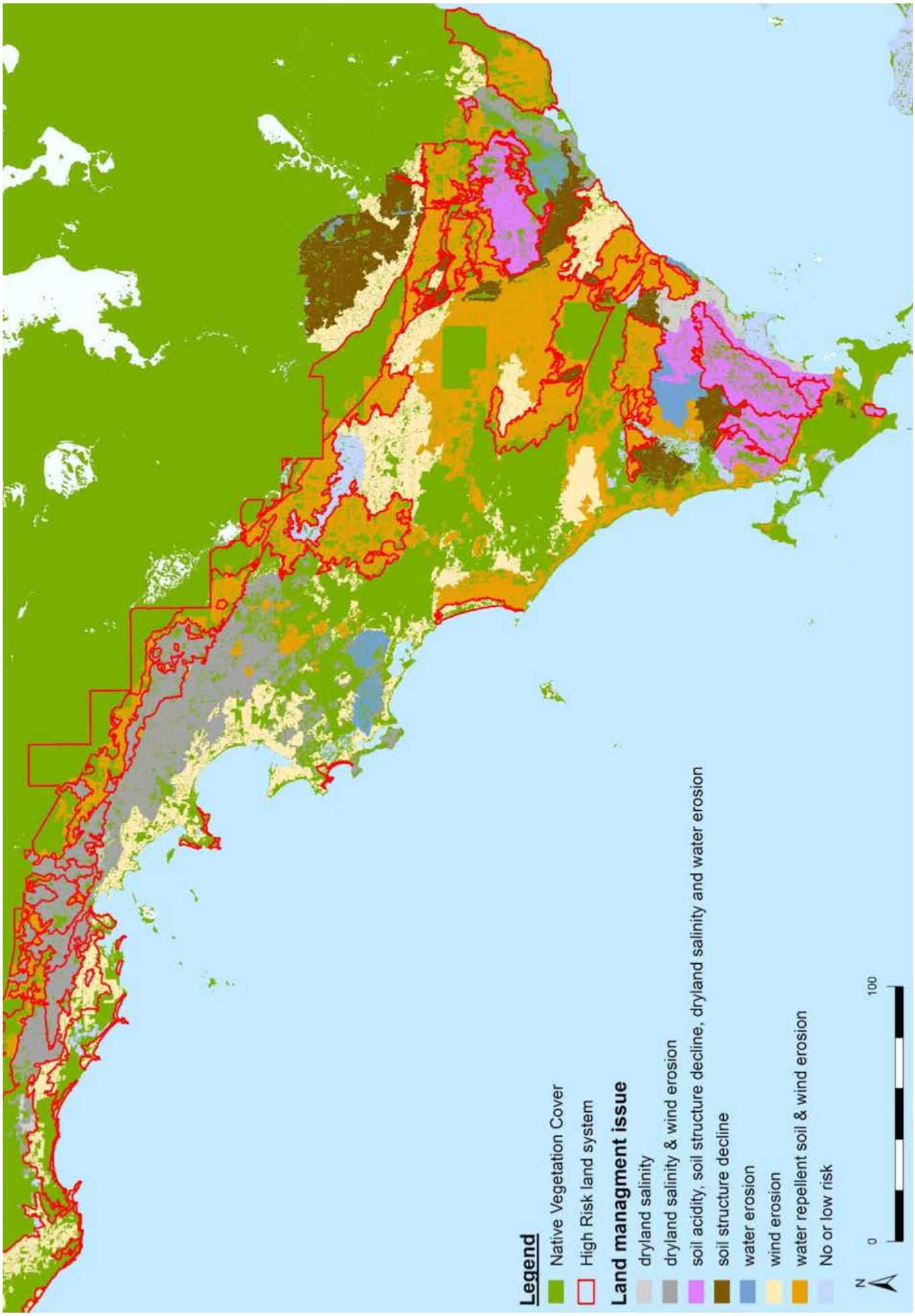
Cropping and grazing account for 80% of land uses for the Eyre Peninsula Natural Resources Management Region (the Region). The Region experiences a Mediterranean climate and average annual rainfall ranges from 250 to 560 mm per year. The Region's land systems include calcareous and sandy soils; shallow soils over calcrete or bedrock; deep soils over clays; ironstone soils; parallel or jumbled sand dunes; and coastal dunes. Land systems are areas of similar geology, topography and soil type[87].

Land management risks are closely associated with the land systems[88], and the map overleaf (Figure 24) displays the risks of wind erosion, dryland salinity, soil acidification, decline in soil structure, water erosion and water repellent soils. Figure 24 also identifies high risk land systems as outlined in red. Details of these high risk land systems are present in Table 14. Landholders in these areas are encouraged to proactively reduce land management risks by implementing sustainable land management practices. Please refer to the Natural Resources Eyre Peninsula website for information to manage land management risks.

Table 14 – Land systems with high land management risks[89]

Land system's District Council	Land system description	Land management risks
Lower Eyre Peninsula and Tumby Bay District Councils	• Undulating hills and gentle plains with ironstone rich soils over yellow clays • Parallel sand dunes with sand over clay and abundance of calcrete outcrops	• High risk of soil acidification • Medium risk of dryland salinity and • Medium risk of soil structure decline • High risk of wind erosion • Medium risk of water repellent soils
District Council of Elliston	• Parallel sand dunes with sand over clay and calcareous sandy loam in swales	• High risk of wind erosion • Medium risk of water repellent soils
Wudinna District Council	• Plains with highly calcareous and shallow sandy- stony loams, and parallel sand dunes	• High risk of wind erosion
Kimba, Cleve and Franklin Harbour District Councils	• Parallel or jumbled sand dunes with sand over clay and calcareous sandy loam in swales • Gentle sand plains or stony flats with low parallel sand dunes • Rolling hills with shallow soils on rocky slopes	• High risk of wind erosion • High or medium risk of water repellent soils • High risk of wind erosion • High risk of soil acidity and dryland salinity • Medium risk of water erosion and soil structure decline
Streaky Bay and Ceduna District Councils, and Out of Council areas	• Undulating plains and rises on calcrete, with shallow calcareous and sandy loams • Parallel sand dunes with calcareous and stony sandy loams in swales	• High risk of dryland salinity • High risk of wind erosion • Medium risk of water repellent soils

Figure 24 – Land management issues for the land systems of the Eyre Peninsula NRM Region[90]



Land management principles

The Eyre Peninsula Natural Resources Management Board (the Board) is the relevant authority for the management and protection of land under the NRM Act. Under Section 122 of the NRM Act, the Board can require a landowner to prepare an action plan if the Board considers:

a. that an owner of land has been, is, or is likely to be, in breach of the general statutory duty on account of land management practices or activities undertaken in relation to land for which the owner is responsible, and

b. that those practices or activities have resulted in, or could reasonably be expected to result in, unreasonable degradation of land or an unreasonable risk of degradation of land.

Degradation is any change in the quality of land, or any loss of soil, that has an adverse effect on water, native vegetation or other natural resources associated with, or reliant on, land, any other aspect of the environment, or biological diversity as per Section 121 of the NRM Act

Under section 122(2)(a) of the NRM Act, the Board must consider relevant provisions of a regional NRM plan. To this effect, the following principles will guide the Board's considerations:

1. A landholder is responsible to minimise the risk of land degradation, including:
    a. managing their land within its capability; and
    b. not impact surrounding properties.
2. When land degradation is observed by the Board or delegate, the cause(s) of degradation must be determined by an appropriate investigation(s).
3. The investigation must be undertaken by the Board or delegate, and the investigation shall:
    a. determine if land degradation was caused by management practice or external event(s);
    b. determine what is regarded as unreasonable degradation and what practices have caused this degradation; and
    c. determine rate of degradation.
4. Subject to Principle 5, should the investigation determine that land degradation was a result of a management practice(s), then the following actions shall be initiated in this order:
    a. The Board or delegate to pursue the landholder to implement voluntary action to prevent further land degradation.
    b. The Board or delegate to pursue the landholder to implement voluntary practice change to remediate land degradation.
    c. The Board requests the landholder to prepare and implement an action plan under section 123 of the NRM Act.
5. Should the investigation identify that the rate of degradation is occurring at an unacceptable rate, then the Board may immediately request the landholder to prepare and implement an action plan under section 123 of the NRM Act.
6. Subject to Principle 7, should the investigation determine that land degradation was caused by an external event beyond the control of the landholder, then the landholder is to take voluntary action to remediate land degradation caused by the external event within a reasonable timeframe.
7. Should a landholder fail to take voluntary action within a reasonable timeframe in relation to Principle 4 or 6, then the Board may request the landholder to prepare and implement an action plan under section 123 of the NRM Act.

Water affecting activity policy

The water affecting activity policy sets out the principles for managing water infrastructure and water take. The policy is applicable to the Eyre Peninsula Natural Resources Management Region, and has been developed under the provisions of Chapter 7 and section 75(3)(k) of the *Natural Resources Management Act 2004*. Definitions are included in section 3 of the policy to assist with the interpretation of the principles.

1. Introduction

Water affecting activities are activities that may impact the condition of a water resource, water dependent ecosystems or water users. Common examples of water affecting activities include: constructing a dam, constructing a road crossing over watercourse, draining water into a watercourse or lake, or drilling a well. A permit and compliance framework is in place to manage potential impacts associated with these activities.

Any person undertaking a water affecting activity should familiarise themselves with this policy. If you are uncertain whether an activity is considered a 'water affecting activity' under the Natural Resources Management Act 2004 (NRM Act), you should seek advice from a water resources officer from the Department of Environment, Water and Natural Resources (DEWNR) before undertaking the activity.

Box 5 - Contact details for water affecting activity enquiries

Phone: (08) 8688 3111

Office address:
Natural Resources Centre
86 Tasman Terrace Port Lincoln

Postal address:
PO Box 22 Port Lincoln 5606

Web address:
www.naturalresources.sa.gov.au/eyrepeninsula/land-and-water/water-affecting-activities

To assist in achieving sustainable water resources management outcomes, specific principles have been developed to manage water take from infrastructure such as diversion structures and non-prescribed wells. These principles are under the auspices of section 127(2) of the NRM Act. It is important to note that the principles for the water take from a prescribed well are set out in the *Water Allocation Plan for the Southern Basins and Musgrave Prescribed Wells Areas*.

1.1 Objectives

The objectives of the water affecting activity policy include:

i. Achieve water resource management outcomes through effective management of water related infrastructure and activities.

ii. Regulate activities that affect the quality or quantity of water resources.

iii. Facilitate productive use of water resources while maintaining the water needs of water dependent ecosystems.

iv. Manage development impacts on water users and water dependent ecosystems.

v. Maintain or improve the hydraulic function of water resources, floodplains and catchments.

vi. Maintain or improve riparian and floodplain habitats for the purpose of conserving aquatic biodiversity and supporting ecological functions and services.

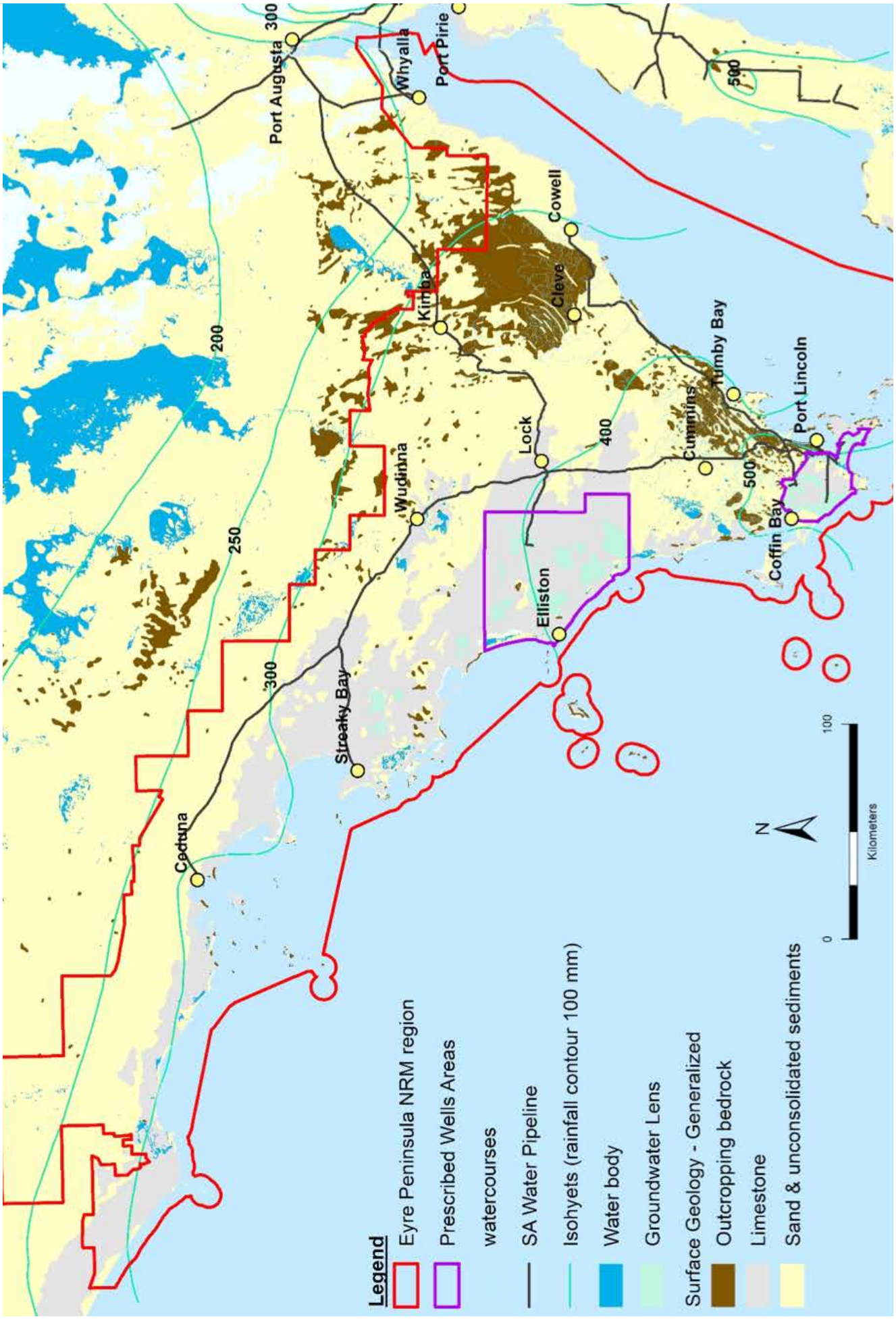
1.2 Water resources of the Eyre Peninsula

The Eyre Peninsula's climate, geology and topography largely dictate the occurrence and character of water resources. The western, central and northern parts of the Eyre Peninsula have limited watercourses due to low rainfall, high evaporation, permeable soils and low topography (refer to map overleaf). In comparison, the southern and eastern parts have a greater number of watercourses due to steeper topography, outcropping bedrock geology, areas of clay soils, and areas of higher rainfall. With the exception of the Tod River, watercourses are seasonal where peak flows are experienced during winter and often cease flowing by late spring or early summer. Water quality in the watercourses is generally brackish to saline in low flowing conditions, yet freshen after winter rainfall and storm events.

Most catchments have been extensively developed for agriculture, which has modified the hydrology and ecology. This has led to the following:

- Dryland salinity and waterlogging due to land clearance and catchment infrastructure. Land clearance has also increased saline discharge from groundwater. A common response to dryland salinity and groundwater discharge is saline drainage.
- Degraded riparian habitats that have ongoing competition for use between livestock, pest plants and native biodiversity.
- Altered flow regime of watercourses including quantity, timing and duration of flow events, which has altered condition of water dependent ecosystems.
- Increased quantity and velocity of run-off resulting in erosion. Erosion rates have reduced as a result of no-till cropping practices and contour banks.
- Increased competition for available water between water users and water dependent ecosystem as a result of dam development, particularly during periods of low rainfall.

Figure 25– Water Resources of the Eyre Peninsula Natural Resources Management Region



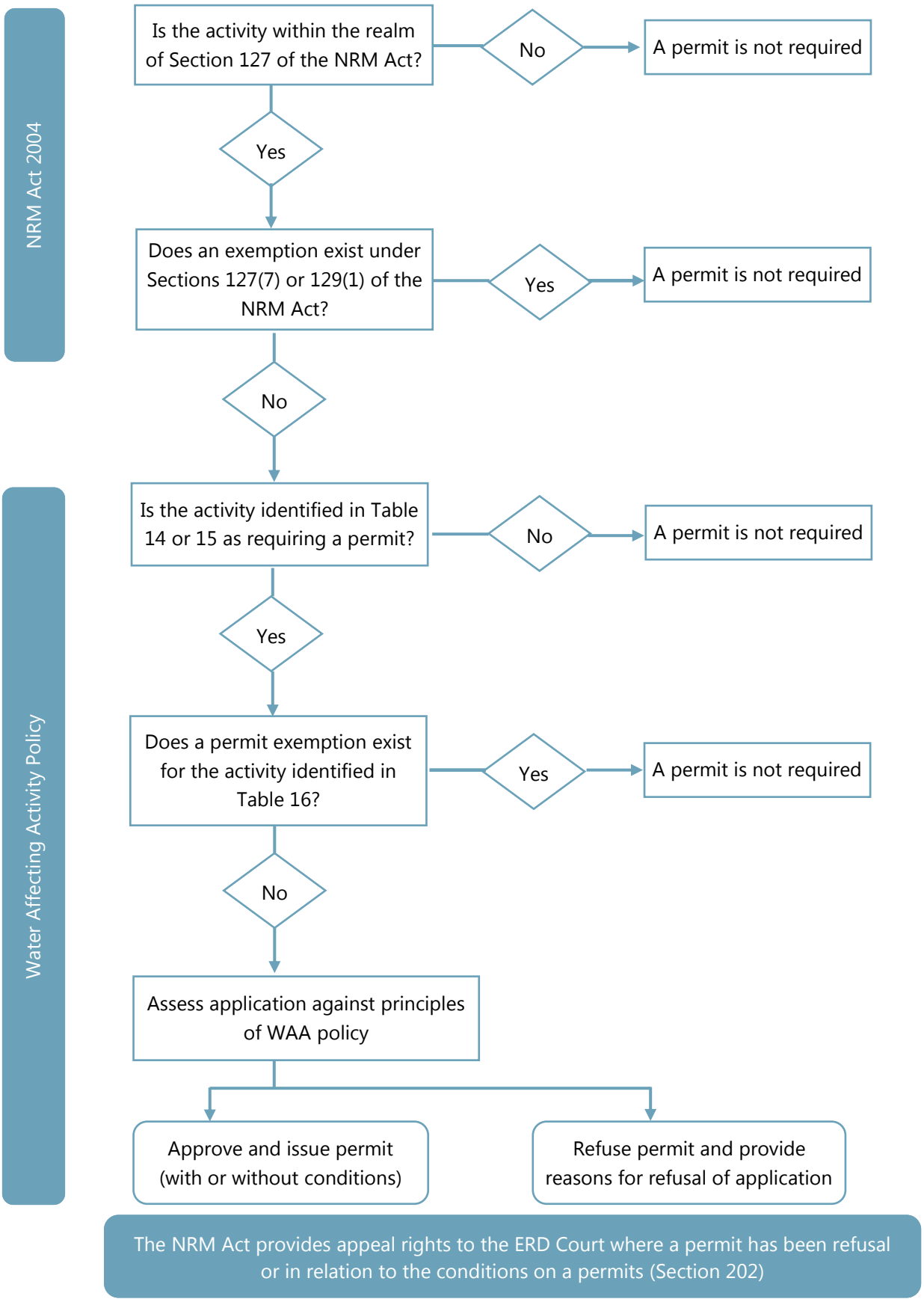


Figure 26 – Assessment process for Water Affecting Activities Permits

Across the Eyre Peninsula there are over 2,200 inland wetlands, and over 85% of the region's wetlands are dependent upon groundwater . Saline lakes are the most common followed by saline marshes, shrub swamps and freshwater sedge marshes. Wetlands are important refuge and breeding grounds for migratory birds.

Groundwater is an important water resource for towns, livestock and groundwater dependent ecosystems including Red Gum woodlands and wetlands. Major sources of groundwater are found within limestone aquifers located along the southern and western parts of the Eyre Peninsula (refer to map on page 69). Water quality in the limestone aquifers varies from fresh to saline. Aquifers with fresh groundwater are referred to as a fresh water lens. The majority of the region's reticulated supply is sourced from fresh water lens within the Southern Basins and Musgrave Prescribed Wells Areas. A Water Allocation Plan is in place to manage extraction from the prescribed wells areas.

Groundwater is accessed via wells or groundwater access trenches. There are occurrences of groundwater quality deteriorating as a result of groundwater access trenches, particularly from evaporation, direct stock access or contaminated run-off.

Springs are common in eastern and southern parts of the Eyre Peninsula. These springs are expressions of groundwater that is predominantly sourced from the bedrock geology. Flows from springs vary from permanent to seasonal; and water quality is highly variable. Flows from springs are often dammed and used for stock watering.

2. Water affecting activity permits

The water affecting activity policy sets out the matters that the Eyre Peninsula Natural Resources Management Board and the Minister will consider when granting or refusing a water affecting activity permit. The principles guide the implementation of Chapter 7 - Part 2 of the NRM Act.

Activities that require a water affecting activity permit are identified in Table 15 and Table 16.

The Minister is the relevant authority for all water affecting activities identified in Table 15. A permit is required to undertake any water affecting activity identified in column 1.

The Eyre Peninsula Natural Resources Management Board is the relevant authority for all water affecting activities identified in Table 16. Water affecting activities that require a permit are identified in column 1; and permit exemptions are identified in column 3.

Following receipt of a permit application, a water resources officer will follow the process outlined overleaf in Figure 26. The permit will be assessed against the policy's general principles and any activity specific principles. These principles are designed to provide clear direction for people wanting to undertake a water affecting activity, while also ensuring permit applications are assessed consistently and objectively.

There are a number of permit exemptions for water affecting activities which are outlined in section 2.2.4. Permit exemptions are for water affecting activities that have been authorised under corresponding legislations, or the Board has identified a permit exemption for a low risk water affecting activity. A single permit for multiple water affecting activities may also apply where an applicant develops a Best Practice Operating Procedure (BPOP). The Board has determined a process for granting a single water affecting activity permit that allows a person to undertake a range of specified water affecting activities at multiple locations where each water affecting activity is included in a BPOP. The process streamlines the assessment and administration processes for a specified range of water affecting activities. Section 2.2.2 provides details on how to develop a BPOP.

When a water affecting activity is undertaken without a permit, or conditions on a permit are not adhered to, a notice to rectify the works may be issued by the relevant authority. In these instances, the relevant authority will initially seek voluntary compliance with the involved person. Should the requested works not be rectified voluntarily, it may become a compliance matter involving legal proceedings and penalties.

Table 15 – Water affecting activities for which the Minister is the relevant authority

Water affecting activities requiring a permit (Column 1)	Section for activity specific principles (Column 2)	Subsection of the NRM Act 2004 (Column 3)
Drilling, plugging, backfilling or sealing of a well.	Section 2.3.9	127(3)(a)
Repairing, replacing or altering the casing, lining or screening of a well	Section 2.3.9	127(3)(b)
Draining or discharging water directly or indirectly into a well.	Section 2.3.10	127(3)(c)

Table 16 – Water affecting activities for which the Board is the relevant authority

Water affecting activities requiring a permit (Column 1)	Section for activity specific principles (Column 2)	Permit exemptions (Column 3)	Subsection of the NRM Act 2004 (Column 4)
The construction or modification of a dam or diversion structure that will collect or divert water flowing in a watercourse or flowing over land. Activities requiring a permit include, but are not limited to: • Construct or modify a dam within in a priority catchment as defined in Table 18; • Construct or modify a weir or diversion structure within in a priority catchment as defined in Table 18.	Section 2.3.1	• Desilt a dam provided the activity is in accordance with principle 21. • Remove an off-stream dam provided the activity is in accordance with principle 22. • Construct, modify or remove a contour bank provided the activity is in accordance with principle 23.	127(5)(a)
The construction or modification of a structure or building in a watercourse, lake or floodplain (see Appendix 1). Activities requiring a permit include, but are not limited to: • Construct or modify a culvert, causeway or bridge; • Construct or modify stormwater infrastructure; • Construct or modify an earthen embankment or concrete foundation; • Construct or modify a monitoring device.	Section 2.3.2	• Emergency repairs to culvert and causeway provided the activity is consistent with principle 24.	127(5)(b)
Draining or discharging water into a watercourse or lake. Activities requiring a permit include, but are not limited to: • Stormwater disposal; • Saline drainage; • Disposal of fluid from drilling; • Disposal of pump test water.	Section 2.3.3		127(5)(c)
Depositing an object or solid material into a watercourse or lake. Activities requiring a permit include, but are not limited to: • Construct or modify an erosion control structure; • Disposal of material within a watercourse or lake; • Raising the bed or bank heights of a watercourse or lake.	Section 2.3.4	• Placing rocks in watercourse for erosion control provided the activity is consistent with principle 25.	127(5)(d)
Obstructing a watercourse or lake in any other manner. Activities requiring a permit include, but are not limited to: • Planting vegetation in watercourse or lake.	n/a	• The Board, or delegate, has provided financial assistance or support for planting vegetation in a watercourse or lake.	127(5)(e)
Depositing an object or solid material on a floodplain or shore of a lake to control flooding. Activities requiring a permit include, but are not limited to: • Levee bank; • Raising the bank heights of a lake.	Section 2.3.5	• Emergency repairs to a levee provided the activity is consistent with principle 26.	127(5)(f)

Continuation - Table 16 – Water affecting activities for which the Board is the relevant authority

Water affecting activities requiring a permit (Column 1)	Section for activity specific principles (Column 2)	Permit exemptions (Column 3)	Subsection of the NRM Act 2004 (Column 4)
Destroying vegetation in a watercourse, lake or floodplain requires a permit	Section 2.3.6	• Vegetation is destroyed in accordance with Chapter 8 of the NRM Act 2004 for the control of pest animals and plants. • Vegetation is destroyed with consent granted under the Native Vegetation Act 1991.	127(5)(g)
Excavating rock, sand or soil from a watercourse, lake or floodplain. Activities requiring a permit include, but are not limited to: • Altering a watercourse, drain or lake; • Mining within a watercourse, lake, floodplain or within 100 metres of the shores of a lake;	Section 2.3.7	• Repair or maintain an existing drain provided the activity is in accordance with principle 28. • Desilt a spring, soak or water hole provided the activity is in accordance with principle 29.	127(5)(h)
Undertaking commercial forestry (including carbon plantings) within a priority catchment requires a permit.	Section 2.3.8		127(ja)

2.1 General principles

1. Subject to 2, a water affecting activity including the design, construction principle maintenance of associated infrastructure shall not:

   a) adversely affect the quantity or quality of water resources;

   b) adversely affect a person's lawful take of water;

   c) contribute to the over-extraction of a water resource;

   d) contribute to water logging, dryland salinity or rising water tables;

   e) expose or mobilise acid sulphate soils;

   f) increase erosion or risk of erosion;

   g) increase localised or catchment flooding risks;

   h) adversely affect the frequency and duration of water flowing in a watercourse or floodplain;

   i) adversely affect the standing water level in a lake or the integrity of an aquifer;

   j) adversely interfere with surface water and groundwater interactions;

   k) adversely affect water dependent ecosystems and their environmental water requirements;

   l) adversely affect ecological functions, diversity or habitat, and adversely impact on the migration of aquatic biota;

   m) compromise the productive capacity of the land;

   n) damage property or existing infrastructure; or

   o) compromise the integrity of authorised scientific monitoring and assessment of water resources.

2. Principle 1(a), 1(c), 1(i), 1(i), 1(j), and 1(m), may not be practical for an authorised mining activity under the Mining Act that involves open pit mining or dewatering an aquifer. For these instances, the applicant is required to develop a risk assessment and mitigation strategies to the satisfaction of the Minister, the Board or delegate.

2.2 Administrative matters

2.2.1 Permit principles

3. A water affecting activity permit is required for activities identified in in column 1 of Table 15, and column 1 of Table 16 as per section 127(3)(e) of the NRM Act 2004.

4. A water affecting activity permit shall be assessed against the general principles in section 2.1 and any activity specific principles stated in the subsections of section 2.3.

5. A delegate of the Board or a delegate of the Minister may request an applicant to provide further information if in the opinion of the delegate, the applicant has provided insufficient information to assess the permit application.

6. The principles specified in the water affecting activity policy apply to the entire Eyre Peninsula Natural Resources Management Region, unless a principle specifically defines an area for its application.

7. The water affecting activity principles set out in the Water Allocation Plan for Southern Basins and Musgrave Prescribed Wells Areas take precedence over the principles of this policy within the Regional NRM Plan.

8. A water affecting activity permit may be varied or revoked by the relevant authority where the permit holder has failed to comply with conditions specified on the permit.

9. A water affecting activity permit is valid for a period of time as determined by the Board.

10. The Board or delegate may change or extend the expiry date of permit for an activity identified in Table 16 if the applicant requests in writing for a change or extension of the expiry date.

11. Public notification is not required for a water affecting activity permit application.

2.2.2 Best practice operating procedures

12. Best Practice Operating Procedures may be developed to grant a single permit to allow a person to undertake a range of specified water affecting activities at multiple locations.

13. Best Practice Operating Procedures must be approved by the Board.

14. A person shall have prior written approval from the Board to undertake a water affecting activity in accordance with Best Practice Operating Procedures, and the following conditions apply:

    a) A Best Practice Operating Procedure is valid for 12 months from the date of approval, or for such other period of time specified by the Board, and will apply to any activities to which the Best Practice Operating Procedures relate that may be undertaken in that period.

    b) The Board may cancel a Best Practice Operating Procedures, the subject of a permit, if in the Board's opinion, the person to whom the approval was granted has not complied with the Best Practice Operating Procedures, or in any other circumstances as the Board thinks fit.

15. The Board may refuse to endorse Best Practice Operating Procedures if in the Board's opinion, the person has previously contravened or failed to comply with Best Practice Operating Procedures, or in any other circumstances as the Board thinks fit.

2.2.3 Development plans

16. Pursuant to section 75(3)(f) of the NRM Act 2004, it is the opinion of the Board that the Development Plans for the District Council of Lower Eyre Peninsula and the District Council of Tumby Bay should be reviewed to improve the relationship between the policies in those plans and the policies in the Regional NRM Plan in relation to:

    a) Amending a development control principle associated with the Water Protection Zone by reducing the percentage of runoff available for collection or diversion from 50 per cent to 25 per cent.

17. Timing of this requested amendment shall be addressed when the relevant District Council next intends to amend its Development Plan.

2.2.4 Permit exemptions

18. A permit is not required in the following circumstances:

    a) an authorisation or consent has been granted for the activity under any of the following legislations as per 129(1) of the NRM Act 2004:

        i. Development Act 1993;

        ii. Environment Protection Act 1993;

        iii. Native Vegetation Act 1991; or

        iv. Pastoral Land Management and Conservation Act 1989;

    b) the Board has specified a permit exemption in Column 3 of Table 16.

19. A permit is not required to construct or modify a dam with a volume greater than five megalitres or a wall height greater than three metres above ground level as development approval is required for such an activity from the relevant authority under the Development Act 1993.

20. For the purposes of principle 19, the relevant authority shall refer the dam proposal to the Board for direction as per Schedule 12 part 12(1) of Development Regulations 2008; and the Board shall provide direction in accordance with the water affecting activity policy.

21. A permit is not required for desilting a dam provided:

    a) desilting only involves the removal of material deposited post dam construction or material deposited since the dam was previously desilted;

    b) excavated material removed from desilting shall not be deposited within a watercourse, lake or floodplain of a watercourse; and

    c) the capacity of the dam is not increased beyond its original size.

22. A permit is not required for removing an off-stream dam provided:

    a) the dam is reinstated with clean fill to the same height of natural ground level; and

    b) the reinstated area is stabilized with top soil and vegetation.

23. A permit is not required for the construction, modification or removal of a contour bank provided the contour bank does not intersect a watercourse.

24. A permit is not required for emergency repairs to a culvert or causeway as a result of a flood event, provided the following is adhered to:

    a) emergency repairs are undertaken for the purposes of allowing safe access and preventing further flood damage;

    b) culvert(s) and causeway are reinstated to a standard that is in accordance with principles 43 below and 44 where practical;

    c) culvert(s) and causeway are reinstated within 12 months of the flood event occurring; and

    d) the applicant notifies the Board or delegate once the works are undertaken.

25. A permit is not required for the placement of gravel or rock for the purpose of erosion control in watercourse, lake or channel provided:

    a) the total volume of gravel and rocks to be placed is less than 50 cubic metres;

    b) no rubbish or construction rubble is used;

    c) the watercourse profile is not altered;

    d) no significant vegetation is removed or buried; and

    e) the activity does not impact fish migration.

26. A permit is not required for emergency repairs to a levee as a result of a flood event, provided the following is adhered to:

    a) the levee is located within the catchments identified in Table 17 (see Figure 28 for location).

    b) emergency repairs are undertaken for the purposes of preventing further flood damage;

    c) he levee is reinstated to a standard that is in accordance with Principle 48;

    d) the levee is reinstated within 12 months of the flood event occurring; and

    e) the applicant notifies the Board or delegate once the works are undertaken.

27. A permit is not required to destroy vegetation growing in a watercourse, lake or floodplain if the activity is for the purpose of controlling pest animals or plants under an obligation of Chapter 8 of the NRM Act 2004, or an authorisation has been obtained under the Native Vegetation Act 1991.

28. A permit is not required for repairing or maintaining an existing drain within the catchments identified in Table 17, provided the activity is in accordance with principle 51.

29. A permit is not required for desilting a spring, soak or water hole provided:

a) Spring is currently accessed for stock purposes, and desilting only involves the removal of unconsolidated material;

b) desilting does not make the opening of the spring larger;

c) excavated material is not deposited within a watercourse, lake or floodplain of a watercourse; and

d) native vegetation is not removed unless authorisation is obtained under the Native Vegetation Act 1991.

Table 17 – Exempt catchments for emergency repairs or drain maintenance

Catchment	Hundreds for administration purposes
Lake Baird	Cummins, Stokes, Mortlock and Koppio
Lake Malata	Ulipa, Cummins, Stokes and Koppio
Lake Wangary	Warrow, Cummins, Mortlock, Koppio, Wanilla, Uley and Lake Wangary
Pillana Lagoon	Cummins and Mortlock

2.3 Activity specific principles

2.3.1 Dams, weirs and diversion structures

30. A permit is required to construct or modify a dam, weir or diversion structure located within a priority catchment as defined in Table 18 and displayed in Figure 28.

31. A dam, weir and diversion structure shall not be located:

    a) in a third order watercourse or higher as defined by Figure 27;

    b) in areas that may result in an increase in land affected by salinity or water logging;

    c) in areas affected by acid sulphate soils;

    d) in, immediately upstream, or immediately downstream of significant riparian vegetation.

32. A dam, weir or diversion structure shall be designed and constructed to:

    a) limit seepage;

    b) limit evaporation;

    c) prevent excavated material being deposited within a watercourse or lake; and

    d) prevent adverse impacts to downstream users or neighbouring properties.

Table 18 – Priority catchments and associated Hundreds

Priority catchments	Hundreds for administration of priority catchments
Big Swamp	Wanilla, Uley and Lincoln
Boston Bay	Lincoln and Louth
Charlton Gully	Louth and Wanilla
Coffin Bay - Jussieu Peninsula	Lake Wangary, Lincoln, Uley, Sleaford, Flinders and Wanilla
Lake Baird	Cummins, Stokes, Mortlock and Koppio
Lake Greenly	Ulipa, Warrow, Cummins and Mortlock
Lake Malata	Ulipa, Cummins, Stokes and Koppio
Lake Wangary	Warrow, Cummins, Mortlock, Koppio, Wanilla, Uley and Lake Wangary
Little Swamp	Wanilla, Louth and Lincoln
Louth Bay	Louth, Koppio and Hutchinson
Lower Tod	Louth and Koppio
Meadows Creek	Louth
Rock Valley Creek	Koppio and Hutchinson
Peake Bay	Louth, Koppio and Hutchinson
Pillana Lagoon	Cummins and Mortlock
Pillowarta	Koppio and Hutchinson
Salt Creek	Stokes, Koppio, Hutchinson and Yaranyacka
Toolillie	Mortlock, Koppio, Wannila and Louth
Tumby Bay	Hutchinson, Stokes and Yaranyacka
Upper Tod	Koppio and Stokes
Woolshed Creek	Warrow and Lake Wangary

Watercourses are ordered by the Strahler system, which is defined by:

- Any watercourse that has no watercourses flowing into it is a 1st order watercourse.
- Where two 1st order watercourses join, the watercourse becomes a 2nd order watercourse.
- Where two or more 2nd order watercourses join, they form a 3rd order watercourse.
- A 3rd order watercourse does not become a
- 4th order watercourse until it is joined by another 3rd order watercourse.

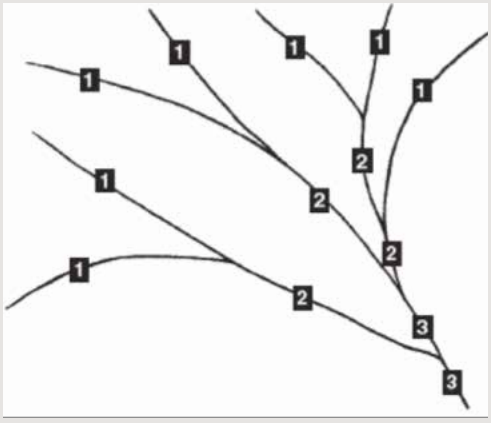


Figure 27 – Watercourse ordering

Principles for dam construction and modification

33. Subject to principles 34 and 35, the allowable dam volume for a new or modified dam for an allotment within a priority catchment shall be calculated by Equation 1.

34. Subject to principle 35, the total volume of any existing dam(s) and a proposed dam(s) for an allotment within a priority catchment shall be equal to or less than the allowable dam volume as defined by Equation 1.

Equation 1:
V = Y × A

Where:

V = allowable dam volume in megalitres (ML)

Y = allowable yield expressed in megalitres per hectare (ML/ha), as defined in Column D of Table 19.

A = area in hectares (ha) of an allotment.

35. An additional volume may be collected in a dam if runoff can be collected from an artificial catchment provided:

a) the volume to be collected is calculated by Equation 2.

b) can be efficiently collected from any of the following surfaces:

i. roof of a building;

ii. secured sheet of polyethylene or equivalent;

iii. bitumen, asphalt or concrete road;

iv. brick or concrete pavement; or

v. compacted earth that has been graded for runoff collection.

c) permission(s) in writing is obtained from the property owner if the applicant intends to collect runoff from a building, road or pavement that is not their property.

Principles for construction and operation of weirs and diversion structures

36. The Board or delegate should consider the following factors in deciding whether or not to grant a permit for the construction of a weir or diversion structure that diverts water from one catchment to another:

a) Water access for an adjoining landholder;

b) The quality of water in the receiving catchment

c) Water dependent ecosystems in the catchment of origin or the receiving catchment; or

d) Recharge or groundwater flow to the Southern Basins Prescribed Wells Area.

Equation 2:
Va = (R × Aa × e)/(1,000,000)

Where:

Va = volume in megalitres (ML) to be collected from an artificial catchment

R = mean annual rainfall in millimetres (mm per year), as defined in Column B of Table 19

Aa = area in metres squared (m2) of the artificial surface to be collected from.

e = efficiency factor to account water collection loses, and factors include:

0.8 for impervious surfaces including concrete, polyethylene, metal and bitumen;

0.4 for compacted earthen surfaces such as an unsealed road; or

the Board or delegate may specify a different efficiency factor for different surfaces or artificial catchments with reduced efficiencies.

Figure 28 – Priority Catchments of the Eyre Peninsula NRM Region

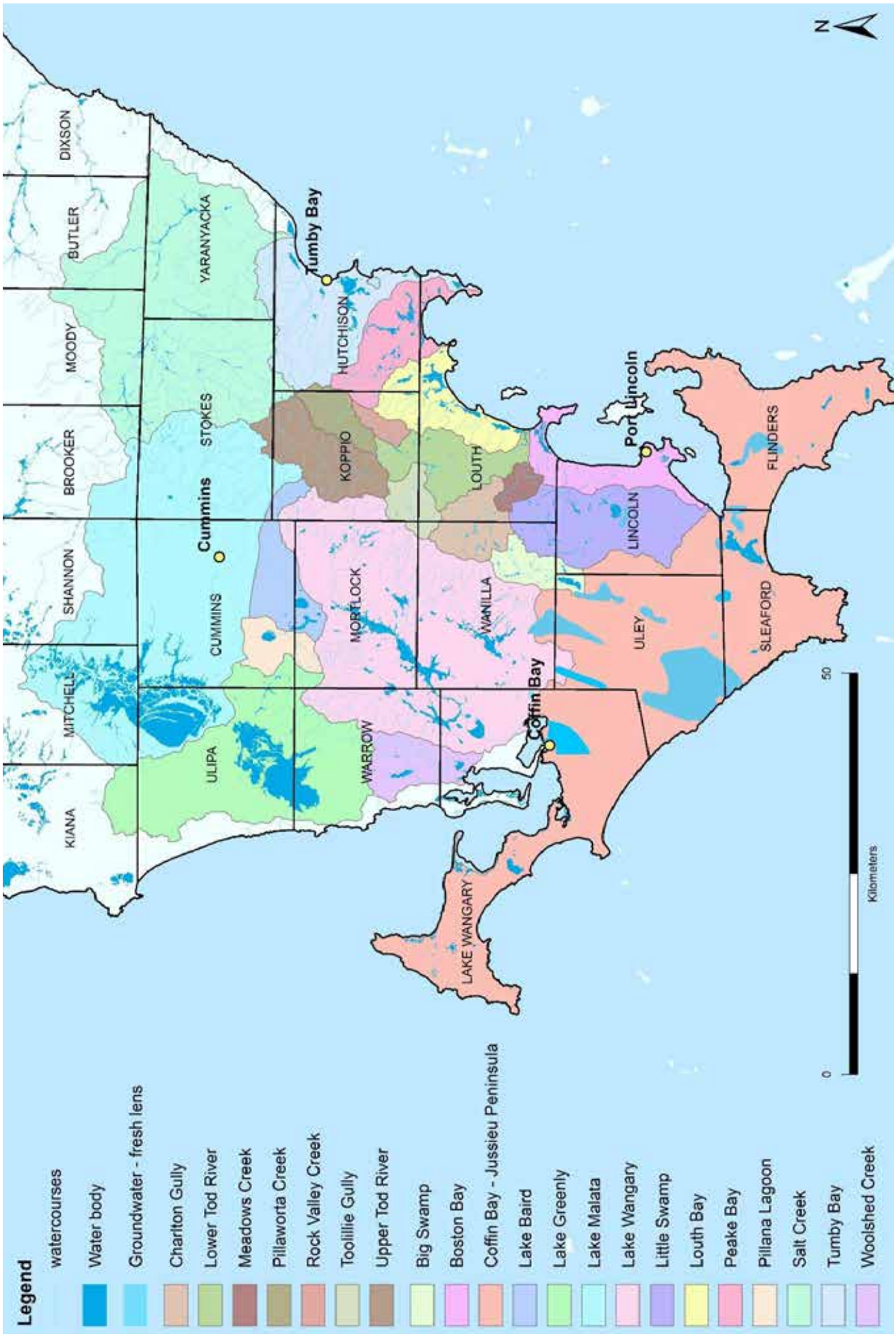


Table 19 – Design values for priority catchments

A Priority catchments	B Mean rainfall (mm)	C Catchment Yield# (ML/ha)	D Allowable Yield* (ML/ha)	E Unit flow rate^ (L/d/ha)
Big Swamp	590	0.50	0.12	43.0
Boston Bay	490	0.23	0.06	33.5
Charlton Gully	590	0.50	0.12	43.0
Coffin Bay - Jussieu Peninsula	560	0.40	0.10	39.9
Lake Baird	415	0.10	0.03	27.8
Lake Greenly	510	0.27	0.07	35.2
Lake Malata	415	0.10	0.03	27.8
Lake Wangary	500	0.25	0.06	34.3
Little Swamp	590	0.50	0.12	43.0
Louth Bay	485	0.22	0.05	33.1
Lower Tod	485	0.22	0.05	33.1
Meadows Creek	415	0.10	0.03	27.8
Rock Valley Creek	510	0.27	0.07	35.2
Peake Bay	400	0.09	0.02	26.7
Pillana Lagoon	415	0.10	0.03	27.8
Pillowarta	510	0.27	0.07	35.2
Salt Creek	410	0.10	0.02	27.4
Toolillie Gully	510	0.27	0.07	35.2
Tumby Bay	400	0.09	0.02	26.7
Upper Tod	510	0.27	0.07	35.2
Woolshed Creek	510	0.27	0.07	35.2

 # Catchment yield is equivalent to runoff, and has been determined from a regional rainfall and runoff relationship using the Tanh hyperbolic function. This relationship was derived from the Toolillie gauging stations (AW 12503), and rainfall data from the Bureau of Meteorology.

**** Allowable yield is 25% of the catchment yield.***

^ The unit threshold flow rate represents the 25th percentile for non-zero flows. It has been determined from a regional curve of annual rainfall from the Bureau of Meteorology stations 18181 and 18043, and streamflow data from the Toolillie gauging stations (AW 12503).

37. A weir or diversion structure should be designed and constructed in such a manner so that it can be operated without the taking water occurring once the watercourse being equal or below the threshold flow rate as defined by Equation 3.

Equation 3:
T = U × Au

Where:

T = threshold flow rate in litres per day (L/d)

U = unit flow rate in litres per day per hectare (L/d/ha), and defined by Column E in Table 19

Au = Area in hectares (ha) of the upstream catchment area

38. A weir or diversion structure on a watercourse or lake within a priority catchment, should be constructed and/or operated in a manner that, in the opinion of the Board or delegate, does not pose an unacceptable risk to:

a) water access for an adjoining landholder;

b) the quality of the water resource;

c) water dependent ecosystems that depend on that water; or

d) recharge or groundwater flow to Southern Basins Prescribed Wells Area.

39. The Board or delegate may consider the construction and/or operation of a weir or diversion structure to pose an unacceptable risk in the following circumstances:

    a) the amount of diversion exceeds or proposes to take more than 10 megalitres per year from a priority catchment;

    b) the diversion occurs, or is proposed to occur, upstream of a water dependent ecosystem defined in Figure 29 or Table 20, and the diversion activity has potential to impact the environmental water requirements of the water dependent ecosystem; or

    c) the diversion occurs or is proposed to occur in the Little Swamp or Big Swamp catchments as defined in Figure 28 and Table 18, and the diversion activity has potential to impact recharge to the Southern Basins Prescribed Wells Area.

40. The Board or delegate may impose conditions in relation to the construction or operation of a weir or diversion structure on a watercourse or lake within a priority catchment to manage an unacceptable risk, including the following conditions:

    a) the diversion must be controlled so that it only takes place in accordance with the specified parameters relating to:

        i. minimum water level or minimum flow rate of the watercourse or lake; and/or

        ii. water salinity.

    b) the applicant must install and maintain a meter in accordance with the South Australian Water Use Meter Specification, and provide regular meter readings; and/or

    c) any other matter deemed relevant by the Board or delegate.

Principles for allowing low flows to bypass dams, weirs and diversion structures

41. For priority catchments, a dam, wall or other structure that collects or diverts water must have design features or include a device that returns or bypasses water up to the threshold flow rate in the following circumstances:

    a) construction or modification of a diversion structure located within a watercourse; or

    b) construction or modification of an on-stream dam with a storage capacity greater than five Megalitres, and located on a first or second order watercourse as defined by Figure 27.

42. The design features or device shall:

    a) allow water to pass downstream of the infrastructure at a rate to equal or greater than the threshold flow rate as defined by Equation 3;

    b) be a design approved by the Board and remain operational; and

    c) not recapture or divert water passing through the return or bypass mechanism

2.3.2 Structures in a watercourse, lake or floodplain

43. The design and construction of any building, structure, embankment or foundation in a watercourse, lake or floodplain shall:

    a) maintain the natural flow of the watercourse or lake;

    b) have provisions to minimise erosion;

    not result in the collection of debris in such a way that increases the flood risks to human safety or property damage; and

    d) not interfere with subsurface flow in such a way as to lead to waterlogging, salinisation of land or increase likelihood of acid sulphate soils developing;

44. The design and construction of a culvert(s) and causeway in a watercourse or lake shall allow for the migration of native fish and aquatic biota by:

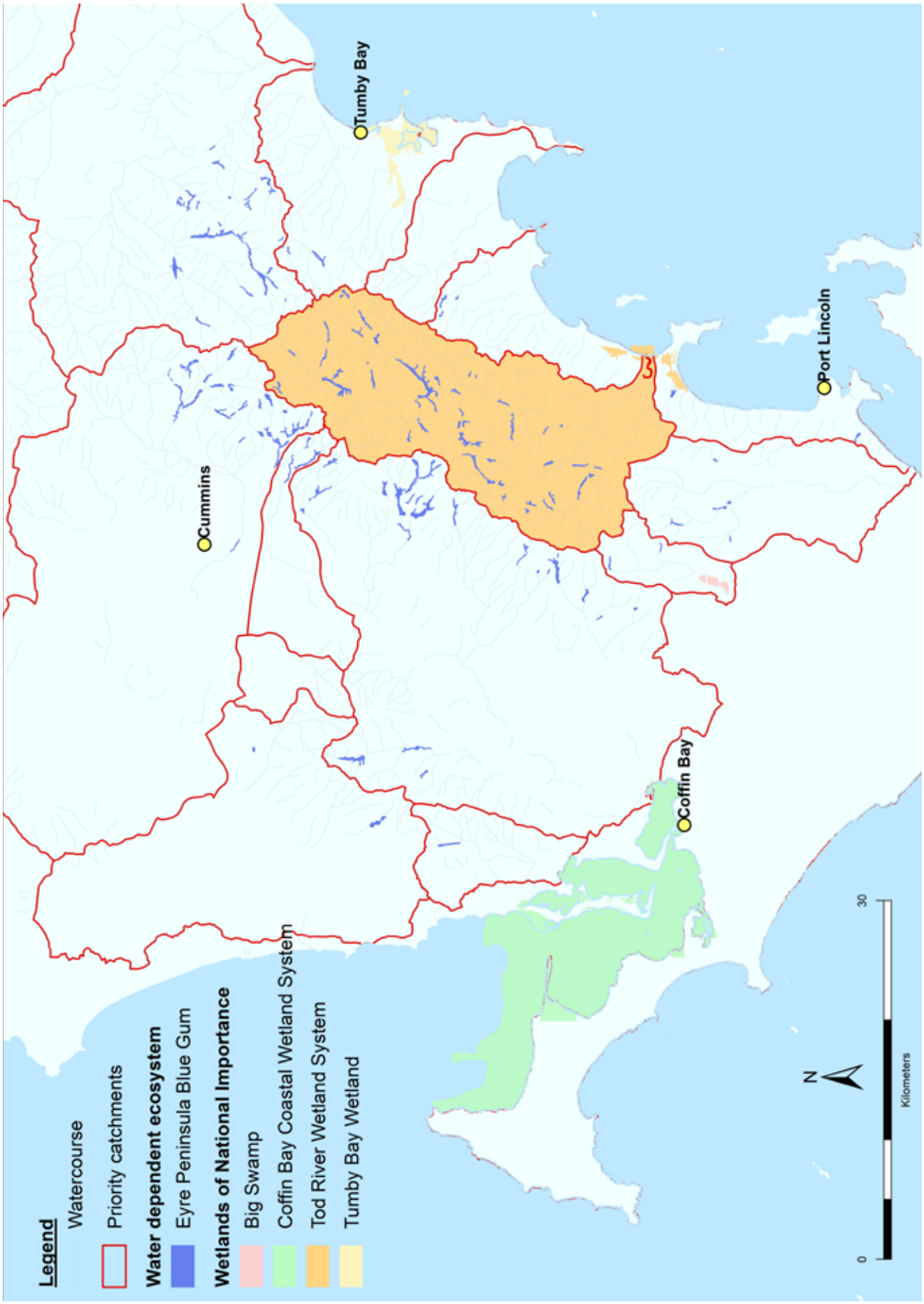
    a) sizing the culvert appropriately to avoid significant increases in the velocity of water flowing through the culvert; and

    b) submerging the invert of the culvert below the mean water level of a lake or below the water level of a watercourse's base flow.

Table 20 - Water dependent ecosystems of concern for water take

Name of water dependent ecosystem	Significance
Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*)	Threatened ecological community under the Environmental Protection and Biodiversity Act 1999
Temperate Coastal Saltmarsh	Threatened ecological community under the Environmental Protection and Biodiversity Act 1999
Big Swamp	Wetland of National Significance
Coffin Bay coastal wetland system	Wetland of National Significance
Tod River wetland system	Wetland of National Significance
Tumby Bay wetland	Wetland of National Significance

Figure 29 – Water dependent ecosystems of concern for water take



2.3.3 Draining or discharging water into a watercourse or lake

45. Prior to draining or discharging water into a watercourse or lake the applicant shall:

    a) ensure water that is to be drained or discharged into a watercourse complies with the Environment Protection Act 1993 and any associated policy;

    b) ensure the quality of water to be drained or discharged is equivalent or better than the quality of the receiving water, with the exception of saline drainage activities; and

    c) install protective measures to prevent erosion from the discharging or draining water.

46. The rate of discharge or drainage activities shall not significantly increase the flow rate of a watercourse or lake.

2.3.4 Depositing materials in a watercourse or lake

47. Disposing of materials in a watercourse or lake shall be free of rubbish, construction rubble and any pollutant identified in Environment Protection (Water Quality) Policy 2015.

2.3.5 Flood control structures

48. Depositing or placing an object or solid material on a floodplain or shore of a lake to control flooding shall not:

    a) adversely impact the natural flow paths of a watercourse or lake;

    b) increase the risk of flooding to life or property;

    c) increase the area or mobilise the areas affected by waterlogging, dryland salinity or acid sulphate soils; or

    d) degrade the habitat or condition of water dependent ecosystems.

2.3.6 Destroying vegetation in a watercourse, lake or floodplain

49. Subject to Principle to 27, the destruction of vegetation shall only occur where it is for the protection of existing infrastructure, or for the rehabilitation of a watercourse, lake or floodplain, and does not result in:

    a) bed and bank instability; or

    b) destruction of significant habitat by altering or removing woody debris or removing dead trees.

Note a separate permit is required to clear native vegetation under the Native Vegetation Act 1991.

2.3.7 Excavating a watercourse, lake or floodplain

50. The removal of rock, sand or soil from a watercourse, lake or floodplain shall not:

    a) risk the stability of a bank of a watercourse or lake; or

    b) alter the natural flow of a watercourse, lake or floodplain.

51. Altering the profile of a watercourse or lake shall:

    a) maintain the hydraulic capacity of the watercourse, channel or lake;

    b) maintain the hydraulic connection of the watercourse to a floodplain provided no flood risks or dryland salinity risks exist; or

    c) not attempt to alter the natural flow path or straighten meandering nature of the watercourse.

2.3.8 Commercial forestry

52. A new commercial forest or expansion of an existing forest shall be a minimum of 20 metres from a watercourse, lake or water-dependent ecosystem.

53. Any natural regeneration of commercial forest species shall be removed from the set- back distance specified in principle 52.

54. The expansion of a commercial forest will be taken to include:

    a) for commercial forests in existence at the date of commencement of section 127(5)(ja) of the NRM Act 2004 (1 July 2014), an increase in the area for which development approval for commercial forestry has been granted as at commencement date; or

    b) for commercial forests established after 1 July 2014, an increase in the net planted area as approved through a WAA permit.

55. The allowable net planted area of a commercial forest in hectares, within a priority catchment as defined in Table 18, shall be determined by volume expected to be taken by the commercial forest along with the following considerations:

    a) Total take of water by the commercial forest and any existing or new dam shall not exceed the allowable volume for the allotment as defined by Equation 1; and

    b) The volume of water taken by a commercial forest shall be determined by:

        i. Equation 4 provided the groundwater level is greater than six metres from the surface of the area to be planted with commercial forest; or

        ii. A hydrogeological investigation is required to undertaken to the satisfaction of the Board when groundwater is less than 6 metres from the surface of the area to be planted with commercial forest.

Equation 4
$Vf=0.85\times Yc \times Ap$

Where:

Vf = annual volume in megalitres (ML) of water take by a commercial forest

Yc = catchment yield expressed in megalitres per hectare (ML/ ha), as defined in Column C of Table 19 for priority catchments.

Ap = the net planted area in hectares (ha) of the commercial forest

56. An existing dam(s) may be removed to increase the volume available for take by the commercial forestry.

57. The applicant of a commercial forest shall at all times ensure that the relevant forestry activity has approvals for the use of the relevant land under the Development Act 1993.

58. A water affecting activity permit will continue to authorise a commercial forestry activity as specified in the permit, for future felling and replanting rotation(s), in accordance with the conditions set out in the permit.

2.3.9 Drilling and repairing a well

The following matters should be taken into account by the Minister when determining whether to grant or refuse a permit for an activity under section 127(3)(a) and 127(3)(b) of the NRM Act.

59. A new well for the taking of groundwater shall not be located within 300 metres from an existing well that is operational and accesses the same aquifer for groundwater take, except where:

    a) the existing well is the property of the applicant proposing to drill the new well; or

    b) the new and existing well are both for the purpose of managed aquifer recharge, and are operated under the same scheme; or

    c) the applicant has undertaken a hydrogeological investigation that demonstrates to the satisfaction of the Minister, that there will be no adverse impact on the existing well; or

    d) an alternative water supply has been provided by the applicant to the impacted water users for the duration that the well is to be impacted.

60. The construction, modification or decommissioning of a well shall be in accordance with the Minimum Construction Requirements for Water Bores in Australia by National Uniform Drillers Licensing Committee (see link for document - http://aditc.com.au/wp-content/uploads/2014/06/Minimum-Construction-Req-Ed-3-2.8MB.pdf)

61. It is a condition of a permit to drill, plug, backfill or seal a well or to repair, replace or alter the casing, lining or screen of a well that the work be undertaken by a person who is a licensed well driller or is supervised in carrying out the work by a licensed well driller.

62. The headworks of a new well or repaired well shall be:

    a) constructed so that the recovery and draining or discharge operations can be metered without interference;

    b) constructed so water cannot leak if the well becomes clogged;

    c) pressure cemented along the full length of the well casing, if the well is to be artificially recharged by a pump.

63. The equipment, materials and methods used for the activity associated with an authorised permit shall not adversely affect the quality of groundwater or the aquifer's integrity.

64. Where a well passes or will pass, through two or more aquifers, an impervious seal shall be made and maintained between all aquifers.

65. A well should be constructed and/or operated in a manner that, in the opinion of the Minister or delegate, does not pose an unacceptable risk to:

    a) water access for adjoining landholder;

    b) the quality of a water resource;

    c) water dependent ecosystems that depend on that water; or

    d) recharge or groundwater flow to Southern Basins Prescribed Wells Area or Musgrave Prescribed Wells Area.

66. The Minister or delegate may consider that the construction and/or operation of a well has the potential to pose an unacceptable risk in the following circumstances:

    a) the new or modified well is proposed to take greater than 10 megalitres per year.

    b) the new or modified well is hydraulically connected to a water dependent ecosystem defined in Figure 29 or Table 20, and the extraction has potential to impact the environmental water requirements of the water dependent ecosystem; or

    c) the new or modified well is located is less than five kilometres from the boundary of the Southern Basins Prescribed Wells Area or Musgrave Prescribed Wells Area.

67. The Minister or delegate may impose conditions in relation to the construction or operation of a well to manage an unacceptable risk, including the following conditions:

    a) the extraction must be controlled so that it only takes place in accordance with the specified parameter(s) relating to:

        i. minimum water level in the well; and/or

        ii. water salinity.

    b) the applicant to install and maintain a meter in accordance with the South Australian Water Use Meter Specification, and provide regular meter readings;

    c) any other matter deemed relevant by the Minster or delegate.

2.3.10 Draining or discharging water into a well

The following matters should be taken into account by the Minister when determining whether to grant or refuse a permit for an activity under section 127(3)(c) of the NRM Act.

68. The draining or discharging of water directly or indirectly into an aquifer shall not:

    a) detrimentally affect the ability of other persons to lawfully take from that aquifer;

    b) degrade groundwater dependent ecosystems; or

    c) degrade the environmental value as per Clause 6 of the Environment Protection (Water Quality) Policy 2015.

69. Prior to draining or discharging water into an aquifer the applicant shall:

    a) pressure cement along the full length of the well casing where the draining or discharging of water into the well is by means other than gravity;

    b) ensure water that is to be drained or discharged into a well complies with the Environment Protection Act 1993 and any associated policy;

    c) ensure the quality of water to be drained or discharged is equivalent or better than the quality of the receiving aquifer;

    d) undertake a risk assessment in accordance with the Australian Guidelines for Water Recycling: Managed Aquifer Recharge and to the satisfaction of the Minister; and

    e) obtain the necessary authorisations and requirements from the following authorities:

        i. the Environmental Protection Authority; and

        ii. SA Health.

70. Draining or discharging water sourced from a different aquifer to the receiving aquifer can only occur where the applicant can prove to the satisfaction of the Minister that such draining or discharging will have no negative consequence on:

    a) the environmental value as per Clause 6 of the Environment Protection (Water Quality) Policy 2015, of the receiving aquifer;

    b) the integrity of the receiving aquifer;

    c) groundwater dependent ecosystems;

    d) existing water users;

    e) surface and near-surface drainage including, but not limited to, waterlogging of soils, creating perched water table or excessive increase in the height of water table; or

    f) direct or indirect damage to buildings, roads and infrastructure.

71. Managed aquifer recharge into a prescribed well of the Southern Basins or Musgrave Prescribed Wells Areas is subject to the provisions in the Water Allocation Plan for Southern Basins and Musgrave Prescribed Wells Areas.

3. Definitions

Allotment: the section, lots, or allotment identified on a certificate of title under the Real Property Act 1886; and includes two or more contiguous allotments owned or occupied by the same person and operated as a single unit for the purpose of primary production.

Applicant: a person who puts forward a water affecting activity permit application.

Aquifer: an underground layer of rock or sediment that holds water and allows water to percolate through.

Aquatic biota: all organisms that live in water at a particular locality

ARI: average recurrence interval is the return period of a defined storm event with a defined magnitude of total rainfall.

Artificial catchment: a manmade surface that allows runoff to be collected, and includes:

a) Roof of a building;

b) Secured sheet of polyethylene or equivalent;

c) Bitumen or concrete road;

d) Brick or concrete pavement;

e) Compacted earth that has been graded for runoff collection.

Base flow: water that flows in a watercourse during seasonal dry periods that is sourced from groundwater discharge.

Bedrock: the solid and consolidated rock or geological material.

Best Practice Operating Procedures: an endorsed procedure that is developed to guide minimum standards of operations for a water affecting activity.

Biodiversity: the number and variety of organisms and species found within a specified geographic region.

Board: the Eyre Peninsula Natural Resources Management Board

BPOP: see definition for Best Practice Operating Procedures

Bund: a wall built for the purpose of preventing water from entering or leaving a place of interest

Catchment: the land area draining to a point of interest

Channel: includes a drain, gutter or pipe; or part of a channel.

Commercial forest: means a forest plantation where the forest vegetation is grown or maintained so that it can be harvested or used for commercial purposes (including through the commercial exploitation of the carbon absorption capacity of the forest vegetation).

Construct: includes erect, alter, reduce, enlarge, repair or excavate.

Desilting: is the activity of removing material that has deposited post construction of a dam, channel or drain. **Dewatering:** taking water from of an aquifer or lake for the purpose of lowering the water level of the aquifer or lake in order to obtain dry access to an underground area that would otherwise be saturated or partially with saturated with water.

Diversion: see 'take' definition

Diversion structure: is a structure that redirects the flow of a watercourse or lake to a point of interest. The structure includes the headwall used to control water flow in the watercourse or lake, and the connecting infrastructure to transport the water to the point of interest such as a channel, or pump and pipe.

Domestic purpose: in relation to the taking of water does not include:

(a) taking water for the purpose of watering or irrigating land, other than land used solely in connection with a dwelling; or

(ab) without limiting paragraph (a)—taking water for the purpose of watering or irrigating more than 0.4 of a hectare of land; or

(b) taking water to be used in carrying on a business (except for the personal use of persons employed in the business).

Drain: see channel definition

Drill: in relation to a well means to drill the well or to excavate the well in any other manner and includes to deepen or widen an existing well

Ecology: the study of the relationships between living organisms and their environment.

Ecosystem: a dynamic complex of plant, animal, fungal and microorganism communities and the associated non-living environment interacting as an ecological unit.

Ecosystem services: those processes and attributes of an ecosystem (or part of an ecosystem) that benefit humans.

Effluent: means domestic wastewater or industrial wastewater;

Environmental Water Requirements: those water requirements that shall be met in order to sustain the environmental values of ecosystems that depend on the water resource, including their processes and biodiversity, at a low level of risk.

Estuary: means a partially enclosed coastal body of water that is permanently, periodically, intermittently or occasionally open to the sea within which there is a measurable variation in salinity due to the mixture of seawater with water derived from or under the land;

Floodplain: means any area of land adjacent to a watercourse, lake or estuary that is periodically inundated with water. Floodplain is spatially defined by the Department of Environment, Water and Natural Resources' Geographic Information System data of "land subject to inundation" or "land subject to flooding" from the "topo.waterbodies" shapefile see https://data.environment.sa.gov.au/NatureMaps

Freeboard: the vertical distance between the full supply level of a dam and the crest of the dam.

Groundwater: means (a) water occurring naturally below ground level; and (b) water pumped, diverted or released into a well for storage underground.

Groundwater access trench: is an excavated opening in the ground that allows access to groundwater.

Groundwater Dependent Ecosystem (GDE): an ecosystem that require access to groundwater, on a permanent or intermittent basis, to meet all or some of its water requirements to maintain the community of plants and animals, and the ecological processes and ecosystem services they provide.

Groundwater extraction: the process of taking water from an underground source, either temporarily or permanently.

Habitat: the natural place or type of site in which an animal or plant, or communities of animals and plants, live.

Headworks: means any assembly on top of a well and located between the well casing and the water delivery system.

Hydrology: the branch of science especially concerned with the movement and quality of water in relation to land

Infrastructure: includes—

(a) artificial lakes;

(b) dams or reservoirs;

(c) embankments, walls, channels or other works or earthworks;

(d) bridges and culverts;

(e) buildings or structures;

(f) roads;

(g) pipes, machinery or other plant or equipment;

(h) any device;

(i) any item or thing used in connection with—

(i) testing, monitoring, protecting, enhancing or re-establishing any natural resource, or any aspect of a natural resource;

(ii) any other program or initiative associated with the management of anatural resource;

(j) other items brought within the ambit of this definition by the regulations;

Intensive farming: a method of keeping animals in the course of carrying on the business of primary production in which the animals are usually confined to a small space or area and are usually fed by hand or mechanical means.

Land: according to the context, (a) land as a physical entity, including land under water; or (b) any legal estate or interest in, or right in respect of, land; and includes any building or structure fixed to the land.

Lake: means a natural lake, pond, lagoon, wetland or spring (whether modified or not) and includes

(a) part of a lake; or

(b) a body of water designated as a lake by an NRM plan or by a Development Plan under the Development Act 1993.

This regional NRM plan includes a soak and water hole within a lake definition.

Managed aquifer recharge: The intentional draining and discharging of water to aquifers for subsequent recovery or environmental benefit.

Megalitre (ML): one million litres.

Metered water use: Water volume measured through a water flow meter.

Mining Act: means any of the following: the Mining Act 1971, the Opal Mining Act 1995, the Petroleum Act 2000 or the Petroleum (Submerged Lands) Act 1982; or any other Act relating to the production, recovery, management, conveyance or delivery of minerals brought within the ambit of this definition by the regulations;

Minister: the Minister responsible for the administration of the Natural Resources Management Act 2004.

Modify: includes any activity that replace, add, remove or make any other adjustment to the configuration of water related infrastructure so that its intended function is changed.

Native title holder: means the person or persons who hold, or claim to hold, the native title in relation to the lands and waters according to their traditional laws and customs.

NRM Act 2004: The Natural Resources Management Act 2004

Off stream dam: a dam not within a watercourse that is a purpose built barrier for collecting runoff from a catchment.

On stream dam: a dam located directly on or in a watercourse that is a purpose built barrier for impounding or diverting the flow of a watercourse.

Prescribed well: a well declared to be a prescribed well under section 125 of the Natural Resources Management Act 2004.

Prescribed Wells Area (PWA): an area of land within which wells are prescribed.

Recharge: recharge is the process whereby groundwater is replenished by water draining into the aquifer from rainfall, irrigation infiltration or leakage from a surface water body.

Riparian: the area adjacent to a watercourse or lake that influences and is influenced by hydrological processes, and includes bed, bank and floodplain of watercourse and lake.

Runoff: water flowing over land after a rain event.

Soak: a permanent or temporary expression of groundwater that occurs where the groundwater intersects with the ground surface, and the pressure of the groundwater is sufficient to move water to the surface.

Spring: see definition for lake

Stock water use: the taking of water to provide drinking water for stock other than stock subject to intensive farming.

Surface water: water flowing over land (except in a watercourse), (i) after having fallen as rain or hail or having precipitated in any another manner or, (ii) after rising to the surface naturally from underground; (b) water of the kind referred to in paragraph (a) that has been collected in a dam or reservoir.

Take from a water resource includes:

(a) to take water by pumping or syphoning the water;

(b) to stop, impede or divert the flow of water over land (whether in a watercourse or not) for the purpose of collecting the water;

(ba) to stop, impede or direct the flow of water in any stormwater infrastructure for the purpose of collecting the water, or to extract any water from stormwater infrastructure;

(c) to divert the flow of water in a watercourse from the watercourse;

(d) to release water from a lake;

(e) to permit water to flow under natural pressure from a well;

(f) to permit stock to drink from a watercourse, a natural or artificial lake, a dam or reservoir;

(g) to cause, permit or suffer any activity referred to in a preceding paragraph;

Watercourse: means a river, creek or other natural watercourse (whether modified or not) in which water is contained or flows whether permanently or from time to time and includes—

(a) a dam or reservoir that collects water flowing in a watercourse;

(b) a lake through which water flows;

(c) a channel (but not a channel declared by regulation to be excluded from the ambit of this definition) into which the water of a watercourse has been diverted;

(d) part of a watercourse;

(e) an estuary through which water flows;

(f) any other natural resource, or class of natural resource, designated as a watercourse for the purposes of this Act by an NRM plan;

This regional NRM plan identifies a watercourse shall have a defined channel with both bed and banks, as distinguished from a mere fold or depression or contour in land along which surface water flows.

Water affecting activity (WAP): as per chapter 7 of the *NRM Act 2014*.

Water allocation plan: a plan prepared by a natural resources management board and adopted by the Minister in accordance with the Act.

Water dependent ecosystem: an ecosystem that require access to water resources on a permanent or intermittent basis to meet all or some of its water requirements to maintain the community of plants and animals, and the ecological processes and ecosystem services they provide.

Water hole: see definition for 'lake'

Water licence: a licence granted by the Minister under section 146 of the *NRM Act 2004*.

Water quality: the physical, chemical and biological characteristics of water.

Water table: the groundwater surface in an unconfined aquifer or confining bed at which the pore pressure is atmospheric.

Weir: see definition for 'diversion structure'

Well: means an opening in the ground excavated for the purpose of obtaining access to groundwater; or an opening in the ground excavated for some other purpose but that gives access to groundwater; or a natural opening in the ground that gives access to groundwater.

Wetland: means an area that comprises land that is permanently or periodically inundated with water (whether through a natural or artificial process) where the water may be static or flowing and may range from fresh water to saline water and where the inundation with water influences the biota or ecological processes (whether permanently or from time to time) and includes any other area designated as a wetland—

(a) by an NRM plan; or

(b) by a *Development Plan under the Development Act 1993,*

but does not include—

(c) a dam or reservoir that has been constructed by a person wholly or predominantly for the provision of water for primary production or human consumption; or

(d) an area within an estuary or within any part of the sea; or

(e) an area excluded from the ambit of this definition by the regulations.

Appendix C: Governance

Role and responsibilities

The Minister for Sustainability, Environment and Conservation (the Minister) administers the Natural Resources Management Act 2004 (NRM Act), the principle legislation for natural resources management (NRM). The Eyre Peninsula Natural Resources Management Region (the Region) is one of eight NRM regions established in South Australia under the NRM Act.

The Eyre Peninsula Natural Resources Management Board (the Board) under the Minister's delegation is the Region's peak body for NRM. The Board operates under the functions of the NRM Act, and the summarized role of the Board includes:

- undertake an active role in management of natural resources within their region;
- prepare, maintain and implement a regional NRM Plan;
- raise awareness and support educational initiatives for integrated and sustainable NRM; and
- provide advice to the assessment of proposal referred to the Board;
- promote the objects of the NRM act in relation to Development Plans.

While implementation of the regional NRM Plan is the responsibility of the Board, the implementation of the Board's programs that are specified in the Business Plan are the responsibility of the Department of Environment, Water and Natural Resources (DEWNR). A service level agreement is in place to administer this arrangement.

There are number of bodies and organisations directly and indirectly involved in NRM. Their role and responsibilities are outlined in Table 21, and further details can be found in the relevant legislations.

The Board has established formal partnerships to assist deliver NRM outcomes, and notable partnerships include:

- Eyre Peninsula Integrated Climate Change Agreement (EPICCA) a partnership between Regional Development Australia – Whyalla and Eyre Peninsula, Eyre Peninsula Local Government Association, State Government and Board, that is driving climate change adaption planning and action.
- WildEyre a partnership between Nature Conservation Council of South Australia, Greening Australia, the Wilderness Society and the Board to deliver a landscape scale biodiversity protection program.
- A service level agreement between The Board and DEWNR to deliver the Board's programs

Table 21 - Roles and responsibilities

Organisation or Body	Role and Responsibilities (legislation)
Minister for Sustainability Environment and Conservation and associated delegations through the Department of Environment, Water and Natural Resources	• Administer the *Native Vegetation Act 1991*, the *National Parks and Wildlife Act 1978* and the *Natural Resources Management Act 2004* • Administer and enforce Water Affecting Activities permit for groundwater resources (NRM Act) • Report on the condition of prescribed water resources (NRM Act) • Party to the co-management agreement with Aboriginal groups for the co-management of a *National Park, Conservation Park or Regional Reserve* (NPW Act) • Party to Heritage Agreements with landholders to protect native vegetation in perpetuity (NV Act) • Develop and maintain the State Natural Resources Management Plan • Develop and maintain the regional *Water Demand and Supply Statement under the Water Industry Act 2012*
Minister for Agriculture, Food and Fisheries	• Administer the *Aquaculture Act 2001* and *Fisheries Management Act 2007* • Promote the ecologically sustainable development of aquaculture
Eyre Peninsula Natural Resources Management Board under the *Natural Resources Management Act 2004*	• Develop and maintain a Water Allocation Plan for the Southern Basins and Musgrave Prescribed Well Areas (NRM Act) • Develop and maintain a Natural Resource Management Plan for the region • Administer and enforce Water Affecting Activities permits for surface water resources • Provides advice on the assessment of proposals that may impact natural resources management
Department of Environment, Water and Natural Resources	• Manage National Parks and Conservation Parks, including actions to encourage public use, preserve wildlife, preserve cultural and natural interests, respond to bushfire and undertake prescribed burning, and control pest plants and animals • Enforce relevant provisions of the *National Parks and Wildlife Act 1978* including policing the take of protected native plants and animals, and administering permits for the keep, sale or destruction of native wildlife • Enforce relevant provisions of *Native Vegetation Act 1991* including policing of native vegetation clearance and landholder compliance with a heritage agreement • Maintain Marine Parks and enforce compliance (*Marine Parks Act 2008*)
Local Government	• Develop and maintain Stormwater Management Plans (*Local Government* (Stormwater Management) *Amendment Act* 2007) • Land use planning and development control including assess and approve development applications (*Development Act 1993*) • Control declared pest animal and plants on Local Government land (NRM Act)
Environmental Protection Authority under the *Environmental Protection Act 1993*	• Monitor and report on water quality and aquatic ecosystem condition • Regulate practices that impact water quality and environmental health • Oversees the implementation of the *Environmental Protection* (Water Quality) *Policy 2015* and administer Environmental Authorisations associated with the *Environmental Protection Act 1993*

Table 21 - Roles and responsibilities

Organisation or Body	Role and Responsibilities (legislation)
Native Vegetation Council under the *Native Vegetation Act 1991*	• Provide advice and make decisions about the protection, removal and re-establishment of native vegetation • Fund research and conservation projects that promote the responsible and ongoing management of native vegetation • Provide advice on development applications that proposes to impact native vegetation (*Development Act 1993*) • Assess applications to clear native vegetation and determine the required significant environmental benefit payment • Administer the Native Vegetation Fund including the collection and spending of money for significant environmental benefit offsets
Coast Protection Board	• Develop and fund coast protection infrastructure (*Coastal Protection Act 1972*) • Assess and provide advice on development applications (*Development Act 1993*)
Parks and Wilderness Council	• Provide advice to the Minster for any matter relating to the *National Parks and Wildlife Act 1978*, *Marine Parks Act* or the *Wilderness Protection Act 1992* • Provide advice to the Minster about management of reserves and conservation of wildlife including funding arrangements, policy development, education and community participation
Stormwater Management Authority under the *Local Government* (Stormwater Management) *Amendment Act 2007*	• Develop and maintain stormwater management planning guidelines • Authority for approving stormwater management plans
SA Water	• Provide water to households, farms and businesses connected to the reticulated water supply infrastructure • Operate and maintain reticulated water supply and sewage infrastructure
Primary Industries and Regions SA (PIRSA)	• PIRSA's Biosecurity SA division manages the risks to South Australia posed by animal and plant diseases, food borne illness, and misuse of rural chemicals • NRM Biosecurity within PIRSA in conjunction with NRM Boards, oversees programs to destroy or contain pest plant and animals, and programs to prevent new pests coming into the region • Issue permits and exemptions for activities that would otherwise contravene fisheries management rules (*Fisheries Management Act 2007*) • Issue commercial fishing licenses and other commercial permits (*Fisheries Management Act 2007*) • Oversee Fisheries Management Plan and fish stock status reports (*Fisheries Management Act 2007*) • Support aquaculture through managing licensing of aquaculture activities and monitoring (*Aquaculture Act 2001*)
Department for Planning, Transport and Infrastructure	• Develop and implement coastal land use planning policy (*Development Act 1993*) • Issue aquatic activities licenses (*Harbors and Navigation Act 1993*)

Promoting the objects of the NRM Act

The strategic plan's goals are consistent with the objects of the NRM Act (see box 6), and specific links include:

1. Sustainable management and use of land, sea & water

The goal supports sustainable use of land and water (object 7(1)(c), and supports primary production and economic development (object 7(1)(d)).

2. Healthy & resilient land, sea and water ecosystems

The goal recognises and protects the intrinsic values of natural resources (object 7(1)(a)), protects biodiversity (object 7(1)(b)) and facilitates pest control (object 7(1)(e)).

3. Active participation in natural resource management

The goal intends to build capacity of the community and stakeholders to undertake NRM (object 7(1)(f)).

Box 6 Objects of the NRM Act

7(1) The Objects of this Act include to assist in the achievement of ecologically sustainable development in the State by establishing an integrated scheme to promote the use and management of natural resources in a manner that—

(a) recognises and protects the intrinsic values of natural resources; and

(b) seeks to protect biological diversity and, insofar as is reasonably practicable, to support and encourage the restoration or rehabilitation of ecological systems and processes that have been lost or degraded; and

(c) provides for the protection and management of catchments and the sustainable use of land and water resources and, insofar as is reasonably practicable, seeks to enhance and restore or rehabilitate land and water resources that have been degraded; and

(d) seeks to support sustainable primary and other economic production systems with particular reference to the value of agriculture and mining activities to the economy of the State; and

(e) provides for the prevention or control of impacts caused by pest species of animals and plants that may have an adverse effect on the environment, primary production or the community; and

(f) promotes educational initiatives and provides support mechanisms to increase the capacity of people to be involved in the management of natural resources.

7(2) For the purposes of subsection (1), ecologically sustainable development comprises the use, conservation, development and enhancement of natural resources in a way, and at a rate, that will enable people and communities to provide for their economic, social and physical well-being while—

(a) sustaining the potential of natural resources to meet the reasonably foreseeable needs of future generations; and

(b) safeguarding the life-supporting capacities of natural resources; and

(c) avoiding, remedying or mitigating any adverse effects of activities on natural.

Alignment with plans and policies

This strategic plan has been prepared to meet the requirements of Section 75 of the NRM Act. The Plan is consistent with the State NRM Plan, and interacting legislations. The plan is further aligned to relevant National, state, regional and local plans and policies. Please refer to below list of influencing documents.

National Legislation, Plans and Strategies

Australia's Biodiversity Conservation Strategy (2010 – 2030)

A guiding framework for biodiversity conservation. Three priorities for action are engaging all Australians in biodiversity conservation, building ecosystem resilience in a changing climate, and achieving measurable results.

Australian Pest Animal Strategy 2007

Seeks to address the undesirable impacts caused by exotic vertebrate animals (mammals, birds, reptiles, amphibians and fish) that have become pests in Australia, and to prevent the establishment of new exotic vertebrate pests.

Australian Weeds Strategy 2007

A framework to establish consistent guidance for all parties involved in weed management and identifies priorities for weed management across the nation. Aims to minimise the impact of weeds on Australia's environmental, economic and social assets.

Caring for our Country 2013-2018

NRM investment initiative seeking to achieve a healthy, better protected, well managed and resilient environment that provides essential ecosystem services in a changing climate.

Environment Protection and Biodiversity Conservation Act 1999

Relates to the protection of the environment and conservation of nationally significant biodiversity. Species that contribute to Eyre Peninsula's landscapes, seascapes and ecosystems may be protected under this Act.

National Bushfire Management Policy 2014

Focuses on the management of fire in forests and rangelands, primarily on public lands. Places priority on the protection of life and identifies the need for consideration of the community benefits of ecosystem services.

National Food Plan 2013: Our food future

A framework to position Australia's food system for the future. Sets goals and strategies for growing exports, innovation and industry development, food security, education and sustainable food.

National Recovery Plan for Malleefowl (2007)

Strategies to secure existing populations across the species' range and achieve de-listing of Malleefowl under the EPBC Act within 20 years through managing populations, planning, research and monitoring, community involvement and project coordination.

National Water Initiative

Australia's blueprint for water reform, the principal water policy agreement of the Council of Australian Governments. Commitments under the NWI relating to the Regional NRM Plan themes of water resources and groundwater resources include to prepare water plans with provision for the environment and deal with over-allocated or stressed water systems.

National Water Quality Management Strategy

A joint national approach to improving water quality in Australian and New Zealand waterways that aims to protect the nations' water resources by improving water quality while supporting the businesses, industry, environment and communities that depend on water for their continued development.

Plan National Wildlife Corridors

An Australian Government initiative to support landscape connectivity that link up areas of habitat, while supporting multiple land uses such as; conservation, farming and forestry. Guides and support individuals, private land managers, community groups, policy makers, planners and natural resource managers to develop and manage corridor initiatives.

State Legislation, Plans and Strategies

Aboriginal Heritage Act 1988

The *Aboriginal Heritage Act 1988* provides for the protection and preservation of Aboriginal sites, objects and remains. Section 23 of the Act provides for a Ministerial authorisation to be granted to a proponent to damage, disturb or interfere with an Aboriginal site object or remains, if a proposed development impinges on any of those things. An authorisation can only be made after a consultation process with the relevant traditional owners, and may be subject to stringent conditions.

***Aquaculture Act 2001* and Aquaculture Zone Policies (Various)**

The *Aquaculture Act 2001* regulates the development and operation of marine and inland aquaculture activities in South Australia. To assist this regulation, the Act enables the creation of policies and zones to manage specific areas and activities. There are nine aquaculture zones within the Eyre Peninsula NRM region, these include: Lower Eyre Peninsula, Coffin Bay, Tumby Bay, Port Neill, Arno Bay, Fitzgerald Bay, Smoky Bay, Streaky Bay and Cape D'Estrees

Development Act 1993* and *Development Regulations 2008

The *Development Act 1993* guides planning and development across the State by regulating development through the creation of Development Plans that facilitate sustainable development and the protection of the environment.

Under the Regulations applications for certain forms of development must be referred to the Minister or delegate responsible for the administration of the *Natural Resources Management Act 2004.*

***Fisheries Management Act 2007* and Fisheries Management Plans (various)**

The *Fisheries Management Act 2007* regulates classes of commercial and recreational fishing activities.

Management Plans describe the biological, economic and social characteristics of the fishery, identify its actual or potential impacts on its associated ecosystem/s, identify any ecological factors that could have an impact on the performance of the fishery, and identify management objectives, research priorities and risks. There are Management Plans for abalone, prawns, rock lobster, marine scale fish and blue crab.

Local Government Act 1999

The *Local Government Act 199* provides Local Governments with power to raise revenue through rates. This revenue is to provide and maintain infrastructure and services

Under Schedule 1A, Local Governments may prepare a stormwater management plan. NRM Boards must consider any stormwater management plan prepared within their NRM region and advise the Stormwater Management Authority if the plan contains appropriate provisions.

***Marine Parks Act 2007* and Marine Park Management Plans (various)**

The *Marine Parks Act 2007* enables the ability to protect and conserve marine areas by establishing Marine Parks and associated zones.

There are ten Marine Parks within the EP NRM Region. These include: Far West Coast, Nuyts Archipelago, West Coast Bays, Investigator, Thorny Passage, Neptune Islands Group, Gambier Islands Group, Sir Joseph Banks Group, Franklin Harbor and Upper Spencer Gulf Marine Parks. Each Marine Park has a specific management plan.

Natural Resources Management Act 2004

This Act sets out the roles and responsibilities for NRM in South Australia. It provides the framework for the Minister, the NRM Boards, and Regional NRM Plans.

National Parks and Wildlife Act 1972

Provides for the establishment and management of reserves and the conservation of wildlife within National Parks, Conservation Parks, and Recreation Parks. The Act provides arranges for the Minister to enter into an arrangement with Native Title Holders to co-manage public land.

Climate Change Adaptation Framework for South Australia (August 2012)

A basis for the state's response to climate change through regional partnerships and the development of Adaptation Plans. The Eyre Peninsula Regional Climate Change Adaptation Plan and NRM Plan work together to build regional capacity to protect and enhance natural resources in a changing climate.

Conserving Nature (2012 – 2020)

A strategy for creating the state's terrestrial and inland aquatic protected area system. It guides and assists decision-making by the State Government, non-government organisations and others, about where to establish new protected landscapes, seascapes and ecosystems (or add to existing protected areas) so they achieve the best conservation and community outcomes.

Living Coast Strategy for South Australia

The State Government's environmental policy directions for sustainable management of South Australia's coastal, estuarine and marine environments. Focuses on promoting environmental stewardship, and also supports development of industries operating within sustainable frameworks.

NatureLinks

A practical approach to conserving the State's native flora and fauna by managing and restoring large areas of habitat within broad 'biodiversity corridors', enabling native species to adapt and survive to environmental change.

No Species Loss: A Nature Conservation Strategy for South Australia (2007 – 2017)

Strategy to protect the state's native species from extinction through: conservation of biodiversity, community ownership and stewardship for biodiversity, ecological knowledge that can influence decision making, adjustment to the impacts of climate change, and active and integrated natural resources management partnerships.

Pest Management Strategy

State-wide strategy to protect the environment and public safety from the adverse impacts of pest plants and animals that threaten landscapes, seascapes, ecosystems, and agricultural production. Made up of strategies, a management plan, community engagement and operational procedures.

The Planning Strategy for South Australia – Eyre and Western Region Plan

Sets out the State Government's vision for land use and future development. Contains principles and policies relating to environment and sustainability, economic development, and population, settlements and culture. The Plan also seeks to promote the capability of the region's people and industries to adapt to changing climatic, economic and social conditions.

South Australia's Climate Change Strategy 2015-2050 – Towards a low carbon economy

Outlines the government's aspirations for the future and provides a framework for renewed effort and action. Towards achieving South Australia's emissions reduction target and building resilience to the climatic changes.

South Australian Food Strategy 2010 – 2015

Supports food production targets in South Australia's Strategic Plan, including priorities for optimising environmental sustainability and fostering regional and sector development.

South Australia's Strategic Plan

A long term vision for South Australia. Targets in the SASP relating to the environment, community and economy link to various themes in the Regional NRM Plan such as ecosystems, agricultural production and sustainable land management

State NRM Plan

Sets a long term vision and goals, with priorities identified for a five year period 2012-2017. The Plan contains policy for the overarching management of South Australia's natural resources. It provides a framework for all natural resources management initiatives, including regional NRM Plans and agency activities.

Water for Good

A plan to ensure there will always be enough water in South Australia in the context of population growth and reduced rainfall. Actions include Regional Water Plans and desalinated seawater to supplement Eyre Peninsula's water resources.

Regional and Local Plans and Strategies

Adjoining NRM Regional Plans

Regional NRM Plans for the

- Alinytjara Wilurara NRM Region
- South Australian Arid Lands NRM Region
- Northern and Yorke NRM Region

These Regional NRM Plans describe each region's goals and long term and intermediate targets with associated strategies and actions to achieve these. The Eyre Peninsula Regional NRM Plan must be consistent with the strategic regional plans of neighbouring NRM regions.

Biodiversity Plan for Eyre Peninsula (2002)

A strategic approach to the conservation and management of biodiversity within the Eyre Region. Plan guides the conservation, management and rehabilitation of ecosystems and landscapes.

Development Plans (various)

Regulates development in the region. Contain policies for Local Government Areas relating to Natural Resources, Water, Stormwater, Coastal Areas, Hazards, Heritage, Open Space and Recreation and primary Production. Development plans exist for each of the 11 Councils within the EP NRM Region; City of Whyalla, City of Port Lincoln, District Council of Lower Eyre Peninsula, District Council of Tumby Bay, District Council of Ceduna, District Council of Streaky Bay, District Council of Elliston, Wudinna District Council, District Council of Cleve, District Council of Kimba and District Council of Franklin Harbour.

Eastern Cleve Hills Salinity Management Plan (2002)

Dryland groundwater-driven salinity is a major issue within the Eastern Cleve Hills that is has an adverse impact on agricultural productivity, land and water ecosystems, surface water/ groundwater quality, land values and infrastructure. The Plan identifies salinity trends in the catchment, reviews the options for managing salinity, and develops a catchment action plan to guide the local community.

East Meets West NatureLink Plan (2006)

Established to assist the species and ecosystems within central and northern Eyre Peninsula and the Far West of South Australia to survive, evolve and adapt to environmental change. It will achieve this by connecting habitats, through a comprehensive system of core protected areas that are buffered and linked by lands which have complementary land management objectives.

Eyre Peninsula Coastal Action Plan and Conservation Priority Study (2011)

A conservation assessment and action plan for the coastal area of the Eyre Peninsula NRM Region, between Two Hummock Point north of Point Lowly and Wahgunyah Conservation Park, west of Cape Adieu. The study was undertaken to improve the understanding of the region's coastal natural resources to provide better protection, conservation and management, and to establish conservation priorities for places and areas within the region.

Eyre Peninsula Regional Climate Change Adaptation Plan (2014)

Identifies potential impacts of climate change on key sectors in the region and adaptation options, areas of decision making that need to consider climate change the most, adaptation pathways to support decision making and priorities for adaptation action. Key areas for decision making identified in the context of a changing climate include agriculture, fisheries, conservation management, coastal development and water resources management.

Far West Coast Healthy Country Plan (2016)

Far West Coast Healthy Country Plan sets the vision, targets and projects for caring for country in the Far West Coast Native Title area. The plan was prepared by the Far West Coast Aboriginal Corporation in consultation with the Aboriginal communities and organisation.

Park Management Plans for National and Conservation Parks and Wilderness Protection Areas (various)

Prepared for all reserves under the *National Parks and Wildlife Act 1972*, the *Wilderness Protection Act 1992*, and the *Crown Land Management Act 2009* (Cwth). As a strategic document, a management plan must identify the vision for the reserve and the objectives and strategies necessary to meet that vision. Each year park managers, taking regional and district priorities into account, draw up work programs to implement the strategies proposed in management plans.

Management Plans support the objectives of the governing legislation which include management of reserves for public benefit and enjoyment, conservation of wildlife in a natural environment, protection of wilderness and the restoration of land to its condition before European colonisation.

Regional Development Australia, Whyalla And Eyre Peninsula Regional Plan 2014-2016

Sets out regional strengths, challenges, opportunities and needs, and regional economic and community development priorities for an area of over 230,000 km² of land between the Spencer Gulf and the Western Australian border.

Regional Recovery Plans - Eyre Peninsula yellow-tailed black cockatoo (2008), Eyre Peninsula southern emu wren (in prep), Draft Regional Recovery Plan for 23 threatened flora taxa on Eyre Peninsula (2007)

Each Plan provides a framework for government agencies and key interest groups to plan and coordinate their efforts to conserve threatened species and ecological communities that contribute to regional ecosystems and landscapes, identifying ways to improve their conservation status, and prioritising recovery objectives and actions with associated performance criteria.

SA Water's Long Term Plan For Eyre Region (2008)

Outlines options and plans to augment potable water supply to meet future demand.

Water Allocation Plan for the Southern Basins and Musgrave Prescribed Wells Areas (2016)

An assessment of the condition of groundwater resources and allocation of extraction volumes in the Southern Basins and Musgrave Prescribed Wells Areas.

Water Supply and Demand Statement

The Eyre Peninsula Regional Demand and Supply Statement describes the demand and supply of all water resources in the Eyre Peninsula NRM Region. The statement is reviewed annually, with a comprehensive review undertaken every 5 years.

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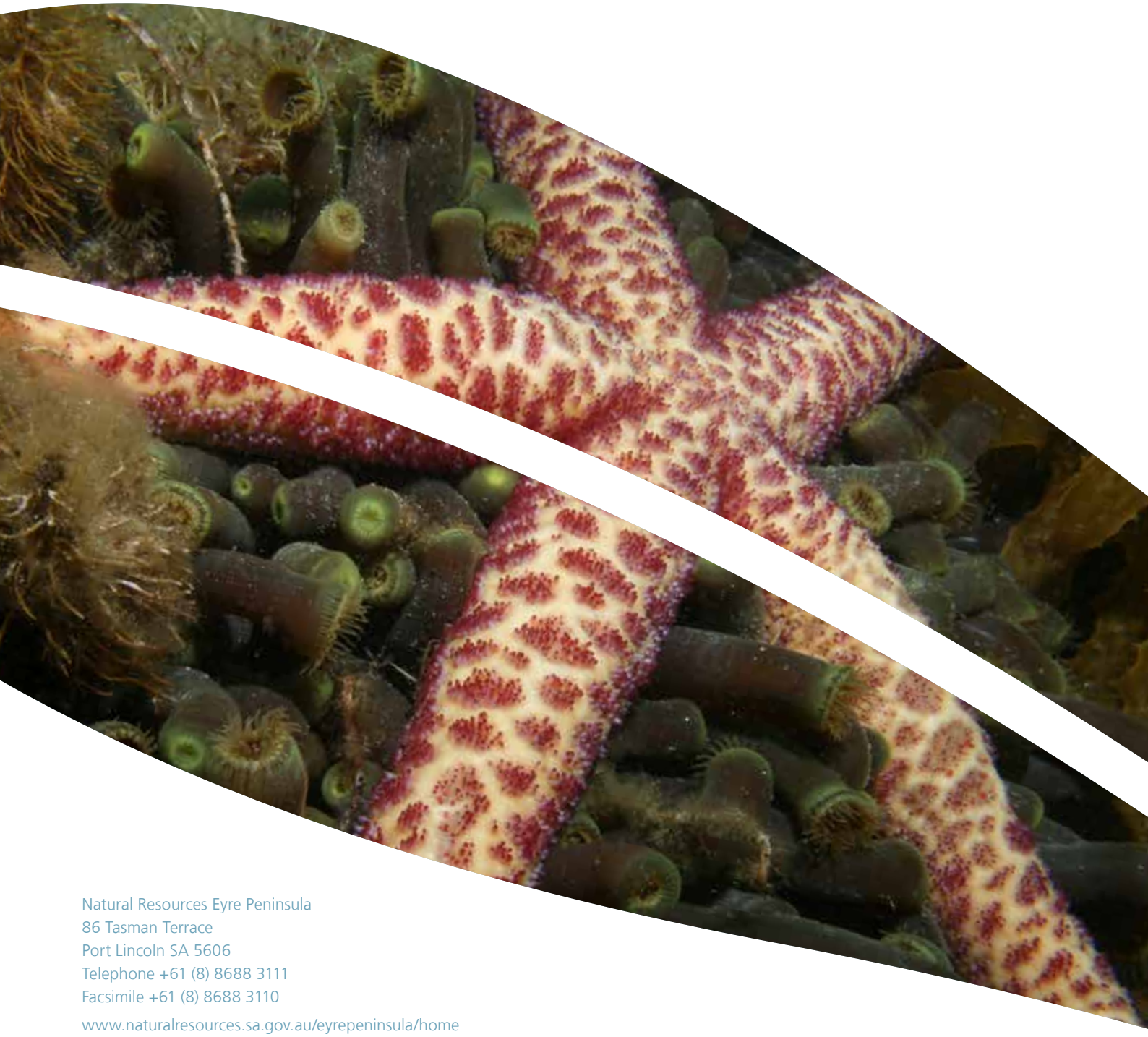

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