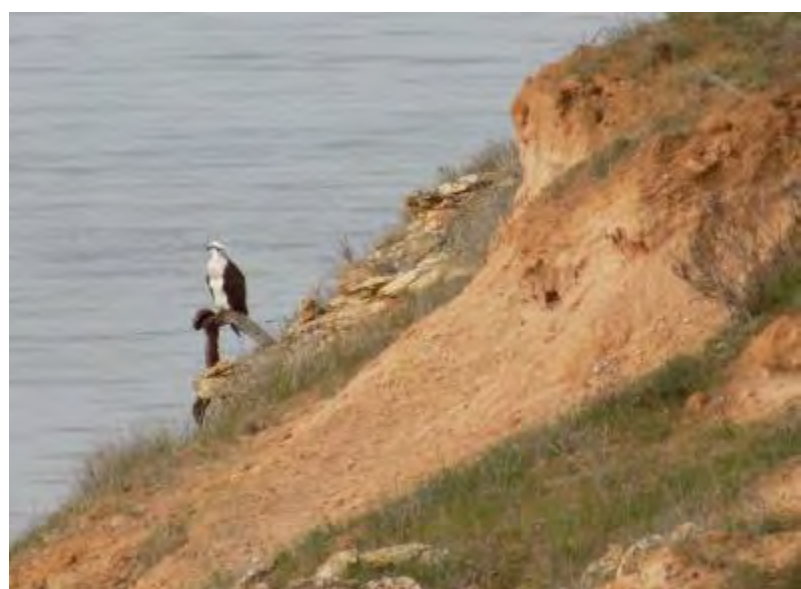




NORTHERN AND YORKE COASTAL MANAGEMENT ACTION PLAN
2020



Natural Resources
Northern and Yorke



LEGATUS
GROUP

The authors of this Plan acknowledge the Traditional Custodians of the land which is described herein, and pay our respects to their Elders past, present and emerging. We honour the deep continuing connection Aboriginal and Torres Strait Islander peoples share with Country, and give respect to the Nukunu, Narungga and Kaurna people.

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Front Cover Photos: Clockwise from top left; Narungga sign at Buthera Rocks on the west coast of Point Pearce peninsula; recreational vehicle impacts at Cape Elizabeth; Formby Bay dunes from Daly Head; Osprey at Pine Point; Coast Spider Orchid (*Caladenia conferta*). All photos (M.Durant).

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Abbreviations

Acronym	Full name
WoNS	Weeds of National Significance
IPCC	Intergovernmental Panel on Climate Change
ORV	Off-road vehicles including motorbikes, quadbikes and cars
DEW	Department of Environment and Water (South Australia)
NRNY	Natural Resources Northern Yorke
NRM	Natural Resource Management
CPB	Coast Protection Board
NGO	Non-Government Organisation
AMLR	Adelaide and Mount Lofty Ranges
CP	Conservation Park
NP	National Park
NPW Act	National Parks and Wildlife Act 1972 (Schedule 7)
EPBC Act	Environmental Protection and Biodiversity Conservation Act 1999
SAPOL	South Australian Police
IBA	Important Bird Area
BDBSA	Biological Database of South Australia
PIRSA	Primary Industries and Regions South Australia
DPTI	Department of Planning Transport and Infrastructure
CPB	Coast Protection Board
HCP	Healthy Country Plan(ning)

Species of National and State Conservation Significance tables.

R	Rare (NPW Act, SA)
V	Vulnerable (NPW Act, SA)
E	Endangered (NPW Act, SA)
VU	Vulnerable (EPBC Act, Australia)
EN	Endangered (EPBC Act, Australia)
CR	Critically Endangered (EPBC Act, Australia)
Ssp.	Sub-species (one or more sub-species are listed as threatened)

1. BACKGROUND

1.1 Introduction

People value the South Australian coastline for a broad range of reasons from the recreational opportunities it provides, the towns and communities it supports, the economic activities such as farming, fishing and tourism that depend upon it, the heritage and cultural values it preserves, and for the simple pleasure of experiencing spectacular natural environments.

People are connected to coastal environments through Aboriginal culture and heritage, European settlement history and through social and family networks.

The coastline also supports diverse and unique ecosystems, flora and fauna. The Northern and Yorke coastline contains many plants and animals that are threatened and declining either within the region or elsewhere in the country, and some species that occur nowhere else. Spencer Gulf and Gulf St Vincent are also globally significant for the conservation of migratory shorebirds which visit this coast from the northern hemisphere via the East Asia Flyway. The gulfs and sheltered bays are also critical environments for South Australia's marine diversity.

Hence there are good reasons to look after what we have, and to plan for the management and enhancement of our coastline in the future.

This is particularly important given the climate is changing and the coast of South Australia is already experiencing the impacts of increasing temperatures, reduced rainfall, increasing frequency of storm surge events and rising sea level. Maximising the health and integrity of coastal ecosystems and reducing local and regional threats are practical responses to climate change that will help maintain its natural character into the future.

As seas gradually rise and storm surge activity increases, it will be imperative that the plants and animals are able to slowly migrate inland to survive in the long term. This will require careful planning and decisions will need to be made in the coming decades regarding where and how we accommodate the landward migration of coastal ecosystems, how we adequately fund on-going management and how we balance the competing interests and pressures on the coastline.

Current funding arrangements for coastal management are in need of review and new funding sources and models will need to be explored. New funding may come from emerging environmental markets such as carbon sequestration in mangroves and saltmarshes (e.g. Blue Carbon projects), and biodiversity and carbon offsetting.

1.2 Coastal Action Planning Context

This Action Plan is an extension of the Conservation Assessment of the Northern and Yorke Coast which was produced in 2006 and was well regarded as a comprehensive approach to determine coastal management priorities.

The study used a Geographic Information System (GIS) to collate, analyse and present information collated from government, non-government organisations,

community groups and experts. The coastal zone was divided into 131 landform units (cells) of varying size and shape depending on the landform and the natural vegetation extent.

Using this information, the conservation values and threats were assessed in each cell, and then combined to derive overall conservation priorities. 43 cells were assessed as High Priority and were described in detail with some broad management comments and recommendations.

The conservation value assessment was based on variables such as:

- Threatened and endemic vegetation communities
- Vegetation patch size, shape, connectivity, condition and diversity
- Threatened and endemic flora and fauna
- Human heritage
- Geological heritage

The threat analysis included variables such as:

- Presence of potential acid sulphate soils
- Recreation impacts; access and facilities, off-road vehicles, tracks and bush camping sites
- Developments and zoning
- Land use and ownership
- Mining
- Weeds

Other Coastal Assessments

Since 2006 the remaining coastline of South Australia has been assessed using a similar approach and plans have been generated for the following districts:

- Southern Fleurieu Peninsula
- Metropolitan Adelaide and Northern
- Far West
- Limestone Coast and Coorong
- Eyre Peninsula

These more recent assessments have included much more detailed management actions than the original report, presented as tables for each cell.

1.3 Aims

The aim of this Plan is to provide people, community groups, Councils, government and non-government organisations with a broadly accepted plan for improved protection, conservation and management of the coast.

It is intended that individuals, groups or collaborative partnerships may use this resource to guide on-ground activities, and to form the basis for developing and seeking funding for coastal management projects at a range of scales.

The management actions in the tables within Section B can be used as a plan for individuals or community volunteers who wish to care for a section of the coast, or they can be used directly to develop larger regional projects that may attract funding from NGOs, NRM agencies or state and federal grants programs.

1.4 Scope

This Plan focusses on the natural character of the coastline including native vegetation, fauna, landforms and cultural heritage.

Hence many issues confronting local Councils and other managers of infrastructure and built assets are not directly addressed. These issues are well summarised by the SA Coastal Councils Alliance (P. Wongthong, Ed. A. Crisp 2019) and they include:

- Maintenance of hard coast protection infrastructure including levees, seawalls and groynes
- Maintenance of recreational infrastructure including boat ramps, pontoons, swimming enclosures and marinas
- Allocation of funding
- Legislation
- Development approvals and processes
- Freeholding

Climate change impacts are addressed by recommending practical, local-scale management actions to strengthen the natural resilience of the coastline against the most immediate impacts. This approach is sometimes referred to as climate adaptation or 'soft' management actions.

Section 2 gives a background to coastal management in SA and the Northern and Yorke Region and some links to useful information.

Section 3 presents the latest climate change impact predictions relevant to the region.

Section 4 describes issues that cannot be adequately dealt with at the Management Unit scale and may require policy, legislative or social change to address.

Section 5 is the main part of the document with detailed site descriptions and management action tables for each of the 42 Management Units.

Section 6 presents a prioritisation designed to guide investment into larger projects, principally for organisations seeking to develop funding proposals or direct existing funds for maximum effect.

1.5 Using this Document

This document is designed to be used electronically with embedded links to help move around the large amount of information. Use the left click on the mouse to navigate through the document links.

Link 1: Use the Table of Contents to navigate to whichever section heading you require.

Link 2: Each Management Unit name in the Table at the start of Section 5 is a link to the detailed information (you may wish to print off relevant sections).

Link 3: At the end of each Management Unit description in Section 5 there is a link called [Back to Start](#) which will take you back to the start of Section 5 to enable easy jumping to another Management Unit description.

1.6 Implementation

The responsibility for implementing the actions recommended in this Plan lies with the organisations and individuals who have an interest in the coast. There is no single agency with responsibility and all stakeholders are encouraged to contribute.

Traditional Owners have an important role in delivery as project partners, landowners and custodians of ecological knowledge. Collaborations between local community groups and the Aboriginal community should be integral to the implementation.

State agencies, the Coast Protection Board and Natural Resources Northern and Yorke can play an important coordination role, particularly relating to tracking, recording and monitoring of the collective management effort.

1.7 Planning Area

The planning area (Map 1) extends from Middle Spit south of Port Wakefield to just south of Port Augusta on the eastern side of Spencer Gulf. It covers nearly 97,000 hectares along 1,100km of coastline and includes the head of Gulf St Vincent, eastern Spencer Gulf and the entire coastal environment of the Yorke Peninsula. Wardang Island, Troubridge Island and the Althorpe Islands are also included.

Seven Local Government Areas have jurisdiction within the planning area with the Yorke Peninsula Council responsible for the largest section of coast.

The planning area corresponds to Cells 5 to 117 in the original conservation assessment of the region (Caton *et. al.* 2006).

1.8 Management Units

The planning area has been allocated to 42 Management Units to assist with identifying management actions at an appropriate scale.

The Management Units were defined by grouping sections of coast with similar management issues, habitats and landforms or similar ownership and/or management. The original cell numbers have been retained to allow easy reference back to the original assessment.

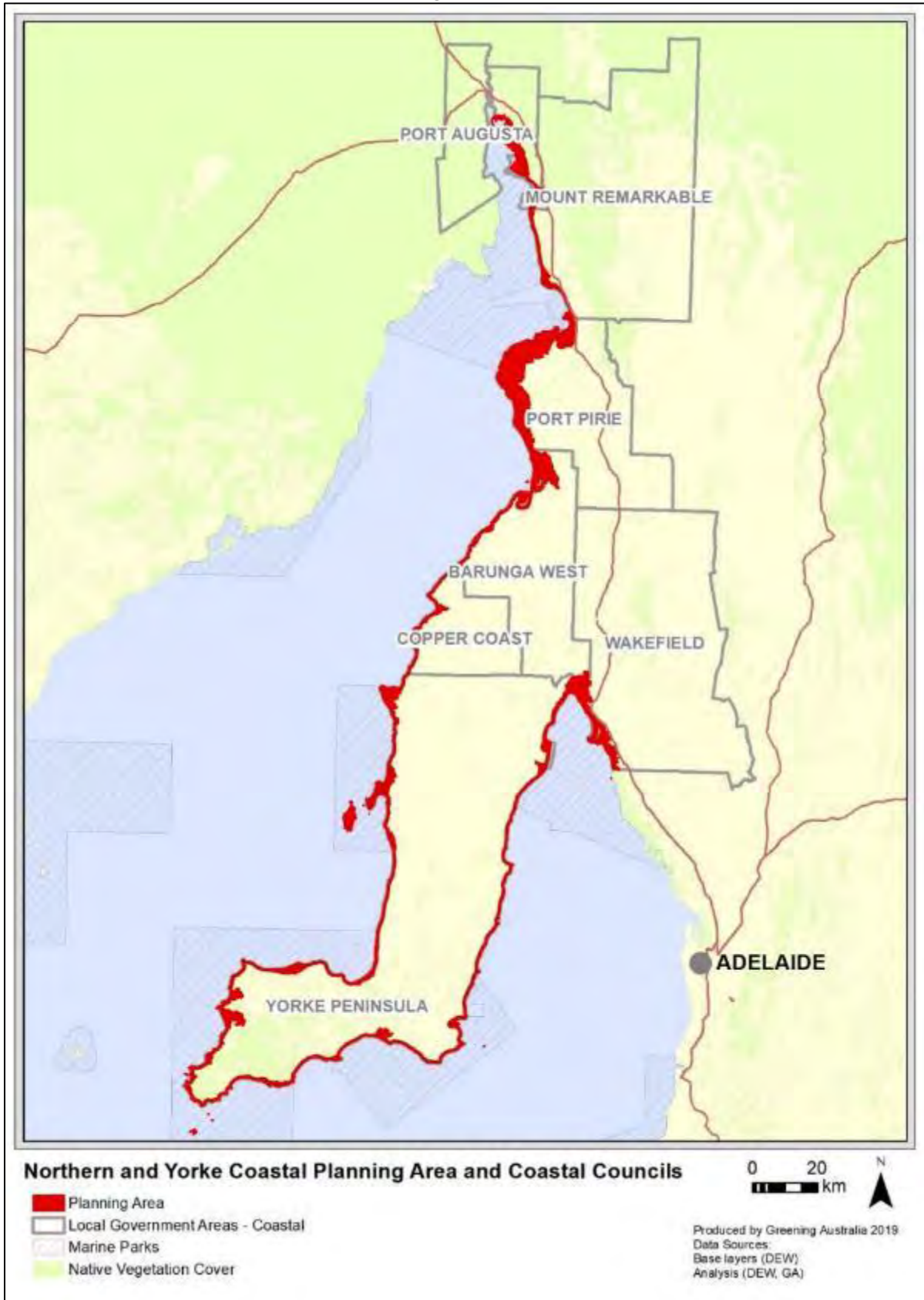
Much of the detailed topographic, marine and vegetation data for the Management Unit descriptions were drawn data layers from within the Nature Maps 3.0 online mapping tool:

<http://spatialwebapps.environment.sa.gov.au/naturemaps>.

Datasets supplied by the Department for Environment and Water and used to update biological and land ownership information since 2006 included:

- Flora and Fauna (Biological Database of South Australia)
- Land ownership (Valuations data)

MAP 1: Northern and Yorke Coastal Planning Area and Coastal Councils



1.9 Consultation

The management activities recommended in this Plan are based predominantly on stakeholder and public consultation supported by in-field verification. Public meetings were held in Hardwicke Bay, Port Broughton and Port Germein and attempts were made to incorporate the priorities of as many groups as possible.

Consultation included:

- Formation of a Steering Group
- 1 coastal Councils meeting at Port Broughton
- 3 community consultation meetings in June 2019 at Hardwicke Bay, Port Broughton and Port Germein
- 1 technical working group meeting
- Traditional Owner meetings (individuals and relevant organisations)
- Draft review by the steering group and technical working group
- Draft released for public and community feedback.

Photo: Community Consultation Meeting at Hardwicke Bay, 14th June 2019 (photo credit Fabienne Dee)



2. COASTAL MANAGEMENT AND INFORMATION

2.1 Coastal Management Responsibilities and Arrangements in SA

Coastal management in South Australia is predominantly a shared responsibility between state and local governments. Local Councils are key managers, as are State agencies such as the Department of Environment and Water (DEW), Department of Planning Transport and Infrastructure (DPTI), Primary Industries and Regions (PIRSA), Environmental Protection Authority (EPA) and the Coast Protection Board (CPB).

The Coast Protection Board (CPB) is South Australia's primary authority and prescribed body for managing the coast under the Coast Protection Act 1972. Its primary focus is to protect coasts from erosion and flooding and to provide advice on coastal development applications and approvals. It also undertakes activities such as monitoring and research of beach profiles, fauna, seagrass and coastal vegetation.

While the Coast Protection Board policies aim to protect the coastline and mitigate the impacts of rising sea levels, the application of these policies, to a large extent relies on local Councils (33).

With increasing pressures from development, agriculture, tourism, fishing, recreation and climate change, the management of coastal assets is requiring greater financial and resource input and these costs are expected to rise significantly (33).

The Coastal Councils Alliance recognises that coast protection legislation needs constant review to adapt to changing conditions and evolving knowledge. In South Australia, the Coast Protection Act 1972 is now nearly 50 years old and despite it being under review for decades, the legislation remains unchanged (33).

Many coastal Councils in South Australia are struggling to cope with increasing impacts from climate change such as increased intensity and frequency of storm events, flooding and erosion are requiring more and more expenditure and resources to address these issues. Studies have shown a very clear upward trend in coastal planning and management expenditure over the past 10 years (33).

Recently, more than 30 coastal Councils in South Australia have formed the Coastal Councils Alliance, with the aim of:

- Establishing governance and resourcing arrangements that supports an informed, coordinated advocacy voice.
- Developing coastal council's advocacy documents to determine priorities and options for more sustainable funding and cost-sharing arrangements.

The Northern and Yorke Region

In the Northern and Yorke region, the 7 Councils who own land and have care and control of many Crown Land parcels undertake the majority of coastal management actions, although activities are largely restricted to the land under their care. The Coast Protection Board (CPB) and Natural Resources Northern and Yorke (NRNY) provide funding to some projects in partnership with the Councils and many management projects are undertaken by community groups with the support of the Council and/or Natural Resources Northern and Yorke.

The South Australian Department for Environment and Water (DEW) manages significant areas of conservation reserve under the National Parks and Wildlife Act

1974, and there is an Indigenous Protected Area at Point Pearce managed by the Traditional Owners and the Aboriginal Lands Trust. The Australian Government Department of Defence also manages large areas, particularly south of Port Wakefield.

All landowners including individuals and private agricultural or industrial companies have management responsibilities for the coast under legislation such as the Natural Resources Management Act 2004 (due to be replaced by the Landscapes SA Act 2019 in July 2020). Privately owned land makes up a significant proportion of coastal land in the region, and the majority of this occurs behind the foreshore and often includes significant native vegetation on sand dunes, cliff tops and beach flats.

Community groups, (e.g. Progress Associations, local environment groups and agricultural groups) volunteers and non-government organisations have few legislative responsibilities for coastal management but they undertake significant on-ground work and make an important contribution to coastal management in South Australia.

2.2 Resources and Further Information on the Northern and Yorke Region

For community members, community groups or landholders that are interested in getting involved in coastal management activities, the first point of contact would be the local Council and/or the staff from Natural Resources Northern Yorke (NRNY). These agencies can provide a great deal of information about local community groups, funding opportunities and further information about current projects.

The Natural Resources Management agencies offer a range of funding and grants programs to local groups and individuals (including private landholders) to assist with on-ground activities that align with regional natural resource priorities. These grants are announced and outlined on their website:

<https://www.naturalresources.sa.gov.au/northernandyorke/get-involved/grants-and-funding>

The Northern Yorke NRM website also contains a great deal of valuable up to date information and resources regarding NRM in the region.

The Department for Environment and Water website is also an excellent source of information (factsheets, reports and articles) and contains many resources for those interested in or involved in environmental management. The website can be found here:

<https://www.environment.sa.gov.au/Home>

This website also contains considerable information regarding climate change and programs designed to mitigate its impacts on natural resources. For example, the Blue Carbon Strategy for South Australia, released in November 2019, aims to accelerate action to protect and restore coastal ecosystems through industry partnerships and funding opportunities. Below is the link to this page:

<https://www.environment.sa.gov.au/topics/climate-change/programs-and-initiatives/climate-change-blue-carbon-strategy>

Climate change:

The Intergovernmental Panel on Climate Change (IPCC) website is an excellent, up-to-date source of information regarding the scientific basis of climate change, its impacts and future risks, and options for adaptation and mitigation. It provides regular assessments and news articles based on its research. The website can be found here:

<https://www.ipcc.ch/>

In addition, Australia's Bureau of Meteorology provides regular updates on climate change in Australia and trends in different parts of the country. The website can be found here:

<http://www.bom.gov.au/climate/>

Environmental information about the Northern Yorke region:

NatureMaps is a government portal that provides biological and geographic information for South Australia including satellite imagery and a broad range of data on native vegetation types, flora and fauna, land ownership, coastal environments, administrative boundaries and landforms. The site can be found here:

<https://data.environment.sa.gov.au/NatureMaps/Pages/default.aspx>

Coast Protection

The Coast Protection Board website is another useful site with significant resources and information for coastal management. It provides information about grants and funding, research and reports, latest news and publications. One of many useful documents found here include the Coastal Planning Information Package. Website:

<https://www.environment.sa.gov.au/topics/coasts/coast-protection-board>

Weeds

Each district in the Northern and Yorke region has a Weed Action Plan which identifies the priority weeds and how they will be managed. The links below take you to websites that provide significant relevant and local information. Also provided below are some relevant articles or reports:

<https://www.naturalresources.sa.gov.au/northernandyorke/plants-and-animals/pest-plants-and-animals/pest-plants-weeds>

Weed Control Handbook for Declared Plants in South Australia (PIRSA)

https://www.barossa.com/uploads/214/full_document_final_weeds.pdf

Environmental Weeds of Concern in the Northern and Yorke Natural Resource Management Coastal Region (2006) by R. Sandercock and P. Schmucker.

Shorebirds

Birdlife Australia has links to various plans and surveys on their website. The Migratory Shorebirds Conservation Action Plan can be found here:

<https://birdlife.org.au/projects/shorebirds-2020/migratory-shorebird-conservation-action-plan>

The Hooded Plover biennial count can also be found on the Birdlife Australia website here:

<http://www.birdlife.org.au/projects/beach-nesting-birds/biennial-count-reports>

Native plant identification and revegetation

The Northern and Yorke Natural Resource Management Board have put together a planting guide for coastal gardens. This document can be sourced on the Northern Yorke Council website here:

<https://yorke.sa.gov.au/environment/biodiversity/indigenous-species-for-gardens-and-revegetation/>

Plant Selector is a website designed to help choose the right plants for the right places in South Australia. Website: <http://plantselector.botanicgardens.sa.gov.au/>

The Seeds of South Australia website is a database that provides images and data for South Australia's approximately 3,500 native plant species. Website:

<https://spapps.environment.sa.gov.au/seedsofsa/>

The State Flora South Australia nursery offers a variety of indigenous plants.

3. CLIMATE CHANGE AND THE COAST

3.1 Latest Climate Assessments

According to the latest Intergovernmental Panel on Climate Change (IPCC) Assessment report on global climate change released in September 2019, 'Global warming has already reached 1°C above the pre-industrial level due to past and current greenhouse gas emissions. There is overwhelming evidence that this is resulting in profound consequences for ecosystems and people. The ocean is warmer, more acidic and less productive. Melting glaciers and ice sheets are causing sea level rise and coastal extreme events are becoming more severe. Sea level rise will increase the frequency of extreme sea level events, which occur for example during high tides and intense storms' (23).

Indications are that with any degree of additional warming, events that occurred once per century in the past will occur every year by mid-century in many regions, increasing risks for many low-lying coastal cities and small islands. The report goes on to say that without major investments in adaptation, low-lying coastal areas will be exposed to escalating flood risks (23).

The Bureau of Meteorology and CSIRO play an important role in monitoring, analysing and communicating observed and future changes in Australia's climate. The fifth biennial State of the Climate report (2018) draws on the latest monitoring, science and projection information for the climate in Australia and synthesises the science informing our understanding of climate in Australia.

In summary, the evidence shows that in Australia:

- The climate has warmed by just over 1 °C since 1910, leading to an increase in the frequency of extreme heat events.
- The oceans have warmed by around 1 °C since 1910, contributing to longer and more frequent marine heatwaves.
- Sea levels are rising, increasing the risk of inundation of coastal and low-lying areas.
- The oceans are acidifying.

From: 'State of the Climate' 2018; CSIRO and Bureau of Meteorology

In South Australia:

- Autumn and winter rainfall has declined in south-eastern Australia since the late 1990s,
- Streamflow has decreased across southern Australia.
- There has been a long-term increase in extreme fire weather, and in the length of the fire season, across South Australia.
- Between 1950 to 2005, South Australia's average temperature has increased by 1.2°C, slightly faster than the national trend.

From: South Australian Trend and Condition Report Card 2018. Enviro Data SA website: data.environment.sa.gov.au/Trend-and-condition-reports

In the Northern Yorke NRM region, projections to 2100 show that:

- There will be a 14.1% decline in rainfall under an intermediate emissions scenario and a 26.9% decline under high emissions scenario.
- Average annual maximum temperatures could increase by 2.2-3.7°C and minimum temperatures could increase by 1.6-3.2°C.
- There will be more time in drought but an increase in intense heavy rainfall.

From; SA Climate Ready; Climate Projections for South Australia, Northern and Yorke Region. Goyder Institute for Water Research 2015.

3.2 Impacts on the NY Coast

Two recent reports have outlined the impacts of climate change on the natural resource assets of coastal areas along the Northern and Yorke Peninsula and how they may adapt in the future. The Yorke and Mid North Strategic Alliance commissioned a report in 2015 to develop a better understanding of the potential impacts of climate change on these assets and the South Australian Coastal Councils Alliance, Situation Analysis of Coastal Management in South Australia 2019 looked at what the impacts would be and how Councils can adapt and manage them.

In summary, these reports found that climate change and sea-level rise are exacerbating risks and costs associated with coastal flooding and erosion, impacting the Northern and Yorke Peninsula coastline in several ways:

- Increasing rates of erosion and recession of erodible foreshores may result in loss of low-lying dune systems, changes to foreshore alignments and the creation of new estuary entrances and increased recession of cliffs. The vulnerable nature of low lying and unconsolidated dune areas suggest that sea-level inundation will be significant over time.
- Storm surges will increase inundation of coastal dunes and low-lying back beach areas which will become more frequent and severe. Significant changes to the tidal velocities and volumes flowing into small estuaries and increases in the frequency and extent of flooding associated with major storm events.
- Dune erosion and inundation of sea water will affect the growing conditions for plants and animals, foraging areas and nesting sites might be lost, and some species may retreat to more favourable site conditions.
- Higher temperatures may become too extreme for flora and fauna species to survive, thus have the potential to heavily impact the diversity of dune vegetation.
- The range of coastal issues facing councils and the lack of financial resources and capacity at the local government level to fulfil these responsibilities, is having a significant effect on coastal management in the State.

Impacts on Coastal Landforms

Climate change and sea level rise will affect different landforms and ecosystems differently, depending on the topography and their exposure to extreme events. The following summarises how these impacts will affect significant areas of the Northern and Yorke coast.

Hard Rock Headlands

For the hard rock headlands and high-energy beaches of the southern part of the Yorke Peninsula, sea-level rise may be a moderate threat. Life forms on shore platforms and near shore reefs may be impacted if there is no potential for adjustment to changing tide levels, however the geological characteristics of hard rock headlands (e.g. within Innes NP) mean they are more capable at withstanding erosion and sea-level rise than softer substrates.

Beaches and dunes

Beach recessions in the order of 5 to 30 m are expected on Yorke Peninsula, depending on beach topography, sand supplies and littoral sediment movement. Communities are already reporting recessions up to 12m in some areas. It appears likely that ocean beaches will receive a greater proportion of long period swell which transmit considerable energy to the shore affecting foredunes and wave refraction patterns. Storm surges have already had significant impacts (e.g. Hardwicke Bay).

Saltmarsh complexes and mangroves

Low-lying saltmarshes will need to retreat together with the advance of the tides if they are to persist. Even very small sea level changes will impact on the saltmarsh due to the very low gradients in these coastal areas. Important saltmarsh areas include the heads of Spencer Gulf and Gulf St Vincent, Port Davis, Port Broughton and smaller areas around Wardang Island, Chinaman Wells and Cape Elizabeth.

Mangrove and inter-tidal zones are important fish nursery habitats and hence secondary impacts could be expected in these areas relating to marine life.

Estuaries

Tidal flows within estuaries will alter in complex ways, while changes in seasonal runoff has the potential to alter critical salinity values. Estuarine fish and other species are vulnerable to reduced river flows, which are anticipated due to rising evaporation rates under climate scenarios. Estuarine areas at Chinaman Creek, Mambray Creek, Port Pirie, First Creek, Second Creek, Third Creek, Fisherman Bay Creek, Broughton River, Port Broughton, Coobowie and Point Davenport are potentially vulnerable to these impacts (SA Office for Sustainability, Greenhouse Discussion Paper, Natural Resources p.30).

Impacts on Flora and Fauna

Native vegetation and fauna habitat

The vulnerability of vegetation communities and animal species to climate impacts depends on their inherent ability to adapt and cope with specific environmental variables including:

- exposure (the degree to which a system or species is exposed to significant climate variations),
- sensitivity or the degree to which a system or species is impacted by climate variations and
- adaptive capacity, or the ability of a system to adapt to those climate variations either through genetic adaptation or migration to more climatically suitable areas

(From: Allen Consulting. (2005). *Climate change risk and vulnerability. Promoting an efficient adaptation response in Australia*. Canberra, Department of the Environment and Heritage, the Australian Greenhouse Office).

These factors should be viewed in conjunction with existing stresses such as vegetation fragmentation, habitat degradation and loss, predation and grazing. According to Caton *et al.* "Climate change is likely to exacerbate threatening processes already impacting on biodiversity and other natural resources and lead to the accelerated loss of a range of ecosystem services, ecological function, species and ecological communities. This will lead to reductions in geographic range of species and ecological communities and increased risk of extinction for species that are already **vulnerable**".

There will also be variable impacts on the germination, establishment, growth and regeneration of native plants. Thus, it is evident that as climatic zones shift, species migration will need to occur. This process will be more difficult in highly fragmented landscapes.

A climate change vulnerability assessment for the Northern and Yorke Region (Koch 2016) incorporated climate change into the Conservation Action Plan for the Northern Yorke region. The modelling assessed the "potential degree of ecological change" for plants to assess predicted change in species composition by 2050 under various climate scenarios. In relation to coastal ecosystems the study found that:

- Species distribution models suggest that the foot of the peninsula, like other coastal areas of southern Australia, will be partially buffered from the impacts of climate change and will remain an important refuge area for many species and mallee woodland communities. These findings suggest that focussing revegetation efforts on the foot of the peninsula and increasing the diversity of habitat types in this area is a sensible strategy for long term conservation efforts.
- There are a number of nationally threatened plant species that have small geographic ranges and are potential candidates for assisted migration. These include Coast Spider Orchid (*Caladenia conferta*), Large Club Spider Orchid (*Caladenia macroclavia*), Ghost Spider Orchid (*Caladenia intuta*), Osborne's Eyebright (*Euphrasia collina*) and Jumping Jack Wattle (*Acacia enterocarpa*). The feasibility of establishing new populations will need to be considered on a species by species basis.

Inundation of low-lying coastal areas will also have an impact on shorebirds and seabirds dependent on beach habitat for breeding and foraging. Identifying areas capable of retreat or facilitating retreat in high value areas would be a management priority for these birds (Birdlife Australia).

Pest Plant Species

In a 2014 report on weeds and climate change, Scott *et al.* state; "The main drivers for climate change impacts on weeds include increased temperatures, changed rainfall, increased CO₂ levels, more extreme weather, more frequent frosts, changed phenology and changed land use. The rate of response of invasive plants is expected to be faster than for native species and crop varieties. Secondly, climate change is likely to foster the appearance of a new set of weed species" (17).

Sleeper weeds are plants that appear benign for many years, but which may suddenly spread rapidly when conditions change. With climate change a warmer and drier Northern and Yorke region will provide new environments for weeds that are currently found further north in the arid zones. On the other hand, more temperate weeds found in the south of the peninsula will not be able to migrate any further south and thus may not be as problematic in the future (17). Buffel Grass is an example of an arid-adapted weed that could become a serious problem in the area.

The potential agricultural sleeper weed list complements the Weeds of National Significance list, which includes weeds that are already widespread (35). Climate change will require reconsidering what is seen as appropriate weed control, to keep current and future management strategies efficient and effective (17).

Pest Animals

Common pest animals in coastal environments in the Northern and Yorke region include cats, foxes, rabbits, hares, starlings, pigeons and blackbirds. Deer are present along the coast on the Northern Adelaide Plains, near Maitland and in the Flinders Ranges just inland of the Upper Spencer Gulf. There is also a developing feral pig issue in the large tracts of native vegetation inland of Foul Bay (L. Dahl-Helm pers. com.). Goats are present in the Southern Flinders Ranges within a few km of the coast.

With climate change, Australia is likely to see worsening pest animal problems because ecosystems are more vulnerable to invasion when they are disturbed.

Climate changes may not necessarily result in greater numbers of pest animals, but it may mean different species emerge as environmental problems (31).

Some species may respond differently in different locations. For example, it is predicted that increasing temperatures may reduce the abundance of rabbits in semi-arid areas due to a decline in reproductivity, but climate change may also reduce ecosystem resilience and alter seasonally food-limited environments to advantage rabbits (30).

The many interacting factors make it difficult to predict the outcomes of climatic changes on pest animals in the Northern and Yorke coastline. However, based on the available evidence a number of impacts may be considered including:

- Vegetation cover decreases and cover-dependent native animals become more exposed to fox and cat predation
- As tidal inundation occurs and tidal flat habitats reduce, shorebirds may be concentrated into fewer and smaller areas where predation impacts could be significant
- Foxes and cats are widespread in arid and temperate Australia and will probably be relatively resistant to climate changes, however changes in prey abundance and distribution may have an impact
- Rabbits may contribute to local plant extinctions by adding grazing pressure to already declining populations
- It is possible that deer could expand northward from the Adelaide plains if mangroves begin to move inland with sea level rise.

3.3 Managing Climate Impacts

The general consensus among coastal managers and ecologists is that the recommended approach to managing the impacts of climate change on natural ecosystems is to build resilience in these ecosystems and eliminate as many barriers to their migration and adaptation as possible.

Building resilience in native species, communities and ecosystems means increasing native vegetation cover, stabilising sand and soil, connecting and revegetating fragmented or degraded areas, and facilitating natural processes such as dune and beach sand cycling.

Isolated, degraded and fragmented ecosystems are far more susceptible to:

- drying out during hot/dry/windy conditions and dying during drought
- weed invasion
- poor regeneration and inability to adapt and migrate
- degradation of animal habitat
- genetic isolation and therefore greater susceptibility to extinction.

In practical terms, building resilience in the natural coastline of the Northern and Yorke region coastline may involve:

- administrative protections (conservation reserves),
- physical protection (e.g. barriers to prevent vehicle and pedestrian damage)
- weed control and management
- pest animal control and management (herbivores and carnivores)
- revegetation to enhance connectivity, reduce edge to interior ratios, buffer edges from dry winds and expand the gene bank
- ensuring water for wetlands.

Allowing coastal ecosystems to migrate inland will also be important. This will require:

- identifying and prioritising retreat and migration opportunities
- building partnerships with private landowners, community groups and other stakeholders to develop projects with multiple benefits for farmers and the coast
- potential purchase of land and/or negotiated agreements with landholders in identified critical areas
- adherence to recommendations relating to tidal retreat made by the Coast Protection Board in development and planning proposals
- the allocation of funding to projects.

Considerable resources may be required when managing special habitats such as the numerous small estuaries of the region, or when planning for the life-cycle requirements of highly threatened plant and animal species. For these types of projects to be successful it is important that the local communities understand and support the initiatives.

Photo: Low cliffs eroding at Moonta Bay forcing residents to reinforce fencing



4. REGIONAL MANAGEMENT ISSUES AND PROPOSED ACTIONS

The consultation phase for this Plan highlighted a number of issues which cannot be adequately addressed by site-based actions such as those in Section 5. The main issues are described below with some recommendations for consideration.

Common recommendations for management of coastal natural resources in South Australia include:

- Ensure Traditional Owners are positioned to work with agencies and community groups in the development and implementation of projects
- Improve communication and coordination between the community, industry and all levels of government
- Undertake ongoing monitoring of physical change to the coastal environment and collect and analyse data to improve our understanding of our coastal, estuarine and marine environments
- Clarify roles and responsibilities of Council, State agencies and SA Police with regard to off-road vehicle use
- Promote and enforce responsible pet ownership, including the impacts of dogs on beaches to shorebirds
- Coordinate fox control at the district scale to minimise impacts on shorebirds
- Prevent further inappropriate coastal development
- Adequately fund coastal management and climate change mitigation at the State and Federal level to alleviate the pressure on local councils
- Plan for increased wildfire and mitigate risk through appropriate prevention measures.

4.1 Aboriginal Management of the Coast

Much can be learned from the region's Traditional Owners, particularly in relation to the connectedness of the coastal environment to both the marine and terrestrial ecosystems, and to our human relationship with the coast.

Recommendation 4.1a: Ensure Traditional Owners are positioned to participate in the design, development and implementation of collaborative coastal management projects. This may be achieved through activities such as:

- *Advocating for Aboriginal Land and Sea Rangers with the ability to work across various land tenures, including the co-management of conservation reserves*
- *Facilitating links between Aboriginal organisations and community groups (e.g. Progress Associations and 'Friends of' groups) and the wider community*
- *Enhance visitor awareness of Aboriginal heritage and coastal connections with signs at key car parks and through other interpretive media*
- *Support and facilitate access to the coast by respecting Indigenous Land Use Agreements (ILUA), Native Title determinations, Healthy Country Plans and other agreements*
- *Identifying and seeking opportunities for additional Indigenous Protected (IPA) areas and freeholding (e.g. Cape Elizabeth).*
- *Ensure the broader community and organisations working in the region are aware of, and follow, appropriate cultural heritage protocols during project and site works.*

4.2 Foundational Environmental Data

LiDAR mapping of coastline

The majority of the South Australian coastline has now been mapped using Light Detection and Ranging (LiDAR) technology which provides the ability to predict and map the extent of coastal inundation at various sea-level rise scenarios. It is also invaluable data for planning for tidal retreat projects and assessing potential impacts on coastal flora, fauna and habitats.

This technology was used in the Northern and Yorke region to develop inundation maps for a number of townships, but data has not been collected for the majority of the coastline.

Recommendation 4.2a: Support and direct investment into obtaining LiDAR elevation data for the whole of the Northern and Yorke coast.

Tidal Retreat Planning

Sea-level rise over the coming decades will necessitate decisions on where to allow natural shoreline recession, where to actively facilitate tidal retreat and where to intervene in order to protect natural or built assets.

These decisions are best made in a regional context to ensure the site-based decisions do not have adverse impacts on individual species or important habitats.

Recommendation 4.2b: Following on from LiDAR acquisition, undertake a regional assessment of species and ecosystems at risk from 'do nothing' and facilitated tidal inundation scenarios, and identify priority tidal retreat projects for development and investment.

Recommendation 4.2c: Ensure that land use change for tidal retreat projects is allowed for in Development Planning in order that development does not compromise adaptation to sea level rise in the future.

Flora and Fauna at Risk from Climate Change

At some point managers will need to make decisions about which species and where relocation is appropriate for conservation. To prepare for this it is appropriate to begin collecting seed and material for gene banking and/or translocation and to undertake planning for translocations.

Recommendation 4.2d: Analyse and identify species for which translocation or assisted migration is likely to be necessary or effective for long-term conservation and develop and implement plans accordingly.

4.3 Compliance and the Law Regarding Off-Road Vehicles (ORV)

One of the more serious threats to the natural environment along the Northern and Yorke coastline is increasing ORV use and associated impacts of vehicle-based recreation (e.g. camping, pedestrian damage in dunes, increased access to remote sites, dogs and rubbish). There are particular concerns for the EPBC-listed Hooded Plover whose breeding habitat often overlaps with the preferred recreational sites on sandy beaches.

There is a need for clarity on the jurisdictions and legal responsibilities of the various coastal land managers including Councils, the Department of Planning, Transport and Infrastructure (DPTI) and the SA Police. For example there is a confusing overlap of jurisdiction and responsibility regarding Crown Act Reserves, land under the care and control of Council, beaches where the Department of Transport and Infrastructure are responsible for land below the 'mean high water (and set speed limits for vehicles), and the Department for Environment and Water (DEW) who manage designated conservation reserves.

An inquiry into off-road vehicle use was initiated in 2019 by the Natural Resources Committee of the SA Parliament. The Local Government Association of South Australia and various Councils have been proactive in proposing enforcement options that might include:

- The establishment of Codes of Practice through community and representative user organisations.
- The enactment of Council by-laws to enforce breaches of the Code of Practice (including appointment of authorised officers which might also include persons from representative jurisdictions).
- Partnering (delegated authority) with State Government Agencies under existing legislation to facilitate enforcement; and
- Enactment of State Government legislation to prohibit and or control identified activities on Council land.
- Determine effective means of closing and rehabilitating tracks and undertake a program to achieve this, including maintenance of track closures and clear directional signage.
- Determine the authority and means for compliance (adapted from a draft submission by the Yorke Peninsula Council).

Recommendation 4.3a: Clarify driving on beaches compliance issues and the associated jurisdictions and legal responsibilities of the various coastal land managers, including the Department of Planning Transport and Infrastructure and the SA Police. Communicate to all relevant parties.

Recommendation 4.3b: Develop and implement a regional beach driving strategy to minimise impacts of vehicles on beaches, including a review to rationalise locations where vehicles should not be allowed on beaches, and define consistent speed limits, rules and erect clear and visible signage needed (adapted from YP Council Parliamentary Submission and Coastal assessments by D. Allen).

Recommendation 4.3c: Develop and undertake an education program to advise of these rules and why they are. Include Birdlife Australia who are able to assist with provision of any educational material, photos or advice surrounding reducing impacts to beach-nesting birds and migratory shorebirds.

Recommendation 4.3d: Undertake an education and compliance program on the use of unregistered vehicles (e.g. Quad bikes, trail bikes) on public land, such as coastal reserves, beaches, parks etc.

4.4 Inter-agency Coordination and Collaboration

A common issue raised within the community is that agencies with responsibility for coastal management do not appear to communicate well with each other. This causes frustration for residents and community groups trying to undertake works or raise matters of concern requiring action.

The SA Coastal Councils Alliance advocates that there is a clear priority to review the current coastal management structure and develop a new model that provides clear roles and resourcing and cost sharing arrangements. Similarly, in 2010 Deb Allen (Coastcare Officer) advocated to refine a Coastal Council Network that develops collaboration amongst coastal planners and natural resource managers to identify and progress coastal projects.

Birdlife Australia have also called for more collaboration around coastal management decision-making and are keen to share knowledge, data and resources to increase conservation outcomes.

Recommendation 4.4a: Investigate the establishment of an inter-agency working group collaboration, and cost-sharing to achieve on-ground management actions.

Recommendation 4.4b: Develop clear roles and resourcing responsibilities for all levels of government (adapted from the Coastal Councils Alliance (33)).

Recommendation 4.4c: Increased education, engagement and capacity building across the community, stakeholders and decision-makers (adapted from D. Allen 2010).

4.5 New Weeds

A significant amount of work has already been undertaken in relation to monitoring and controlling high threat weeds in the Northern and Yorke region. However, as already outlined, new weeds are likely to emerge under changing climate conditions. Hence there needs to be an increased focus on prediction, detection and early intervention (24).

Recommendation 4.5a: Identify potential new weeds and 'sleeper' species likely to emerge as major weeds under changing climatic conditions. Map locations, develop control strategies and undertake pre-emptive control actions including analysis of import pathways.

Recommendation 4.5b: Implement an education program targeting residents and visitors, plant nurseries and councils on the identification and impact of known and potential weed species and suggested management actions, including information on garden plants that can become weeds and alternative native species that can be used.

4.6 Feral Animals

As previously outlined, feral animal distributions and impacts are likely to change as climate changes. Due to the complexity of the interactions between vegetation and

habitat, herbivores and predator/prey relationships, it will be important to understand the issue and determine proactive management approaches.

Recommendation 4.6a: Undertake research and predictive modelling to understand the effect of climate change on pest animal distributions and impacts (possible collaborative study/monitoring program). Include potential interactions with reintroduced native mammals on the 'foot' of Yorke Peninsula (Great Southern Ark project).

4.7 Support and Develop New Funding

Traditional funding sources such as national and state government investments, government grants programs and NRM or Council levy funds are clearly not sufficient to meet current coastal management requirements (33), let alone the increasing pressures brought by climate change. New areas of funding are required to adequately finance conservation and rehabilitation work, notwithstanding the likely increases in coastal infrastructure costs. One potential source is the emerging carbon and biodiversity offsets markets.

Carbon Sequestration

To stimulate the supply of carbon offsets, the South Australian government has pledged to facilitate innovative ways to finance carbon offset projects and ensure its long-term investment. This would also require addressing any legislative or policy barriers and building the capacity of stakeholders to participate in the carbon market (ref 26).

Co-investment between the South Australian Government and research organisations has driven new research into carbon project opportunities across South Australia, including the mapping and assessment of the carbon sequestration potential of coastal wetlands and seagrass habitats (Blue Carbon projects). For example, the Goyder Institute is undertaking a study on carbon sequestration through the ecological restoration of a tidal ecosystem that was reconnected to tidal flows after being isolated. The significance of this project lies in a market-ready approach to obtain carbon credits from the restoration of salt fields (25).

There are opportunities for the Northern Yorke region to incorporate 'Blue Carbon' financing into regional planning and implementation of tidal retreat projects.

Biodiversity Credits and Offsets

The Native Vegetation Council in South Australia is driving the development of a Biodiversity Credit Exchange which gives eligible landholders access to funding to protect, manage and restore areas of native vegetation on their land in order to generate biodiversity credits. These credits are sold at cost to buyers that are required to offset vegetation clearances in the same region (27). Given that significant parts of the Northern and Yorke coastline are managed by private landholders, and the increasing demand for coastal developments, there is potential for participation in this market as it develops.

Recommendation 4.7a: Investigate opportunities to participate in developing environmental markets such as the carbon market (including Blue Carbon) and biodiversity offsets to drive habitat restoration and climate change mitigation.

Collaborative Conservation and Corporate and Philanthropic Finance

The Northern and Yorke NRM Board and the Department for Environment and Water has invested in collaborative conservation since 2007 and several collaborations have formed under the banners of Living Flinders, Naturally Yorke and Mid North Horizons.

Figure: Brand logos developed by collaborative planning groups in the Northern and Yorke Region



These collaborations include government, non-government, community and agricultural organisations. The branded programs are supported by extensive participatory planning and can provide a mechanism for seeking private, philanthropic and corporate investment into high profile projects.

Recommendation 4.7b: Reinvigorate the collaborative partnerships under the Living Flinders, Naturally Yorke and Mid-North Horizons banners, update the project prospectus for each Program and seek non-government investment in high priority outcomes for the coastal environment.

Photo: Overlooking Miranda from Mt Grainger, Upper Spencer Gulf

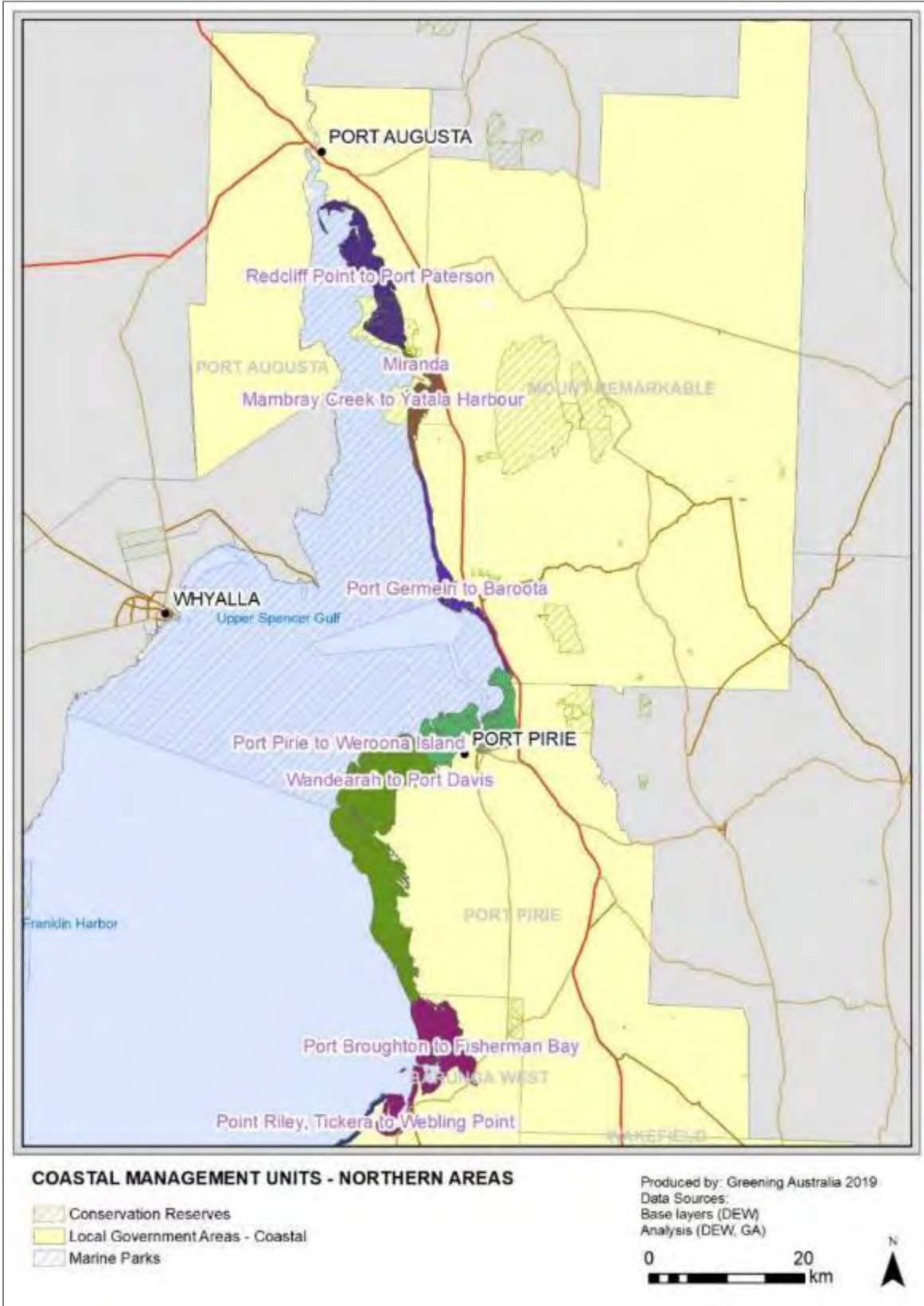


5. MANAGEMENT UNIT DESCRIPTIONS

Table 1: Management Units

Cell Numbers	Management Unit Name
NY5,6,7, 8	Lorne to Sandy Point
NY9	Bald Hill
NY10, 11, 12	Port Wakefield to Port Clinton
NY13,14,15,16	Wills Creek
NY17	Tiddy Widdy to Inkster Well
NY18	Ardrossan
NY19	Parara to Rogues Point
NY20, 21,22,23,24,25	Muloowurtie Point to Port Julia
NY26,27,28,29,30,31,32	Port Julia to Port Vincent
NY33	Port Vincent
NY34	Beach Point
NY35	Stansbury
NY36, 37, 38	Klein Point to Coobowie
NY39	Edithburgh and Coobowie Estuary
NY40	Troubridge Island
NY41	Sultana Point
NY42, 43	Troubridge Point
NY44,45,46,47	Kemp Bay, Port Moorowie to Sturt Bay
NY48, 49	Point Davenport to Foul Bay
NY50, 51	Point Yorke to Meehan Hill
NY52, 53,54,55	Marion Bay to Stenhouse Bay
NY56,57,58,59	Stenhouse Bay, Althorpe Islands to Reef Head
NY60, 61,62,63,64,65,66,67	West Cape to Browns Beach
NY68, 69, 70	Gym Beach to Constance Bay
NY71,72,73	Formby Bay to Swincer Rocks
NY74,75,76	Gonzo's, Point Annie to Berry Bay
NY77, 78, 79	Corny Point to Point Turton
NY80, 81	Hardwicke Bay to Port Minlacowie
NY82, 83, 84	Cockle Beach to Wauraltee
NY85	Port Victoria
NY86, 87	Point Pearce and Wardang Island
NY88, 89	Chinaman Wells to The Gap
NY90, 91	Cape Elizabeth to Port Hughes
NY92, 93, 94	Moonta Bay, Bird Island to Wallaroo
NY95, 96, 97, 98	Point Riley, Tickera Bay to Webling Point
NY99, 100, 101	Port Broughton to Fisherman Bay
NY102, 103, 104	Wandearah to Port Davis
NY105, 106, 107	Port Pirie to Weroona Island
NY108, 109, 110	Port Germein and Baroota
NY111, 112	Mambray Creek to Yatala Harbor
NY113, 114	Miranda
NY115, 116, 117	Redcliff Point to Point Paterson

Map 2: Coastal Management Units – Northern Areas



Map 3: Coastal Management Units – Central



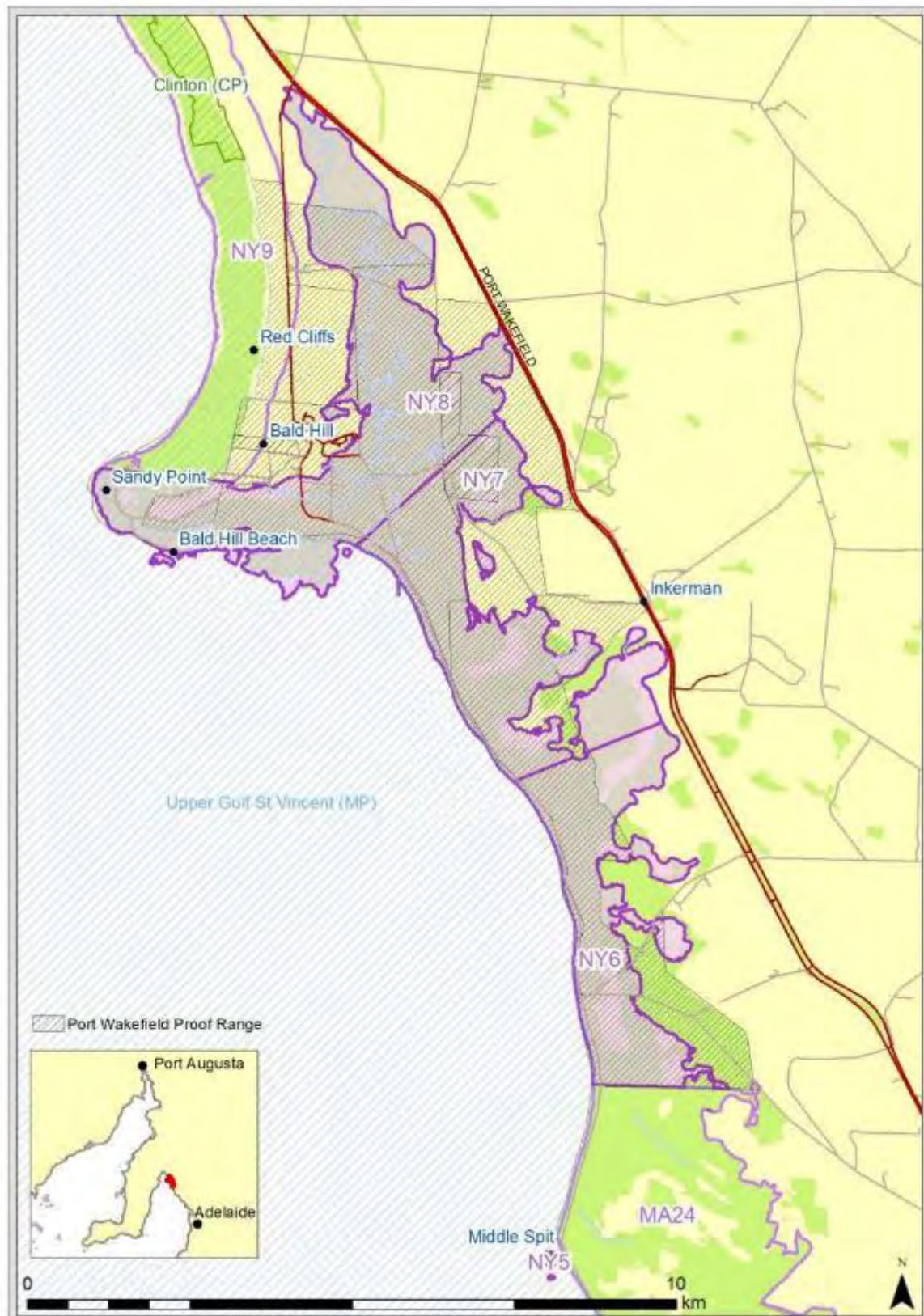
Map 4: Coastal Management Units – Southern



Cells NY5 - NY8: Lorne to Sandy Point

Area: 2,986 hectares

Location: Located south of Port Wakefield, on the north-eastern coast of Gulf St. Vincent.



Land Tenure/Ownership

Private: small areas of farmland on the inland side.

Public: some unallotted Crown Land at Sandy Point.

Traditional Owners: Kaurna.

Other: almost the entire Management Unit is owned by the Commonwealth of Australia Department of Defence (Port Wakefield Proof Range).

Landforms

This low energy, tide-dominated coastline is characterised by stable dunes, saline flats and sabkhas (coastal flats subject to periodic flooding and evaporation which result in the accumulation of clays, evaporites, and salts). Chenier ridges (stranded sandy or shelly beach ridges) occur in the north and are separated by mud-flats with marsh and swamp vegetation.

Cell 5 is a small sand Island consisting of bare sand and shellgrit.

Marine Habitat

The marine environment features large tracts of bare sand, shellgrit and marine limestone to 1 km offshore, then dense seagrass with some annual seagrass areas.

Areas of mangroves front the extensive intertidal flats, where seagrass debris builds up around the mangroves.

Native Vegetation

This Management Unit contains 85% native vegetation cover (2,534 ha), the majority of which is low samphire and saltmarshes (*Tecticornia* sp., *Sarcocornia blackiana* low open shrubland over *Disphyma crassifolium* ssp. *clavellatum* (mixed) forbs).

The narrow frontal dunes support *Olearia axillaris*+/-*Acacia ligulata*+/-*Exocarpos aphyllus*+/-*Myoporum insulare*+/-*Alyxia buxifolia*+/-*Dodonaea viscosa* ssp. *spatulata* mid open shrublands and grasses.

Beach ridges support *Melaleuca lanceolata* tall open shrubland over *Exocarpos aphyllus* shrubs and *Maireana oppositifolia* shrubs.

Sandy Point has a mangrove fringe with the dunes supporting low shrub associations.

Conservation Significance

Almost the entire area has high conservation value with the exception of a small number of cleared areas on the inland boundary. The high conservation value of this part of the Upper Gulf St Vincent area is attributed to the large area of EPBC-listed Temperate Coastal Saltmarsh ecological community and the presence of the nationally vulnerable Bead Samphire (*Tecticornia flabelliformis*). It also supports many regionally significant species, including coastal-dependent reptiles and rare butterflies (1).

Vegetation patch size and connectivity to other patches along this part of the coastline is good and provides the necessary habitat connectivity for many plants and animals to continue to survive here. This Management Unit has high conservation value for threatened flora and fauna, as well as species diversity (Caton *et. al.* recorded 105 species in Cell 8 alone).

This part of the coastline also supports a variety of coastal waders including Terns, Plovers, Sandpipers and Curlews. Over 100 bird species have been recorded in these cells, twenty of which are rated as rare, vulnerable or threatened. The high tide bird roost sites near to Middle Spit, are also of high conservation value.

The area is also part of the Important Bird Area (IBA) and is recognised as significant by the Adelaide International Bird Sanctuary collaboration.

Table 2. Species of National and State Conservation Significance (BDBSA records), Lorne to Sandy Point Management Unit

<i>Biota</i>	<i>Common name</i>	<i>Australia (EPBC)</i>	<i>SA (NPW Act)</i>
<i>Animal species</i>			
<i>Acanthiza iredalei rosinae</i>	Samphire Thornbill	VU	VU
<i>Arenaria interpres</i>	Ruddy Turnstone		R
<i>Calidris canutus</i>	Red Knot	EN	
<i>Xenus cinereus</i>	Terek Sandpiper		R
<i>Calidris ferruginea</i>	Curlew Sandpiper	CR	
<i>Calidris tenuirostris</i>	Great Knot	CR	R
<i>Charadrius leschenaultii</i>	Greater Sand Plover	VU	R
<i>Egretta garzetta</i>	Little Egret		R
<i>Limosa lapponica</i>	Bar-tailed Godwit	ssp	R
<i>Neophema elegans</i>	Elegant Parrot		R
<i>Neophema petrophila</i>	Rock Parrot		R
<i>Numenius madagascariensis</i>	Far Eastern Curlew	CR	V
<i>Pluvialis fulva</i>	Pacific Golden Plover		R
<i>Sternula nereis</i>	Fairy Tern	VU	E
<i>Tringa brevipes</i>	Grey-tailed Tattler		R
<i>Tyto igyanica delicatula</i>	Eastern Barn Owl		
<i>Plant species</i>			
<i>Tecticornia flabelliformis</i>	<i>Bead Samphire</i>	VU	V

Caton *et. al.* also recorded the White-bellied Sea Eagle, Red-necked Stint, White-browed Babbler, Pacific Swift (Fork-tailed Swift), Little Tern, Blue Winged Parrot, Banded Stilt, Bar tailed Godwit and Letter Winged Kite in this Management Unit.

Management

The Commonwealth of Australia Department of Defence actively manage the majority of this coast. They have undertaken biological survey work, run pest animal and weed control programs, and undertaken revegetation including the rehabilitation of mined shell grit areas. Private lands are managed within farm enterprises. Caton *et. al* noted that the necessary exclusion of public access from the proof range and the implementation of an adaptive management process appears to have benefits for conservation of bird and plant species.

The declaration of the Adelaide International Bird Sanctuary to the south of the Defence lands has allowed a greater collaboration of coastal managers along the northern Adelaide Plains and head of Gulf St Vincent, and future collaborations to protect shorebirds may develop under this banner. The nearshore environment is within the Upper Gulf St Vincent Marine Park and its management is also likely to be guided by the International Bird Sanctuary collaboration.

Relevant plans

- Wakefield Regional Council Development Plan, February 2017
- Northern and Yorke Regional NRM Plan; Strategic Plan, 2019-2029
- Adelaide International Bird Sanctuary - Winaityinaityi Pangkara NP Plan
- Coastal Motor Vehicle Access Management Strategy (2008) Northern and Yorke Natural Resources Management Region. D. Allen.
- Yorke NRM District Weed Action Plan (2018) Northern and Yorke Natural Resource Management Board.

Recommended Actions

The main management priorities for this area are climate change adaption and impact mitigation, fox and weed control.

Climate Change Impact:

The low-lying saltmarsh areas are particularly threatened by sea level rise. The landward migration of these important communities is partly or fully restricted by the Port Wakefield Highway and adjacent agriculture, although it may be possible to manage areas in Cell 6 for migration of the mangrove and samphire species in step with changes in the tide levels (1).

Coastal hazards include an Inland Runoff/Flood Hazard Zone with Storm Surge Hazard Zones further inland. The stranded tidal flat behind the sand island is a Storm Surge Hazard Zone. These areas will experience increased coastal erosion and inundation, with rising sea levels.

Access and Recreation Impacts:

Public access is highly restricted but Defence staff have reported occasional trespassing along the coast.

Weeds:

At least two WoNS are found in these cells; Erect Prickly Pear (*Opuntia stricta*) and African Boxthorn (*Lycium ferocissimum*). Calomba Daisy also occurs and Buffel Grass has been recorded on roadsides in the area.

Table 3. Recommended Management Actions; Lorne to Sandy Point Management Unit

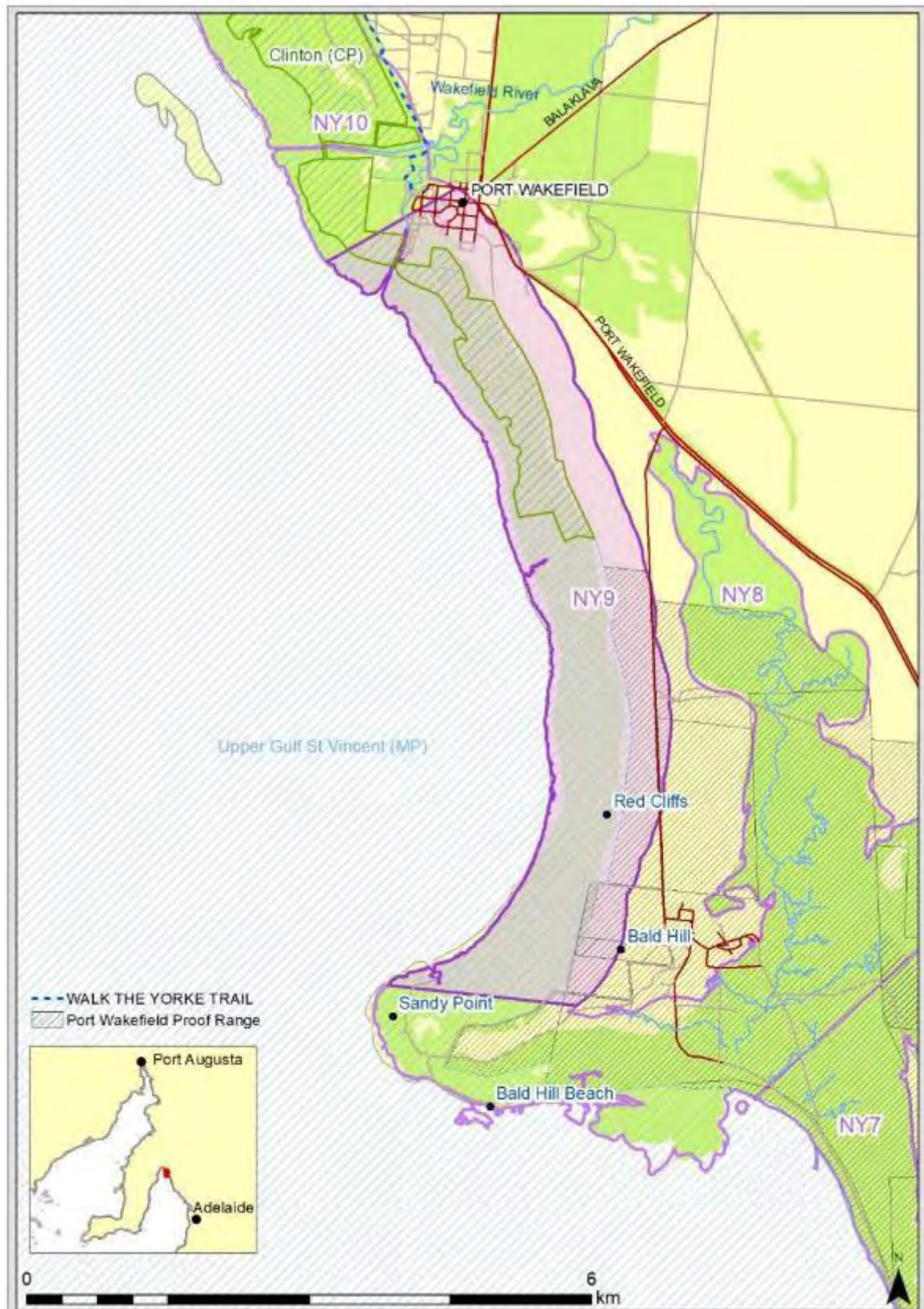
<i>Issue/Threat</i>	<i>Location</i>	<i>Recommended Action</i>	<i>Priority of Action</i>	<i>Potential Contributors</i>
<i>Climate change impact</i>				
Inundation and shoreline recession Storm surge and sea-level rise impact	Whole Management Unit	Undertake flood and inundation mapping with regard to natural assets of the coast. Identify and map suitable areas for allowing tidal retreat. Involve neighbouring landholders in planning for tidal retreat zones and projects.	Medium	Commonwealth of Australia (Defence), DEW / NRNY, CPB, Adelaide International Bird Sanctuary Partnership Group
<i>Access and recreation</i>				
Unauthorized vehicle access	Coastal side of Defence land	Maintain surveillance and block tracks if required.	Medium	Commonwealth of Australia (Defence) DEW /AMLR NRM
<i>Weeds</i>				
Woody (African Boxthorn, Western Coast Wattle)	Whole Management Unit	Maintain surveillance and control weeds when observed. (Consult with Defence).	Medium	Commonwealth of Australia (Defence)
Succulents (Prickly Pear) and grasses (Buffel Grass)	Mostly coming from the roadside	Maintain surveillance and control weeds when observed. (Consult with Defence).	Medium	Commonwealth of Australia (Defence)
<i>Feral animals</i>				
Fox and cat predation on native animals and shorebirds	Whole Management Unit	Undertake control as recommended by NRNY and coordinate with neighbours.	High	Commonwealth of Australia (Defence), NRNY, neighbouring landholders

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Cell NY9: Bald Hill

Area: 1,158 hectares

Location: Sandy Point to Port Wakefield



Land Tenure/Ownership

Private: some private land (residential blocks in Port Wakefield and strip of farmland to the south of the town).

Public: Clinton CP and Upper Gulf St Vincent Marine Park.

Council: Wakefield Council owns parcels and amenities in the town.

Traditional Owners: Kaurna.

Other: Commonwealth of Australia; Department of Defence.

Landforms

This Management Unit is in the lowest-energy part of the gulf and contains extensive intertidal sand and mudflats along the predominantly mangrove coastline. The area is backed by a narrow flat saltmarsh plain with expanses of samphire. The landward side in the north is bounded by a chenier dune ridge and further south by low erodible cliff slopes and a short section of limestone capped cliffs.

Marine Habitat

The seabed supports areas of dense, to medium density seagrass, with some patchy seagrass areas and bare sand nearer to the shore. Around Port Wakefield is a large estuarine habitat which is critically important as a fish nursery and is a part of the Upper St Vincent Gulf Marine Park.

Native Vegetation

This Management Unit contains 57% native vegetation cover (665 ha) of predominantly mangrove (*Avicennia marina* var. *resinifera* Low Open Forest) along the intertidal zone, backed by intact intertidal Samphire (*Tecticornia* spp. Low Shrubland).

The narrow chenier dune south of the town contains some coastal shrublands with reasonable quality *Lomandra effusa* sedgeland in the understorey.

The erodible cliffs support degraded shrublands of *Melaleuca lanceolata*, *Acacia oswaldii* and *Geijera linearifolia* with some good cover of native speargrasses (*Austrostipa* spp.)

Conservation Significance

This Management Unit contains Wetlands of National Importance and EPBC listed Temperate Coastal Saltmarsh, which supports many regionally significant species, including coastal-dependent reptiles and rare butterflies. The head of gulf wetlands and the Wakefield River estuary are also important areas for fish nurseries and is protected within the Marine Park.

The intertidal vegetation in this Management Unit is in good condition and the sand and mudflats provide significant habitat for migratory wading birds. The area has links to the Adelaide International Bird Sanctuary National Park - Winaityinaityi Pangkara, as it acts as a crucial habitat for migratory birds. This part of the Upper Gulf St Vincent is also regarded as an important Bird Area by Birdlife Australia, meaning it has international importance for bird conservation and is known to support key bird species.

The Birds SA Monitoring Group visit the Bald Hill area each month and conduct bird counts, gather observations and contribute data to shorebird counts in Gulf St Vincent through Birds SA and Birdlife Australia's Shorebirds 2020 Program (Shorebird Alliance unpublished meeting notes).

Table 4. Species of National and State Conservation Significance (BDBSA records), Bald Hill Management Unit

Biota	Common name	Australia (EPBC)	SA (NPW Act)
<i>Animal species</i>			
<i>Acanthiza iredalei rosinae</i>	Samphire Thornbill	VU	V
<i>Actitis hypoleucos</i>	Common Sandpiper		R
<i>Arenaria interpres</i>	Ruddy Turnstone		R
<i>Bubulcus ibis coromandus</i>	Eastern Cattle Egret		R
<i>Cladorhynchus leucocephalus</i>	Banded Stilt		V
<i>Elanus scriptus</i>	Letter-winged Kite		R
<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R
<i>Neophema elegans</i>	Elegant Parrot		R
<i>Numenius madagascariensis</i>	Far Eastern Curlew	CR	V
<i>Podiceps cristatus</i>	Great Crested Grebe		R
<i>Stagonopleura guttata</i>	Diamond Firetail		V
<i>Sternula nereis</i>	Fairy Tern	VU	E
<i>Plant species</i>			
N/A			

Caton *et. al.* also noted Grey Teal, White-faced Heron, Common Greenshank, Crested Pigeon, Singing Honeyeater and White-browed Scrubwren. Less commonly seen species include Great Crested Grebe, Blue-winged Parrot, Nankeen Night Heron, Sacred Kingfisher, White-winged Fairywren and Horsfield's Bushlark in this Management Unit.

Management

The majority of the coast is within the Clinton Conservation Park and the Upper Gulf St Vincent Marine Park and is currently managed by DEW. Future management of this public land is likely to be guided by the Adelaide International Bird Sanctuary collaboration. Small areas in the south of the area are managed by the Defence forces as part of the Port Wakefield Proof Range.

The Wakefield Regional Council, Adelaide Mt Lofty NRM and Port Wakefield community have been active around the township managing ORV access and undertaking revegetation.

Relevant plans

- Mainland Conservation Parks of Yorke Peninsula. Department for Environment and Heritage, 2009
- Wakefield Regional Council Development Plan, February 2017
- Northern and Yorke Regional NRM Plan; Strategic Plan 2019-2029
- Adelaide International Bird Sanctuary - Winaityinaityi Pangkara NP Plan

- Coastal Motor Vehicle Access Management Strategy (2008) Northern and Yorke Natural Resources Management Region. D. Allen.
- Yorke NRM District Weed Action Plan (2018) Northern and Yorke Natural Resource Management Board.

Recommended Actions

The main management priorities for this area are protecting native vegetation, weed and feral animal control and mitigating the impacts of climate change.

Climate Change Impact:

Sea level rise will have significant impact on these important low-lying communities, particularly as they are mostly bounded by low cliffs and dune ridges on the landward side, and further by Port Wakefield Road and the town itself. Cliff erosion is also likely to occur as the slopes are composed of soft sediments.

Impacts on migratory and resident shorebirds are likely but will need to be managed from a broader perspective.

To the south of this cell, a Storm Surge Hazard Zone will be prone to increased coastal erosion with rising sea levels.

Access and Recreation Impacts:

The cliff track from the old quarry south of Port Wakefield down to Sandy Point has some associated ORV activity, particularly where it terminates at the Proof Range boundary where driving up and down the erodible cliffs is causing some erosion and impacting native vegetation. The isolated nature of this area also facilitates potentially undesirable recreation activities such as firearms target practice.

There is also ORV activity within the quarry itself and there are some impacts on native vegetation surrounding the quarry.

Photo: Vehicle tracks at Bald Hill on erodible cliffs which support native grasses and shrubs.



Weeds:

Two WoNS have been recorded in this Management Unit; Bridal Creeper (*Asparagus asparagoides*) and African Boxthorn (*Lycium ferocissimum*). Other weeds present here include Western Coastal Wattle (*Acacia cyclops*), Aleppo Pine (*Pinus halepensis*), Calomba Daisy (*Oncosiphon suffruticosom*) and *Gazania* sp.

Council staff have noted the rapid spread of Declared Weeds, particularly Buffel Grass, after recent summer rains.

Table 5. Recommended Management Actions; Bald Hill Management Unit

<i>Issue/Threat</i>	<i>Location</i>	<i>Recommended Action</i>	<i>Priority of Action</i>	<i>Potential Contributors</i>
<i>Climate change impact</i>				
Climate Impacts - Cliff and dune erosion potential	Sand dune ridge in the north east of the unit	Revegetate the sand dune ridge running south from the quarry and the tops of the erodible cliffs in the south, in conjunction with rabbit control.	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
Significant native vegetation vulnerable to species composition change, compromised structural integrity and reduced regeneration potential (resilience)	Cliff and dune top low shrublands and sedgeland Disturbed samphire	Maintain vegetation integrity by minimising disturbance from vehicles, pedestrians, feral animals and weeds. Facilitate regeneration by passive (access management) or active (revegetation) interventions as required.	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
<i>Temperature and reduced rainfall impact</i>				
<i>Access and recreation</i>				
Vehicle access management - informal access and 4WD/motorbike activity	From old quarry south of Port Wakefield down to Sandy Point	Formalise a 'turn-around' for vehicles at the southern end of the cliff track. Install signs to promote environmental values discourage vehicles driving up the cliff slope or further driving around the Defence land boundary.	Medium	DEW / NRNY, CPB, Council, SAPOL, DPTI, community groups, Traditional Owners, NGOs
<i>Weeds</i>				
Woody (Western Coast Wattle, African Boxthorn, Aleppo Pine) and Grasses (Buffel Grass)	Whole cell.	Undertake African Boxthorn control along the length of the southern track. Control all woody weeds around the quarry in conjunction with native vegetation protection measures. Control Buffel Grass and other Declared weeds, particularly where infestations are actively spreading.	High	Landholders, DEW / NRNY, Council, community groups, Traditional Owners, NGOs
Broadleaf (<i>Gazania</i> , Calomba Daisy)	In native vegetation	Control broadleaf weeds according to Bushcare principles	Medium	Landholders, DEW / NRNY, Council,

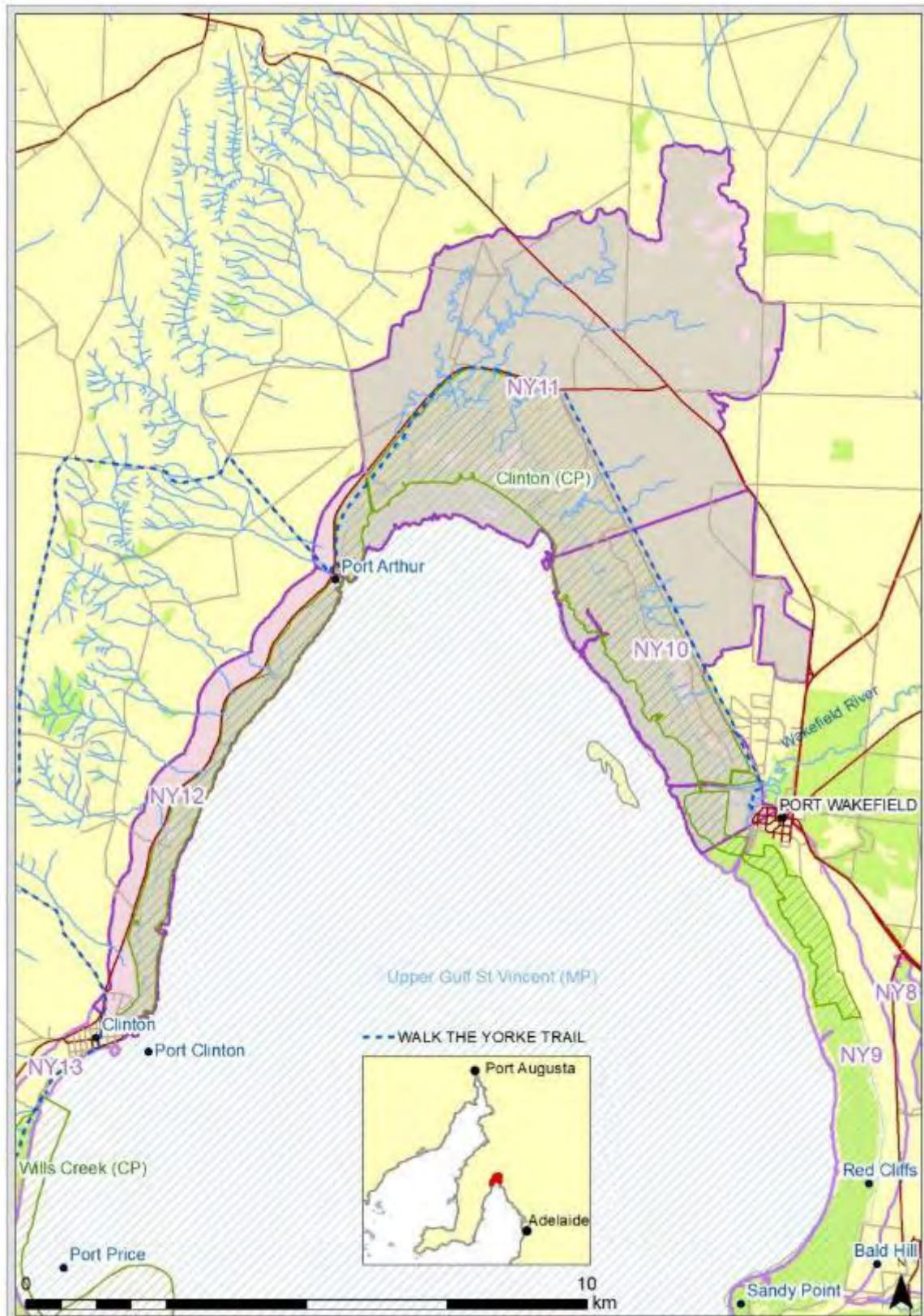
	south of the town	starting with the areas of highest quality vegetation.		community groups, Traditional Owners NGOs
Succulents (Prickly Pear)	South of township	Attempt eradication of Prickly Pear – will require follow up after initial control	High	Landholders, DEW / NRNY, Council, community groups, Traditional Owners NGOs
<i>Native vegetation</i>				
Vegetation Protection - Un-managed native vegetation (<i>Lomandra effusa</i> understorey)	Shellgrit sand dune and cliffs south of the town, particularly on the north edge of quarry	Undertake weed control and delineate the higher quality native vegetation with signs and or fencing, as it is well worth protecting. Encourage and support local community groups to look after the area.	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
<i>Feral animals</i>				
Feral animals - herbivores (Rabbits)	Soft erodible cliffs in the south of the site	Implement rabbit control along the southern track possibly including fumigation of warrens in the cliff.	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
Feral animals - predators (Domestic and feral cats)	Surrounding the towns	Raise awareness of the impact of cats on shorebirds in sensitive inter-tidal areas. Encourage responsible ownership.	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs

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Cells NY10 - NY12: Pt Wakefield to Pt Clinton

Area: 6,054 hectares

Location: These cells comprise the head of Gulf St Vincent, from Port Wakefield to Clinton.



Land Tenure/Ownership

Private: land around the towns north of the Gulf head.

Public: extensive public land includes Clinton Conservation Park, unallotted Crown Land (north of the gulf head, nearshore) and Crown Land Act Reserve (disused railway).

Council: Port Wakefield Council and Yorke Peninsula Council have small parcels in townships.

Traditional Owners: Narungga Native Title Determination area and Kaurna.

Landforms

The Port Wakefield region contains extensive intertidal flats at the head of Gulf St Vincent. The Wakefield River estuary is located close to the township.

The coastline within these cells is sheltered and low energy, with mudflats and saltmarsh plains subject to inundation. The tidal inlet carries freshwater flows in wet years. Both the old and the new Port Wakefield river channels have been heavily modified.

At the northern end of Clinton, the sandy coast merges with the mangroves through a series of recurved or hooked beach ridges.

Marine Habitat

The marine environment is dominated by dense to medium density seagrass, with tracts of bare sand at the southern end. The continuous mangrove woodland extends from Port Wakefield all the way along the east coast of Yorke Peninsula, to Clinton.

The Port Wakefield estuary is characterised by channels created from land-based freshwater flows, receiving sediment from both river and marine sources and influenced by tide, wave and river processes. Bare mud areas adjacent to the river and in some of the intertidal and supratidal saltmarsh areas support a benthic microbial community.

This mangrove-lined estuary is an important nursery for a wide range of fish and invertebrates and protects the fragile and important saltmarsh habitats from wave action. The Upper Gulf St Vincent Marine Park encompasses this area.

Native Vegetation

This Management Unit contains 88% (or 5,356 ha) native vegetation cover. The eastern side of the gulf supports intertidal mangroves (*Avicennia marina* var. *resinifera* Low Open Forest), supratidal samphire and extensive areas of stranded samphire and Nitre Bush Shrubland (*Nitraria billardierei* + *Atriplex* spp. Shrubland and *Tecticornia* spp.).

At the head of the gulf are extensive supratidal samphire shrublands which are subject to grazing on some private land blocks.

Conservation Significance

This Management Unit has very high conservation value as it contains habitat for a diversity of species, many of which are threatened. The vegetation is generally in good condition and provides valuable habitat for a range of regionally significant species, coastal waders and bush birds, as well as butterflies and reptiles (1). The mangrove-lined estuary is an important nursery area for a wide range of fish and invertebrates. 125 species of plants and animals were recorded by Caton *et.al.* The area is also an important foraging area for White-bellied Sea-eagle and Eastern Osprey (56, 57).

The high conservation value of this part of the Upper Gulf St Vincent area is also attributed to the high proportion of EPBC listed Temperate Coastal Saltmarsh here, which is a threatened ecological community and contains the largest area of critical habitat for the nationally vulnerable Bead Samphire (*Tecticornia flabelliformis*). These are Wetlands of National Importance.

The area is also part of the Important Bird Area (IBA) and is recognised as significant by the Adelaide International Bird Sanctuary collaboration.

Table 6. Species of National and State Conservation Significance (BDBSA records), Pt Wakefield to Pt Clinton Management Unit

<i>Biota</i>	<i>Common name</i>	<i>Australia (EPBC)</i>	<i>SA (NPW Act)</i>
<i>Animal species</i>			
<i>Acanthiza iredalei rosinae</i>	Sapphire Thornbill	VU	V
<i>Actitis hypoleucos</i>	Common Sandpiper		R
<i>Ardeotis australis</i>	Australian Bustard		V
<i>Arenaria interpres</i>	Ruddy Turnstone		R
<i>Balaenoptera edeni</i>	Bryde's Whale		R
<i>Biziura lobata</i>	Musk Duck	VU	V
<i>Balaenoptera physalus</i>	Fin Whale		R
<i>Calidris canutus</i>	Red Knot	EN	
<i>Xenus cinereus</i>	Terek Sandpiper		R
<i>Calidris ferruginea</i>	Curlew Sandpiper	CR	
<i>Calidris melanotos</i>	Pectoral Sandpiper		R
<i>Calidris pugnax</i>	Ruff		R
<i>Calidris tenuirostris</i>	Great Knot	CR	R
<i>Charadrius leschenaultii</i>	Greater Sand Plover	VU	R
<i>Charadrius mongolus</i>	Lesser Sand Plover	EN	R
<i>Cladorhynchus leucocephalus</i>	Banded Stilt		V
<i>Corcorax melanorhamphos</i>	White-winged Chough		R
<i>Falco peregrinus</i>	Peregrine Falcon		R
<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R
<i>Haliaeetus leucogaster</i>	White-bellied Sea Eagle		E
<i>Limosa lapponica</i>	Bar-tailed Godwit	ssp	R
<i>Limosa limosa</i>	Black-tailed Godwit		R
<i>Megaptera novaeangliae</i>	Humpback Whale	VU	V
<i>Melanodyras cucullata cucullata</i>	Hooded Robin		R
<i>Myiagra inquieta</i>	Restless Flycatcher		R

<i>Neophema chrysostoma</i>	Blue-winged Parrot		V
<i>Neophema elegans</i>	Elegant Parrot		R
<i>Neophema petrophila</i>	Rock Parrot		R
<i>Numenius madagascariensis</i>	Far Eastern Curlew	CR	V
<i>Numenius phaeopus</i>	Whimbrel		R
<i>Plegadis falcinellus</i>	Glossy Ibis		R
<i>Pluvialis fulva</i>	Pacific Golden Plover		R
<i>Podiceps cristatus</i>	Great Crested Grebe		R
<i>Spatula rhynchotis</i>	Australasian Shoveler		R
<i>Sternula nereis</i>	Fairy Tern	VU	E
<i>Tringa brevipes</i>	Grey-tailed Tattler		R
<i>Tringa glareola</i>	Wood Sandpiper		R
<i>Plant species</i>			
<i>Maireana rohrlachii</i>	Rohrlach's Bluebush		R
<i>Poa fax</i>	Scaly Poa		R
<i>Swainsona fuscoviridis</i>	Dark Green Swainson-pea		R

Management

Clinton Conservation Park is managed by the Department for Environment and Water, and Crown Lands are largely managed by Port Wakefield and Yorke Peninsula Councils. Active community groups such as the Friends of Gulf St Vincent are centred around Port Wakefield township.

Relevant plans

- Narungga Healthy Country Plan (in progress)
- Mainland Conservation Parks of Yorke Peninsula. Department for Environment and Heritage, 2009
- Wakefield Regional Council Development Plan, February 2017
- Northern and Yorke Regional NRM Plan; Strategic Plan 2019-2029
- Yorke Peninsula Council Coastal Management Strategy; Federation Park to Hickeys Point (in progress)
- Coastal Motor Vehicle Access Management Strategy (2008) Northern and Yorke Natural Resources Management Region. D. Allen.
- Yorke NRM District Weed Action Plan (2018) Northern and Yorke Natural Resource Management Board.
- Adelaide International Bird Sanctuary - Winaityinaityi Pangkara NP Plan
- Shorebird Conservation Action Plan, South Australian Shorebird Alliance / Birdlife Australia.

Recommended Actions

Threats to the conservation value of this area include climate change (particularly its associated sea level rise), ORV damage, weeds and feral animals, grazing on private, land rubbish dumping and reduced water quality.

There have also been concerns raised by the community regarding chemical dumping up stream, in the Wakefield River channel. Contamination could be made more likely by extreme climatic events (e.g. flashy run-off).

Climate Change Impact:

Sea-level rise will result in more frequent inundation of the low-lying areas in this area. All along Gulf St Vincent mangrove forests have already been measured migrating inland, in response to sea level rise (9). This increase in mangrove extent demonstrates that seas are rising faster than the samphire communities can adapt and migrate, and in many places, there is nowhere for these communities to move into.

However, there is potential to facilitate tidal retreat north of Port Wakefield and around the head of the gulf. On the western side of the gulf the samphire is partially blocked from inland retreat by the low coastal slopes which are a relic of the previous higher sea level.

Roads in this area constitute a barrier at present and some infrastructure modifications may be necessary in the future. Similarly, the disused railway corridor heading north from Port Wakefield may also be a barrier to regular tidal movement as well as tidal retreat.

Most of the coastal area in this cell is a Storm Surge Hazard Zone, thus will be susceptible to increased erosion and inundation, with rising sea levels.

Access and Recreation Impacts:

Significant formalisation of tracks has occurred on the track heading north west from the Port Wakefield caravan park. However, there are extensive ORV tracks on the northern edge of Port Wakefield township between the old courthouse and the new developments on Port Wakefield Road. There are some minor impacts at the Port Arthur carpark where fences have been cut. The carpark and fences could benefit from greater formalisation.

The Shorebird Conservation Action Plan recommends the installation of appropriate interpretive/regulatory signage at strategic locations to inform and educate visitors about the values of migratory shorebirds and the risks posed by disturbance. Consideration should be given to closing beaches during key feeding times and nesting periods for shorebirds, and to addressing illegal fishing, crabbing and mud cockle collection.

Weeds:

WoNS in this Unit include African Boxthorn (*Lycium ferocissimum*), Silver Nightshade (*Solanum elaeagnifolium*) and Bridal Creeper (*Asparagus asparagoides*). Other weeds present include Western Coastal Wattle (*Acacia cyclops*), Aleppo Pine (*Pinus halepensis*), and Calomba Daisy (*Oncosiphon suffruticosum*). Pepper Trees and Giant Reed (*Arundo donax*) occur on vacant land near the vehicle tracks and the Pepper Trees extend along the disused railway.

Photo: Saltmarshes impacted by grazing and Calomba Daisy infestation, north of the Port Wakefield Kadina Road



Table 7. Recommended Management Actions; Pt Wakefield to Pt Clinton Management Unit

<i>Issue/Threat</i>	<i>Location</i>	<i>Recommended Action</i>	<i>Priority of Action</i>	<i>Potential Contributors</i>
<i>Climate change impact</i>				
Inundation and shoreline recession	Northern margins of the samphire and saltmarsh community	Set-asides for tidal retreat are possible in this cell but they will occur on private land so engagement should start as soon as possible. Review levees and diversions of the Wakefield River channel (e.g. the swimming lagoon) to maximise the protection of the town and the opportunities for tidal movement and retreat. Assess hydrology along the disused railway embankment running NNW from Port Wakefield.	Medium	DEW / NRNY, CPB, DPTI, Council, landholders, community groups, Traditional Owners, NGOs
<i>Access and recreation impacts</i>				
Vehicle access management - excessive tracks and 4WD/motorbike activity	In behind housing to the north of Port Wakefield town	Restrict access from new housing development in the north of the town and from North St in the town. Rationalise and formalise tracks. Assess the costs and benefits of creating a designated off-road track within	High	DEW / NRNY, CPB, Council, SAPOL, DPTI, community groups, Traditional Owners

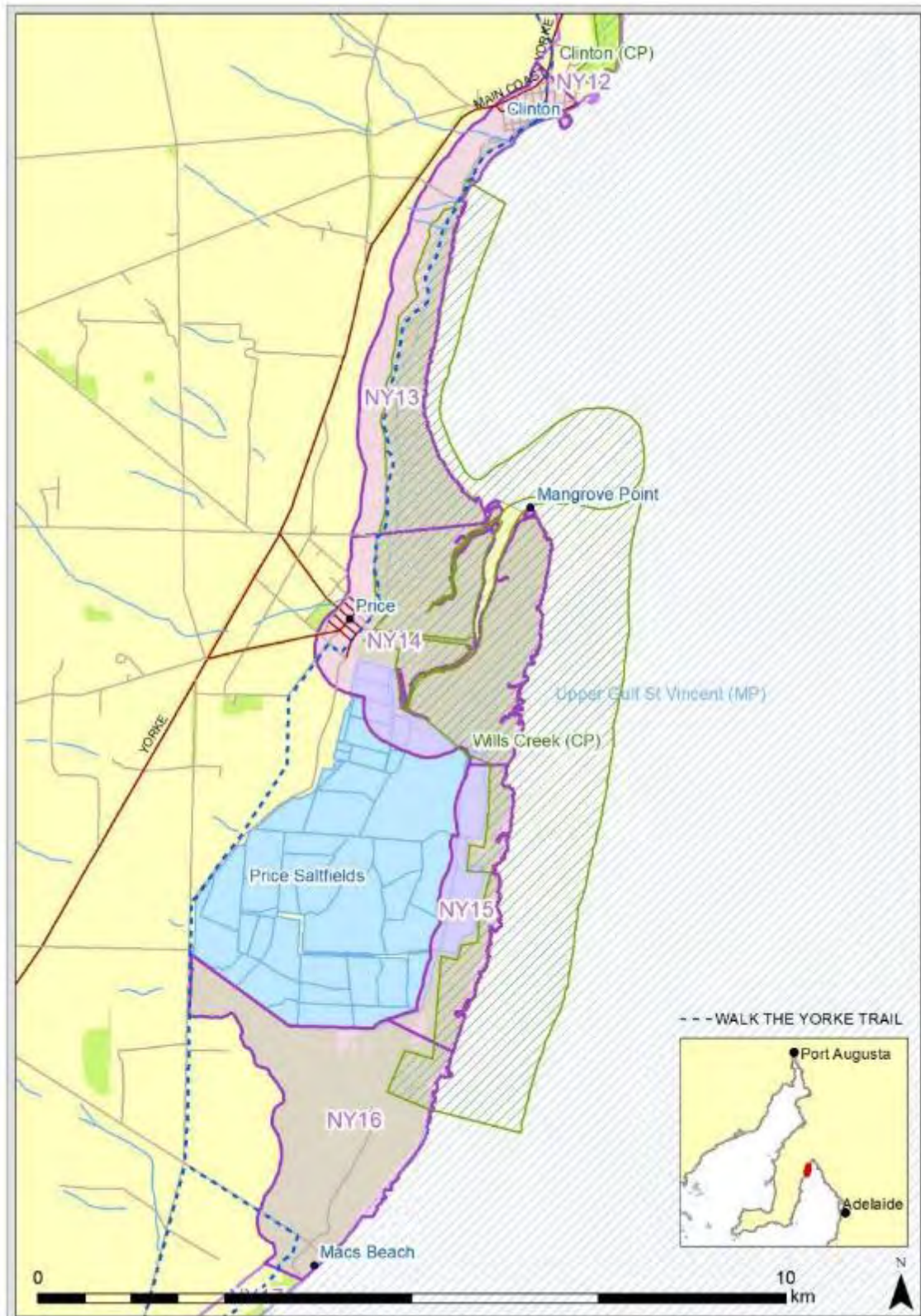
		the old quarry to provide formal ORV recreation.		NGOs
Beach driving		Install interpretive/regulatory signage at strategic locations to inform/educate visitors about the values of migratory shore birds and the risks posed by disturbance.	High	DEW / NRNY, CPB, Council, SAPOL, DPTI, community groups, Traditional Owners NGOs
<i>Weeds</i>				
Woody (Western Coast Wattle, African Boxthorn, Aleppo Pine, Pepper Tree and Giant Reed)	Vacant land behind housing in the north of the site. Pepper Trees along the dis-used railway line	Undertake woody weed control in conjunction with vehicle access measures.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional Owners NGOs
<i>Other</i>				
Revegetation	Shellgrit and sand dune tops around the new boardwalk could be enhanced with native species revegetation	Undertake revegetation of exposed dune tops with appropriate native shrub species in conjunction with weed control and vehicle access controls.	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
Agricultural impacts - Livestock grazing	Saltmarsh on private lands at the head of the gulf	Engage with landholders to discuss sustainable grazing options to maximise the resilience of the saltmarshes.	Medium	Landholders, DEW / NRNY, agricultural groups, PIRSA, NGOs
Illegal dumping	Carparks and isolated roads	Local effort to reduce illegal dumping.	High	DEW / NRNY, Council, community groups, Traditional Owners NGOs
<i>Feral animals</i>				
Fox and cat control	Clinton CP	High conservation values and shorebirds will benefit from feral predator control.	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs

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Cells NY13 - NY16: Wills Creek to Macs Beach

Area: 6,054 hectares

Location: This area is located on the eastern side of Gulf St Vincent, south of Clinton. It includes the Price salt evaporation pans and Wills Creek Conservation Park.



Land Tenure/Ownership

Private: private farms on the landward side, residential within Price and Clinton townships.

Public: significant public land in Wills Creek Conservation Park. Crown Land Act Reserve around Price township.

Traditional Owners: Narungga Native Title Determination area.

Other: industry land (Cheetham salt fields).

Landforms

This low energy coastline features extensive intertidal sand and mudflats and a sheltered estuarine inlet at Price. Cell 16 has sand/shelly beaches, fronted by a 300m intertidal plain, backed by low narrow, stable dunefields.

The Price salt fields are a dominant feature south of Price.

Marine Habitat

Extensive areas of seagrass, varying in density, occurs offshore, with an expansive area of bare sand further out to sea. Mangroves dominate the tidal zone along this coastline.

Native Vegetation

This Management Unit contains approximately 72% (or 1,654 ha) native vegetation cover, dominated by mangroves (*Avicennia marina* var. *resinifera* Low Open Forest) and low samphire shrublands (*Tecticornia* spp. Low Shrubland).

There is a very narrow strip of coastal slope shrublands between Clinton and Price.

Dune ridges containing tall shrublands occur in the south (*Olearia axillaris*+/*-Exocarpos syrticola*+/*-Beyeria lechenaultii*+/*-Atriplex cinerea*+/*-Santalum acuminatum* mid open shrubland) and *Gahnia lanigera* Sedgeland, has also been recorded in this area (1).

Conservation Significance

This area has high conservation value due to the threatened vegetation (EPBC listed Temperate Coastal Saltmarsh) and a high number of threatened species, particularly shorebirds. It contains important coastal wader habitat and the Price salt fields are a nesting site for the Caspian Tern and the Fairy Tern. The native vegetation also provides important bush bird and butterfly habitat and the Southern Death Adder and Black Tiger Snake have been recorded here (1).

Wills Creek Conservation Park is situated at Mangrove Point and extends from Port Clinton south to the town of Price. The area is part of the Important Bird Area (IBA) and is recognised as significant by the Adelaide International Bird Sanctuary collaboration. Osprey have been observed here attempting to nest on a navigation marker (57).

Table 8. Species of National and State Conservation Significance (BDBSA records), Wills Creek to Macs Beach Management Unit

Biota	Common name	Australia (EPBC)	SA (NPW Act)
<i>Animal species</i>			
<i>Acanthiza iredalei rosinae</i>	Samphire Thornbill	VU	V
<i>Actitis hypoleucos</i>	Common Sandpiper		R
<i>Arenaria interpres</i>	Ruddy Turnstone		R
<i>Biziura lobata</i>	Musk Duck		R

<i>Bubulcus ibis coromandus</i>	Eastern Cattle Egret		R
<i>Calidris canutus</i>	Red Knot	EN	
<i>Calidris ferruginea</i>	Curlew Sandpiper	CR	
<i>Calidris melanotos</i>	Pectoral Sandpiper		R
<i>Calidris subminuta</i>	Long-toed Stint		R
<i>Calidris tenuirostris</i>	Great Knot	CR	R
<i>Charadrius mongolus</i>	Lesser Sand Plover	EN	R
<i>Charadrius leschenaultii</i>	Greater Sand Plover	VU	R
<i>Cladorhynchus leucocephalus</i>	Banded Stilt		V
<i>Egretta garzetta</i>	Little Egret		R
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		R
<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R
<i>Haliaeetus leucogaster</i>	White-bellied Sea Eagle		E
<i>Limosa lapponica</i>	Bar-tailed Godwit	ssp	R
<i>Limosa limosa</i>	Black-tailed Godwit		R
<i>Myiagra inquieta</i>	Restless Flycatcher		R
<i>Neophema elegans</i>	Elegant Parrot		R
<i>Neophema petrophila</i>	Rock Parrot		R
<i>Numenius madagascariensis</i>	Far Eastern Curlew	CR	V
<i>Numenius phaeopus</i>	Whimbrel		R
<i>Pandion haliaetus cristatus</i>	Eastern Osprey		E
<i>Podiceps cristatus</i>	Great Crested Grebe		R
<i>Spatula rhynchotis</i>	Australasian Shoveler		R
<i>Sternula nereis</i>	Fairy Tern	VU	E
<i>Tringa brevipes</i>	Grey-tailed Tattler		R
<i>Tringa glareola</i>	Wood Sandpiper		R
<i>Tringa nebularia</i>	Common Greenshank		
<i>Xenus cinereus</i>	Terek Sandpiper		R
Plant species			
N/A			

Management

Public land is managed by Crown Lands and Yorke Peninsula Council. Cheetham Salt manages the salt pans. Community based bird conservation groups have constructed nesting platforms for Eastern Osprey here.

Relevant plans

- Narungga Healthy Country Plan (in progress)
- Mainland Conservation Parks of Yorke Peninsula; Management Plan. Department for Environment and Heritage, 2009
- Yorke Peninsula Council Coastal Management Strategy; Federation Park to Hickeys Point (in progress)
- Seawater Flooding Adaptation Pathways for Yorke Peninsula Council (Port Clinton). M. Western and J. Kellett, September 2015
- Shorebird Conservation Action Plan, South Australia Shorebird Alliance / Birdlife Australia
- Coastal Motor Vehicle Access Management Strategy (2008) Northern and Yorke Natural Resources Management Region. D. Allen.
- Yorke NRM District Weed Action Plan (2018) Northern and Yorke Natural Resource Management Board.

Recommended Actions

The main threats to the conservation value of this area are ORV damage (particularly dunes and saltmarsh areas near to Macs Beach), weeds and disturbance associated with mining (salt extraction).

Climate change

Low-lying saltmarsh areas are likely to be affected by sea level rise. The town of Price, the Yorke Highway and the salt fields present significant restrictions to inland migration of these communities.

The area around the salt evaporation pans is a Storm Surge Hazard Zone, which will be prone to increased erosion and inundation, with rising sea levels.

Access and Recreation Impacts

Most of this coast is inter-tidal and difficult to access so ORV's are not having a major impact. However, a significant number of access tracks in the south toward Macs Beach is damaging native vegetation, which has led to sand blow-outs and sand drift.

Weeds

African boxthorn (*Lycium ferocissimum*), a WoNS, has been recorded throughout this Management Unit. Otherwise, weed impacts are generally low in this area.

Other (Osprey nesting)

Recent attempts by an Osprey pair to nest in this area should be encouraged with the construction of artificial nest platforms in areas away from human disturbance.

Table 9. Recommended Management Actions; Wills Creek to Macs Beach Management Unit

<i>Issue/Threat</i>	<i>Location</i>	<i>Recommended Action</i>	<i>Priority of Action</i>	<i>Potential Contributors</i>
<i>Climate change impact</i>				
Inundation and shoreline recession <i>Storm surge and sea-level rise impact</i>	Whole Management Unit	Undertake flood and inundation mapping with regard to natural assets of the coast. Identify and map suitable areas for allowing tidal retreat. Involve landholders in planning for tidal retreat zones and projects.	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs, Cheetham Salt
Significant native vegetation vulnerable to species composition change, compromised structural integrity and reduced regeneration potential (resilience)	Tall shrublands on sand dune systems Disturbed samphire	Maintain vegetation integrity by minimising disturbance from vehicles, pedestrians, feral animals and weeds. Facilitate regeneration by passive (access management) or active (revegetation) interventions as required.	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs, Cheetham Salt
<i>Access and recreation</i>				
ORVs creating excessive tracks, vegetation damage, sand drift and blow-outs	Immediately north and south of Macs Beach Road entry point	Rationalise the number of tracks through native vegetation and formalise the preferred access to protect high quality native vegetation. Install barriers and information signs as appropriate.	High	DEW / NRNY, CPB, Council, SAPOL, DPTI, community groups, landholders, Traditional Owners, NGOs, Cheetham Salt
<i>Weeds</i>				
Woody (African Boxthorn)	Whole Management Unit	Undertake control as per Declared Weeds and WoNS responsibilities.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional Owners, NGOs, Cheetham Salt
<i>Other</i>				
Osprey nesting and disturbance	Near-shore navigation marker	Monitor Osprey nesting attempts and construct artificial nesting platforms away from disturbance.	High	NRNY, DEW / NRNY, Birds SA, community groups
<i>Feral animals</i>				
Fox and cat predation on native animals and shorebirds	Whole Management Unit	Undertake control as recommended by NRNY and coordinate with neighbours.	High	NRNY, DEW landholders

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Cell NY17: Tiddy Widdy to Inkster Well

Area: 367 hectares

Location: Located on the north-east coast of the Yorke Peninsula, just north of Ardrossan. It includes Tiddy Widdy Beach, Inkster Well and southern Macs Beach.



Land Tenure/Ownership

Private: Some private land, especially in residential areas, backed by private farmland.

Public: Crown Leasehold in the north, unallotted Crown Land.

Council: Yorke Peninsula Council own parcels on the coast.

Traditional Owners: Narungga Native Title Determination area.

Landforms

This coastal area features low relict cliffs fronted by a 300 – 500m wide strip of low irregular dunes and intertidal sand flats. The low energy shelly beach is frequently covered by deep piles of seagrass debris.

Marine Habitat

This is a sheltered low wave energy part of the coastline. Extensive areas of medium density seagrass occupy the marine environment, with some bare sand areas closer to the shore.

Native Vegetation

Approximately 37% (or 136 ha) of native vegetation cover remains in this Management Unit. Samphire low shrublands occur behind the dunes at Macs beach and the dunes support tall shrublands in moderate to poor condition.

Vegetation associations in the area include:

Olearia axillaris+/-*Exocarpos syrticola*+/-*Beyeria lechenaultii*+/-*Atriplex cinerea*+/-*Santalum acuminatum* mid open shrubland

Nitraria billardierei (mixed) low shrubland over *Mesembryanthemum crystallinum* low forbs

Tecticornia sp.,*Sarcocornia quinqueflora* low open shrubland

Conservation Significance

Although a high number of species (94 flora and 19 fauna) have been recorded here and native vegetation covers most of the dunes, its linear shape, sparse cover and weed invasion are all threatening the long-term viability of these communities (1).

The Common Death Adder has been recorded in the dunes, which also provide moderate habitat value for coastal waders and butterflies. The Olive Ridley Turtle, Sand Goanna, Dwarf Skink and Spotted Harrier have also been recorded in this Unit (1).

Table 10. Species of National and State Conservation Significance (BDBSA records), Tiddy Widdy to Inkster Well Management Unit

Biota	Common name	Australia (EPBC)	SA (NPW Act)
<i>Animal species</i>			
<i>Acanthophis antarcticus</i>	Common Death Adder		
<i>Calidris ferruginea</i>	Curlew Sandpiper	CR	
<i>Calidris canutus</i>	Red Knot	EN	
<i>Calidris ferruginea</i>	Curlew Sandpiper	CR	
<i>Calidris tenuirostris</i>	Great Knot	CR	R
<i>Numenius madagascariensis</i>	Far Eastern Curlew	CR	V

<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R
<i>Limosa lapponica</i>	Bar-tailed Godwit	ssp	R
<i>Sternula nereis</i>	Fairy Tern	VU	E
<i>Plant species</i>			
N/A			

Management

The large area of public land is managed by Yorke Peninsula Council. The Tiddy Widdy Progress Association is an active community group in the area.

Relevant plans

- Narungga Healthy Country Plan (in progress)
- Yorke Peninsula Council Strategic Management Plan, 2016-2020
- Yorke Peninsula Council Coastal Management Strategy; Federation Park to Hickeys Point (in progress)
- Northern and Yorke Regional Strategic Plan. Northern and Yorke Natural Resources Management Board, 2009 – 2018
- Coastal Motor Vehicle Access Management Strategy (2008) Northern and Yorke Natural Resources Management Region. D. Allen.
- Yorke NRM District Weed Action Plan (2018) Northern and Yorke Natural Resource Management Board.

Recommended Actions

The main actions recommended for this Management Unit are mitigating the effects of climate change, weed control and ORV track formalisation.

Climate change

Sea level rise may accelerate dune erosion and the dune vegetation is partly restricted from inland migration by agriculture and roads.

Almost the entire coastline of this cell is a Potential Drift Hazard Zone, which means most of the area will be impacted by increased coastal erosion, with rising sea levels.

Access and Recreation Impacts

Formalisation of access has been undertaken along most of the coastline here. ORV activity is concentrated in the north around Macs Beach where additional formalisation and barriers are recommended. Beach access for vehicles is provided at Tiddy Widdy but there is still some damage occurring and there are potential conflicts with beach nesting birds.

Weeds

A number of aggressive weed species have been recorded in this cell, including an infestation of Western Coastal Wattle (*Acacia cyclops*) in the dune reserve and African boxthorn (*Lycium ferocissimum*) a WoNS, which is found throughout the area. Other weeds recorded include succulent weeds such as *Agave* spp. and *Gazania*.

Photo: *Gazania*, *Agave spp* and *Acacia cyclops* in the dunes at Tiddy Widdy Beach



Table 11. Recommended Management Actions; Tiddy Widdy to Inkster Well Management Unit

Issue/Threat	Location	Recommended Action	Priority of Action	Potential Contributors
<i>Climate change impact</i>				
Beach and dune erosion <i>Storm surge and sea-level rise impact</i>	Whole Management Unit	Monitor beach and dune recession. Strengthen dune integrity with access management, dune stabilisation and revegetation. Avoid removal of dunes for development or infrastructure (maintain natural sand replenishment processes). Involve landholders in planning for future dune breaches and retreat zones.	Medium	DEW / NRNY, CPB, Council, community groups, private landholders and leases, Traditional Owners, NGOs
Inundation and shoreline recession <i>Storm surge and sea-level rise impact</i>	Tiddy Widdy Beach	Undertake flood and inundation mapping with regard to natural assets of the coast. Strengthen natural sand barriers with appropriate coastal shrub revegetation of the foredune.	Medium	DEW / NRNY, CPB, Council, community groups, Traditional Owners, NGOs

<i>Access and recreation</i>				
ORV activity in dunes	Northern parts near Macs Beach	Rationalise tracks through native vegetation and formalise the preferred access to protect native vegetation. Install barriers and information signs as appropriate.	High	DEW / NRNY, CPB, Council, SAPOL, DPTI, community groups, private landholders, Traditional Owners NGOs
Driving on Beach	Formal access points along Tiddy Widdy beach	Provide information on appropriate behaviour expectations with respect to beach driving speeds and shorebirds.	Medium	DEW / NRNY, CPB, Council, SAPOL, DPTI, community groups, Traditional Owners NGOs
<i>Weeds</i>				
Garden escapee and succulents (including Agave, Aloe etc.)	Whole Management Unit	Control required in vegetation on crownlands. Engage local residents and encourage them to control succulents and plant natives.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional Owners, NGOs
Woody (African Boxthorn, Western Coast Wattle, Pepper Tree)	Whole Management Unit	Control Boxthorn as per Declared Weeds and WoNS responsibilities. Pepper Tree control is a low priority but control may be undertaken.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional Owners, NGOs
<i>Feral animals</i>				
Fox and cat predation on native animals and shorebirds	Whole Management Unit	Undertake control as recommended by NRNY and coordinate with neighbours.	High	Landholders, DEW / NRNY, Council, Traditional Owners, NGOs

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Cell 18: Ardrossan

Area: 218 hectares

Location: Located on the north-eastern coast of the Yorke Peninsula and encompasses the coastal area adjacent to the town of Ardrossan.



Land Tenure/Ownership

Private: predominantly private ownership, including town and farm blocks.

Public: Crown land directly managed by DEW along and near the foreshore. State and Council Crown land under care of Council.

Council: Yorke Peninsula Council reserves.

Traditional Owners: Narungga Native Title Determination area.

Other: significant industry ownership (Viterra, Cheetham Salt).

Landforms

The coastal landscape transitions around the Ardrossan cell from the tidally dominated mangrove environment of northern Gulf St Vincent to a low cliff dominated coastline associated with the Ardrossan Fault, which broadly defines the eastern coast of Yorke Peninsula.

Although Ardrossan is a sheltered low wave energy part of the coastline, the coastal cliffs are composed of the highly erodible Hindmarsh Clay, which are vulnerable to erosion and recession.

Marine Habitat

Bare sand and extensive tracts of medium to dense seagrass dominates the marine environment in the Ardrossan area.

Native Vegetation

Approximately 3% of this this small and largely urban cell is formally mapped as native vegetation (6.2 ha). However, when the under-recognised grasslands are included it is more like 6% or 16.5 hectares of native vegetation (A. Shackley pers. com.). These unique and significant remnants of the original low grassland, shrubland and sedgeland vegetation occur in an open space park (Crown land) north of the jetty. The fenced part of this remnant has regenerated to a low shrubland including *Acacia hakeoides*, *Dodonaea baueri*, *Eremophila desertii* and *Acrotriche patula*, with a highly diverse understorey of grasses, sedges and herbs.

Outside of the fenced in the mowed section of the park there is a remarkable diversity of shrubs, sedges, grasses and herbs persisting in a grassland setting. On the southern side of the park is a creek line containing remnant Mallee Box (*Eucalyptus porosa*) trees over native shrubs, sedges and grasses amongst a variety of weeds.

The herbaceous grassland extends to the north along the Esplanade, adjacent to the coastal reserve, but its condition quickly degrades northwards.

Conservation Significance

The coastal shrubland and grassland remnants within the confines of the town contain a very high diversity of plant species with 3 State-Rare plants found here (Table 12). At least 67 native plant species have been identified in the vicinity of the park, including the State-Endangered Lanky Buttons (*Leptorhynchos elongatus*) which is no longer found at many previously recorded sites along the coast (A. Shackley pers. com.).

Management

Public land is largely managed by Yorke Peninsula Council. Viterra manages the industry land and port facilities in the south. Active community groups in the area include the Ardrossan Progress Association and the Australian Plant Society (NYP).

Relevant plans

- Narungga Healthy Country Plan (in progress)
- Yorke Peninsula Council Coastal Management Strategy; Federation Park to Hickeys Point (in progress)
- Northern and Yorke Regional NRM Plan; Strategic Plan 2019-2029

- Coastal Motor Vehicle Access Management Strategy (2008) Northern and Yorke Natural Resources Management Region. D. Allen.
- Yorke NRM District Weed Action Plan (2018) Northern and Yorke Natural Resource Management Board.

Table 12. Species of National and State Conservation Significance (BDBSA records), Ardrossan Management Unit

<i>Biota</i>	<i>Common name</i>	<i>Australia (EPBC)</i>	<i>SA (NPW Act)</i>
<i>Animal species</i>			
<i>Falco peregrinus</i>	<i>Peregrine Falcon</i>		R
<i>Sternula nereis</i>	Fairy Tern	VU	E
<i>Plant species</i>			
<i>Leptorhynchus elongatus</i>	Lanky Buttons		E
<i>Maireana rohlachii</i>	Rohrlach's Bluebush		R
<i>Podolepis decipiens</i>	Showy Copper-wire Daisy		R

Recommended Actions

The main management priorities for this area are mitigating climate change impacts and protecting native vegetation.

Climate change

The remnant native vegetation patch in this cell is vulnerable to temperature and rainfall changes, particularly outside the fenced area, which is subject to regular mowing. The Ardrossan cliffs are soft and erodible so cliff recession is also an issue.

To the north and south of Ardrossan is Potential Drift Hazard Zone, which will be prone to increased coastal erosion, with rising sea levels.

Access and Recreation Impacts

Minimal access and recreation impacts have occurred within this cell, although some beach driving occurs on the southern end of Tidby Widdy Beach. Formalising pedestrian access around remnant vegetation and erodible cliffs is recommended.

Weeds

Bridal Creeper (*Asparagus asparagoides*) a WoNS, has been recorded in this area and Gazania a Declared weed, occurs in the remnant shrublands and grasslands. Other weeds present include a number of introduced bulbs which threaten the grasses and lilies in the remnant vegetation.

Photo: Foreground shows native grasses herbs and shrubs persisting under the mowing regime. The fenced shrubland plot can be seen in the background.



Table 13. Recommended Management Actions; Ardrossan Management Unit

<i>Issue/Threat</i>	<i>Location</i>	<i>Recommended Action</i>	<i>Priority of Action</i>	<i>Potential Contributors</i>
<i>Climate change impact</i>				
Significant native vegetation vulnerable to species composition change, compromised structural integrity and reduced regeneration potential (resilience)	Cliff top low shrublands and sedgeland Grassy and herbaceous understorey	Maintain vegetation integrity by minimising disturbance from vehicles, pedestrians, feral animals and weeds. Facilitate regeneration by passive (access management) or active (revegetation) interventions as required.	Medium	DEW / NRNY, CPB, Council, community groups, Traditional Owners, NGOs Ardrossan community, Native Plant Society/ National Trust
<i>Temperature and reduced rainfall impact</i>				
Flora at risk of localised extinction	Woodlands Known threatened species locations and habitats	Identify and monitor (survey) species most at risk (e.g. endemic orchids and herbs). Consider active translocation and or	Medium	DEW / NRNY, CPB, Council, community groups, Traditional Owners, NGOs Ardrossan
<i>Temperature and reduced rainfall impact</i>				

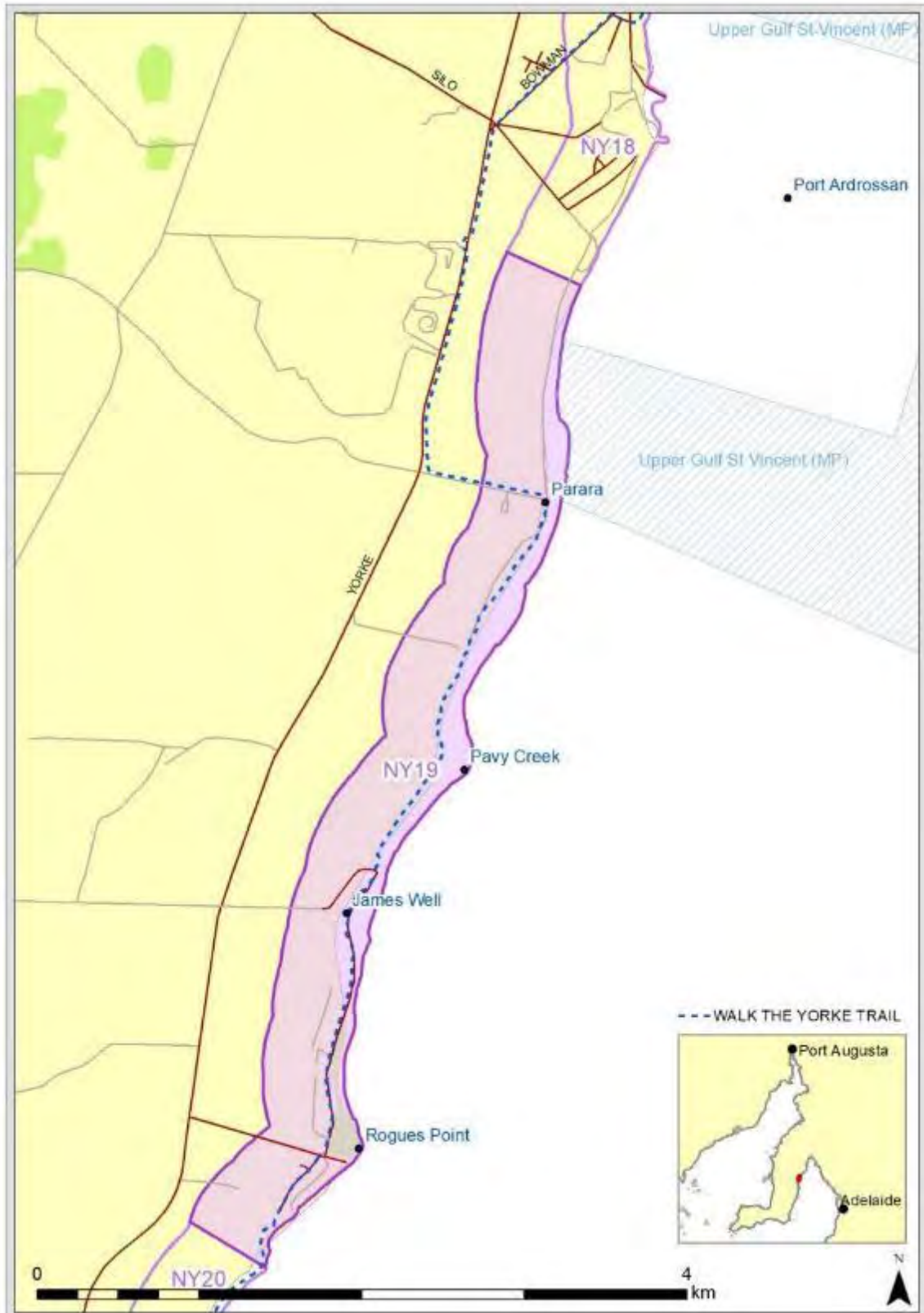
		gene/seed banking for highly threatened species in fragmented or disturbed vegetation.		community, Native Plant Society / National Trust
<i>Access and recreation</i>				
Formalise		Additional signs to alert the public to important native vegetation. Consider low fencing and/or signage to delineate the native vegetation and prevent excessive pedestrian traffic.		
<i>Weeds</i>				
Garden escapes (Gazania and bulbs)	In and out of fenced grassland area	Weed control following Bushcare principles and minimum off-target damage.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional Owners NGOs, Native Plant Society / National Trust
<i>Native vegetation</i>				
Vegetation protection - high value grassland/sedgeland management	Northern open space between Park Tce and Jetty Rd and nearby area adjacent Esplanade	Develop a specific management plan involving the local community, interest groups and Council. Time slashing to promote native perennial vegetation outside of the formal fence. Adjust the height of the mowing/slashing (>200mm if possible) to allow herbs and grasses to more readily set seed.	High	DEW / NRNY, CPB, Council, community groups, Traditional Owners, NGOs Ardrossan community, Australian Plant Society, (NYP), National Trust SA
<i>Domestic pets</i>				
Shorebird impacts from cats and off-leash dogs on beaches	Surrounding the towns, campgrounds and accessible beaches	Raise awareness of the impact of cats and off-leash dogs on shorebirds in sensitive areas. Encourage responsible pet ownership.	Medium	NRNY, CPB, Council, landholders, community groups

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Cell NY19: Parara to Rogues Point

Area: 334 ha

Location: This cell is located on the east coast of Yorke Peninsula covers the area from south Ardrossan to the southern side of Rogues Point.



Land Tenure/Ownership

Private: significant areas of private farmland on the inland side.

Public: much of the foreshore area is public Crown Land Act Reserve or owned by Council.

Council: some foreshore areas are owned by the Yorke Peninsula Council.

Traditional Owners: Narungga Native Title Determination area.

Other: Viterra owns industrial land in the north, near the port facilities.

Landforms

Predominantly low cliffs protected by wide intertidal sandflats and sandy/shelly beaches. There are larger sand dune complexes where ephemeral streams such as Pavy Creek and Rogues Gully reach the coast and cusped forelands have accumulated, extending seawards for up to 250 m. This indicates that the streams are delivering some sediment to the coast and/or they are interrupting the general northerly longshore drift and causing sand accumulation (39).

Marine Habitat

Where Pavy Creek meets the ocean, the estuarine habitat provides shelter for a variety of marine life. Continuous areas of medium to dense seagrass occupy the offshore waters.

A four-hectare artificial reef (Windara Reef) lies approximately 1km off Rogues Point, 7km south of Ardrossan. An initiative of the Nature Conservancy, the reef is 8-10 m deep and made of concrete structures and Yorke Peninsula limestone and **has been 'seeded'** with Pacific Oyster shells and juvenile native oysters. This is the first shellfish restoration reef of its kind in South Australia and has been designed to contribute to a healthier marine environment and improved opportunities for recreational fishers (24).

Native Vegetation

The 2% (or 7 ha) of native vegetation remaining in this Management Unit is primarily confined to cliff-slope shrublands. The condition of this vegetation is poor in the south but improves just north of James Well. There is also a thin strip of native vegetation along the dunes stretching 1km north from the Rogues Point boat ramp. These tall shrublands are mapped as:

Olearia axillaris+/-*Exocarpos syrticola*+/-*Beyeria lechenaultii*+/-*Atriplex cinerea*+/-*Santalum acuminatum* mid open shrubland.

Conservation Significance

This area has limited conservation value mainly due to the lack of vegetation in the area, however, Sand Goannas, Brown Falcons and a range of waders have been recorded in this cell (1). The Fairy Tern is the only threatened species in this Management Unit that is recorded in the Biological Database of SA.

Table 14. Species of National and State Conservation Significance (BDBSA records), Parara to Rogues Point Management Unit

Biota	Common name	Australia (EPBC)	SA (NPW Act)
<i>Animal species</i>			
<i>Sternula nereis</i>	Fairy Tern	VU	E
<i>Plant species</i>			
N/A			

Management

Most of the public land is managed by Yorke Peninsula Council. These public lands are backed by privately managed farms. The Council has been active in revegetation and campground formalisation around Parara. Illegal camping has been reduced since the campground has been formalised, although ORV activity is still an issue.

At Rogues Point progress groups have been controlling White Weeping Broom and other weeds in the dunes.

Relevant plans

- Narungga Healthy Country Plan (in progress)
- Yorke Peninsula Council Coastal Management Strategy; Federation Park to Hickeys Point (in progress)
- Northern and Yorke Regional NRM Plan; Strategic Plan, 2019-2029
- Coastal Motor Vehicle Access Management Strategy (2008) Northern and Yorke Natural Resources Management Region. D. Allen.
- Yorke NRM District Weed Action Plan (2018) Northern and Yorke Natural Resource Management Board.

Recommended Actions

The main threat to the conservation value of this area is cliff erosion, which is exacerbated by ORV tracks, and in the future will be accelerated by rising sea levels.

Climate change

Cliff erosion is already evident in this area and is expected to accelerate with rising seas. The beaches and dune systems have limited ability to migrate inland.

Rock walls have already been installed at Rogues Point and these could be complemented by soft protection measures such as revegetation with Nitre Bush and other coastal shrubs.

The entire coastline of this cell is a Potential Drift Hazard Zone and there is a Storm Surge Hazard Zone south of Parara Point. These areas will be vulnerable to increased erosion and inundation, with rising sea levels.

Access and Recreation Impacts

Parara campsite has recently been formalised and access to the coastal reserve is restricted from James Well northward. However significant ORV activity is occurring on the low cliffs in these areas which is impacting on the native vegetation and exacerbating cliff erosion.

Weeds

Western Coastal Wattle (*Acacia cyclops*) is common in this area and there has been regrowth from previous control efforts between Rogues Point to Macs Beach (D. Furbank pers. com.).

African Boxthorn (*Lycium ferocissimum*) a WoNS, White Weeping Broom, European Olive and Gazania also occur here.

Succulents and garden plants are a significant issue in the low dunes around James Well and Rogues Point settlements.

Many non-native trees and shrubs have been planted in the parks from James Well to Rogues Point, some of which may become weeds in certain situations (e.g. *Acacia saligna* and *Melaleuca nyssophylla*). Removal is a low priority however efforts to gradually replace with local native species should be supported.

Other (Cats)

Domestic and feral cats have been identified as an issue around Rogues Point, which is probably also the case for many of the coastal towns (46).

Photo: Recent cliff erosion at Parara (as evidenced by the exposed Umbrella Wattle roots). Also informal vehicle tracks which are impacting native vegetation on delicate soils can be seen in the background.



Table 15. Recommended Management Actions; Parara to Rogues Point Management Unit

<i>Issue/Threat</i>	<i>Location</i>	<i>Recommended Action</i>	<i>Priority of Action</i>	<i>Potential Contributors</i>
<i>Climate change impact</i>				
Cliff erosion <i>Storm surge and sea-level rise impact</i>	Whole Management Unit (particularly low cliffs between Parara and James Well)	Identify sections of cliffs most at risk, monitor recession. Maximise cliff-top integrity by maintaining vegetation buffers from the coast and providing set-backs from cropping and grazing activities. Support revegetation on cliff-tops and Pavey Gully	Medium	DEW / NRNY, CPB, Council, landholders, community groups, private landholders, Traditional Owners, NGOs

		Involve landholders in planning for future retreat zones.		
Beach and dune erosion <i>Storm surge and sea-level rise impact</i>	Whole Management Unit	Monitor beach and dune recession. Strengthen dune integrity with access management, dune stabilisation and revegetation. Avoid removal of dunes for development or infrastructure (maintain natural sand replenishment processes). Involve landholders in planning for future dune breaches and retreat zones.	Medium	DEW / NERNY, CPB, Council, community groups, Traditional Owners, NGOs
Access and recreation				
ORVs causing excess tracks and cliff erosion outside of formal camping	Parara to James Well	Complement recent campground formalisation by installing barriers on unwanted tracks - particularly where the tracks are vertical up cliff-slopes and causing erosion.	High	DEW / NERNY, CPB, Council, SAPOL, DPTI, community groups, Traditional Owners NGOs
Weeds				
Woody (Western Coast Wattle, Olive)	Parara to James Well, slopes between James Well and Rogues Point	Control is required for Declared and WoNS weeds. Public education regarding identification and control.	Medium	Landholders, DEW / NERNY, Council, community groups, Traditional Owners NGOs
Succulents - Agave and other garden escapes	James Well foredunes	Encourage and support public education regarding alternative garden plants.	Medium	Landholders, NERNY, Council, community groups, NGOs
Non-native plantings	Parara campgrounds, Rogues Point Town Park	Plant local native species where possible, gradual replacement of non-native trees and shrubs.	Medium	Landholders, NERNY, Council, community groups
Feral animals				
Feral animals - predators (Domestic and feral cats)	Surrounding the towns	Raise awareness of the impact of cats on shorebirds in sensitive inter-tidal areas. Encourage responsible ownership.	Medium	DEW / NERNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs

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Cell NY20 – NY25: Muloowurtie Point to Port Julia

Area: 1,047 hectares

Location: South of Ardrossan on the east coast of Yorke Peninsula, between Rogues Point and Port Julia, including the settlements of Pine Point and Black Point.



Land Tenure/Ownership

Private: predominantly private farmland with residential blocks in townships.

Public: a thin strip of Unallotted Crown Land along the foreshore.

Council: Yorke Peninsula Council reserve along the foreshore.

Traditional Owners: Narungga Native Title Determination area.

Other: a small section is owned by Rex Minerals north of Pine Point.

Landforms

Landforms feature continuous 20m high cliff slopes fronted by narrow beaches and wide sand flats. Two rocky outcrops occur at Pine Point and Black Point, at either end of a crenulate coastline with small sandy forelands or rocky outcrops separating the beach sections.

At Pine Point, the cliffs are up to 30 m high and are protected by coastal sediments, while an iron-rich sandstone forms a shore platform and appears to underlie the sandy spit, which projects 200 m into the gulf. Black Point juts some 3 km seaward. Longshore sediment transport and dune activity have formed the foreland over thousands of years.

Marine Habitat

Offshore a mixture of patchy, sparse to dense seagrass covers a sandy ocean bed. The coastline from Rouges Point to Pine Point is a high wave energy area, but otherwise, this part of the coastline is sheltered with low wave energy.

Native Vegetation

This Management Unit contains only 8% (or 81 ha) native vegetation cover, mainly restricted to cliff-tops and within the numerous gullies, such as those north of Pine Point. Patches of mallee over chenopod shrubs occur north of Pine Point, where around 10 hectares of native revegetation has been undertaken (Rex Minerals site). There is also a small but significant patch of vegetation at Muloowurtie Point which contains Drooping Sheoaks/coastal shrubs over a *Lomandra effusa* sedge understorey, and a diversity of native herbs.

The largest contiguous patch of shrubland >1m tall occurs along the coastline to the south of Black Point. The vegetation here consists of *Dodonaea viscosa* ssp. *spatulata* shrubland >1m with emergent *Allocasuarina verticillata* mid trees and *Alyxia buxifolia* and *Tetragonia implexicoma* low shrubs.

Conservation Significance

The low conservation value of this area is attributed to the limited native vegetation along most of the coastline (with the exception of the vegetation south of Black Point). At Pine Point and Black Point there is some good coastal wader habitat.

Southern Hairy-nosed Wombats occur in the Crown Reserves and there have been reports of sand goannas in the area.

This cell contains significant indigenous heritage (Q. Agius pers. com.).

Table 16. Species of National and State Conservation Significance (BDBSA records), Muloowurtie Point to Port Julia Management Unit

<i>Biota</i>	<i>Common name</i>	<i>Australia (EPBC)</i>	<i>SA (NPW Act)</i>
<i>Animal species</i>			
<i>Arenaria interpres</i>	Ruddy Turnstone		R
<i>Calidris ferruginea</i>	Curlew Sandpiper	CR	
<i>Charadrius mongolus</i>	Lesser Sand Plover	EN	R
<i>Dermochelys coriacea</i>	Leatherback Turtle	EN	V
<i>Egretta sacra</i>	Pacific Reef Heron (Eastern Reef Egret)		R
<i>Falco peregrinus</i>	Peregrine Falcon		R
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		R
<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R
<i>Sternula nereis</i>	Fairy Tern	VU	E
<i>Thinornis rubricollis</i>	Hooded Plover	VU	V
<i>Tringa brevipes</i>	Grey-tailed Tattler		R
<i>Turnix varius</i>	Painted Buttonquail		R
<i>Pandion haliaetus cristatus</i>	Osprey		E
<i>Lasiornis latifrons</i>	Southern Hairy Nosed Wombat		
<i>Plant species</i>			
N/A			

Management

The public land is predominantly managed by Yorke Peninsula Council and includes the Walk the Yorke trail, which is a conspicuous feature along this coast. Rex Minerals manages their land north of Pine Point and have undertaken management on the Crown reserve.

An active environmental group in the area is the Port Julia Progress Association, who are undertaking significant weed control, amongst other activities.

Relevant plans

- Narungga Healthy Country Plan (in progress)
- Yorke Peninsula Council Coastal Management Strategy; Federation Park to Hickeys Point (in progress)
- Northern and Yorke Regional NRM Plan; Strategic Plan, 2019-2029
- Port Julia has a management plan developed by the Pt Julia Progress Association
- Coastal Motor Vehicle Access Management Strategy (2008) Northern and Yorke Natural Resources Management Region. D. Allen.
- Yorke NRM District Weed Action Plan (2018) Northern and Yorke Natural Resource Management Board.

Recommended Actions

The main threats to the conservation value of this area include coastal cliff erosion, weeds and the further loss of native vegetation through the impact of adjacent agriculture on the already narrow vegetation strip.

Climate change

The small remnants of vegetation in this Management Unit are vulnerable to the warmer and drier conditions of a changing climate, which may degrade remnants and cause a reduction in their resilience and species diversity.

There is a Storm Surge Hazard Zone around Pine Point and a Potential Drift Hazard Zone on the south side of Black Point. These areas will be particularly vulnerable to erosion with rising sea levels. Cliff erosion is likely to accelerate and inundation and beach recession will increase around Black Point.

Photo: Erodeable cliffs and beach at Muloowurtie Point



Access and Recreation Impacts

Most of the access issues have been dealt with through formalisation of beach access and the Walk the Yorke trail.

Weeds

African Boxthorn (*Lycium ferocissimum*) and Bridal Creeper (*Asparagus asparagoides*) both WoNS, have been recorded along with *Acacia cyclops*, *Acacia saligna* and some succulents, bulbs and garden escapees. Some weed control has been carried out at Sheoak flat.

Perennial Veldt Grass (*Ehrharta calycina*) is present in the dunes south of Black Point.

Native Vegetation Management

The narrow strip of remnant vegetation in this area is highly vulnerable to degradation from climate related impacts and unintentional clearance through cropping practices. Many remnants are unfenced and largely unmanaged.

Other

Rubbish dumping in the short but deeply incised gullies of the area was common practice prior to public rubbish collection services. Community and NRM projects to clean up gullies and remediate with protection measures, pest control and revegetation, would be beneficial.

Rabbits are a problem in native vegetation particularly around Pine Point and a program to control them would help with soil stability and the general resilience of the vegetation.

Table 17. Recommended Management Actions; Muloowurtie Point to Port Julia Management Unit

<i>Issue/Threat</i>	<i>Location</i>	<i>Recommended Action</i>	<i>Priority of Action</i>	<i>Potential Contributors</i>
<i>Climate change impact</i>				
Cliff erosion <i>Storm surge and sea-level rise impact</i>	Whole Management Unit	Identify sections of cliffs most at risk, monitor recession. Maximise cliff-top integrity by maintaining vegetation buffers from the coast and providing set-backs from cropping and grazing activities. Involve landholders in planning for future retreat zones.	Medium	DEW / NARNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
Beach and dune erosion <i>Storm surge and sea-level rise impact</i>	Whole Management Unit	Monitor beach and dune recession. Strengthen dune integrity with access management, dune stabilisation and revegetation. Avoid removal of dunes for development or infrastructure (maintain natural sand replenishment processes). Involve landholders in planning for future dune breaches and retreat zones.	Medium	DEW / NARNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
<i>Access and recreation</i>				
Pedestrian access - informal path	Muloowurtie Point	Minor formalisation of tracks - ensure walkers are directed to stay on tracks.	Medium	YP Council, landholders, community groups, Traditional Owners, NGOs
<i>Weeds</i>				
Woody (Western Coast Wattle, Golden Wreath Wattle, Pepper	Cliff-top native vegetation at Muloowurtie	Control Boxthorn as per Declared Weeds and WoNS responsibilities. Pepper Tree, <i>Acacia saligna</i> and	Medium	Landholders, DEW / NARNY, Council,

Tree, Dune Tea-tree: <i>Leptospermum laevigatum</i>)	Point (Acacia cyclops). Foredunes in front of residences at Pine Point	<i>Leptospermum</i> control is a lower priority but is recommended.		community groups, Traditional, Owners NGOs
Succulents	Foredunes in front of residences at Pine Point	Undertake control of escaping succulents. Consult residents and facilitate public education.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional, Owners NGOs
Bulbs and tubers (including Bridal Creeper)	Muloowurtie Point, Pine Point	Control as per Declared Weeds and WoNS responsibilities. Public education.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional, Owners NGOs
Native vegetation				
Remnant native protection and management	Larger remnants south of Black Point	Work with adjacent crop farmers to provide appropriate buffers and raise awareness of value of remnant scrub.	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
Cropping on coastal reserve / lack of native vegetation	Cliffs north of Port Julia	Work with landholders to pull cropping back to parcel boundaries. Revegetation of coastal cliff-top to slow erosion.	Medium	Landholders, DEW / NRNY, agricultural groups, PIRSA, NGOs
Rubbish				
Rubbish dumping in gullies	Gullies	Remove rubbish as part of gully restoration activities.	Medium	DEW / NRNY, CPB, Council, landholders, community groups
Domestic pets				
Shorebird impacts from cats and off-leash dogs on beaches	Surrounding the towns	Raise awareness of the impact of cats and off-leash dogs on shorebirds in sensitive areas. Encourage responsible pet ownership.	Medium	NRNY, CPB, Council, landholders, community groups
Feral animals				
Fox and cat predation on native animals and shorebirds	Whole Management Unit	Undertake control as recommended by NRNY and coordinate with neighbours.	High	Landholders, NRNY, Traditional owners
Rabbits	Whole cell but particularly around Pine Point	Control rabbits by approved methods including baiting and calicivirus releases.	Medium	DEW / NRNY, Council, landholders, Traditional Owners

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Cell NY26 – NY32: Port Julia to Port Vincent

Area: 592 hectares

Location: Located on the east coast of Yorke Peninsula between Port Julia and Port Vincent and including Sheoak Flat.



Land Tenure/Ownership

Private: most of the area is private land and includes farm blocks and many shacks.

Public: a thin Crown Land strip along the shore and Unallotted Crown Land and Crown Land Act Reserve.

Traditional Owners: Narungga Native Title Determination area.

Landforms

The steep 20 m high red cliffs at Port Julia are composed of Eocene sandy limestone overlain by clay. Limestone cliffs extend for almost 50 km from south of Port Julia with occasional breaks such as at Sheoak Flat, where a relict cliff line has been stranded up to 500m inland.

To the south, numerous sandy beaches are separated by small rocky headlands or rock outcrops. Just south of Sheoak Flat, sandy beaches up to 100m wide occur at the base of 20m high bluffs.

Marine Habitat

The marine environment in this low energy part of the coastline features medium to dense seagrass interspersed with large tracts of bare sand. Large areas of dense seagrass inhabit the deeper waters.

North of Vincent Landing is a 1-2km narrow strip of continuous, medium density macroalgae.

Native Vegetation

The 7% (or 43 ha) of remaining native vegetation in this Management Unit occurs mostly as a thin, linear and disconnected strip along the cliff tops. There are several medium-sized and connected patches of native vegetation north of Sheoak Flat consisting of emergent *Melaleuca lanceolata* low trees over *Templetonia retusa* and *Acacia nematophylla* mid open shrubland.

Other mapped vegetation types include:

Eucalyptus gracilis+/-*Eucalyptus leptophylla*+/-*Eucalyptus phenax* ssp.+/-*Eucalyptus oleosa* ssp.+/-*Eucalyptus brachycalyx*+/-*Eucalyptus porosa*+/-*Eucalyptus dumosa*+/-*Eucalyptus socialis* ssp. mid mallee woodland

Melaleuca pauperiflora ssp. *mutica*, *Eucalyptus oleosa* ssp., *Eucalyptus leptophylla*+/-*Eucalyptus socialis* ssp. low woodland.

Conservation Significance

The lack of vegetation cover in these cells and its isolation, size and shape, limits the habitat quality and overall conservation value of this area.

Two threatened plant species; Coast Spider Orchid (*Caladenia conferta*) and Lanky Buttons (*Leptorhynchus elongatus*) were recorded in the 1960s near Port Julia and Port Vincent respectively, but are unlikely to persist in the degraded coastal patches. Both can be found in nearby inland remnants in good condition.

Table 18. Species of National and State Conservation Significance (BDBSA records), Port Julia to Port Vincent Management Unit

<i>Biota</i>	<i>Common name</i>	<i>Australia (EPBC)</i>	<i>SA (NPW Act)</i>
<i>Animal species</i>			
<i>Actitis hypoleucos</i>	Common Sandpiper		R
<i>Falco peregrinus</i>	Peregrine Falcon		R
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		R
<i>Myiagra inquieta</i>	Restless Flycatcher		R
<i>Plant species</i>			
n/a			

Management

Most of this coast is managed by private landholders. Active community groups in the area include the Port Julia and Port Vincent Progress Associations.

Relevant plans

- Narungga Healthy Country Plan (in progress)
- Yorke Peninsula Council Coastal Management Strategy; Federation Park to Hickeys Point (in progress)
- Northern and Yorke Regional NRM Plan; Strategic Plan, 2019-2029
- Coastal Motor Vehicle Access Management Strategy (2008) Northern and Yorke Natural Resources Management Region. D. Allen.
- Yorke NRM District Weed Action Plan (2018) Northern and Yorke Natural Resource Management Board.

Recommended Actions

The main threats to the natural values of this area include weeds, rabbits and ORV damage to the limited remaining patches of native vegetation.

Climate change

Low cliffs throughout this area are likely to be vulnerable to erosion and recession as storm surges increase and sea levels rise. The thin strip of remaining native vegetation is vulnerable to receding cliff lines and higher temperature/lower rainfall conditions.

There is a Storm Surge Hazard Zone south of Port Julia which will be prone to increased erosion and inundation, with rising sea levels.

Access and Recreation Impacts

Access issues are relatively minor along this coast, as much of the land is under private ownership.

Weeds

WoNS found in this area include Bridal Creeper (*Asparagus asparagoides*) and African Boxthorn (*Lycium ferocissimum*). Other weeds include Western Coast Wattle (*Acacia cyclops*), Golden Wreath Wattle (*Acacia saligna*), Aleppo Pine (*Pinus halepensis*) and a variety of succulents and garden escapees.

Other (rabbits and revegetation)

Rabbits are often observed on roadsides and in native vegetation around the Port Vincent Golf Course. Revegetation to reconnect the remaining patches of vegetation into one contiguous area would have significant habitat benefits along this coast.

Photo: Numerous private land blocks south of Sheoak Flat



Table 19. Recommended Management Actions: Port Julia to Port Vincent Management Unit

Issue/Threat	Location	Recommended Action	Priority of Action	Potential Contributors
<i>Climate change impact</i>				
Cliff erosion Storm surge and sea-level rise impact	Whole Management Unit	Identify sections of cliffs most at risk, monitor recession. Maximise cliff-top integrity by maintaining vegetation buffers from the coast and providing set-backs from cropping and grazing activities. Involve landholders in planning for future retreat zones.	High	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
<i>Access and recreation</i>				
Minor impacts				
<i>Weeds</i>				
Woody (African Boxthorn, Western	Foredunes in front of residences and	Control required - as per fact sheet. Work with	Medium	Landholders,

Coast Wattle, Golden Wreath Wattle, Aleppo Pine)	private blocks on low cliffs (African Boxthorn and Acacia cyclops). Cliff-top vegetation above Pt Julia Jetty (Aleppo Pine). Roadside north of Port Vincent Golf Course (<i>Acacia saligna</i>)	private landowners to undertake weed control and Bushcare activities in line with legislative responsibilities. Promote information and awareness of weed issues.		DEW / NRNY, Council, community groups, Traditional, Owners NGOs
Succulents and garden plants	Foredunes in front of residences and private blocks on low cliffs	Control required - as per fact sheet. Work with private land owners to undertake weed control and bushcare activities in line with legislative responsibilities. Promote information and awareness of weed issues.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional, Owners NGOs
<i>Other</i>				
Rabbits	Adjacent to golf course and toward Port Vincent	Engage golf course management to discuss control options.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional, Owners NGOs, golf course
Revegetation	Whole Management Unit	Revegetate to buffer and connect existing vegetation.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional, Owners NGOs
<i>Domestic pets</i>				
Shorebird impacts from cats and off-leash dogs on beaches	Surrounding the towns	Raise awareness of the impact of cats and off-leash dogs on shorebirds in sensitive areas. Encourage responsible pet ownership.	Medium	NRNY, CPB, Council, landholders, community groups
<i>Feral animals</i>				
Fox and cat predation on native animals and shorebirds	Whole Management Unit	Undertake control as recommended by NRNY and coordinate with neighbours.	High	Landholders, NRNY, Traditional owners

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Cell NY33: Port Vincent

Area: 191 hectares

Location: The township of Port Vincent on the central east coast of Yorke Peninsula.



Land Tenure/Ownership

Private: mostly private farmland to the west and residential blocks in town.

Public: a narrow strip of Crown land along the foreshore.

Council: Crown land lease along foreshore and some ownership of blocks inland.

Traditional Owners: Narungga Native Title Determination area.

Other: The Minister of Transport owns inundated land in the marina.

Landforms

The coastline at Port Vincent protrudes seawards 1 km offshore and the town largely sits on Surveyor Point, a sandy cusped foreland. Middle Spit extends offshore for a further 4 km in a north-easterly direction, resulting from the northward longshore drift.

The northern section of this cell has jetties, boat ramps and a seawall, with seagrass meadows right up to the beach. The southern side has extensive, but less vegetated sand flats fronting the beach.

Marine Habitat

The immediate shallows around Port Vincent township are bare sand areas, interspersed with patches of dense macroalgae and a dense low-profile reef on the southern side of the headland. Dense seagrass covers the seafloor in the rest of this area. This is a sheltered, low-energy coastline.

Native Vegetation

This Management Unit has only 6% of native vegetation cover (or 12 ha). There is limited native vegetation around Port Vincent. What remains is a narrow, linear patch of mallee on the western side, of predominantly *Eucalyptus gracilis* mid mallee woodland over *Melaleuca lanceolata* tall shrubs and some degraded coastal shrublands on the slopes above the marina.

Conservation Significance

This coastal land has relatively low conservation value although the nationally Vulnerable Silver Daisy-bush (*Olearia pannosa* ssp. *pannosa*) occurs in the gullies above the marina. Another threatened plant, the Coast Spider-orchid (*Caladenia conferta*), was recorded here in the 50s and 60s but is no longer likely to occur in this Unit. There are significant marine biodiversity values along this coast.

Management

Public land in this area is managed by the Yorke Peninsula Council. The marina is managed by the Department of Transport. The Port Vincent Progress Association is an active local community group in the area.

Relevant plans

- Narungga Healthy Country Plan (in progress)
- Yorke Peninsula Council Coastal Management Strategy; Federation Park to Hickeys Point (in progress)
- Northern and Yorke Regional NRM Plan; Strategic Plan, 2019-2029
- Coastal Motor Vehicle Access Management Strategy (2008) Northern and Yorke Natural Resources Management Region. D. Allen.
- Yorke NRM District Weed Action Plan (2018) Northern and Yorke Natural Resource Management Board.

Recommended Actions

The low conservation value of this cell is mainly attributable to the lack of native vegetation cover and threats such as urban development, pollution and weeds. Substantial improvement to habitat and land stability would be gained through revegetation, on vulnerable erodible soils.

Climate change

Climate change will have limited impact on the natural features of this area, however there is a Potential Drift Hazard Zone on the southern side of Port Vincent which will be prone to increased coastal erosion with rising sea levels.

Table 20. Species of National and State Conservation Significance (BDBSA records), Port Vincent Management Unit

<i>Biota</i>	<i>Common name</i>	<i>Australia (EPBC)</i>	<i>SA (NPW Act)</i>
<i>Animal species</i>			
<i>Arctocephalus tropicalis</i>	Subantarctic Fur Seal (1997 rare sighting of a single animal close to shore)	EN	E
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		R
<i>Sternula nereis</i>	Fairy Tern	VU	E
<i>Plant species</i>			
n/a			

Access and Recreation Impacts

There are limited impacts from access and recreation due to its predominantly urban setting. Tidy towns have developed some good walking tracks.

Weeds

White Weeping Broom (*Retama raetam*) has been recorded in the south of this cell.

Table 21. Recommended Management Actions: Port Vincent Management Unit

<i>Issue/Threat</i>	<i>Location</i>	<i>Recommended Action</i>	<i>Priority of Action</i>	<i>Potential Contributors</i>
<i>Climate change impact</i>				
Possible coastal erosion	South of Port Vincent	Monitor beach and dune recession, strengthen by improving vegetation cover	Medium	Council, community groups, Traditional, Owners, NGOs
<i>Access and recreation</i>				
n/a				
<i>Weeds</i>				
Woody (White Weeping Broom)	Foredunes on southern side of town	Control required - as per fact sheet. Undertake public education.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional, Owners, NGOs

Broadleaves and Bulbs (Soursob)	Foredunes on southern side of town	Control recommended due to excessive biomass smothering native vegetation.	Medium	Landholders, DEW / NRY, Council, community groups, Traditional Owners, NGOs
<i>Domestic pets</i>				
Shorebird impacts from cats and off-leash dogs on beaches	Surrounding the towns	Raise awareness of the impact of cats and off-leash dogs on shorebirds in sensitive areas. Encourage responsible pet ownership.	Medium	NRY, CPB, Council, landholders, community groups

Photo: Port Vincent Marina showing degraded shrublands on the slopes



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Cell NY34: Beach Point

Area: 567 hectares

Location: This cell is located on the east coast of Yorke Peninsula and includes the area from south of Port Vincent to Stansbury.



Land Tenure/Ownership

Private: most of this Management Unit is private land.

Public: Crown Land Act Reserve

Council: Yorke Peninsula Council

Traditional Owners: Narungga Native Title Determination area.

Landforms

Landform features 10-20m high eroding cliffs with some rock debris at the base and at the southern end of this cell, several small pocket sandy beaches are backed and bordered by cliffs and connected by an intertidal sand flat.

Marine Habitat

Continuous to patchy, dense seagrass grows in the shallow waters along most of this coastline, with patches of dense low-profile reef. Large tracts of bare sand interspersed with macroalgae and medium density seagrass, occurs in the deeper waters. The shoreline here is sheltered, with low wave energy.

Native Vegetation

Only 3% (or 15 ha) of native vegetation remains in this Management Unit, which is largely restricted to gullies, roadsides and a thin strip along the cliff tops and slopes. Small but highly diverse patches occur at Devils Gully (where a local community group has undertaken weed control and revegetation), along some roadsides and farmland at Freshwater Well and in the gullies on private land to the south.

The larger patches on farmland are predominantly sand mallee of *Eucalyptus incrassata* mid open mallee woodland over *Melaleuca uncinata* tall shrubs. The gullies near the coast support Drooping Sheoak over Sword sedges and Black Grass with many herbaceous species. The largest of the gullies in the south contains some very old Dryland Tea-trees (*Melaleuca lanceolata*) with a grassy ground layer.

Conservation Significance

The small but diverse vegetation remnants in this area are have conservation value as indicators of the pre-European vegetation. The Nationally Vulnerable Silver Daisy (*Olearia pannosa* spp. *Pannosa*) grows unusually close the coast just south of this cell and future surveys may find it within this cell.

Bird surveys undertaken by Kent Treloar at Freshwater Well and the southern end of the cells indicate that there is a reasonable diversity of birds, despite the limited habitat.

Table 22. Species of National and State Conservation Significance (BDBSA records), Beach Point Management Unit

Biota	Common name	Australia (EPBC)	SA (NPW Act)
<i>Animal species</i>			
<i>Thinornis rubricollis</i>	Hooded Plover	VU	V
<i>Freshwater Well Bird Surveys 2016 – 2017 (Kent Treloar)</i>			
<i>Pandion haliaetus cristatus</i>	Eastern Osprey		E
<i>Falco peregrinus</i>	Peregrine Falcon		R

Plant species

N/A

Management

Public land in this area is managed by Crown Lands and Yorke Peninsula Council. Several community groups have been active in this area over the last 20 years, undertaking revegetation, weed control and vegetation protection.

Relevant plans

- Narungga Healthy Country Plan (in progress)
- Yorke Peninsula Council Coastal Management Strategy; Federation Park to Hickeys Point (in progress)
- Northern and Yorke Regional NRM Plan; Strategic Plan, 2019-2029
- Coastal Motor Vehicle Access Management Strategy (2008) Northern and Yorke Natural Resources Management Region. D. Allen.
- Yorke NRM District Weed Action Plan (2018) Northern and Yorke Natural Resource Management Board.

Recommended Actions

The main management priority for this cell is to protect the existing native vegetation from weeds, agriculture and erosion. There are also some minor vehicle access issues.

Climate change

Cliff erosion and sand loss are current and ongoing in this area. The cliffs are likely to be further impacted by storm surge events and sea-level rise. The narrow vegetation remnants will be vulnerable to further degradation, under increasing temperatures and lower rainfall.

*Photo: Beach Hut showing typical issues along this coast: soft erodible cliffs, cropping up to a narrow strip of native vegetation (see the *Lomandra effusa*/*Gahnia lanigera* sedgeland/grasslands on the top of the point toward the back of the photo) and African Boxthorn.*



Access and Recreation Impacts

Most of this coastline is backed by privately owned farms, so access is difficult and there is limited damage from vehicles. The Walk the Yorke trail does allow for increased access but is well formalised. Tracks and turn arounds at Freshwater Well and Beach Hut could be formalised.

Weeds

WoNS include African Boxthorn (*Lycium ferocissimum*) and Bridal Creeper (*Asparagus asparagoides*). Perennial Veldt Grass (*Ehrharta calycinal*) is invading the *Lomandra effusa* sedgelands at Freshwater Well. Other weeds that are highly likely to be present in this Management Unit include: Aleppo Pine (*Pinus halepensis*), Gazania, Century Plant, Golden Pallensis, Golden Wreath Wattle, Sea Lavender, False Caper and Western Coastal Wattle.

Native Vegetation

Revegetation has been undertaken at a number of locations along this coast including some significant areas around Devils Gully and smaller areas at Freshwater Well and private lands. These plantings require maintenance during the establishment phase.

Table 23. Recommended Management Actions: Beach Point Management Unit

<i>Issue/Threat</i>	<i>Location</i>	<i>Recommended Action</i>	<i>Priority of Action</i>	<i>Potential Contributors</i>
<i>Climate change impact</i>				
Cliff erosion Storm surge and sea-level rise impact	Whole Management Unit	Identify sections of cliffs most at risk, monitor recession. Maximise cliff-top integrity by maintaining vegetation buffers from the coast and providing set-backs from cropping and grazing activities. Involve landholders in planning for future retreat zones.	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
Significant native vegetation vulnerable to species composition change, compromised structural integrity and reduced regeneration potential (resilience) <i>Temperature and reduced rainfall impact</i>	Cliff top low shrublands and sedgelands Woodlands with grassy or herbaceous understorey	Maintain vegetation integrity by minimising disturbance from vehicles, pedestrians, feral animals and weeds. Facilitate regeneration by passive (access management) or active (revegetation) interventions as required.	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
<i>Access and recreation</i>				
Vehicle access management - Informal parking and beach access	Freshwater Well	Minor formalisation of carpark. Signage regarding appropriate behaviour.	Medium	DEW / NRNY, CPB, Council, SAPOL, DPTI, community groups, Traditional Owners, NGOs

<i>Weeds</i>				
Woody (Aleppo Pine, Western Coast Wattle, African Boxthorn)	Freshwater Well, cliff front at Beach Hut (African Boxthorn), Freshwater Well (Aleppo Pine, Acacia cyclops)	Undertake control in native vegetation first, according to Bushcare principles. Wider control as per Declared species responsibilities.	Medium	Landholders, DEW / NRNy, Council, community groups, Traditional, Owners NGOs
Grasses (Perennial Veldt Grass)	Freshwater Well	Bushcare weed control in native vegetation.	Medium	Landholders, DEW / NRNy, Council, community groups, Traditional, Owners NGOs
<i>Native vegetation</i>				
Revegetation maintenance	Devils Gully, Freshwater Well, Private lands	Maintain native plantings with appropriate mowing and weed control. Support active landholders to manage and continue with revegetation.	Medium	Landholders, DEW / NRNy, Council, community groups, Traditional, Owners NGOs
Vegetation protection - private ownership of coastal reserve	All along cliffs	Engage with landholders regarding native vegetation protection and management and revegetation.	Medium	Landholders, DEW / NRNy, community groups, Traditional, Owners NGOs
Agricultural impacts - cropping adjacent to coast	All along cliffs	Work with landholders to pull cropping back to parcel boundaries, including fencing where possible. Revegetation of coastal cliff-top to slow erosion.	Medium	Landholders, DEW / NRNy, agricultural groups, PIRSA, NGOs
<i>Feral animals</i>				
Fox and cat predation on native animals and shorebirds	Whole Management Unit	Undertake control as recommended by NRNy and coordinate with neighbours.	High	Landholders, NRNy, Traditional owners

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Cell NY35: Stansbury

Area: 375 hectares

Location: Located around the township of Stansbury on the east coast of Yorke Peninsula



Land Tenure/Ownership

Private: numerous private blocks occur south of town and private land further inland.
Public: a thin strip of unallotted Crown Land fronts the coast to the north and south of Stansbury.
Council: Yorke Peninsula Council owns the town parks and coastal frontage at Oyster Point.
Traditional Owners: Narungga Native Title Determination area.

Landforms

This section of the coastline features narrow beaches which lie at the base of high cliffs up to 20m. On the northern side of Stansbury, four low groynes cross the middle section of the beach. The southern side the beach is fronted by wide, extensive sand flats. A long sand spit (South Spit) extends from Oyster Point for some 5 km to the northeast.

Marine Habitat

The shallow waters surrounding Stansbury supports patchy, sparse seagrass which is interspersed with areas of bare sand. Further out to sea are large tracts of dense seagrass. The sheltered waters within Oyster Bay, just north of Stansbury, support a fish breeding area.

Oyster farms are leased in the gulf waters surrounding Stansbury. Presently 80 hectares are farmed producing about 5 million oysters in the area. The inshore leases have now largely been abandoned as non-productive with all leases now located on the sand spit which dominates Oyster Bay (13).

Native Vegetation

Native vegetation is poorly mapped along this part of the coastline however, satellite imagery shows that approximately 4% (or 14 ha), is all that remains in this Management Unit. Remnant vegetation is largely restricted to a narrow strip along the cliff line (mainly Drooping Sheoak woodland over Black Grass sedges and coastal heath), and on the dune system just south of Stansbury.

Conservation Significance

The Nationally Vulnerable Silver Daisy (*Olearia pannosa ssp. pannosa*) occurs in this area and there are areas of valuable habitat for wading birds and the State Endangered Osprey.

This Management Unit will be within the Great Southern Ark rewilding project. The project aims to reintroduce native animals into the area and protect them from feral animals by building a fence across the peninsula to create a 140,000 hectare "safe haven". The fence is specially designed to keep feral animals out and direct them into areas where they can be managed.

Table 24. Species of National and State Conservation Significance (BDBSA records), Stansbury Management Unit

Biota	Common name	Australia (EPBC)	SA (NPW Act)
<i>Animal species</i>			
<i>Calidris ferruginea</i>	Curllew Sandpiper	CR	
<i>Larus dominicanus dominicanus</i>	Kelp Gull		R
<i>Oxyura australis</i>	Blue-billed Duck		R
<i>Pandion haliaetus cristatus</i>	Eastern Osprey		E
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		R

<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R
<i>Plant species</i>			
<i>Olearia pannosa ssp. pannosa</i>	Silver Daisy	VU	V

Management

Yorke Peninsula Council is active around the township of Stansbury and south of the town along the Walk the Yorke trail. The Stansbury Progress Association is active in the area.

Relevant plans

- Narungga Healthy Country Plan (in progress)
- Yorke Peninsula Council Coastal Management Strategy; Federation Park to Hickeys Point (in progress)
- Northern and Yorke Regional NRM Plan; Strategic Plan, 2019-2029
- Coastal Motor Vehicle Access Management Strategy (2008) Northern and Yorke Natural Resources Management Region. D. Allen.
- Yorke NRM District Weed Action Plan (2018) Northern and Yorke Natural Resource Management Board.

Recommended Actions

Management priorities for this area include mitigating the effects of climate change, weed management and enhancing and protecting native vegetation, specifically threatened flora.

Photo: Remnant Drooping Sheoak over Black Grass sedgeland north of Stansbury with revegetation



Climate change

The cliffs to the north and south of Stansbury are vulnerable to erosion and recession. As the remnant vegetation they contain is likely to be negatively impacted under warmer

temperatures and decreased rainfall, this erosion is likely to be exasperated. The Silver Daisy population is also vulnerable in this area. Foreduces in the town are vulnerable to erosion and recession and there is no possibility for vegetation retreat with sea level rise.

There is a Potential Drift Hazard Zone on the southern side of Stansbury, which will be prone to increased erosion with rising sea levels.

The sea wall in the township will be upgraded and there may be opportunities to incorporate soft protections to complement the new infrastructure.

Access and Recreation Impacts

Recreation impacts are minimal in the area due to the largely urban setting. Outside of the township the coast is mostly under private ownership and beach access is limited. Pedestrian access has been formalised along the Walk the Yorke Trail.

Weeds

Two WoNS occur here; African Boxthorn (*Lycium ferocissimum*) and Bridal Creeper (*Asparagus asparagoides*). Other weeds include Western Coast Wattle (*Acacia cyclops*), Aleppo Pine (*Pinus halepensis*), European Olive (*Olea europea* ssp.), **Ward's Weed** (*Carrichtera annua*) and Perennial Veldt Grass (*Ehrharta calycina*). Other weeds that are also highly likely to be present in this Management Unit include Gazania, Century Plant, Golden Pallensis, Golden Wreath Wattle, Sea Lavender and False Caper. There is an olive plantation in Stansbury that was planted in the 1980's which may be a source for local infestation.

Other

Rabbits have been identified as an issue around Stansbury. There has also been some community concern about abundant cormorants in relation to town infrastructure and fishing, however there are no obvious impacts on conservation values of the area, from this species.

Table 25. Recommended Management Actions; Stansbury Management Unit

<i>Issue/Threat</i>	<i>Location</i>	<i>Recommended Action</i>	<i>Priority of Action</i>	<i>Potential Contributors</i>
<i>Climate change impact</i>				
Climate impacts - Coastal erosion	Foreshore in front of town	Opportunity to strengthen soft protection through revegetation to complement planned upgrades to the sea wall (e.g. Nitre Bush and Boobiella).	Medium	DEW / NRNY, CPB, Council, community groups, Traditional Owners, NGOs
Cliff erosion <i>Storm surge and sea-level rise impact</i>	Whole Management Unit	Identify sections of cliffs most at risk, monitor recession, maximise cliff-top integrity by maintaining vegetation buffers from the coast and providing set-backs from cropping and grazing activities. Involve landholders in planning for future retreat zones.	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
<i>Access and recreation</i>				
n/a				

<i>Weeds</i>				
Woody (Western Coast Wattle, Aleppo Pine, Olive)	Northern edge of town, Aleppo Pine on cliff above marina, weeds in native vegetation along walking trail at cemetery	Control Declared weeds as required – control in native vegetation using bushcare principles.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional, Owners, NGOs
<i>Native vegetation</i>				
Threatened flora	Private property north of Stansbury	Support landholders to actively restore native vegetation and manage remnants to maintain <i>Olearia pannosa</i> populations.	Medium	DEW / NRNY, CPB, private landholders, community groups, Traditional Owners, NGOs
<i>Feral animals</i>				
Rabbits	Around Stansbury	Undertake rabbit control.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional, Owners, NGOs
<i>Domestic pets</i>				
Shorebird impacts from cats and off-leash dogs on beaches	Surrounding the towns	Raise awareness of the impact of cats and off-leash dogs on shorebirds in sensitive areas. Encourage responsible pet ownership.	Medium	NRNY, CPB, Council, landholders, community groups,

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Cells NY36 - NY38: Klein Point to Coobowie

Area: 827 hectares

Location: Located on the south-eastern coast of Yorke Peninsula, south of Stansbury to Coobowie. Includes Klein Point, Port Giles and Wool Bay.



Land Tenure/Ownership

Private: the majority of this area is private agricultural land.

Public: One narrow strip of Unallotted Crown Land.

Council: Yorke Peninsula Council owns significant parkland around Wool Bay.

Traditional Owners: Narungga Native Title Determination area.

Other: extractive industries at Klein Point Quarry leases the Crown Leasehold land and Viterra own grain storages at Port Giles.

Landforms

The coastline here features steep, eroding, limestone cliffs up to 20m high with sand and boulder/cobble beaches at their base. The boulder beaches grade to shingle/sand beaches in the south.

Klein Point includes a jetty and associated infrastructure for the quarry operation. There is a small sandy beach to the south of the jetty. South of Wool Bay 50-100m wide rock and sand platforms are backed by sheer cliffs with areas of high tide sand at the base.

Swell and waves travel up the gulf and have formed a series of cusped forelands at Coobowie.

Marine Habitat

This is a sheltered, very low energy part of the coastline where patchy, sparse, low profile reefs and medium to dense seagrass characterises most of the offshore environment. Large tracts of dense seagrass cover the offshore area around Wool Bay. In deeper waters, there is a large tract of medium density macroalgae. The marine environment around Coobowie is an important fish breeding area.

Native Vegetation

Native vegetation is poorly mapped along this part of the coastline however, satellite imagery shows that approximately 3% (or 21 ha) of this Management Unit contains native vegetation cover. The cliff tops north and south of the Klein Point jetty support some good quality cliff-top shrublands and sedgeland with a high diversity of native plants including the State-Rare Lanky Buttons (*Leptorhynchos elongatus*). Reasonable quality grassy woodlands occur in the parklands around Wool Bay and some relatively dense shrublands along the Walk the Yorke trail toward Port Giles and Hickey's Point.

Vegetation associations here include:

Gahnia lanigera, *Lepidosperma congestum* (NC), *Lomandra effusa*, *Austrostipa* sp. low sedgeland (Klein Point cliffs).

Allocasuarina verticillata +/- *Melaleuca lanceolata* +/- *Eucalyptus porosa* +/- *Santalum acuminatum* low woodland (Wool Bay).

Conservation Significance

High value flora is supported in the narrow remnants along the cliff tops and at least 2 State-Rare species occur in the sedgelands (Lanky Buttons and Showy Copper-wire Daisy). The area contains some good wading bird habitat. At Port Giles there is a seal colony which regularly uses the man-made rock wall (46).

Table 26. Species of National and State Conservation Significance (BDBSA records), Klein Point to Coobowie Management Unit

<i>Biota</i>	<i>Common name</i>	<i>Australia (EPBC)</i>	<i>SA (NPW Act)</i>
<i>Animal species</i>			
<i>Arenaria interpres</i>	Ruddy Turnstone		R
<i>Eubalaena australis</i>	Southern Right Whale	EN	V
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		R
<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R
<i>Numenius madagascariensis</i>	Far Eastern Curlew	CR	V
<i>Sternula nereis</i>	Fairy Tern	VU	E
<i>Thinornis rubricollis</i>	Hooded Plover	VU	V
<i>Tringa brevipes</i>	Grey-tailed Tattler		R
<i>Plant species</i>			
<i>Leptorhynchus elongatus</i>	Lanky Buttons		R
<i>Podolepis decipiens</i>	Showy Copper-wire Daisy		R

Management

Public land in this area is managed by Crown Lands and Yorke Peninsula Council. Adelaide Brighton Cement manages Klein Point Quarry and Viterro manages Port Giles. The Wool Bay Progress Association and the Coobowie Progress Association are active groups in the area with some excellent works undertaken by the Coobowie group in constructing the bird hide and associated signs.

Relevant plans

- Narungga Healthy Country Plan (in progress)
- Northern and Yorke Regional NRM Plan; Strategic Plan, 2019-2029
- Draft Coastal Management Strategy; Hickeys Point to Corny Point. Yorke Peninsula Council, 2019
- Coastal Motor Vehicle Access Management Strategy (2008) Northern and Yorke Natural Resources Management Region. D. Allen.
- Yorke NRM District Weed Action Plan (2018) Northern and Yorke Natural Resource Management Board.
- Draft Coastal Management Strategy; Hickeys Point to Corny Point (2019) Yorke Peninsula Council.

Recommended Actions

The main management priorities for this area are ORV track management, weed control and maximising the integrity and resilience of the cliff-top vegetation. Much of this section has a narrow but high value strip of native vegetation, which is highly threatened by weeds.

Climate change

Cliff erosion is a risk from Klein Point to Hickey's Point. At Wool Bay sediments from the eroding cliffs are regularly washed onto the carpark and out to sea. With sea level rise, this will become a bigger problem and may require protective measures to prevent further damage.

The shoreline in front of Coobowie is a Potential Drift Hazard Zone, which will be prone to increased levels of erosion, with sea level rise.

Access and Recreation Impacts

Access to the coastline is largely unrestricted in this section and there are minor impacts from informal camping and vehicle damage to vegetation. Some excessive tracks occur in high quality native vegetation north of Klein Point. Dumping has become a problem on the cliff face at Klein Point.

Weeds

Weeds are a significant issue along this part of the coast. WoNS include African Boxthorn (*Lycium ferocissimum*), Bridal Creeper (*Asparagus asparagoides*) and Athel Pine (*Tamarisk aphylla*).

A long list of weeds has been recorded in these cells, including; Western Coastal Wattle (*Acacia cyclops*), Golden Pallensis (*Asteriscus spinosus*), Century Plant (*Agave Americana*), Aleppo Pine (*Pinus halepensis*) and Marram Grass (*Ammophila arenaria*) on the foredunes. Also found here are Golden Wreath Wattle, Evening Primrose, Radiata Pine, Golden Aeonium, Red Hot Poker and Marram Grass (Yorke Peninsula Council 2019). At Wool Bay, Gazanias (*Gazania* sp.) are growing on the cliff tops. False Caper and Sea Lavender are also common in the area thus are highly likely to also be present in this Management Unit.

Native Vegetation Management

The native vegetation on the cliff tops around Klein Point and down to Wool Bay are significant in the context of the east coast of Yorke Peninsula and should be afforded some protection and management. There may be an opportunity to designate this area as a Conservation Zone (similar to the Barkers Rocks Conservation Area on the west coast). This would require engagement and partnering with Adelaide Brighton Cement to achieve significant conservation outcome for the Peninsula.

Photo: High quality cliff-top sedgeland, south of Klein Point



Table 27. Recommended Management Actions; Klein Point to Coobowie Management Unit

<i>Issue/Threat</i>	<i>Location</i>	<i>Recommended Action</i>	<i>Priority of Action</i>	<i>Potential Contributors</i>
<i>Climate change impact</i>				
Cliff erosion <i>Storm surge and sea-level rise impact</i>	Whole Management Unit	Identify sections of cliffs most at risk, monitor recession. Maximise cliff-top integrity by maintaining vegetation buffers from the coast and providing set-backs from cropping and grazing activities. Involve landholders in planning for future retreat zones.	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
Coastal erosion mitigation	Coobowie township levy	Strengthen levy protection through planting of native vegetation in sand mounds.	Medium	DEW / NRNY, CPB, Council, community groups, Traditional Owners, NGOs
<i>Access and recreation</i>				
Informal camping and duplicated tracks	North of Klein Point and coast from Wool Bay to Port Giles	Rationalise and rehabilitate excessive tracks, formalise camping areas or restrict if necessary.	Medium	DEW / NRNY, CPB, Council, SAPOL, DPTI, community groups, Traditional Owners, NGOs
Rubbish dumping - associated with informal camping	Cliff tops north of Klein Point and between Wool Bay and Pt Giles	Consider restricting access to some areas of clifftops. Removal of Platypus Gums south of Pt Giles may help open up the area and discourage dumping.	Medium	DEW / NRNY, Council, community groups, Traditional Owners, NGOs
<i>Weeds</i>				
Woody (Western Coast Wattle, African Boxthorn, Tamarisk)	Whole cell, particularly slopes above Klein Point boat ramp road and in Wool Bay Parklands	Control African Boxthorn and Tamarisk as per Declared Weeds and WoNS responsibilities. Control Western Coast Wattle to avoid further spread.	High	Landholders, DEW / NRNY, Council, community groups, Traditional Owners, NGOs, Adelaide Brighton Cement
Inappropriate amenity plantings	Seaward side of Klein Point Road	Revegetate open spaces with appropriate native species and staged removal of non-natives (can maintain Norfolk Pines on landward side and restrict amenity plantings to spoil heaps on the seaward side). Avoid planting trees or	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional Owners

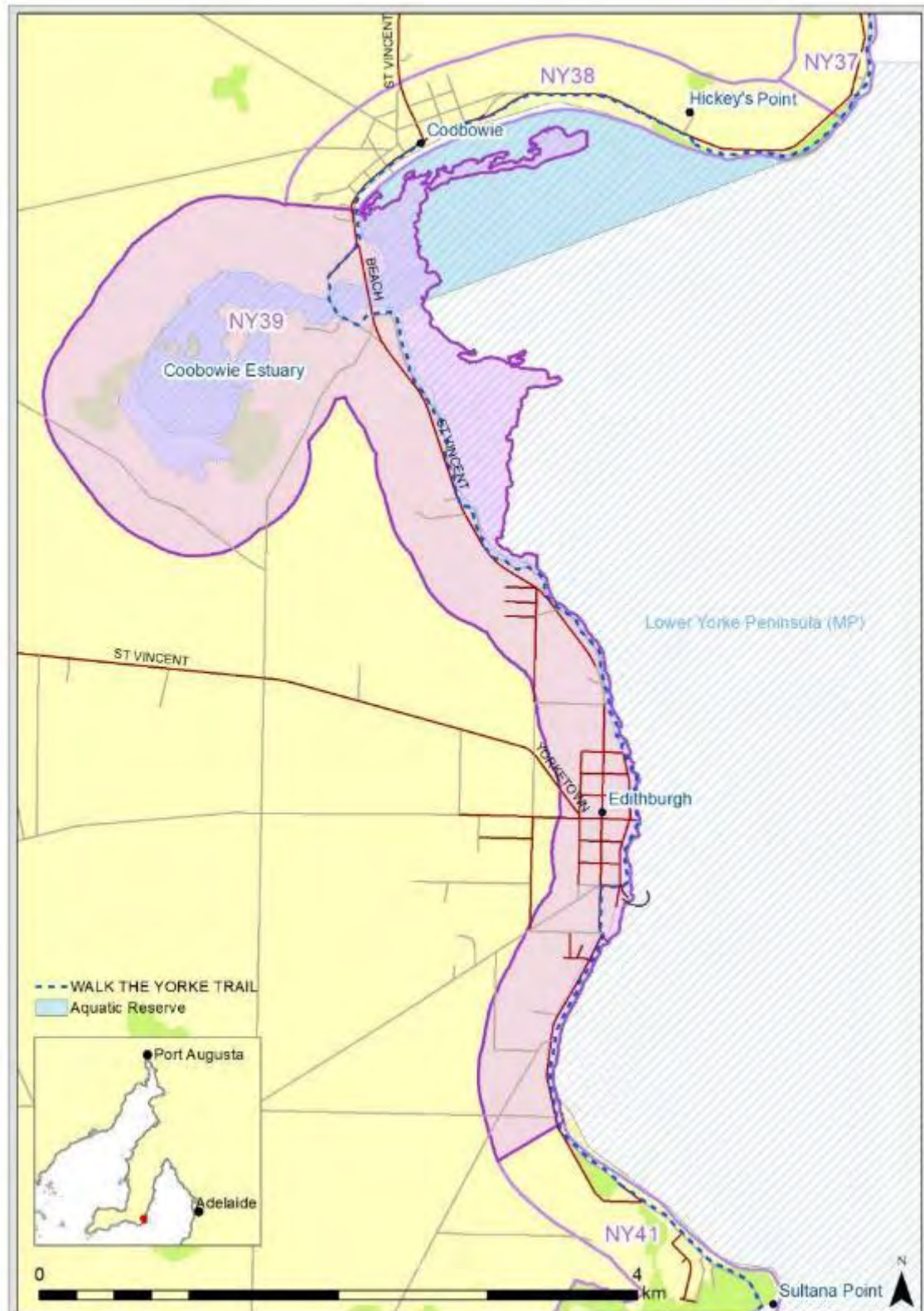
		shrubs into low sedgeland communities.		NGOs, Adelaide Brighton Cement
Bulbs and tubers (including Bridal Creeper)	Native vegetation near Wool Bay boat ramp	Control required - as per fact sheet. Undertake public education.	High	DEW / NRY, Council, community groups, Traditional Owners NGOs
<i>Native vegetation</i>				
Vegetation protection - un-managed vegetation	Seaward side of Klein Point Road	Significant vegetation would benefit from formal protection and active management. Support the designation of a coastal vegetation reserve.	Medium	DEW / NRY, Council, community groups, Traditional Owners NGOs, Adelaide Brighton Cement
Inappropriate revegetation	Coastal shrublands and sedgelands	Maintain the low vegetation character and avoid planting larger trees and shrubs in sedgelands.	High	DEW / NRY, Council, community groups, Traditional Owners NGOs, Adelaide Brighton Cement
<i>Domestic pets</i>				
Shorebird impacts from cats and off-leash dogs on beaches	Surrounding the towns	Raise awareness of the impact of cats and off-leash dogs on shorebirds in sensitive areas. Encourage responsible pet ownership.	Medium	NRY, CPB, Council, landholders, community groups,
<i>Feral animals</i>				
Fox and cat predation on native animals and shorebirds	Whole Management Unit	Undertake control as recommended by NRY and coordinate with neighbours.	High	Landholders, NRY, Traditional Owners

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Cell NY39: Edithburgh and Coobowie Estuary

Area: 792 hectares

Location: Located on the south-eastern coast of Yorke Peninsula, just south of the township of Coobowie. It includes Edithburgh and the Coobowie estuary (Salt Creek Bay).



Land Tenure/Ownership

Private: predominantly private farmland around the estuary and north of Edithburgh, with some smaller blocks south of the township.

Public: a thin strip of unallotted Crown Land fronts most of the coast.

Council: a thin strip of coastal land around Edithburgh is owned by Yorke Peninsula Council.

Traditional Owners: Narungga Native Title Determination area.

Landforms

This part of the coastline features low coastal slopes to low cliffs and an estuarine inlet, surrounded by narrow salt flats. Narrow, low energy sand and shingle beaches are fronted by a low bedrock platform.

Marine Habitat

The very sheltered, low wave energy area within Salt Creek Bay, supports dense to medium density seagrass areas interspersed with low profile reef and bare inshore sand areas. Coobowie Aquatic Reserve is an important fish nursery.

Native Vegetation

Native vegetation cover is limited in this Management Unit, with only 9% remaining (71 ha). There are some areas of supratidal samphire around the shores of the inlet and a large samphire flat around the estuary consisting of *Tecticornia* sp. and *Sarcocornia quinqueflora* shrubland. Grey Mangroves are beginning to colonise the estuary, which could be expected to accelerate with rising sea levels.

Conservation Significance

The Coobowie Aquatic Reserve is an important fish nursery and contains important habitat for several migratory shorebird species.

Table 28. Species of National and State Conservation Significance (BDBSA records), Edithburgh and Coobowie Estuary Management Unit

Biota	Common name	Australia (EPBC)	SA (NPW Act)
<i>Animal species</i>			
<i>Actitis hypoleucos</i>	Common Sandpiper		R
<i>Arenaria interpres</i>	Ruddy Turnstone		R
<i>Biziura lobata</i>	Musk Duck		R
<i>Calidris canutus</i>	Red Knot	EN	
<i>Calidris ferruginea</i>	Curlew Sandpiper	CR	
<i>Cereopsis novaehollandiae novaehollandiae</i>	Cape Barren Goose		R
<i>Cladorhynchus leucocephalus</i>	Banded Stilt		V
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		R
<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R
<i>Limosa lapponica</i>	Bar-tailed Godwit	ssp	R
<i>Numenius madagascariensis</i>	Far Eastern Curlew	CR	V

<i>Pluvialis fulva</i>	Pacific Golden Plover	R
Plant species		
N/A		

Management

Yorke Peninsula Council is actively managing the parklands and coastline along the Walk the Yorke trail. Active community groups in the area include the Edithburgh Progress Association and the Coobowie Progress Association.

Relevant plans

- Narungga Healthy Country Plan (in progress)
- Northern and Yorke Regional NRM Plan. Strategic Plan, 2019-2029.
- Coastal Motor Vehicle Access Management Strategy (2008) Northern and Yorke Natural Resources Management Region. D. Allen.
- Yorke NRM District Weed Action Plan (2018) Northern and Yorke Natural Resource Management Board.
- Draft Coastal Management Strategy; Hickeys Point to Corny Point (2019) Yorke Peninsula Council.

Recommended Actions

The main management priorities in this area are weed control and mitigating the impacts of climate change, particularly in the estuary and surrounding areas.

Climate change

Sea level rise will impact the estuary and could threaten the road and farmland to the west of the inlet. The estuary inlet is also a Storm Surge Hazard Zone, so this area will likely be impacted by flooding and erosion with sea level rise, particularly during storms.

There are opportunities to facilitate landward migration of salt-tolerant vegetation and for improving the connection of the estuary to the sea. LiDAR mapping would be an important step in understanding what the impacts and opportunities are.

The low coastal zone south of Edithburgh is vulnerable to storm surges and shoreline recession which could impact some native vegetation and infrastructure. Nitre bushes are helping to stabilise the seawall.

Access and Recreation Impacts

There are relatively minor access issues along this section of coast. Pedestrian access is formalised by the Walk the Yorke trail.

Weeds

African Boxthorn (*Lycium ferocissimum*) a WoNS, and Western Coastal Wattle (*Acacia cyclops*) infestations occur around the estuary and the foreshore reserve. Bridal veil (*Asparagus declinatus*) a WoNS, grows along the Walk the Yorke coastal track from Coobowie to Edithburgh.

Infestations of Western Coast Wattle are being managed around the bird hide. Other weeds include Aleppo Pine (*Pinus halepensis*), Century Plant (*Agave Americana*), Gazania (*Gazania* sp.), Golden Pallensis (*Asteriscus spinosus*), Golden Wreath Wattle (*Acacia saligna*), Sea Lavender and False Caper. Vegetation surrounding Coobowie Estuary is highly modified with a high density of Western Coastal Wattle and Aleppo Pine. Weed removal and revegetation is recommended along the Edithburgh to Coobowie walking trail and should be undertaken in stages (4).

Photo: Farmland around Coobowie Estuary may be at risk of inundation and presents opportunities for tidal retreat and revegetation



Table 29. Recommended Management Actions; Edithburgh and Coobowie Estuary Management Unit

<i>Issue/Threat</i>	<i>Location</i>	<i>Recommended Action</i>	<i>Priority of Action</i>	<i>Potential Contributors</i>
<i>Climate change impact</i>				
Climate impacts - restricted tidal exchange	Coobowie Estuary	Support the installation of additional culverts in both main causeways to increase water exchange and tidal retreat options.	Medium	YP Council, DPTI
Inundation and shoreline recession <i>Storm surge and sea-level rise impact</i>	Whole Management Unit	Identify and map suitable areas for allowing tidal retreat. Involve landholders in planning for tidal retreat zones and projects. Strengthen natural sand barriers with appropriate coastal shrub revegetation of the foredune. Strengthen artificial barriers with coastal shrub revegetation where appropriate.	High	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
<i>Access and recreation</i>				
n/a				
<i>Weeds</i>				

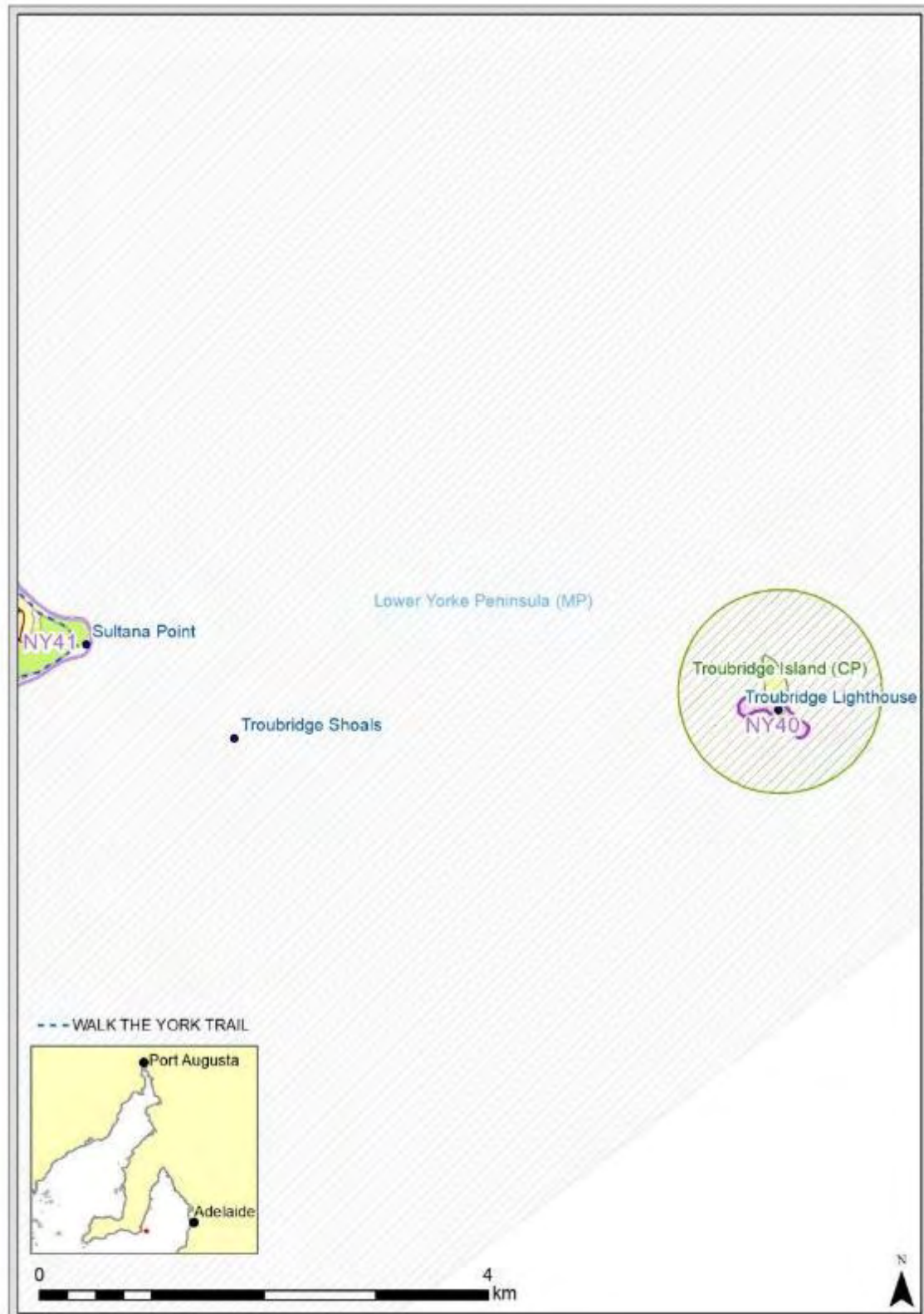
Woody (Western Coast Wattle, African Boxthorn, Aleppo Pine)	Whole management Unit	Control environmental weeds according to bushcare principles.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional, Owners NGOs
Bulbs (Bridal Veil)	Along the Walk the Yorke trail	Control environmental weeds according to bushcare principles.	High	Landholders, DEW / NRNY, Council, community groups, Traditional, Owners NGOs
<i>Native vegetation</i>				
Revegetation - lack of native vegetation	Western and southern surrounds of the estuary	Undertake an assessment of tidal retreat potential and active revegetation of salt tolerant species (e.g. Swamp Paperbark). Broadscale revegetation may also help intercept salty groundwater and slow the salinisation of surrounding farmland as sea level rises.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional, Owners NGOs
<i>Domestic pets</i>				
Shorebird impacts from cats and off-leash dogs on beaches	Surrounding the towns	Raise awareness of the impact of cats and off-leash dogs on shorebirds in sensitive areas. Encourage responsible pet ownership.	Medium	NRNY, CPB, Council, landholders, community groups
<i>Feral animals</i>				
Fox and cat predation on native animals and shorebirds	Whole Management Unit	Undertake control as recommended by NRNY and coordinate with neighbours.	High	Landholders, NRNY, Traditional Owners

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Cell NY40: Troubridge Island

Area: 10 hectares

Location: This cell comprises Troubridge Island which is located on the south coast of Yorke Peninsula, 6.5 km offshore from Edithburgh.



Land Tenure/Ownership

Public: Crown Lands Act Reserve.

Landforms

Troubridge Island is a sand island which has accumulated on a reef. Most of the sand for this section of coastline is derived from coastal erosion, offshore sources and marine organisms. The Island is a dynamic environment which has changed shape and orientation many times in recent history, influenced by ocean swells and wave action over time.

Marine Habitat

The marine environment around the Island supports large areas of dense to patchy seagrass and a large tract of macroalgae to the north of the island.

Native Vegetation

Approximately 40% (or 3.7 ha) Troubridge Island is covered with native vegetation. Coastal shrubland covers most of the stable parts of the island, dominated by Nitre Bush (*Nitraria billardierei*). As the sand on this island is perpetually moving, natural colonization by plants can be slow and patchy (39).

Conservation Significance

The island has valuable habitat for waders and shorebirds.

Table 30. Species of National and State Conservation Significance (BDBSA records), Troubridge Island Management Unit

Biota	Common name	Australia (EPBC)	SA (NPW Act)
<i>Animal species</i>			
<i>Arenaria interpres</i>	Ruddy Turnstone		R
<i>Calidris alba</i>	Sanderling		R
<i>Calidris canutus</i>	Red Knot	EN	
<i>Calidris ferruginea</i>	Curlew Sandpiper	CR	
<i>Calidris tenuirostris</i>	Great Knot	CR	R
<i>Cereopsis novaehollandiae novaehollandiae</i>	Cape Barren Goose		R
<i>Charadrius mongolus</i>	Lesser Sand Plover	EN	R
<i>Falco peregrinus</i>	Peregrine Falcon		R
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		R
<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R
<i>Limosa lapponica</i>	Bar-tailed Godwit	ssp	R
<i>Neophema elegans</i>	Elegant Parrot		R
<i>Neophema petrophila</i>	Rock Parrot		R

<i>Neophoca cinerea</i>	Australian Sea Lion	VU	V
<i>Sternula nereis</i>	Fairy Tern	VU	E
<i>Thinornis rubricollis</i>	Hooded Plover	VU	V
<i>Plant species</i>			
N/A			

Management

Troubridge Island is managed by Crown Lands and the caretakers of the lighthouse. An active community group on the island is The Friends of Troubridge Island Conservation Park.

Relevant plans

- Narungga Healthy Country Plan (in progress)
- Northern and Yorke Regional NRM Plan; Strategic Plan, 2019-2029.
- Yorke NRM District Weed Action Plan (2018) Northern and Yorke Natural Resource Management Board.

Recommended Actions

The main management priority for this island is weed control in order to maintain habitat values for shorebirds.

Photo: Troubridge Island in its current configuration showing the vegetation and shallow sand in the nearshore environment (NatureMaps <http://spatialwebapps.environment.sa.gov.au/naturemaps>)



Climate change

The island is highly vulnerable to storm surges and sea-level rise. The highest point of the island at high tide is 5 m, so under the 2050 predictions of a 0.5m rise, with storm surge the island could be completely inundated and/or washed away.

Little can be done to manage these impacts apart from maintaining perennial vegetation. The shape of the island will be dynamic as sea levels rise.

Access and Recreation Impacts

Access is difficult and well formalised no significant damage is recorded.

Weeds

African Boxthorn (*Lycium ferocissimum*) a WoNS and Marguerite Daisy (*Argyranthemum frutescens*), have been recorded on this island.

Table 31. Recommended Management Actions: Troubridge Island Management Unit

<i>Issue/Threat</i>	<i>Location</i>	<i>Recommended Action</i>	<i>Priority of Action</i>	<i>Potential Contributors</i>
<i>Climate change impact</i>				
Inundation and shoreline recession Storm surge and sea-level rise impact	Whole Management Unit	Strengthen natural sand barriers with appropriate coastal shrub revegetation of the foredune. Avoid removal of dunes for development or infrastructure (maintain natural sand replenishment processes).	Medium	Caretakers, Friends of Troubridge Island
<i>Access and recreation</i>				
n/a				
<i>Weeds</i>				
Woody (African Boxthorn)	Whole cell	Control African Boxthorn as per WoNS responsibilities.	High	Caretakers, Friends of Troubridge Island

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Cell NY41: Sultana Point

Area: 524 hectares

Location: Located on the south-eastern extremity of Yorke Peninsula, from south of Edithburgh.



Land Tenure/Ownership

Private: the majority is privately owned farmland. The Edithburgh windfarm operates around 11 wind turbines at Wattle Point on private land.

Public: a thin strip of unallotted Crown Land fronts the coast.

Council: Yorke Peninsula Council owns coastal reserve land around Sheoak Beach.

Traditional Owners: Narungga Native Title Determination area.

Landforms

Sultana Point is a cusped foreland of low relief, shaped by swell and waves travelling up the gulf coastline. Records show that shoreline changes are rapid around this foreland, with erosion on the southern side and accretion on the north. The dune plain narrows towards Wattle Point. Beaches are low energy and composed of coarse sand, protected by the Troubridge Shoals, reefs and sand flats. This is the eastern extremity of the Holocene dune complex that extends across the foot of the Yorke Peninsula. The beaches along this coastline are fronted by wide sand flats.

Marine Habitat

The marine environment is dominated by large expanses of constantly moving bare sand, particularly south of Sultana Point. Dense seagrass occurs throughout the rest of the area. There is a small low-profile reef platform between Wattle and Sultana Point. This coastline is a moderately exposed, low wave energy area.

Native Vegetation

Approximately 37% (or 195 ha) of this Management Unit contains native vegetation cover, consisting mainly of *Olearia axillaris* + *Leucopogon parviflorus* dune shrubland with a small, stranded tidal samphire at the rear of the dunes near Sultana Point.

Native vegetation associations include:

Olearia axillaris, *Leucopogon parviflorus*+/-*Acacia nematophylla*+/-*Myoporum insulare* mid open shrubland.

Allocasuarina verticillata+/-*Eucalyptus porosa* low open woodland.

Conservation Significance

Species diversity is moderately high in this Management Unit, with 57 plant species and 30 fauna species recorded (1). The area also has some good coastal wader habitat with at least 3 nationally significant shorebirds recorded including the Critically Endangered Curlew Sandpiper. Hooded Plovers have breeding territories at Sheoak Beach.

The Western Daddy-long-legs orchid is the only rated plant species recorded in the Biological Database of South Australia, although it is likely that other significant species occur in the large remnant south of Sultana Point.

Table 32. Species of National and State Conservation Significance (BDBSA records), Sultana Point Management Unit

<i>Biota</i>	<i>Common name</i>	<i>Australia (EPBC)</i>	<i>SA (NPW Act)</i>
<i>Animal species</i>			
<i>Arenaria interpres</i>	Ruddy Turnstone		R
<i>Calidris canutus</i>	Red Knot	EN	
<i>Calidris ferruginea</i>	Curlew Sandpiper	CR	
<i>Charadrius mongolus</i>	Lesser Sand Plover	EN	R
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		R
<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R
<i>Neophema petrophila</i>	Rock Parrot		R
<i>Thinornis rubricollis</i>	Hooded Plover	VU	V
<i>Pluvialis fulva</i>	Pacific Golden Plover		R
<i>Sternula nereis</i>	Fairy Tern	VU	E
<i>Tringa brevipes</i>	Grey-tailed Tattler		R
<i>Plant species</i>			
<i>Caladenia bicallata</i> ssp. <i>bicallata</i>	Western Daddy-long-legs (record from 1994)		R

Management

Public land in this area is managed by Crown Lands and Yorke Peninsula Council. An active community group in the area is the Edithburgh Progress Association.

Relevant plans

- Narungga Healthy Country Plan (in progress)
- Northern and Yorke Regional NRM Plan; Strategic Plan, 2019-2029
- Coastal Motor Vehicle Access Management Strategy (2008) Northern and Yorke Natural Resources Management Region. D. Allen.
- Yorke NRM District Weed Action Plan (2018) Northern and Yorke Natural Resource Management Board.
- Draft Coastal Management Strategy; Hickeys Point to Corny Point (2019) Yorke Peninsula Council.

Recommended Actions

Several management actions would enhance the conservation value of this area including limiting ORV access, remnant vegetation protection, formalising camping areas, weed control and revegetation to protect existing dune vegetation and reduce dune instability. Mitigating future climate change impacts should also be considered.

Fire is also an issue for residents at Sultana Point and DEW has recently undertaken prescribed burning to create a firebreak on the southern side of the township. Wildfire burnt areas to the west in December 2019.

Climate change

With sea level rise, coastal vegetation migration is partly restricted. There is considerable erosion around Sultana Point where in some areas, the road has been eroded away. Protective measures to ensure erosion does not worsen with sea level rise, should be considered.

Native vegetation on the larger dune system is susceptible to thinning under predicted drier conditions and this will exacerbate dune blowouts. Some exposed sandy substrate can already be seen in aerial photography.

Most of this cell is a Potential Drift Hazard Zone with a particularly large drift area, which stretches nearly a kilometre inland between Wattle Point and Sultana Point. This section of coastline will be further impacted by coastal erosion, with rising sea levels.

Access and Recreation Impacts

There are 2 formal campsites along this section of coastline which are showing some minor track and camping impacts. These are addressed in the Draft Yorke Peninsula Council Coastal Management Strategy (2019).

Weeds

African Boxthorn (*Lycium ferocissimum*), Bridal Creeper (*Asparagus asparagoides*) and Boneseed (*Chrysanthemoides monilifera* ssp. *monilifera*) are WoNS occurring in this section. European Olive (*Olea europaea*) occurs south of Sultana Point.

Photo: Marguerite Daisy amongst native vegetation along the Walk the Yorke trail at Sultana Point.



Other weeds present include White Weeping Broom (*Retama raetam*), Western Coastal Wattle (*Acacia Cyclops*), Marguerite Daisy (*Argyranthemum frutescens*), Buckthorn (*Rhamnus alaternus*), Polygala (*Polygala spp.*) and exotic grasses including Buffalo Grass (*Stenotaphrum secundatum*,) and Sea Wheat-grass (*Thinopyrum junceiforme*).

It will be important to monitor and control weeds in the prescribed burn area, to maintain the integrity of the vegetation.

Native Vegetation

The large remnant on private land south of Sultana Point is a priority for management and protection. There are also opportunities to reconnect remnants through revegetation along this part of the coast, to improve habitat and stability of the dune and cliff systems.

Table 33. Recommended Management Actions; Sultana Point Management Unit

<i>Issue/Threat</i>	<i>Location</i>	<i>Recommended Action</i>	<i>Priority of Action</i>	<i>Potential Contributors</i>
<i>Climate change impact</i>				
Beach and dune erosion <i>Storm surge and sea-level rise impact</i>	Whole Management Unit	Monitor beach and dune recession. Strengthen dune integrity with access management, dune stabilisation and revegetation. Avoid removal of dunes for development or infrastructure (maintain natural sand replenishment processes).	Medium	DEW / NRNY, CPB, Council, community groups, Traditional Owners, NGOs
<i>Access and recreation</i>				
Vehicle access management - multiple informal access tracks to the beach	High quality sedgeland east of Goldsmith Beach camping area	Rationalise the number of tracks through native vegetation and formalise the preferred access to protect high quality native vegetation, particularly as it recovers from recent wildfire.	High	DEW / NRNY, CPB, Council, SAPOL, DPTI, community groups, Traditional Owners NGOs
<i>Weeds</i>				
Woody (Western Coast Wattle, Aleppo Pine, White Weeping Broom, Marguarite Daisy, Polygala)	Coast trail between Edithburgh and Sultana Point, roadside vegetation	Control Western Coast Wattle and Declared woody weeds in high quality vegetation first as per Bushcare methods. A control strategy may be necessary for the widespread Western Coast Wattle. Particular attention should be paid to the recently burnt areas.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional, Owners NGOs
Garden escapes	Around Sultana Point residential area	Undertake control in native vegetation. Public education regarding potential weeds and alternative garden plants. Particular attention should be paid to the recently burnt areas.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional, Owners NGOs, local residents
<i>Native vegetation</i>				

Revegetation - narrow coastal vegetation	West of Sultana Point	Revegetation to connect remnants and buffer the narrow coastal vegetation would enhance habitat values in this cell. Low shrub revegetation may be suitable under wind turbines.	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
Vegetation protection - private land	South of Sultana Point residential area	Engage and assist landholders regarding the management of significant native vegetation on private land. Consider conservation covenants such as Heritage Agreements.	Medium	Landholders, DEW / NRNY, community groups, Traditional Owners, NGOs
<i>Domestic pets</i>				
Shorebird impacts from cats and off-leash dogs on beaches	Surrounding the towns	Raise awareness of the impact of cats and off-leash dogs on shorebirds in sensitive areas. Encourage responsible pet ownership.	Medium	NRNY, CPB, Council, landholders, community groups,
<i>Feral animals</i>				
Fox and cat predation on native animals and shorebirds	Whole Management Unit	Undertake control as recommended by NRNY and coordinate with neighbours.	High	Landholders, NRNY, Traditional Owners

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Cells NY42 - NY43: Troubridge Point

Area: 307 hectares

Location: Located south of Edithburgh, on the far south-eastern 'heel' of Yorke Peninsula. Includes Goldsmith Beach, Troubridge Point and Troubridge Hill.



Land Tenure/Ownership

Private: predominantly private farmland.

Public: a strip of mostly unallotted Crown Land along the cliff tops.

Council: Yorke Peninsula Council owns the coastal reserve around Goldsmith Beach.

Traditional Owners: Narungga Native Title Determination area.

Landforms

This section of coast features limestone cliffs with some dune areas around Goldsmith Beach campground. West of Troubridge Point the limestone cliffs are around 10m high and are fronted by small sandy pocket beaches.

Native Vegetation

There is little native vegetation cover in this Management Unit with only 6% (or 0.5 ha) remaining. Some cliff-top dune shrubland occurs around the Troubridge Hill Lighthouse in the west, and coastal shrublands and low sedgelands around Goldsmith Beach (which was in good condition prior to a recent wildfire). There is a small patch of native vegetation regrowth, east of Troubridge Hill. Apart from these small patches, most of the cliff tops have been denuded of vegetation.

Vegetation is mapped as *Olearia axillaris*, *Leucopogon parviflorus*+/-*Acacia nematophylla*+/-*Myoporum insulare* mid open shrubland.

Marine Habitat

The marine environment comprises large tracts of continuous, dense, medium to low-profile reef interspersed with patches bare sand (north of Troubridge Point) and dense to medium density seagrass. This is a moderately exposed, moderate wave energy area.

Conservation Significance

Due to the paucity of native vegetation cover in this Management Unit, the conservation value of this part of the coastline is low. White-bellied Sea-Eagles were recorded here in the early 2000's but were not recorded breeding during recent surveys (56).

This Management Unit will be within the Great Southern Ark rewilding project. The project aims to reintroduce native animals into the area and protect them from feral animals by building a fence across the peninsula to create a 140,000 hectare "safe haven". The fence is specially designed to keep feral animals out and direct them into areas where they can be managed.

Table 34. Species of National and State Conservation Significance (BDBSA records), Troubridge Point Management Unit

Biota	Common name	Australia (EPBC)	SA (NPW Act)
<i>Animal species</i>			
<i>Actitis hypoleucos</i>	Common Sandpiper		R
<i>Cereopsis novaehollandiae novaehollandiae</i>	Cape Barren Goose		R
<i>Falco peregrinus</i>	Peregrine Falcon		R
<i>Haliaeetus leucogaster</i>	White-bellied Sea Eagle		E
<i>Neophema petrophila</i>	Rock Parrot		R
<i>Thinornis rubricollis</i>	Hooded Plover	VU	V

Plant species

N/A

Management

Mostly under private management with the majority of public land in this area managed by Yorke Peninsula Council.

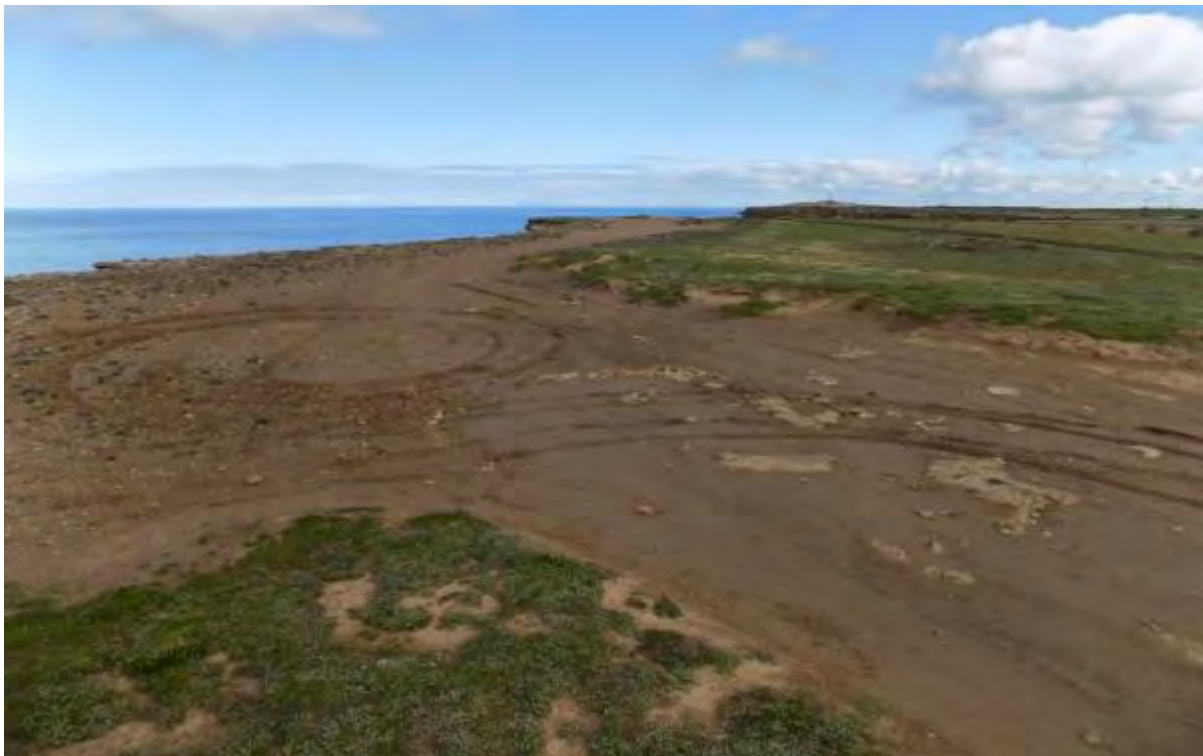
Relevant plans

- Narungga Healthy Country Plan (in progress)
- Northern and Yorke Regional NRM Plan; Strategic Plan, 2019-2029.
- Coastal Motor Vehicle Access Management Strategy (2008) Northern and Yorke Natural Resources Management Region. D. Allen.
- Yorke NRM District Weed Action Plan (2018) Northern and Yorke Natural Resource Management Board.
- Draft Coastal Management Strategy; Hickeys Point to Corny Point (2019) Yorke Peninsula Council.

Recommended Actions

Priority management actions recommended for this area include managing the high number of ORV tracks and strategic revegetation to address the lack of vegetation cover and fauna habitat.

Photo: Vehicle impacts on the cliff tops



Climate change

The limestone cliffs around Troubridge Point are relatively soft and vulnerable to erosion, therefore further cliff recession is likely under increased storm surge and sea level rise conditions.

There is a Potential Drift Hazard Zone around Troubridge Hill lighthouse, which will be prone to increased erosion risk, with rising sea levels.

Access and Recreation Impacts

Vehicle impacts are significant in this section of coast with many tracks and viewpoints along the coast road, where much of the fragile topsoil has already been lost. The potential undercutting of the limestone cliffs also poses a public safety risk.

Weeds

African Boxthorn (*Lycium ferocissimum*) a WoNS, occurs in scattered patches of low densities in this area. Sea Lavender (*Limonium perezii*) and introduced grasses are common. The extensive Sea Lavender mats are probably best retained for stability in lieu of native vegetation recovery or revegetation.

Table 35. Recommended Management Actions; Troubridge Point Management Unit

<i>Issue/Threat</i>	<i>Location</i>	<i>Recommended Action</i>	<i>Priority of Action</i>	<i>Potential Contributors</i>
<i>Climate change impact</i>				
Cliff erosion <i>Storm surge and sea-level rise impact</i>	Whole Management Unit	Identify sections of cliffs most at risk and monitor recession. Maximise cliff-top integrity by maintaining vegetation buffers from the coast and providing set-backs from cropping and grazing activities. Involve landholders in planning for future retreat zones.	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
Climate impact - erodible cliffs vulnerable to undercutting	Limestone cliffs near Troubridge Point	Restrict vehicle access to overhanging cliff sections to protect public safety. Monitor for cliff recession in relation to the road.	High	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
<i>Access and recreation</i>				
Unregulated vehicle access to cliff tops is damaging already degraded native vegetation	Whole cell	Consider roadside fencing. Rationalise viewing points and formalise where access will be maintained.	High	DEW / NRNY, CPB, Council, SAPOL, DPTI, community groups, Traditional Owners, NGOs
<i>Weeds</i>				
Woody (African Boxthorn)	Whole cell	Employ a bushcare strategy to undertake active control and follow-up in high quality native vegetation first. Raise awareness of landholder obligations regarding Declared Weeds.	High	Landholders, DEW / NRNY, Council, community groups, Traditional Owners, NGOs
<i>Native vegetation</i>				

Revegetation - lack of coastal vegetation	Whole cell	Low shrub revegetation could help rehabilitate bare ground and assist with access track definition while maintaining open viewing opportunities. Facilitate natural regeneration where possible.	Medium	NRNY, DEW (crownlands)
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<i>Feral animals</i>				
Fox and cat predation on native animals and shorebirds	Whole Management Unit	Undertake control as recommended by NRNY and coordinate with neighbours.	High	Landholders, NRNY, Traditional Owners

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Cell NY44 – NY47: Kemp Bay, Port Moorowie to Sturt Bay

Area: 2,436 hectares

Location: Located on the south coast or the “arch of the ‘foot’ of Yorke Peninsula. Encompasses the long stretches of beaches of Sturt Bay and includes the town of Port Moorowie.



Land Tenure/Ownership

Private: the majority of this Management Unit is in private ownership.

Public: a narrow strip of unallotted Crown Land along most of the coastline.

Council: some larger blocks west of Port Moorowie are owned by the Yorke Peninsula Council.

Traditional owners: Narungga Native Title Determination area. Narungga Nations Aboriginal Corporation for Land have parcels at Kemp Bay.

Landforms

Landforms along this part of the coastline which encompasses Sturt Bay and Waterloo Bay, features low coastal cliffs, calcarenite bluffs and long, low energy, sandy beaches. Some sections of coast, such as around Suicide Point have overhanging and eroding cliffs with boulders and rubble at the base.

Other dominant features include cliff-top dunefields with blowouts and well-connected dunes on the coastal plains.

Marine Habitat

The marine environment features continuous, dense low-profile limestone reefs and a large tract of continuous, dense seagrass lies within Waterloo Bay. This coastline is moderately exposed with low wave energy.

Native Vegetation

Native vegetation covers approximately 60% of this Management Unit (or 1,420ha), with a significant strip of native vegetation 100 – 300m wide along much of the coastline. There is also a large patch of native vegetation to the west of Port Moorowie. Vegetation condition is generally in good condition in this Management Unit.

Mapped vegetation associations include:

Emergent *Allocasuarina verticillata* mid trees over *Dodonaea viscosa* ssp. *spatulata* tall shrubland and *Alyxia buxifolia* mid shrubs and *Tetragonia implexicoma* low shrubs

Gahnia lanigera, *Lepidosperma congestum* (NC), *Lomandra effusa*, *Austrostipa* sp. low sedgeland

Melaleuca lanceolata+/-*Allocasuarina verticillata* low woodland

+/-*Olearia axillaris*+/-*Exocarpos syrticola*+/-*Beyeria lechenaultii*+/-*Atriplex cinerea*+/-*Santalum acuminatum* mid open shrubland

Alyxia buxifolia, *Beyeria lechenaultii*, *Lasiopetalum discolor*, *Geijera linearifolia* low shrubland.

Conservation Significance

There is a high diversity of both plant species and vegetation communities in this area. Several dune communities endemic to the region are found here and there is good habitat for butterflies, including the Yellow Sedge Skipper (1).

Cell 44 has considerable floristic diversity with around 122 plant species recorded (1).

Immediately offshore from the headland is Troubridge Hill Aquatic Reserve, which protects the inshore reef and the historic shipwreck of the Clan Ranald 1909 on the seafloor 1.5 km south of Troubridge Hill, (listed on the Register of the National Estate).

High conservation value areas occur around Gilbert Point just west of Port Moorowie where a geological monument is also located. *Gahnia lanigera*/*Lepidosperma* sedgeland and *Alyxia buxifolia* shrublands are found within this cell.

The sandy beaches in this Management Unit provide valuable habitat for breeding Hooded Plovers and Ospreys and Sea Eagles can often be seen in the Waterloo Bay area.

Table 36. Species of National and State Conservation Significance (BDBSA records), Kemp Bay, Port Moorowie to Sturt Bay Management Unit

Biota	Common name	Australia (EPBC)	SA (NPW Act)
<i>Animal species</i>			
<i>Globicephala macrorhynchus</i>	Short-finned Pilot Whale		R
<i>Haliaeetus leucogaster</i>	White-bellied Sea Eagle		E
<i>Pedionomus torquatus</i>	Plains-wanderer	CR	E
<i>Plegadis falcinellus</i>	Glossy Ibis		R
<i>Thinornis rubricollis</i>	Hooded Plover	VU	V
<i>Plant species</i>			
<i>Poa drummondiana</i>	Knotted Poa		R
<i>Triglochin minutissima</i>	Tiny Arrowgrass		R

Management

Yorke Peninsula Council is actively managing many parts of this coast, with access and camping facilities upgraded at Sturt Bay and Mozzie Flat, and the Walk the Yorke Trail passing through this area. Narungga Nations manages approximately 32 ha of land around Kemp Bay and private landholders have management responsibility for the majority of the zone, including significant areas of native vegetation.

Point Davenport Conservation Park is managed by the Department for Environment and Water.

Relevant plans

- Narungga Healthy Country Plan (in progress)
- Northern and Yorke Regional NRM Plan; Strategic Plan, 2019-2029
- Draft Coastal Management Strategy; Hickeys Point to Corny Point (2019) Yorke Peninsula Council.
- Mainland Conservation Parks of Yorke Peninsula; Management Plan. Department for Environment and Heritage, 2009.
- Coastal Motor Vehicle Access Management Strategy (2008) Northern and Yorke Natural Resources Management Region. D. Allen.
- Yorke NRM District Weed Action Plan (2018) Northern and Yorke Natural Resource Management Board.

Recommended Actions

The main management priorities in this area are preventing further cliff erosion, weed control and ORV track management.

Climate change

Limestone cliffs in this section are vulnerable to erosion and sea level rise is likely to accelerate this impact. Given the significant and well-connected vegetation cover along this part of the coastline, there is opportunity to maintain its integrity in the face of increased temperatures and reduced rainfall.

As most of this part of the coastline is a Potential Drift Hazard Zone, sea level rise will increase the severity and risk of erosion in this area.

Access and Recreation Impacts

ORV tracks are impacting some areas, particularly around Kemp Bay and beach driving is impacting Hooded Plover breeding sites at Sturt Bay. Some formalisation of tracks and campgrounds has been carried out (i.e. at Mozzie Flat), although further work could be undertaken in the smaller carpark. At Port Moorowie motorbikes particularly, are causing damage.

Photo: Cliff top damage from vehicles and pedestrians occurring at Kemp Bay



Weeds

At least two WoNS are found in these cells, African Boxthorn (*Lycium ferocissimum*) and Bridal Creeper (*Asparagus asparagoides*). Some very large African Boxthorn plants occur at Kemp Bay.

Other weeds present include Western Coastal Wattle (*Acacia cyclops*), Wild Sage, Annual grasses, False Sowthistle, False Caper (*Euphorbia terracina*), Seascape Daisy (*Osteospermum fruticosum*), Gazania (*Gazania sp.*) and Lincoln Weed (*Diplotaxis tenuifolia*). Sea Spurge is present at the boat ramp.

Native Vegetation Management

Much of the roadside vegetation in this area remains unfenced, however given the contiguous nature of the vegetation it would be advised to avoid installing boundary fences unless required to avoid unnecessary vegetation clearance. There is some rubbish dumping occurring on the roadsides in this area and additional signs and patrols may be warranted.

Some minor issues around road grading which in some areas directs run-off into good quality vegetation, need to be addressed. Directing run-off into already degraded areas would be preferable.

Table 37. Recommended Management Actions: Kemp Bay, Port Moorowie to Sturt Bay Management Unit

<i>Issue/Threat</i>	<i>Location</i>	<i>Recommended Action</i>	<i>Priority of Action</i>	<i>Potential Contributors</i>
<i>Climate change impact</i>				
Cliff erosion <i>Storm surge and sea-level rise impact</i>	Whole Management Unit	Identify sections of cliffs most at risk and monitor recession. Maximise cliff-top integrity by maintaining vegetation buffers from the coast and providing set-backs from cropping and grazing activities. Involve landholders in planning for future retreat zones.	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
<i>Access and recreation</i>				
Vehicle access management - multiple tracks and uncertainty of formal/informal (e.g. which track is the Walk the Yorke)	East of Kemp Bay Point	Formalise the tracks more clearly, particularly to the east of Kemp Bay. Close off excess tracks to protect vegetation.	Medium	DEW / NRNY, CPB, Council, SAPOL, DPTI, community groups, Traditional Owners NGOs
Vehicle access management - informal vehicle access to dunes and beach	Western campsite at Mozzie Flat, Sturt Bay campsite, private lands along Sturt Bay	Rationalise access to beach and formalise the retained tracks (public land). Install barriers at public campsites similar to the other campsites at Mozzie Flat. Engage landholders and provide information on native vegetation values, legislation and management.	Medium	DEW / NRNY, CPB, Council, SAPOL, DPTI, community groups, Traditional Owners NGOs
<i>Weeds</i>				
Woody (<i>Acacia saligna</i> , Olive, Western Coast	Western end of Port Moorowie along the coastal	Control woody weeds in native vegetation first as per bushcare method.	High	Landholders, DEW / NRNY, Council,

Wattle, African Boxthorn)	walking track (Acacia saligna, Olive), campsite and private land adjacent to Mozzie Flat (African Boxthorn, Acacia cyclops)	Engage local residents and landholders and provide information and assistance.		community groups, Traditional Owners NGOs
Off-target damage from weed control	Mozzie Flat campground	Identify alternative methods and chemicals to minimise off-target damage during Boxthorn control.	Medium	YP Council
<i>Native vegetation</i>				
Vegetation protection - unfenced high quality native vegetation on roadsides, private and public land	Roadside and adjacent private lands along South Coast Rd	Provide landholders with information on native vegetation management and legislative responsibilities (particularly intact strata under the Native Vegetation Act). Install roadside signs detailing the high value of the vegetation. Avoid fencing if possible, to minimise vegetation clearance.	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
Road grading - occasional grading gutters on the road shoulder directing run-off into high quality vegetation	South-coast Road	Investigate alternative run-off management solutions. Avoid grading which directs run-off into high quality native vegetation.	Medium	YP Council
<i>Rubbish</i>				
Rubbish dumping	Roadsides west of Mozzie Flat turn-off	Installation of additional "fines apply" signs.	Medium	YP Council
<i>Domestic pets</i>				
Shorebird impacts from cats and off-leash dogs on beaches	Surrounding the towns	Raise awareness of the impact of cats and off-leash dogs on shorebirds in sensitive areas. Encourage responsible pet ownership.	Medium	NRNY, CPB, Council, landholders, community groups,
<i>Feral animals</i>				
Fox and cat predation on native animals and shorebirds	Whole Management Unit	Undertake control as recommended by NRNY and coordinate with neighbours.	High	Landholders, NRNY, Traditional Owners

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Cell NY48 – NY49: Point Davenport to Foul Bay

Area: 1,038 hectares

Location: Located along the length of Foul Bay to the Point Davenport Conservation Park.



Land Tenure/Ownership

Private: the majority of this Management Unit is private land.

Public: a strip of unallotted Crown Land on the eastern side and part of Point Davenport Conservation Park.

Council: a large block owned by Yorke Peninsula Council on the western side of the Foul Bay, Traditional Owners: Narungga Native Title Determination area. Narungga own land at the eastern end of Foul Bay.

Landforms

Cell 48 features a sandy recurved spit at Point Davenport which is growing slowly towards the east. It is separated from the main beach by a small creek, leading to the lagoon behind it, an estuary and small saline lakes. Point Davenport is an unusual landform with a recently deposited, prominent triangular spit separating Sturt Bay and Foul Bay. This feature has expanded seaward some 4 km, impounding a low Swamp Paperbark (*Melaleuca halmaturorum*) swamp.

Cell 49 faces the southeast and is protected from strong waves by the Point Yorke headland, offshore reefs and shoals. Foul Bay is characterised by broad intertidal sandflats and seagrass meadows, backed by sand dunes.

Marine Habitat

Benthic mapping shows the marine environment from Point Davenport across to the western side of Foul Bay supports large tracts of dense seagrass, to 200m offshore. The coastline around Point Davenport is sheltered with low wave energy, but further to the west is a more moderately exposed coastline.

The estuarine habitat at Point Davenport is an important fish breeding area and is protected by the Lower Yorke Peninsula Marine Park, which stretches from Point Davenport to Stansbury.

Native Vegetation

Approximately 536 ha of native vegetation occurs here, comprising 52% of this Management Unit. Most of cell 48 has good native vegetation cover and includes *Melaleuca halmaturorum* Low Open Forest over an open Samphire understorey, with other saline tolerant species. Cell 49 has a strip of dune vegetation along most of the coastline dominated by *Olearia axillaris* shrubland >1m. This vegetation is reasonably well connected with other patches to the east and the west.

Native vegetation around Point Davenport includes a large patch of *Alyxia buxifolia*+/- *Leucopogon parviflorus*+/- *Beyeria lechenaultii* mid open shrubland, which occurs on dunes including dune slopes and low interdune areas.

This floristically diverse area also contains areas of *Tecticornia* sp. low open shrubland over *Parapholis incurva* (mixed) low tussock grasses and *Melaleuca halmaturorum* low open forest over *Sarcocornia quinqueflora* (mixed) shrubs in the low clay swamps behind Port Davenport.

Conservation Significance

The high diversity of plants and animals in this Management Unit and the native vegetation in reasonable condition underlies the conservation value of this area (1). Point Davenport Conservation Park covering 247 hectares, protects a Wetland of National Importance and an important fish breeding area.

The estuary is a rare environment within the region which provides good shorebird and wader habitat. The large number of threatened birds recorded here is a reflection of the quality, quantity and diversity of habitats and niches. Birds SA have so far recorded 69 bird species in Point Davenport Conservation Park (49). The area also contains good butterfly habitat, including for the Yellow sedge Skipper (1).

This Unit is within the Great Southern Ark rewilding project footprint. The project aims to reintroduce native animals into the area and protect them from feral animals by building a fence across the peninsula to create a 140,000 hectare "safe haven". The fence is specially designed to keep feral animals out and direct them into areas where they can be managed.

Table 38. Species of National and State Conservation Significance (BDBSA records), Point Davenport to Foul Bay Management Unit

<i>Biota</i>	<i>Common name</i>	<i>Australia (EPBC)</i>	<i>SA (NPW Act)</i>
<i>Animal species</i>			
<i>Arenaria interpres</i>	Ruddy Turnstone		R
<i>Calidris alba</i>	Sanderling		R
<i>Calidris ferruginea</i>	Curlew Sandpiper	CR	
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		R
<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R
<i>Haliaeetus leucogaster</i>	White-bellied Sea Eagle		E
<i>Microeca fascians facinans</i>	Jacky Winter		R
<i>Myiagra inquieta</i>	Restless Flycatcher		R
<i>Neophema petrophila</i>	Rock Parrot		R
<i>Neophoca cinerea</i>	Australian Sea Lion	VU	V
<i>Numenius madagascariensis</i>	Far Eastern Curlew	CR	V
<i>Numenius phaeopus</i>	Whimbrel		R
<i>Pandion haliaetus cristatus</i>	Eastern Osprey		E
<i>Pluvialis fulva</i>	Pacific Golden Plover		R
<i>Sternula nereis</i>	Fairy Tern	VU	E
<i>Thinornis rubricollis</i>	Hooded Plover	VU	V
<i>Tringa brevipes</i>	Grey-tailed Tattler		R
<i>Varanus rosenbergi</i>	Heath Goanna		V
<i>Plant species</i>			
<i>Centrolepis glabra</i>	Smooth Centrolepis		R
<i>Leionema microphyllum</i>	Limestone Phebalium		R
<i>Myoporum parvifolium</i>	Creeping Boobiolla		R
<i>Picris squarrosa</i>	Squat Picris		R

Management

Public land is principally managed by Yorke Peninsula Council who has formalised campgrounds and developed the Walk the Yorke trail. Significant Western Coast Wattle control has been undertaken by the South Coast Environment Group (SCREG) and Foul Bay Area Progress Association is also active in the area.

Relevant plans

- Narungga Healthy Country Plan (in progress)
- Northern and Yorke Regional NRM Plan; Strategic Plan, 2019-2029
- Yorke Peninsula Council Draft Coastal Management Strategy; Hickeys Point to Corny Point, 2019
- Department for Environment and Heritage Management Plan; Mainland Conservation Parks of Yorke Peninsula 2009, Department for Environment and Heritage
- Coastal Motor Vehicle Access Management Strategy (2008) Northern and Yorke Natural Resources Management Region. D. Allen.
- Yorke NRM District Weed Action Plan (2018) Northern and Yorke Natural Resource Management Board.

Recommended Actions

The significant proportion of private land ownership, impact of informal camping areas, climate change and weeds are some of the biggest threats to the conservation value of this area.

While the Point Davenport CP is relatively inaccessible, its small size and the lack of a buffer between it and adjacent cropping and grazing land, constitute challenges to management such as fire risk mitigation, weed invasion and the potential for chemical spray drift (1).

Climate change

Sea level rise and inundation is likely to impact the inlet within Point Davenport Conservation Park. This area is geomorphologically unique with relatively recently deposited, low-lying coastal sediments making it highly susceptible to the impacts of rising seas.

The entire coastline of this Management Unit is a Potential Drift Hazard Zone so increased coastal erosion is likely to occur with rising sea levels.

Access and Recreation Impacts

Foul Bay Bush Camp is located 42 km south west of Warooka and access is via South Coast Road. Revegetation is recommended between sites at the north-eastern end (currently a day visit area) and could be opened to camping once the vegetation is established. Beach access should be limited to a less vegetated area at the north eastern end and signage to limit and direct access to the beach, installed (4).

Some fishermen moor their boats off Sandy Point at Point Davenport Conservation Park where there have been reports of illegal hunting of kangaroos and ducks (37). It is recommended that this is monitored and managed as necessary and a sign could be installed to educate and notify of infringement if caught.

Weeds

African Boxthorn (*Lycium ferocissimum*), a WoNS is widespread and frequent in this area. Western Coastal Wattle (*Acacia cyclops*) is also present throughout the area including in a plantation adjacent to the Foul Bay boat ramp. Other weeds recorded include Buffalo Grass (*Stenotaphrum secundatum*), Century Plant (*Agave americana*), Gazania (*Gazania* sp.) and False Caper (*Euphorbia terracina*).

Photo: Signage located at Foul Bay boat ramp. The *Acacia cyclops* plantation is in the background



Table 39. Recommended Management Actions; Point Davenport to Foul Bay Management Unit

Issue/Threat	Location	Recommended Action	Priority of Action	Potential Contributors
<i>Climate change impact</i>				
Beach and dune erosion <i>Storm surge and sea-level rise impact</i>	Whole Management Unit	Monitor beach and dune recession. Strengthen dune integrity with access management, dune stabilisation and revegetation. Avoid removal of dunes for development or infrastructure (maintain natural sand replenishment processes). Involve landholders in planning for future dune breaches and retreat zones.	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
Inundation and shoreline recession <i>Storm surge and sea-level rise impact</i>	In front of and immediately either side of Foul Bay shacks	Undertake flood and inundation mapping with regard to natural assets of the coast. Identify and map suitable areas for allowing tidal retreat. Involve landholders in planning for tidal retreat zones and projects.	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs

		Strengthen natural sand barriers with appropriate coastal shrub revegetation.		
<i>Access and recreation</i>				
Beach access	Foul Bay campsite	Limit beach access to the less vegetated area at the north eastern end of the Foul Bay campsite and install signs to direct access.	Medium	DEW / NRNY, Council, community groups, Traditional Owners NGOs
<i>Weeds</i>				
Woody (Western Coast Wattle, African Boxthorn)	Whole Management Unit	Undertake woody weed control as per Bushcare methods. At Foul Bay undertake staged removal of the source Western Coast Wattle population and replace with local native species (also a revegetation opportunity).	High	Landholders, DEW / NRNY, Council, community groups, Traditional, Owners NGOs
Succulents and garden escapes (including Gazania, Agave sp.)	Foul Bay shacks and surrounds	Engage with residents and provide information on garden weeds in bushland and alternative native garden plants.	Medium	Landholders, NRNY, Council, community groups
<i>Native vegetation</i>				
Vegetation protection - significant vegetation on private land	Foul Bay along South Coast Rd	Provide landholders with information on native vegetation values, management and their legislative responsibilities (e.g. intact strata under the Native Vegetation Act).	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional, Owners NGOs
Revegetation - good opportunities to reconnect coastal habitats with inland lake systems	Small section of the Park on the western side and adjacent private lands	Engage with adjacent landholders to develop revegetation opportunities.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional, Owners NGOs
<i>Domestic pets</i>				
Shorebird impacts from cats and off-leash dogs on beaches	Surrounding the towns	Raise awareness of the impact of cats and off-leash dogs on shorebirds in sensitive areas. Encourage responsible pet ownership.	Medium	NRNY, CPB, Council, landholders, community groups
<i>Feral animals</i>				
Foxes and cats	In Park and adjacent properties	Develop a coordinated fox and cat control program.	Medium	NRNY / DEW (parks), private landowners
Rabbits	Around Point Davenport	Develop a coordinated rabbit baiting program.	Medium	NRNY / DEW (parks), private landowners

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Cell NY50 - NY51: Point Yorke to Meehan Hill

Area: 1,166 hectares

Location: Located on the south coast of Yorke Peninsula and includes the area between Point Yorke, Butlers Beach to Meehan Hill lookout.



Land Tenure/Ownership

Private: farmland comprises the majority of this Management Unit, including private tourism facilities.

Public: a very narrow strip along the coast of unallotted Crown Land between Kangaroo Island Lookout and Meehan Hill Lookout.

Traditional Owners: Narungga Native Title Determination area.

Landforms

This section of coastline is characterised by numerous sandy beaches in between rocky cliffs and headlands. Around Point Yorke, an exposed bedrock platform sits at the base of 20-40m high cliffs, which are covered by eroding sand dunes.

Hillock Point is a prominent headland surrounded by steep incised rock platforms. On the eastern sheltered side is a small sand and rock beach.

Marine Habitat

The marine environment features nearshore dense, low to high profile reefs and areas of patchy, sparse seagrass. Large tracts of bare sand dominate the deeper offshore waters.

The coastline is moderately exposed with moderate wave energy.

Native Vegetation

Native vegetation covers approximately 45% (or 524 ha) of the coastline in this Management Unit and is generally well connected with other native vegetation to the east and west. It is also reasonably well connected to other vegetated areas to the north.

Along the coastal dunes *Olearia axillaris* + *Leucopogon parviflorus* shrubland generally dominates. Further inland patches of *Eucalyptus diversifolia* ssp. *diversifolia*, *Eucalyptus rugosa*+/-*Eucalyptus oleosa* ssp.+/-*Eucalyptus gracilis* mid mallee woodland are found.

To the west of Hillock Point is a large tract of *Olearia axillaris*, *Leucopogon parviflorus*+/-*Acacia nematophylla*+/-*Myoporum insulare* mid open shrubland.

East of Hillock Point is mapped as *Beyeria lechenaultii*+/-*Scaevola crassifolia*+/-*Goodenia varia*+/-*Leucophyta brownii*+/-*Olearia axillaris*+/-*Lasiopetalum discolor* low shrubland.

Conservation Significance

To the west of Hillock Point is a large patch of native vegetation which is relatively intact and the Nationally Vulnerable Malleefowl is regularly sighted in this area (L. Dahl-Helm pers. com.).

To the east of Hillock Point, clearing for agriculture has been pushed into the native vegetation remnants, increasing the edge to interior ratio of the patches, making them more vulnerable to desiccation and weed invasion.

No plants of State or National significance are recorded in the Biological Database of SA which indicates that this area may be under-surveyed. It is likely that significant species such as the State-Rare Limestone Phebalium (*Leionema microphyllum*) would be found if comprehensively surveyed.

Native vegetation in this Management Unit is part of the Southern Yorke Peninsula Important Bird Area (IBA).

This Unit is within the Great Southern Ark rewilding project footprint. The project aims to reintroduce native animals into the area and protect them from feral animals by building a fence across the peninsula to create a 140,000 hectare "safe haven". The fence is specially designed to keep feral animals out and direct them into areas where they can be managed.

Table 40. Species of National and State Conservation Significance (BDBSA records), Point Yorke to Hillock Point Management Unit

<i>Biota</i>	<i>Common name</i>	<i>Australia (EPBC)</i>	<i>SA (NPW Act)</i>
<i>Animal species</i>			
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		R
<i>Haliaeetus leucogaster</i>	White-bellied Sea Eagle		E
<i>Leipoa ocellata</i>	Malleefowl	VU	V
<i>Neophema petrophila</i>	Rock Parrot		R
<i>Pandion haliaetus cristatus</i>	Eastern Osprey		E
<i>Thinornis rubricollis</i>	Hooded Plover	VU	V
<i>Varanus rosenbergi</i>	Heath Goanna		V
<i>Plant species</i>			
N/A			

Management

Yorke Peninsula Council has been active in managing access around Kangaroo Island and Meehan Hill lookouts and along the Walk the Yorke trail. Trees for Life has undertaken revegetation on private lands west of Point Yorke. A private business manages the campgrounds in the Butlers Beach camping area at Hillock Point and has undertaken significant environmental work in conjunction with the South Coast Road Environment Group, SYP Landcare and the Friends of Walk the Yorke. The Foul Bay Area Progress Association is also an active community group in the area.

Relevant plans

- Narungga Healthy Country Plan (in progress)
- Northern and Yorke Regional NRM Plan; Strategic Plan, 2019-2029.
- Yorke Peninsula Council Draft Coastal Management Strategy; Hickeys Point to Corny Point, 2019
- Coastal Motor Vehicle Access Management Strategy (2008) Northern and Yorke Natural Resources Management Region. D. Allen.
- Yorke NRM District Weed Action Plan (2018) Northern and Yorke Natural Resource Management Board.

Recommended Actions

Management recommendations for this Unit include the maintenance of vegetation integrity through revegetation and weed control, and campsite and lookout formalisation.

Climate change

Significant vegetation is at risk of being impacted by increasing temperatures and reduced rainfall. This is further exacerbated by the fragmented nature of these remnants. Dune blowouts are likely to become more frequent, particularly as there is already significant disturbance from pedestrian access.

Most of the coastal area along this Management Unit is a Potential Drift Hazard Zone and behind Hillock Point is an Actual Drift Hazard Zone. These areas will be more at risk of erosion, with rising sea levels.

Access and Recreation Impacts

Access issues at Meehan Hill lookout have been largely addressed by the Yorke Peninsula Council with track formalisation and fencing of quality vegetation. Kangaroo Island Lookout still has access issues which are causing cliff-top dune blowouts. This issue is identified in the Council's coast strategy where it is recommended that the goat tracks leading to beach on western side of the carpark be revegetated, leaving only one access track.

Track formalisation, Dutch ladder access to beaches and public education have been undertaken on the private camping areas.

Photo: Access from the Kangaroo Island Lookout carpark leading to a dune blowout



Weeds

African Boxthorn (*Lycium ferocissimum*) a WoNS is the main woody weed in this area along with Western Coast Wattle (*Acacia cyclops*). Less serious weeds include Pincushion (*Scabiosa atropurpurea*), Sea Spurge (*Euphorbia paralias*) and Lincoln Weed (*Diplotaxis tenuifolia*). A range of weedy annual grasses also occur.

Native Vegetation

Good opportunities exist to reconnect fragmented remnants for high biodiversity gain. Some landholders have already undertaken revegetation works west of Point Yorke.

Table 41. Recommended Management Actions; Point Yorke to Hillock Point Management Unit

Issue/Threat	Location	Recommended Action	Priority of Action	Potential Contributors
<i>Climate change impact</i>				
Significant native vegetation	Tall shrublands on	Maintain vegetation integrity by minimising disturbance	Medium	DEW / NRNY, CPB, Council,

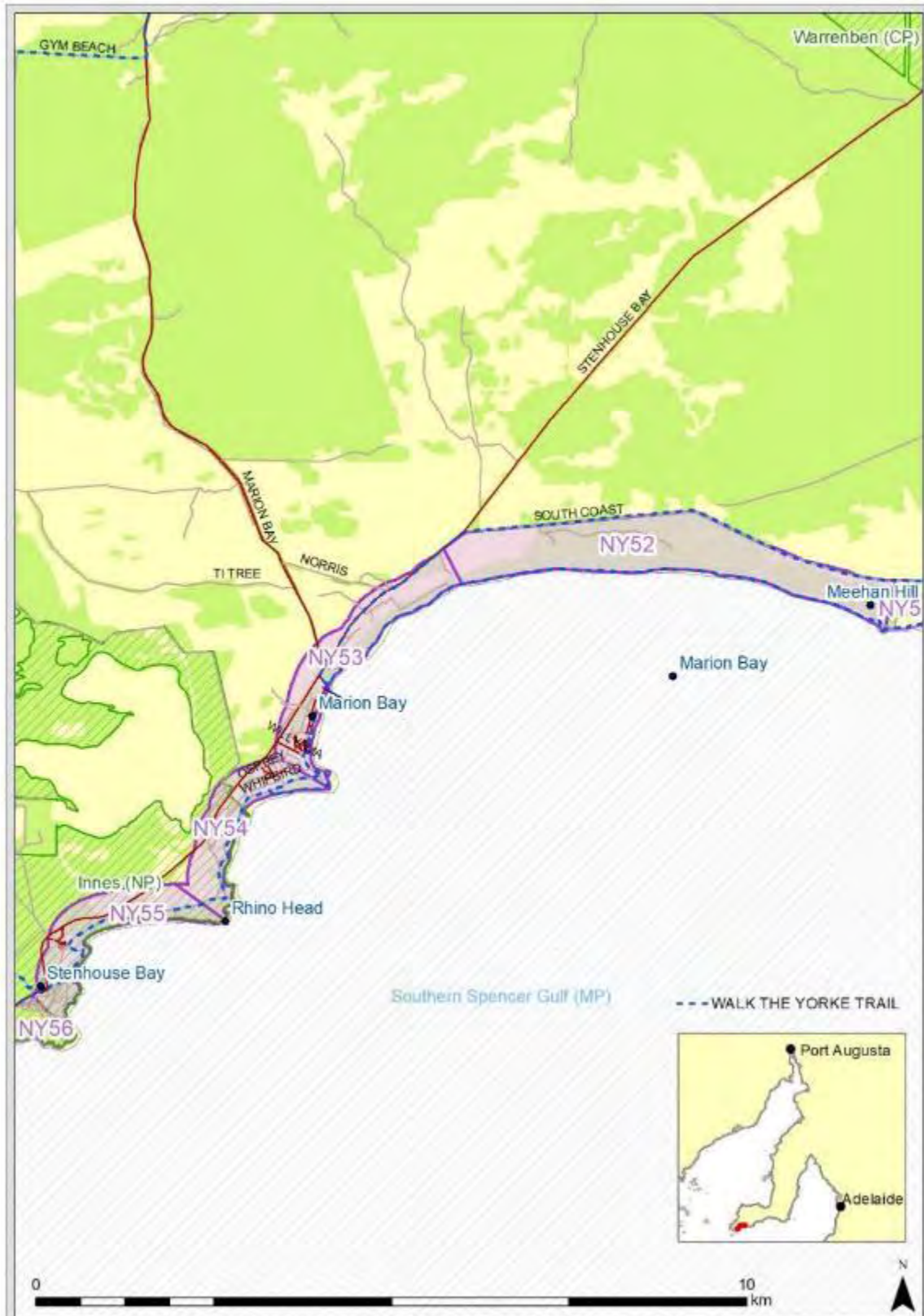
vulnerable to species composition change, compromised structural integrity and reduced regeneration potential (resilience)	sand dune systems Cliff top low shrublands and sedgeland	from vehicles, pedestrians, feral animals and weeds. Facilitate regeneration by passive (access management) or active (revegetation) interventions as required. Undertake active management of fire regime in large intact remnants.		landholders, community groups, Traditional Owners, NGOs
Cliff erosion <i>Storm surge and sea-level rise impact</i>	Whole Management Unit	Identify sections of cliffs most at risk, monitor recession. Maximise cliff-top integrity by maintaining vegetation buffers from the coast and providing set-backs from cropping and grazing activities.	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
Access and recreation				
Access management in Crown Land along the cliff-tops	Private lands west of Point Yorke	Support landowners to rationalise and formalise access to coast and provide information to the public to avoid exacerbating cliff-top blowouts.	High	DEW / NRNY, CPB, Council, community groups, Traditional Owners, NGOs
Pedestrian access management - informal tracks from carpark, cliff-top dune blowouts	Kangaroo Island Lookout (southern end of Hundred Line Rd)	Formalise carpark and install physical barrier to prevent pedestrian traffic walking west onto the cliff ledge and dune blowout area. Rationalise goat tracks to the west and revegetate unwanted tracks.	High	DEW / NRNY, CPB, Council, SAPOL, DPI, community groups, Traditional Owners, NGOs
Weeds				
Woody (African Boxthorn, Western Coast Wattle)	Whole Management Unit	Control woody weeds in native vegetation first as per bushcare method. Engage local residents and landholders and provide information and assistance.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional Owners, NGOs
Native vegetation				
Revegetation - opportunity to reconnect fragmented remnants for high biodiversity gain	North and south of South Coast Rd	Work with landowners to reconnect larger vegetation fragments and buffer coastal vegetation through natural regeneration and revegetation.	Medium	DEW / NRNY, CPB, landholders, community groups, Traditional Owners, NGOs
Feral animals				
Fox and cat predation on native animals and shorebirds	Whole Management Unit	Undertake control as recommended by NRNY and coordinate with neighbours.	High	Landholders, NRNY, Traditional Owners

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Cell NY52 – NY55: Marion Bay to Stenhouse Bay

Area: 916 hectares

Location: Located on the far south coast of Yorke Peninsula around Marion Bay and includes Penguin Point and Rhino Head, as well as the townships of Marion Bay and Stenhouse Bay.



Land Tenure/Ownership

Private: the majority of this Management Unit is private farmland and residential blocks.

Public: Innes National Park west of Marion Bay and a thin strip of unallotted Crown Land fronting the Bay.

Council: some large parcels owned by the Yorke Peninsula Council around Marion Bay township and Penguin Point.

Traditional Owners: Narungga Native Title Determination area.

Landforms

Marion Bay is a large, sandy bay backed by parabolic dunes up to 28 m high on the eastern side of the bay, with a series of beach ridges at the western end. It is a low energy beach with wave size decreasing towards Penguin Point. Extensive irregular dunefields reflect the medium energy beach at the eastern end.

Around Marion Bay township, deep reefs fronting the beach reduce the wave intensity where 150m wide sand flats have formed. Penguin Point is comprised of vertical calcarenite cliffs with vegetated cliff-top dunes. In Stenhouse Bay, deep reefs front the beach and vegetated dunes have built up over the backing vertical calcarenite bluffs.

At Rhino Head two small pocket sand beaches with rock debris from the calcarenite cliffs above and fronted by a rock platform. This coastline has moderately exposed with moderate to low wave energy areas, with some sheltered, low wave energy areas.

Marine Habitat

The marine environment consists of low-profile platform reefs, with areas of bare sand and seagrass. The sheltered coastline between Penguin Point and Rhino head supports dense seagrass. Stenhouse bay features reef along most of the shoreline.

Native Vegetation

This Management Unit contains 55% native vegetation cover (or 536 ha). The eastern side of Marion Bay features *Olearia axillaris*, *Leucopogon parviflorus*+/-*Acacia nematophylla* mid open shrubland on dune slopes and crests, interdune and foredune areas. To the western side of the bay *Eucalyptus diversifolia* ssp. *diversifolia* mid open mallee forest dominates.

Between Penguin Point and Rhino Head, *Lasiopetalum discolor*, *Melaleuca lanceolata* ssp. *lanceolata* shrubland <1m dominates on the limestone plains and sandy loam soils.

The area has some good vegetation, but low dune shrubland is sparse in places. Most of the coastal area has native vegetation cover. Connectivity is good with vegetation being connected to other areas of native vegetation at Rhino Head and north of Marion Bay.

Conservation Significance

Cell 52 contains unusual dune vegetation communities including areas of *Lepidosperma gladiatum* sedgeland which are of conservation value. The area also has geological heritage value and good habitat for butterflies (1).

Six regionally threatened plant species have been detected here including *Davesia sejugata* which has a very restricted distribution on Yorke Peninsula.

Notable species recorded in these cells include the Malleefowl (as recently as 2006), Hooded Plover, The State-Vulnerable Heath Goanna, Black Falcon, Swamp Harrier and Rainbow Lorikeet. Native vegetation in this unit is part of the Southern Yorke Peninsula Important Bird Area (IBA).

This Unit is within the Great Southern Ark rewilding project footprint. The project aims to reintroduce native animals into the area and protect them from feral animals by building a

fence across the peninsula to create a 140,000 hectare "safe haven". The fence is specially designed to keep feral animals out and direct them into areas where they can be managed.

Table 42. Species of National and State Conservation Significance (BDBSA records), Marion Bay to Stenhouse Bay Management Unit

<i>Biota</i>	<i>Common name</i>	<i>Australia (EPBC)</i>	<i>SA (NPW Act)</i>
<i>Animal species</i>			
<i>Falco peregrinus</i>	Peregrine Falcon		R
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		R
<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R
<i>Haliaeetus leucogaster</i>	White-bellied Sea Eagle		E
<i>Leipoa ocellata</i>	Malleefowl	VU	V
<i>Lichenostomus cratitius occidentalis</i>	Purple-gaped Honeyeater (mainland SA)		R
<i>Neophema petrophila</i>	Rock Parrot		R
<i>Neophoca cinerea</i>	Australian Sea Lion	VU	V
<i>Pandion haliaetus cristatus</i>	Eastern Osprey		E
<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R
<i>Varanus rosenbergii</i>	Heath Goanna		V
<i>Plant species</i>			
<i>Austrostipa multispiculis</i>	Many-flowered Spear-grass		R
<i>Davesia sejugata</i>	Disjunct Bitter Pea		E
<i>Poa fax</i>	Scaly Poa		R
<i>Prasophyllum calcicola</i>	Limestone Leek-orchid		V
<i>Ranunculus sessiliflorus var. pilulifer</i>	Annual Buttercup		V
<i>Tecticornia lepidosperma</i>	Slender Samphire		R

Management

Public land within Innes National Park is co-managed by the Department of Environment and Water and Narungga Traditional Owners. Active community groups include the Friends of Innes National Park and the Marion Bay Progress Association.

Relevant plans

- Narungga Healthy Country Plan (in progress)
- Northern and Yorke Regional NRM Plan; Strategic Plan, 2019-2029
- Yorke Peninsula Council Draft Coastal Management Strategy; Hickeys Point to Corny Point, 2019

- Coastal Motor Vehicle Access Management Strategy (2008) Northern and Yorke Natural Resources Management Region. D. Allen.
- Yorke NRM District Weed Action Plan (2018) Northern and Yorke Natural Resource Management Board.

Recommended Actions

The priority management actions in this Unit relate to mitigation of beach and dune erosion, ORV track formalization and weed control.

Climate change

Beach and dune erosion are potential issues in Marion Bay where the beaches are backed by sand dunes. A storm surge barrier has been installed in the Marion Bay township to protect houses. With rising sea levels this barrier may need to be upgraded.

The hard granite cliffs around Stenhouse Bay are relatively resistant to erosion.

The entire Marion Bay area is a Potential Drift Hazard Zone, as is the area between Penguin Point and Rhino Head. Stenhouse Bay has a Drift Hazard Zone to the southwest of the bay. These areas will be subjected to increased beach and cliff erosion with rising sea levels.

Access and Recreation Impacts

Vegetation clearance, grazing and ORV damage to dunes are impacting on the natural values of this area. There is some informal camping occurring on private property and dune and cliff erosion is occurring at Kangaroo Island Point.

Photo: Fenced blowout at Penguin Point which is still unstable



Weeds

Two WoNS: Bridal Creeper (*Asparagus asparagoides*) and African Boxthorn (*Lycium ferocissimum*) occur here. Other weeds include False Caper (*Euphorbia terracina*), Fumitory (*Fumaria* sp.), False Sowthistle (*Reichardia tingitana*), Myrtle-leaf Milkwort (*Polygala myrtifolia*), Onion Weed (*Asphodelus fistulosus*), Scabiosa and introduced grasses. Significant control of African Boxthorn has been undertaken but it requires follow up to adequately control the infestation.

Development

Coastal development may be an issue in this area as there has been some discussion about building a marina and Marion Bay is one of the coastal towns which could increase in population over time. A Concept Plan was undertaken by GHD in 2017 for the Yorke Peninsula Council, to review the options for a Marion Bay Boat Launching Facility.

Table 43. Recommended Management Actions; Marion Bay to Stenhouse Bay Management Unit

<i>Issue/Threat</i>	<i>Location</i>	<i>Recommended Action</i>	<i>Priority of Action</i>	<i>Potential Contributors</i>
<i>Climate change impact</i>				
Beach and dune erosion <i>Storm surge and sea-level rise impact</i>	Whole Management Unit	Monitor beach and dune recession. Strengthen dune integrity with access management, dune stabilisation and revegetation. Avoid removal of dunes for development or infrastructure (maintain natural sand replenishment processes). Involve landholders in planning for future dune breaches and retreat zones.	Medium	DEW / NRNY, CPB, Council, community groups, Traditional Owners, NGOs
<i>Access and recreation</i>				
Vehicle access - informal and excessive tracks	Within 1km of Stenhouse Bay Tavern	Rationalise tracks to provide formal access.	Medium	DEW / NRNY, CPB, community groups, Traditional Owners, NGOs
Pedestrian access - vegetation damage off the formal path	Cliff-top dunes at Penguin Point	Additional path formalisation and signs to discourage fence hopping and prevent erosion.	Medium	DEW / NRNY, CPB, Council, community groups, Traditional Owners, NGOs
<i>Weeds</i>				
Woody (African Boxthorn, Western Coast Wattle)	Marion Bay shacks, Penguin Point, remnant scrub adjacent the	Control woody weeds as per Bushcare methods. Monitor and control any Western Coast Wattle before it spreads.	High	Landholders, DEW / NRNY, Council, community groups, Traditional Owners, NGOs

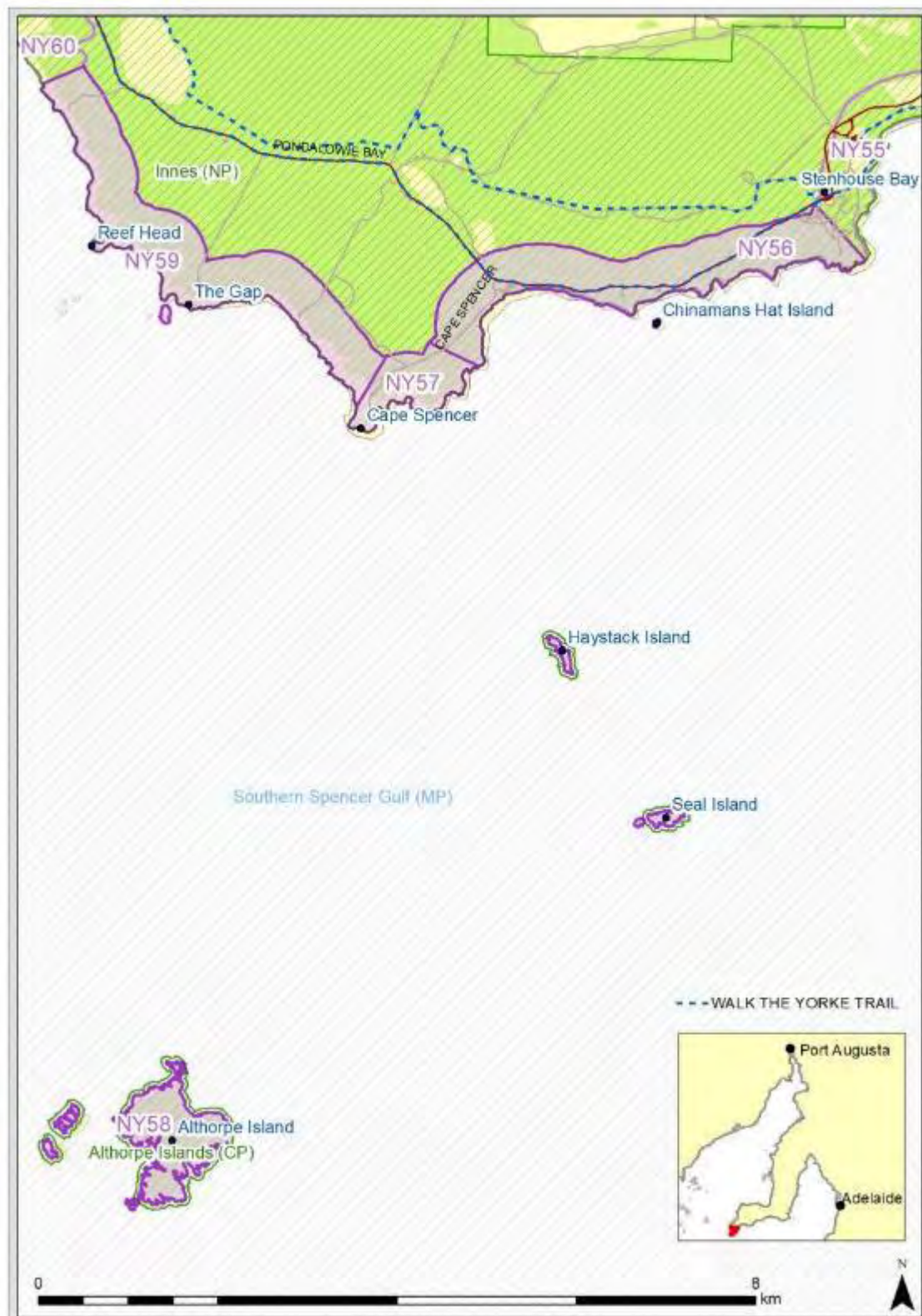
	South Coast Rd			
Succulents and bulbs - Gazania, Bridal Creeper	Around the older shacks on the foreshore in Marion Bay township, Penguin Point carpark	Control Bridal Creeper as per Declared Species and WoNS responsibilities. Provide information to local landholders regarding the control of high priority weeds and the containment of garden weeds.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional, Owners NGOs
<i>Native vegetation</i>				
Vegetation protection - significant vegetation in private ownership	Immediately west of Meehan Hill Lookout	Engage and assist landholders regarding the management of significant native vegetation on private land. Consider conservation covenants such as Heritage Agreements. Provide information on native vegetation values, management and legislative responsibilities (e.g. intact strata under the Native Vegetation Act).	Medium	Landholders, DEW / NRNY, community groups, Traditional, Owners NGOs
Revegetation - opportunities for buffering and strengthening connectivity and rehabilitating degraded areas	Private land west of Meehan Hill lookout Within 1km of Stenhouse Bay Tavern (rehabilitating degraded land)	Engage landholders to discuss potential revegetation projects. Rehabilitate unused tracks around Stenhouse Bay with facilitated natural regeneration and revegetation.	Medium	Landholders, DEW / NRNY, community groups, Traditional, Owners NGOs
<i>Domestic pets</i>				
Shorebird impacts from cats and off-leash dogs on beaches	Surrounding the towns	Raise awareness of the impact of cats and off-leash dogs on shorebirds in sensitive areas. Encourage responsible pet ownership.	Medium	NRNY, CPB, Council, landholders, community groups,
<i>Feral animals</i>				
Fox and cat predation on native animals and shorebirds	Whole Management Unit	Undertake control as recommended by NRNY and coordinate with neighbours.	High	Landholders, NRNY, Traditional Owners
Rabbits	Marion Bay area	Control rabbits.	Medium	DEW / NRNY, community groups

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Cells NY56 - NY59: Stenhouse Bay, Althorpe Island to Reef Head

Area: 732 hectares

Location: Located on the far south coast of Yorke Peninsula from Stenhouse Bay, west into the Innes National Park. Includes Cape Spencer, Cable Hut Bay, Althorpe Islands and Reef Head.



Land Tenure/Ownership

Public: Crown Land Act Reserve (Innes National Park, Althorpe Islands Conservation Park).
Traditional Owners: Narungga Native Title Determination area.

Landforms

Between Stenhouse Bay and Cape Spencer the south-facing aeolianite cliffs are up to 200 m high. Strong winds and high wave energy have formed this coast into a series of sandy beaches with rocky outcrops, separated by protruding bluffs. The steep rocky headlands and vertical calcarenite cliffs increase in height towards the west. The beaches are generally protected by offshore rock platforms and reefs and there are sections of beach with strong currents and rips.

The Althorpe Islands consist of an aeolianite plateau up to 90 m tall, over granite basement rock, with steep cliffs and caves on all sides and one small sandy embayment.

Marine Habitat

The marine environment is dominated by extensive limestone, medium to low profile reefs. There is a large tract of bare sand between Cape Spencer and The Gap. The Althorpe Islands are surrounded by heavy limestone reefs.

Much of this coastline is exposed with high wave energy, however there are some areas that are moderately exposed and some low wave energy areas.

Native Vegetation

Native vegetation on the mainland in this Management Unit is extensive and well connected with approximately 80% of the area covered with native vegetation (approximately 584 ha).

The native vegetation is mapped as:

Lasiopetalum discolor, *Melaleuca lanceolata* ssp. *lanceolata* (NC)+/- *Calytrix tetragona* +/- *Gahnia lanigera* +/- *Pomaderris paniculosa* ssp. *paniculosa*+/-*Templetonia retusa* low shrubland.

Leucopogon parviflorus, *Acacia anceps* mid open shrubland over *Lasiopetalum discolor* low shrubs and *Calytrix tetragona* (mixed) low shrubs.

Olearia axillaris, *Leucopogon parviflorus* +/- *Acacia nematophylla* +/- *Myoporum insulare* mid open shrubland.

Templetonia retusa, *Acacia nematophylla*, *Olearia axillaris* +/- *Alyxia buxifolia* mid open shrubland

Patches of *Eucalyptus diversifolia* ssp. *diversifolia* mid open mallee forest occur on some dunes, flats, rock outcrops and plains. A large patch of *Lasiopetalum discolor*, *Melaleuca lanceolata* ssp. *lanceolata* shrubland <1m lies south of Stenhouse Bay.

Native vegetation on the Althorpe islands consists of low saltbush shrubland with dense Nitre Bush shrubs in sheltered locations.

Conservation Significance

This Management Unit has high conservation value for flora and fauna with over 30 species listed in the Biological Database of SA.

The area is an Important Bird Area (IBA) and supports a high number of species including the Nationally Vulnerable White-bellied Whippbird (southern mainland sub-species of the Western

Whipbird), and White-bellied Sea-Eagle and Eastern Osprey which continue to nest here (56, 57). Beach habitats in this area are highly valuable for a variety of waders.

The area around Reef Head has a particularly high plant diversity. Cape Spencer has geological and natural heritage values. Chainman's Hat Island is a nesting site for Little Penguins and is surrounded by a Marine Park.

The Althorpe Islands have important Aboriginal and European heritage value and a high species richness with 125 plants, and 30 animal species recorded (note the island has been intensively surveyed).

The Western Islets are breeding sites for the Crested Tern (population 2,000 – 3,000), from September to December. The main island is a breeding site for the Little Penguin (population 51 – 100), from July to January. Seal Island is a breeding site for the Fairy Tern (population 51 – 100), from September to December. Haystack Island is a breeding site for the White-Faced Storm Petrel (population 601 – 1,000), from September to December. Sea lions also breed on these islands.

One significant feature of these islands is that the shrub communities differ greatly from the clifftop communities of the peninsula, being more akin to arid communities further north. This may possibly relate to conditions of late Pleistocene low sea level, when the islands were linked to the mainland, and cool arid conditions were prevalent in the area (1).

The mainland section of this Unit is within the Great Southern Ark rewilding project footprint. The project aims to reintroduce native animals into the area and protect them from feral animals by building a fence across the peninsula to create a 140,000 hectare "safe haven". The fence is specially designed to keep feral animals out and direct them into areas where they can be managed.

Table 44. Species of National and State Conservation Significance (BDBSA records), Stenhouse Bay to Reef Head Management Unit

<i>Biota</i>	<i>Common name</i>	<i>Australia (EPBC)</i>	<i>SA (NPW Act)</i>
<i>Animal species</i>			
<i>Actitis hypoleucos</i>	Common Sandpiper		R
<i>Arenaria interpres</i>	Ruddy Turnstone		R
<i>Cereopsis novaehollandiae novaehollandiae</i>	Cape Barren Goose		R
<i>Cladorhynchus leucocephalus</i>	Banded Stilt		V
<i>Egretta sacra</i>	Pacific Reef Heron (Eastern Reef Egret)		R
<i>Eubalaena australis</i>	Southern Right Whale	EN	V
<i>Falco peregrinus</i>	Peregrine Falcon		R
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		R
<i>Haliaeetus leucogaster</i>	White-bellied Sea Eagle		E
<i>Hylacola cauta cauta</i>	Shy Heathwren		R

<i>Leipoa ocellata</i>	Malleefowl	VU	V
<i>Lichenostomus cratitius occidentalis</i>	Purple-gaped Honeyeater (mainland SA)		R
<i>Macronectes giganteus</i>	Southern Giant Petrel	EN	
<i>Neophema petrophila</i>	Rock Parrot		R
<i>Neophoca cinerea</i>	Australian Sea Lion	VU	V
<i>Pandion haliaetus cristatus</i>	Eastern Osprey		E
<i>Petroica boodang boodang</i>	Scarlet Robin		R
<i>Psophodes leucogaster leucogaster</i>	White-bellied Whipbird (mainland subspecies)	VU	E
<i>Stercorarius antarcticus</i>	Brown Skua		
<i>Sternula albifrons</i>	Little Tern		
<i>Sternula nereis</i>	Fairy Tern	VU	
<i>Thinornis rubricollis</i>	Hooded Plover	VU	
<i>Turnix varius</i>	Painted Buttonquail		
<i>Plant species</i>			
<i>Caladenia bicallata</i> ssp. <i>bicallata</i>	Western Daddy-long-legs		R
<i>Caladenia brumalis</i>	Winter Spider-orchid	VU	V
<i>Caladenia flaccida</i>	Drooping Spider-orchid		V
<i>Centrolepis cephaloformis</i> ssp. <i>cephaloformis</i>	Cushion Centrolepis		R
<i>Isotoma scapigera</i>	Salt Isotome		R
<i>Microlepidium pilosulum</i>	Hairy Shepherd's-purse		R
<i>Myoporum parvifolium</i>	Creeping Boobialla		R
<i>Orobanche cernua</i> var. <i>australiana</i>	Australian Broomrape		R
<i>Poa drummondiana</i>	Knotted Poa		R
<i>Poa fax</i>	Scaly Poa		R
<i>Prasophyllum calcicola</i>	Limestone Leek-orchid		V
<i>Spyridium leucopogon</i>	Silvery Spyridium		R
<i>Stackhousia annua</i>	Annual Candles	VU	V
<i>Tecticornia flabelliformis</i>	Bead Samphire	VU	V

Management

Innes National Park is managed by the Department for Environment and Water (DEW). A co-management arrangement with Narungga traditional owners is currently in progress. The Friends of Innes National Park and the Friends of Althorpe Island are active community groups.

Relevant plans

- Narungga Healthy Country Plan (in progress)
- Northern and Yorke Regional NRM Plan; Strategic Plan, 2019-2029
- Mainland Conservation Parks of Yorke Peninsula. Department for Environment and Heritage, 2009.
- Shorebird Conservation Action Plan; South Australia Shorebird Alliance / Birdlife Australia.
- Yorke NRM District Weed Action Plan (2018) Northern and Yorke Natural Resource Management Board.
- Innes National Park Management Plan (2003) Department for Environment and Heritage.
- Recovery Plans EPBC-listed species (Malleefowl, Western Whipbird and threatened flora).

Recommended Actions

The main threat to conservation values in this Management Unit are beach erosion, weed invasion, feral animals and uncontrolled fire.

Climate change

This Unit is likely to experience accelerated cliff and beach erosion as most of this coastline is designated as a Potential Drift Hazard Zone. Inundation of low-lying areas will be minimal as cliffs dominate the landscape. Low-lying parts of the Althorpe Islands may be at risk from sea level rise impacts.

Access and Recreation Impacts

Innes National Park receives high annual visitation and the infrastructure has been upgraded accordingly. Hence there are minimal access impacts apart from the immediate vicinity of car parks and campgrounds where people stray from the formal tracks.

The Althorpe Islands are difficult to access and have very low visitation and impact. At present the main path is considered unsafe and access is only permitted by helicopter.

There is potential in this Management Unit for disturbance impacts to shorebirds and raptors during the breeding seasons. Raising public awareness of the issue and temporary beach closures during key feeding times and nesting periods should be supported.

Weeds

Perhaps the most significant threat to the conservation values of this area is weed invasion. African Boxthorn (*Lycium ferocissimum*), a WoNS and other problematic weeds present such as Western Coast Wattle (*Acacia cyclops*) and Boneseed (*Chrysanthemoides monillifera*), have been found at several different locations in the Innes NP.

Feral Predators

Intensive fox and cat control programs have been undertaken for many years in Innes National Park and surrounding private lands. Their success have been demonstrated by the presence of surviving Malleefowl and Tammar Wallaby populations. Climate change and the re-introduction of small mammals under the Great Southern Ark Project will present new challenges and increased urgency to controlling feral predators.

Fire

The large tracts of intact native vegetation in this area increases the potential for large scale wildfires to occur, particularly under climate change scenarios. The Naturally Yorke Conservation Action Planning Group developed a collaborative goal for this issue: by 2020, evidence-based, landscape-scale fire management regimes are in place for sub-coastal

mallee communities, to mitigate the risk of large wildfires to flora and fauna populations (e.g. Malleefowl) and maximise habitat and species diversity (59).

To achieve this goal a significant increase in funding and resources would be required to undertake and appropriate planned burning program.

Table 45. Recommended Management Actions; Stenhouse Bay to Reef Head Management Unit

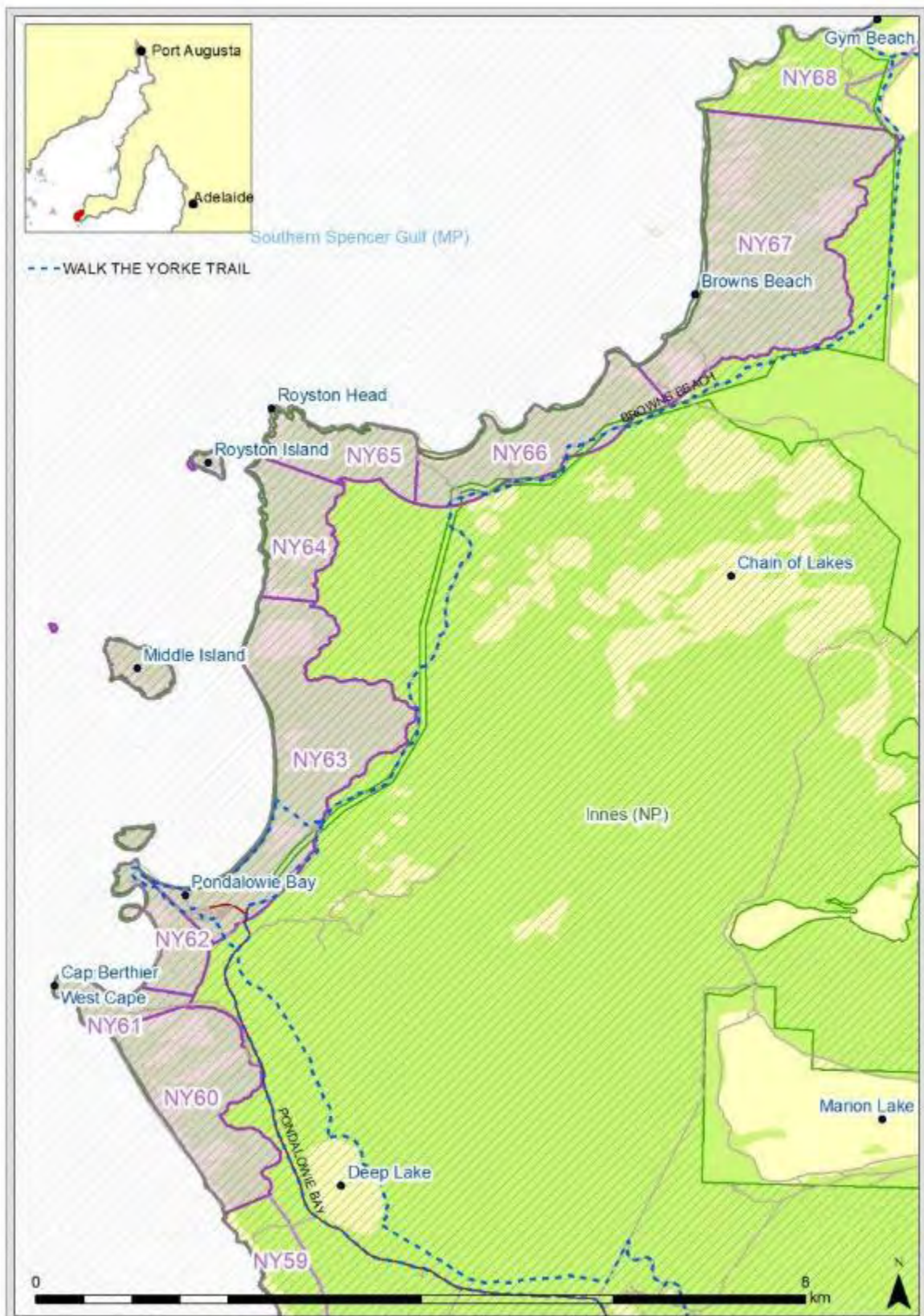
<i>Issue/Threat</i>	<i>Location</i>	<i>Recommended Action</i>	<i>Priority of Action</i>	<i>Potential Contributors</i>
<i>Climate change impact</i>				
Flora at risk of localised extinction <i>Temperature and reduced rainfall impact</i>	Known threatened species locations and habitats	Identify and monitor (survey) species most at risk (e.g. endemic orchids and herbs) Consider active translocation and or gene/seed banking for highly threatened species in fragmented or disturbed vegetation Active management of fire regimes and the control of other threats in large intact remnants.	Medium	DEW / NRNY, Friends of Parks, CPB, Traditional Owners, NGOs
Significant native vegetation vulnerable to species composition change, compromised structural integrity and reduced regeneration potential (resilience)	Whole Management Unit	Maintain vegetation integrity by minimising disturbance from vehicles, pedestrians, feral animals and weeds. Facilitate regeneration by passive (access management) or active (revegetation) interventions as required. Active management of fire regimes in large intact remnants.	Medium	DEW / NRNY, Friends of Parks, CPB, Traditional Owners, NGOs
<i>Access and recreation</i>				
n/a				
<i>Weeds</i>				
Woody (African Boxthorn, Western Coast Wattle)	Whole Management Unit	Monitor for invasive woody weeds and control as new plants arise. Develop strategies for control of widespread infestations.	High	DEW / NRNY, Friends of Parks, CPB, Traditional Owners, NGOs
<i>Feral animals</i>				
Foxes and cats	Whole Management Unit	Increase efforts to control foxes and cats, including the use of new available techniques.	High	DEW / NRNY, Friends of Parks, CPB, Traditional Owners, NGOs

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Cells NY60 - NY67: West Cape to Browns Beach

Area: 1,390 hectares

Location: Innes National Park at the south-west extremity of Yorke Peninsula.



Tenure/Ownership

Public: the entire Management Unit is within Innes National Park.

Traditional Owners: Narungga Native Title Determination area.

Landforms

Landform features along this predominantly west facing coastline have been shaped by an exposed, moderate to high wave energy environment. The eroding aeolianite cliffs, which are underlain by granite, have formed numerous nearshore rocky reefs and islands with headlands that are separated by sandy beaches.

Between the headlands several crescent-shaped bays are backed by vegetated parabolic dunes extending up to 1.5 km inland, with occasional blowouts. Cliff-top dunes are connected at back of the bays. This coastline is still subject to active erosion.

At Pondalowie Bay there is a steep island tombolo (a bar of sand or shingle joining an island to the mainland). From Royston Head the coastline faces more to the north where lower energy beaches like Shell Beach are bordered by sloping granite platforms. Browns Beach is bordered in the south by a 150m long rock platform. Two beach rock reefs protrude 50 and 100m offshore to create a sheltered lagoon in front of the beach.

Marine Habitat

The exposed headlands with moderate to high wave energy areas are surrounded by large tracts of bare sand and near-shore, dense, low-profile reefs. Some of the sheltered beaches are low wave energy areas.

Native Vegetation

82% of the unit is mapped as native vegetation (1,135ha), the remainder being bare sand. Coastal native vegetation within Innes National Park is largely intact and consists predominantly of:

Olearia axillaris + *Leucopogon parviflorus* shrubland along the coastline and dunes with patches of *Eucalyptus diversifolia* ssp. *diversifolia* mallee

Allocasuarina verticillata Low Woodland over a sclerophyll coastal shrub understorey on the hind dunes.

Conservation Significance

This part of the coastline has a very high conservation significance due to the vegetation being largely intact and well-connected, with many species of conservation significance.

Significant species detected within these cells include the Nationally Vulnerable Malleefowl, White-bellied (Western) Whipbird, Osprey, White-bellied Sea Eagle, Blue-winged Parrot, Banded Stilt, Rock Parrot, Sooty Oystercatcher and Peregrine Falcon. Tammar Wallabies have been re-introduced into the Park and it is a stronghold for Western Pygmy Possum. There is also good habitat for bush birds and butterflies and the beaches in this Management Unit are important breeding territories for Hooded Plovers.

There are also important examples of recent stromatolites within the saline lakes of the Park. **Stromatolites**, a Greek word meaning 'layered rock' are microbial reefs created by cyanobacteria (also known as blue-green algae) and formed by a slow process of sediment trapping and binding.

This Unit is within the Great Southern Ark rewilding project footprint. The project aims to reintroduce native animals into the area and protect them from feral animals by building a fence across the peninsula to create a 140,000 hectare "safe haven". The fence is specially designed to keep feral animals out and direct them into areas where they can be managed.

Table 46. Species of National and State Conservation Significance (BDBSA records), West Cape to Browns Beach Management Unit

Biota	Common name	Australia (EPBC)	SA (NPW Act)
<i>Animal species</i>			
<i>Actitis hypoleucos</i>	Common Sandpiper		R
<i>Arenaria interpres</i>	Ruddy Turnstone		R
<i>Burhinus grallarius</i>	Bush Stonecurlew		R
<i>Calidris alba</i>	Sanderling		R
<i>Cladorhynchus leucocephalus</i>	Banded Stilt		V
<i>Egretta garzetta</i>	Little Egret		R
<i>Egretta sacra</i>	Pacific Reef Heron (Eastern Reef Egret)		R
<i>Eubalaena australis</i>	Southern Right Whale	EN	V
<i>Falco peregrinus</i>	Peregrine Falcon		R
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		R
<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R
<i>Haliaeetus leucogaster</i>	White-bellied Sea Eagle		E
<i>Hylacola cauta cauta</i>	Shy Heathwren		SP
<i>Leipoa ocellata</i>	Malleefowl	VU	V
<i>Lichenostomus cratitius occidentalis</i>	Purple-gaped Honeyeater (mainland SA)		R
<i>Mirounga leonina</i>	Southern Elephant Seal	VU	R
<i>Neophema elegans</i>	Elegant Parrot		R
<i>Neophema petrophila</i>	Rock Parrot		R
<i>Pandion haliaetus cristatus</i>	Eastern Osprey		E
<i>Petroica boodang boodang</i>	Scarlet Robin		R
<i>Psophodes leucogaster leucogaster</i>	Western Whipbird mainland subspecies	VU	E
<i>Sternula nereis</i>	Fairy Tern	VU	E
<i>Thalassarche melanophris</i>	Black-browed Albatross	VU	ssp
<i>Thinornis rubricollis</i>	Hooded Plover	VU	V
<i>Turnix varius</i>	Painted Buttonquail		R
<i>Varanus rosenbergi</i>	Heath Goanna		V
<i>Plant species</i>			

<i>Austrostipa echinata</i>	Spiny Spear-grass		R
<i>Caladenia bicallata</i> ssp. <i>bicallata</i>	Western Daddy-long-legs		R
<i>Caladenia brumalis</i>	Winter Spider-orchid*	VU	V
<i>Leptorhynchos scaber</i>	Annual Buttons		R
<i>Orobanche cernua</i> var. <i>australiana</i>	Australian Broomrape		R
<i>Poa fax</i>	Scaly Poa		R
<i>Prasophyllum calcicola</i>	Limestone Leek-orchid		V
<i>Tecticornia flabelliformis</i>	Bead Samphire**	V	VU
<i>Tecticornia lepidosperma</i>	Slender Samphire		R

*Common in the area and likely to occur in the coastal zone

**Recorded in the Park in recent surveys and likely in the coastal zone (D. Furbank pers com.)

Management

Innes National Park is managed by the Department for Environment and Water (DEW) which works with many organisations including the Friends of Innes National Park, the Native Orchid Society, Zoos SA and universities on various research and monitoring projects. A co-management arrangement with Narungga traditional owners is currently in progress.

Relevant plans

- Narungga Healthy Country Plan (in progress)
- Northern and Yorke Regional NRM Plan; Strategic Plan, 2019-2029
- Yorke NRM District Weed Action Plan (2018) Northern and Yorke Natural Resource Management Board.
- Innes National Park Management Plan. Department for Environment and Heritage, 2003
- Recovery Plans EPBC-listed species (Malleefowl, Western Whipbird and threatened flora).

Recommended Actions

There are good opportunities to manage threats and conserve significant flora and fauna given the extensive native vegetation. There are also good opportunities to monitor and study the results of planned rewilding measures.

Climate change

The cliffs along this coast are likely to be impacted by storm surge events and sea-level rise which will increase erosion of both headlands and beaches and further expand dune blowout areas.

Beach erosion will impact cells 60, 62, 63, 64 and dune blowouts in cells 63 and 64. Part restricted migration potential in cell 66 and unrestricted migration potential in cell 67.

The whole of this coastal area is a Potential Drift Hazard Zone, which will be subjected to more severe erosion events, with rising sea levels.

Access and Recreation Impacts

Campsites and infrastructure within the Park are well formalised and although they are well used, there are relatively minor impacts to date.

However, there are extensive areas of de-vegetated dunes in these cells that are a natural feature of high-energy sandy coastlines. Where human impact has exacerbated dune instability, further action to control access and undesirable recreation activities may necessary. The photo below shows one of these areas near Browns Beach.

Photo: Example of exacerbated dune blowouts adjacent to campsites and car parks, Browns Beach



Weeds

At least three WoNS occur in this area: African Boxthorn (*Lycium ferocissimum*), Bridal Creeper (*Asparagus asparagoides*) and Bridal Veil (*Asparagus declinatus*), as well as a number of other serious environmental weeds.

Feral Predators

Intensive fox and cat control programs have been undertaken for many years in Innes National Park and surrounding private lands. Their success has been demonstrated by the presence of surviving Malleefowl and Tammar Wallaby populations. Climate change and the re-introduction of small mammals under the Great Southern Ark Project will present new challenges and increased urgency to controlling feral predators.

Fire

The large tracts of intact native vegetation in this area increases the potential for large scale wildfires to occur, particularly under climate change scenarios. The Naturally Yorke Conservation Action Planning Group developed a collaborative goal for this issue: by 2020, evidence-based, landscape-scale fire management regimes are in place for sub-coastal mallee communities, to mitigate the risk of large wildfires to flora and fauna populations (e.g. Malleefowl) and maximise habitat and species diversity (59).

To achieve this goal, a significant increase in funding and resources would be required to undertake and appropriate such a planned fire hazard reduction program.

Table 47. Recommended Management Actions: West Cape to Browns Beach Management Unit

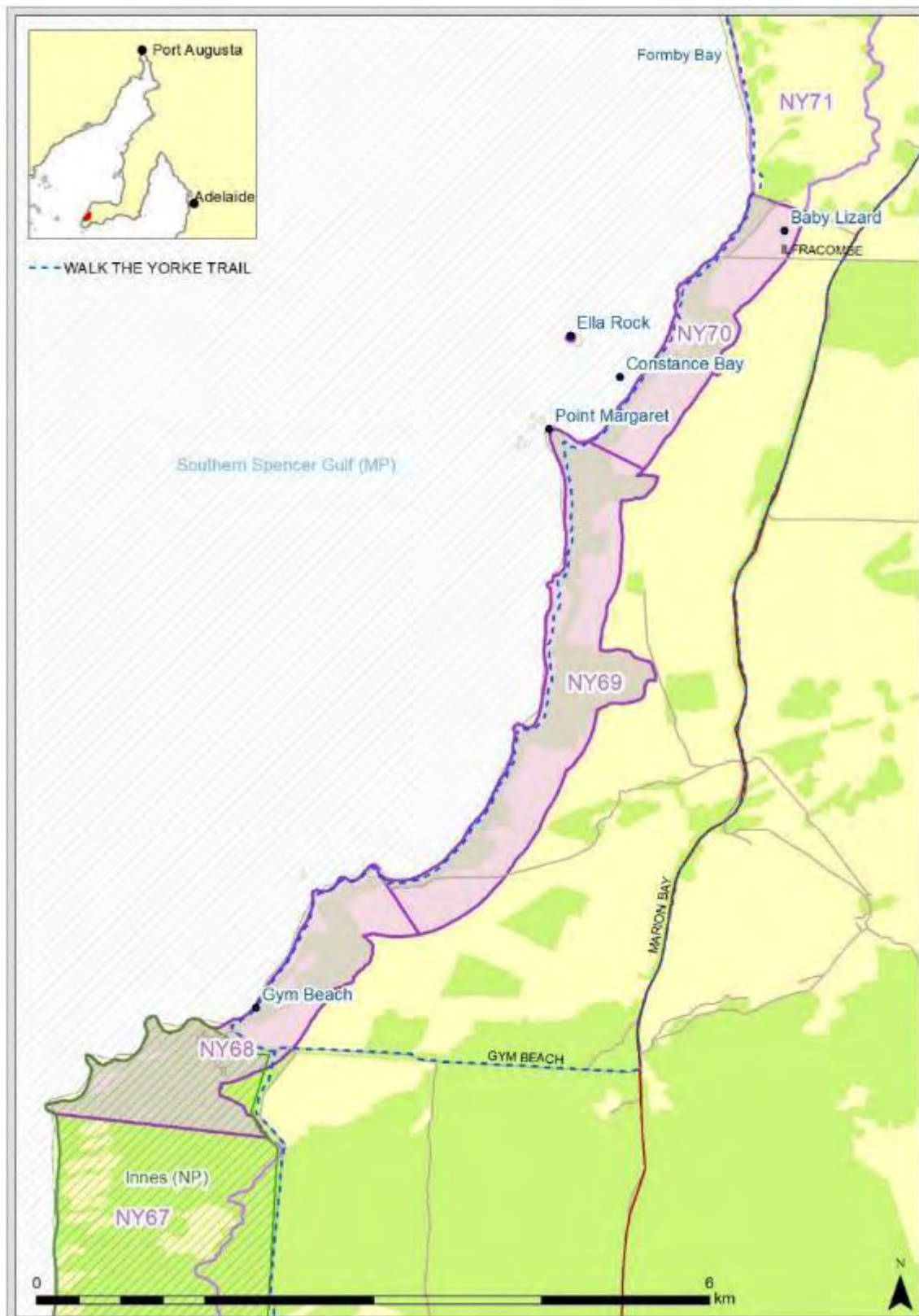
<i>Issue/Threat</i>	<i>Location</i>	<i>Recommended Action</i>	<i>Priority of Action</i>	<i>Potential Contributors</i>
<i>Climate change impact</i>				
Beach and dune erosion	Beach front dune systems (e.g. Pondalowie Bay, Browns Beach)	Monitor dune recession. Visitor access management to minimize ORV impacts to foredune systems. Strengthen dune integrity with access management, dune stabilisation and revegetation.	Medium	DEW / NRNY, community groups, CPB, Traditional Owners, NGOs
<i>Access and recreation</i>				
Pedestrian impacts (high visitation)	Campsites, dunes and cliff lookouts	Maintain and improve infrastructure and signage as necessary to discourage off-track access.	Medium	DEW / NRNY, community groups, CPB, Traditional Owners, NGOs
<i>Weeds</i>				
Woody (African Boxthorn, Western Coast Wattle)	Whole cell	Monitor for invasive woody weeds and control as new plants arise.	High	DEW / NRNY, community groups, CPB, Traditional Owners, NGOs
Succulents and bulbs (Bridal Creeper, Bridal Veil)	Whole cell	Monitor for invasive woody weeds and control as observed.	High	DEW / NRNY, community groups, CPB, Traditional Owners, NGOs
<i>Feral animals</i>				
Foxes and cats	Whole Management Unit	Increase efforts to control foxes and cats, including the use of new available techniques	High	DEW / NRNY, community groups, CPB, Traditional Owners, NGOs

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Cells NY68 - NY70 Gym Beach to Constance Bay

Area: 641 hectares

Location: Immediately north of Innes National Park along the 'toe' of the Peninsula.
Includes Point Margaret.



Land Tenure/Ownership

Private: the majority of this Management Unit is under private ownership

Public: a thin strip of unallotted Crown Land along the coast

Council: Yorke Peninsula Council own parcels around Baby Lizards carpark, and have care and control of some Crown Land

Traditional Owners: Narungga Native Title Determination area.

Landforms

A high energy coastline with small sand beaches between sections of calcarenite rock platforms, often with a strip of high tide sand above the platforms. The beaches are bordered by rock outcrops and reefs in the south and bluffs to the north. Intertidal flats with rock debris lie at the base of the vertical cliffs.

Marine Habitat

The marine environment consists of a mixture of continuous to patchy, dense, low-profile reef areas close to shore, with vast tracts of bare sand further out to sea.

Native Vegetation

54% of this Management Unit (or 343 ha) is mapped as having native vegetation cover. A narrow patch of well-connected native vegetation occurs along the coastline, backed by adjacent agriculture (cropping and/or grazing). Some larger blocks of dune vegetation and low cliff-top shrublands also occur here.

Vegetation associations include:

Olearia axillaris, *Leucopogon parviflorus*+/-*Acacia nematophylla*+/-*Myoporum insulare* mid open shrubland on sand dunes.

Eucalyptus diversifolia ssp. *diversifolia* mallee woodland.

Beyeria lechenaultii+/-*Scaevola crassifolia*+/-*Goodenia varia*+/-*Leucophyta brownii*+/-*Olearia axillaris*+/-*Lasiopetalum discolor* low shrubland on cliffs.

Conservation Significance

This area has good beach habitat for a range of waders. Malleefowl has been recorded here, likely from with Innes National Park. Native vegetation is generally well connected along this part of the coast, however most of this Management Unit is private land thus native vegetation may be compromised by farming practices.

This Unit is within the Great Southern Ark rewilding project footprint. The project aims to reintroduce native animals into the area and protect them from feral animals by building a fence across the peninsula to create a 140,000 hectare "safe haven". The fence is specially designed to keep feral animals out and direct them into areas where they can be managed.

Table 48. Species of National and State Conservation Significance (BDBSA records), Gym Beach to Constance Bay Management Unit

Biota	Common name	Australia (EPBC)	SA (NPW Act)
<i>Animal species</i>			
<i>Arenaria interpres</i>	Ruddy Turnstone		R
<i>Egretta sacra</i>	Pacific Reef Heron (Eastern Reef Egret)		R
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		R

<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R
<i>Haliaeetus leucogaster</i>	White-bellied Sea Eagle		E
<i>Leipoa ocellata</i>	Malleefowl	VU	V
<i>Sternula nereis</i>	Fairy Tern	VU	E
<i>Thinornis rubricollis</i>	Hooded Plover	VU	V
<i>Varanus rosenbergi</i>	Heath Goanna		V
<i>Plant species</i>			
<i>Microlepidium pilosulum</i>	Hairy Shepherd's-purse		R

Management

Most of this Management Unit is privately managed agricultural land with a small section in the south included in Innes National Park and managed by Department for Environment and Water.

Community groups have been very active in the area undertaking works such as tracks and access formalisation. Work by the Formby Bay Environmental Action Group at Baby Lizards carpark, was carried out in conjunction with the Yorke Peninsula Council. The Council also manages the Walk the Yorke trail through the Crown lands.

Relevant plans

- Narungga Healthy Country Plan (in progress)
- Northern and Yorke Regional NRM Plan; Strategic Plan, 2019-2029.
- Yorke Peninsula Council Draft Coastal Management Strategy; Hickeys Point to Corny Point, 2019
- Coastal Motor Vehicle Access Management Strategy (2008) Northern and Yorke Natural Resources Management Region. D. Allen.
- Yorke NRM District Weed Action Plan (2018) Northern and Yorke Natural Resource Management Board.

Recommended Actions

There are good opportunities for reconnecting coastal remnant vegetation with inland remnants through revegetation on private land.

Climate change

There is high potential for cliff erosion, with increased storm surge frequency and sea level rise. Limited ability occurs for species and habitats to migrate inland, due to the presence of adjacent agriculture located close to the coastal dune system.

The whole length of this coastline is a Potential Drift Hazard Zone, which with rising sea levels, will be prone to greater erosion.

Access and Recreation Impacts

There are informal tracks and dune blowouts in this area. The Yorke Peninsula Council has recommended installing a wooden boardwalk and staircase to formalise access at Gym Beach (although not on Council land). The formalisation and levelling of the carpark was also recommended.

Visitation in this area is likely to increase with a newly sealed road planned to link Gym Beach and Marion Bay through Innes National Park. This may affect how campgrounds and carparks are formalised and may increase the need for visitor information.

Weeds

African Boxthorn (*Lycium ferocissimum*) a WoNS, is found in this area. Other weeds recorded by Yorke Peninsula Council include Soursob, Pincushion, Annual grasses and a small amount of Marram Grass is present in the foredunes. Beach Daisy (*Arctotheca populifolia*) is spreading at the base of dunes, north to Formby Bay.

Photo: Path formalisation along the Walk the Yorke trail toward Trespassers surf break. Note the path is in keeping with natural character of the cliff-top environment



Table 49. Recommended Management Actions: Gym Beach to Constance Bay Management Unit

<i>Issue/Threat</i>	<i>Location</i>	<i>Recommended Action</i>	<i>Priority of Action</i>	<i>Potential Contributors</i>
<i>Climate change impact</i>				
Cliff erosion	Whole Management Unit	Monitor recession and plan for future retreat.	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
Significant native vegetation vulnerable to species composition change, compromised structural integrity and reduced regeneration	Cliff-top low shrublands and sedgeland	Maintain vegetation integrity by minimising disturbance from vehicles, pedestrians, feral animals and weeds. Facilitate regeneration by passive (access management) or active (revegetation) interventions as required.		DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs

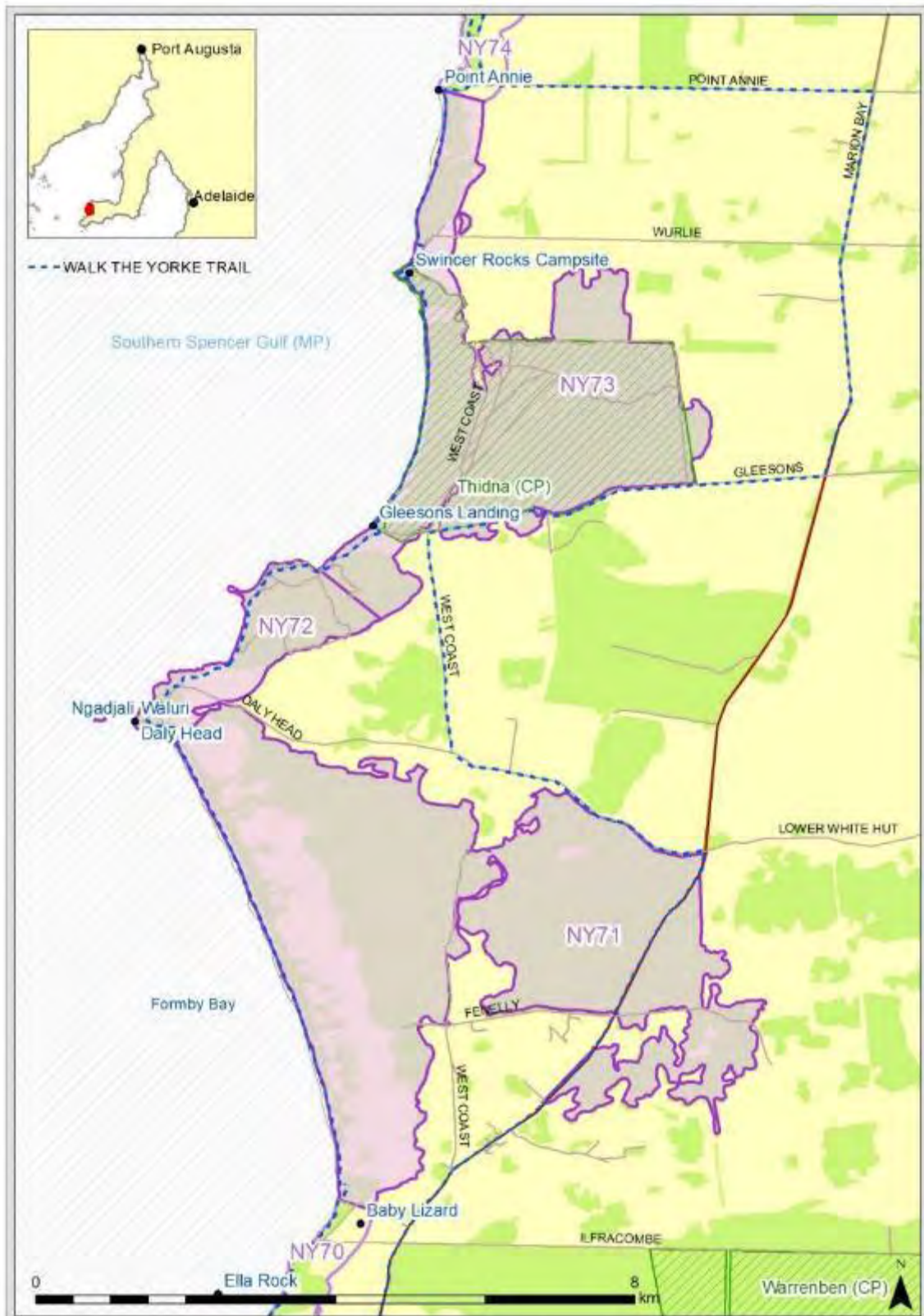
potential (resilience)				
<i>Access and recreation</i>				
Pedestrian access causing damage to cliffs	Gym Beach carpark	Install wooden boardwalk and staircase access to beach and formalise carpark.	Medium	DEW / NRNY, CPB, Council, SAPOL, DPTI, community groups, Traditional Owners NGOs
<i>Weeds</i>				
Woody (African Boxthorn)	Gym Beach	Eradicate the African Boxthorn plants near car park.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional, Owners NGOs
Garden escapees (Beach Daisy)	Whole Management Unit	Monitor beaches and control as observed.	High	Landholders, DEW / NRNY, Council, community groups, Traditional, Owners NGOs
<i>Other</i>				
Revegetation	Whole Management Unit	Work with landholders to plan and develop revegetation projects to connect coastal vegetation with inland remnants and achieve mutual benefits for farmers and biodiversity.	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
Vegetation protection	Heritage Agreement	Support landholders to manage weeds and feral animals (rabbits).	High	DEW / NRNY, CPB, landholders, community groups, Traditional Owners, NGOs
<i>Domestic pets</i>				
Shorebird impacts from cats and off-leash dogs on beaches	Camp grounds	Raise awareness of the impact of cats and off-leash dogs on shorebirds in sensitive areas. Encourage responsible pet ownership.	Medium	NRNY, CPB, Council, landholders, community groups,
<i>Feral animals</i>				
Fox and cat predation on native animals and shorebirds	Whole Management Unit	Undertake control as recommended by NRNY and coordinate with neighbours.	High	Landholders, NRNY, Traditional Owners

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Cell NY71 – NY73: Formby Bay, Daly Head to Thidna

Area: 3,738 hectares

Location: Central western coast of the 'toe' of Yorke Peninsula including Daly Head and Gleasons Landing campgrounds



Land Tenure/Ownership

Private: Large areas of private land around Formby Bay (farmland and hobby blocks).

Public: Thidna Conservation Park and a thin strip of unallotted Crown Land along the foredunes.

Council: Yorke Peninsula Council own land north of Daly Head through to Gleesons Landing and around Swincer Rocks.

Traditional owners: Narungga Native Title Determination area.

Landforms

Formby Bay between Point Margaret and Daly Head is a large embayment 9 km long and with broad, flat, intertidal shore platforms and notched aeolianite cliff bases. Tall parabolic dunes up to 60 m high extend 3 km inland and are fronted by actively mobile dunes approximately 1 km wide. The extensive transgressive dunes exhibit massive drift as this coastline is one of the highest energy beaches on the Peninsula.

Daly Head is a prominent bedrock headland underlain by metamorphic rock. An intertidal platform connects a rocky island and Daly Head.

North of Daly Head rock outcrops and 300m long calcarenite capped bedrock contains some high tide sandy areas at the base of the bluffs.

Marine Habitat

The marine environment is strongly influenced by the high energy waves. Bare sand covers the offshore area south of Daly Head. A mixture of continuous and patchy, dense low-profile reef occupies large areas further offshore.

The marine environment around Thidna Conservation Park has heavy calcarenite (aeolianite) continuous to patchy, dense, low-profile reef and a large patch of continuous, dense seagrass further out to sea. This area is a Rock Lobster Sanctuary and part of the Southern Spencer Gulf Marine Park.

Native Vegetation

A significant proportion of this Management Unit contains native vegetation (80% or 3,002 ha), particularly on the massive dune systems behind Formby Bay and in the saline lake systems in Thidna Conservation Park. Vegetation connectivity is good, with significant woodland and mallee remnants on the landward side. Species richness is high with at least 260 plant species recorded here.

Native vegetation associations include:

Olearia axillaris + *Leucopogon parviflorus* shrublands grow on the dune systems with *Templetonia retusa*, *Acacia nematophylla* shrubland >1m on some dune slopes;

Melaleuca halmaturorum low open forest over *Sarcocornia quinqueflora* (mixed) shrubs in the swampy areas of Thidna Conservation Park;

Around Daly Head there is a large patch of *Beyeria lechenaultii* low shrubland over *Senecio pinnatifolius* low shrubs;

A large patch of *Eucalyptus diversifolia* ssp. *diversifolia* sub-coastal mallee and *Eucalyptus porosa* open woodland occurs north of Daly Head;

Melaleuca lanceolata + *Allocasuarina verticillata* Low Woodland over a grassy and herbaceous understorey occurs on beach ridges and plains;

Gahnia lanigera/*Lepidosperma congestum* low sedgeland on the cliffs and *Alyxia buxifolia* shrublands are found within this cell;

Thidna Conservation Park also contains Swamp Paperbark low open forests and associated samphire shrublands surrounding the saline depressions;

Native Australian Boxthorn (*Lycium australe*) is also present in this area.

Conservation Significance

This section of the coast has high conservation value due to its high species richness and a high number of species of conservation significance.

Significant plant species detected here include the EPBC-listed Bead Samphire, Annual Candles, Inland Green-comb Spider Orchid and the Large-fruit Groundsel.

Fauna richness also stands out here, with 43 species recorded in Cell 71. The area has high habitat value for bush birds, reptiles and butterflies including the Yellowish Sedge Skipper Butterfly (1).

This Unit is within the Great Southern Ark rewilding project footprint. The project aims to reintroduce native animals into the area and protect them from feral animals by building a fence across the peninsula to create a 140,000 hectare "safe haven". The fence is specially designed to keep feral animals out and direct them into areas where they can be managed.

Table 50. Species of National and State Conservation Significance (BDBSA records), Formby Bay, Daly Head to Thidna Management Unit

Biota	Common name	Australia (EPBC)	SA (NPW Act)
<i>Animal species</i>			
<i>Ardenna carneipes</i>	Flesh-footed Shearwater		R
<i>Arenaria interpres</i>	Ruddy Turnstone		R
<i>Lichenostomus cratitius occidentalis</i>	Purple-gaped Honeyeater (mainland SA)		R
<i>Neophoca cinerea</i>	Australian Sea Lion	VU	V
<i>Pandion haliaetus cristatus</i>	Eastern Osprey		E
<i>Thinornis rubricollis</i>	Hooded Plover	VU	V
<i>Trichosurus vulpecula</i>	Common Brushtail Possum		R
<i>Plant species</i>			
<i>Austrostipa echinata</i>	Spiny Spear-grass		R
<i>Austrostipa pilata</i>	Prickly Spear-grass		V
<i>Billardiera</i> sp. Yorke Peninsula (P.C.Heyligers 80164)	Lehmann's Apple-berry		E
<i>Caladenia bicallata</i> ssp. <i>bicallata</i>	Western Daddy-long-legs		R
<i>Caladenia tensa</i>	Inland Green-comb Spider-orchid	EN	
<i>Isotoma scapigera</i>	Salt Isotome		R

<i>Leionema microphyllum</i>	Limestone Phebalium		R
<i>Poa drummondiana</i>	Knotted Poa		R
<i>Prasophyllum calcicola</i>	Limestone Leek-orchid		V
<i>Senecio macrocarpus</i>	Large-fruit Groundsel	VU	V
<i>Stackhousia annua</i>	Annual Candles	VU	V
<i>Tecticornia flabelliformis</i>	Bead Samphire	VU	V

Management

Public land is managed by Yorke Peninsula Council and Thidna Conservation Park is managed by the Department for Environment and Water.

Between Gleesons Landing and the Dustbowl carpark good revegetation and weed management has been undertaken and paths have been built. The local nursery is helpful in providing native dune stabilizing plants including Nitre Bush (*Nitraria billardierei*).

Relevant plans

- Narungga Healthy Country Plan (in progress)
- Northern and Yorke Regional NRM Plan; Strategic Plan, 2019-2029
- Yorke Peninsula Council Draft Coastal Management Strategy; Hickeys Point to Corny Point, 2019
- Coastal Motor Vehicle Access Management Strategy (2008) Northern and Yorke Natural Resources Management Region. D. Allen.
- Yorke NRM District Weed Action Plan (2018) Northern and Yorke Natural Resource Management Board.

Recommended Actions

The main management priorities for this area are; mitigating the effects of climate change and sea level rise, protection and enhancement of native vegetation (particularly on dunes and clifftops), recreation impacts and weed control.

Climate change

Beach and dune erosion are natural processes along high energy coastlines, however with rising sea levels and greater storm intensity, erosion is likely to be intensified along this section of coast. Dune drift within the massive transgressive dune systems may be exacerbated by the drying out and thinning of native vegetation.

Coastal hazards include an expansive Potential Drift Hazard Zone behind an Actual Drift Hazard Zone, along the whole length of the coastline. These areas are likely to experience greater erosion and more erosive storm events, with sea level rise.

Access and Recreation Impacts

There are a number of popular camping areas in this Management Unit, including Daly Head, Gleesons Landing and Swincer Rocks. ORV damage is an issue in the northern part of the Formby Bay dune system and within Thidna Conservation Park. There are also multiple informal tracks around Swincer Rocks.

Trespassing through private land to access the coast is a common occurrence in this area.

Weeds

African Boxthorn (*Lycium ferocissimum*), a WoNS, is present throughout the area, but generally at low density. However, local residents have commented that much of it is growing back and control efforts need to be intensified.

Other significant weeds in these cells include the highly invasive Pyp grass (*Ehrharta villosa*) which occurs around the beach carpark at Daly Head, Beach Daisy (*Arctotheca populifolia*) along the base of the beach foredune Formby Bay through to Daly Head, and low densities of Lincoln Weed (*Diplotaxis tenuifolia*) around campsites.

This Unit is within the Great Southern Ark rewilding project footprint. The project aims to reintroduce native animals into the area and protect them from feral animals by building a fence across the peninsula to create a 140,000 hectare "safe haven". The fence is specially designed to keep feral animals out and direct them into areas where they can be managed.

Photo: Access management and rehabilitation at Daly Head



Table 51. Recommended Management Actions: Formby Bay, Daly Head to Thidna Management Unit

<i>Issue/Threat</i>	<i>Location</i>	<i>Recommended Action</i>	<i>Priority of Action</i>	<i>Potential Contributors</i>
<i>Climate change impact</i>				
Beach and dune erosion	Whole Management Unit	Monitor beach and dune recession.	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
Storm surge and sea-level rise impact		Strengthen dune integrity with access management, dune stabilisation and revegetation.		

Cliff erosion <i>Storm surge and sea-level rise impact</i>	Around headlands and cliffs	Identify sections of cliffs most at risk, monitor recession. Maximise cliff-top integrity by maintaining vegetation buffers from the coast and providing set-backs from cropping and grazing activities. Involve landholders in planning for future retreat zones.	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
Access and recreation				
Vehicle access management	Blue Bay dunes, Gleesons Landing carpark and beach access, Thidna CP boundary, Swincer Rocks south of carpark	Formalise access tracks and install physical barriers where vehicle access is damaging native vegetation or causing erosion. Install Dutchman Ladders where beach access is to be retained. Additional signs as required.	High	DEW / NRNY, CPB, Council, SAPOL, DPTI, community groups, Traditional Owners NGOs
Pedestrian tracks and beach access causing erosion	Access track to Trespassers, Daly Head carpark, campsites at Gleesons Landing	Install staircase at Daly Head campground and Gleesons Landing campground. Formalise access using appropriate barriers and natural formalization.	Medium	DEW / NRNY, CPB, Council, SAPOL, DPTI, community groups, Traditional Owners NGOs
Weeds				
Woody (African Boxthorn, Western Coast Wattle)	Around carparks and campgrounds at Baby Lizards, Gleesons Landing Carpark, Swincer Rocks	Control African Boxthorn using minimal disturbance techniques in native vegetation. Monitor for Western Coast Wattle and control any establishing plants.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional, Owners NGOs
Broadleaf (Beach Daisy)	Base of the foredune along the length of Formby Bay through to Daly Head	Monitor and implement annual herbicide control.	High	Landholders, DEW / NRNY, Council, community groups, Traditional, Owners NGOs
Grasses (Pyp Grass)	Daly Head carpark	Develop a Pyp Grass control strategy and implement over successive years until near eradication is achieved.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional, Owners

				NGOs
<i>Native vegetation</i>				
Revegetation	Cliff-tops and dune blowouts including Gleesons Landing and campgrounds and beachfront mound at Swincer Rocks	Use revegetation of local native shrubs and groundcovers to rehabilitate degraded dunes and cliff-tops, and help formalise campgrounds in conjunction with access management measures.	Medium	DEW / NRY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
<i>Domestic pets</i>				
Shorebird impacts from cats and off-leash dogs on beaches	Camp grounds	Raise awareness of the impact of cats and off-leash dogs on shorebirds in sensitive areas. Encourage responsible pet ownership.	Medium	NRNY, CPB, Council, landholders, community groups,
<i>Feral animals</i>				
Fox and cat predation on native animals and shorebirds	Whole Management Unit	Undertake control as recommended by NRY and coordinate with neighbours.	High	Landholders, NRY, Traditional Owners

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Cells NY74 - NY76: Gonzo's, Point Annie to Berry Bay

Area: 602 hectares

Location: West of Corny Point township on the west coast of the 'foot'.



Land Tenure/Ownership

Private: land on the inland side of the Management Unit.

Public: a narrow strip of unallotted Crown Land along the coastline.

Other: Australian Maritime Safety Authority has ownership over a small parcel of land at the Corny Point lighthouse.

Traditional owners: Narungga Native Title Determination area.

Landforms

The dominant coastal feature of this area is tall limestone cliffs. Berry Bay has 10-20m high rounded granite platforms, boulders and reefs beneath dune capped calcarenite bluffs.

At Corny Point a 50-100m wide boulder strewn platform and reef with a high tide sand beach, lies beneath a 20-30m calcarenite cliff.

South of Corny Point the coastline is exposed to high-energy south-westerly winds and waves, and hence is rugged and varied. The coastline changes dramatically east of Corny Point which is backed by relatively low, flat country and is protected from prevailing south-westerly winds and waves.

Marine Habitat

This section of coast includes sheltered, low wave energy bays and south-western facing beaches and headlands which are exposed with moderate wave energy.

From Port Annie to Corny Point the coastline faces west and is moderately exposed with moderate wave energy. Offshore there is a mixture of continuous and patchy, dense, low profile reef and sand.

To the east of Corny Point where the coastline faces northwest, is a more sheltered low wave energy coastline with continuous, dense tracts of seagrass. Patches of dense low-profile reef occur around Corny Point.

Native Vegetation

Native vegetation covers 25% (or 149 ha) of this Management Unit. The cliffs in this location support some excellent quality low shrublands with a sedge and Black Grass understorey and a high diversity of plant taxa. Most of the cell is mapped as:

Lasiopetalum discolor, *Melaleuca lanceolata* ssp. *lanceolata*+/-*Calytrix tetragona*+/-*Gahnia lanigera*+/-*Pomaderris paniculosa* ssp. *paniculosa*+/-*Templetonia retusa* low shrubland.

There are also some small pockets of Drooping Sheoak (*Allocasuarina verticillata*) which indicate that these woodlands once occupied the inland areas adjacent to the cliff-top vegetation.

Conservation Significance

Although this section of coastline has low conservation value due to the size, shape and area of native vegetation, some of the cliff-top vegetation has regional significance and there is important Aboriginal heritage here.

Faunal diversity is fairly low, probably due to the narrow strip of remaining native vegetation being backed by agriculture. The rugged cliffs and pocket beached do however, provide a diversity of habitats for birds and reptiles.

This Unit is within the Great Southern Ark rewilding project footprint. The project aims to reintroduce native animals into the area and protect them from feral animals by building a fence across the peninsula to create a 140,000 hectare "safe haven". The fence is specially designed to keep feral animals out and direct them into areas where they can be managed.

Table 52. Species of National and State Conservation Significance (BDBSA **records**), **Gonzo's, Point Annie** to Berry Bay Management Unit

<i>Biota</i>	<i>Common name</i>	<i>Australia (EPBC)</i>	<i>SA (NPW Act)</i>
<i>Animal species</i>			
<i>Arenaria interpres</i>	<i>Ruddy Turnstone</i>		R
<i>Eubalaena australis</i>	<i>Southern Right Whale</i>	EN	V
<i>Haematopus fuliginosus</i>	<i>Sooty Oystercatcher</i>		R
<i>Haematopus longirostris</i>	<i>(Australian) Pied Oystercatcher</i>		R
<i>Megaptera novaeangliae</i>	<i>Humpback Whale</i>	VU	V
<i>Neophoca cinerea</i>	<i>Australian Sea Lion</i>	VU	V
<i>Pandion haliaetus cristatus</i>	<i>Eastern Osprey</i>		E
<i>Sternula nereis</i>	<i>Fairy Tern</i>	VU	E
<i>Thinornis rubricollis</i>	<i>Hooded Plover</i>	VU	V
<i>Plant species</i>			
<i>Prasophyllum goldsackii</i>	<i>Goldsack's Leek-orchid</i>	EN	E

Management

Public land is managed by Yorke Peninsula Council and an active community group in the area is the Corny Point Progress Association.

Some revegetation has been undertaken near the lighthouse. Berry Bay is a good place to showcase how a community has led the charge to protect the coast from human impacts. Paths and stairs have been built and responsibly managed access control has vastly improved the situation over last 10 years.

Relevant plans

- Narungga Healthy Country Plan (in progress)
- Northern and Yorke Regional NRM Plan; Strategic Plan 2019-2029
- Yorke Peninsula Council Draft Coastal Management Strategy; Hickeys Point to Corny Point 2019
- Coastal Motor Vehicle Access Management Strategy (2008) Northern and Yorke Natural Resources Management Region. D. Allen.
- Yorke NRM District Weed Action Plan (2018) Northern and Yorke Natural Resource Management Board.

Recommended Actions

The main priorities in this Management Unit are the protection and enhancement of native vegetation (particularly cliff-top vegetation), weed control, mitigating access and recreation impacts and preparing for climate change impacts, particularly more frequent and intense storm surges and the drying out of soils and vegetation on the cliff-top.

Climate change

This section of coast is considered relatively resilient to climate change impacts due to the resistant nature of the cliff geology. However, there are sections of erosion-prone cliff slopes where it will be important to retain the integrity of the vegetation and minimise vegetation loss and slope instability, as temperatures rise and rainfall decreases.

The whole coastline in this Management Unit is a Potential Drift Hazard Zone, which means coastal erosion events will increase in intensity and frequency along the beaches, with rising sea levels.

Access and Recreation Impacts

Significant formalisation work has already been undertaken at a number of locations including Berry Bay North and South. At Gravel Bay the formal tracks provide a unique 4WD experience for people to access the beach and camp. However, vehicles are still causing significant off-track damage by driving vertically up and down the soft, vegetated slopes causing significant erosion and native vegetation damage (see photo below).

Vehicles also continue to damage sensitive cliff-top vegetation by creating a multitude of unnecessary tracks. Several tracks have already been blocked with boulders and good formalisation has already occurred at Berry Bay and Corny Point Lighthouse. However, further rationalisation is required to provide access while maintaining the integrity of the vegetation.

The issue of trespassing on local property to access the beach from Daly Head to Point Annie has been raised by local residents.

Photo: ORV impacts of the low cliffs at Gravel Bay



Weeds

African Boxthorn (*Lycium ferocissimum*) a WoNS, is present in this area. Other notable weeds recorded, include Pyp Grass (*Ehrharta villosa*), Marguerite Daisy (*Argyranthemum frutescens*) and Agave (*Agave americana*).

Table 53. Recommended Management Actions: **Gonzo's, Point Annie to Berry Bay** Management Unit

Issue/Threat	Location	Recommended Action	Priority of Action	Potential Contributors
Climate change impact				
Native vegetation	Whole cell	Maintain the integrity of cliff-top vegetation by minimising vehicle and pedestrian impacts and controlling weeds. Facilitate regeneration by passive (access management) or active (revegetation) interventions as required.	High	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
Access and recreation				
Numerous access tracks in cliff-top vegetation causing erosion and excessive vegetation damage	Cliff-tops between Point Annie/Gonzo's Beach and Berry Bay.	Rationalise tracks so that cliff top viewing is still possible. Install barriers on unwanted tracks in quality native vegetation. Formalise carparks at Round Rock and Mysto's.	High	DEW / NRNY, CPB, Council, SAPOL, DPTI, community groups, Traditional Owners NGOs
ORV tracks up cliff slopes and beach front causing erosion and vegetation damage	Gravel Bay beach along beach camping access track	Install information signs to clarify expected behaviours and engender respect. Formalise the beach campsites to prevent driving up cliff-slopes.	High	DEW / NRNY, CPB, Council, SAPOL, DPTI, community groups, Traditional Owners NGOs
Pedestrian access management	Berry Bay South boardwalk, Pt Annie carpark track to beach	Modify existing signs or install new information directing people to stick to the formalised paths.	Medium	YP Council, NRNY, community groups
Weeds				
Woody - African Boxthorn, Western Coastal Wattle	In native vegetation south of Berry Bay North Carpark	Control African Boxthorn using minimal disturbance techniques in native vegetation. Monitor for Western Coastal Wattle and control any establishing plants.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional Owners NGOs
Succulents – (<i>Agave americana</i>) and bulbs including <i>Freesia</i> sp.	Gravel Bay carpark (<i>Freesia</i> sp.), old quarry and rubble piles south of Berry Bay	Eradicate these isolated weed infestations over a 2 - 3 year period.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional Owners NGOs

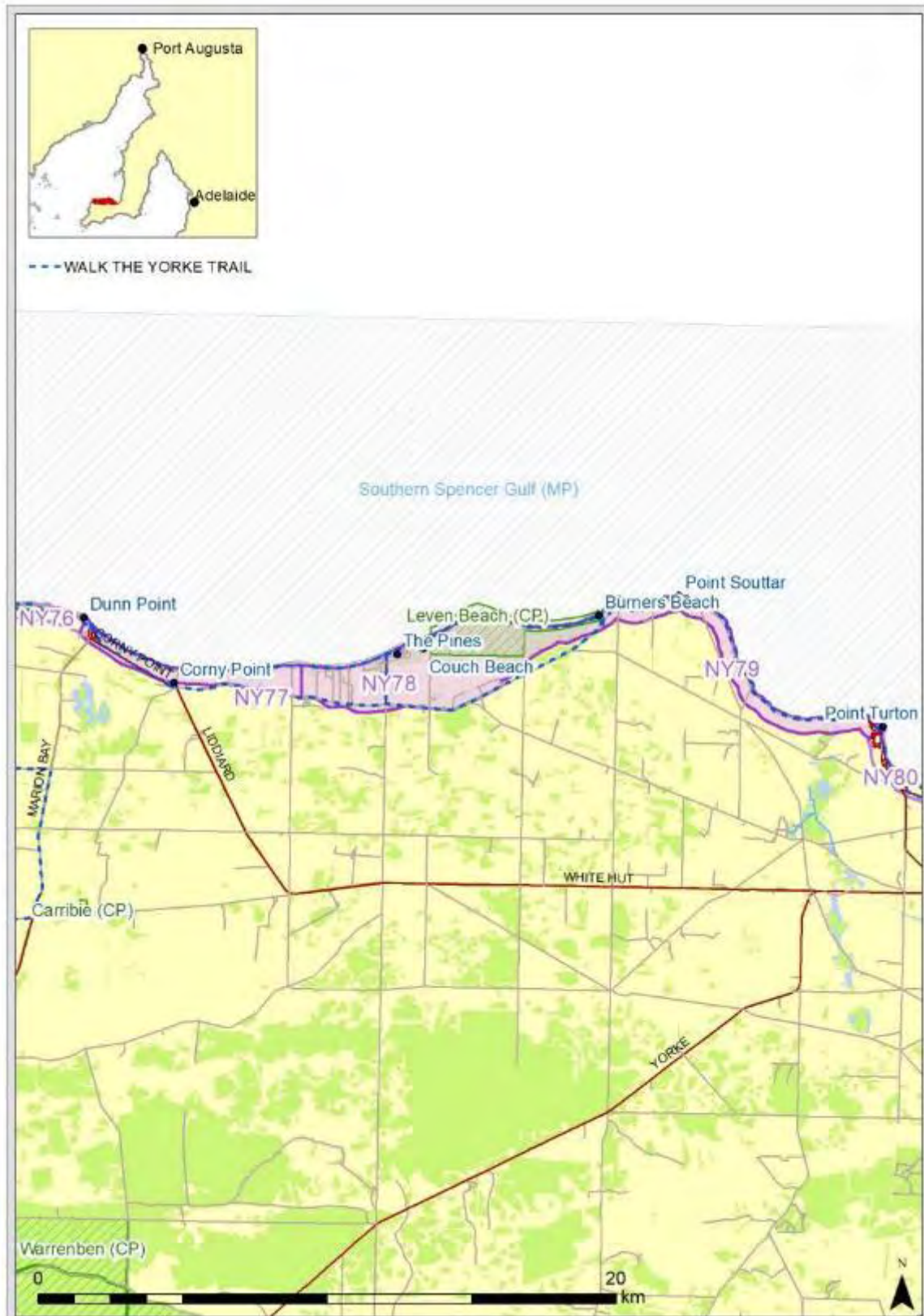
	South (Agave sp.)			
Broadleaf - Marguerite Daisy, Beach Daisy	Round Rock and quarry south, carpark north of lighthouse	Eradicate the isolated infestation of Marguerite Daisy. Regular monitoring of the beach and foredunes for Beach Daisy - control immediately if observed.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional, Owners, NGOs
Grasses - Pyp Grass	Roadside just south of the lighthouse	Develop a control strategy and undertake staged control to eradicate the infestation.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional, Owners, NGOs
<i>Native vegetation</i>				
Revegetation - lack of adjacent woodland vegetation	Whole cell, including crownland north of Lighthouse Rd near Greig Lookout.	Seek opportunities to buffer and enhance the remaining cliff-top vegetation with woodland revegetation (principally Drooping Sheoak) to enhance habitat values and protect remnant vegetation.	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
Revegetation - rehabilitation of degraded land	Old quarry site and rubble piles on cliff-top south of Berry Bay South carpark	Use dense shrub to revegetate the quarry site and help rationalise tracks.	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
<i>Domestic pets</i>				
Shorebird impacts from cats and off-leash dogs on beaches	Camp grounds	Raise awareness of the impact of cats and off-leash dogs on shorebirds in sensitive areas. Encourage responsible pet ownership.	Medium	NRNY, CPB, Council, landholders, community groups,
<i>Feral animals</i>				
Fox and cat predation on native animals and shorebirds	Whole Management Unit	Undertake control as recommended by NRNY and coordinate with neighbours.	High	Landholders, NRNY, Traditional Owners

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Cell NY77 – NY79: Corny Point to Point Turton

Area: 2,890 hectares

Location: Northern coast of the 'foot' from Corny Point township through the Pines and Leven Beach CP to Point Turton



Land Tenure/Ownership

Private: private land comprises the majority of this Management Unit.

Public: Leven Beach Conservation Park and a narrow strip of unallotted Crown Land along the foreshore and clifftops.

Council: owns land at The Pines and Couch Beach

Traditional owners: Narungga Native Title Determination area.

Landforms

From Corny Point this mostly north-facing coastline, is characterised by narrow high tide beaches fronted by 300-400m sand flats. In some areas the beaches are backed by sand dunes.

Leven Beach and The Pines are situated on a relatively recently deposited coastal plain and beach ridge system which is backed by the stranded limestone coastal cliffs behind Burners Beach.

Point Souttar to Point Turton is partially fronted by a continuous 100m wide rock platform/reef and partially by 20m high calcarenite bluffs, with rock debris at the base.

Marine Habitat

The marine environment is dominated by large expanses of continuous, dense seagrass on a sand substratum formed in a sheltered, low wave energy environment.

Native Vegetation

This Management Unit contains 27% (or 787 ha) native vegetation cover with the majority of this in the Leven Beach Conservation Park or immediately adjacent.

At Leven Beach CP there are tall coastal shrublands consisting of *Olearia axillaris* +/- *Leucopogon parviflorus* +/- *Acacia nematophylla*, backed by *Melaleuca lanceolata* in the Park

Coastal cliff-top low shrublands and Black Grass (*Gahnia lanigera*) dominated sedgeland occur around Burners Beach.

Fronting the coast at The Pines is a thin strip of coastal vegetation mainly comprised of Drooping Sheoak (*Allocasuarina verticillata*) woodland over coastal shrubs and sedges, such as (*Lepidosperma gladiatum*). The occurrence of these woodlands is indicative of beach recession in the area as this vegetation type would normally be found inland of the dune systems.

West of Point Turton there is a small patch of *Melaleuca halmaturorum* Low Open Forest over an open understorey of Samphire and *Gahnia filum* sedgeland associated with 'The Drain'. The Swamp Paperbarks occur at the back of the beach here. Other than this small patch, little native vegetation remains on the cliffs east of Point Souttar.

Conservation Significance

At least 186 native plant species were recorded at 5 survey sites within this Unit indicating a high diversity in the vegetation (1).

The Sheoak woodlands close to the coast in this area, are of regional interest and there is good wader habitat on the beach flats. Leven Beach Conservation Park conserves Drooping Sheoak and Dryland Tea-tree woodlands and the *Gahnia filum* sedgeland associated with The Drain potentially provide habitat for the nationally endangered Yellowish Sedge-skipper Butterfly (*Hesperilla donnysa donnysa* form *flavescens*).

This Management Unit is within the Great Southern Ark rewilding project footprint. The project aims to reintroduce native animals into the area and protect them from feral animals by building a fence across the peninsula to create a 140,000 hectare "safe haven". The fence is specially designed to keep feral animals out and direct them into areas where they can be managed.

Table 54. Species of National and State Conservation Significance (BDBSA records), Corny Point to Point Turton Management Unit

<i>Biota</i>	<i>Common name</i>	<i>Australia (EPBC)</i>	<i>SA (NPW Act)</i>
<i>Animal species</i>			
<i>Actitis hypoleucos</i>	<i>Common Sandpiper</i>		R
<i>Chlamydera guttata</i>	<i>Western Bowerbird</i>		R
<i>Cereopsis novaehollandiae novaehollandiae</i>	<i>Cape Barren Goose*</i>		R
<i>Eubalaena australis</i>	<i>Southern Right Whale</i>	EN	V
<i>Grampus griseus</i>	<i>Risso's Dolphin</i>		R
<i>Haematopus fuliginosus</i>	<i>Sooty Oystercatcher</i>		R
<i>Haematopus longirostris</i>	<i>(Australian) Pied Oystercatcher</i>		R
<i>Haliaeetus leucogaster</i>	<i>White-bellied Sea Eagle</i>		E
<i>Neophema petrophila</i>	<i>Rock Parrot</i>		R
<i>Neophoca cinerea</i>	<i>Australian Sea Lion</i>	VU	V
<i>Sternula nereis</i>	<i>Fairy Tern</i>	VU	E
<i>Thinornis rubricollis</i>	<i>Hooded Plover</i>	VU	V
<i>Turnix varius</i>	<i>Painted Buttonquail</i>		R
<i>Plant species</i>			
<i>Austrostipa echinata</i>	<i>Spiny Spear-grass</i>		R
<i>Leptorhynchos scaber</i>	<i>Annual Buttons</i>		R
<i>Myoporum parvifolium</i>	<i>Creeping Boobiella</i>		R
<i>Philotheca angustifolia ssp. angustifolia</i>	<i>Narrow-leaf Wax-flower</i>		R

* Personal observation (Letitia Dahl-Helm)

Management

Leven Beach Conservation Park is managed by the Department for Environment and Water (DEW) and public land is largely managed by Yorke Peninsula Council. The Corny Point Progress Association and local residents at The Pines, are active in this area. Two private properties on the southern side of Leven Beach have undertaken native species revegetation.

Relevant plans

- Narungga Healthy Country Plan (in progress).
- Northern and Yorke Regional NRM Plan; Strategic Plan, 2019-2029.
- Yorke Peninsula Council Draft Coastal Management Strategy, Corny Point to Cape Elizabeth, 2019 (in progress).
- Department for Environment and Heritage (2009) Mainland Conservation Parks of Yorke Peninsula Department.
- Coastal Motor Vehicle Access Management Strategy (2008) Northern and Yorke Natural Resources Management Region. D. Allen.
- Yorke NRM District Weed Action Plan (2018) Northern and Yorke Natural Resource Management Board.
- Department for Environment and Heritage Management Plan; Mainland Conservation Parks of Yorke Peninsula 2009.

Recommended Actions

The main management priorities for this area are; preparing for increased coastal erosion and inundation, vehicle management along the beaches and weed control.

Climate change

Coastal erosion is an issue for the Corny Point township and on the right side of Dairy Rd where erosion is moving onto farmland. Flooding occurs with king tides and storm surges affect shacks. Dairy Road boat ramp is an inundation point at king tide.

Local residents at The Pines and Corny Point report that the coast has receded up to 12m in places, mainly during the large storm surge events around 2016. This is confirmed by records showing considerable dynamic shoreline change near The Pines. The Pines have reportedly lost 25m of sand dunes from Walkway 5, caused by backwash from an inappropriately designed seawall.

Landward migration of coastal ecosystems is restricted by residential developments and agricultural land.

To coastline from Corny Point to Leven Beach Conservation Park, is a Potential Drift Hazard Zone which will experience more intense and frequent erosion events with rising seas.

Photo: Burners Beach Campground with excessive tracks in the cliff-top vegetation visible in the foreground



Access and Recreation Impacts

There are issues with speeding vehicles between the boat ramps at Corny Point. Hooded Plover chicks have been known to die from the impact of summer traffic, as cars go too fast because of compacted sand between the boat ramps. Oil and diesel spills are also occurring from tractors parked in the water.

Camping at Burners Beach is associated with some vehicle damage to cliffs and vegetation and minor vehicle damage to cliff-top vegetation is occurring on the Headland at Galway Bay just east of Burners Beach campground. A cliff-top dune blowout has formed in high value native vegetation just west of Burners Beach campground, presumably resulting from pedestrian traffic.

Local residents have highlighted the need for more parking in the area near The Pines boat ramp and for widening of Sheoak Road to accommodate fire trucks.

Weeds

At least four WoNS occur in this Management Unit including Bridal Veil (*Asparagus declinatus*), Bridal Creeper (*Asparagus asparagoides*), African Boxthorn (*Lycium ferocissimum*) and Boneseed (*Chrysanthemoides monilifera*). NRM staff have been actively controlling and monitoring these weeds but a significant increase in resources is required to eradicate these infestations. Similarly, Western Coast Wattle (*Acacia cyclops*) occurs all through this coastal strip and is another high priority for control.

African Boxthorn is a significant problem in Leven Beach Conservation Park where it appears to be increasing in density and there are some very large plants. Aerial control has been undertaken within the Park and follow-up control will be required. Note that the native Australian Boxthorn (*Lycium australe*) also occurs in this area and toward Burners Beach.

Garden escapes and succulents are invading shrublands around the housing and shacks at Point Souttar. *Gazania* (*Gazania linearis*) is becoming a problem at the town end of the coastal strip and is slowly moving down into the dunes. Residents at the Pines have reported a grassy fire hazard behind the rock wall where Pyp Grass also needs managing.

Table 55. Recommended Management Actions: Corny Point to Point Turton Management Unit

<i>Issue/Threat</i>	<i>Location</i>	<i>Recommended Action</i>	<i>Priority of Action</i>	<i>Potential Contributors</i>
<i>Climate change impact</i>				
Climate change - beach and dune loss due to storm surge	Corny Point, The Pines	Maintain the integrity of foreshore dunes. Use native grass and shrub revegetation to strengthen dune resilience. Monitor beach and dune recession. Strengthen dune integrity with access management, and dune stabilization.	Medium	DEW / NRNY, CPB, Council, community groups, Traditional Owners, NGOs
<i>Access and recreation</i>				
Vehicle access management - excessive tracks in cliff-top vegetation	Headland between Burners Beach and Galway Bay (Crown Leasehold land)	Rationalise tracks and block unwanted tracks. May require track ripping and/or revegetation to facilitate vegetation recovery.	Medium	DEW / NRNY, CPB, Council, SAPOL, DPTI, community groups, Traditional Owners

Vehicle access management - beach access and speeding	Beach between boat ramps	Public education is required around public safety. Install additional signs where necessary.	Medium	NGOs DEW / NRNY, CPB, Council, SAPOL, DPI, community groups, Traditional Owners NGOs
Pedestrian access	Burners Beach campsite	Further measures are required to discourage people from climbing the cliffs (barriers and signs).	Medium	YP Council
<i>Weeds</i>				
Woody (Western Coast Wattle, Golden Wreath Wattle, Mirror Bush, African Boxthorn)	Whole cell (priority is the spreading Boxthorn infestation in Leven Beach CP)	Undertake control of infestations within native vegetation first, then tackle roadsides and paddocks. Recommended to undertake mapping and density assessment of weeds in Leven Beach CP prior to developing a weed management strategy and control.	High	Landholders, DEW / NRNY, Council, community groups, Traditional Owners NGOs
Grasses (Pyp Grass)	The Pines native vegetation strip	Develop a control strategy and undertake a staged control program.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional Owners NGOs
Succulents and garden escapes (various)	Point Souttar (private and Crown land)	Engage with local residents to discuss the issue. Undertake control on Crown Leasehold parcels.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional Owners NGOs
<i>Domestic pets</i>				
Shorebird impacts from cats and off-leash dogs on beaches	Surrounding the towns and camp grounds, Burners Beach/ Leven Beach CP	Raise awareness of the impact of cats and off-leash dogs on shorebirds in sensitive areas. Encourage responsible pet ownership.	Medium	NRNY, CPB, Council, landholders, community groups,
<i>Feral animals</i>				
Fox and cat predation on native animals and shorebirds	Whole Management Unit	Undertake control as recommended by NRNY and coordinate with neighbours.	High	Landholders, NRNY, Traditional Owners

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Cell NY80 – NY81: Hardwicke Bay to Port Minlacowie

Area: 1,684 hectares

Location: Hardwicke Bay township and dunes north of Warooka on the 'foot' of the Peninsula.



Land Tenure/Ownership

Private: Private land comprises most of this Management Unit, including most of the Hardwicke Bay dune system and parcels owned by private developers.

Public: includes a very thin strip of Crown Land along much of the foreshore.

Council: Yorke Peninsula Council has coastal land at the northern end of Hardwicke Bay dunes and around the townships.

Traditional owners: included within the Narungga Native Title Determination area.

Landforms

This area features high tide sand beaches fronted by 700m wide ridged sand flats. In the shelter of Hardwicke Bay, the low-energy beaches have shaped multiple inshore ridges and runnel formations and a low, stable foredune ridge.

From Hardwicke Bay township to the north a rocky intertidal platform fronts the narrow high tide beach and wide shore platform.

Marine Habitat

The marine environment is dominated by expanses of bare sand and continuous to patchy dense seagrass. Offshore from Hardwicke Bay, lies a continuous to patchy, dense, low-profile reef.

This is a sheltered, low wave energy part of the coastline.

Native Vegetation

This Management Unit contains 39% (or 656 ha) of native vegetation cover. Hardwicke Bay contains a large coastal dune remnant in variable condition. Vegetation associations include:

Olearia axillaris + *Leucopogon parviflorus* tall coastal shrubland

Allocasuarina verticillata Low Woodland over a sclerophyll coastal shrub understorey

Gahnia lanigera/*Lepidosperma congestum* low sedgeland.

Conservation Significance

The Hardwicke Bay dune system supports one of the largest patches of coastal native vegetation, in this part of the Yorke Peninsula. Caton *et. al.* documented a very high species diversity within this area, including 119 plant species and 45 animal species.

The native vegetation patch size, connectivity and shape (good edge to interior ratio), contributes to the importance of this area for conservation.

The lack of conservation-rated plant species recorded in BDBSA for this area suggests that flora data is deficient, particularly given the large size of the remnant and the good quality of some areas of vegetation.

Significant species detected within this cell include the Nationally-listed Far Eastern Curlew, Curlew Sandpiper and Hooded Plover and 8 other state-listed birds. There is also an unusual record for the Subantarctic Fur Seal and White-bellied Sea-eagles are known to patrol this coast (L. Dahl-helm pers. com.).

There are important Narungga cultural heritage sites in this Management Unit which should be afforded protection and resourcing for further survey and documentation.

Table 56. Species of National and State Conservation Significance (BDBSA records), Hardwicke Bay to Port Minlacowie Management Unit

<i>Biota</i>	<i>Common name</i>	<i>Australia (EPBC)</i>	<i>SA (NPW Act)</i>
<i>Animal species</i>			
<i>Arctocephalus tropicalis</i>	<i>Subantarctic Fur Seal</i>	EN	E
<i>Arenaria interpres</i>	<i>Ruddy Turnstone</i>		R
<i>Calidris alba</i>	<i>Sanderling</i>		R
<i>Calidris ferruginea</i>	<i>Curlew Sandpiper</i>	CR	
<i>Cereopsis novaehollandiae novaehollandiae</i>	<i>Cape Barren Goose</i>		R
<i>Cladorhynchus leucocephalus</i>	<i>Banded Stilt</i>		V
<i>Haematopus fuliginosus</i>	<i>Sooty Oystercatcher</i>		R
<i>Haematopus longirostris</i>	<i>(Australian) Pied Oystercatcher</i>		R
<i>Neophema petrophila</i>	<i>Rock Parrot</i>		R
<i>Haliaeetus leucogaster</i>	<i>White-bellied Sea Eagle</i>		E
<i>Numenius madagascariensis</i>	<i>Far Eastern Curlew</i>	CR	V
<i>Pluvialis fulva</i>	<i>Pacific Golden Plover</i>		R
<i>Thinornis rubricollis</i>	<i>Hooded Plover</i>	VU	V
<i>Plant species</i>			
n/a			

Management

Private landholders manage the majority of the conservation assets in this area.

Public land is largely managed by Yorke Peninsula Council who have undertaken access control and formalisation at many of the beach access points. Active community groups in the area include the Hardwicke Bay and District Progress Association, Point Turton Progress Association, Friends of Walk the Yorke and Friends of Hooded Plover. Friends of the Hooded Plover have been monitoring breeding activity each year and installing protective fencing around vulnerable nests.

Relevant plans

- Narungga Healthy Country Plan (in progress)
- Northern and Yorke Regional NRM Plan; Strategic Plan, 2019-2029
- Yorke Peninsula Council Draft Coastal Management Strategy, Corny Point to Cape Elizabeth, 2019 (in progress)
- Coastal Motor Vehicle Access Management Strategy (2008) Northern and Yorke Natural Resources Management Region. D. Allen.
- Yorke NRM District Weed Action Plan (2018) Northern and Yorke Natural Resource Management Board.

Recommended Actions

Management priorities for this Unit include preparing for increasing frequency and intensity of erosion and inundation events, ORV access management, weed control and revegetation. Caton *et. al.* identified development zoning as a potential threat to the Hardwicke Bay dunes due to the possibility of future housing (on parcels greater than 100 acres) and other land uses occurring.

Climate change

The Hardwicke Bay dune system is a barrier to the inundation of Peesey Swamp and thus should be actively managed to retain integrity. Hardwicke Bay experienced significant beach and foredune erosion during the 2016 storm surge event.

Low coastal frontages at Point Turton and from Hardwicke Bay township northward to Port Minlacowie are vulnerable to storm surge erosion and beach recession.

Dune erosion is occurring around Point Turton and the cliff on south shore has been badly eroded by recent storm events, where some damage to property has occurred. Nitre Bush and foredune native shrubs have protected many shacks from storm erosion.

Most of the coastline in this Management Unit is a Potential Drift Hazard Zone. Locals have already reported that sand movement is blocking the boat ramp and inappropriate infrastructure at Point Turton is causing sand build up, requiring expensive dredging. A proposed engineering study was to be trialled for this area (46).

Access and Recreation Impacts

There are excessive tracks and informal camping areas on the Hardwicke Bay dune system, including on private and public land. Flaherty's Beach has been well formalised but beach access points in the north of the dunes have had fences cut and motorbike access issues.

Vehicle access to the beaches in this Management Unit pose a major threat to the beach-nesting birds such as Hooded Plovers and Oystercatchers. Recently improved vehicle beach access at Flaherty's Beach may represent an elevated threat to beach waders and foredune vegetation, which will need to be monitored.

Signage for motorbike and 4WD speed limits and management of rubbish dumping and camping in the sand dunes, is needed in this area.

Weeds

African Boxthorn (*Lycium ferocissimum*) a WoNS, is common in this area and significant control work has been undertaken by NRY, including aerial herbicide application in the Hardwicke Bay dunes. North of the Minlacowie boat ramp there is a large patch of African Boxthorn (about 500m) in a good quality patch of native vegetation. The Friends of Walk the Yorke has partnered with the Council to undertake control in this area but controlling African Boxthorn is a constant challenge for locals.

Other weeds present include Western Coast Wattle (*Acacia cyclops*) and Golden Wreath Wattle (*Acacia saligna*) which are prevalent in the Point Turton township. Succulents and garden escapees are also found around townships and shacks. Some control of Gazania has occurred in the area.

Other

Further flora surveys would provide a more comprehensive assessment of the conservation value of this area. Similarly, further surveying and documentation of sites by Traditional Owners would elevate the importance of conserving this area.

Photo: Fences cut at the access point in northern Hardwicke Bay dunes



Table 57. Recommended Management Actions: Hardwicke Bay to Port Minlacowie Management Unit

Issue/Threat	Location	Recommended Action	Priority of Action	Potential Contributors
<i>Climate change impact</i>				
Beach and dune erosion and recession due to storm surge	Whole Management Unit	Monitor beach and dune recession. Strengthen dune integrity with access management, dune stabilisation and revegetation (e.g. Nitre Bush and other native shrub and grass plantings to strengthen the foredune).	Medium	DEW / NRNA, CPB, Council, community groups, Traditional Owners, NGOs
<i>Access and recreation</i>				
Vehicle access management - excessive tracks leading to blowout and beach driving People have cut the fence next to	Northern end of Hardwicke Bay native vegetation block	Strengthen physical barriers to discourage fence cutting and unauthorised motorbike access. Modify the sign on the road to read "Pedestrian Access to	High	DEW / NRNA, CPB, Council, SAPOL, DPTI, community groups, Traditional Owners, NGOs

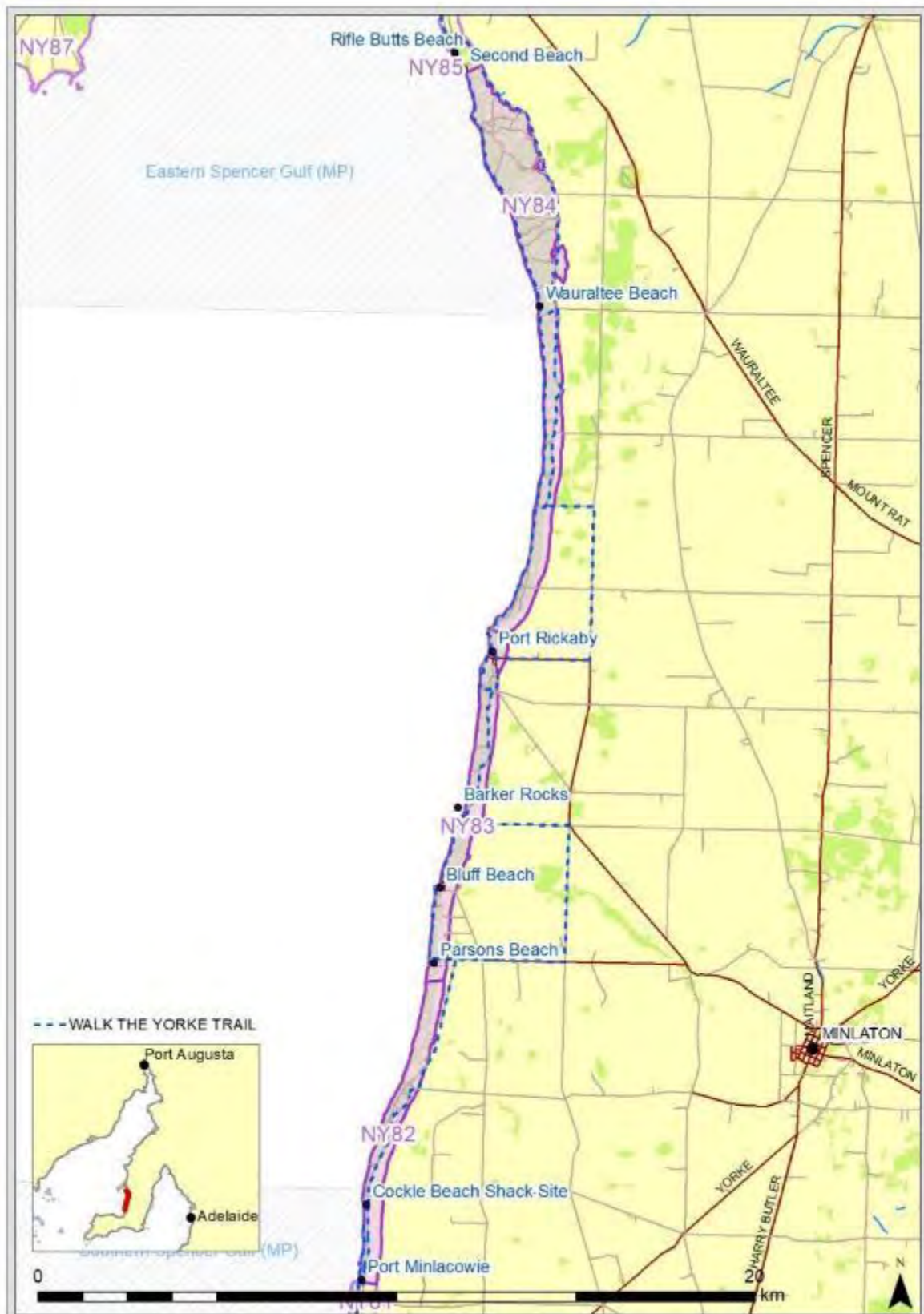
pedestrian turnstile to access with motorbikes		Beach Only" or 'No Vehicle Access to Beach".		
Weeds				
Woody (African Boxthorn, Western Coast Wattle, Golden Wreath Wattle)	Around caravan park and town foreshore in Point Turton, north of Hardwicke Bay in low dunes	Control woody weeds in native vegetation first, then town parks and roadsides. Monitor for new infestations in dunes.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional, Owners NGOs
Succulents and garden escapes - various	Dunes at the northern end of Hardwicke Bay township	Engage with local community group and residents to discuss the issue. Undertake control in native vegetation.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional, Owners NGOs
Native vegetation				
Revegetation opportunity - habitat enhancement and dune buffer	Private land immediately north of Hardwicke Bay town	Revegetation of the narrow cropping strip between Beegoody Road and the dunes would significantly improve the habitat value of the remaining vegetation. Engage with landholder to gauge interest in revegetation.	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
Lack of baseline flora data	Hardwicke Bay dune system	Undertake comprehensive flora surveys.	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
Cultural Heritage				
Potential damage to cultural sites	Whole Management Unit	Further surveying, documentation and protection of cultural sites.	High	Traditional Owners and landholders
Domestic pets				
Shorebird impacts from cats and off-leash dogs on beaches	Surrounding the towns and accessible beaches	Raise awareness of the impact of cats and off-leash dogs on shorebirds in sensitive areas. Encourage responsible pet ownership.	Medium	NRNY, CPB, Council, landholders, community groups,
Feral animals				
Fox and cat predation on native animals and shorebirds	Whole Management Unit	Undertake control as recommended by NRNY and coordinate with neighbours.	High	Landholders, NRNY, Traditional Owners

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Cells NY82 - NY84 Cockle Beach to Wauraltee

Area: 2,154 hectares

Location: Western coast of the 'lower leg' of the Peninsula.



Land Tenure/Ownership

Private: many blocks along coast, residential blocks in the townships and significant areas at Wauraltee.

Public: significant blocks are owned by the Yorke Peninsula Council on the foreshore north of Hardwicke and around Port Rickaby and northern Wauraltee dunes. A very narrow foreshore strip of unallotted Crown Land.

Traditional owners: included within the Narungga Native Title Determination area.

Landforms

This area features mostly low dunes and cliffs. Larger dune systems up to 2km wide occur in the north at Wauraltee, which are sometimes backed by samphire flats. A large sandy bay forms the section of coast north from Port Rickaby with narrow high-tide beaches and dunes up to 20 m high.

Marine Habitat

This part of the coastline is relatively sheltered with low to moderate wave energy. Patches of continuous, dense seagrass occur within a predominantly low-profile continuous, dense reef offshore area.

Native Vegetation

Native vegetation covers 58% (or 1243 ha) of this Management Unit. There is a narrow strip of more or less continuous vegetation in the south, with some unusual vegetation types and some patches are in excellent condition. The vegetation widens with the dune systems at Wauraltee Beach.

Vegetation associations include:

Olearia axillaris+/-*Exocarpos syrticola*+/-*Beyeria lechenaultii*+/-*Atriplex cinerea*+/-*Santalum acuminatum* mid open shrubland in larger dune systems and low foredunes

Patches of *Triodia* spp. Hummock Grasslands and *Eucalyptus gracilis* + *E. oleosa* +/- *E. brachycalyx* Mallee over a primarily chenopod understorey of *Atriplex vesicaria*, *Maireana pentatropis*, *M. erioclada* (e.g. at Barkers Rocks Conservation Reserve).

Eucalyptus porosa, *Eucalyptus diversifolia* ssp. *diversifolia* mid mallee woodland

Gahnia lanigera/*Lepidosperma congestum* low sedgeland

Conservation Significance

A high diversity of both plants and animals are found in this area and the relatively connected remnant vegetation gives this Unit a high conservation value. Threatened flora values are high with at least 1 species of National significance and 4 species of State significance recorded here.

This Management Unit has significant habitat value for waders and high values for reptile and butterfly habitats (1). This area is also important for a range of declining woodland birds such as Jacky Winter (*Microeca fascinans fascinans*).

Southern Hairy-nosed Wombats inhabit areas adjacent to Wauraltee dunes and the population here is one of the larger sub-populations on the Peninsula.

There are important Narungga cultural heritage sites in this Management Unit which should be afforded resourcing for further survey, documentation and protection.

Geological heritage values have also been identified in this area (1).

Table 58. Species of National and State Conservation Significance (BDBSA records), Cockle Beach to Wauraltee Management Unit

Biota	Common name	Australia (EPBC)	SA (NPW Act)
<i>Animal species</i>			
<i>Actitis hypoleucos</i>	Common Sandpiper		R
<i>Arenaria interpres</i>	Ruddy Turnstone		R
<i>Calidris ferruginea</i>	Curlew Sandpiper	CR	
<i>Corcorax melanorhamphos</i>	White-winged Chough		R
<i>Egretta garzetta</i>	Little Egret		R
<i>Egretta sacra</i>	Pacific Reef Heron (Eastern Reef Egret)		R
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		R
<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R
<i>Neophema petrophila</i>	Rock Parrot		R
<i>Pluvialis fulva</i>	Pacific Golden Plover		R
<i>Sternula nereis</i>	Fairy Tern	VU	E
<i>Thinornis rubricollis</i>	Hooded Plover	VU	V
<i>Plant species</i>			
<i>Austrostipa echinata</i>	Spiny Spear-grass		R
<i>Billardiera</i> sp. Yorke Peninsula (P.C.Heyligers 80164)	Lehmann's Apple-berry		E
<i>Myoporum parvifolium</i>	Creeping Boobiialla		R
<i>Olearia pannosa</i> ssp. <i>pannosa</i>	Silver Daisy-bush	VU	V
<i>Orobanche cernua</i> var. <i>australiana</i>	Australian Broomrape		R

Management

The Yorke Peninsula Council manages significant land in this Unit, as do private landholders around Wauraltee. Substantial formalisation of campsites and visiting areas has been undertaken by the Council, however there are many areas on private land and Crown Reserve where ORV access is problematic. Some landholders are involved in weed control.

Relevant plans

- Narungga Healthy Country Plan (in progress)
- Northern and Yorke Regional NRM Plan; Strategic Plan 2019-2029
- Yorke Peninsula Council Draft Coastal Management Strategy, Corny Point to Cape Elizabeth, 2019 (in progress)
- Coastal Motor Vehicle Access Management Strategy (2008) Northern and Yorke Natural Resources Management Region. D. Allen.
- Yorke NRM District Weed Action Plan (2018) Northern and Yorke Natural Resource Management Board.

- Shorebird Conservation Action Plan, South Australia Shorebird Alliance / Birdlife Australia

Recommended Actions

The main priority actions for this Management Unit are managing ORV impacts and vehicle speed on the beach and improving the integrity of sand dunes to minimise erosion.

Climate change

The coastal dunes and vegetation are very narrow and linear in the southern part of this coastline, which increases their susceptibility to drying out as temperatures rise. Beach and dune erosion will increase as sea levels rise.

Of high priority is the maintenance of coastal vegetation integrity in this area. Opportunities for landward migration of coastal ecosystems are limited due to adjacent farmland and residential development. However, engagement with adjacent landholders is recommended as project opportunities may arise.

The whole of the coastline in this Management Unit is a Potential Drift Hazard Zone, thus will be prone to increased erosion with rising sea levels and more intense storms. There has already been some infrastructure damage in the area due to storm surge and erosion.

Access and Recreation Impacts

The impacts of ORV activity and beach driving are clearly demonstrated at Wauraltee Beach and in the dunes. Speed is an issue on the beach and Council receives many complaints about dangerous driving near campers and beachgoers. Numerous tracks and informal camping areas are found in the Wauraltee dunes, many of which go over sensitive sand dunes which then form blowouts. There is some rubbish dumping associated with the camping also.

Photo: Dune damage from vehicles at informal camps in the north of Wauraltee Dunes



At Parsons Beach it has been reported that local residents have moved because rubbish, sewage and disturbance from motorbikes was so bad. There are no camping facilities and people are forming numerous goat tracks through the dunes and damaging vegetation. At **Watson's** Beach valuable Hooded Plover habitat and breeding pairs are disturbed by recreation activities, especially on long weekends. Cockle Beach is known for motorbike damage from constantly creating new tracks and causing erosion.

Large dune blowouts near Port Rickaby, which have been around for many years, attract sand boarding activities. At low visitation this may be a minor issue but there is potential for these types of activities to exacerbate the sand drift.

Weeds

African Boxthorn (*Lycium ferocissimum*) a WoNS, occurs in this area and there has been considerable control effort including aerial herbicide application in the northern parts of the Wauraltee dunes by NRNY staff. Other weeds of concern include Western Coast Wattle (*Acacia cyclops*), Aleppo Pine and Pyp grass. Garden escapes, various succulents and *Gazania* are found around townships.

Table 59. Recommended Management Actions; Cockle Beach to Wauraltee Management Unit

<i>Issue/Threat</i>	<i>Location</i>	<i>Recommended Action</i>	<i>Priority of Action</i>	<i>Potential Contributors</i>
<i>Climate change impact</i>				
Beach and dune erosion	Whole cell	Monitor beach and dune recession and strengthen dune integrity with access management, dune stabilisation and revegetation.	High	DEW / NRNY, CPB, Council, community groups, Traditional Owners, NGOs
<i>Access and recreation</i>				
Vehicle access management - excessive tracks in high quality native vegetation and private land	North of Cockle Beach to Watsons/Parsons Beach, north of Port Rickaby, Bamboos Beach, Wauraltee Beach, Wauraltee dunes	Rationalise tracks and beach access. North of Cockle Beach maintain a single vehicle track in addition to the Walk the Yorke track. Block off additional tracks and rehabilitate in partnership with the landowners. Strengthen physical barriers in the northern sections of the Wauraltee dunes. Formalise car parks and campgrounds.	High	DEW / NRNY, CPB, Council, SAPOL, DPTI, community groups, Traditional Owners, NGOs
Vehicle access management - beach driving and speed	Parsons Beach, Bamboos Beach, Bertrams Rd, Wauraltee Beach and Second Beach.	Access management and public education is required, including additional signs where necessary. Liaise with SA Police regarding compliance.	Medium	DEW / NRNY, CPB, Council, SAPOL, DPTI, community groups, Traditional Owners, NGOs
Pedestrian access management	Blowout south of Port Rickaby	Carpark is well formalised but pedestrians are still taking multiple informal paths. Better signs and formalisation are required, along with public education.	Medium	DEW / NRNY, CPB, Council, SAPOL, DPTI, community groups, Traditional Owners, NGOs
Rubbish dumping	Northern Wauraltee dunes at informal campsites	Address by managing informal access and camping.	Medium	Landholders, YP Council

<i>Weeds</i>				
Woody (African Boxthorn, Western coast Wattle)	Foredunes north of Port Minlacowie, un-occupied private blocks south of Bluff Beach, north Wauraltee dunes (African Boxthorn), north of Bamboos Beach and Wauraltee dunes (Western coast Wattle)	Undertake control in line with WoNS and Declared weeds responsibilities. Remind owners of un-occupied blocks at Bluff Beach of their legislative responsibility to control Declared and WoNS.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional, Owners NGOs
Succulents and garden escapes	Port Rickaby dunes in front of township (garden escapes), Barker Rocks Campground	Engage Port Rickaby residents to discuss the issue of garden escapes. Undertake control of Agave at Barker Rocks.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional, Owners NGOs
Broadleaf (Artichoke Thistle)	Northern Wauraltee dunes	Undertake control to stop its spread into the dunes.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional, Owners NGOs
Grasses (Pyp Grass)	Northern Wauraltee dunes	Develop a strategy for control and implement.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional, Owners NGOs
<i>Native vegetation</i>				
Revegetation opportunity - habitat enhancement and buffering	North Wauraltee dunes (revegetation), north of Cackle Beach and behind Bamboos Beach (remnant vegetation management and enhancement)	Revegetation of natural woodlands immediately east of the Wauraltee dunes and north Cackle Beach remnants would significantly enhance the habitat values in the district. This could be supported by grazing management or exclusion and regeneration of adjacent open woodland remnants on private land.	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
Vegetation protection	North of Cackle Beach to Watsons/Parsons Beach, Wauraltee dunes	Approach landholders to discuss potential Heritage Agreement or other covenant (similar to Barker Rocks). Consider land purchase for conservation.	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs

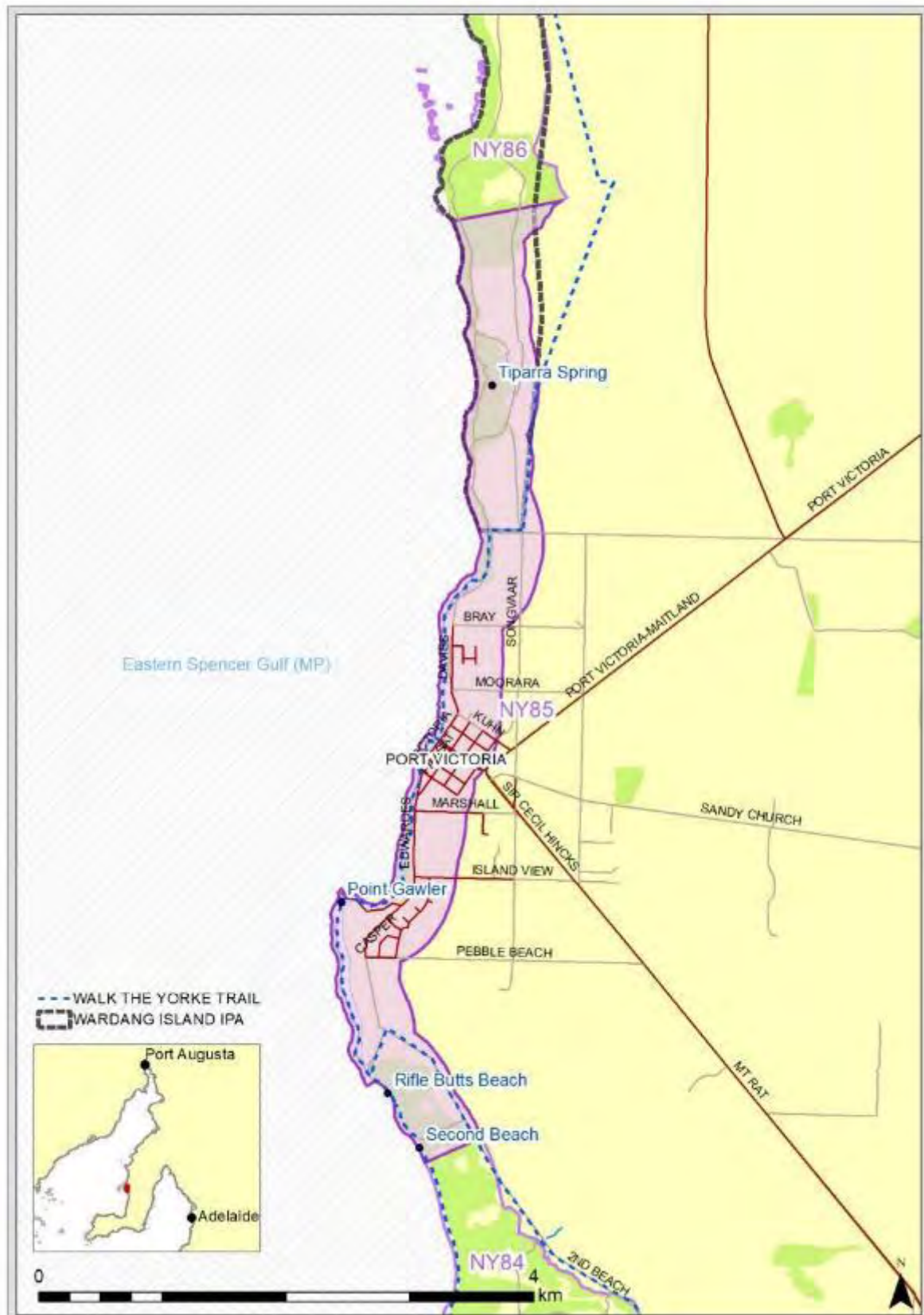
Cultural Heritage				
Potential damage to cultural sites	Whole Management Unit	Further survey, documentation and protection of cultural sites.	High	Traditional Owners and landholders
<i>Domestic pets</i>				
Shorebird impacts from cats and off-leash dogs on beaches	Surrounding the towns, campgrounds and accessible beaches	Raise awareness of the impact of cats and off-leash dogs on shorebirds in sensitive areas. Encourage responsible pet ownership.	Medium	NRNY, CPB, Council, landholders, community groups,
<i>Feral animals</i>				
Fox and cat predation on native animals and shorebirds	Whole Management Unit	Undertake control as recommended by NRNY and coordinate with neighbours.	High	Landholders, NRNY, Traditional Owners

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Cell NY85: Port Victoria

Area: 428 hectares

Location: Port Victoria township on the central west coast of Yorke Peninsula



Land Tenure/Ownership

Private: confined mainly to residential blocks apart from some farmland south of the town.

Public: a narrow strip of Crown Land along most of this coast.

Council: Yorke Peninsula Council owns significant land in the northern Wauraltee dunes and around the township of Port Victoria.

Traditional owners: Freehold parcels north of the town and Aboriginal Lands Trust at Point Pearce. Included within the Narungga Native Title Determination area.

Other: Port Victoria Golf Club.

Landforms

This Management Unit features elevated and rocky beach/rock platforms beneath 15m high calcarenite bluffs. High tide sand flats extend up to 800m wide. A small sand dune complex occurs to the north of the Wauraltee dunes (Rifle Butts Beach).

Marine Habitat

This area is a shallow, low-energy section of coastline, even when it faces west, because of the extensive intertidal sandflats, seagrass meadows and reefs, which dissipate wave energy. Continuous to patchy, dense seagrass and continuous, dense low-profile reef dominates this offshore area.

Native Vegetation

Native vegetation covers 21% (or 92 ha) of this Management Unit and is patchy, generally in narrow strips and in poor to moderate condition.

A small area of low coastal heath occurs on the foreshore in the north of Port Victoria and a relatively diverse tall shrubland occurs at the turn-off to the boat ramp. Rifle Butts Beach contains some good quality coastal shrublands and low sedgeland in the swales.

Vegetation associations include:

Olearia axillaris mid sparse shrubland over *Rhagodia candolleana* ssp. *candolleana* low shrubs and *Carpobrotus rossii* mixed low forbs, on dunes, dune crests, slopes and footslopes

Olearia axillaris mid open shrubland over *Poa poiformis* var. *poiformis*, *Lagurus ovatus* low shrubs

Conservation Significance

Most of the conservation value in this cell relates to the nearshore marine environment and fauna, and the area has important Hooded Plover habitat. There are breeding pairs at Rifle Butts, at least two pairs between the boat ramp and Jetty, and another at the beach to the north.

Port Victoria has been identified by the Directory of Important Migratory Shorebird Habitat as internationally important in South Australia.

Table 60. Species of National and State Conservation Significance (BDBSA records), Port Victoria Management Unit

Biota	Common name	Australia (EPBC)	SA (NPW Act)
<i>Animal species</i>			
<i>Arenaria interpres</i>	Ruddy Turnstone		R
<i>Calidris canutus</i>	Red Knot	EN	

<i>Calidris tenuirostris</i>	Great Knot	CR	R
<i>Charadrius mongolus</i>	Lesser Sand Plover	EN	R
<i>Egretta sacra</i>	Pacific Reef Heron (Eastern Reef Egret)		R
<i>Eubalaena australis</i>	Southern Right Whale	EN	V
<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R
<i>Kogia breviceps</i>	Pygmy Sperm Whale		R
<i>Limosa lapponica</i>	Bar-tailed Godwit	ssp	R
<i>Neophema elegans</i>	Elegant Parrot		R
<i>Thinornis rubricollis</i>	Hooded Plover	VU	V
Plant species			
<i>Maireana rohrlachii</i>	Rohrlach's Bluebush		R

Management

The Yorke Peninsula Council manages Rifle Butts Beach in the south and other public land. Formalisation works have been undertaken at Rifle Butts Beach by the Council. The northern section is a declared Indigenous Protected Area (IPA) and is management by local Rangers according to the IPA Management Plan. Other Narungga lands are being managed by Narungga organisations. Land restoration has been undertaken in partnership with NRM and NGO agencies.

Relevant plans

- Narungga Healthy Country Plan (in progress)
- Wardang Island IPA Management Plan
- Yorke Peninsula Council Draft Coastal Management Strategy, Corny Point to Cape Elizabeth, 2019 (in progress)
- Northern and Yorke Regional NRM Plan; Strategic Plan 2019-2029
- Coastal Motor Vehicle Access Management Strategy (2008) Northern and Yorke Natural Resources Management Region. D. Allen.
- Yorke NRM District Weed Action Plan (2018) Northern and Yorke Natural Resource Management Board.

Recommended Actions

The main management priorities for this area is the protection of the Hooded Plover breeding pairs which are impacted by off leash dogs. The northern breeding pair are also impacted by vehicles on the beach.

Climate change

Dune erosion and storm surge damage is likely at Rifle Butts Beach and on the Wardang Island IPA. Minor cliff recession is possible elsewhere.

To the north of Port Victoria is a Potential Drift Hazard Zone which will be prone to increased erosion with rising sea levels.

Access and Recreation Impacts

Access and recreation impacts are relatively minor in this Management Unit. The Rifle Butts Beach carpark and track have been well formalised to protect some significant vegetation.

Some minor damage is occurring to the remaining vegetation along the Walk the Yorke track and adjacent to the Golf Course, caused by pedestrian traffic straying from the track. This also occurs to some extent to the north of town.

Photo: Rifle Butts Beach ORV access formalisation



Weeds

African Boxthorn (*Lycium ferocissimum*) is the most prevalent WoNS found here. Other weeds present include White Weeping Broom (*Retama raetam*) and Century Plant (*Agave americana*,) which occur north of the township. Gazania is well established in the shrublands near the boat ramp. Western Coast Wattle (*Acacia cyclops*) is prevalent throughout and particularly near the boat ramp entrance and north of the town.

Table 61. Recommended Management Actions: Port Victoria Management Unit

Issue/Threat	Location	Recommended Action	Priority of Action	Potential Contributors
<i>Climate change impact</i>				
Beach and dune erosion	North Wauraltee dunes / Rifle Butts Beach	Monitor beach and dune recession and strengthen dune integrity with access management, dune stabilisation and revegetation.	High	DEW / NRNY, CPB, Council, community groups, Traditional Owners, NGOs

<i>Access and recreation</i>				
Excessive walking tracks	North and south of town between the Walk the Yorke track and the beach	Rationalise tracks where they traverse through native vegetation or cause minor erosion to the cliff slopes.	Low	Landholders, DEW / NRNY, Council, community groups, Traditional, Owners
<i>Weeds</i>				
Woody (Western Coast Wattle, African Boxthorn, White Weeping Broom, Oleander)	Rifle Butts Beach carpark, coastal vegetation north and south of Port Victoria including Wardang IPA (<i>Acacia cyclops</i>), Crownland and Wardang IPA north of Port Victoria (White Weeping Broom), Pt Victoria boat ramp (Oleander), whole cell (African Boxthorn)	Control woody weeds in native vegetation first, then town parks and roadsides. Monitor for new infestations.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional, Owners and IPA Rangers, NGOs
Succulents and garden escapes (Gazania)	Port Victoria boat ramp	Control Gazania in the best in native vegetation first, then town parks and roadsides.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional, Owners NGOs Port Victoria Golf Club,
<i>Feral animals</i>				
Rabbits	Town surrounds, boat ramp and golf course, southern section of Wardang IPA	Undertake control in line with Declared pest species legislation.	Medium	DEW / NRNY, Traditional, Owners NGOs, Port Victoria Golf Club
<i>Domestic pets</i>				
Shorebird impacts from cats and off-leash dogs on beaches	Surrounding the towns	Raise awareness of the impact of cats and off-leash dogs on shorebirds in sensitive areas. Encourage responsible pet ownership.	Medium	NRNY, CPB, Council, landholders, community groups,

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Cell NY86 – NY87: Point Pearce and Wardang Island

Area: 4,111 hectares

Location: Central west coast of the 'leg' of the Peninsula, north of Port Victoria.
Wardang Island lies 9 km offshore from Port Victoria township.



Land Tenure/Ownership

Traditional owners: Nearly the entire Management Unit is owned by the Aboriginal Lands Trust although there are proposals for some areas to be transferred back to Narungga freehold. Included within the Narungga Native Title Determination area.

Public: Goose Island Conservation Park

Landforms

Landform features include a sheltered bay between the towns of Port Victoria and Point Pearce and a peninsula (The Point) extending seaward from west of Point Pearce township.

Rocky headlands and narrow high tide beaches edge the coast along the western side of the Point and rocky cliffs also occur on the western side of Wardang Island.

Sand bars and small rocky islets extend out of the bay across to Wardang Island, which has a high point of 29 m. Beatrice Rock, Island Point and Rocky Island between the peninsula and Wardang Island are included within Goose Island Conservation Park.

Marine Habitat

Dense seagrass meadows dominate the bay and a low-profile reef platform (heavy limestone/calcareenite) extends from Point Pearce to Reef Point. Shallow sandbanks extend from the southern tip of the peninsula.

Large tracts of continuous, dense low-profile reef and continuous, dense seagrass surround Wardang Island. A moderately exposed and moderate wave energy shoreline occurs on the west coast and a sheltered, low wave energy area dominates the east coast.

Native Vegetation

Native vegetation covers 42% (or 1725 ha) of this Management Unit. A large area of native vegetation remains on the northern part of the Point Pearce peninsula but native vegetation has been largely cleared elsewhere. Low-energy shore of samphire and saltmarsh complexes front the intertidal sand flats within the bay and the eastern side of Wardang Island.

Wardang Island contains some tall *Olearia axillaris*, *Myoporum insulare*, and *Acacia oswaldii* shrubland on sand dune areas and some samphire shrublands on the eastern side. The remainder of the Island is covered by introduced grasses with patches of native speargrass and scattered native shrubs. IPA Rangers recently revegetated around 240 hectares of the Island.

Vegetation associations include:

Olearia axillaris, *Myoporum insulare*, *Acacia oswaldii* shrubland

Gahnia lanigera/*Lepidosperma congestum* Low sedgeland

Tecticornia sp., *Sarcocornia quinqueflora* low open shrubland.

Conservation Significance

There are many cultural sites of high significance in the area including soaks and waterholes in the sandhills, remains of old settlements and fish traps in the nearshore environment.

This area also has high conservation value due to significant fauna on Wardang Island, Southern hairy-nosed Wombats on the mainland and the occurrence of the EPBC-listed Temperate Coastal Saltmarsh ecological community. The sheltered bay is an important meadow of *Zostera* spp. seaweed which are important for fish species and protected as a Marine Park Sanctuary Zone.

The area supports good faunal diversity. The coastal habitats are significant for wading birds (K. Treloar pers. com.) and reptiles, and Southern Hairy-Nosed Wombats are present along the coast of the peninsula and in the adjacent cropland.

Rocky Island supports large breeding and nesting colonies of Black-faced Cormorants. Wardang Island supports the introduced Tammar Wallaby, Little Penguin colonies, Peninsula Brown Snakes, Barn Owls and White-bellied Sea-Eagles. The sea-eagles are regularly observed but the nest was observed to be abandoned in 2017 (56). A small flock of introduced Emu still remain on the Island and Australian Sea Lions are often found on the western coast.

Table 62. Species of National and State Conservation Significance (BDBSA records), Point Pearce and Wardang Island Management Unit

Biota	Common name	Australia (EPBC)	SA (NPW Act)
<i>Animal species</i>			
<i>Actitis hypoleucos</i>	Common Sandpiper		R
<i>Arenaria interpres</i>	Ruddy Turnstone		R
<i>Calidris canutus</i>	Red Knot	EN	
<i>Calidris tenuirostris</i>	Great Knot	CR	R
<i>Cladorhynchus leucocephalus</i>	Banded Stilt		V
<i>Eudyptula minor</i>	Little Penguin		
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		R
<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R
<i>Haliaeetus leucogaster</i>	White-bellied Sea Eagle		E
<i>Hylacola cauta cauta</i>	Shy Heathwren		R
<i>Limosa lapponica</i>	Bar-tailed Godwit	ssp	R
<i>Neophema petrophila</i>	Rock Parrot		R
<i>Neophoca cinerea</i>	Australian Sea Lion	VU	V
<i>Sternula nereis</i>	Fairy Tern	VU	E
<i>Thinornis rubricollis</i>	Hooded Plover	VU	V
<i>Tringa brevipes</i>	Grey-tailed Tattler		R
<i>Plant species</i>			
<i>Orobanche cernua</i> var. <i>australiana</i>	Australian Broomrape	R	
<i>Zostera muelleri</i> ssp. <i>mucronata</i>	Garweed		R

Management

This section of coast is an Indigenous Protected Area (IPA) and is managed by IPA Rangers through the Aboriginal Lands Trust, Australian Government and the Point Pearce community. Cultural significance is very high with continuous Aboriginal connection and recent history as an Aboriginal mission. Significant locations are signposted on the west coast of the peninsula and there are views of Wardang Island. Freshwater soaks in the dunes have been an important water source and the area is significant for traditional and current fishing. The area is well protected as it has an Indigenous Protected Area and a Marine Protected Area.

Bird surveys are done each year from Chinamen Wells to Point Pearce. Cat control, African Boxthorn control and revegetation was undertaken on Wardang Island in 2016. The Narungga Healthy Country Plan identifies Wardang Island as a potential site for future rewilding and small mammal reintroduction.

Relevant plans

- Narungga Healthy Country Plan (in progress)
- Wardang Island IPA Management Plan
- Northern and Yorke Regional NRM Plan; Strategic Plan 2019-2029
- Department for Environment and Heritage Management Plan (2009) Althorpe Islands, Goose Island and Troubridge Island Conservation Parks
- Yorke NRM District Weed Action Plan (2018) Northern and Yorke Natural Resource Management Board.

Recommended Actions

Management actions identified in the Wardang Island IPA Management Plan and the draft Narungga Healthy Country Plan include greater access to Wardang Island, weed and pest animal control, revegetation of cleared areas and reintroduction of small mammals on Wardang Island. Some ORV damage in the sandhills and upgrading of signs could also be undertaken.

Photo: Old signage and access control at Buthera Rocks is in need of an upgrade



Climate change

Low lying samphire flats in the Point Pearce and Wardang Island area would be particularly susceptible to inundation with sea-level rise. The mainland here may have potential for the development of facilitated tidal retreat zones with potential to incorporate Blue Carbon finance models.

The western side of Wardang Island and the western side of the peninsula are Potential Drift Hazard Zones. These locations will experience an increase in erosion frequency and intensity with rising sea levels. Coastal erosion is already occurring on Wardang Island (39).

Access and Recreation Impacts

Many informal ORV tracks extend across the landscape on the mainland and there is some sand dune damage on the peninsula. Native vegetation cover needs to be protected to stabilize soils, where possible.

Weeds

African Boxthorn (*Lycium ferocissimum*) is the main WoNS here. Western Coast Wattle (*Acacia cyclops*) is a significant issue on the mainland and the IPA Rangers are undertaking ongoing control. White Weeping Broom (*Retama raetam*) also occurs on the mainland section and some regrowth since previous control works, has been recorded.

Table 63. Recommended Management Actions: Point Pearce and Wardang Island Management Unit

<i>Issue/Threat</i>	<i>Location</i>	<i>Recommended Action</i>	<i>Priority of Action</i>	<i>Potential Contributors</i>
<i>Climate change impact</i>				
Sea-level rise and tidal retreat opportunities		Identify potential areas for facilitated landward migration of coastal samphire shrublands and develop projects accordingly.	High	IPA Rangers and Traditional Owners, Dept. Prime Minister and Cabinet, NGOs, DEW / NRNY
<i>Access and recreation</i>				
Off road vehicle damage		Protect high value sites and sand dunes from off-road vehicle damage.	Medium	IPA Rangers, DEW / NRNY
<i>Weeds</i>				
Woody (Western Coast Wattle, African Boxthorn, White Weeping Broom)	Whole Management Unit	Undertake staged control of Western Coast Wattle and African Boxthorn in preparation for on-going revegetation. Undertake follow up control for all species on the mainland IPA. Weeds all identified in the HCP.	High	IPA Rangers, DEW / NRNY
Succulents (Iceplant)	Northern Wardang Island	Follow up on previous control works to eventually eradicate the weed from the island. Shrub planting on the sand dunes where control has occurred, is recommended	Medium	IPA Rangers, DEW / NRNY
<i>Native vegetation</i>				

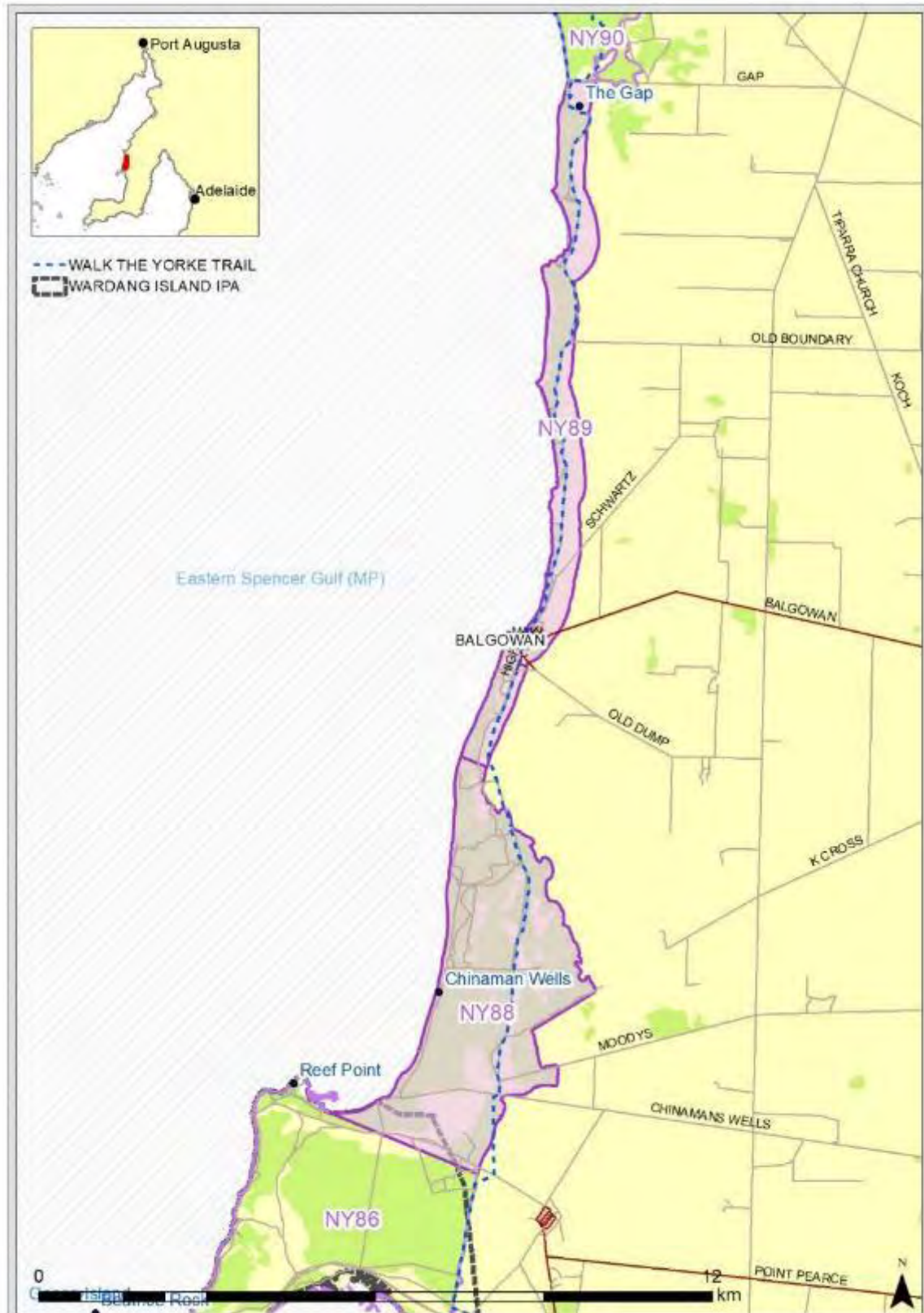
Past vegetation clearance	Whole of Wardang Island	Implement an ongoing annual revegetation program to improve biodiversity and support the reintroduction of locally-extinct mammals on Wardang Island.	Medium	IPA rangers, Dept. Prime Minister and Cabinet, NGOs, DEW / NRNY
<i>Other</i>				
Small mammal reintroduction	Wardang Island	Reintroduce selected small mammal species to Wardang Island to improve ecosystem functions and to breed animals for release on the mainland.	Medium	IPA Rangers, DEW / NRNY, FAME, WWF, Fauna Research Alliance, NGOs
<i>Domestic pets</i>				
Shorebird impacts from cats and off-leash dogs on beaches	Township	Raise awareness of the impact of cats and off-leash dogs on shorebirds in sensitive areas. Encourage responsible pet ownership.	Medium	NRNY, IPA Rangers community groups
<i>Feral animals</i>				
Fox and cat predation on native animals and shorebirds	Mainland	Undertake control as recommended by NRNY and coordinate with neighbours.	High	IPA Rangers, DEW / NRNY
Rabbits	Mainland IPA	Continue on-going rabbit baiting program including adjacent properties on the southern boundary.	Medium	IPA Rangers, DEW / NRNY
Feral predators (impacts on reptiles, Little Penguin and shorebirds)	Wardang Island	Undertake annual and on-going cat control on Wardang Island and Fox and Cat control on the mainland. Work towards an eradication target on Wardang Island.	High	IPA Rangers, DEW / NRNY

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Cell NY88 – NY89: Chinaman Wells to The Gap

Area: 1,996 hectares

Location: North of Point Pearce on the west coast of the central 'leg' of the Peninsula to just south of Cape Elizabeth.



Land Tenure/Ownership

Private: the majority of this Management is privately owned.

Public: a narrow strip of Crown Reserve along the foreshore.

Council: Yorke Peninsula Council own land around Balgowan and campgrounds up to The Gap.

Traditional owners: Narungga Native Title Determination area. Small parcel of Aboriginal Lands Trust land near Point Pearce.

Landforms

Landforms include low sandy beaches with extensive intertidal sandflats up to 2.5km wide (such as Chinaman Wells), which are generally backed by dunes, behind which are low-lying samphire flats.

In the northern part of this Management Unit dunes are up to 800m wide over low bluffs and cliffs. Sand beaches are backed and separated by 15m high eroding bluffs and rock debris.

Marine Habitat

This part of the coastline is sheltered with low wave energy. The offshore environment supports a mixture of continuous, dense seagrass and continuous, dense low-profile reef areas.

Native Vegetation

Native vegetation covers 61% (or 1,223 ha) of this Management Unit. It contains some significant mallee and sheoak woodland remnants in the south (known locally as Wallaby Scrub), which retain a diverse understorey and support nationally threatened orchids and other ground flora. These grade into samphire flats which lie behind the sandy coast at Chinaman Wells.

Further north the vegetation becomes a narrow strip around Balgowan before widening to substantial sand dune systems with coastal shrubs surrounding the Bamboos and The Gap campgrounds.

Native vegetation associations in this area include:

Olearia axillaris+/-*Exocarpos syrticola*+/-*Beyeria lechenaultii*+/-*Atriplex cinerea*+/-*Santalum acuminatum* mid open shrubland

Allocasuarina verticillata Low Woodland over a sclerophyll coastal shrub understorey.

Eucalyptus porosa+/-*Eucalyptus phenax*+/-*Eucalyptus leptophylla*+/-*Eucalyptus socialis* ssp. mid mallee woodland

Tecticornia sp.,*Sarcocornia quinqueflora* low open shrubland.

Conservation Significance

There are high conservation values in this Management Unit including significant habitat for butterflies and shorebirds (1).

Mallee and sheoak remnants support threatened plants such as the Nationally Vulnerable Winter Spider Orchid (*Caladenia brumalis*) and the Silver Daisy (*Olearia pannosa* ssp. *pannosa*) along with many other herbaceous species. These woodland remnants are also important for declining woodland birds such as the Hooded Robin and Gilberts Whistler. Part of the dune system at Chinaman Wells is under Heritage Agreement.

This section of the coast is highly valued by the local community and there are important geological features and highly valuable sub-fossil deposits, particularly around Balgowan.

Table 64. Species of National and State Conservation Significance (BDBSA records), Chinaman Wells to The Gap Management Unit

<i>Biota</i>	<i>Common name</i>	<i>Australia (EPBC)</i>	<i>SA (NPW Act)</i>
<i>Animal species</i>			
<i>Arenaria interpres</i>	<i>Ruddy Turnstone</i>		<i>R</i>
<i>Calidris canutus</i>	<i>Red Knot</i>	<i>EN</i>	
<i>Calidris ferruginea</i>	<i>Curlew Sandpiper</i>	<i>CR</i>	
<i>Calidris tenuirostris</i>	<i>Great Knot</i>	<i>CR</i>	<i>R</i>
<i>Cladorhynchus leucocephalus</i>	<i>Banded Stilt</i>		<i>V</i>
<i>Egretta sacra</i>	<i>Pacific Reef Heron (Eastern Reef Egret)</i>	<i>R</i>	<i>VU</i>
<i>Falco peregrinus</i>	<i>Peregrine Falcon</i>		<i>R</i>
<i>Melanodyas cucullata</i>	<i>Hooded Robin</i>		<i>R</i>
<i>Neophema elegans</i>	<i>Elegant Parrot</i>		<i>R</i>
<i>Sternula albifrons</i>	<i>Little Tern</i>		<i>E</i>
<i>Thinornis rubricollis</i>	<i>Hooded Plover</i>	<i>VU</i>	<i>V</i>
<i>Pachycephala inornata</i>	<i>Gilbert's Whistler</i>		<i>R</i>
<i>Tringa brevipes</i>	<i>Grey-tailed Tattler</i>		<i>R</i>
<i>Plant species</i>			
<i>Caladenia brumalis</i>	<i>Winter Spider Orchid</i>	<i>VU</i>	<i>V</i>
<i>Caladenia moschata</i>	<i>Musky Caladenia</i>		<i>E</i>
<i>Centrolepis cephaloformis</i> ssp. <i>cephaloformis</i>	<i>Cushion Centrolepis</i>		<i>R</i>
<i>Olearia pannosa</i> ssp. <i>pannosa</i>	<i>Silver Daisy</i>	<i>VU</i>	<i>V</i>
<i>Olearia picridifolia</i>	<i>Rasp Daisy Bush</i>		<i>R</i>

Management

Yorke Peninsula Council has undertaken significant formalisation works at The Gap and The Bamboos and there are locally active community members that are interested in coastal management. The Feral Trees group have undertaken removal of Aleppo Pines from vegetation with significant conservation value and significant African Boxthorn control is being undertaken by community groups (Friends of the Gap and Cape Elizabeth) and NRRY.

Relevant plans

- Narungga Healthy Country Plan (in progress)
- Northern and Yorke Regional NRM Plan; Strategic Plan 2019-2029
- Yorke Peninsula Council Draft Coastal Management Strategy, Corny Point to Cape Elizabeth, 2019 (in progress)

- Coastal Motor Vehicle Access Management Strategy (2008) Northern and Yorke Natural Resources Management Region. D. Allen.
- Yorke NRM District Weed Action Plan (2018) Northern and Yorke Natural Resource Management Board.

Recommended Actions

ORV track formalisation and access management are priorities for this area, particularly where motorbikes are accessing coastal dunes on private land and Crown Land without permission.

Climate change

The red erodible cliffs north of Balgowan are vulnerable to storm surge erosion and a significant section near the beach access ramp was damaged in the 2016 event.

A Potential Drift Hazard Zone occurs to the north of Balgowan, increased erosion will occur with rising sea levels. Landward from Chinaman Wells is a large Inland Runoff/Flood Hazard Zone which will experience increased flooding and inundation, with rising seas.

Access and Recreation Impacts

There are some minor tracks in samphire at Chinaman Wells and multiple ORV tracks through the coastal vegetation on the cliff tops north of Balgowan. The cliff-top damage is associated with permissible camping, however it warrants some investigation as to whether there is a public safety risk regarding possible cliff collapse, particularly if cliff erosion accelerates.

Yorke Peninsula Council has formalised camping at Tiparra Rocks, The Bamboos and The Gap. However, fences are still being cut and vehicles are trespassing on private and public land with significant impacts in some places.

Photo: Excessive informal tracks on overhanging cliffs north of Balgowan



Weeds

African Boxthorn (*Lycium ferocissimum*) is the main WoNS here. The dunes behind the shacks in Balgowan are becoming infested with multiple garden escapes and Boneseed (*Chrysanthemoides monilifera*) which is another WoNS and requires control.

North of Balgowan the Feral Trees community group have undertaken control of Aleppo Pine near the Bamboos and some coastal recreation remediation work has been done (pers com D. Furbank).

Native Vegetation

Engage with local landholders to discuss management and potential formal protection for the woodland remnants which are floristically very important here.

Table 65. Recommended Management Actions: Chinaman Wells to The Gap Management Unit

<i>Issue/Threat</i>	<i>Location</i>	<i>Recommended Action</i>	<i>Priority of Action</i>	<i>Potential Contributors</i>
<i>Climate change impact</i>				
Climate change - potential inundation and shoreline recession	Chinaman Wells In front of and immediately either side of shacks	Strengthen natural sand barriers with appropriate shrub revegetation of the foredune. Strengthen artificial barrier in front of shacks with shrub revegetation. Involve landholders in planning for tidal retreat zones and projects.	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
<i>Access and recreation</i>				
Vehicle access management - excessive tracks, dune and vegetation damage	Chinaman Wells, cliff-tops north of Balgowan, Tiparra Rocks and The Bamboos carparks, private land	Rationalise tracks, install barriers and rehabilitate unwanted tracks, strengthen fences to stop fence cutting along the road and at Tiparra Rocks.	High	DEW / NRNY, CPB, Council, SAPOL, DPTI, community groups, Traditional Owners NGOs
Vehicle access management - driving on beach	Off Chinaman Wells road in the SW corner	Block access to the Wardang IPA in the south, community education and signs detailing expected behaviours regarding shorebirds, Aboriginal land and vehicles.	Medium	DEW / NRNY, CPB, Council, SAPOL, DPTI, community groups, Traditional Owners NGOs
Vehicle access management - vehicles on overhanging cliffs at informal viewing points	Cliffs north of Balgowan	Formalise cliff viewing areas to minimise vegetation damage and protect public safety.	High	DEW / NRNY, CPB, Council, SAPOL, community groups, Traditional Owners
Pedestrian access management - dune damage	Tippara Rocks, The Bamboos, The Gap campgrounds	Further formalisation of pedestrian access including fencing and information signs detailing expected behaviours.	High	DEW / NRNY, CPB, Council, SAPOL, community groups,

				Traditional Owners
<i>Weeds</i>				
Woody (African Boxthorn, Western Coast Wattle, Aleppo Pine)	Whole Management Unit	Undertake African Boxthorn control as per WoNS responsibilities. Monitor and control regrowth of Western Coast Wattle and Aleppo Pine.	Medium	Landholders, DEW / NRY, Council, community groups, Traditional Owners, NGOs
<i>Native vegetation</i>				
Vegetation protection - significant woodlands and threatened flora	Remnant woodlands in the south	Engage with local landholders to discuss management and potential formal protection for the scrub.	Medium	DEW / NRY, landholders, community groups, Traditional Owners, NGOs
<i>Other</i>				
Rubbish dumping - vehicles and boats	Samphire flats behind the dunes	The old boat stranded in the samphire may provide some interest for walkers, however dumped vehicles and other associated rubbish should be removed.	Medium	DEW / NRY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
<i>Domestic pets</i>				
Shorebird impacts from cats and off-leash dogs on beaches	Surrounding the towns, campgrounds and accessible beaches	Raise awareness of the impact of cats and off-leash dogs on shorebirds in sensitive areas. Encourage responsible pet ownership.	Medium	NRY, CPB, Council, landholders, community groups
<i>Feral animals</i>				
Fox and cat predation on native animals and shorebirds	Whole Management Unit	Undertake control as recommended by NRY and coordinate with neighbours.	High	Landholders, NRY, Traditional Owners

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Cell NY90 – NY91: Cape Elizabeth to Port Hughes

Area: 3,486 hectares

Location: South of Port Hughes on the northern west coast of Yorke Peninsula



Land Tenure/Ownership

Private: private land occurs on the landward side Cape Elizabeth and the cliffs toward Port Hughes.

Public: Large areas of unallotted and Crown Land Reserve owned by the Minister for Environment.

Council: Yorke Peninsula Council own a parcel in the middle of Cape Elizabeth and blocks in the south of Port Hughes. Copper Coast Council own blocks north of Port Hughes.

Traditional owners: Narungga Native Title Determination area. Cape Elizabeth has previously been transferred to Narungga but is now Crown Land. Dibhara property is just to the east.

Landforms

Cape Elizabeth is a triangular spit that protrudes 5 km into Spencer Gulf and is protected by a rocky offshore reef. Landforms include high, well-vegetated dunes (with large blowouts), beach ridges and spits and samphire flats on the landward side of the dunes.

The western shore is exposed to the south-westerly winds, which have formed transgressive dunes behind the shore. These extensive areas of unstable and drifting dunes dominate the west and south coast of the Cape. On the southern side of the cape a long beach is fronted by a partially vegetated sand flats and rock platforms. The eastern end is backed by samphire and saltmarsh, behind a small spit. The high tide beaches are fronted by 1km wide sand flats in some areas.

Just south of Port Hughes is a narrow section of low dunes backed by inland dune swale country.

Marine Habitat

South of the Cape a dense low-profile reef lies close to the shoreline and extends 300m offshore. Small patches of seagrass are scattered throughout the nearshore area on this side of the Cape. This is a moderately exposed, high wave energy area.

To the north of the Cape, continuous areas of bare sand stretches 1km out to sea, with expansive, dense tracts of seagrass found further offshore. The coastline here is sheltered with low wave energy.

Native Vegetation

Native vegetation covers 78% (or 2,713 ha) of this Management Unit. Cape Elizabeth contains a significant area of native vegetation, associated predominantly with tall sand dunes and samphire flats.

Vegetation associations include:

Olearia axillaris+/-*Exocarpos syrticola*+/-*Beyeria lechenaultii*+/-*Atriplex cinerea*+/-*Santalum acuminatum* mid open shrubland

Olearia axillaris+/-*Acacia ligulata*+/-*Acacia cyclops* mid sparse shrubland

Allocasuarina verticillata low woodland

Tecticornia sp.,*Sarcocornia quinqueflora* low open shrubland

Juncus kraussii sedgeland (rare on Yorke Peninsula), occurs in non-saline depressions and soaks behind the dunes.

Conservation Significance

Cape Elizabeth has high conservation value due to the large area of native vegetation and the moderately high species richness, with 94 plant taxa recorded (1). Notable species

recorded here includes the Nationally Vulnerable Silver Daisy, the state threatened and regionally endangered Cushion Centrolepis. This area also has some good habitat for waders and beach nesting birds.

There are lower conservation values north of Cape Elizabeth due to the very narrow strip of remaining coastal vegetation.

Cultural Heritage

Cape Elizabeth has very high cultural significance for the Narungga people, with many significant sites identified including burial sites, meeting places and water places. Work has been undertaken with the NRY to protect some of these sites that are being damaged by ORV use.

Table 66. Species of National and State Conservation Significance (BDBSA records), Cape Elizabeth to Port Hughes Management Unit

<i>Biota</i>	<i>Common name</i>	<i>Australia (EPBC)</i>	<i>SA (NPW Act)</i>
<i>Animal species</i>			
<i>Calidris alba</i>	Sanderling		R
<i>Calidris ferruginea</i>	Curlew Sandpiper	CR	
<i>Dermochelys coriacea</i>	Leatherback Turtle	EN	V
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		R
<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R
<i>Neophema petrophila</i>	Rock Parrot		R
<i>Thinornis rubricollis</i>	Hooded Plover	VU	V
<i>Plant species</i>			
<i>Centrolepis cephaloformis ssp. cephaloformis</i>	Cushion Centrolepis		R
<i>Myoporum parvifolium</i>	Creeping Boobiolla		R
<i>Olearia pannosa ssp. pannosa</i>	Silver Daisy Bush	VU	V

Management

Natural Resources Northern and Yorke have been active in undertaking management actions partnership with Narungga representatives. Cape Elizabeth is specifically identified in the Narungaa Nations ILUA with Local Government. The Yorke Peninsula Council has also been active including working with 4WD clubs in 2019 to clean up rubbish for Clean Up Australia Day.

Overall, the management of Cape Elizabeth requires review and clarity of responsibility. Transfer to indigenous management would be desirable given the significant sites.

Relevant plans

- Narungga Healthy Country Plan (in progress)
- Northern and Yorke Regional NRM Plan; Strategic Plan 2019-2029.
- Coastal Motor Vehicle Access Management Strategy (2008) Northern and Yorke Natural Resources Management Region. D. Allen.

- Yorke NRM District Weed Action Plan (2018) Northern and Yorke Natural Resource Management Board.

Recommended Actions

The priorities for this Management Unit include managing ORV activity, protecting culturally sensitive sites, control of woody weeds, formalisation of camping areas and the management of rubbish dumping. There may be opportunities to manage land for tidal retreat and to improve sand dune vegetation to mitigate some impacts of climate change.

Climate Change Impact

Almost the entire inland area of the Cape is an Inland Runoff/Flood Hazard Zone and the entire coastal area in this Management Unit is a Potential Drift Hazard Zone. With sea-level rise, the drift hazard areas will experience more beach and dune erosion and the large Runoff/Flood Hazard Zone will experience more frequent and intense flooding and inundation events.

Migration of coastal ecosystems is partly restricted by adjacent agricultural land but there may be opportunities to facilitate samphire migration on public and adjacent private land.

Significant coastal erosion has occurred to the north of Cape Elizabeth after two major storm surges within the last 10 years. This highlights need to focus on improving vegetation integrity, dune stabilisation and protection from storm surge.

Photo: Multiple tracks and ORV activity in dunes in the north of Cape Elizabeth



Access and Recreation Impacts

Aerial photography shows extensive damage from informal tracks through the dunes and informal camping areas. Areas behind the foredunes have been impacted by vehicles, grazing, fire and/or weed invasion, which is causing de-vegetation of dunes.

Engage public users (local and 'weekenders') of the site by various methods. Improve signs detailing expected behaviours. Improve formalisation of tracks and camping areas. Consider designating areas where off-road vehicle use is allowed (minimum damage). Include private lands south of Port Hughes in management solutions.

Vehicle impacts on the samphire flats could also increase the potential for acid sulfate soils to develop and become an issue, given the high levels of disturbance.

Weeds

African boxthorn (*Lycium ferocissimum*) is the main WoNS here but Western Coast Wattle (*Acacia cyclops*) is also widespread and abundant in the sand hills. It has been suggested that *Acacia cyclops* was aerial seeded into the dunes to help with stabilisation. In a similar way, aerial seeding of native species into the blowouts prior to weed removal could be an option for dealing with the large scale of the problem. Dune stabilisation should not be compromised so a staged removal incorporating native species revegetation is recommended. Include private lands south of Port Hughes in management solutions such as staged weed removal and aerial seeding.

Table 67. Recommended Management Actions: Cape Elizabeth to Port Hughes Management Unit

<i>Issue/Threat</i>	<i>Location</i>	<i>Recommended Action</i>	<i>Priority of Action</i>	<i>Potential Contributors</i>
<i>Climate change impact</i>				
Climate Change - exposed blowouts and damaged samphire vulnerable to drying	Whole Management Unit	Manage vehicle damage as detailed below. Investigate hydrology and inundation potential or barriers to maximise samphire condition (a wetter samphire system could also help deter vehicles).	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
Climate change - potential inundation and shoreline recession	Whole Management Unit	Strengthen natural sand barrier with appropriate shrub revegetation of the foredune. Strengthen artificial barrier in front of shacks with shrub revegetation. Identify and map suitable areas for allowing tidal reconnection and retreat. Involve landholders in planning for tidal retreat zones and projects.	High	DEW / NRNY, CPB, Council, community groups, Traditional Owners, NGOs
<i>Access and recreation impacts</i>				
Vehicle access management - dune and samphire vegetation damage	Whole Management Unit	Intensify public education efforts through multiple channels.	High	DEW / NRNY, CPB, Council, SAPOL, DPTI, community groups, Traditional Owners, NGOs
Vehicle access management - beach driving (shorebird disturbance and sand compaction and public safety)	Beaches north of The Gap and 'The Bamboos'	Engage public regarding expected behaviours and legal responsibilities. Liaise with SA Police regarding compliance. Include private lands south of Port	High	DEW / NRNY, CPB, Council, SAPOL, DPTI, community groups, Traditional Owners

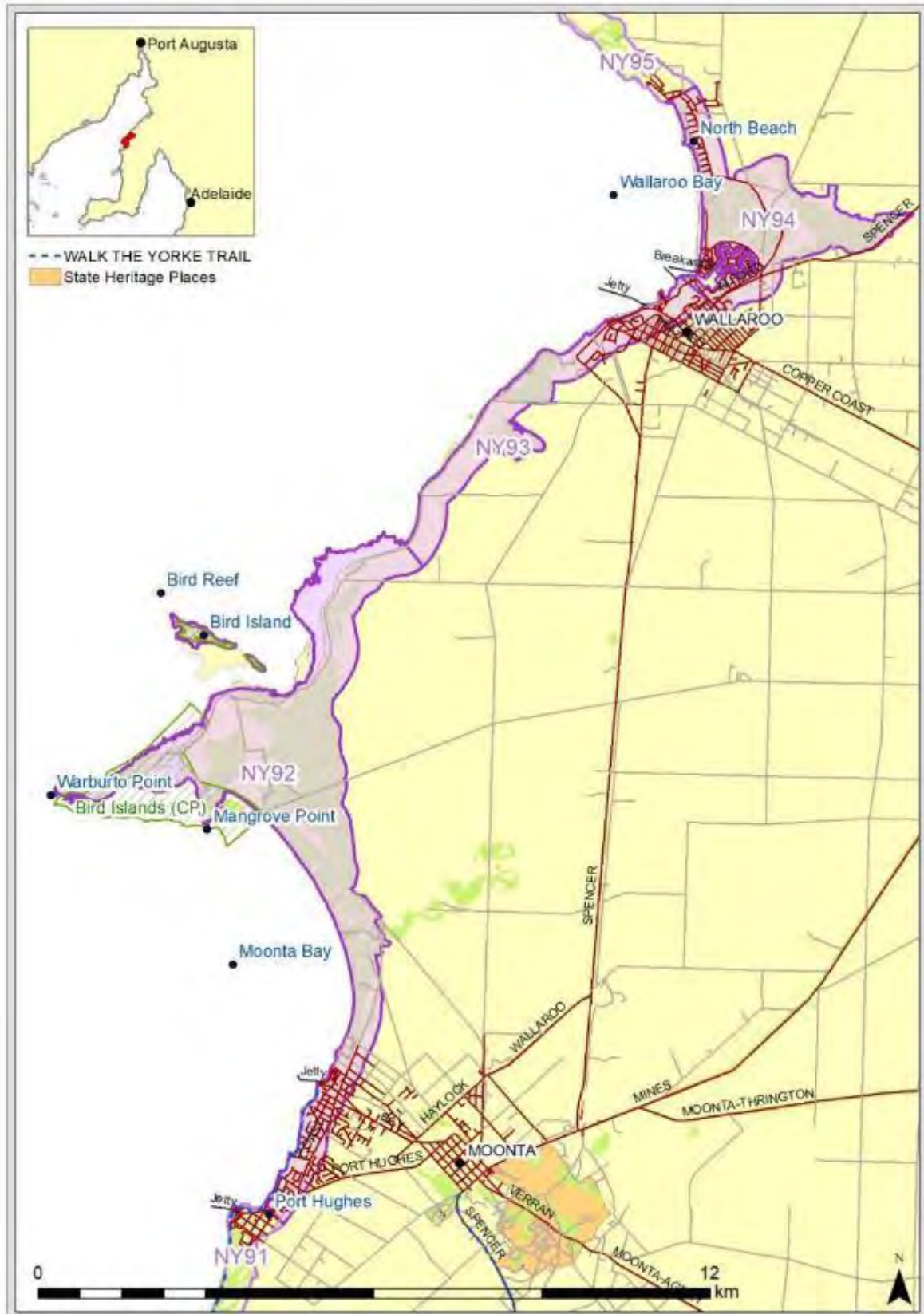
		Hughes in management solutions.		NGOs
Informal camping and rubbish dumping	Whole Management Unit	Formalise camping areas and ORV access tracks. Provide a formal rubbish disposal area for campers.	High	DEW / NARNY, CPB, Council, community groups, Traditional Owners, NGOs
<i>Weeds</i>				
Woody (African Boxthorn, Western Coastal Wattle)	Whole Cell (sand dunes are an Acacia cyclops hotspot)	Develop a weed management strategy to deal with the widespread infestation of Western Coastal Wattle.	High	Landholders, DEW / NARNY, Council, community groups, Traditional Owners, NGOs
<i>Native Vegetation</i>				
Vegetation protection - significant unmanaged vegetation	Whole cell	Support and facilitate formal protection for the area. Potentially designate as an Indigenous Protected Area and facilitate Narungga management and employment. Include private lands south of Port Hughes in management solutions.	High	DEW / NARNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
<i>Cultural Heritage</i>				
Cultural heritage - damage to significant sites	Dune systems	Work with Narungga representatives to identify significant locations and implement vehicle exclusion and vegetation rehabilitation action.	High	NARNY, DEW, SA Police, YP Council, community, Narungga organisations
<i>Other</i>				
Rubbish dumping	Shacks on Cape Elizabeth point	Improve formalisation of camping and provide information detailing expected behaviour. Consider garbage bag dispenser installation.	Medium	DEW / NARNY, CPB, Council, SAPOL, DPTI, community groups, Traditional Owners, NGOs
<i>Domestic pets</i>				
Shorebird impacts from cats and off-leash dogs on beaches	Campgrounds and accessible beaches	Raise awareness of the impact of cats and off-leash dogs on shorebirds in sensitive areas. Encourage responsible pet ownership.	Medium	NARNY, CPB, Council, landholders, community groups
<i>Feral animals</i>				
Fox and cat predation on native animals and shorebirds	Whole Management Unit	Undertake control as recommended by NARNY and coordinate with neighbours	High	Landholders, NARNY, Traditional Owners

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Cell NY92 – NY94: Moonta Bay, Bird Island to Wallaroo

Area: 2,498 hectares (Bird Island Conservation Park 358 hectares)

Location: Port Hughes to Wallaroo and Bird Island



Land Tenure/Ownership

Private: large blocks behind Bird Island Conservation Park.

Public: Crown Reserve north of Port Hughes, Bird Island, foreshore, Wallaroo.

Council: Copper Coast Council own some big blocks in Wallaroo.

Traditional owners: Narungga Native Title Determination area.

Other: Viterra, south Wallaroo and Australasian Granite (mining).

Landforms

A Cambrian conglomerate, which is resistant to erosion, crops out extensively at Port Hughes and north of the Moonta jetty, influencing the general morphology of Moonta Bay and forming broad, rocky shore platforms.

The coastline north of Warburto Point is scalloped, forming a series of bays with broad intertidal sandflats and shore platforms, backed by low-lying hooked sand spits and shell and beach ridges. An outcrop of resistant quartzite has produced the shoals of Bird Island Conservation Park, with its tidal channels and mangroves.

Cell 94 comprises the urban area of north Wallaroo with long sand beaches separated by a 200m wide reef and rocks. A rockwall marina has been constructed at Wallaroo township.

Marine Habitat

The marine environment around Bird Island is comprised of a mixture of reef, dense seagrass, mangroves and tracts of bare sand. Low tide calcarenite reef surrounds the headland. This area is a sheltered low wave energy part of the coastline.

Bird Island to Wallaroo supports low-profile reef, with dense seagrass further out to sea. North of Wallaroo, sand stretches half a kilometre out to sea, further offshore lies an expansive area of continuous, dense seagrass.

Native Vegetation

Native vegetation covers 43% (or 1,076 ha) of this Management Unit. There are substantial areas of native coastal dune vegetation behind the northern beaches of Moonta Bay which are mapped as *Olearia axillaris* +/- *Acacia ligulata* +/- *Acacia cyclops* mid sparse shrubland.

The two islands forming Bird Islands Conservation Park are fringed by Grey Mangrove (*Avicennia marina* ssp. *marina*) woodlands and samphire. A tall open shrubland of Coast Daisy-bush (*Olearia axillaris*) and grasslands of introduced species occur on the sandy, higher ground.

Conservation Significance

This area has high conservation for coastal wading birds, attributed to Bird Island Conservation Park. Three State-rated parrot species have been recorded here (Elegant Parrot, Rock Parrot and Blue-winged Parrot).

Significant species noted by Caton *et.al.* include the White-bellied Sea-eagle, Banded Stilt, Grey-tailed Tattler, Pied Oystercatcher, Sooty Oystercatcher, Peregrine Falcon, and the State-rare Eastern Reef Egret and Ruddy Turnstone.

Cultural Significance

This area has high cultural significance for Narungga people with many sites on the coasts around Wallaroo (Wadla waru) and in the Moonta (Munda) region. In Wallaroo, "The Magazine" was a significant living area for the local Aboriginal population until the silos were built (P. Turner pers.com.). Land at Port Hughes is specifically referenced in the Narungga Nations Indigenous Land Use Agreement (ILUA) with the various local Councils.

Table 68. Species of National and State Conservation Significance (BDBSA records), Moonta Bay, Bird Island to Wallaroo Management Unit

Biota	Common name	Australia (EPBC)	SA (NPW Act)
<i>Animal species</i>			
<i>Ardea intermedia</i>	Intermediate Egret		R
<i>Arenaria interpres</i>	Ruddy Turnstone		R
<i>Xenus cinereus</i>	Terek Sandpiper		R
<i>Calidris ferruginea</i>	Curlew Sandpiper	CR	
<i>Cereopsis novaehollandiae novaehollandiae</i>	Cape Barren Goose		R
<i>Charadrius leschenaultii</i>	Greater Sand Plover	VU	R
<i>Charadrius mongolus</i>	Lesser Sand Plover	EN	R
<i>Cladorhynchus leucocephalus</i>	Banded Stilt		V
<i>Egretta sacra</i>	Pacific Reef Heron (Eastern Reef Egret)		R
<i>Eubalaena australis</i>	Southern Right Whale	EN	V
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		R
<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R
<i>Neophema chrysostoma</i>	Blue-winged Parrot		V
<i>Neophema elegans</i>	Elegant Parrot		R
<i>Neophema petrophila</i>	Rock Parrot		R
<i>Sternula nereis</i>	Fairy Tern	VU	E
<i>Tachyglossus aculeatus</i>	Short-beaked Echidna		
<i>Thinornis rubricollis</i>	Hooded Plover	VU	V
<i>Tringa brevipes</i>	Grey-tailed Tattler		R
<i>Plant species</i>			
<i>Olearia minor</i> (regionally NE)	Heath Daisy-bush		
<i>Acacia nyssophylla</i> (regionally CR)	Spine Bush		

Management

Public lands are managed by Copper Coast Council and there are several privately managed areas including Viterra south of Wallaroo, Australasian Granite and some big blocks of private land behind Bird Island Conservation Park. Friends of Hooded Plover volunteers regularly monitor Hooded Plover breeding activity, install protective fencing and signs around nests and talk to beachgoers and dog walkers in the Moonta Bay area. Friends of Port Hughes, Moonta and District Progress Association and North Beach Shack Owner's Association have also

performed conservation work and amenity improvement along the coast over the past few years.

Recent management issues have arisen in the Moonta Bay area, where a number of cliff-top landholders are seeking to protect their properties through rock wall installation, to protect their properties from further storm surge damage.

Relevant plans

- Narungga Healthy Country Plan (in progress)
- Coastal Motor Vehicle Access Management Strategy (2008) Northern and Yorke Natural Resources Management Region. D. Allen.
- Yorke NRM District Weed Action Plan (2018) Northern and Yorke Natural Resource Management Board.

Recommended Actions

Management priorities along this part of the coastline are mainly centred around protecting wading birds and their habitat. This includes disturbances from vehicles and dogs on beaches.

Climate change

Bird Island and the low-lying samphire flats behind it are vulnerable to sea level rise impacts. There is potential for the coast to retreat here but it will be largely on private land. The dune system on the north beach may be vulnerable to erosion in storm surge events, however the wide beach may provide some buffering.

There are Inland Runoff/Flood Hazard zones just inland of North Beach in Wallaroo and just inland of Warburto Point. To the south there is an expansive Potential Drift Hazard Zone that stretches 1km landward. This area is likely to be impacted by severe erosion events, with higher sea levels.

Photo: Vehicle damage to samphire flats adjacent to Bird Islands CP.



Access and Recreation Impacts

Agencies and local community members have reported vehicle impacts on the coast near Bird Island where there are a number of duplicate and unnecessary tracks and significant potential to disturb coastal birds. There are also significant impacts related to ORV activity in the dune systems north of Moonta. Further public education and engagement in this area may be warranted.

Weeds

Three WoNS have been reported in this area; African Boxthorn (*Lycium ferocissimum*) is common, Boneseed (*Chrysanthemoides monilifera*) is found along the Moonta Bay clifftops and Silver-leaf Nightshade (*Solanum elaeagnifolium*) has also been recorded. Other weeds present include Western Coast Wattle, Blowfly Bush, Giant Reed, Gazania, Marguerite Daisy and succulent weeds. Pyp Grass occurs at North Beach Wallaroo and Aleppo Pine (*Pinus halepensis*) occurs along the Port Hughes clifftops.

Table 69. Recommended Management Actions; Moonta Bay, Bird Island to Wallaroo Management Unit

<i>Issue/Threat</i>	<i>Location</i>	<i>Recommended Action</i>	<i>Priority of Action</i>	<i>Potential Contributors</i>
<i>Climate change impact</i>				
Climate impact - cliff erosion	Moonta Bay to Port Hughes	Monitor cliff recession. Maintain integrity of vegetation and soil stability. Revegetate if necessary.	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
Inundation and shoreline recession Storm surge and sea-level rise impact	Inland runoff/flood hazard zones inland of North Beach, Wallaroo and Warburto Point. South of this is an expansive potential drift hazard zone stretching 1km inland	Undertake flood and inundation mapping with regard to natural assets of the coast. Identify and map suitable areas for allowing tidal retreat. Involve landholders in planning for tidal retreat zones and projects. Strengthen natural sand barriers with appropriate coastal shrub revegetation of the foredune. Strengthen artificial barriers in front of beach shacks with coastal shrub revegetation.	Medium	DEW / NRNY, CPB, Council, community groups, Traditional Owners, NGOs
<i>Access and recreation</i>				
Excessive tracks and ORV activity in dunes, samphire flats and beaches	Coast near Bird Island CP, private lands at North Beach Wallaroo Dunes just north of Moonta	Rationalise tracks, install barriers and rehabilitate unwanted tracks. Further public education and engagement.	High	DEW / NRNY, CPB, Council, SAPOL, DPTI, community groups, Traditional Owners, NGOs

<i>Weeds</i>				
Woody (Western Coast Wattle, African Boxthorn, Boneseed, Blowfly Bush, Marguerite Daisy)	Whole Management Unit	Undertake woody weed control as per bushcare method. Control African Boxthorn as per Declared Weeds and WoNS responsibilities.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional Owners NGOs
Garden escapes and succulents (Gazania and Iceplant)	Dunes in Port Hughes, Moonta Bay and North Beach Wallaroo	Engage with local community group and residents to discuss the issue. Undertake control in native vegetation.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional Owners NGOs
<i>Native vegetation</i>				
Protection of significant vegetation on private land	Moonta Bay North Beach Wallaroo	Provide landholders with information on native vegetation values, management and legislative responsibilities (e.g. intact strata under the Native Vegetation Act).	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
<i>Domestic pets</i>				
Shorebird impacts from cats and off-leash dogs on beaches	Surrounding the towns, campgrounds and accessible beaches	Raise awareness of the impact of cats and off-leash dogs on shorebirds in sensitive areas. Encourage responsible pet ownership.	Medium	NRNY, CPB, Council, landholders, community groups
<i>Feral animals</i>				
Fox and cat predation on native animals and shorebirds	Around Bird Island	Undertake control as recommended by NRNY and coordinate with neighbours.	High	Landholders, NRNY, Traditional Owners

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Cell NY95 – NY98: Point Riley, Tickera Bay to Webling Point

Area: 2,931 hectares

Location: From the northern beach of Wallaroo around Point Riley to Webling Point to the west of Port Broughton.



Land Tenure/Ownership

Private: significant farm blocks behind the narrow Crown Land strip.

Public: a narrow foreshore strip of Crown Reserve and a short foreshore section of Crown Leasehold around Webling Point.

Council: City Barunga West Council parcels around Tickera.

Traditional owners: Narungga Native Title Determination area.

Other: Private development companies and farming companies (e.g. Salt Creek Farm).

Landforms

Landforms in this area consist of sloping bedrock shorelines with narrow strips of high tide sand. Several small sand, cobble and boulder beaches are found in the breaks between the platform.

A very low energy beach and sand spit occurs in the north toward Webling Point, fronted by up to 2.5km tidal flats. There are also saltmarshes in lee of the large sand spit, with bare supratidal flats between the marsh and the farmland. Wide sand flats front the marsh and there are sand flats with small islands of saltmarsh offshore.

Marine Habitat

This sheltered, low wave energy environment supports expansive areas of continuous, dense seagrass. North of Tickera there are large tracts of bare sand near the coast with dense seagrass further out to sea.

Native Vegetation

Native vegetation covers 28% (or 831 ha) of this Management Unit. The coastline from Point Riley to Tickera has relatively little remaining natural vegetation, however, there is a narrow strip of somewhat unique native vegetation along the cliff tops and slopes (*Eremophila glabra* spp. shrublands and other more arid-adapted species) and several gullies which contain native vegetation. Samphire flats occur north of Tickera.

Vegetation associations include:

Melaleuca lanceolata tall sparse shrubland

Acacia ligulata +/- *Pittosporum angustifolium* +/- *Allocasuarina verticillata* tall open shrubland

Olearia axillaris +/- *Acacia ligulata* +/- *Exocarpos aphyllus* +/- *Myoporum insulare* +/- *Alyxia buxifolia* +/- *Dodonaea viscosa* ssp. *spatulata* mid open shrubland

Templetonia retusa, *Acacia nematophylla*, *Olearia axillaris* +/- *Alyxia buxifolia* mid open shrubland

Tecticornia sp., *Sarcocornia quinqueflora* low open shrubland

Conservation Significance

This area shows relatively low conservation values, mainly due to the lack of native vegetation. However, this may be due to a lack of survey and biodiversity data for this long stretch of coast.

White-bellied Sea-eagles can be observed here and the nearshore sand spits are likely to be important for wading birds (1).

Cultural Heritage

Aboriginal heritage has not been extensively surveyed and documented along this part of the coast but the area is rich in heritage.

Table 70. Species of National and State Conservation Significance (BDBSA records), Point Riley, Tickera Bay to Webling Point Management Unit

<i>Biota</i>	<i>Common name</i>	<i>Australia (EPBC)</i>	<i>SA (NPW Act)</i>
<i>Animal species</i>			
<i>Haliaeetus leucogaster</i>	<i>White-bellied Sea Eagle</i>		<i>E</i>
<i>Larus dominicanus dominicanus</i>	<i>Kelp Gull</i>		<i>R</i>
<i>Plant species</i>			
<i>n/a</i>			

Management

The Buronga West and Copper Coast Councils manage the public land along the foreshore. The majority of the area is managed privately.

Relevant plans

- Narungga Healthy Country Plan
- Northern and Yorke Regional NRM Plan; Strategic Plan 2019-2029.
- Barunga West Council Development Plan 2015
- Coastal Motor Vehicle Access Management Strategy (2008) Northern and Yorke Natural Resources Management Region. D. Allen.
- Yorke NRM District Weed Action Plan (2018) Northern and Yorke Natural Resource Management Board.

Recommended Actions

The main management priorities for this part of the coastline are mitigating the impacts of climate change, ORV track formalisation and weed control.

Climate change

Low-lying coasts in the north from Tickera toward Webling Point are vulnerable to inundation. Shacks at Tickera were inundated during the 2016 storm surge events. There is potential to manage land for tidal retreat but data on future potential tidal inundation extent is deficient.

The low cliffs along this section of coast are also vulnerable to erosion in storm surge events. North of Tickera there is an extensive inland Runoff/Flood Hazard Zone, a Storm Surge Hazard Zone and a Potential Drift Hazard Zone. These areas will be subjected to more frequent and intense erosion and inundation events, with rising sea levels.

Access and Recreation Impacts

ORV impact is visible on the cliffs around Point Riley and at Webling Beach, adjacent to the coast road and there are numerous informal lookouts and carparks along the road between Point Riley and Tickera.

The Copper Coast Council have suggested that construction of formal boat launching facilities may help to limit the number of private launching points.

Weeds

Two WoNS occur here; Bridal Creeper (*Asparagus asparagoides*) and African Boxthorn (*Lycium ferocissimum*). Western Coast Wattle is also present and Gazania is spreading around Tickera.

Photo: Vehicle damage at Point Riley



Table 71. Recommended Management Actions: Point Riley, Tickera Bay to Webling Point Management Unit

<i>Issue/Threat</i>	<i>Location</i>	<i>Recommended Action</i>	<i>Priority of Action</i>	<i>Potential Contributors</i>
<i>Climate change impact</i>				
Cliff erosion	Tickera	Monitor cliff recession. Support landholders to undertake cliff buffering and revegetation projects.	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
Climate impact - coastal inundation	Tickera to Point Riley	Monitor beach recession. Strengthen flood resilience by maintaining and revegetating foredunes and beach mounds. Plan to manage land for tidal retreat.	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
Flashy run-off	Gullies and creeklines opening to the coast	Maintain vegetation cover to reduce erosion potential.	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs

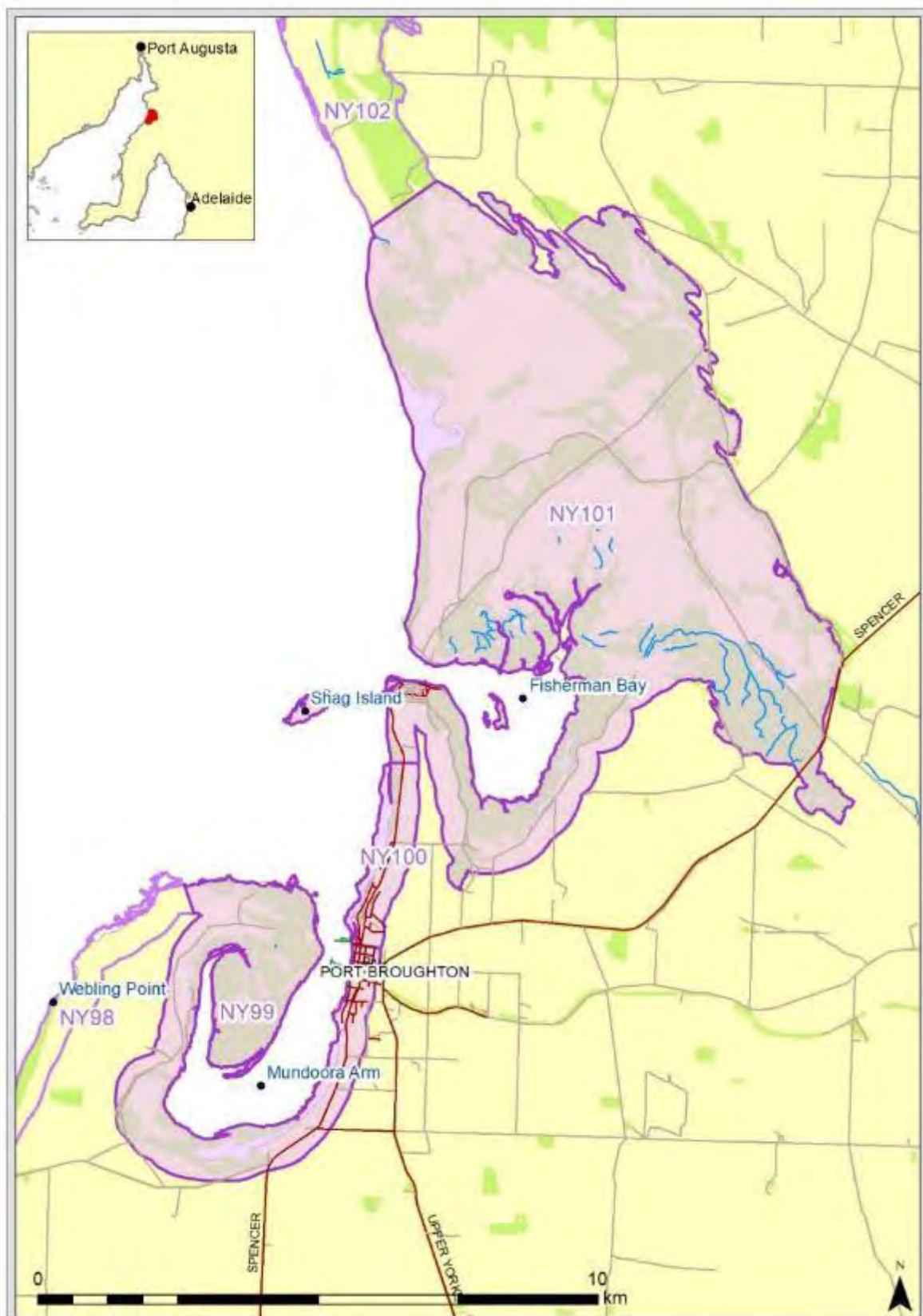
<i>Access and recreation</i>				
Duplicate and excessive 4WD and motorbike tracks	Cliffs at Point Riley to North Beach, Webling Point	Rationalise tracks and install barriers where appropriate and rehabilitate unwanted tracks. Formalise access tracks.	Medium	DEW / NRNY, CPB, Council, SAPOL, DPTI, community groups, Traditional Owners NGOs
<i>Weeds</i>				
Woody (African Boxthorn, Western Coast Wattle)	Tickera	Undertake woody weed control as per bushcare method. Control African Boxthorn as per Declared Weeds and WoNS responsibilities.	High	Landholders, DEW / NRNY, Council, community groups, Traditional, Owners NGOs
Bulbs (Bridal Creeper)	Whole Management Unit	Scattered Bridal Creeper should be controlled in the early stages of infestation, as per WoNS responsibilities.	High	Landholders, DEW / NRNY, Council, community groups, Traditional, Owners NGOs
Succulents and garden escapes (Gazania)	Tickera dunes	Engage with local community group and residents to discuss the issue. Undertake control in native vegetation.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional, Owners NGOs
<i>Other</i>				
Revegetation opportunity	Gullies and cliff slopes	Instigate projects to restore and rehabilitate the gullies and cliff slopes.	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
Cultural heritage survey and conservation	Whole Management Unit	Support indigenous organisations to undertake cultural heritage survey in order to inform priority conservation projects.	High	Appropriate indigenous organisations
<i>Domestic pets</i>				
Shorebird impacts from cats and off-leash dogs on beaches	Surrounding the towns, campgrounds and accessible beaches	Raise awareness of the impact of cats and off-leash dogs on shorebirds in sensitive areas. Encourage responsible pet ownership.	Medium	NRNY, CPB, Council, landholders, community groups
<i>Feral animals</i>				
Fox and cat predation on native animals and shorebirds	Whole Management Unit	Undertake control as recommended by NRNY and coordinate with neighbours.	High	Landholders, NRNY, Traditional Owners

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Cells NY99 - NY101: Port Broughton to Fisherman Bay

Area: 7,501 hectares

Location: Port Broughton inlet and Fisherman Bay just to the north of Port Broughton



Land Tenure/Ownership

Private: Large private farm block north of Fisherman Bay and urban areas.

Public: Unallotted Crownland Reserve along the foreshore north Port Broughton. A large Crownland Leasehold block north of Fisherman Bay. Crownland Reserve blocks south of Port Broughton and foreshore at Fisherman Bay.

Council: Barunga West Council own parcels in and around Port Broughton.

Traditional owners: Narungga and Nukunu Native Title Determination areas.

Other: Fisherman Bay Management Pty around the residential township.

Landforms

Port Broughton is an intertidal estuary inlet. Sand flats separate the mangroves from the deeper seagrass channel of Mudoora Arm. The inlet beach area is fronted by 300-400m wide intertidal flats.

Fisherman Bay is a shallow seagrass covered bay with a deeper tidal channel in the centre, surrounded by intertidal saltmarsh flat.

To the north of Fisherman Bay is a narrow beach fronted by 2km wide bare sand flats which extend inland. At the mouth are numerous small vegetated chenier mounds.

Marine Habitat

The sheltered marine environment in this area is dominated by saltmarshes, mangroves and seagrass, which provides essential habitat for a variety of marine organisms. An island of mangroves lies in the middle of the Bay.

Native Vegetation

Native vegetation covers 40% (or 2,972 ha) of this Management Unit. This complex coastline supports extensive samphire flats to the north of Fisherman Bay with small areas of Drooping Sheoak woodland on higher ground and small pockets of mangroves in the bay. Samphire flats and dune shrublands cover the low-lying areas around the inlets, except around urban areas.

Vegetation associations include:

Tecticornia sp., *Sarcocornia quinqueflora* low open shrubland

Allocasuarina verticillata+/-*Melaleuca lanceolata* low woodland

Avicennia marina ssp. *marina* low open forest

Conservation Significance

The nearshore environment in this Management Unit is complex and likely to provide significant habitat values for shorebirds and waders, and for a variety of marine flora and fauna. The occurrence of the Samphire Thornbill is significant as it is isolated from the populations of the Samphire Coast and head of Gulf St Vincent.

The Cyanobacterial mats recorded here are also significant.

Table 72. Species of National and State Conservation Significance (BDBSA records), Port Broughton to Fisherman Bay Management Unit

Biota	Common name	Australia (EPBC)	SA (NPW Act)
<i>Animal species</i>			
<i>Acanthiza iredalei rosinae</i>	Samphire Thornbill	VU	V

<i>Cladorhynchus leucocephalus</i>	Banded Stilt		V
<i>Egretta garzetta</i>	Little Egret		R
<i>Egretta sacra</i>	Pacific Reef Heron (Eastern Reef Egret)		R
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		R
<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R
<i>Haliaeetus leucogaster</i>	White-bellied Sea Eagle		E
<i>Larus dominicanus dominicanus</i>	Kelp Gull		R
<i>Limosa lapponica</i>	Bar-tailed Godwit		R
<i>Neophema elegans</i>	Elegant Parrot		R
<i>Plectorhyncha lanceolata</i>	Striped Honeyeater		R
<i>Plant species</i>			
<i>Maireana rohlachii</i>	Rohrlach's Bluebush		R
<i>Tecticornia flabelliformis</i>	Bead Samphire	VU	V

Management

The Barunga West Council manages significant land in the area and there are active community groups around Fisherman Bay and the Port Broughton Sailing Club. Most other land is privately managed.

Relevant plans

- Narungga and Nukunu Healthy Country Plans (in progress)
- Northern and Yorke Regional NRM Plan; Strategic Plan 2019-2029.
- Barunga West Council Development Plan 2015.
- Coastal Motor Vehicle Access Management Strategy (2008) Northern and Yorke Natural Resources Management Region. D. Allen.
- Yorke NRM District Weed Action Plan (2018) Northern and Yorke Natural Resource Management Board.

Recommended Actions

The main management priorities for this area are mitigating the impacts of climate change, ORV track formalisation and weed control.

Climate change

The intertidal flats around the bays in this area are vulnerable to inundation with climate change and associated sea level rise. Opportunities exist north of Fisherman Bay to manage land for tidal retreat.

This coastline is largely a Potential Drift Hazard Zone and to the north of Fisherman Bay lies an extensive Storm Surge Hazard Zone. These areas will experience more frequent and intense coastal erosion and storm damage events, with rising sea levels.

Access and Recreation Impacts

There are minimal recreational impacts in this area, however at Back beach some track formalisation is required.

Weeds

African Boxthorn (*Lycium ferocissimum*) is the main WoNS recorded here although Bridal Creeper and Prickly pear have also been recorded. Gazania and many garden escapes are associated with the township and shacks.

Other:

Rubbish dumping has been reported in this area, particularly around the township of Fisherman Bay.

Table 73. Recommended Management Actions: Port Broughton to Fisherman Bay Management Unit

<i>Issue/Threat</i>	<i>Location</i>	<i>Recommended Action</i>	<i>Priority of Action</i>	<i>Potential Contributors</i>
<i>Climate change impact</i>				
Climate impact - coastal inundation	North of Fisherman Bay	Monitor beach recession. Strengthen flood resilience by maintaining and revegetating foredunes and beach mounds. Plan to manage land for tidal retreat.	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
<i>Access and recreation</i>				
Vehicle access management - driving on beach and cliff embankments	Back Beach	Rationalise tracks and install barriers where appropriate and rehabilitate unwanted tracks. Formalise access tracks.	Medium	DEW / NRNY, CPB, Council, SAPOL, DPTI, community groups, Traditional Owners
<i>Weeds</i>				
Woody (African Boxthorn)	Whole Management Unit	Monitor and control as per Declared species responsibilities.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional, Owners
Bulbs (Bridal Creeper)	Whole Management Unit	Monitor and control as per Declared species responsibilities.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional, Owners
Garden escapes and succulents (Gazania, Prickly Pear)	Whole Management Unit	Monitor Gazania and garden escapes to prevent from establishing in vegetated dunes. Control Prickly Pear as per Declared and WoNS responsibilities.	Medium	Landholders, DEW / NRNY, Council, community groups,
<i>Domestic pets</i>				
Shorebird impacts from cats and off-leash dogs on beaches	Surrounding the towns, campgrounds and accessible beaches	Raise awareness of the impact of cats and off-leash dogs on shorebirds in sensitive areas. Encourage responsible pet ownership.	Medium	NRNY, CPB, Council, landholders, community groups,

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Cells NY102 - NY104 Wandearah to Port Davis

Area: 17,894 hectares

Location: From Fisherman's Bay north along the central eastern coastline of Spencer Gulf to Port Pirie



Land Tenure/Ownership

Private: mostly private farmland in the south.

Public: a thin strip of unallotted Crown Land Reserve along the foreshore in the south and large blocks around Port Davis. Some Crown Leasehold around Pt Davis. Port Davis Marine Park (DEW).

Council: Port Pirie Council own land around the Port Davis boat ramp.

Other: Point Jarrold Flora and Fauna Research Association (Heritage Agreement).

Traditional owners: Nukunu Native Title Determination area.

Landforms

This Management Unit is characterised by its low-energy and low gradient coastline. The prograding coast here is up to 7 km in width, having advanced towards the sea as a result of the accumulation of waterborne sediment.

The prominent protrusion of the coastline between Port Pirie and Port Broughton some 20 km seaward from the general alignment of the coast is a classic deltaic landscape feature resulting from a significant river reaching the coast in the past (39). The southern part of this Management Unit includes the flat Broughton River deltaic plain and features multiple channels with some sedimentary growth, low tide flats and islands and extensive stands of mangrove, sand flats and tidal streams.

To the north, the extensive saltmarshes are fronted by low sand beach ridges and low tide sand flats, with chenier dune ridges.

Marine Habitat

Northern Spencer Gulf is an inverse or negative estuary where evaporation exceeds freshwater input, with salinities of 34 to 49 parts per thousand, increasing in the northernmost portion of the gulf. Water temperatures are also elevated, ranging between 13 - 28°C. The gulf thus provides a refuge for plants and animals that colonised during warmer water conditions of the past (39).

Protected from the ocean swell, these northernmost gulf areas also experience diminished wave heights but amplified tidal ranges (39). Point Jarrold is a sanctuary zone as a part of the Marine Park system in the Upper Spencer Gulf.

The marine environment here features extensive mangrove stands, bare sand to 3km offshore and dense seagrass further out to sea.

Native Vegetation

The majority of this coastline supports samphire and saltmarsh communities with extensive mangroves occurring northward from the Broughton River mouth.

Vegetation associations include:

Olearia axillaris +/- *Acacia ligulata* +/- *Exocarpos aphyllus* +/- *Myoporum insulare* +/- *Alyxia buxifolia* +/- *Dodonaea viscosa* ssp. *spatulata* mid open shrubland

Nitraria billardierei +/- *Olearia axillaris* mid open shrubland

Tecticornia sp., *Sarcocornia blackiana* low open shrubland

Allocasuarina verticillata +/- *Melaleuca lanceolata* low woodland

Avicennia marina ssp. *marina* low open forest.

Conservation Significance

This area has one of the highest conservation values in the Northern Yorke coastal region, due to its large area of native vegetation, high species diversity and number of threatened species (1). Intertidal samphire here would qualify as the EPBC-listed temperate saltmarsh community.

Cyanobacterial mat development and significant chenier ridges give further significance to this area.

Fauna

This coastal area provides important feeding grounds for migratory waders such as the Slender-billed Thornbill and Fairy Tern. The Upper Spencer Gulf supports some of the most important fish nurseries in South Australia, where whiting, squid and snapper gather to spawn and dolphins congregate to feed and breed (54). It is also identified as an important foraging zone for the White-bellied Sea-eagle (56).

Flora

Significant flora in this part of the coast includes the Nationally Vulnerable Bead Samphire (*Tecticornia flabelliformis*).

Table 74. Species of National and State Conservation Significance (BDBSA records), Wandearah to Port Davis Management Unit

Biota	Common name	Australia (EPBC)	SA (NPW Act)
<i>Animal species</i>			
<i>Acanthiza iredalei rosinae</i>	Samphire Thornbill	VU	V
<i>Calidris canutus</i>	Red Knot	EN	
<i>Calidris ferruginea</i>	Curlew Sandpiper	CR	
<i>Charadrius mongolus</i>	Lesser Sand Plover	EN	R
<i>Falco peregrinus</i>	Peregrine Falcon		R
<i>Melanodryas cucullata cucullata</i>	Hooded Robin		R
<i>Neophema chrysostoma</i>	Blue-winged Parrot		V
<i>Neophema petrophila</i>	Rock Parrot		R
<i>Pachycephala inornata</i>	Gilbert's Whistler		R
<i>Sternula nereis</i>	Fairy Tern	VU	E
<i>Plant species</i>			
<i>Poa fax</i>	Scaly Poa		R
<i>Tecticornia flabelliformis</i>	Bead Samphire	VU	V

Management

This isolated part of the coast is relatively unmanaged, with little on-ground activity from community groups and individuals. However, the Upper Spencer Gulf Marine Park system includes a sanctuary zone around Point Jarrold, and northwards towards Port Pirie is included in Upper Spencer Gulf Marine Park.

The large areas of leasehold Crown Land/Unallotted Crown land should be considered for enhanced protection by management, including consideration for reservation, together with the sub-tidal sand flats. Such a saltmarsh reserve and an adjacent marine protected area would complement each other and allow the development of management strategies running across the land-sea boundary (1).

Relevant plans

- Nukunu Healthy Country Plan (in progress)
- Northern and Yorke Regional NRM Plan; Strategic Plan 2019-2029.
- Northern and Yorke Regional Strategic Plan 2009 – 2018. Northern and Yorke Natural Resources Management Board
- Broughton River Catchment Action Plan J. Munro (Ed) Natural Resources Northern and Yorke, 2016.
- Coastal Motor Vehicle Access Management Strategy (2008) Northern and Yorke Natural Resources Management Region. D. Allen.
- Yorke NRM District Weed Action Plan (2018) Northern and Yorke Natural Resource Management Board.

Recommended Actions

This Management Unit, together with the adjacent Cell 105, forms an extensive area of high conservation value saltmarsh and tidal flats (1).

Climate change

The whole coastline along this Management Unit is a Storm Surge Hazard Zone and the inland area is a Runoff/Flood Hazard Zone, which means that this area will be greatly impacted by rising sea levels and more frequent and intense storms.

The high value of these intertidal saltmarshes warrants investigation of opportunities to allow inland migration of the community in step with rising sea levels. Appropriate levels of investment and resources should be directed to this purpose.

Access and Recreation Impacts

Large sections of this coastline are relatively inaccessible, resulting in relatively minor impacts from ORV activity.

Weeds

African Boxthorn (*Lycium ferocissimum*) a WoNS has been recorded in this area. There is little other information on the weeds along this part of the coast.

Table 75. Recommended Management Actions: Wandearah to Port Davis Management Unit

Issue/Threat	Location	Recommended Action	Priority of Action	Potential Contributors
<i>Climate change impact</i>				
Inundation and shoreline recession	Whole Management Unit	Undertake flood and inundation mapping with regard to natural assets of the coast.	High	DEW / NRNY, CPB, Council, landholders, community groups,
Storm surge and sea-level rise impact				

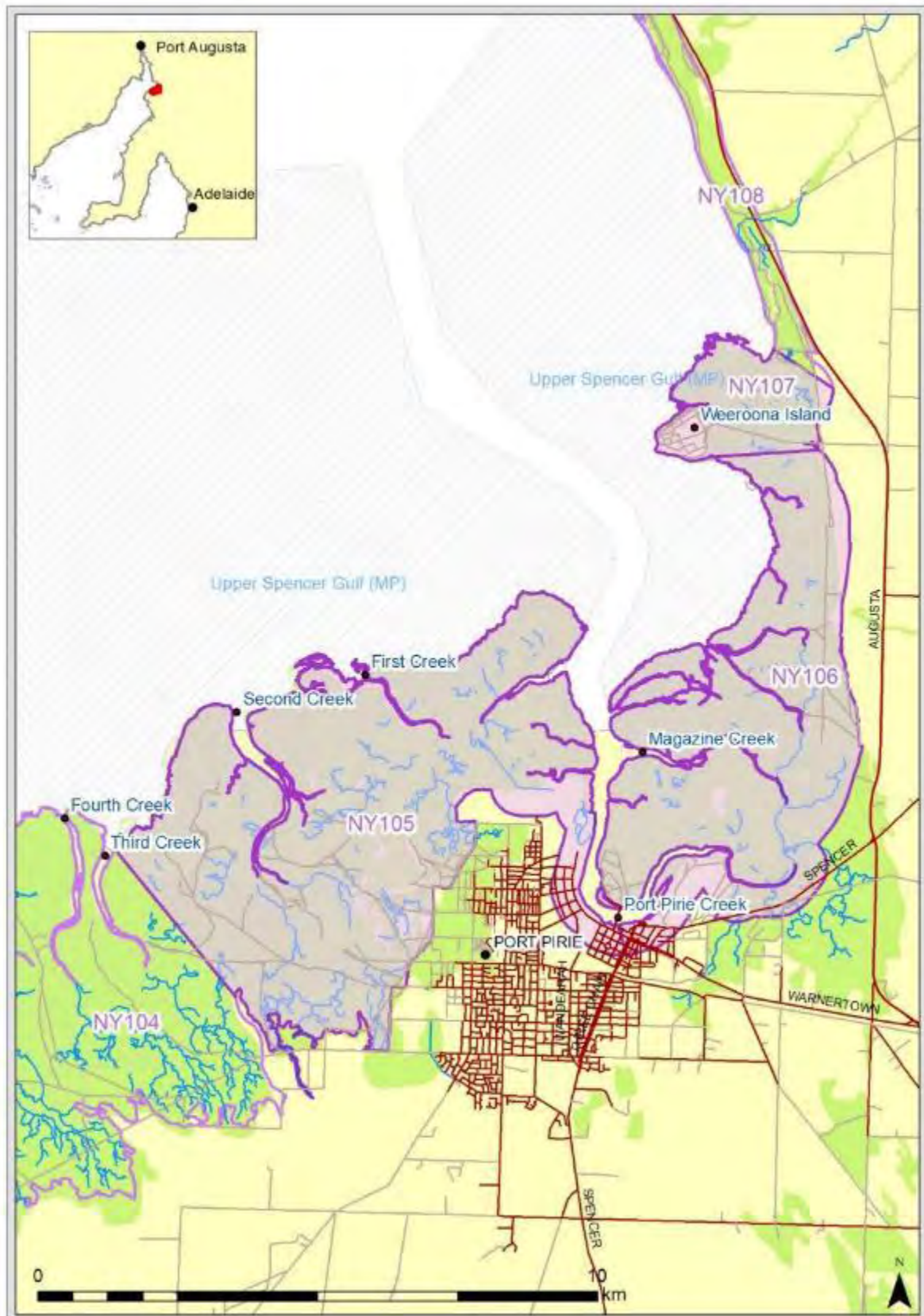
		Identify and map suitable areas for allowing tidal retreat.		Traditional Owners, NGOs
		Involve landholders in planning for tidal retreat zones and projects and direct resources to these projects.		
Significant native vegetation vulnerable to species composition change, compromised structural integrity and reduced regeneration potential	Whole Management Unit	Maintain vegetation integrity by minimising disturbance from vehicles, pedestrians, feral animals and weeds.	Medium	DEW / NARNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
<i>Access and recreation</i>				
Vehicle access management - driving on the beach	Whole Management Unit	Rationalise any excessive tracks and install additional signs. Public education may be required.	High	DEW / NARNY, CPB, Council, SAPOL, DPTI, community groups, Traditional Owners NGOs
<i>Weeds</i>				
Woody (African Boxthorn)	Whole Management Unit	Surveying and monitoring African boxthorn, locations and extent, is important to ensure this weed does not invade into difficult to access areas.	High	Landholders, DEW / NARNY, Council, community groups, Traditional, Owners NGOs
<i>Domestic pets</i>				
Shorebird impacts from cats and off-leash dogs on beaches	Surrounding the towns, campgrounds and accessible beaches	Raise awareness of the impact of cats and off-leash dogs on shorebirds in sensitive areas. Encourage responsible pet ownership.	Medium	NARNY, CPB, Council, landholders, community groups
<i>Feral animals</i>				
Fox and cat predation on native animals and shorebirds	Whole Management Unit	Undertake control as recommended by NARNY and coordinate with neighbours.	High	Landholders, NARNY, Traditional Owners

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Cell NY105 – NY107: Port Pirie to Weeroona Island

Area: 6,683 hectares

Location: Eastern side of Port Pirie and north to Weeroona Island



Land Tenure/Ownership

Private: small proportion of private land mostly in townships.

Public: Large areas of unallotted Crown Land and Crown Leasehold

Council: Mt Remarkable Council (Weeroona Island), Port Pirie Council (Port Pirie township)

Other: SA Water Corporation (treatment works west of Port Pirie), Minister for Transport, Planning and Infrastructure (waters), railways, Nyrstar, rifle range and car clubs.

Traditional owners: Nukunu Native Title Determination area.

Landforms

The mostly north-facing coastline around Port Pirie sits in the sheltered waters of Germein Bay. This area features a wide prograding coast with extensive mangroves, sandflats and seagrass beds. Here, tidal influences dominate the coastline, with the widespread development of tidal inlets (spring tides vary between 2 and 4 m).

At Weeroona Island, erosion resistant rocks of sandstone and quartzite crop out and form an island 40 m high.

West of Port Pirie features a flat deltaic plain with low tide flats, islands, multiple channels and sedimentary deposits.

To the north and east of Port Pirie, wide and extensive bands of mangroves with numerous tidal creeks extend to Weeroona Island.

Marine Habitat

The marine environment here is dominated by bare sand to 3km offshore and extensive tracts of dense seagrass further out to sea. The tidal flats support extensive mangrove stands.

The whole coastline in this Management Unit is very sheltered, with low wave energy.

Native Vegetation

Native vegetation covers 89% (or 5,980 ha) of this Management Unit. Most of this is saltmarsh and samphire with the exception of the urban area around Port Pirie.

Vegetation associations include:

Avicennia marina ssp. *marina* low open forest over *Tecticornia* sp., *Sarcocornia quinqueflora* shrubs

Tecticornia sp., *Sarcocornia blackiana* low open shrubland

Maireana oppositifolia+/-*Tecticornia indica* ssp. low open shrubland

Conservation Significance

The entire area has high conservation value, except the Port Pirie urban area. Cell 105 has a particularly high conservation value, due to the high number of threatened species and low number of introduced species. In addition, patch size, connectivity, and edge to interior ratio are all very high (1).

Much of the samphire and saltmarshes would be protected under the EPBC Act.

Fauna

The extensive sand flat areas provide valuable habitat for coastal waders. This part of the coastline also has good habitat for bush birds, reptiles and butterflies (1).

Table 76. Species of National and State Conservation Significance (BDBSA records), Port Pirie to Weeroona Island Management Unit

<i>Biota</i>	<i>Common name</i>	<i>Australia (EPBC)</i>	<i>SA (NPW Act)</i>
<i>Animal species</i>			
<i>Acanthiza iredalei rosinae</i>	<i>Samphire Thornbill</i>	VU	V
<i>Arctocephalus tropicalis</i>	<i>Subantarctic Fur Seal</i>	EN	E
<i>Ardea intermedia</i>	<i>Intermediate Egret</i>		R
<i>Cladorhynchus leucocephalus</i>	<i>Banded Stilt</i>		V
<i>Egretta garzetta</i>	<i>Little Egret</i>		R
<i>Egretta sacra</i>	<i>Pacific Reef Heron (Eastern Reef Egret)</i>		R
<i>Haematopus longirostris</i>	<i>(Australian) Pied Oystercatcher</i>		R
<i>Melanodyras cucullata cucullata</i>	<i>Hooded Robin</i>		R
<i>Neophema elegans</i>	<i>Elegant Parrot</i>		R
<i>Sternula nereis</i>	<i>Fairy Tern</i>	VU	E
<i>Plant species</i>			
n/a			

Management

There is a complex mix of land managers in this area given the urban interface with some significant natural values. The Port Pirie and Mt Remarkable Councils play a significant role managing infrastructure, development and natural environments.

Relevant plans

- Nukunu Healthy Country Plan (in progress)
- Northern and Yorke Regional NRM Plan; Strategic Plan 2019-2029.
- Coastal Motor Vehicle Access Management Strategy (2008) Northern and Yorke Natural Resources Management Region. D. Allen.
- Yorke NRM District Weed Action Plan (2018) Northern and Yorke Natural Resource Management Board.

Recommended Actions

The biggest threats to conservation value of this Management Unit are ORV damage, invasive weeds and sea level rise. Development and industry are also sources of potential conflict with natural values (40), for example the oil spill of 1992 which caused a loss of a significant bird life (41). A desalination plant has also been proposed in this area (39).

Native vegetation clearance on Weeroona Island associated with subdivision of blocks is also of concern.

Climate change

The extensive intertidal and supratidal flats are likely to be inundated under sea level rise scenarios. Migration of the samphire community is largely restricted by the township in the

south and the highway and railway to the east. Some tidal retreat could be facilitated in the west.

The whole coastline in this Management Unit is a Storm Surge Hazard Zone, thus will experience more frequent and intense coastal erosion and inundation events, with rising sea levels.

Access and Recreation Impacts

Relatively minor vehicle impacts occurring in samphire flats west of the town, over the “Bridge to Nowhere” and along the sandy coast between the town and Weeroona Island.

Weeds

At least three WoNS occur in this area: Erect Prickly Pear (*Opuntia stricta*), Silver-leaf Nightshade (*Solanum elaeagnifolium*) and African Boxthorn (*Lycium ferrocissimum*). Buffel Grass (*Cenchrus ciliaris*), a Declared Weed, has also been recorded here and appears to be spreading in the area. A control strategy is required to effectively tackle the established infestation of Buffel Grass and significant resources should be directed to its containment.

Other (development)

Port Pirie and the Upper Spencer Gulf is undergoing significant expansions in renewable energy, residential and other land developments. Weeroona Island is a good demonstration of the potential impacts from development in the coastal zone where residential blocks are being sold within the last False Sandalwood (*Myoporum platycarpum*) and Bullock Bush (*Alectryon oleifolius*) woodlands in the district. While this development has already been approved and is underway, the impacts may be minimised by engaging with residents to promote the value of native vegetation, the impacts of garden weeds, appropriate fire risk management and biodiversity.

Photo: Subdivision and sale of residential blocks in the last remaining Myoporum platycarpum and Alectryon oleifolius Woodlands on Weeroona Island



Table 77. Recommended Management Actions; Port Pirie to Weeroona Island Management Unit

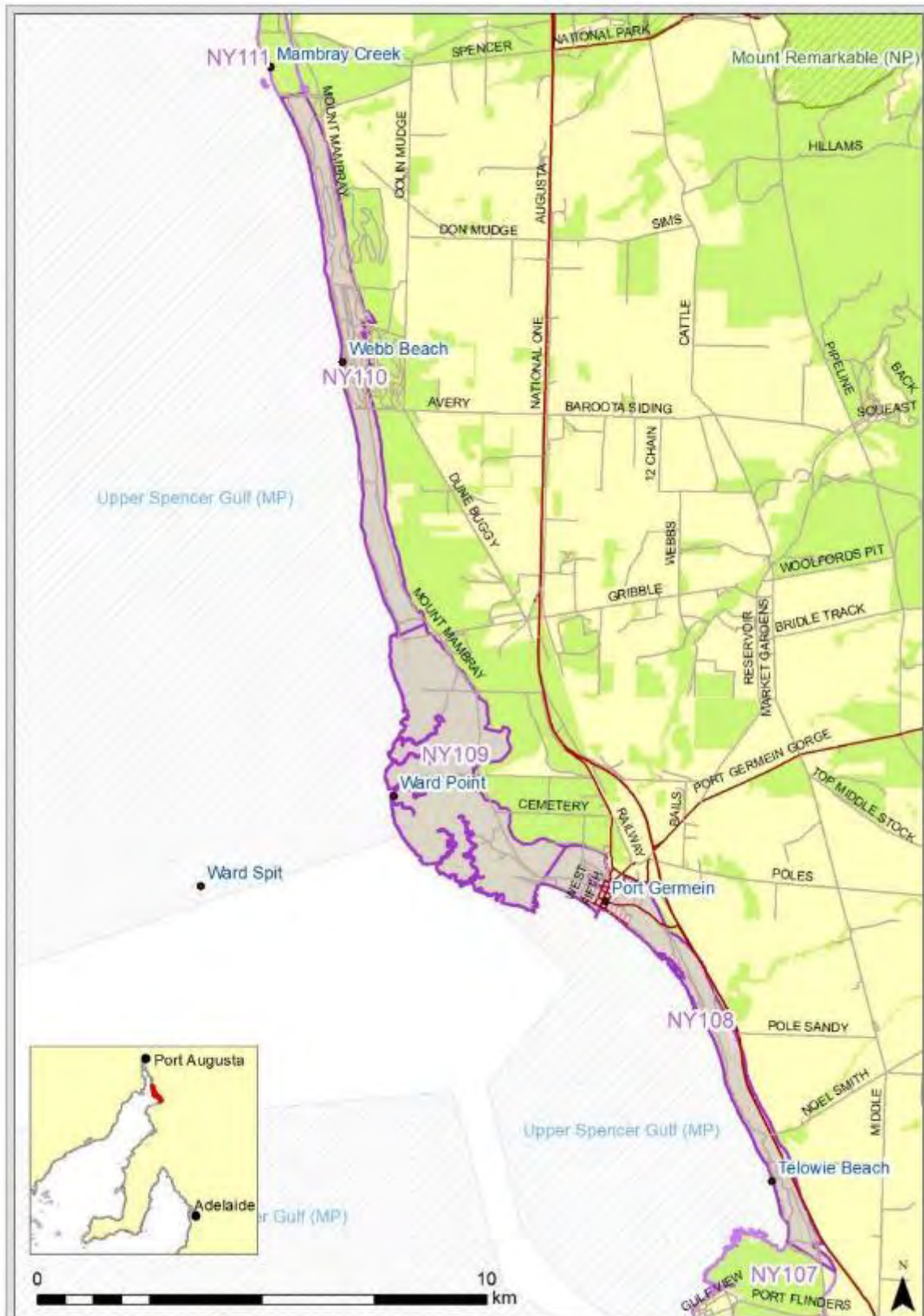
<i>Issue/Threat</i>	<i>Location</i>	<i>Recommended Action</i>	<i>Priority of Action</i>	<i>Potential Contributors</i>
<i>Climate change impact</i>				
Inundation and shoreline recession <i>Storm surge and sea-level rise impact</i>	Intertidal and supratidal flats	Undertake flood and inundation mapping with regard to natural assets of the coast. Identify and map suitable areas for allowing tidal retreat. Involve landholders in planning for tidal retreat zones and projects.	High	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
<i>Access and recreation</i>				
Informal and excessive tracks in native vegetation	South of Weeroona Island causeway, Solomontown (Crowland), Bridge to Nowhere	Rationalise tracks, install barriers and rehabilitate unwanted tracks.	Medium	DEW / NRNY, CPB, Council, SAPOL, DPI, community groups, Traditional Owners NGOs
<i>Weeds</i>				
Succulents and bulbs	Weeroona Island	Engage with new and existing residents to discuss minimum impact development, the value of native vegetation, garden weeds, appropriate fire risk management and biodiversity.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional Owners NGOs
Grasses (Buffel Grass)	Roadsides	Monitor for spread coming from the highway and railways and control early. Devise and implement a containment and control strategy.	High	Landholders, DEW / NRNY, Council, community groups, Traditional Owners NGOs
<i>Other</i>				
Development - residential subdivision in native vegetation	Weeroona Island	Engage with new and existing residents to discuss minimum impact development, the value of native vegetation, garden weeds, appropriate fire risk management and biodiversity.	High	DEW / NRNY, CPB, Council, Native Vegetation Council
<i>Domestic pets</i>				
Shorebird impacts from cats and off-leash dogs on beaches	Surrounding the towns, campgrounds and accessible beaches	Raise awareness of the impact of cats and off-leash dogs on shorebirds in sensitive areas. Encourage responsible pet ownership.	Medium	NRNY, CPB, Council, landholders, community groups

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Cell NY108 – NY110: Port Germein and Baroota

Area: 2,537 hectares

Location: From Telowie Beach just south of Port Germein through Ward Point and Baroota to Mambray Creek.



Land Tenure/Ownership

Private: on the coast north of Avery Rd and around townships

Public: Crown Land Act Reserve (e.g. Telowie Beach), significant unallotted Crown Land around Wards Point up to Avery Rd

Council: Mount Remarkable Council own parcels around Port Germein

Traditional owners: Nukunu Native Title Determination area.

Other: Minister for Transport, Planning and Infrastructure (waters), Aus-Rail Track, Port Germein Golf Club and Broughton Riverview: off-road park.

Landforms

Landscape features in this Management Unit include narrow long sections of dunes and wide beaches, offshore sand bars and islands. Cell 109 at Ward Point has a small deltaic plain with multiple channels and sedimentary accumulation. The mangroves are fronted by wide bare sand flats.

Germein Bay contains the settlement of Port Germein, which has been built across a wide beach ridge plain. The beach north of Port Germein is fronted by sandflats almost 1 km in width.

Marine Habitat

The marine environment consists of extensive areas of bare sand to 1 km offshore, with dense tracts of seagrass further out to sea. The intertidal mudflats support large areas mangroves.

This is a sheltered, low-energy shoreline.

Native Vegetation

Native vegetation covers 95% (or 2,406 ha) of this Management Unit. Coastal shrublands of *Acacia ligulata* occur south of Port Germein and on the chenier dune ridges to the north. There are significant areas of inter-tidal mangrove and samphire flats around Ward Point and narrow dune vegetation and samphire further north.

Vegetation associations include:

Acacia ligulata, *Olearia axillaris*+/-*Rhagodia parabolica*+/-*Lycium ferocissimum*+/-*Geijera linearifolia* tall open shrubland

Avicennia marina ssp. *marina* low open forest over *Tecticornia* sp., *Sarcocornia quinqueflora* shrubs

Tecticornia sp. *Sarcocornia blackiana* low open shrubland

Maireana oppositifolia+/-*Tecticornia indica* ssp. low open shrubland

Conservation Significance

This part of the coastline has high conservation value due to the threatened status of some vegetation communities and flora species and species diversity. Patch size, connectivity, and edge to interior ratio is also good. There are also high value samphire areas, including some which would be protected under the EPBC Act, and medium to high values for endemic dune communities.

The area also has high habitat value for butterflies and bush birds, such as the Slender-billed Thornbill (1).

The offshore sand bars, islands and sand flats are a valuable habitat for wading birds such as the Far Eastern Curlew. 'Ward Spit' is recorded as a nesting site for the Caspian Tern.

Table 78. Species of National and State Conservation Significance (BDBSA records), Port Germein and Baroota Management Unit

<i>Biota</i>	<i>Common name</i>	<i>Australia (EPBC)</i>	<i>SA (NPW Act)</i>
<i>Animal species</i>			
<i>Arenaria interpres</i>	Ruddy Turnstone		R
<i>Calidris canutus</i>	Red Knot	EN	
<i>Calidris ferruginea</i>	Curllew Sandpiper	CR	
<i>Calidris tenuirostris</i>	Great Knot	CR	R
<i>Cladorhynchus leucocephalus</i>	Banded Stilt		V
<i>Egretta garzetta</i>	Little Egret		R
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		R
<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R
<i>Limosa lapponica</i>	Bar-tailed Godwit	ssp	R
<i>Numenius madagascariensis</i>	Far Eastern Curlew	CR	V
<i>Pluvialis fulva</i>	Pacific Golden Plover		R
<i>Plant species</i>			
n/a			

Management

The Mount Remarkable Council bears the majority of the management responsibility in this Management Unit. Friends of Telowie Gorge are a very active group trying to mitigate ORV damage along the coast south of Port Germein and undertaking African Boxthorn control.

Relevant plans

- Nukunu Healthy Country Plan (in progress)
- Northern and Yorke Regional NRM Plan; Strategic Plan 2019-2029
- Coastal Motor Vehicle Access Management Strategy (2008) Northern and Yorke Natural Resources Management Region. D. Allen.
- Yorke NRM District Weed Action Plan (2018) Northern and Yorke Natural Resource Management Board.

Recommended Actions

The main threats to the conservation value of this Management Unit are ORV track damage and weed invasion. The conservation priority is high in this area. Caton *et.al.* recommended that a detailed examination of the reservation of saltmarsh areas should be undertaken together with neighbouring areas (1).

Climate change

Sea level rise will increase beach and dune erosion and areas with barriers to migration such as Telowie Beach are most vulnerable. Tidal inundation is likely to increase around Wards Point and there are opportunities to facilitate migration. The areas that will experience the greatest

impacts from sea level rise are north of Port Germein where there is a Storm Surge Hazard Zone and parts of cell 110 which are Inland Runoff/Flood Hazard Zones.

Access and Recreation Impacts

A vast network of ORV tracks is impacting this coastline. Hotspots include Telowie Beach where local efforts to reduce illegal dumping and close damaging informal tracks should be supported, and the private and Crown lands around the Barrow's Beach off-road track.

There are a number of tracks in the Management Unit which could be closed as they are not useful for access and vehicles often become bogged in the low-lying parts.

Weeds

WoNS in this area include African Boxthorn (*Lycium ferocissimum*), Erect Prickly Pear (*Opuntia stricta*) and Bridal Creeper (*Asparagus asparagoides*). Buffel Grass (*Cenchrus ciliaris*), a Declared Weed, has also been recorded and is spreading in the area. A control strategy is required to effectively tackle the established infestation of Buffel Grass and significant resources should be directed to its containment.

Photo: Unregulated ORV activity in shell grit dunes north of Barrows Rd



Table 79. Recommended Management Actions; Port Germein and Baroota Management Unit

<i>Issue/Threat</i>	<i>Location</i>	<i>Recommended Action</i>	<i>Priority of Action</i>	<i>Potential Contributors</i>
<i>Climate change impact</i>				
Significant native vegetation vulnerable to species composition change, compromised structural integrity and reduced regeneration potential (resilience)	Tall shrublands on sand dune systems	Maintain vegetation integrity by minimising disturbance from vehicles, pedestrians, feral animals and weeds.	High	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
	Disturbed samphire	Facilitate regeneration by passive (access management) or active (revegetation) interventions as required.		
Beach and dune erosion <i>Storm surge and sea-level rise impact</i>	Whole Management Unit	Monitor beach and dune recession. Strengthen dune integrity with access management, dune stabilisation and revegetation. Involve landholders in planning for future dune breaches and retreat zones.	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
<i>Access and recreation</i>				
Vehicle access management - informal and excessive tracks in native vegetation	Telowie Beach, Ward Point, Samphire Rd, Barrows Beach crownlands, adjacent off-road park	Rationalise tracks, install barriers and rehabilitate unwanted tracks, install additional signs detailing expected behaviours and the value of native vegetation. Block and close the boggy track at the end of Barrows Rd.	High	DEW / NRNY, CPB, Council, SAPOL, DPI, community groups, Traditional Owners, NGOs
<i>Weeds</i>				
Succulents and bulbs (Opuntia spp., Carrion Flower, Bridal Creeper)	Telowie Beach and dunes surrounding Port Germein	Undertake control of Bridal creeper, Prickly Pear and other Opuntia spp. as per Declared Weeds and WoNS responsibilities. Monitor for Carrion Flower and control as observed.	High	Landholders, DEW / NRNY, Council, community groups, Traditional Owners, NGOs
Woody (African Boxthorn)	Telowie Beach, Avery Rd	Undertake control as per Declared Weeds and WoNS responsibilities.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional Owners, NGOs
Grasses (Buffel Grass)	Telowie Beach and roadsides	Monitor and control as observed. Develop and implement a strategy for containment.	High	Landholders, DEW / NRNY, Council, community groups, Traditional Owners, NGOs

<i>Other</i>				
Rubbish dumping	Mangroves north of Port Germein, Wards Point	Ensure appropriate signage and regularly patrol the area.	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
<i>Domestic pets</i>				
Shorebird impacts from cats and off-leash dogs on beaches	Surrounding the towns, campgrounds and accessible beaches	Raise awareness of the impact of cats and off-leash dogs on shorebirds in sensitive areas. Encourage responsible pet ownership.	Medium	NRNY, CPB, Council, landholders, community groups
<i>Feral animals</i>				
Fox and cat predation on native animals and shorebirds	Whole Management Unit	Undertake control as recommended by NRNY and coordinate with neighbours.	High	Landholders, NRNY, Traditional Owners

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Cell NY111 - NY112: Mambray Mouth to Yatala Harbor

Area: 2,401 hectares

Location: Mambray Mouth to Yatala Harbor. Southern end of Winninowie CP



Land Tenure/Ownership

Private: significant areas of coastal land.

Public: Crown Reserve on the foreshore area. Winninowie Conservation Park (DEW). Unallotted Crown land in the south.

Traditional owners: Nukunu Native Title Determination area.

Landforms

To the south, narrow high-tide beaches are fronted by 1.5km wide bare sand flats that terminate in the mangroves of Yatala Harbour, in the north. The sandy beaches on this predominantly west-facing coastline stretch from Germein Bay up to just south of Yatala Harbor.

The whole of Yatala Harbor embayment is fringed by mangroves, intertidal and supratidal samphire, and saline flats. Mount Grainger and Mount Gullet flank the inlet of Yatala Harbor, a west-facing sheltered embayment that is 4 km wide and is designated an aquatic reserve.

Marine Habitat

Large tracts of bare sand occur near the coast and large expanses of medium to dense seagrass occurs further out to sea. Mangroves dominate in and around Yatala Harbour.

Yatala Harbour is an Aquatic Reserve, to approximately 1 km offshore. Seasonally elevated Gulf water temperatures occur here, supporting marine sub-tropical species.

This area is a sheltered and low-energy coastline.

Native Vegetation

Native vegetation covers 89% (or 2,140 ha) of this Management Unit and 88% of the native vegetation, is saltmarsh complex. This area also features low shrubland on dunes, extensive intertidal and supratidal samphire and mangroves, particularly around Yatala Harbour. There are also some small patches of old-growth mallee with hollows, further inland.

Native vegetation associations include:

Avicennia marina ssp. *marina* low open forest over +/-*Tecticornia* sp., +/-*Sarcocornia quinqueflora* shrubs

Tecticornia halocnemoides ssp., +/-*Tecticornia arbuscula*, +/-*Maireana oppositifolia*, +/-*Frankenia pauciflora* var., +/-*Wilsonia humilis* low shrubland

Maireana oppositifolia, +/-*Tecticornia indica* ssp. low open shrubland over +/-*Disphyma crassifolium* ssp. *clavellatum*, +/-*Frankenia sessilis*

Eucalyptus socialis ssp. +/-*Eucalyptus oleosa* ssp. mallee woodland

Conservation Significance

There are high conservation values here due to species richness and the threatened status of the vegetation communities (1). Vegetation patch size, connectivity and edge to interior ratio are good and there is high habitat value for bushbirds, coastal waders and butterflies (1).

Chenier ridges and intertidal cyanobacterial mats are also recorded in this cell.

Although Caton *et. al.* states that 70-80% of our endemic saltmarsh species are found in this Management Unit, the BDBSA shows only one threatened plant record in this area. This may indicate a paucity of baseline environmental data. However, the Winninowie Conservation Park management Plan and local Biologist Doug Reily have compiled more detailed records for the general area.

Table 80. Species of National and State Conservation Significance (BDBSA records), Mambray Mouth to Yatala Harbor Management Unit

<i>Biota</i>	<i>Common name</i>	<i>Australia (EPBC)</i>	<i>SA (NPW Act)</i>
<i>Animal species</i>			
n/a			
<i>Plant species</i>			
<i>Austrostipa breviglumis</i>	Cane Spear-grass		R
<i>Malacocera gracilis</i>	Slender Soft Horns*		V
<i>Orobanche cernua var. australiana</i>	Australian Broomrape*		R
<i>Santalum spicatum</i>	Sandalwood*		V
<i>Sarcozona bicarinata</i>	Ridged Noon-flower*		V

* From Winninowie Conservation Park Management Plan (occurs within the park).

Management

Winninowie Conservation Park is managed by the Department for Environment and Water. Most of the southern parts of the Unit are privately owned and managed.

Relevant plans

- Nukunu Healthy Country Plan (in progress)
- Winninowie Conservation Park Management Plan (2000).
- Northern and Yorke Regional NRM Plan; Strategic Plan 2019-2029.
- Coastal Motor Vehicle Access Management Strategy (2008) Northern and Yorke Natural Resources Management Region. D. Allen.
- Yorke NRM District Weed Action Plan (2018) Northern and Yorke Natural Resource Management Board.

Recommended Actions

The main threats to the conservation value of this Management Unit are weed invasion, ORV damage and climate change impacts. There is also some illegal dumping in the area.

Climate change

The whole coastline in this area is a Storm Surge Hazard Zone which is likely to experience increased coastal erosion and inundation, with rising sea levels and more frequent storms.

Sea level rise would potentially have major impact on the saltmarsh communities around Yatala Harbour. Dune erosion will be exacerbated by storm surge events in the sandy and shellgrit dunes of this coast. There is potential to facilitate tidal retreat in partnership with landholders.

Access and Recreation Impacts

There is ORV access at the southern end of Winninowie CP and there are excessive tracks which could be rationalised. The unmade coastal scenic road appears as an accessible road on smart phone applications which is misleading and may attract vehicle activity.

Weeds

African Boxthorn (*Lycium ferocissimum*), a WoNS occurs in this area and is particularly dense in patches along the coast near Mt Gullet. Buffel Grass (*Cenchrus ciliaris*) a Declared Weed is

also becoming more common north of Port Pirie and appears to be spreading in the district. Containment and control strategies are required to deal with this established weed infestation.

Other (Foxes and Cats)

Survey data supplied by D. Reilly shows many native species in this area that would be prey to cats and foxes.

Table 81. Recommended Management Actions: Mambray Mouth to Yatala Harbor Management Unit

<i>Issue/Threat</i>	<i>Location</i>	<i>Recommended Action</i>	<i>Priority of Action</i>	<i>Potential Contributors</i>
<i>Climate change impact</i>				
Beach and dune erosion	Dunes and beaches in the southern part of the Management Unit	Monitor beach and dune recession.	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
Storm surge and sea-level rise impact		Strengthen dune integrity with access management, dune stabilisation and revegetation. Involve landholders in planning for future dune breaches and retreat zones.		
Inundation and shoreline recession	Whole Management Unit	Undertake flood and inundation mapping with regard to natural assets of the coast.	High	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
Storm surge and sea-level rise impact		Identify and map suitable areas for allowing tidal retreat and involve landholders in planning for tidal retreat zones and projects. Strengthen natural sand barriers with appropriate coastal shrub revegetation of the foredune.		
<i>Access and recreation</i>				
Vehicle access management - informal and excessive tracks in native vegetation, soil erosion	Western side of Mt Grainger, internal tracks off Chinaman Creek Rd	Reinforce existing barriers to prevent multiple vehicle tracks up the western side of Mt Grainger. Install additional signs reminding that it is a Conservation Park, vegetation is sensitive and fines apply. Also install signs at Miranda.	High	DEW / NRNY, CPB, Council, SAPOL, DPTI, community groups, Traditional Owners, NGOs
<i>Weeds</i>				
Woody (African Boxthorn)	Whole cell	Undertake control as per Declared Weeds and WoNS responsibilities.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional Owners, NGOs
Grasses (Buffel Grass)	Roadsides	Monitor for spread coming from the highway and railways.	High	Landholders, DEW / NRNY, Council, community groups

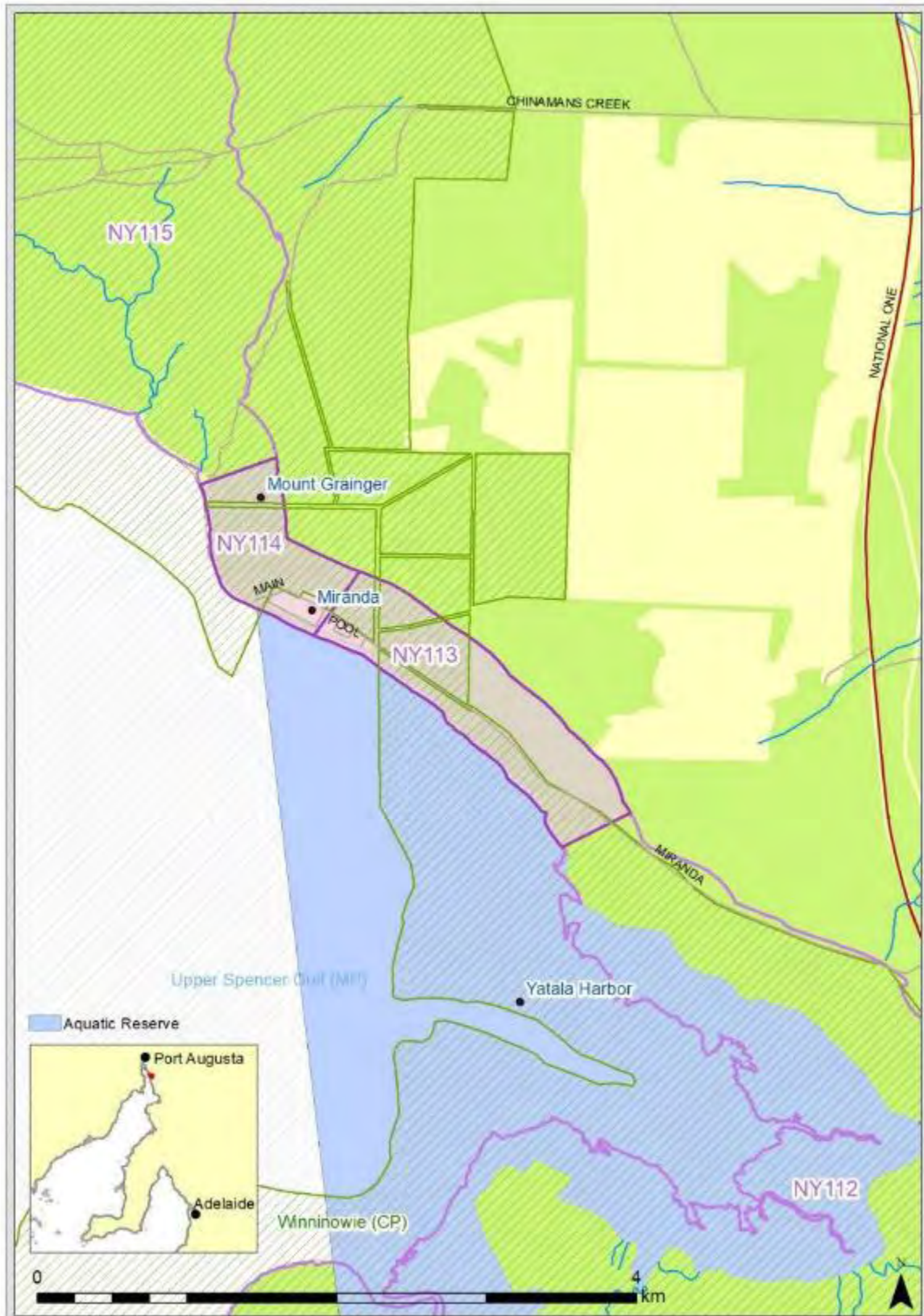
				Traditional, Owners, NGOs
<i>Native vegetation</i>				
Important vegetation - old mallee with hollows.	Mallee woodlands	Support formal conservation covenants such as Heritage Agreements and engage with private landholders regarding vegetation management.	Medium	DEW / NRNY, CPB, Council, community groups, Traditional Owners, NGOs
<i>Feral animals</i>				
Feral animals - predators (cats and foxes)	From Miranda into Winninowie	Engage with local residents to discuss cat management and native wildlife. Undertake fox baiting within Winninowie CP.	High	Landholders, DEW / NRNY, Traditional, Owners, NGOs

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Cells NY113 - NY114: Miranda

Area: 184 hectares

Location: Around the township of Miranda



Land Tenure/Ownership

Private: residential blocks in the township of Miranda

Public: Winninowie CP, Minister for the Environment (DEW)

Council: Port Augusta Council has some park land within the township

Traditional owners: included within the Nukunu Native Title Determination area.

Landforms

This area features narrow, high-tide beaches that are fronted by wide intertidal sand flats. Mt Grainger in the north is a unique landform known as a monadnock as described by D. Reilly (44).

Marine Habitat

The marine environment is dominated by bare sand to 2 kilometres offshore and medium to dense seagrass further seaward. This part of the Upper Spencer Gulf is very sheltered with low-wave energy.

D. Reilly (44) records 6 important seagrass communities and 2 algal communities in this area and highlights the high productivity of the marine environment here.

Native Vegetation

Native vegetation covers 90% (or 165 ha) of this Management Unit.

Vegetation Associations include:

Maireana oppositifolia, *Atriplex paludosa* ssp. *cordata*, *Lycium australe* mid open shrubland,

Eucalyptus porosa+/-*Eucalyptus phenax* ssp. *phenax*+/-*Eucalyptus oleosa* ssp. *ampliata* mid mallee woodland (to the north around Mt Grainger).

Conservation Significance

Although these are small and narrow cells, they also comprise a small section of land that bridges the two sections of Winninowie Conservation Park, which has a very high conservation value.

Few animal or plant records are found in the Biological Database of SA for this small section, however extensive survey work has been undertaken in the Winninowie and Chinaman Creek areas to the north (44).

Table 82. Species of National and State Conservation Significance (BDBSA records), Miranda Management Unit

Biota	Common name	Australia (EPBC)	SA (NPW Act)
Animal species			
n/a (see Winninowie CP Management Plan lists)			
Plant species			
<i>Zostera muelleri</i> ssp. <i>mucronata</i>	Garweed		R

Management

The majority of the unit is within the Winninowie CP and managed by the Department for Environment and Water. Port Augusta Council services the Miranda township.

Relevant plans

- Nukunu Healthy Country Plan (in progress)
- Winninowie Conservation Park Management Plan (2000) Department for Environment and Heritage.
- Northern and Yorke Regional NRM Plan; Strategic Plan 2019-2029.
- Coastal Motor Vehicle Access Management Strategy (2008) Northern and Yorke Natural Resources Management Region. D. Allen.
- Yorke NRM District Weed Action Plan (2018) Northern and Yorke Natural Resource Management Board.

Recommended Actions

The main threat to the conservation value of this Management Unit is invasive weeds (including Buffel grass in both cells). Mt Grainger is impacted by ORV activity and there are identified issues with escaped invasive garden plants and cats emanating from the Miranda township.

Climate change

With sea level rise, there will be some tidal retreat and migration is partly restricted in both cells as agricultural land acts as a barrier to inland migration.

Part of cell 113 has a Storm Surge Hazard Zone, which will experience increased coastal erosion and inundation with rising sea levels.

Access and Recreation Impacts

ORV track damage is damaging the dunes and vegetation around Miranda township, particularly to the east. There are also some beach shacks on the foreshore in Miranda.

Photo: ORV tracks leading up the western side of Mt Grainger



Weeds

African Boxthorn (*Lycium ferocissimum*), a WoNS, is found here. Buffel Grass (*Cenchrus ciliaris*), a Declared Weed, is also becoming more common north of Port Pirie and appears to be spreading. Buffel Grass is a high priority to control in the early stages of invasion. A containment strategy is required for the established infestation in the district.

Feral Predators

Survey data supplied by Doug Reilly (44) shows that foxes and cats are present in this area and there are many native species that would be potential prey to these feral predators.

Table 83. Recommended Management Actions: Miranda Management Unit

<i>Issue/Threat</i>	<i>Location</i>	<i>Recommended Action</i>	<i>Priority of Action</i>	<i>Potential Contributors</i>
<i>Climate change impact</i>				
Significant native vegetation vulnerable to species composition change, compromised structural integrity and reduced regeneration potential (resilience) <i>Temperature and reduced rainfall impact</i>	Mt Grainger and surrounds	Maintain vegetation integrity by minimising disturbance from vehicles, pedestrians, feral animals and weeds. Facilitate regeneration by passive (access management) or active (revegetation) interventions as required. Active management of fire regime in large intact remnants.	<i>High</i>	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
Inundation and shoreline recession <i>Storm surge and sea-level rise impact</i>	Shoreline south of the township	Undertake flood and inundation mapping with regard to natural assets of the coast. Identify and map suitable areas for allowing tidal retreat. Involve landholders in planning for tidal retreat zones and projects. Strengthen natural sand barriers with appropriate coastal shrub revegetation of the foredune. Strengthen artificial barriers in front of beach shacks with coastal shrub revegetation.	<i>Medium</i>	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
<i>Access and recreation</i>				
Vehicle access management - informal and excessive tracks in native vegetation, soil erosion	Western side of Mt Grainger, internal tracks off Chinaman Creek Rd	Reinforce existing barriers to prevent multiple vehicle tracks up the western side of Mt Grainger. Install additional signs reminding that it is a Conservation Park, vegetation is sensitive	<i>High</i>	DEW / NRNY, CPB, Council, SAPOL, DPTI, community groups, Traditional Owners, NGOs

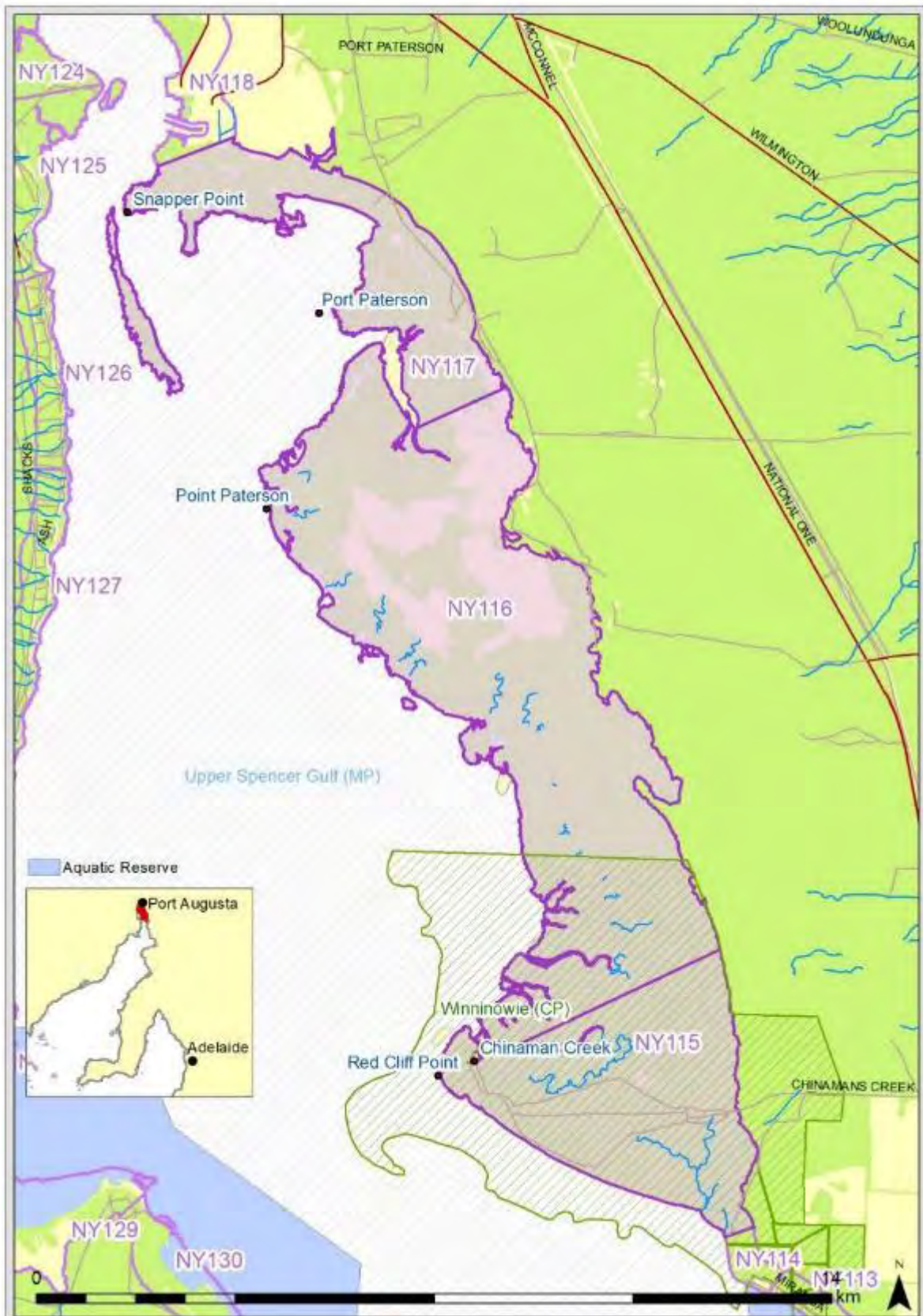
		and fine apply. Also install signs at Miranda.		
Weeds				
Woody (African Boxthorn)	Whole cell	Undertake control as per Declared Weeds and WoNS responsibilities.	Medium	Landholders, DEW / NRNY, Council, community groups, Traditional, Owners NGOs
Grasses (Buffel Grass)	Roadsides	Monitor for spread coming from the highway and railways. Control infestations early to prevent establishment.	High	Landholders, DEW / NRNY, Council, community groups, Traditional, Owners NGOs
Feral animals				
Predators (cats and foxes)	From Miranda into Winninowie	Engage with local residents to discuss cat management and native wildlife. Undertake fox baiting within Winninowie CP.	High	Landholders, DEW / NRNY, Traditional, Owners NGOs
Rabbits	Whole cell	Monitor township and surrounds for rabbit activity. Contact the NRNY to seek advice for control around townships.	Medium	DEW / NRNY, CPB, Council

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Cells NY115 - NY117: Redcliff Point to Point Paterson

Area: 6,378 hectares

Location: Winninowie Conservation Park toward Port Augusta.



Land Tenure/Ownership

Private: large adjacent farmland blocks to the east.

Public: Winninowie Conservation Park (DEW), a narrow coastal strip of unallotted Crown Land fronts the coast north of Winninowie CP.

Other: Generation Lessor Corp at the former power station.

Traditional owners: Partly Nukunu Native Title Determination area.

Landforms

This very low-energy, sheltered section of the Upper Spencer Gulf features sandflats, sandbars, and sandy islands formed through sedimentary aggradation. Much of this area is being colonized by mangroves. Cell 115 features a narrow beach and dune in front of low relict cliffs. The saltmarsh plain in Cell 116 has some intermittently flooded areas and Cell 117 features an intertidal complex (1).

Marine Habitat

The marine environment here, largely influenced by the very sheltered low wave energy waters, is dominated by large areas of mobile sand, interspersed with tracts of mangroves and seagrass.

Cells 115 and 116 have offshore sand islands (Middle Bank and East Banks) and a large sand/shellgrit ridge runs through the mangroves in the north.

This part of the upper Spencer Gulf experiences high summer temperatures and evaporation rates and only a small irregular surface freshwater flow. Thus, this negative or inverse estuary is characterised by hypersaline waters and wide sea temperature extremes. The area contains six seagrass communities and two algal communities (44).

Native Vegetation

Native vegetation covers approximately 86% (or 5,512 ha) of this Management Unit.

72% of Cell 115 is saltmarsh. The rest of the area features dune shrublands, supratidal samphire and low open chenopod shrubland. Supratidal (stranded) mangroves occur near saline groundwater springs at the landward side of the saltmarsh. At the inner edge of the cell, patches of mallee occur.

75% of Cell 116 is saltmarsh. This cell also features intertidal and supratidal samphire, with a mangrove fringe and some mallee patches at inner edge of saltmarsh.

Vegetation Associations include;

Nitraria billardierei +/- *Olearia axillaris* mid open shrubland

Myoporum platycarpum ssp. *platycarpum* low open woodland

Atriplex vesicaria ssp. +/- *Maireana sedifolia* +/- *Maireana pentatropis* low shrubland

Avicennia marina ssp. *marina* low open forest over +/- *Tecticornia* sp., +/- *Sarcocornia quinqueflora* shrubs

Maireana oppositifolia, +/- *Tecticornia indica* ssp. low open shrubland over +/- *Disphyma crassifolium* ssp. *clavellatum*, +/- *Frankenia sessilis*.

Conservation Significance

The Upper Spencer Gulf is known for its high conservation value. Caton *et.al.* document high conservation values for threatened vegetation communities and species, high species

diversity and relatively low weed invasion. There are good habitat values for bush birds, waders and butterflies, and this area is important for migratory and resident birds.

Burne in Caton *et.al.* described significant geological features within the cell including “supratidal springs of saline non-marine groundwater, some of which have isolated mangrove growth, cyanobacterial marshes and gypsum fans. The supratidal plain, mangrove marshes and beach ridges are also important. The whole association is a classic example of a cool water carbonate/ evaporate coastal complex”.

In 1974 Doug Reilly established the Chinaman Creek Research Station which became a centre for marine and terrestrial research. Investigations revealed the environmental significance of the area and its sensitivity to development. The studies showed clearly that this region of the Spencer Gulf is one of the finest examples of subtropical marine and coastal ecosystem in the southern hemisphere and has the richest and most diverse coastal flora in South Australia (44).

Table 84. Species of National and State Conservation Significance (BDBSA records), Redcliff Point to Point Paterson Management Unit

Biota	Common name	Australia (EPBC)	SA (NPW Act)
<i>Animal species</i>			
<i>Arenaria interpres</i>	Ruddy Turnstone		R
<i>Balaenoptera edeni</i>	Bryde's Whale		R
<i>Cladorhynchus leucocephalus</i>	Banded Stilt		V
<i>Egretta garzetta</i>	Little Egret		R
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		R
<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R
<i>Neophema chrysogaster</i>	Orange-bellied Parrot	CR	E
<i>Neophema chrysostoma</i>	Blue-winged Parrot		V
<i>Neophema elegans</i>	Elegant Parrot		R
<i>Neophema petrophila</i>	Rock Parrot		R
<i>Sternula nereis</i>	Fairy Tern	VU	E
<i>Plant species</i>			
<i>Elachanthus glaber</i>	Shiny Elachanth		R
<i>Malacocera gracilis</i>	Slender Soft-horns		V
<i>Orobanche cernua var. australiana</i>	Australian Broomrape		R
<i>Osteocarpum pentapterum</i>	Five-wing Bonefruit		E
<i>Santalum spicatum</i>	Sandalwood		V
<i>Sarcozona bicarinata</i>	Ridged Noon-flower		V
<i>Tecticornia lepidosperma</i>	Slender Samphire		R

Management

Approximately one third of this Management Unit is within Winninowie Conservation Park and is managed by the Department for Environment and Water.

Relevant plans

- Winninowie Conservation Park Management Plan (2000) Department for Environment and Heritage.
- Northern and Yorke Regional NRM Plan; Strategic Plan 2019-2029.
- Coastal Motor Vehicle Access Management Strategy (2008) Northern and Yorke Natural Resources Management Region. D. Allen,
- Yorke NRM District Weed Action Plan (2018) Northern and Yorke Natural Resource Management Board.

Recommended Actions

The main threats to the conservation value of this Management Unit are weed invasion and ORV damage. Improved surveying and monitoring of species would also be of great value for this area to identify where enhanced habitat protection is needed (1).

Climate change

Climate change and associated sea level rise will have major impact on these low-lying saltmarshes. A designated buffer area on the development plan should be considered, to enable migration of the mangrove and samphire species in step with change in the tidal levels. A review of flood banks and other barriers to tidal circulation in this cell is necessary (1).

The whole Management Unit is a Storm Surge Hazard Zone with areas of Potential Drift Hazard Zones, thus there will be an increase in coastal erosion and inundation in this area with rising sea levels, particularly during storm events.

Access and Recreation Impacts

ORV tracks are particularly impacting areas of Cell 117 in the north. There is a dump located close to shoreline approximately 2 km southeast of Redcliff Point.

Weeds

African Boxthorn (*Lycium ferocissimum*), a WoNS has been recorded here and) Buffel Grass (*Cenchrus ciliaris*) a Declared Weed is also becoming more common and appears to be spreading after recent summer rains.

Table 85. Recommended Management Actions: Redcliff Point to Point Paterson Management Unit

Issue/Threat	Location	Recommended Action	Priority of Action	Potential Contributors
<i>Climate change impact</i>				
Inundation and shoreline recession <i>Storm surge and sea-level rise impact</i>	Whole Management Unit	Undertake flood and inundation mapping with regard to natural assets of the coast. Identify and map suitable areas for allowing tidal retreat and involve landholders in planning for tidal retreat zones and projects.	High	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs

		Strengthen natural sand barriers with appropriate coastal shrub revegetation of the foredune where applicable.		
Beach and dune erosion <i>Storm surge and sea-level rise impact</i>	Sand and shellgrit ridges throughout	Monitor beach and dune recession. Strengthen dune integrity with access management, dune stabilisation and revegetation.	Medium	DEW / NRNY, CPB, Council, landholders, community groups, Traditional Owners, NGOs
Access and recreation				
ORV tracks	Northern parts	Formalise tracks, put up signs, close tracks that are inappropriate and revegetate.	Medium	DEW / NRNY, CPB, Council, SAPOL, DPTI, community groups, Traditional Owners, NGOs
Weeds				
Woody (African Boxthorn)	Whole Management Unit	Undertake control in high quality vegetation first. Ensure work is followed up in subsequent years.	High	Landholders, DEW / NRNY, community groups, Traditional Owners, NGOs
Grasses (Buffel Grass)	Roadsides	Monitor for spread coming from the highway and railways.	High	Landholders, DEW / NRNY, DPTI, Council, Traditional Owners, NGOs
Native vegetation				
Vegetation protection	Intertidal zone on private land	Engage with landholders to discuss options for formal protection of the intertidal zone.	Medium	DEW / NRNY, CPB, landholders, community groups, Traditional Owners, NGOs
Feral animals				
Fox and cat predation on native animals and shorebirds	Whole Management Unit	Undertake control as recommended by NRNY and coordinate with neighbours.	High	Landholders, NRNY, Traditional Owners
Pollution				
Potential waste discharge into marine environment	Whole Management Unit	Ensure developments are compliant with all conditions of development approval.	Medium	Port Augusta Council, EPA, DEW / NRNY

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6. PRIORITIES FOR INVESTMENT AND FUNDING

6.1 Prioritising Future Investment

The Caton *et. al.* report contained a comprehensive priority analysis of all 131 Cells based on many variables (M. Royal in Caton *et. al.* 2006), as described in Section 1.2. However, the aggregation of Cells into Management Units for this Plan provides an opportunity to update the ratings and help identify sections of coast requiring the most urgent investment. Since 2006 there has been significant change in the coastal management situation including:

- Climate impacts have become much more visible on the coast and climate adaptation projects are urgently needed,
- Threats such as weeds, development and recreation may have changed in distribution or level of impact,
- Significant work has already been undertaken at some sites (e.g. campsite formalisation on Yorke Peninsula),
- **The 'foot' of Yorke Peninsula is set to become a mainland sanctuary for native mammals under the Great Southern Ark rewilding program.**

Table 1 and Map 2 show a qualitative assessment of priorities for new funding and investment at the Management Unit scale. The highest priority projects are those with high conservation value, high threat values, high exposure to climate impacts and good opportunities for undertaking projects which increase the resilience of the coastline or allow migration of ecosystems.

Those Management Units with a lower priority are still important to work on. They may have had considerable investment in recent years (i.e. formalisation of campgrounds and access management) or may be considered relatively resilient to climate change impacts, but they may still have significant weed or access issues.

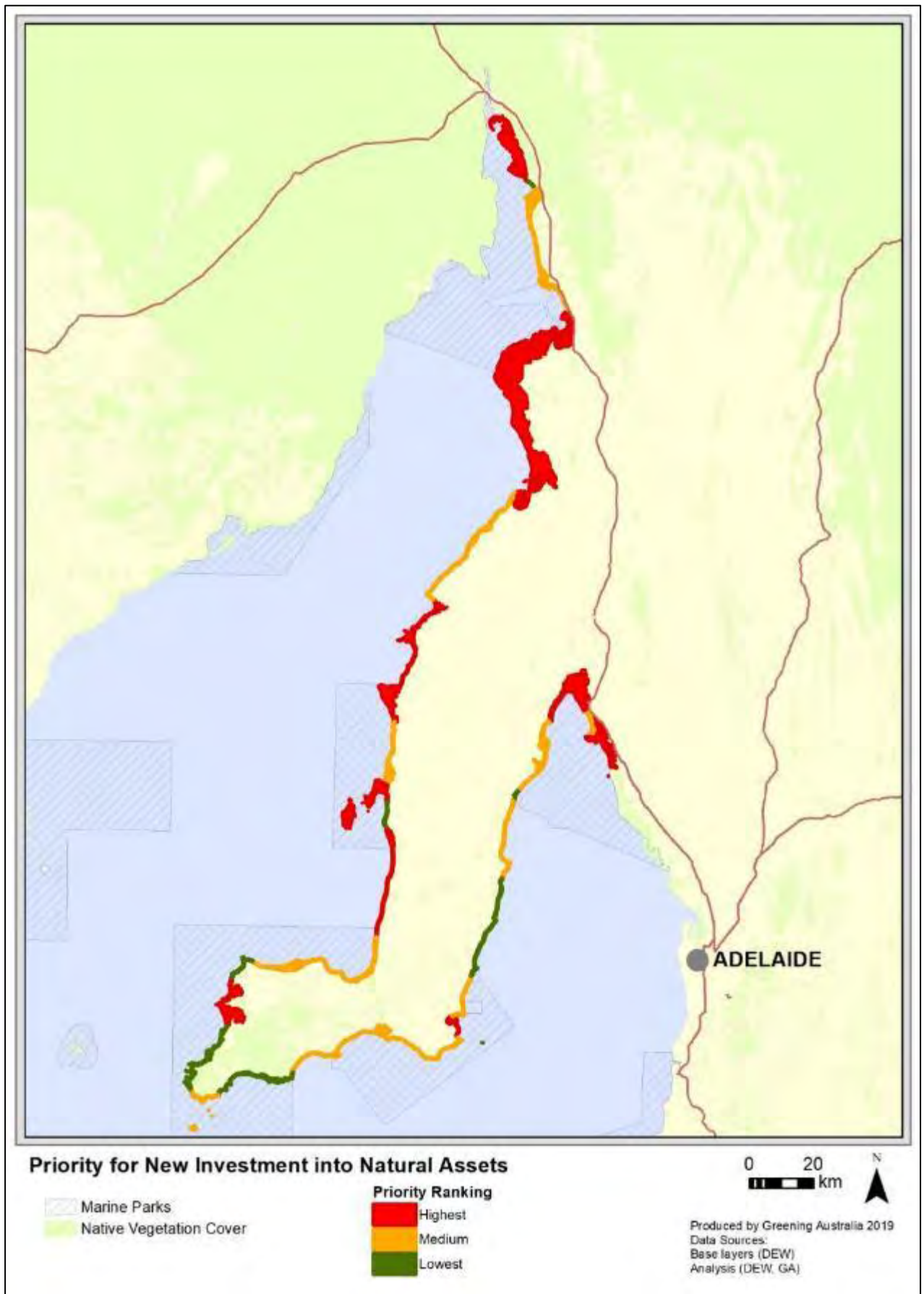
The priority ranking was based on:

- Conservation Priority: aggregated conservation values based on the original Cell assessments by Caton *et.al.* and incorporating any new information (quantitative aspect and qualitative assessment)
- Threat Priority: aggregated threat ratings based on the original Cell assessments by Caton *et.al.* and incorporating any new information (quantitative aspect and qualitative assessment)
- Climate Change Impact: Level of exposure to climate change impacts such as dune and cliff erosion or coastal inundation and storm surges
- Climate Change Opportunity: Potential for management actions to effectively address climate change impacts (e.g. through tidal retreat projects or revegetation to stabilise cliffs).

Table 86: Priority for New Investment by Management Unit

Cell Numbers	Management Unit Name	Priority
NY5,6,7, 8	Lorne to Sandy Point	Highest
NY10, 11, 12	Pt Wakefield to Port Clinton	Highest
NY39	Edithburgh and Coobowie Estuary	Highest
NY71,72,73	Formby Bay, Daly Head, Gleasons to Swincer Rocks	Highest
NY82, 83, 84	Cockle Beach to Wauraltee	Highest
NY86, 87	Point Pearce and Wardang Island	Highest
NY90, 91	Cape Elizabeth to Port Hughes	Highest
NY92, 93, 94	Moonta Bay, Bird Island to Wallaroo	Highest
NY99, 100, 101	Port Broughton to Fisherman Bay	Highest
NY102, 103, 104	Wandearah to Port Davis	Highest
NY105, 106, 107	Port Pirie to Weroona Island	Highest
NY115, 116, 117	Redcliff Point to Point Paterson	Highest
NY9	Bald Hill	Medium
NY13,14,15,16	Wills Creek to Macs Beach	Medium
NY17	Tiddy Widdy to Inkster Well	Medium
NY19	Parara to Rogues Point	Medium
NY20, 21,22,23,24,25	Muloowurtie Point to Port Julia	Medium
NY36, 37, 38	Klein Point to Coobowie	Medium
NY41	Sultana Point	Medium
NY42, 43	Troubridge Point	Medium
NY44,45,46,47	Kemp Bay, Port Moorowie to Sturt Bay	Medium
NY48, 49	Point Davenport to Foul Bay	Medium
NY56,57,58,59	Stenhouse Bay, Althorpe Islands to Reef Head	Medium
NY77, 78, 79	Corny Point to Point Turton	Medium
NY80, 81	Hardwicke Bay to Port Minlacowie	Medium
NY88, 89	Chinaman Wells to The Gap	Medium
NY95, 96, 97, 98	Point Riley, Tickera Bay to Webling Point	Medium
NY108, 109, 110	Port Germein and Baroota	Medium
NY111, 112	Mambray Creek to Yatala Harbor	Medium
NY18	Ardrossan	Lowest
NY26,27,28,29,30,31,32	Port Julia to Port Vincent	Lowest
NY33	Port Vincent	Lowest
NY34	Beach Point	Lowest
NY35	Stansbury	Lowest
NY40	Troubridge Island	Lowest
NY50, 51	Point Yorke to Meehan Hill	Lowest
NY52, 53,54,55	Marion Bay to Stenhouse Bay	Lowest
NY60, 61,62,63,64,65,66,67	West Cape to Browns Beach	Lowest
NY68, 69, 70	Gym Beach to Constance Bay	Lowest
NY74,75,76	Gonzo's, Point Annie to Berry Bay	Lowest
NY85	Port Victoria	Lowest
NY113, 114	Miranda	Lowest

MAP 2



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